

REGIONAL DISTRICT OF NANAIMO

Invitation to Tender 20-037:

BENSON CREEK FALLS REGIONAL PARK

ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

TENDER DOCUMENTS



Prepared for:

Regional District of Nanaimo
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Nanaimo, BC
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Prepared By:

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Nanaimo, BC
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Date: June 12, 2020
Project No. 0837-067

www.heroldengineering.com

Regional District of Nanaimo

20-037: BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

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Regional District of Nanaimo

20-037: BENSON CREEK FALLS REGIONAL PARK

ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

Sealed tenders, clearly marked 'Tender 20-037 Benson Creek Falls Regional Park – Access Improvements, Bridge Replacement and Other Works' will be received by email to ASadeghi@heroldengineering.com on or before 15:00 hours, July 3, 2020. The owner and consultant will not be responsible for any technological delays. Submissions will be opened in private at that time. Tenders will NOT be opened in public; however, unverified results will be distributed to bidders and posted on the RDN website as soon as reasonably practicable.

The project site is located in Benson Creek Regional Park west of Nanaimo, BC. The project site is accessible only by foot traffic via Weigles Road or Jameson Road. The work consists of: supply and installation of aluminum truss pedestrian bridge, construction of cast in place abutments, supply and installation of aluminium staircase, supply and installation of wooden steps on grade, other miscellaneous work and all works incidental thereto as shown on the drawings.

The Tender Documents are available on BC BID and on the Regional District of Nanaimo website <https://www.rdn.bc.ca/current-bid-opportunities>

There is no mandatory site meeting scheduled for this Tender. However, bidders are strongly advised to complete a thorough examination of the project area and familiarized themselves with the works. Work Points have been clearly marked in the field and should be read in conjunction with the project drawings.

Location map with direction to the project site is included in **Appendix A**.

Direct all inquiries, in writing to: Attention:

Ali Sadeghi, P. Eng., Project Manager, Herold Engineering Limited, 3701 Shenton Road, Nanaimo, BC, V9T2H1, Phone 250.751.8558, and e-mail: ASadeghi@heroldengineering.com

Each Tender Form Received from a Bidder must be accompanied by a digital E-Bid Bond in the amount equal to TEN PERCENT (10%) of the TOTAL AMOUNT OF TENDER and a digital Surety's Consent

. Bid Bonds shall be issued on a form approved by the Insurance Bureau of Canada and issued by a Surety acceptable to the Owner. The Successful Bidder will be required to submit a 50% Labour & Materials Bond and a 50% Performance Bond within fourteen (14) days after Notice of Intent to Award the Contract.

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, and the lowest or any tender may not necessarily be accepted. The Owner reserves the right to waive formalities in any Tender as the interests of the Regional District may require without stating reasons therefore.

REGIONAL DISTRICT OF NANAIMO
20-037: BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND
OTHER WORKS
Nanaimo, BC

PART II
INSTRUCTIONS TO TENDERERS

REGIONAL DISTRICT OF NANAIMO
BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

PART II

INSTRUCTIONS TO TENDERERS

ARTICLE 1. TENDER

Tenders, clearly marked 'Tender 20-037 Benson Creek Falls Regional Park – Access Improvements, Bridge Replacement and Other Works' will be received by email to ASadeghi@heroldengineering.com on or before 15:00 hours, **July 3, 2020**. The owner and consultant will not be responsible for any technological delays. Submissions will be opened in private at that time.

ARTICLE 2. NON-MANDATORY BIDDERS MEETING

There is no mandatory site meeting scheduled for this Tender. However, bidders are strongly advised to complete a thorough examination of the project area and familiarized themselves with the works. Work Points have been clearly marked in the field and should be read in conjunction with the project drawings.

Location map with direction to the project site is included in **Appendix A**

ARTICLE 3. SCOPE OF WORK

The scope of work to be carried out for trail improvements and bridge construction consists of but is not necessarily limited to, the following:

- Mobilization and Demobilization
- Public access and site safety management
- Improvement to access trail as deemed necessary by bidders
- Foundation excavation
- Formwork for abutments
- Supply and installation of cast-in-place concrete abutment
- Supply, delivery and erection of aluminum truss footbridge
- Supply and installation of aluminum staircase
- Supply and installation of wooden steps on grade
- Other Miscellaneous works
- Environmental mitigation
- Quality Management

ARTICLE 4. STANDARDS AND SPECIFICATIONS

All work and materials are to be as described in:

- Any specifications referenced on the contract documents or drawings.
- Regional District of Nanaimo Parks and Trails Guidelines

The Standard Construction Contract Document for this project is CCDC 18 as amended by the Supplementary General Conditions.

ARTICLE 5. DEPOSIT FOR CONTRACT DOCUMENTS

There is no cost for the Contract Documents in digital format.

ARTICLE 6. EXAMINE

The Tenderer must carefully examine the Contract Documents and the site of the proposed works, judging for and satisfying themselves as to the probable conditions to be encountered. Should a Tenderer find discrepancies in, or omissions from, the drawings or other documents, or should they be in doubt as to their meaning, they should at once notify the Consultant. The Tenderer may not claim, after the submission of a tender, that there was any misunderstanding with respect to the conditions imposed by the documents.

Although provision is made in the General Conditions for certain unforeseen site conditions, Tenderers shall make allowances in their bids for such conditions as in the sole opinion of the Tenderer are warranted. It is expected that Tenderers will visit the site before tendering and shall satisfy themselves as to the nature and location of the Work, the means of temporary access, and shall obtain all necessary information as to risks, contingencies and circumstances which may affect his/her Tender. The Tenderer is responsible for obtaining all information required for the preparation of the Tender.

The Tenderer's attention is drawn to the Supplementary General and Special Conditions of the documents, which contain any changes or additions to the General Conditions. The Tenderer's attention is also drawn to any addenda, which may be issued prior to the time of tender closure.

No verbal agreement or conversation made or had at any time with any officer, agency, or employee of the Owner or the Consultant shall affect or modify any of the terms or obligations neither herein stated, nor deemed to be any representation or warranty.

ARTICLE 7. ENVIRONMENTAL INFORMATION

An Environmental Management Plan (EMP) is included in **Appendix C**.

The Tenderer is advised that the Regional District of Nanaimo will retain an environmental monitor to assist the successful Contractor in the implementation of EMP.

ARTICLE 8. GEOTECHNICAL INFORMATION

The Tenderer is advised that all the relevant geotechnical information for this project is compiled in the Tetra Tech reports.

The report will be made available in future as an addendum to this tender.

ARTICLE 9. QUERIES/ADDENDA

Direct all questions in writing **only** to **Ali Sadeghi, P.Eng., Project Manager**, Herold Engineering Limited, 3701 Shenton Road, Nanaimo, BC, V9T 2H1 or by email to ASadeghi@heroldengineering.com.

Addenda may be issued during bidding period. All Addenda become part of the Contract Documents. Changes in cost from Addenda items are to be included in the bid price. Verbal answers are only binding when confirmed by written addenda.

Addenda will be posted to BC BID and on the Regional District of Nanaimo website <https://www.rdn.bc.ca/current-bid-opportunities>.

Clarifications requested by Tenderers should be received in writing not less than five (5) days before date set for receipt of Bids.

ARTICLE 10. FORM OF SUBMISSION

Tenders, clearly marked 'Tender 20-037 Benson Creek Falls Regional Park – Access Improvements, Bridge Replacement and Other Works' will be received by email to ASadeghi@heroldengineering.com on or before 15:00 hours, **July 3, 2020**. The owner and consultant will not be responsible for any technological delays. Submissions will be opened in private at that time.

Electronically submitted Tenders will be deemed to be successfully received when the time as posted on the incoming email is at or before the established closing date and time.

It is the Tenderer's sole responsibility to ensure their Tender is received when, where and how it is specified in this document.

ARTICLE 11. SCHEDULE OF COMPLETION

The Regional District of Nanaimo requires that this contract be completed by **November 15, 2020**. The completion date may be extended to address unforeseen circumstances. RDN can not be held responsible financially for any cost to the Tenderer due to project delays.

In-stream work must be planned and implemented around the "work in stream window of least risk" between June 15 to September 15.

A bird breeding season pre-clearing nest survey is required if vegetation removal occurs within nesting season between March 15 to August 15.

ARTICLE 12. TENDER SIGNING

If the Tenderer is an individual, a corporation or a partnership, the Tender shall be executed by the individual or a partner authorized to legally bind the tenderer to the statements made in the Tender.

If the Tenderer is a joint venture, each party to the joint venture shall execute the Tender under seal in the manner appropriate to such party.

ARTICLE 13. QUANTITIES

The quantities inserted against the various items in the Schedule of Quantities and Prices of the Tender Form have been stated for the purpose of comparing tenders on a uniform basis, but it must be distinctly understood that any quantities shown in the said Schedule are approximate only and that neither the Owner nor the Consultant expressly or by implication represent that the actual quantities will even approximately correspond therewith.

No variation in the quantities actually handled shall give rise to any claim against the Owner or the Consultant.

ARTICLE 14. TENDER PRICE

Unit and lump sum prices shall be filled in where indicated in the Schedule of Quantities and Prices of the Tender Form. The unit prices shall be extended in accordance with the quantities shown and the extensions shall be inserted in the space provided. The total tender must be an accurate extension of the unit and lump sum prices submitted and the quantities shown. All pricing is to be in Canadian Dollars.

In the event of a discrepancy between the unit prices and extended totals, the unit prices will govern and the Consultant will correct the extended totals accordingly.

In the event of a discrepancy between a maximum allowable lump sum price and the submitted lump sum price, the maximum allowable price shall govern and the Consultant will correct the price and extend totals

accordingly. The prices tendered shall include the supply of all materials except those specified to be supplied by others, all supervision, labor and equipment and a provision for overhead and profit, and shall represent the entire cost to the Owner for the completed works as specified and shown on the drawings. All costs to prepare a Tender shall be borne solely by the Tenderer.

ARTICLE 15. FEES FOR CHANGES IN WORK

Unless otherwise agreed between Owner and Contractor, the allowance for overhead and profit for the payment for approved COST PLUS WORK shall be calculated as follows:

1. For Contractor, for overhead and profit, 10% of the actual cost of the Contractors work.
2. For Contractor, for overhead and profit, 5% of the amount for Subcontractor's work, being the actual costs of the subcontractors work plus the amount set out in .3 below.
3. For Subcontractor, for overhead and profit, 10% of the actual cost of the Subcontractor's work.

ARTICLE 16. LIST OF SUBCONTRACTORS

The Tenderer must indicate, in the List of Subcontractors in the Tender Form, the names of all subcontractors he proposes to employ on the work. Subcontractors shall not be changed or additional subcontractors employed without the written authorization of the Consultant. Failure to submit a complete list may result in the Tender being considered incomplete.

ARTICLE 17. SCHEDULE OF FORCE ACCOUNT RATES

The Tenderer must indicate, in the Schedule of Force Account Rates of the Tender Form, all personnel and equipment hourly rates likely to be used on the project. All equipment rates are to be in line with the current 'Blue Book' rates.

These rates will form the basis for payment for force account work carried out in accordance with the General Conditions. Failure to adequately complete the schedule may result in the Tender being considered incomplete.

ARTICLE 18. LIST OF MANUFACTURERS AND SUPPLIERS

The Tenderer must indicate in the List of Manufacturers and Suppliers in the Tender Form, the manufacturer or product brand name of the items listed together with the name of the supplier or distributor from which each item will be purchased.

Where more than one supplier or manufacturer is listed or specified, the name of the selected supplier or manufacturer shall be inserted. Manufacturers and suppliers will not be changed from those shown in the Tender Form without the written authorization of the Consultant. Failure to complete the list may result in the Tender being considered incomplete.

ARTICLE 19. PROPOSED ALTERNATE MATERIALS

The Tenderer may propose to use materials other than that specified or shown on the drawings by providing the required information in the list of Proposed Alternate Materials in the Tender Form. Evaluation of proposed alternate materials will be made by the Owner following the closing of tenders. However, the Total amount of Tender must be based on the use of specified materials.

ARTICLE 20. SECURITY REQUIREMENTS

Bid Bonds:

The Tender must be accompanied by a digital E-Bid Bond in an amount **not less than ten percent (10%) of the Tender Price**. The digital E-Bid Bond must be issued by a surety company

licensed to conduct business in the province or territory wherein the work is located, and must be accompanied with a digital Surety's Consent. The Bid Bond must be a digital E-Bid Bond only, no photocopied or scanned copies of the bond are permissible. Failure to comply will result in an incomplete submission.

If the successful Tenderer fails for any reason to execute the Contract Agreement and to provide the surety bonds stipulated in the General Conditions within the time agreed to in the Tender Form, and such extension of time as may be granted by the Owner, that portion of his Bid Bond will be forfeited to and retained by the Owner in the amount of the difference in money between the Total Tender and the amount for which the Owner may legally contract with another party to perform the work, if the latter amount be in excess of the former.

The Bid Bonds submitted by unsuccessful Tenderers will be returned to them as soon as the successful Tenderer has delivered to the Owner a fully executed Performance Bond for the Work or the period for which tenders are irrevocable has elapsed, whichever shall first happen.

Labour and Material Payment Bonds and Performance Bonds:

The successful Tenderer shall provide a digital or original paper Performance Bond and a digital or original paper Labour and Material Payment Bond each in the amount of FIFTY PERCENT (50%) of the CONTRACT PRICE.

These bonds must be provided within fourteen (14) days of contract award and must be maintained in good standing until the fulfilment of the Contract, including the requirements of the Warranty provided for in GC 12.3 - Warranty and the payment of all obligations arising under the Contract. Should the successful Tenderer fail to provide these required bonds; the Bid Bond may be forfeited.

All such bonds shall be issued on a form approved by the Insurance Bureau of Canada and issued by a Surety acceptable to the Owner.

The costs attributed to providing such bonds shall be included in the Total Amount of Tender. The obligee on the bonds must be the Owner.

Submit with the Tender and digital Bid bond, a digital "Consent of Surety" stating that the Surety is willing to supply the Performance and Labour and Material Payment Bonds required.

The Bid Bond and Surety's Consent must be submitted in digital format and must meet the following criteria:

1. The version submitted by the Tenderer must be verifiable by the Owner with respect to the totality and wholeness of the bond form, including: the content; all digital signatures; all digital seals; with the Surety Company, or an approved verification service provider of the Surety Company.
2. The version submitted must be viewable, printable and storable in standard electronic file formats acceptable to the Owner, and in a single file. Format should be pdf.
3. The verification may be conducted by the Owner immediately or at any time during the life of the bond and at the discretion of the Owner with no requirement for passwords or fees.
4. The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding Item 1.1

Bonds failing the verification process will NOT be considered to be valid and the bid will be rejected.

Bonds passing the verification process will be treated as original and authentic.

ARTICLE 21. TENDER WITHDRAWAL

A Tenderer may, without prejudice to himself, withdraw his tender on written request received by the Consultant (Ali Sadeghi, Herold Engineering) any time prior to the time set for the closing of tenders.

ARTICLE 22. REVISIONS TO TENDER

Any revision to the tender by the Tenderer must be in writing by letter, properly executed, and received by the Consultant (Ali Sadeghi, Herold Engineering) at the closing location before the closing time.

1. Email

Email revisions must be received as a new email by the Consultant (Ali Sadeghi, Herold Engineering) prior to the established closing time. The Tenderer assumes all responsibility for the timely and effective delivery of any emailed revision.

The revision must substantially comply with the following requirements:

- a. state the tender number and description;
- b. state the closing time; and,
- c. state the amount by which the tender is to be increased or decreased AND the increase or decrease to each unit price affected.

2. Amount of Bid Bond

The Tenderer must ensure that the total amount of the Bid Bond is not less than ten percent (10%) of the total tender price. The Tenderer should consider the effect of revisions on the tender price and the bid bond requirements.

3. Multiple Revisions

Where a Tenderer submits multiple revisions to the original tender price, each revision should be numbered sequentially by the Tenderer. Unless the Tenderer clearly stipulates to the contrary on the face of the revision, each successive revision will nullify and replace any previous revision to the identified item or tender price.

4. Unclear or Ambiguous Revisions

If in the opinion of the Owner or Consultant, any revision is unclear, ambiguous as to meaning or intent, or does not comply with the requirements of Article 14, that revision will be disregarded and the original tender price, or the tender price determined by consideration of any other revisions will prevail.

The Owner or Consultant, their employees and agents will not assume any responsibility for timely receipt of any revisions.

ARTICLE 23. TENDER REJECTION

The Owner reserves the right to reject any or all tenders; the lowest bid will not necessarily be accepted.

Without limiting the generality of the foregoing, any tender may be disqualified or rejected which is incomplete, obscure or irregular, which has erasures or corrections in the Tender Form, which has prices

that are omitted or are unbalanced, which contains an escalator clause or other qualifying conditions or has an insufficient or irregular Surety.

A tender shall also be rejected if there is any evidence that the Tenderer has any legal connection with any other company, firm or person submitting a tender for this work, any knowledge of the tender prices to be submitted for this work by others, or any undisclosed connection or arrangement with any other company, firm, or person having a financial interest in the proposed Contract.

The Owner reserves the right to reject any or all tenders, to accept the tender deemed most favourable in the interests of the Owner, and to re-issue the tender with the same or different terms. Acceptance of any tender is based on the availability of adequate funds to the Owner and regulatory approvals.

ARTICLE 24. AWARD

Preference will be given to tenders that give the greatest value based on quality, service and price.

The Owner will, upon selection of an acceptable tender, issue in writing a Notice of Intent to Award to the Tenderer. This notice will be given as soon as possible following the closing of tenders and, unless otherwise agreed to by the Tenderer, not later than sixty (60) days following the closing of tenders.

ARTICLE 25. WORKSAFE BC AND SAFETY

1. The Tenderer is advised that the workplace may have the following known operations and/or site conditions that could present a potential hazard to workers and other persons at the workplace.

Other hazards may exist, such as:

Excavations	Tree Removal
Remote Site	Overhead hazard (trees)
Wildlife interaction	Steep terrain

2. The successful Tenderer will be designated as the Prime Contractor and must be qualified and willing to undertake the role and shall fulfill the **Prime Contractor** responsibilities as defined in
 - a. *WorkSafeBC Occupational Health and Safety Regulation*, Notice of project, Section 20.2, and Coordination of multiple employer workplaces, Section 20.3;
 - b. *Workers Compensation Act* (BC), Coordination at multiple-employer workplaces, Section 118, Subsections (1) & (2); and
 - c. General Requirements, Section 3.10 WorkSafe BC.
3. The Prime Contractor will be required to coordinate the safety of all workers on the work site, including their employees, their subcontractors, Regional District, work crews and their contractors, and private utilities, (BC Hydro, Telus and Shaw). Prior to commencing work, the successful Tenderer will be required to forward a copy of their current OH&S Safety Program document, WorkSafeBC Notice of Project, and WorkSafeBC Clearance Letter.

ARTICLE 26. TESTING

The Regional District of Nanaimo will employ a Materials Testing Consultant during the work to test all work and materials deemed necessary and determine whether they are in accordance with the Specifications. The Contractor shall coordinate his work with the Consultant to ensure that the testing is done efficiently and no delays are caused.

ARTICLE 27. DFO PERMITTING

Submission of The Request for Review for the Department of Fisheries and Oceans is not required for this project. Section 11 notification confirmation is included in **Appendix E**.

ARTICLE 28. TRANSPORTATION

Transportation of materials, machinery, crews, etc. to and from the project site is the sole responsibility of the Successful Bidder. The project sites are not road accessible and Bidders must give consideration to safe and cost-effective material transportation to and from the site.

ARTICLE 29. COVID 19

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 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.

ARTICLE 30. No Claim for Compensation

Except as expressly and specifically permitted in these Instructions to Tenderers, no Tenderer shall have any claim for any compensation of any kind whatsoever, as a result of participating in the tender, and by submitting a bid each Tenderer shall be deemed to have agreed that it has no claim.

ARTICLE 31. Solicitation of Board Members

If a member of the Board, or a person who was a member of the Board in the previous six months has a direct or indirect interest in the contract, then the Tenderer shall report this to the REGIONAL DISTRICT in accordance with Section 107 of the *Community Charter* upon being notified of the award of the contract. The Tenderer warrants and represents that it has not received any information or a record from any Board member or former Board member contrary to Section 108 of the *Community Charter*.

ARTICLE 32. Freedom of Information and Protection of Privacy Act

All documents submitted to the REGIONAL DISTRICT will be held in confidence by the REGIONAL DISTRICT, subject to the provisions of the Province of British Columbia's *Freedom of Information and Protection of Privacy Act*. Unverified bid results and the successful vendor and value of the award is routinely released.

ARTICLE 33. Ownership of Tenders

All Tenders, including any attachments and other documentation, submitted to and accepted by the RDN in response to this Tender become the property of the RDN.

ARTICLE 34. Litigation Clause

The RDN may, in its absolute discretion, reject a Proposal submitted by Proponent, if the Proponent, or any officer or director of the Proponent 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 Call for Proposals.

In determining whether to reject a Proposal under this clause, the RDN will consider whether the litigation is likely to affect the Proponent's ability to work with the RDN, its consultants and representatives and whether the RDN's experience with the Proponent 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 Proponent.

REGIONAL DISTRICT OF NANAIMO
20-037: BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT
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PART III

SUPPLEMENTARY GENERAL AND SPECIAL CONDITIONS

REGIONAL DISTRICT OF NANAIMO
BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS
Nanaimo, BC

PART III

SUPPLEMENTARY GENERAL AND SPECIAL CONDITIONS

1. Supplementary General Conditions.....	SC2
2. Special Conditions	SC4
3. Pay Item Descriptions (For all Scheduled Works).....	SC7

1. SUPPLEMENTARY GENERAL CONDITIONS

1. General

These Supplementary Conditions shall be read in conjunction with the General Conditions of the Contract and shall govern over them.

The Standard Construction Contract Document for the project is CCDC 18.

2. Article A-2 Agreements and Amendments

Add paragraph 2.3:

Counterpart:

This 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.

3. GC 1.1 Contract Documents

a) **Replace** 1.1.7 with:

1.1.7 If there is a conflict within the Contract Documents:

- .1 The order of priority of documents, from highest to lowest, shall be
 - . the Agreement between the Owner and the Contractor,
 - . the Definitions,
 - . Supplementary Conditions,
 - . the Tender Documents,
 - . the Drawings,
 - . Technical Specifications,
 - . the General Conditions,
 - . Material and finishing schedules.

b) Paragraph 1.1.9 after the words are and shall remain in the first sentence, **add** 'as between the Engineer and the Contractor'

4. GC 1.4 Assignment

After neither party to the Contract shall assign the Contract or a portion thereof without the written consent of the other, **delete** '*which consent shall not be unreasonably withheld.*'

5. GC 3.5 Construction Schedule

Revise clause 3.5.1.2 to include "and submit to the Owner and Consultant in PDF format and native file format."

6. GC 3.7 Layout of The Work

The Contractor will be responsible for the project layout. Temporary bench marks and digital AutoCAD files will be provided by the Owner. The Contractor must satisfy himself before commencing any work as to the meaning and correctness of all stakes and marks, and no claim will be entertained by the Owner for or on account of any alleged inaccuracies, unless the Contractor notified the Consultant of such inaccuracies in writing before commencing the Work.

The Contractor shall assume full responsibility for alignment, elevations, and dimensions of all parts of the Work, regardless of whether the Contractor's work has been checked by the Consultant.

7. GC 3.12 Use of the Work

Add paragraph 3.12.3: The Contractor shall maintain the place of Work in a tidy condition and free from accumulation of debris. Waste material must be promptly removed from site.

8. GC 5.5 Applications for Progress Payment

Add paragraph 5.5.7: With each and every application for payment after the first progress payment, a Statutory Declaration on CCDC 9A-2001 Form shall be completed and sworn before a Notary Public or a Commissioner of Oaths for the Province of British Columbia.

9. GC 5.6 Progress Payment

Revise clause GC 5.6.2 as follows:

The Owner will, within Thirty (30) days of the date of the Consultant's Certificate, make Agreement. The actual amount paid is subject to the Owner's rights under law or this Contract to make deductions. Payment to the Contractor on account in accordance with the provisions of Article A-5 of the agreement. The actual amount paid is subject to the Owner's rights under law or this Contract to make deductions.

Add paragraph 5.6.4: Before any payment is made by the Owner to the Contractor, the Consultant or the Owner may by written notice, require that the Contractor furnish such further detailed information as the Consultant or the Owner may determine is necessary to establish compliance by the Contractor with the Contract Documents.

10. GC 5.7 Substantial Performance Of Work

Add paragraph 5.7.1.1: There will be no progressive Substantial Performance of Portions of the Work.

11. GC 5.9 Progressive Release Of Holdback

Paragraph 5.9.1: **Delete** entire paragraph **and replace** with the following: *'There will be no progressive release of holdback funds.'*

12. GC 5.13 Interest

Add GC 5.13: Notwithstanding the provisions of Article A-5 PAYMENT, paragraph 5.3, the Owner is not liable to pay interest on any amount which may at any time become payable to the Contractor under this Contract whether or not the payment is in default and whether or not any action or other proceeding has been commenced in respect thereof.

13. GC 6.7 Quantity Variations

Delete entire section.

2. SPECIAL CONDITIONS

1. Scope of Work

The scope of work to be carried out for trail improvements and bridge construction, consists of but is not necessarily limited to, the following:

- Mobilization and Demobilization
- Public access and site safety management
- Improvement to access trail as deemed necessary by bidders
- Foundation excavation
- Formwork for abutments
- Supply and installation of cast-in-place concrete abutment
- Supply, delivery and erection of aluminum truss footbridge
- Supply and installation of aluminum staircase
- Supply and installation of wooden steps on grade
- Other Miscellaneous works
- Environmental mitigation
- Quality Management

2. Herold Engineering (HEL) – Consultant

Herold Engineering acting on behalf of the Regional District of Nanaimo will provide Contract Administration and Construction Field Review services.

3. Materials

All material for the project to meet the requirements as specified and shown on the drawings.

4. Meetings

In addition to a pre-construction meeting with the HEL staff, regular weekly meetings will be held to discuss project progress and address any scope of work updates. The meeting frequency may be adjusted based on project progress and work happening at that time. The meeting location will be at the project site.

5. Slope Stability

The project site is characterized by steep slopes. At the minimum, the Contractor shall adhere to the following guidelines:

- Concrete footings should be placed as soon as possible after excavation.
- The soil exposed for construction of footings should be kept dry during excavation and prior to footing construction to prevent loosening of the soil.
- Excavation and footings work should be done during a forecasted period of dry weather, when the groundwater table is lower and there is less chance of a rainfall event while the excavations are exposed.
- Avoid exposing and working with silt bearing surfaces during periods of rainfall. Excavations should be exposed for a minimum period of time during a window of minimal precipitation.
- The Contractor must develop a site-specific safe work procedure, prepared by a qualified person. It is expected that this would involve work shutdowns in periods of heavy rainfall and other procedures to mitigate risks associated with the steep slopes. This plan must be approved by RDN and its representative before the commencement of works.

- Contractors are to observe the recommendation as stated in the Tetra Tech Geotechnical report.

6. Public Access

The project sites will be closed to the public for the duration of the works and the Contractor is not required to accommodate public traffic access within the Construction area. The Contractor shall be responsible for supplying, installing and maintaining all necessary signing, flagging and other such warning or traffic control devices for the safety of the public within the construction zone or as determined by the Consultant. The Contractor is expected to regularly inspect and monitor their work site to ensure public safety, workers safety and security. Record of the inspection shall be kept for owner's review.

A Public Access Plan is to be submitted for approval prior to the pre-construction meeting.

7. Hours of Work

Hours of work for the project shall be limited to between 6 AM and 7 PM, Monday to Friday. Requests for exemptions will be considered based on scheduling requirements.

8. Site Security

The Contractor shall be solely responsible for site security and shall provide all the means necessary or desirable for security and protection of the work site, all materials, supplies, tools and equipment and all other improvements, whether or not incorporated into the work.

9. Access Improvement

It is the Contractors responsibility to review and assess the existing trail and access road to ensure it meets their requirements to complete the project. No alteration to trail alignment is anticipated nor allowed without written permission by the Regional District of Nanaimo and the Consultant.

10. Protection of Existing Trail

The Contractor is cautioned that any damage done to the trail wearing surface, such as scoring, teeth marks, track marks, etc., shall be completely reinstated in a manner acceptable to the Consultant and Regional District of Nanaimo and no extra payment shall be made.

11. Tree Protection

The trees within the project area that are not being removed will require protection. Care is to be taken when working around these trees and the cutting of any roots. It's estimated that a maximum of two (2d) trees within the project area will require removal. Any Regional District of Nanaimo bylaws related to working around trees apply, unless otherwise advised by the District or the Environmental Monitor.

Tree protection measures are to be to the satisfaction of the Environmental Monitor.

12. Record Drawings

- a. Contractor to maintain a complete set of 'redline' record drawings for the duration of the project.
- b. Drawings shall include all information as specified elsewhere for the construction drawings, but shall be corrected upon completion of construction to note all works removed or abandoned during construction. This information shall be retained in a digital point file.

- c. All dimensions, elevations and inverts shown shall reflect the As-Built conditions of the construction and all references to "Proposed" shall be removed. As-Built drawings shall be to scale in accordance with the As-Built dimensions shown. The Revision Table shall be completed indicating the drawings are As-Built. All changes and notes marked in "red ink" on the IFC drawings.
- d. All As-Built features shall be surveyed and survey points recorded in a digital point file with all changes marked on the IFC drawings in red ink. The As-Built drawing shall reflect the true elevation and location of all constructed features, in both the plan and profile views.

13. Construction Survey Layout

The Contractor is to provide all necessary construction layout. The Consultant will supply the Contractor with the necessary survey control points and AutoCAD base plan digital files to enable the Contractor to control the final layout of the work. The Contractor shall be responsible for the conformance of the finished work to this data even though it may be checked by the Consultant. Any known or suspected discrepancies or deviations from the plans are to be reported immediately to the Consultant.

14. Environmental Mitigation

Environmental Mitigation measures must be in accordance with Benson Creek Fall Regional Park Environmental Impact and Remediation Assessment & Environmental Protection Plan by Aquaparian Environmental Consulting Ltd., included in **Appendix C**.

Contractor shall develop a detailed Sediment and Erosion Control Plan which will identify contingency measures and emergency procedures suitable to the method of construction and procedures deemed necessary to complete the works. The Erosion plan will be reviewed by RDN and Project Environmental Consultant prior to the commencement of works.

15. Fire Protection

The Contractor shall take every precaution to prevent an unintentional fire from occurring on or about the work site. The following conditions in respect to fire protection shall be followed:

- a. No burning of any debris on or about the work site unless authorized by RDN, Ministry of Forest, Lands and Natural Resource Development, and BC Wildfire services.
- b. No smoking on or about the work site.

16. Wild Fire Act and Wildfire Regulation

The Contractor, employees, and subcontractors work operations must comply with the BC Wildfire Act and Wildfire Regulations. This includes wildfire hazard assessment and abatement during "high risk" activities as defined by the BC Wildfire Regulations. It's the Contractor's responsibility to review and understand the Act and Regulation and take steps to ensure compliance.

3. PAY ITEM DESCRIPTIONS (FOR ALL SCHEDULED WORKS)

1. General Requirements

1. Mobilization and Demobilization

Mobilization includes, but is not limited to, the movement of necessary personnel, equipment, supplies and incidentals to the work site, to commence the Project and for associated costs which must be performed in order to commence the Project.

No payment for Mobilization will be made until the value of the Work completed on bid items other than Mobilization exceeds 10% of the total tender price. When the amount bid for Mobilization exceeds 10% of the original Total Tender amount, the Owner will withhold the portion in excess of 10% of the original Total Tender until the date of Construction Completion.

The total amount bid for Mobilization will be paid only once, regardless of the number of times the Contractor mobilizes to the Site.

Payment for demobilization is included in the total bid amount for Mobilization and there will be no separate or additional payment made for demobilization.

2. Project Layout

This item is for all of the Contractor's costs related to the survey layout item required for the construction of the bridge and any other items required to complete the work. The Consultant will provide digital layout information. Payment will be made at the lump sum amount tendered for this item.

3. Public Access Plan and Site Security

This item is for all costs associated with the preparation of the Public Access Plan, control of public traffic as required for the work, as outlined in Item 6 of the Special Conditions of the Contract.

Payment will be made at the lump sum amount tendered for this item.

4. Environmental Mitigation

Payment for Environmental Mitigation will be made at the lump sum price as shown in the Tender Form. The price shall include all work incidental thereto for the implementation of the recommendations in the Benson Creek Fall Regional Park Environmental Impact and Remediation Assessment & Environmental Protection Plan by Aquaparian Environmental Consulting Ltd., included in the **Appendix C**. The Contractor will be required to maintain the works until Total Performance of the Contractor as directed by the environmental consultant.

2. Bridge Construction

The scope of the work to be carried out for bridge construction and included in the lump sum items generally consist of, but are not necessarily limited to, the following (as shown on the drawings) as outlined in items 2.1.

- Mobilization and Demobilization
- Construction of Cast-in-Place Concrete slab foundation and Ballast Wall
- Supply of Aluminum Truss and Bracing

- Supply of aluminum Gradating Planks
- Supply Timber Elements for the Railing
- Installation of aluminum structure and elements
- Supply and installation of all temporary forming, falsework and lifting assembly as deemed necessary by Contractor

The Contractor shall submit a detailed erection procedure to the Consultant for review and acceptance a minimum of 4 weeks in advance of erection. The erection procedure shall include drawings and supporting documents necessary to erect and install the bridge.

Payment will be made at a Lump Sum Price Bid for the items listed in the Tender Form. Progress payment will be made monthly, based on percentage of work completed, and materials and fabricated-components delivered to the site and incorporated in the works. Progress claims shall be submitted in sufficient detail to outline work complete and components on site.

3. Aluminum Stairs

The Contractor will be required to supply and install an aluminum staircase with the following features:

- Approximately 6 lineal meters including landing (WP4).
- Approximately 18 lineal meters including landings (WP12).
- Aluminum C channel stringers.
- Aluminum grating.
- Aluminum and cedar (red or yellow) handrails.
- Concrete pier footings.
- See drawings (**Appendix B**) for more detailed information

It is the Contractors responsibility to verify all dimensions and elevations prior to fabrication and construction of aluminum stairs.

Changes to foundation may be required following project geotechnical engineer's field review.

Payment for Aluminum Stairs will be made per lineal metre as shown in the Tender Form. This price shall include the supply of all materials, labor and equipment to completed works as specified and shown on the drawings.

4. Wooden Steps on Grade

The Contractor will be required to supply and install wooden steps on grade with the following features:

- Approximately 35 lineal meters (various locations).
- Cedar (red or yellow) riser ties and decking.
- Rebar pins into subgrade.
- Expanded aluminum traction strips across the steps.
- See drawings (**Appendix B**) for more detailed information.

Payment for Wooden Steps on Grade will be made at the unit rate basis per lineal metre as shown in the Tender Form. This price shall include the supply of all materials, labor and equipment to completed works as specified and shown on the drawings.

5. Miscellaneous Work

1. Crib Step Delineator

Payment for supply and installation of Crib Step Delineator as specified in the drawings will be made at per lineal metre as shown in the Tender Form. The prices shall include the supply of all materials, labor and equipment to completed works as specified and shown on the drawings.

2. Trail Erosion Repair

Payment for supply and installation of riprap (Class 10), non-woven geotextile and granular trail surfacing as specified in the drawings will be made at per metre as shown in the Tender Form.

The prices shall include the supply of all materials, labor and equipment to completed works as specified and shown on the drawings

3. Tree Removal

A maximum two (2) trees have been identified in the project area that may require removal.

Payment for removal of these trees will be made at the lump sum price as shown in the Tender Form. The price shall include all work incidental thereto for the cutting of trees, clearing and safely placing trees off the trail within the project area.

The trees are to remain on site to decompose naturally.

4. Trail Widening

Payment for trail construction, widening and improvement at various location to RDN Trail Type 3 Standard and as specified in Regional District of Nanaimo Parks and Trails Guidelines – January 2014 will be made per lineal metre as shown in the Tender Form.

The prices shall include the supply of all labor and equipment to completed works as specified and shown on the drawings

5. Cedar Split Rail Fence

Payment for supply and installation of Cedar Split Rail Fence as specified in the drawings will be made at per lineal metre as shown in the Tender Form.

The prices shall include the supply of all materials, labor and equipment to completed works as specified and shown on the drawings

4. STANDARD SPECIFICATIONS

Any specifications referenced on the contract documents or drawings.

Regional District of Nanaimo Parks and Trails Guidelines - January 2014.

REGIONAL DISTRICT OF NANAIMO
20-037: BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT
AND OTHER WORKS

Nanaimo, BC

PART IV

CIVIL WORKS CONTRACT
CCDC 18

REGIONAL DISTRICT OF NANAIMO
20-037: BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT
AND OTHER WORKS

Nanaimo, BC

PART V

TENDER FORM, CCDC 18 UNIT PRICE CONTRACT

REGIONAL DISTRICT OF NANAIMO
BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

PART V

TENDER FORM

The undersigned Tenderer, having carefully examined the Contract Documents and the locality of the proposed work, and having full knowledge of the work required and of the materials to be furnished and used, hereby agrees to provide all necessary materials, supervision, labour, and equipment and to perform and complete all work and fulfil everything as set forth and in strict accordance with the Contract Documents and Addenda numbered _____* for the prices stated in the Tender Form Schedule of Quantities and Prices.

The undersigned also agrees:

1. That the Instructions to Tenderers form part of this tender and agrees to be bound by the requirements set forth in the Instructions to Tenderers.
2. That the Owner is not bound to accept the lowest or any tender.
3. That this tender is irrevocable for sixty (60) days after the closing date for receipt of tenders and that the Owner may at any time within such period accept this tender whether any other tender has previously been accepted or not.
4. To commence and proceed actively with the work after Notice to Proceed is received, and to attain Substantial Performance, as defined by the Builders Lien Act, subject to the provisions of the General Conditions for extension of Contract time.
5. To do all extra work not reasonably inferable from the specifications or drawings but called for in writing by the Consultant and to accept as full compensation therefore payment in accordance with the provisions of the General Conditions.
6. That the estimates of quantities shown in the Tender Form are estimates only for the purpose of comparing tenders on a uniform basis and that neither the Owner nor the Consultant represent that the actual quantities will correspond therewith and that we will be paid at the tendered unit prices for the actual quantities handled.
7. That the Owner may delete from the Contract a portion or portions of the Work without any change in the unit prices provided such deletion is not for the purpose of allowing someone else to perform the deleted portion during the Contract Time.

* To be Completed by Tenderer

Name of Contractor

Business Address

City, Postal Code

Date

Phone No.

Total Amount of Tender \$ _____

Signature of Authorized Representative

The above tendered sum **includes all taxes**, duties and any other additional charges on any or all material, equipment and labour, and it is understood that payment will be made for the completion of all work specified in this Contract on the basis of the unit prices tendered only and that any approved extras or refunds shall be made by mutual agreement between the Consultant and the Contractor.

Completion of Work

If the undersigned be notified in writing of the acceptance of this proposal, within fourteen (14) days following such acceptance, he agrees to execute and Agreement for the above stated sum in the form of the specimen submitted to guarantee completion of the Contract in accordance with the documents and within the time stated in the Specifications.

Security Deposit and Surety's Consent

Accompanying this tender please find our security deposit in the form of a **digital E-Bid Bond in the amount of \$_____ being ten percent (10%)** of the tender price (including taxes), and a digital "Surety's Consent" to provide a Performance Bond and a Labour and Materials Bond each in the amount to 50% of the tender price. This security deposit for unsuccessful Tenderers will be refunded within (60) days from the tender opening date. The security deposit for the successful tender will become the property of the Owner if the Tenderer fails or refuses to execute a contract bond within fourteen (14) days after notification that he is the successful Tenderer.

Signatures

The undersigned agrees that the Owner reserves the right to reject the tender on any one or all projects.

I.	_____	_____
	Witness	Legal Name of Tenderer

	Title	

	Date	
II.	_____	
	Witness	

	Title	

	Date	_____
		Signature of Authorized Representative

TENDER FORM UNIT PRICE CONTRACT

TF4

Item	Description	Est. Qty	Units	Unit Price	Total
Section 1	General Requirements				
1.01	Mobilization	1	Lump Sum	_____	_____
1.02	Project Layout	1	Lump Sum	_____	_____
1.03	Public Access Plan	1	Lump Sum	_____	_____
1.04	Environmental Mitigation	1	Lump Sum	_____	_____
1.05	Site Security	1	Lump Sum	_____	_____
Section 2	Bridge Construction				
2.01	Cast-in-place Concrete Abutments and Ballast Wall	1	Lump Sum	_____	_____
2.02	Supply Aluminum Truss Bridge	1	Lump Sum	_____	_____
2.03	Install Aluminum Truss Bridge	1	Lump Sum	_____	_____
Section 3	Stairs	1	Lump Sum	_____	_____
3.01	Supply Aluminum Staircase	24	Lineal metre	_____	_____
3.02	Install Aluminum Staircase	24	Lineal metre	_____	_____
Section 4	Crib Steps				
4.01	Supply and Installation of Wooden Steps on Grade	35	Lineal metre	_____	_____
Section 5	Miscellaneous Work				
5.01	Supply and installation of Crib step delineator	35	Lineal metre	_____	_____
5.02	Trail Erosion Repair	30	Lineal metre	_____	_____
5.03	Tree Removal	1	Lump Sum	_____	_____
5.04	Trail Widening	30	Lineal metre	_____	_____
5.05	Cedar Split Rail Fence	15	Lineal metre	_____	_____

SUMMARY

Section 1 – General Requirements	_____
Section 2 - Bridge Construction	_____
Sections 3 – Stairs	_____
Sections 4 – Crib Steps	_____
Sections 5 - Miscellaneous Work	_____
Subtotal - Tender Bid Price	=====
GST 5%	_____
TOTAL	=====

LIST OF SUBCONTRACTORS

It is our intention that the following work will, subject to the Consultant's approval, be subcontracted to the firms indicated below. All other work will be performed by our own forces, except as authorized in writing by the Consultant.

<u>Trade / Payment Method</u>	<u>Name and Address of Subcontractor</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

LIST OF MANUFACTURERS AND SUPPLIERS

The following is a list of suppliers from whom we intend to purchase the various items of material indicated, together with the product brand name or the name of the manufacturer of each.

We will alter neither products nor suppliers from those listed below without the written authorization of the Consultant.

<u>Item</u>	<u>Product Brand Name or Manufacturer</u>	<u>Supplier</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SCHEDULE OF FORCE ACCOUNT RATES

The following personnel and equipment rates will form the basis of payment for force account work carried out in accordance with Article 17 of the General Conditions. (Complete Schedule or attach similar information).

Personnel:

List by Occupation	Hourly Rate	Overtime Rate
Superintendent		
Foreman		
Labourer		
Security		
Others		
(Specify)		

Equipment: (to be as per current 'Blue Book' rates).

Description	Hourly Rate	Model and Size
(Specify)		

PROPOSED ALTERNATE MATERIALS

We propose using the following materials as alternates to those specified and shown on the drawings. Should any of these proposed alternates be accepted, we will adjust our Total Tender in accordance with the price variation shown below. These prices will represent the total cost difference to the Owner for supply and installation of the proposed alternate products in lieu of those specified.

Item	Product Brand Name or Manufacturer	Supplier	Price Variation

APPENDIX A

REGIONAL DISTRICT OF NANAIMO

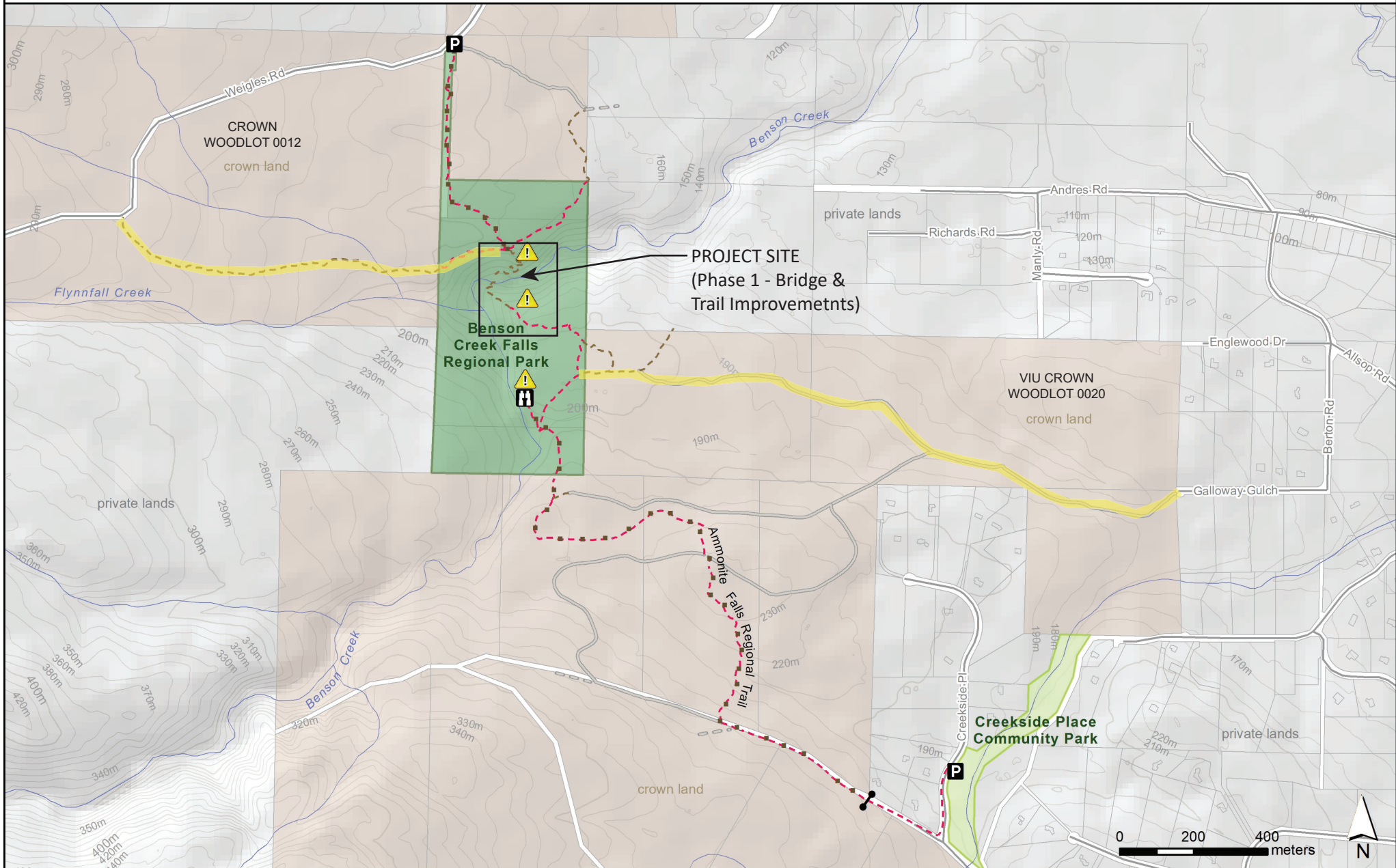
20-037: BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

PART V

Location Map

BENSON CREEK FALLS REGIONAL PARK & AMMONITE FALLS REGIONAL TRAIL



- | | | | | | | | |
|----|--|---|--------------|-------|------------------------|---|--|
| ■ | Numbered Trail Marker | 🚗 | Vehicle Gate | --- | RDN Recreational Trail | ■ | Possible Construction Access via Crown Woodlot |
| ⚠️ | Caution: steep trail, not maintained beyond this point | P | Parking | - - - | Other Trail | — | Gravel Road |
| 🏠 | Viewpoint | | | | | | |

APPENDIX B

REGIONAL DISTRICT OF NANAIMO

20-037: BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

**SCHEDULE OF DRAWINGS
(Drawings bound separately)**

SCHEDULE OF DRAWINGS**(Drawings bound separately)**

Drawing No.	Project Drawing No.	Description	Revision No.	Date
0837-067-S00	S00	Cover sheet, Key Plan and Drawing List	0	June 11, 2020
0837-067-S01	S01	General Notes	B	June 11, 2020
0837-067-S2	S20	Site 1 – Plan and Profile	F	June 11, 2020
0837-067-S21	S21	Site 1 – Detail and Elevation	F	June 11, 2020
0837-067-S22	S22	Site 1 – Typical Detail Sheet 1	F	June 11, 2020
0837-067-S23	S23	Site 1 – Typical Detail Sheet 2	D	June 11, 2020
0837-067-S24	S24	Site 1 – Typical Detail Sheet 3	D	June 11, 2020
0837-067-S30	S30	Site 1 – Truss Bridge General Arrangement	E	June 11, 2020
0837-067-S31	S31	Site 1 – Truss Bridge, Plan Elevation and Section	E	June 11, 2020
0837-067-S32	S32	Site 1 – Truss Bridge Abutments and Details	B	June 11, 2020
0837-067-S40	S40	Site 2 – Erosion Control	F	June 11, 2020

APPENDIX C

REGIONAL DISTRICT OF NANAIMO

20-037: BENSON CREEK FALLS REGIONAL PARK

ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

**Benson Creek Fall Regional Park Environmental Impact and
Remediation Assessment & Environmental Protection Plan
Aquaparian Environmental Consulting Ltd. – May 20, 2020**

APPENDIX D

REGIONAL DISTRICT OF NANAIMO

20-037: BENSON CREEK FALLS REGIONAL PARK

ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT

AND OTHER WORKS

Nanaimo, BC

Regional District of Nanaimo Parks and Trails Guidelines
January 2017

APPENDIX E

REGIONAL DISTRICT OF NANAIMO

20-037: BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS, BRIDGE REPLACEMENT AND OTHER WORKS

Nanaimo, BC

Section 11 Notification Confirmation

Ali Sadeghi

From: Roden, Jacqueline FLNR:EX <Jacqueline.Roden@gov.bc.ca>
Sent: February 4, 2020 3:56 PM
To: Cramer, Kelsey; jeni.rowell@aquaparian.com
Subject: Section 11 Notification - 1004730 - Benson Cr
Attachments: VI-HabitatOfficer_TermsandConditions_Feb11.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Caution: This email is from an **external source**. Do not click links or open attachments unless you recognize the sender and know the content is safe.

File: 1004730
Tracking Number: 100309038

Ministry of Forests, Lands and Natural Resource Operations has received your *Water Sustainability Act* Section 11 Notification. Please quote the above file number, if you have any questions.

We have noted that you propose carrying out a project during a time period not normally authorized for in-stream works. The Ministry expects applicants to complete in-stream projects within the general “work window” (June 15th to September 15th), in order to minimize the risk of damage to fish and fish habitat or to downstream water users. For projects proposed to occur outside the work window, a technical rationale prepared by a qualified professional should be submitted that addresses these concerns. The rationale should include a detailed Sediment and Erosion Control Plan which will identify contingency measures and emergency procedures.

It is the applicant's responsibility to ensure that all sections of the notification form are complete, as processing of this notification will not commence until we have a complete application. We remind you that by signing the notification, ***you are accepting the legal responsibility for this work.***

The Habitat Officer will usually confirm acceptance of the application or ask for clarification of details of the project within 10 working days. Once the Habitat Officer has completed the review, you will receive a response that may include further conditions and or information. If after 45 days you have not received a response from the Habitat Officer, you may proceed with the work, subject to the following:

- West Coast Region *Terms and Conditions of the Habitat Officer (please see the attached pdf)*
- *Guide to Working In and Around Water*

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>

We recommend that you also review the following information:

- *Best Management Practices (BMP's) Instream Works*

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices>

If you plan to remove/salvage fish, you will require a Fish Salvage Permit before work can proceed. Please contact FrontCounter BC at 1 877-855-3222 or go to

http://www.env.gov.bc.ca/pasb/applications/process/scientific_fish_collect.html#new for application forms and information. Please provide our office with a copy of your approved permit.

Thank you,

Jacqueline Roden

Program Assistant

Phone (250) 751-7352

Forest Lands, Natural Resource Operations
and Rural Development

**Terms and Conditions For Changes In And About A Stream Specified By
Ministry of Forests, Lands and Natural Resource Operations
Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)
(Updated February, 2011)**

Section 42 (1) of *the Water Regulation* gives authority to a Habitat Officer to add specific conditions to ensure the protection of habitat in addition to the conditions of general application. Under this authority the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) Habitat Officer for West Coast Region requires the following mandatory terms and conditions:

42 (1) To protect habitat, a person making a change in and about a stream under this regulation, other than under section 44(1) (o) to (s) or (2), must make that change in accordance with terms and conditions specified by the habitat officer with respect to

(a) the timing window or the period or periods of time in the year during which the change can proceed without causing harm to fish, wildlife or habitat,

The timing window of least risk to fish and fish habitat must be applied to all activities in fish streams as well as tributaries that have a risk of depositing sediment into fish streams. Windows of least risk are designed to protect all fish species known to occur in a stream. One way fish presence can be confirmed is through a fish inventory database.¹ Please note if using this database that the lack of fish records for a particular area is not necessarily equivalent to fish absence. All streams are assumed to have both spring and fall spawners, until proven otherwise. The Table below represent time periods when instream work must be conducted. Numbers in the Table represent an approved start or end date for instream work.

Reduced Risk Work Windows for Fish and Wildlife for Vancouver Island

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Throughout	All Species*	June 15	September 15
Throughout	Steelhead	June 15	September 15
Throughout	Rainbow Trout	August 15	September 15
Throughout	Cutthroat Trout	August 15	September 15
Throughout	Dolly Varden	June 15	September 1
Throughout	Chinook	July 15	September 15
Throughout	Chum	May 15	September 15
Throughout	Coho	June 15	September 15
Throughout	Pink	May 1	August 15
Throughout	Sockeye	June 1	September 15
Throughout	Kokanee	June 1	September 15

*The general fisheries timing window for instream work on Vancouver Island is June 15th to September 15th. When more detailed information is available w.r.t. fish species present at the (work) site, then the applicable timing window (above) for that species should be applied.

¹ Fisheries Inventory site at <http://www.env.gov.bc.ca/fish/>

Localized exceptions to this table include:

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Not specifically known	Green Sturgeon Red Listed	November 1	April 30
Misty Lake	Giant Black Stickleback Red Listed	No Work Window, Spawns in spring and summer in lakes only	
Enos Lake	Enos Lake Limnetic Stickleback Red Listed	No Work Window. Consult a Registered Professional Biologist	
Cowichan Lake, Mesachie Lake	Cowichan Lake Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist	
Morrison Creek and Tributaries (Puntledge River)	Morrison Creek Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist.	

A qualified professional (Registered Professional Biologist) must be consulted to determine whether the project will have any impact on the above Species at Risk. Please refer to the BC Species and Ecosystems Explorer for details: <http://www.env.gov.bc.ca/atrisk/toolintro.html>

Beaver: The instream work window for beaver dam removal is June 15th to September 15th.² Opening plugged culverts or removing beaver dams and draining ponds between September 15th and June 15th can result in mortalities of both beavers and fish, and will not normally be accepted. Special circumstances may warrant dam removal during this time. Request to modify or remove beaver dams, or unplug culverts outside the work window must be accompanied by a detailed request directed to a Habitat Officer. Such request will be dealt with on a case-by-case basis, and approval may be given.

Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

(b) *The minimum instream flow or the minimum flow of water that must remain in the stream while the change is being made,*

- The natural rate of water flow must be maintained upstream and down stream of the worksite during all phases of instream activity.

(c) *The removal of material from the stream or stream channel in connection with the change,*

- In fish streams, the permanent removal of stable, naturally occurring material from the stream or stream channel is not permitted.

² A beaver dam may be modified or removed only in order to protect property (e.g. a road base), as per Section 9(2) of the *BC Wildlife Act*. A “Habitat Officer” of the Ministry of Forests, Lands and Natural Resource Operations establishes terms and conditions associated with the removal or modification of beaver dams, pursuant to Part 7, Sections 42 and 44 (1) (v) of the *BC Water Act Regulation* and Section 9 of the *BC Wildlife Act*.

- In non-fish streams, the permanent or temporary removal of stable, naturally occurring material must be minimized and completed only as necessary to make the change in accordance with Part 7 of the *Water Regulation*.
- The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.
- Any spoil materials must be placed in a location which ensures that sediment or debris does not enter the watercourse.

(d) The addition of substance, sediment, debris or material to the stream or stream channel in connection with the change,

- Instream activities must be conducted in the dry and the worksite must be isolated from water flowing in the stream channel.
- All equipment must be located and operated in the dry.
- Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks).
- Measures must be taken to ensure that no harmful material (e.g. fuel and other hydrocarbons, soil, road fill, or sediment), which could adversely impact water quality, fish and other aquatic life, and /or fish habitat, can enter the wetted perimeter as a result of the project activities.
- Erosion and sediment control structures are to be available onsite and utilized as necessary.
- Do not work in weather conditions likely to contribute to sediment production to the stream.
- If approved, beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size). All material removed from a beaver dam must be side-cast in such a manner that it cannot re-enter the stream.

(e) The salvage or protection of fish or wildlife while the change is being made or after the change has been made,

- If dewatering of the worksite is necessary, fish salvage must occur on a fish-bearing stream prior to commencing works. A scientific fish collection permit must be obtained from the MFLNRO Permits and Authorization Service Bureau (<http://www.env.gov.bc.ca/pasb/applications.html>) prior to commencing salvage activities. A fish salvage permit is required from Department of Fisheries and Oceans in salmon bearing waters, contact Steve Baillie at 250 756-7227.
- If an area is de-watered as a result of beaver dam removal or modification and results in the stranding of fish, then these fish must be salvaged and returned to the stream.

- Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life.
- Do not disturb wildlife and /or their residences (e.g. beaver lodges³) within the project area.

(f) The protection of natural materials and vegetation that contribute to habitat or stream channel stability,

- Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.
- The Riparian Areas Regulation (RAR), enacted under Section 12 of the *Fish Protection Act* in July 2004, calls on local governments by March 31, 2006 to protect Riparian Areas during residential, commercial, and industrial development by ensuring that proposed activities are subject to a science based assessment conducted by a Qualified Environmental Professional. The Riparian Areas are the 30 meter strip on both sides of the stream, measured from the high water mark. For information on the RAR, and whether it applies to your project, we suggest you visit the Ministry's website and check the Frequently Asked Questions:
http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html#extension

(g) The restoration of the work site after the change has been made, and

- Complete restoration activities (including erosion control), as required, that will lead to natural pre-disturbance conditions.
- Any disturbed areas must be restored to function as they did in their pre-disturbance condition.

(h) The requirement to obtain an approval from the federal Department of Fisheries and Oceans (DFO) in connection with the change.

- Proponents are responsible for complying with the federal *Fisheries Act*. No harmful alteration, disruption or destruction (HADD) of fish habitat is authorized by this document. Be aware that a series of Operational Statements (OS) have been developed to streamline the Habitat Management Program's (HMP) regulatory review of low risk activities. The OS outline measures and conditions for avoiding the harmful alteration, disruption and destruction (HADD) to fish habitat, and thus be in compliance with subsection 35(1) of the *Fisheries Act*.
- Project Review Application Forms (PRAF) and additional information can be found at DFO Habitat Management Website "Working Near Water" at <http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm>.

³ Beaver may only be removed by the registered trapline holder or contract problem beaver trappers. A list of trappers can be obtained through the Nanaimo Regional Office at 250 751-3100.

Proponents are not required to submit their proposal for review by Fisheries and Oceans Canada (DFO) when they incorporate the measures and conditions outlined in the OS into their plans. The Following is a list of Operational Statements:

Aquatic Vegetation Removal
Bridge Maintenance
Clear Span Bridges
Culvert Maintenance
Directional Drilling
Dock Construction
Ice Bridges
Routine Maintenance Dredging
Underwater Cables

To obtain this material, please visit the following website:

http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm

- The central DFO contact telephone number for Vancouver Island is as follows:

DFO Habitat Information Line 250 740-0544

Section 44 of the *Water Regulation* is important, as it provides the requirements for the installation of culverts in streams. **Fish passage in pipe culverts** has historically been a problem in the Pacific Northwest, and Vancouver Island is no exception. This follows in part from the emphasis on culvert efficiency and capacity to convey storm flows. Characteristics of culverts that make them efficient may create high velocities, and shallow flow that are impassable to fish. Perched outlets, inadequate jump pools, culvert obstructions, inlet drops, and inaccessible outlet weirs or rock aprons are examples of problems frequently associated with pipe culverts. Investment in stream enhancement is offset by loss of accessible fish habitat by installation of culverts that do not pass fish. If your project involves the installation of a culvert, please make special reference to Part 7 of the *Regulation*, Section 44, where it states:

44 (1) For the purposes of section 9 of the Water Act, the following changes in and about a stream may be made without the necessity of obtaining an approval or licence for that change, provided that the change is made in accordance with this regulation and in accordance with the terms and conditions, described in section 42, specified by a habitat officer:

(a) the installation, maintenance or removal of a stream culvert for crossing a stream for the purposes of a road, trail or footpath, provided that:

(ii) in fish bearing waters, the culvert allows fish in the stream to pass up or down stream under all flow conditions,

Important terms to note:

"fish bearing waters" means a stream having a fish population present at some time during the year;

"stream" includes a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch;

Fish Passage Criteria:

Fish passage design should provide for weakest swimmers including the smallest fish. If small fish are able to pass, this provides reasonable confidence that the majority of fish can pass through the culvert.

Fish passage includes any related downstream works that may affect access to the outlet of the culvert. If the culvert is accessible and not obstructed, fish passage is determined by the hydraulics of the culvert that affect velocity and depth of flow. This is governed by slope and geometry of the culvert relative to assumed levels of discharge and accounting for backwatering effects.

Mitigation to and/or to reduce inlet and barrel velocities and/or maintain adequate swim depth is likely to be required for most culverts installed at greater than 0.5% slope. Culverts installed above 0.5% are generally likely to require backwatering to mitigate against adverse velocities and shallow depth of flow. This may involve constructing a weir or series of weirs downstream of the outlet or use of an alternative design such as embedding the culvert into the stream, so that 1/3rd of the culvert is filled with natural substrates.

Backwatering requires hydraulic design because it influences culvert capacity and results in varied flow conditions in the culvert. Culverts installed above 0.5% will generally involve hydraulic assessment of fish passage in the design. Proposed use of baffles are subject to maintenance to clear obstructed baffle slots or notches. Similarly, downstream weirs must be sufficiently robust to withstand design storm flows. Weir structures including baffle weirs need to be maintained and may require repair over the life of the culvert. This may be problematic where the responsibility for long term maintenance cannot be secured. Local government should be consulted to determine acceptance.

Culverts at less than 0.5% slope may require backwatering if depth of flow is inadequate at the inlet. Culverts should not be installed flat if there is a difference in slope between the culvert and the stream of more than 2% resulting in an inlet drop exceeding 30cm or outlet drop.

Where feasible, open bottom structures, or embedded culverts that preserve or simulate the natural stream bed, are preferred. These structures are generally more likely to be fish passable and are not subject to the same degree of hydraulic design considerations as bare pipe culverts. Provincial guidelines are contained in the Fish Stream Crossing Guidebook available for download at:

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>.

These guidelines were developed for the forest industry, but have equal applicability in other settings.

Assessment of fish passage in non-embedded pipe and closed bottom box culverts is based on the following criteria that have been adapted from similar criteria used in Oregon. While they are not in regulation, they are considered to be based on best available science and research on fish passage.

Fish passage should be based on juvenile fish swimming capabilities:

- Generally, this will require limiting velocities in the culvert to less than 0.6m/sec^2 .
- The minimum swim depth is 20cm to facilitate both juvenile and adult fish passage.
- Maximum outlet jump or hydraulic drop at the inlet or within the culvert should not exceed 15cm. If an outlet drop exists there must be a jump pool. Outlet jumps are not a desired feature, but may be present as a mitigating measure to a previously installed culvert. The jump pool should be the greater of 1.5 times the outlet drop or 60cm. Added depth is required to facilitate fish accelerating into a jump. The deep point of the pool must be close enough to the outfall for fish to utilize the full depth of the pool to make the jump into the culvert barrel.
- Backwatering to the inlet is important to ensure that fish do not become exhausted short of the inlet. This may happen as a result of accelerated flows at the inlet caused by inlet constriction relative to stream width, steepness of the culvert, or increased velocity associated with high fish passage flows.
- The flow velocities of the culvert need to be checked against a high fish passage discharge estimate for the culvert. Flows that are not exceeded more than 10 percent of the time during the maximum discharge month when fish may be present may be used as a high fish passage flow guideline.
- A range of low flows should be examined to ensure that the culvert will have sufficient depth of flow during low flow periods when fish may be present based on expected flows in the adjacent stream.

The foregoing considerations do not replace the need for adequate professional design or input from a professional biologist with fisheries experience. They do not cover all circumstances that may be encountered. Local government may have additional bylaws or requirements that restrict what is acceptable. Fisheries and Oceans Canada also has requirements and policies relating to fish passage pursuant to the federal *Fisheries Act*.

Confirming Fish Bearing Status of the Stream:

The presence of fish refers to migrating, spawning, and rearing fish and includes all species and life stages that may be present at any time of the year. Fish bearing status is confirmed on the basis of known presence/absence as confirmed by fish observations or inventory.

The alternative to conclusively determining fish absence is to accept that fish may potentially be present and to develop the crossing to pass fish.

Most available information on fish distribution and habitat has been compiled into the Fisheries Information Summary System (FISS) provincial database. FISS provides a standardized, systematic summary of information about fish, fish habitat and resource use (fishing). If information confirming the absence of fish is not available, a reach level survey may be required to prove fish absence.

The Fisheries Information Summary System (FISS) is maintained by the Ministry of Forests, Lands and Natural Resource Operations and Fisheries and Oceans Canada. Information may be accessed through the BC Ministry of Forests, Lands and Natural Resource Operations Fisheries Inventory Data Queries website. Much of the mapping of fish presence is interpreted at a scale of 1:20,000, the FISS misses many small streams that may contain fish in urban and rural areas. Many fish observations are single location spot observations that enable inference of fish presence upstream in the absence of documented barriers.

The Resources Inventory Committee manual Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Manual is an essential reference on data recording protocols for fish-stream identification. The manual is available on the Ministry of Forests, Lands and Natural Resource Operations website: <http://ilmbwww.gov.bc.ca/risc/pubs/aquatic/recon/index.htm>. This manual contains standard data collection forms for stream reaches, reach sample sites, and fish collection records which are recommended for use. The standard for database management is the Field Data Information System (FDIS) which is available to capture and store reach, sample-site, and fish collection data. Copies of the field forms can be obtained from Crown Publications. The RIC manuals contain much more information than that required to identify fish bearing stream reaches.

The basic information needed for fish-stream identification is fish presence or absence; therefore, describing the distribution of fish in a drainage basin is far more important than gathering data on fish abundance or population age structure.

Similarly, habitat quality is not a primary factor for fish-stream identification: fish-bearing status is not based upon the potential of the habitat to produce fish. However, habitat information can provide important clues to the type of fish-habitat use that can occur in an area, and it can identify operational considerations for locating stream crossings.

Fish presence can be determined by a number of acceptable techniques that cover a range of efficiency and sampling intensity. The simplest technique might be sufficient to determine presence. Fish presence is confirmed once an individual specimen of the appropriate species is properly identified.

Determination of the absence of fish from a body of water is much more difficult. While no fish may be captured at successively greater levels of sampling intensity, the ultimate “proof” of absence must be associated with the most intensive and efficient procedure appropriate for the species, life stage and time of year. For example, when sampling for quantitative purposes, baited traps are ideally set over 24 hours for juvenile fish, or two-trial electrofishing is performed. It is recognized that these levels of effort are sometimes difficult to achieve.

Ultimately, an acceptable survey has been performed when there is, in total, sufficient evidence to support the conclusion that fish do not occur in a given stream reach. The evidence must include, *in addition to fish capture results*:

1. Any known information on fish presence upstream and downstream of the reach sampled.
2. Type and location of obstructions to fish migrations.
3. Sampling conditions including stream flow, temperature and conductivity.
4. Sampling methods and effort (include gear selection sample timing).
5. Judgment of seasonal habitat availability.
6. Evaluation of seasonal fish use of stream and off-channel habitats.

A summary of fish presence or absence should reference existing inventories and fish observation mapping. It is recommended that fish sampling results and methods used, be recorded in on standard fish collection forms. Contractors that have the capability are encouraged to enter the information into the FDIS database management system. These data standards will ensure data are captured and available for future uses including the review of the stream classifications.

Sampling should be carried out at least 2 times during the year. The critical sampling periods include:

- Winter periods to capture spawning and fish rearing in headwater streams
- Summer periods during the low flow periods in areas where juveniles may be rearing.

All stream reaches for which non-fish-bearing status is proposed require a short, concise, written justification for this designation. This non-fish-bearing status report contains information that, in the professional opinion of the person responsible for the survey, provides sufficient evidence to support the conclusion that fish do not occur in the stream reach in question. Information that should be provided includes:

1. Date and time of sampling events, including initial and any follow-up sampling efforts.
2. Fish sampling methods and effort employed.
3. Capture methods used (e.g., electrofisher; Gee traps; use of barrier nets at either downstream limit, upstream limit, or at both ends of the sampled site).
4. Sampling area covered (number, length and area of sample site).
5. Sampling effort (e.g., number of traps, electrofishing seconds).
6. Stream conditions during sampling (e.g., specific conductance; flow stage of high, medium or low; temperature; turbidity).
7. Supporting evidence:
 - i. Known fish species presence both upstream and downstream.
 - ii. Type and location of obstructions to fish migrations.
 - iii. Seasonal habitat availability.
 - iv. Seasonal fish use of stream and off-channel habitats.
 - v. Results of any 1:20 000 reconnaissance fish and fish habitat inventory conducted in the watershed.

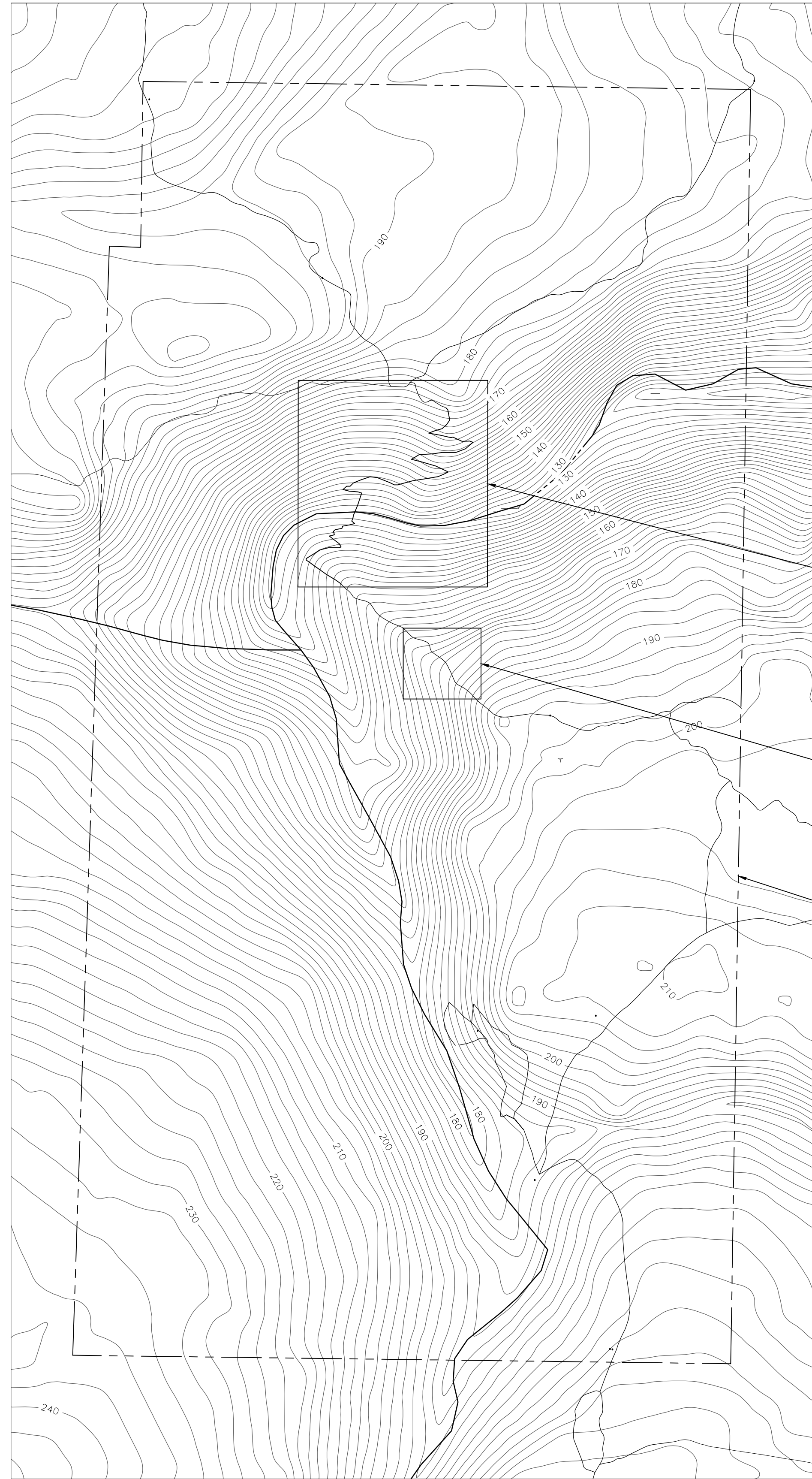
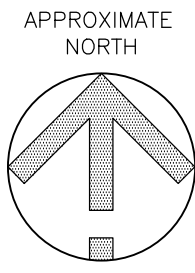
Downstream barriers must be confirmed as permanent and described as to whether they are assessed as natural or manmade, and whether the barrier is year round or seasonal. Absence of resident fish above barriers must be confirmed.

This document does not supersede the requirements of the *Water Act and Regulations*, *Federal Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments.

Where the West Coast Habitat Officer has an agreement with a company or agency pursuant to the *BC Water Act* Section 9 and Regulation 204/88, Part 7, the agreed Standard Operation Procedures (SOP) will be considered as satisfying the above conditions.

For enquiries regarding Terms and Conditions, please contact:

Habitat Officer
West Coast Region
Ministry of Forests, Lands and Natural Resource Operations
2080A Labieux Road
Nanaimo BC V9T 6J9
250 751-3100



BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS

DRAWING LIST

<u>DRAWING NUMBER</u>	<u>DESCRIPTION</u>
0837-067-S00	COVER SHEET, KEY PLAN AND DRAWING LIST
0837-067-S01	GENERAL NOTES
0837-067-S20	CREEK CROSSING - SITE 1 - PLAN AND PROFILE
0837-067-S21	CREEK CROSSING - SITE 1 - DETAILS AND ELEVATIONS
0837-067-S22	CREEK CROSSING - SITE 1 - TYPICAL DETAILS SHEET 1
0837-067-S23	CREEK CROSSING - SITE 1 - TYPICAL DETAILS SHEET 2
0837-067-S24	CREEK CROSSING - SITE 1 - TYPICAL DETAILS SHEET 3
0837-067-S30	CREEK CROSSING - SITE 1 - TRUSS BRIDGE GENERAL ARRANGEMENT
0837-067-S31	CREEK CROSSING - SITE 1 - TRUSS BRIDGE, PLAN ELEVATION AND SECTION
0837-067-S32	CREEK CROSSING - SITE 1 - TRUSS BRIDGE ABUTMENTS AND DETAILS
0837-067-S40	CREEK CROSSING - SITE 2 - EROSION CONTROL

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3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

HEROLD PROJECT NO.
0837-067

GENERAL NOTES:

1.0 GENERAL

1.1 DESIGN LOADS

LIVE LOAD: 4.0 KPa PER CHBDC

SNOW LOAD: S_s = 2.1 KPa
S_r = 0.4 KPa

1.2 READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH ALL OTHER CONTRACT DRAWINGS AND DOCUMENTS. REPORT ANY CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.

1.3 VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.

1.4 NOTIFY ENGINEER 48 HOURS IN ADVANCE FOR INSPECTION OF STRUCTURAL CONNECTIONS BEFORE COVERING UP.

1.5 CONTRACTOR'S RESPONSIBILITY: THESE DRAWINGS SHOW COMPLETED STRUCTURAL COMPONENTS OF THE BRIDGE, STAIRS AND STEPS. THE REQUIRED TEMPORARY BRACING AND SHORING TO PERFORM THE WORK SAFELY IS THE RESPONSIBILITY OF THE CONTRACTOR.

1.6 ENVIRONMENTAL WORK PROCEDURES, TIMING, AND SPECIAL PRECAUTIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS AND LIMITATIONS OF THE FEDERAL DEPARTMENT OF FISHERIES AND OCEANS, AND THE PROVINCIAL MINISTRY OF WATER, LAND AND AIR PROTECTION.

1.7 SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION.

1.8 ELEVATIONS ARE IN METRES AND DIMENSIONS ARE IN MILLIMETRES.

1.9 UNDER NO CIRCUMSTANCES ARE DRAWINGS TO BE SCALED.

1.10 QUALITY ASSURANCE QUALIFICATION OF CONTRACTOR AND SUPERINTENDENT: THE CONTRACTOR SHALL BE FULLY CONVERSANT WITH ALL SAFETY PROCEDURES AND REGULATIONS RELATING TO CONSTRUCTION, AND SHALL EMPLOY STAGING AND OTHER SAFETY PROVISIONS AS SPECIFIED ELSEWHERE AND REQUIRED BY THE WORKERS COMPENSATION BOARD REGULATIONS.

2.0 ENVIRONMENTAL CONSTRUCTION REQUIREMENTS

2.1 ALL TREES AND ROOTS TO BE PRESERVED UNLESS IDENTIFIED. LOWER BRANCHES ON EXISTING TREES MAY BE PRUNED IF NECESSARY, PER ISA PRUNING GUIDELINES.

ALL EXCESS MATERIAL FROM CONSTRUCTION TO BE DISPOSED OF BY CONTRACTOR OFF SITE, IN ACCORDANCE WITH ALL LOCAL, PROVINCIAL AND FEDERAL REGULATIONS.

3.0 CAST-IN-PLACE CONCRETE

3.1 ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF CAN/CSA A23.1-06 AND A23.2-06.

3.2 CONCRETE MIXES SHALL CONFORM TO CAN/CSA A23.1-06 AND A23.2-06 AND SHALL HAVE THE FOLLOWING PROPERTIES:

CLASS	28 DAY STRENGTH	MAXIMUM AGGREGATE SIZE	MAXIMUM SLUMP	AIR CONTENT	EXPOSURE
ALL ITEMS	35 MPa	19mm	75mm	4% TO 7%	F-1

3.4 REINFORCING STEEL TO CONFORM TO CSA SPECIFICATION G30.18M, GRADE 400, UNLESS NOTED OTHERWISE.

3.5 LAP OF BARS FOR SPLICES TO BE 40 x BAR DIAMETER, UNLESS NOTED OTHERWISE.

3.6 PROVIDE A 20mm CHAMFER ON ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE.

3.7 CONCRETE FINISHES SHALL BE IN ACCORDANCE WITH CAN/CSA A23.1.

3.8 ALL CONCRETE CURING SHALL BE IN ACCORDANCE WITH CAN/CSA A23.1. SPECIAL PRECAUTIONS SHALL BE TAKEN AS NOTED IN CSA A23.1 FOR PLACING AND CURING CONCRETE ABOVE 27° C AND BELOW 5° C.

3.9 MINIMUM CONCRETE COVER TO REINFORCING SHALL BE 50mm, UNLESS NOTED OTHERWISE.

3.10 REINFORCEMENT ABBREVIATIONS:

H2E HOOK 2-ENDS, STANDARD HOOK
H1E HOOK 1-END, STANDARD HOOK
H2E600 HOOK 2-ENDS, 600 LONG HOOKS
15M1600 15M STRAIGHT BAR, 1600 LONG

4.0 GROUT

4.1 GROUT TO BE NON SHRINK, 50MPa.

5.0 ALUMINUM

5.1 ALL STAIR AND PLATFORM MATERIAL TO BE ALUMINUM UNLESS NOTED OTHERWISE. ALUMINUM SHALL BE 6061-T6.

5.2 STRUCTURES TO BE DESIGNED AND FABRICATED IN ACCORDANCE WITH CAN3-S157-M83.

5.3 WELDING SHALL BE IN ACCORDANCE WITH CSA W59.2-M 1991.

5.4 PROVIDE A MINIMUM 6mm FILLET WELD OR EQUIVALENT FOR CONNECTIONS, UNLESS NOTED OTHERWISE.

5.5 GRIND SMOOTH ALL SHARP EDGES AND THE WALKING SURFACE OF THE STAIR TREADS AND PLATFORMS.

5.6 FOR CORROSION PROTECTION: WHERE ALUMINUM IS IN CONTACT WITH CONCRETE, A UHMW PAD SHALL BE INSTALLED AS A BARRIER BETWEEN THE DISSIMILAR ITEMS.

5.7 BOLTED CONNECTIONS SHALL BE USED FOR ALL FIELD CONNECTIONS. CONTRACTOR TO DETERMINE LOCATIONS OF BOLTED CONNECTIONS SO AS TRANSPORTATION OF THE MEMBERS TO THE SITE IS AS EASY AS POSSIBLE. CONNECTIONS SHALL BE DESIGNED BY THE CONTRACTOR AND SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW. A MINIMUM OF 2-19# BOLTS, IS REQUIRED. ALL BOLTS TO ASTM A325 GALV.

6.0 STEEL

6.1 ALL FABRICATED AND MISCELLANEOUS METAL TO BE GRADE 300W AND GALVANIZED IN ACCORDANCE WITH ASTM A123M.

6.2 WHERE WELD SIZE NOT SHOWN, USE MINIMUM 6mm FILLET.

6.3 ALL WELDING SHALL BE IN ACCORDANCE WITH CSA W59-1989 (R2001) AND SHALL BE PERFORMED BY FABRICATORS "FULLY APPROVED" BY THE CANADIAN WELDING BUREAU UNDER CSA W55.3-19659 (R1998). FABRICATING SHOP TO HAVE A MINIMUM DIVISION 2.1 CERTIFICATION BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA W47.1-92 (R2001) AND CSA W55.3-1965 (R1998) FOR RESISTANCE WELDING OF STRUCTURAL COMPONENTS. THE FABRICATOR SHALL SUBMIT PROOF OF CERTIFICATION PRIOR TO START OF WORK.

7.0 WELDING INSPECTIONS

7.1 ALL INSPECTIONS SHALL BE PERFORMED BY A CERTIFIED ENGINEER REGISTERED IN THE PROVINCE OF B.C. AND PAID FOR BY THE CONTRACTOR. INSPECTION PROCEDURES SHALL BE AS OUTLINED BELOW.

7.2 ALL WELDS ARE TO BE VISUALLY INSPECTED BEFORE GALVANIZING. CONTRACTOR SHALL BE RESPONSIBLE FOR CO-ORDINATING INSPECTIONS AND PROVIDING SUITABLE AND SAFE ACCESS TO THE WORK BEING INSPECTED.

7.3 ALL FAILURES IDENTIFIED BY THE TESTING AND INSPECTIONS SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. COST OF ADDITIONAL TESTING TO CONFIRM CONFORMANCE WITH SPECIFICATIONS SHALL BE BORNE BY THE CONTRACTOR.

7.4 SUBMIT ALL TEST REPORTS TO HEROLD ENGINEERING FOR REVIEW. DO NOT COVER MEMBERS AND THEIR CONNECTIONS WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER.

8.0 TIMBER

8.1 ALL NEW TIMBER TO CONFORM TO CSA-0141-91 "SOFTWOOD LUMBER" TIMBER GRADES AND SPECIES AS FOLLOWS:

MEMBER	(FINISH)	SPECIES	GRADE
CAP/RAILS	(S4S)	CEDAR	GROUP A No. 1, OR BETTER
POST	(ROUGH)	CEDAR	GROUP A No. 1, OR BETTER
STEPS	(ROUGH)	CEDAR	GROUP A No. 1, OR BETTER

8.2 ALL TIMBER CONSTRUCTION, DETAILS AND FASTENINGS SHALL CONFORM FULLY TO CSA 086, CURRENT EDITION.

8.3 PRE-DRILL ALL BOLT AND LAG SCREW SHANK HOLES (BUT NOT LEAD HOLES). BOLT HOLES SHOULD BE FULL LENGTH AND SIZE FOR MACHINE BOLTS.

9.0 MISCELLANEOUS STEEL CONNECTIONS

9.1 BOLTED CONNECTIONS SHALL UTILIZE ASTM A307 GALVANIZED. BOLTS COMPLETE WITH NUTS AND MALLEABLE IRON WASHERS AND RUBBER WASHERS (TO SEPARATE STEEL FROM ALUMINUM), UNLESS OTHERWISE SHOWN ON DRAWINGS.

9.2 ROUGH HARDWARE: BOLTS, NUTS, WASHERS, GALVANIZED FOR EXTERIOR USE. NAILS AND SPIKES TO CONFORM TO CSA B111-1974, S406-92.

9.3 PROVIDE TAPERED WASHERS WHERE CHANNELS HAVE TAPERED FLANGES.

10.0 ADHESIVE ANCHORS

10.1 ALL ANCHORS ARE TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

10.2 UNLESS NOTED OTHERWISE ADHESIVE ANCHORS SHALL BE HILTI 'HAS' ROD. REFER TO DRAWINGS FOR ANCHOR LOCATIONS, SIZES, CENTRES AND EMBEDMENT LENGTH. USE HILTI HY200 MAX OR HILTI HIT RE500 ADHESIVE AS NOTED BELOW.

USE HILTI HIT HY200 MAX WHEN:
A QUICK CURE IS REQUIRED,
CONDITIONS ARE DRY,
HOLES ARE HAMMER DRILLED,
HOLES ARE NOT OVER-SIZED,
BASE MATERIAL TEMPERATURE IS ABOVE 5° CELSIUS.

USE HILTI HIT RE500 WHEN:
EXTENDED WORKING TIME IS REQUIRED AND CURE TIME IS NOT CRITICAL,
HOLES ARE DRILLED USING DIAMOND CORE, PNEUMATIC OR HAMMER DRILLS,
DEEP EMBEDMENT IS SPECIFIED,
THE APPLICATION IS UNDERWATER, OR HOLES ARE OVERSIZED.

10.3 HOLES FOR ADHESIVE ANCHORS SHALL BE CLEANED OUT WITH HIGH PRESSURE AIR AND THEN A BRUSH PRIOR TO ANCHOR INSTALLATION.

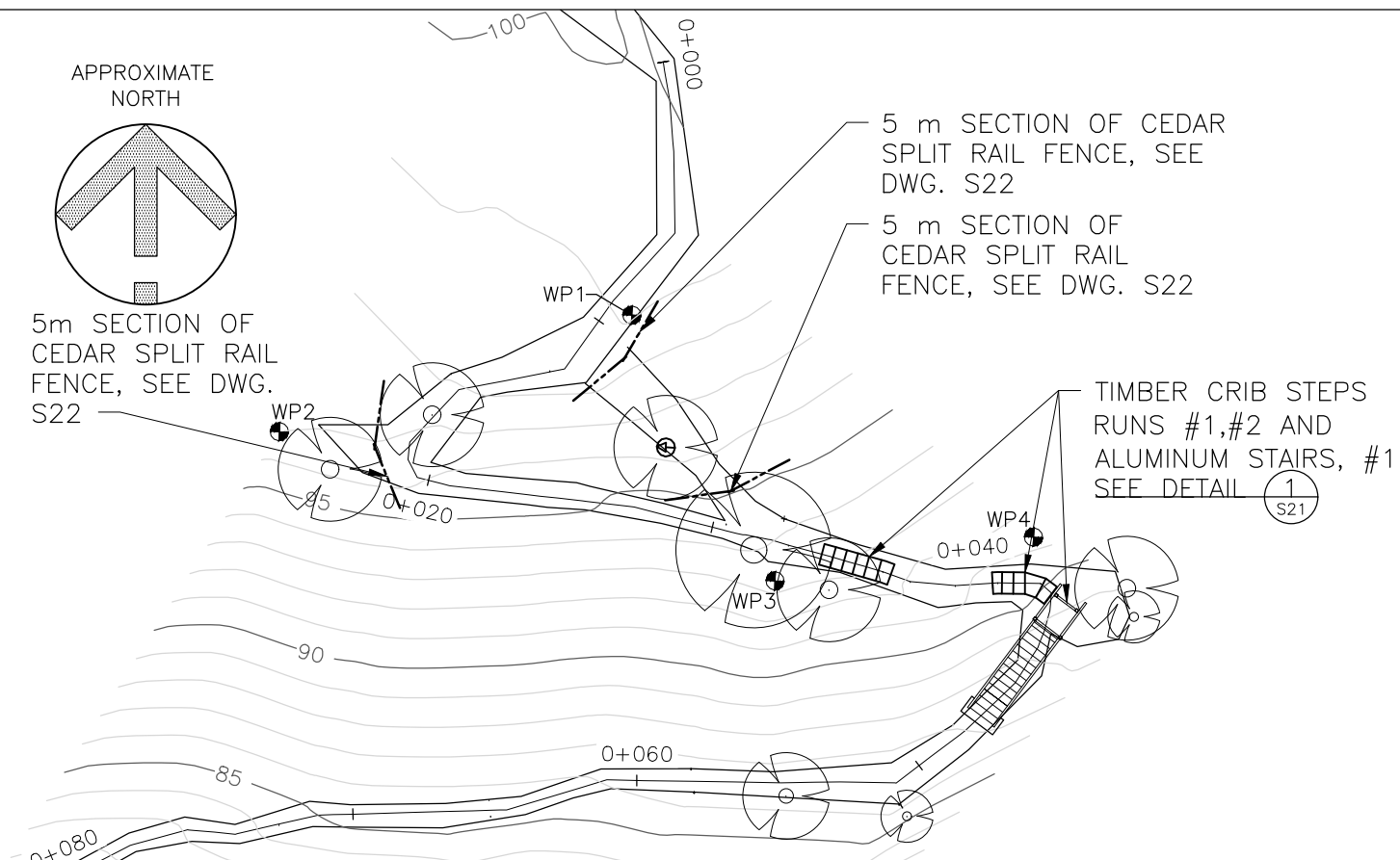
10.4 INSTALLERS OF HILTI PRODUCTS SHALL HAVE RECEIVED TRAINING BY HILTI (CANADA) CORP. IN THE USE OF THE SPECIFIED PRODUCTS. THE GENERAL CONTRACTOR SHALL PROVIDE THE DESIGN ENGINEER WITH A LETTER STATING THAT THIS TRAINING HAS BEEN COMPLETED.

11.0 ABBREVIATIONS

- CL. - CLEAR
- CL. - CENTRELINE
- CP. - COMPLETE PENETRATION
- C/W - COMPLETE WITH
- DWS. - DRAWING
- EL. - ELEVATION
- I.D. - INSIDE DIAMETER
- LLH - LONG LEG HORIZONTAL
- LLV - LONG LEG VERTICAL
- MAX. - MAXIMUM
- MIN. - MINIMUM
- N.T.S. - NOT TO SCALE
- OPP. - OPPOSITE
- PL. - PLATE
- R. - RADIUS
- SIM. - SIMILAR
- S.S. - STAINLESS STEEL
- T.O. - TOP OF
- TYP. - TYPICAL
- U/S - UNDERSIDE
- U.N.O. - UNLESS NOTED OTHERWISE
- WP. - WORK POINT

ISSUED FOR TENDER

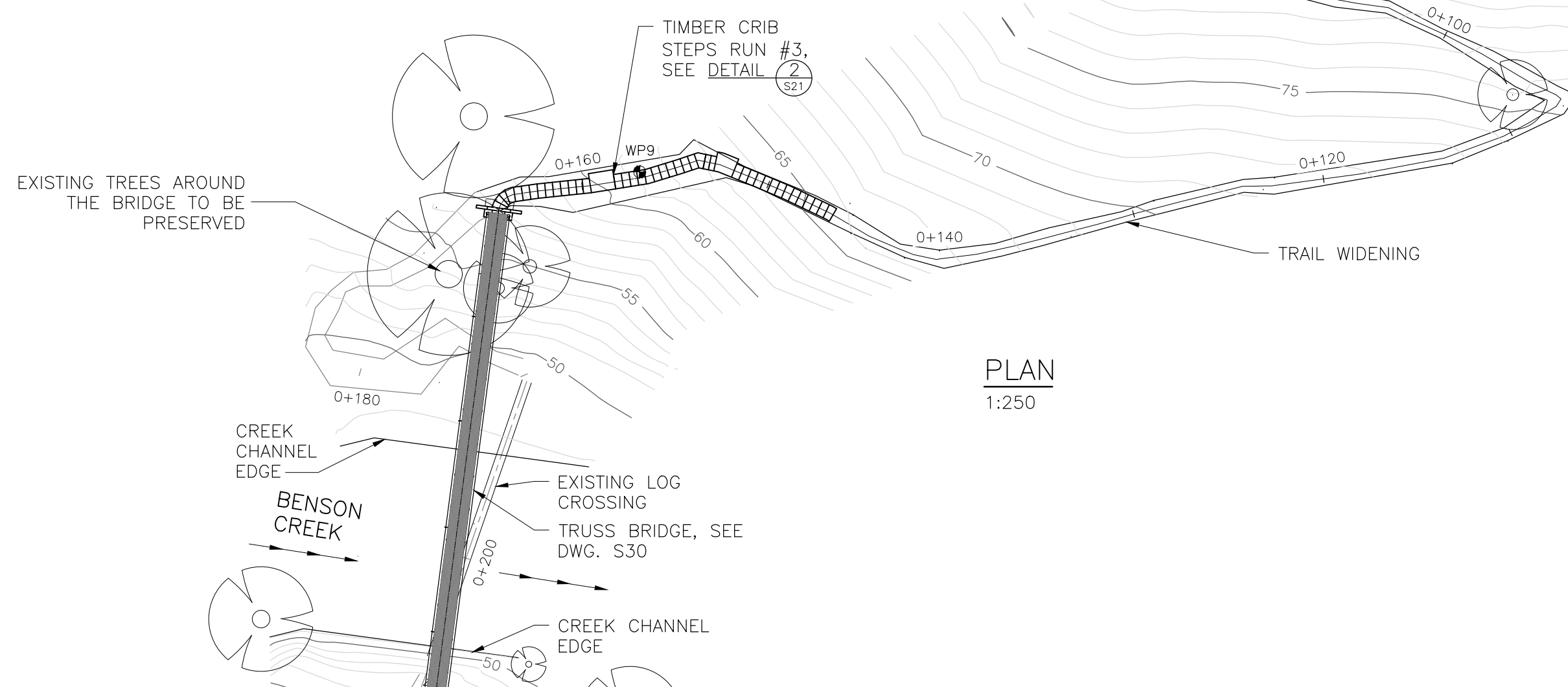
ISSUES						SUB CONSULTANT	DRAFTED PHU	 HEROLD ENGINEERING <small>3701 Shenton Rd, Nanaimo, BC V9T 2H1 Tel: 250-751-8558 Fax: 250-751-8559 Email: mail@heroldengineering.com</small>	ENGINEERS SEAL	GENERAL NOTES	BENSON CREEK FALLS REGIONAL PARK FEASIBILITY ASSESSMENT & CONCEPTUAL DESIGN	HEL PROJECT No. 0837-048	CLIENT DWG. No. N/A
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR							SCALE	PERMIT No.
A	2020.04.08	PERMIT										AS SHOWN	N/A
B	2020.06.10	CLIENT REVIEW											
													REVISION
S01												B	



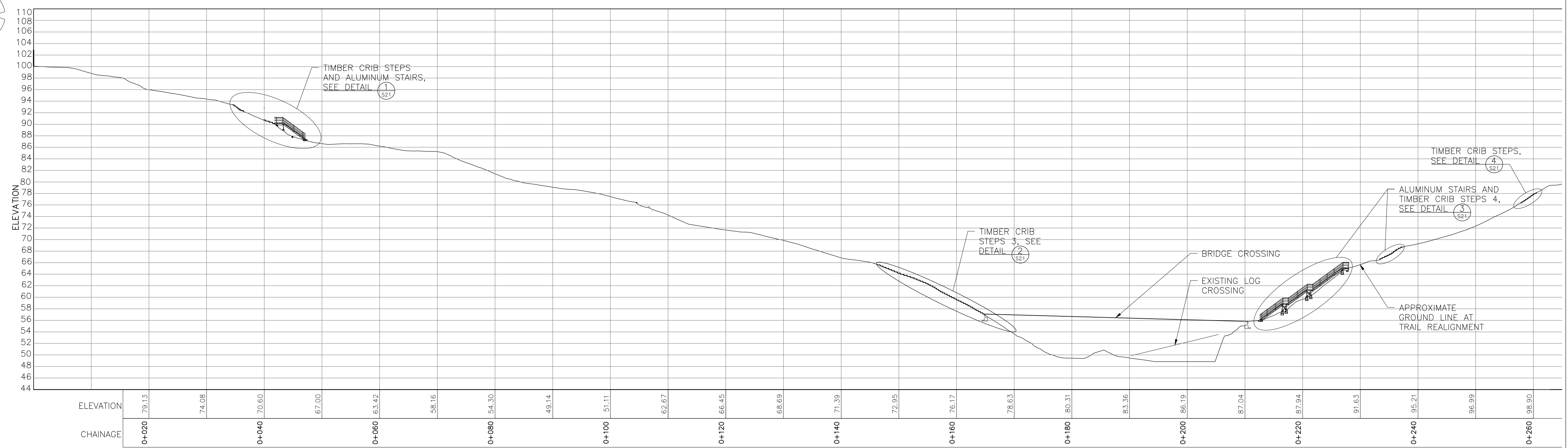
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WORK POINT	DETAIL
WP 1	CEDAR SPLIT FENCE
WP 2	CEDAR SPLIT FENCE
WP 3	WOODEN CRIB STEPS
WP 4	ALUMINUM STAIRS
WP 8	TRAIL WIDENING
WP 9	WOODEN CRIB STEPS
WP 10	27.3 METRE ALUMINUM TRUSS BRIDGE
WP 12	ALUMINUM STAIRS
WP 14	WOODEN CRIB STEPS
WP 15	WOODEN CRIB STEPS
WP 17	TRAIL EROSION

ISSUED FOR TENDER

- NOTES:**
- FOR GENERAL NOTES, SEE DWG. S01
 - ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.



PLAN
1:250



CENTERLINE PROFILE OF EXISTING TRAIL
1:400

ISSUES					
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW			
B	2019.11.22	CLIENT REVIEW			
C	2020.01.20	CLIENT REVIEW			
D	2020.04.06	PERMIT			
F	2020.06.10	CLIENT REVIEW	F	2020.06.11	TENDER

SUB CONSULTANT

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DRAFTING REVIEW
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DESIGNED
AS
DESIGN REVIEW
—

HEROLD ENGINEERING

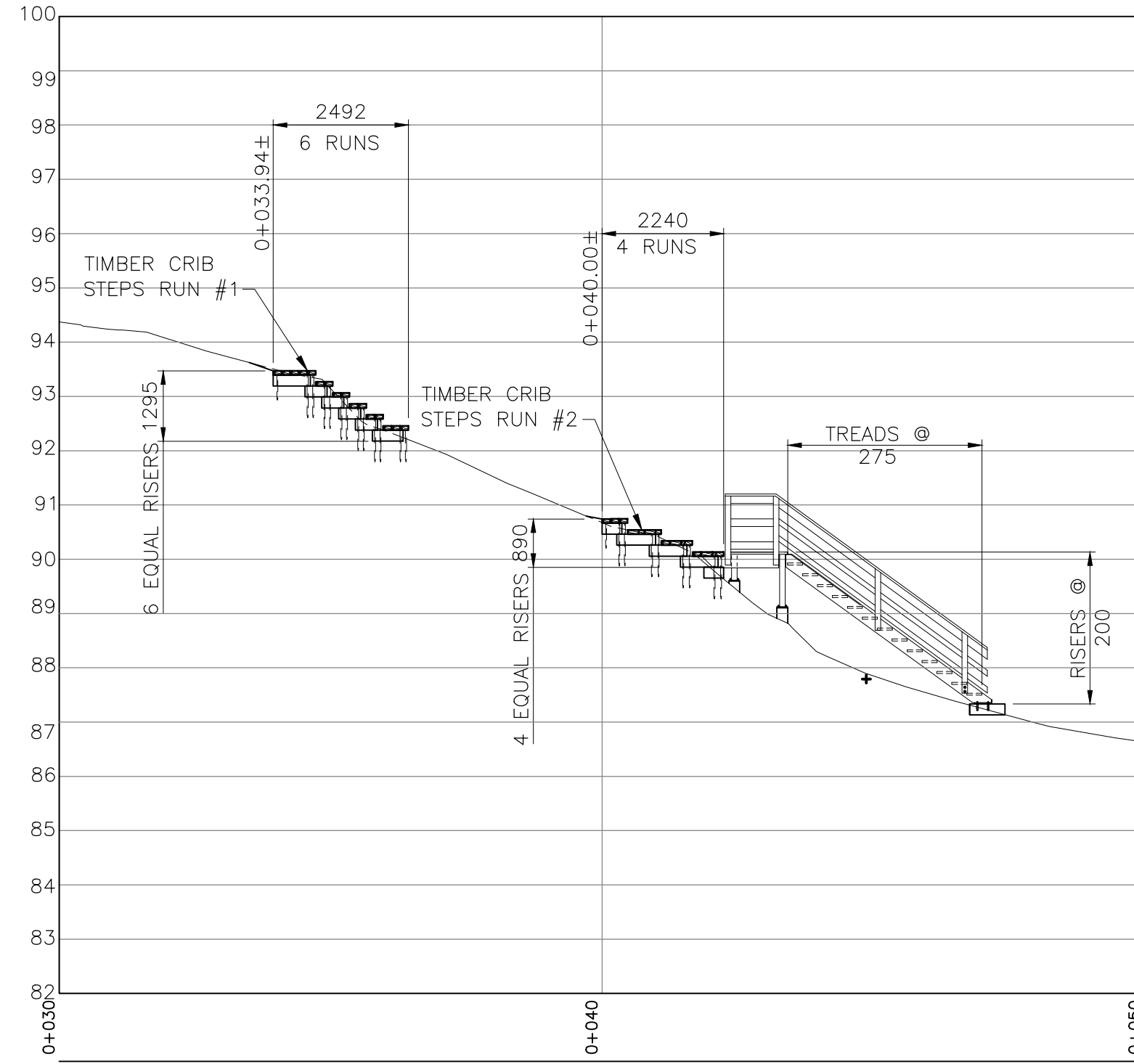
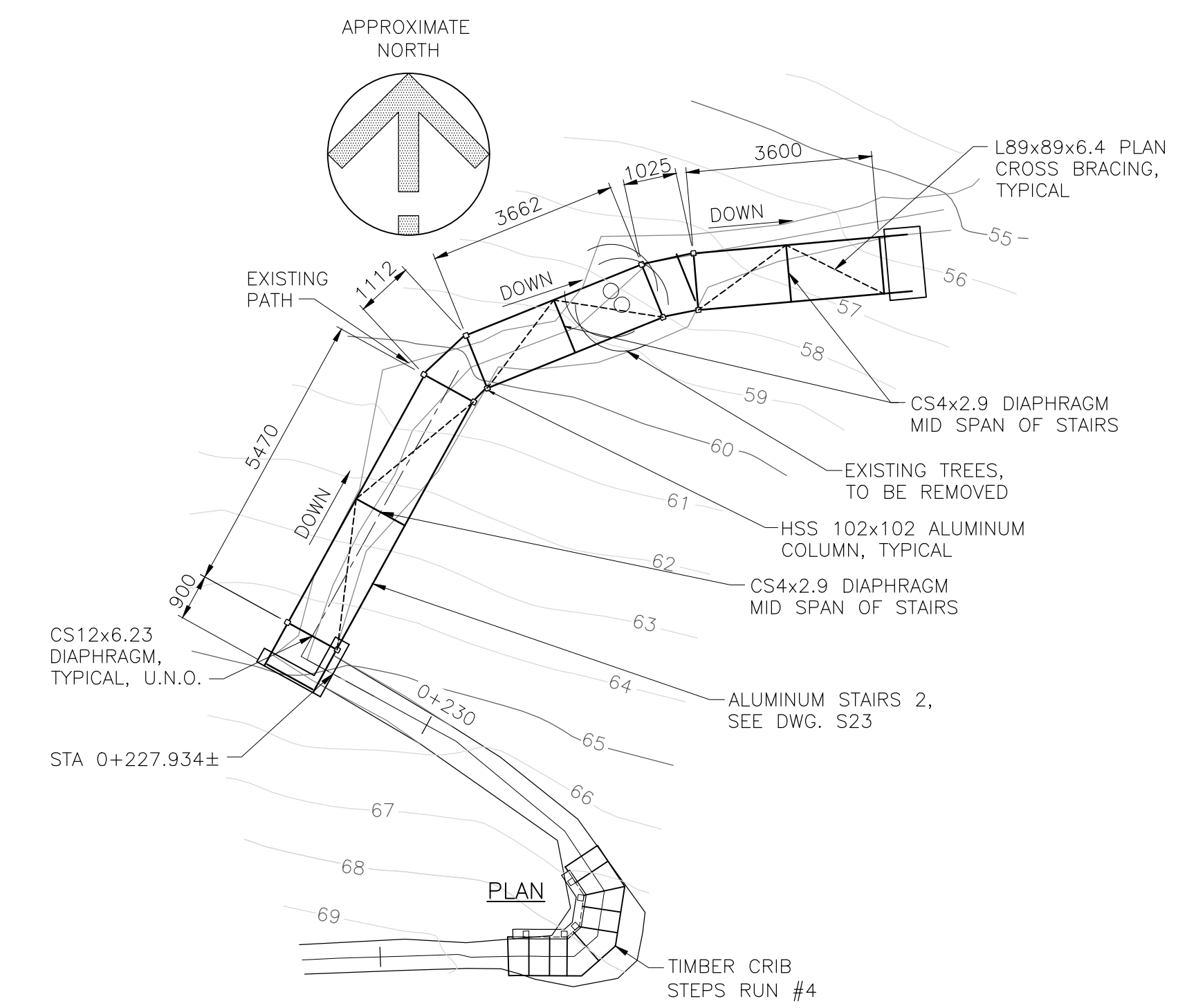
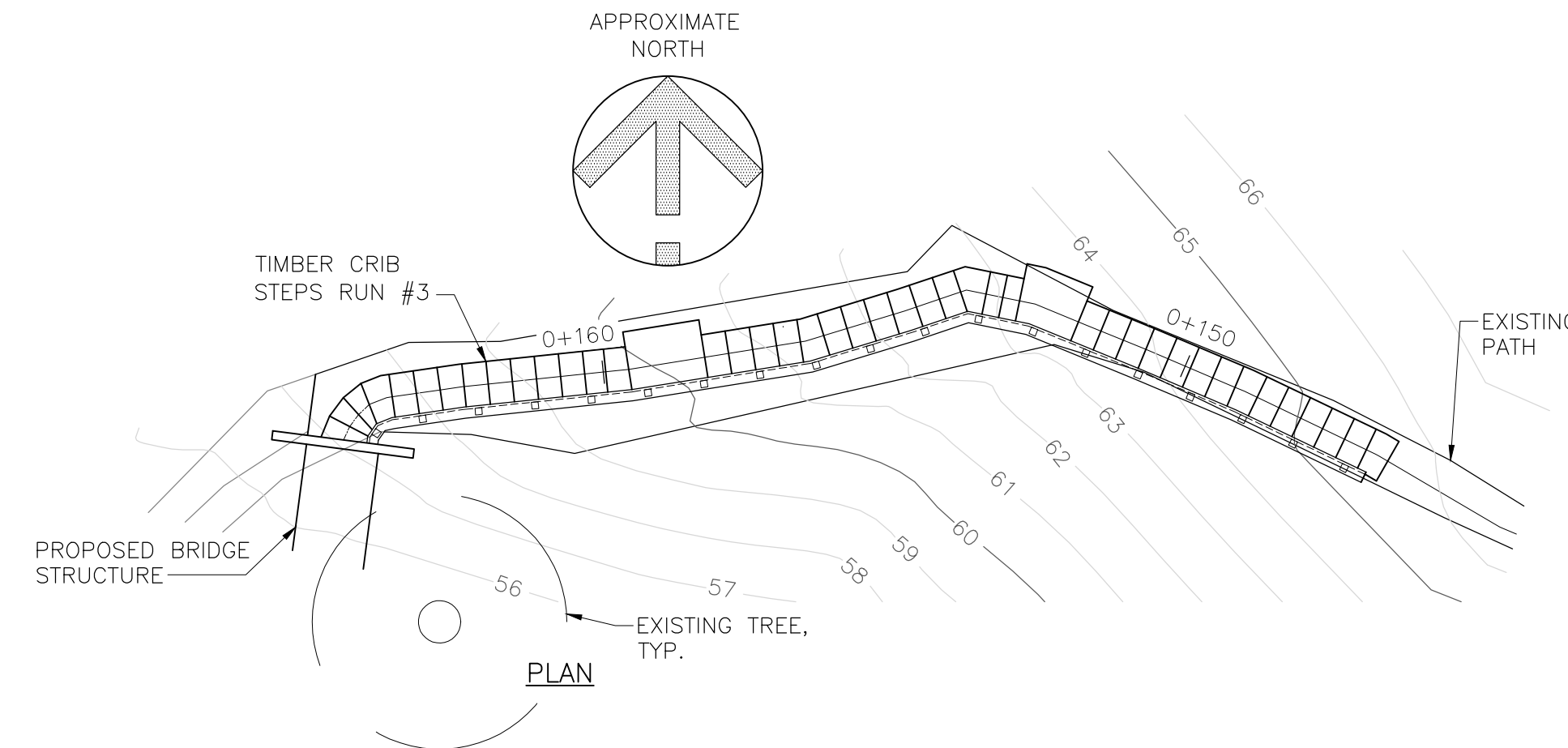
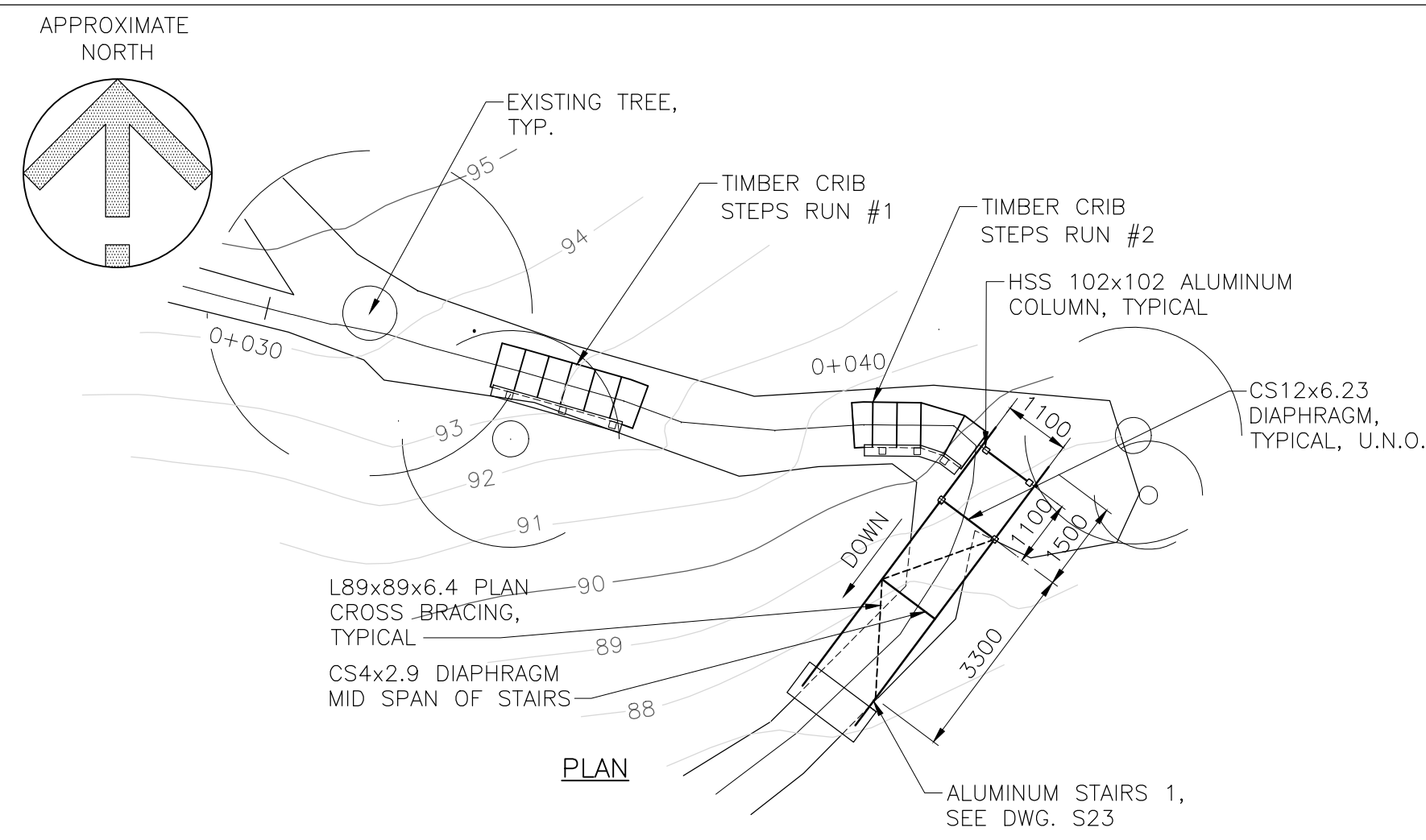
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

ENGINEERS SEAL

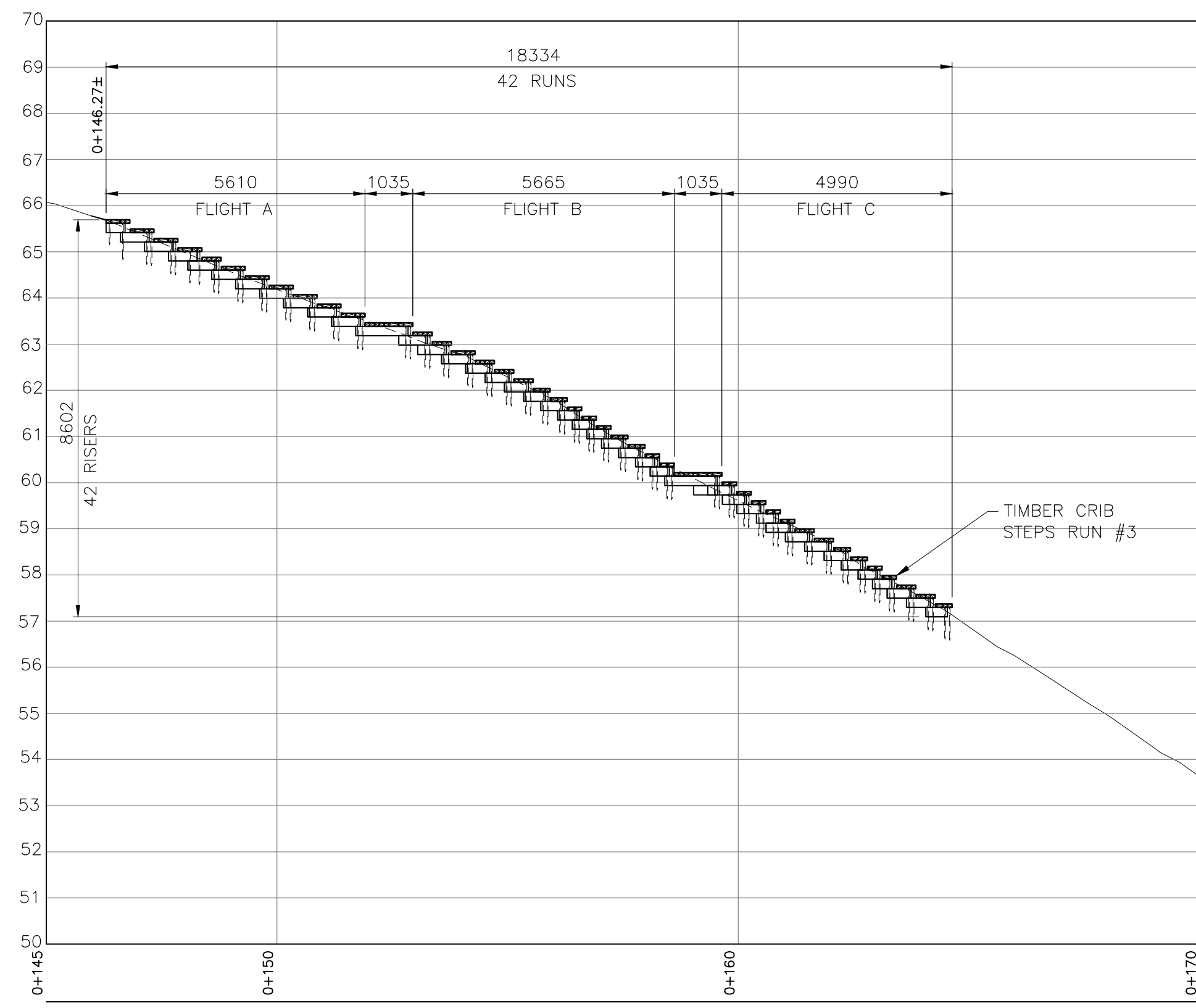
**CREEK CROSSING
SITE 1 - PLAN AND
PROFILE**

**BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO**

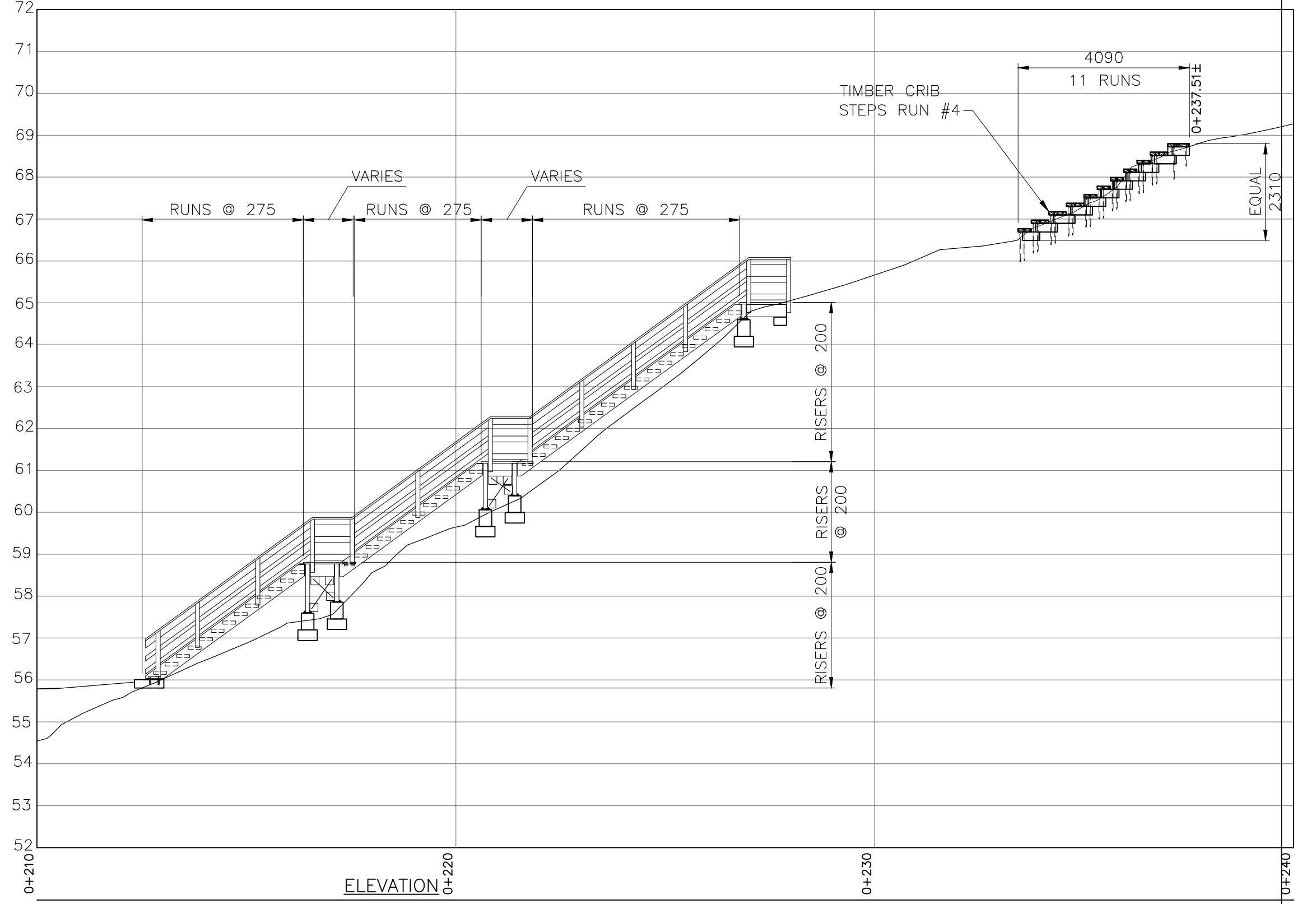
HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S20	REVISION F



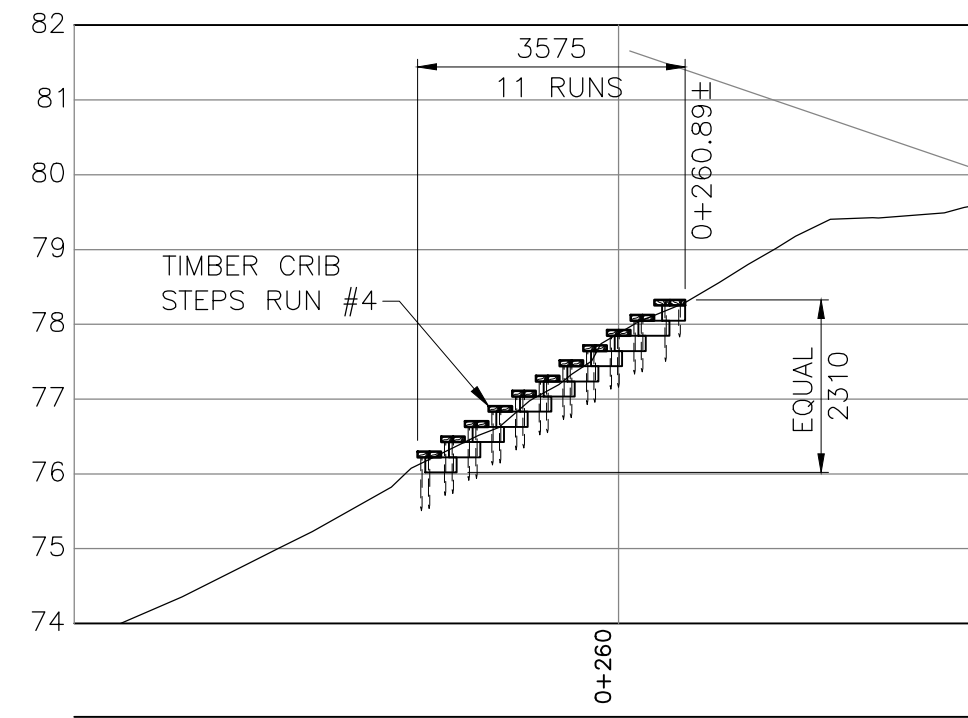
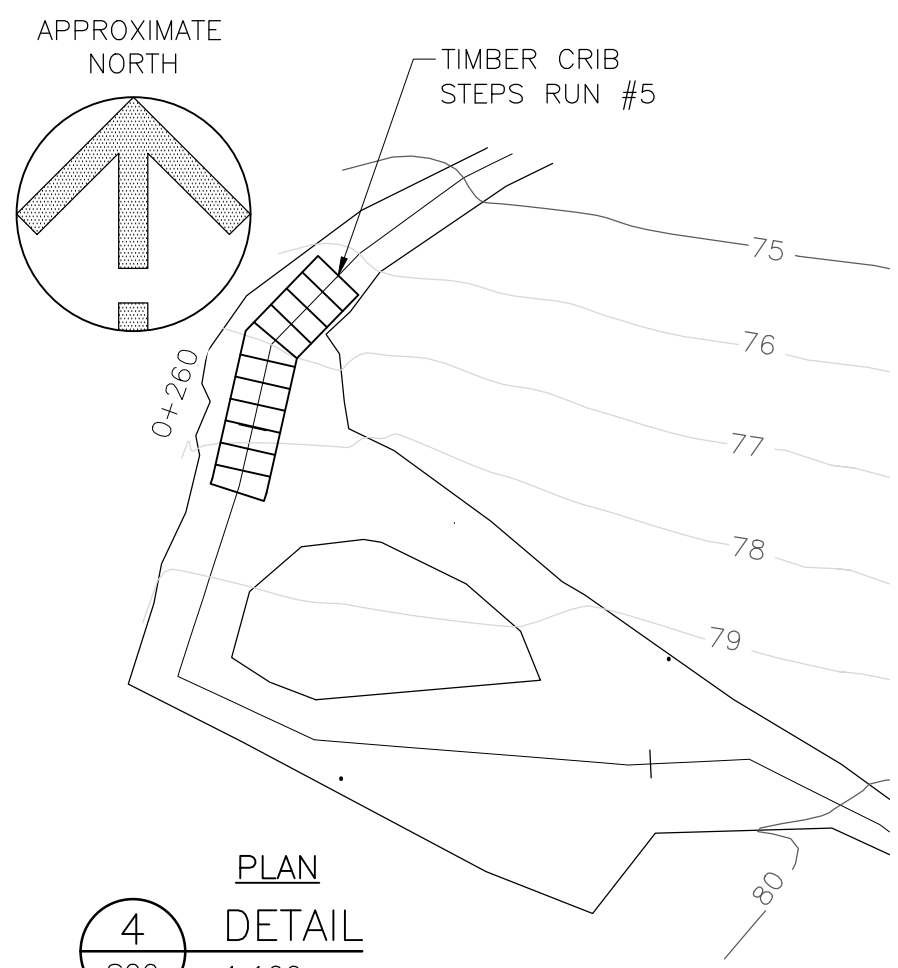
1 DETAIL
S20 1:100
NOTE: CRIB STAIR DELINEATOR NOT SHOWN ON ELEVATIONS, TYP.



2 DETAIL
S20 1:100
NOTE: CRIB STAIR DELINEATOR NOT SHOWN ON ELEVATIONS, TYP.



3 DETAIL
S20 1:100
NOTE: CRIB STAIR DELINEATOR NOT SHOWN ON ELEVATIONS, TYP.



4 DETAIL
S20 1:100

ISSUED FOR TENDER

- NOTES:**
- FOR GENERAL NOTES, SEE DWG. S01
 - ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.
 - ALL DIMENSIONS TO BE CONFIRMED BY CONTRACTOR.

ISSUES			SUB CONSULTANT		
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW			
B	2019.11.22	CLIENT REVIEW			
C	2020.01.20	CLIENT REVIEW			
D	2020.04.06	PERMIT			
E	2020.06.10	CLIENT REVIEW			
F	2020.06.11	TENDER			

HEROLD ENGINEERING

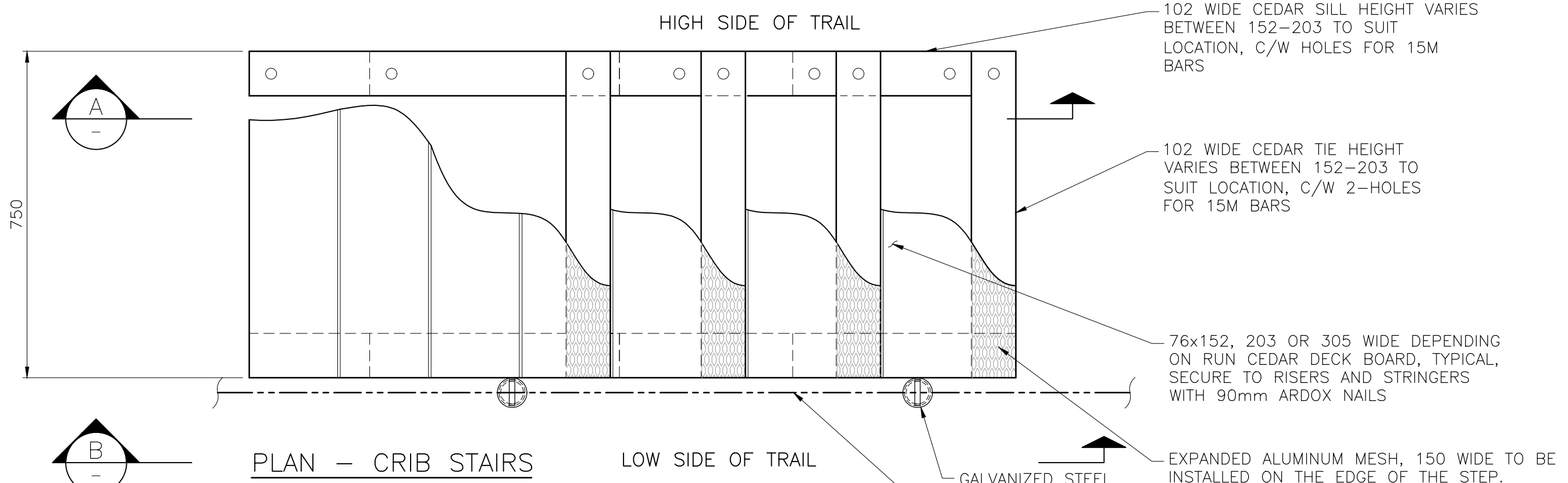
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

**CREEK CROSSING
SITE 1 - DETAILS AND
ELEVATIONS**

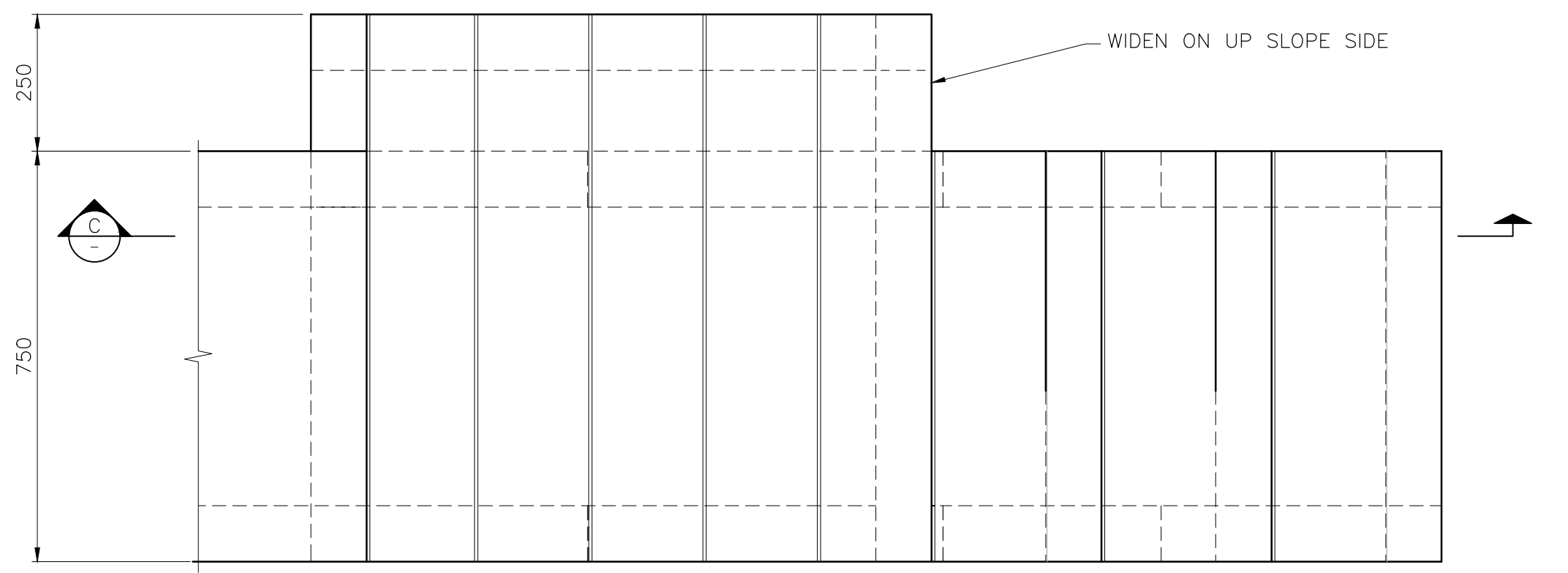
**BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO**

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S21	REVISION F

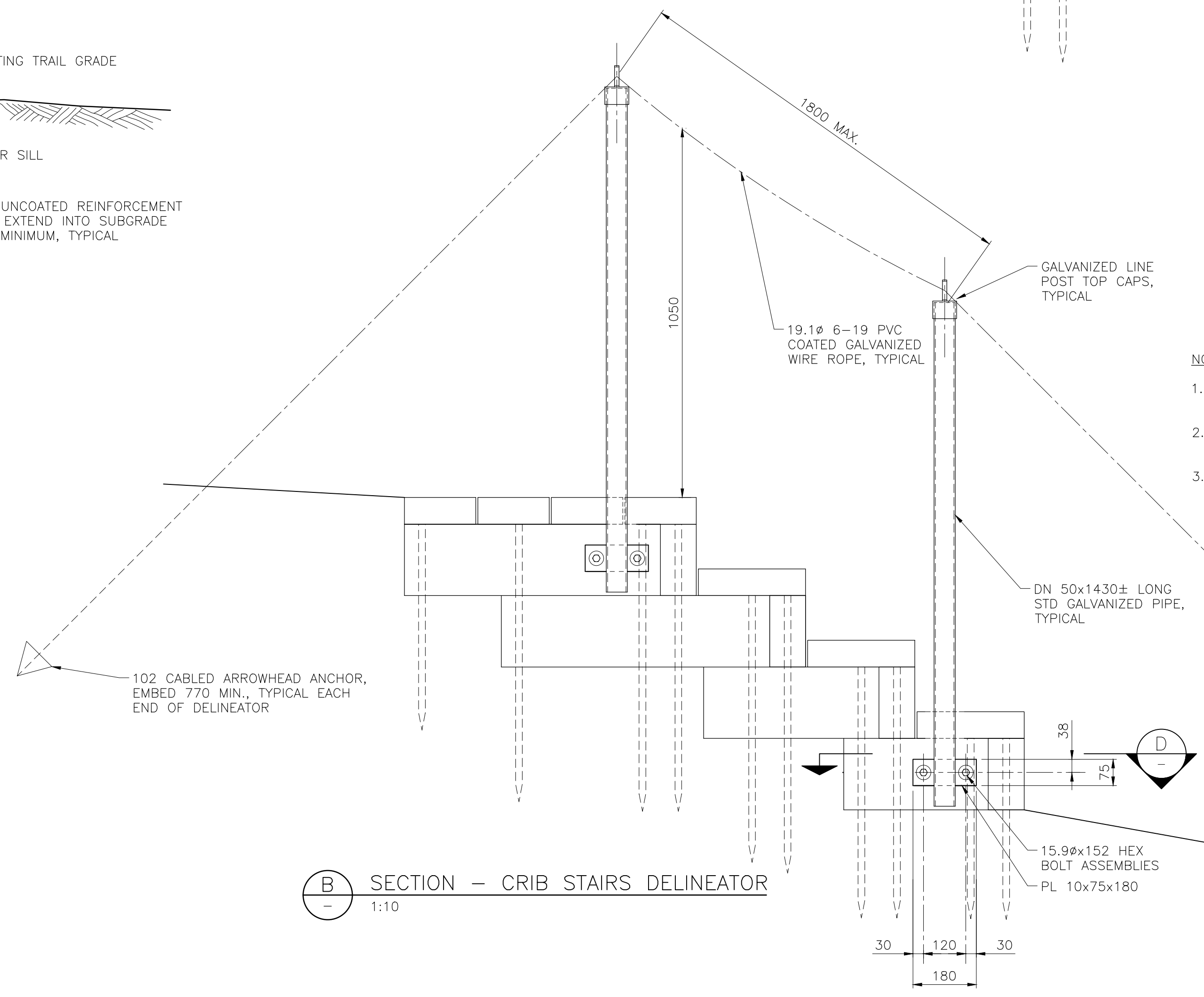
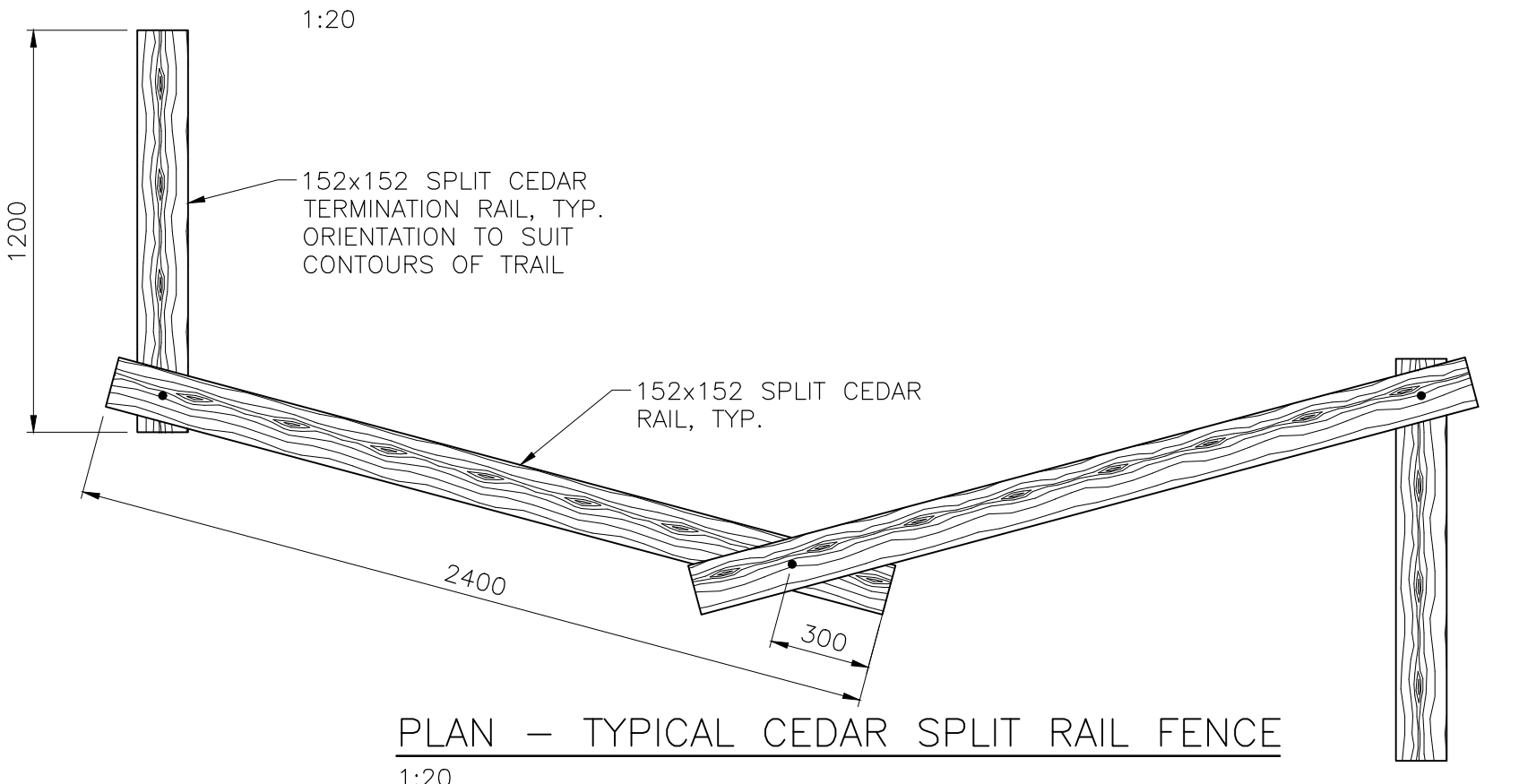
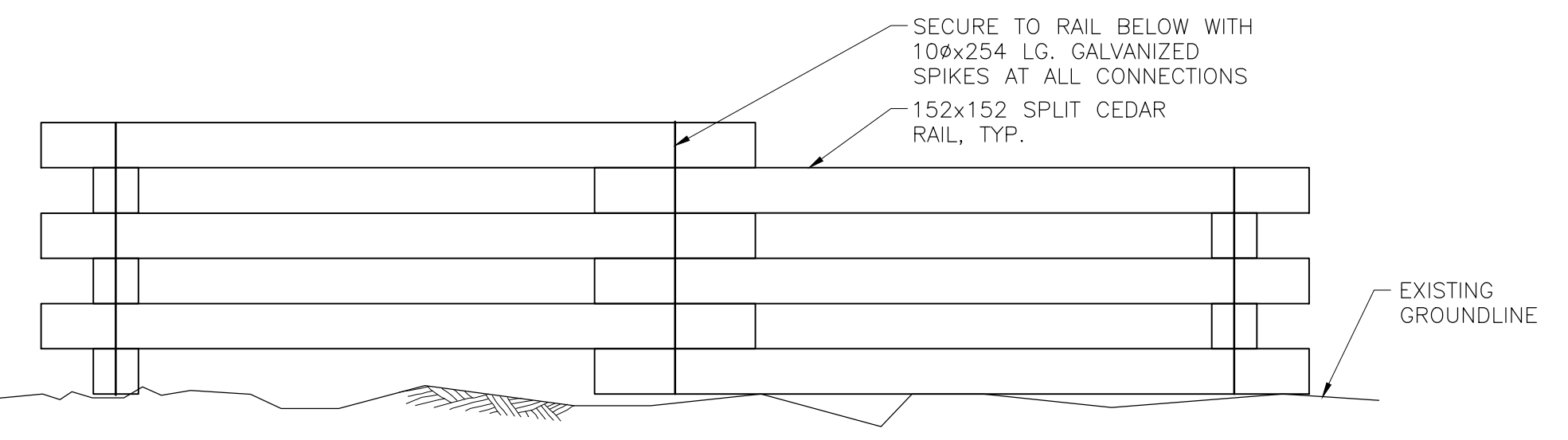
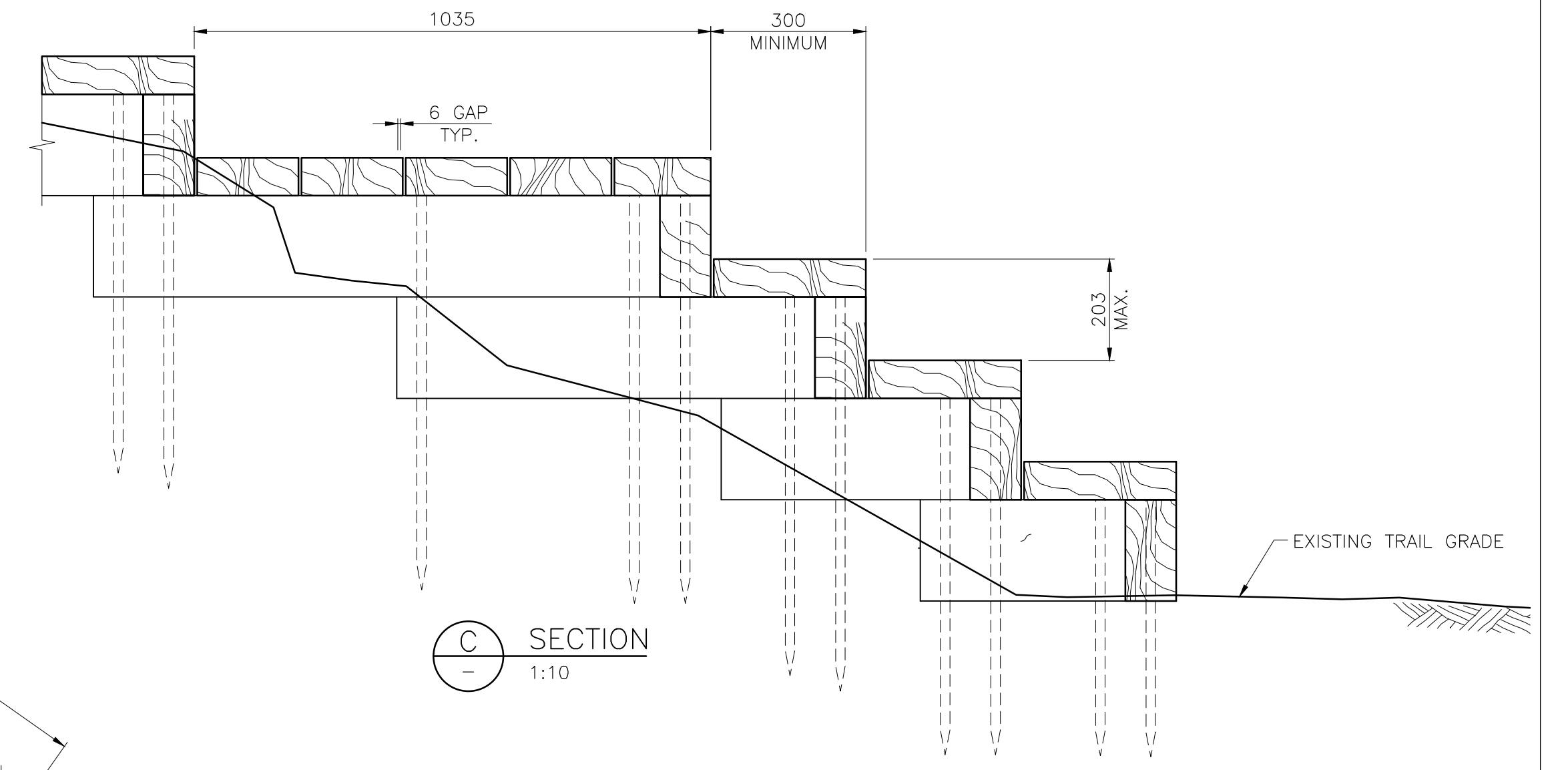
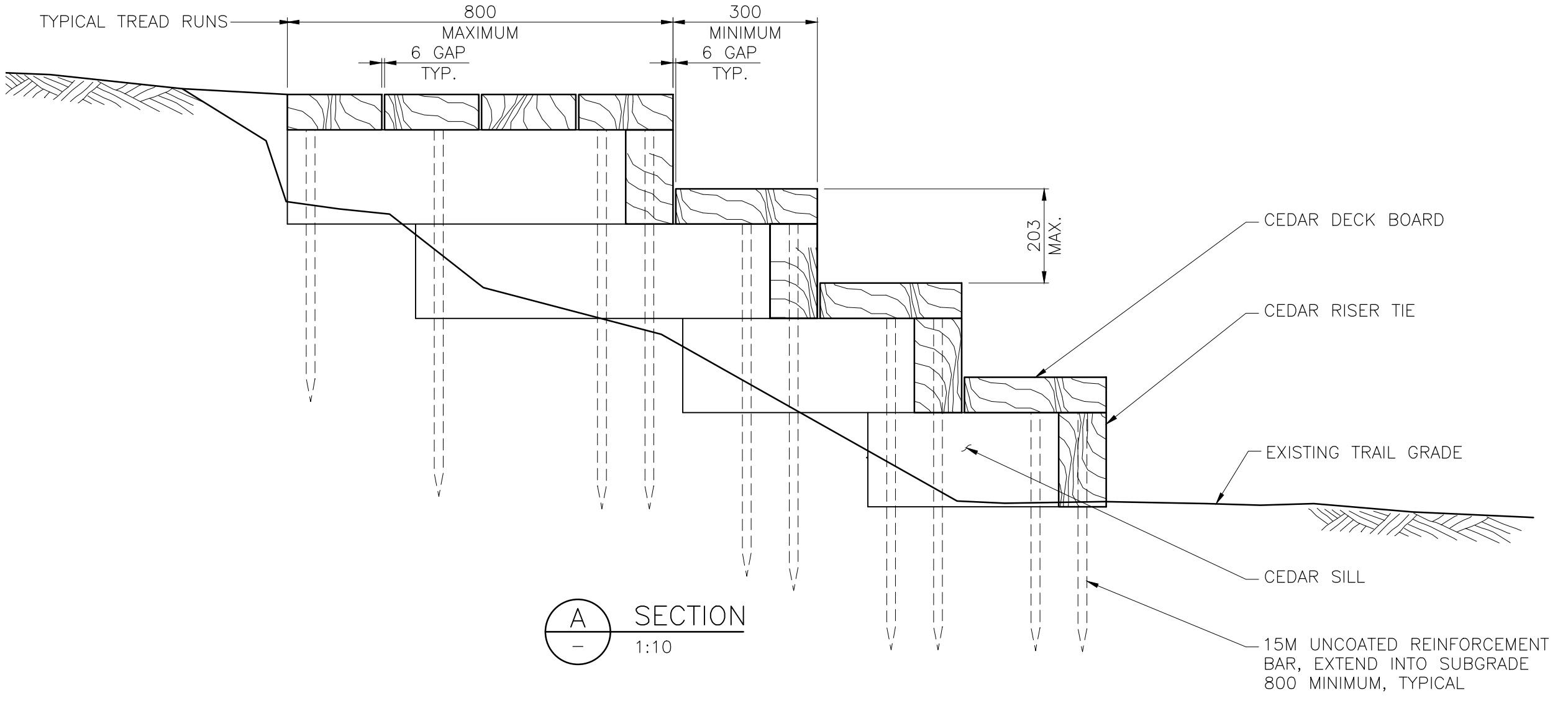
ARCHITECTURAL D 24" x 36" | File: \\herold\shared\2020\06\Benson_Creek_Falls_Improvements\CAD_Support\Access\Access_Crossing_Site_1 - Typical Details Sheet.dwg, 11_29_2020 10:46:48 AM, 11_29_2020 10:46:48 AM, 11_29_2020 10:46:48 AM



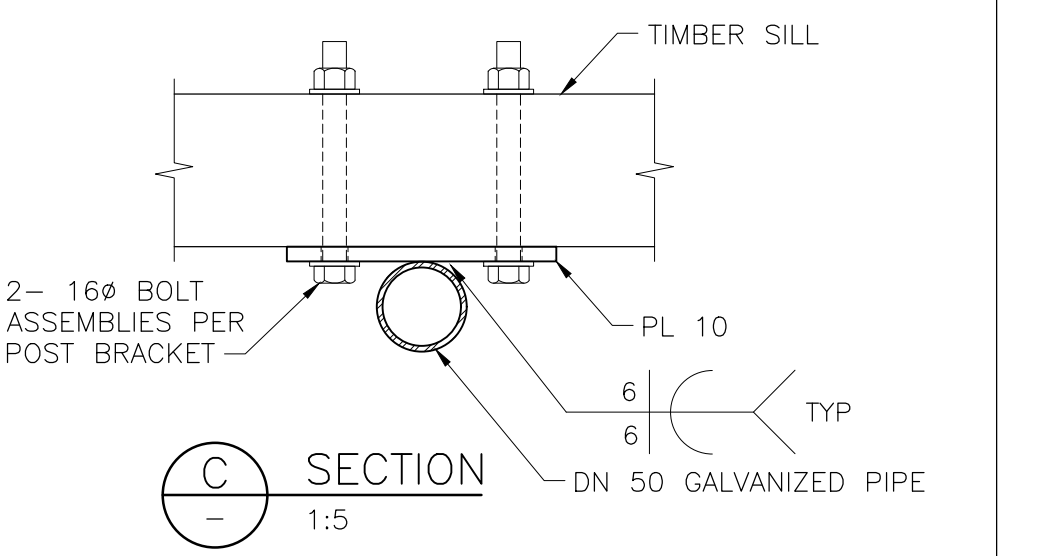
PLAN - CRIB STAIRS
1:10
NOTES:
1. FOR EXTENTS AND LOCATIONS, SEE DWG. S20 AND S21.
2. NOTE: ALL CEDAR TO BE ROUGH CUT, ACTUAL DIMENSION.
3. USE APPROPRIATE SIMPSON STRONG TIE OR APPROVED EQUAL FOR ALL STRINGER TO SILL CONNECTIONS.



PLAN - CRIB STAIR LANDING
1:10
NOTES:
1. SIMILAR TO CRIB STAIRS DETAIL UNLESS NOTED OTHERWISE.
2. EXPANDED ALUMINUM MESH NOT SHOWN.



NOTES:
1. FOR EXTENTS AND LOCATIONS, SEE DWG. S20 AND S21.
2. ALL HARDWARE TO BE HOT DIPPED GALVANIZED.
3. HEX BOLT ASSEMBLIES INCLUDE HEX BOLT, NUT AND WASHERS.



NOTES:
1. FOR GENERAL NOTES, SEE DWG. S01
2. ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.

ISSUED FOR TENDER

ISSUES					
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW	F	2020.06.11	TENDER
B	2019.11.22	CLIENT REVIEW			
C	2020.01.20	CLIENT REVIEW			
D	2020.04.06	PERMIT			
E	2020.06.10	CLIENT REVIEW			

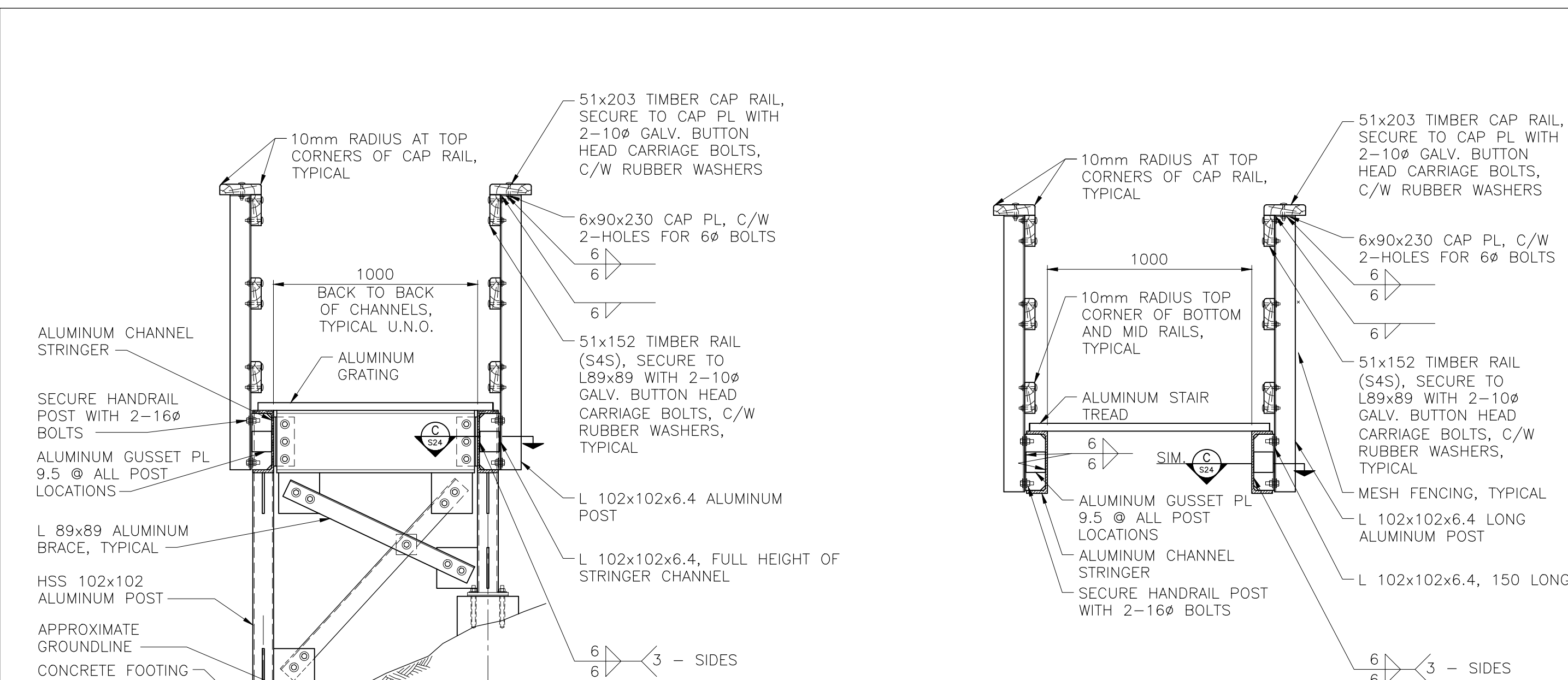
SUB CONSULTANT	

HEROLD ENGINEERING
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

ENGINEERS SEAL
CREEK CROSSING SITE 1 - TYPICAL DETAILS SHEET 1

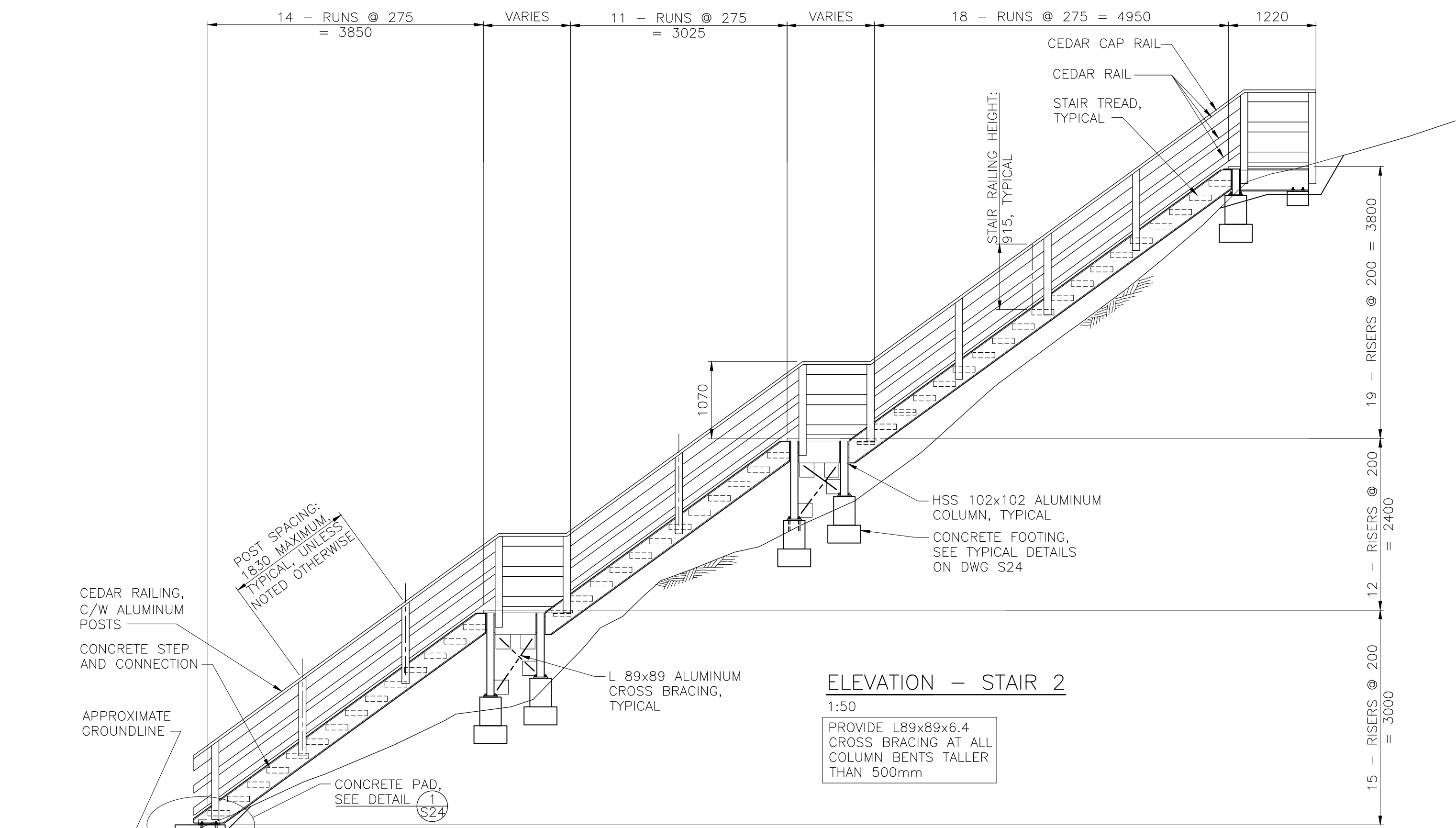
BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S22	REVISION F

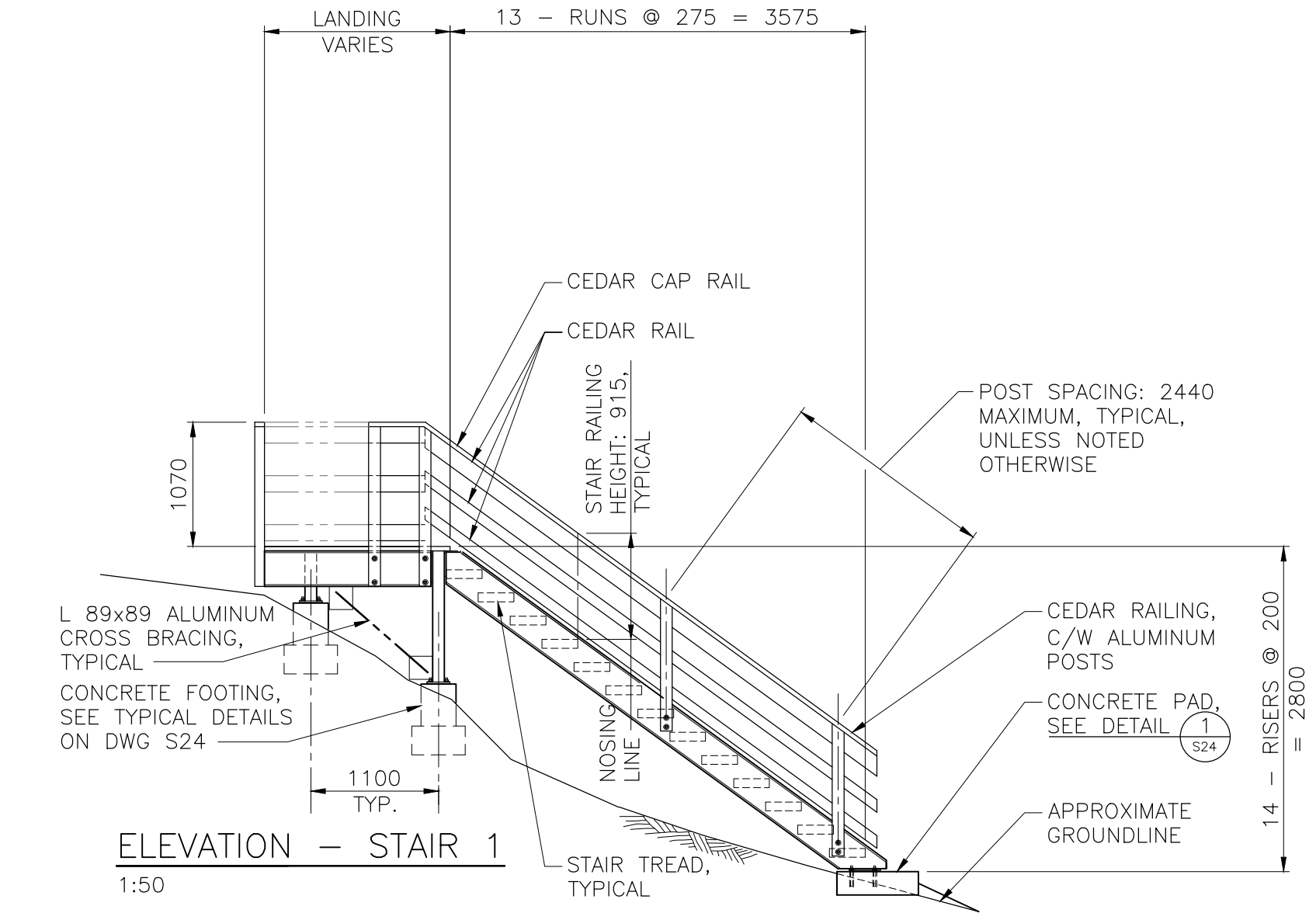


TYPICAL TRANSVERSE SECTION - STAIRS
1:20

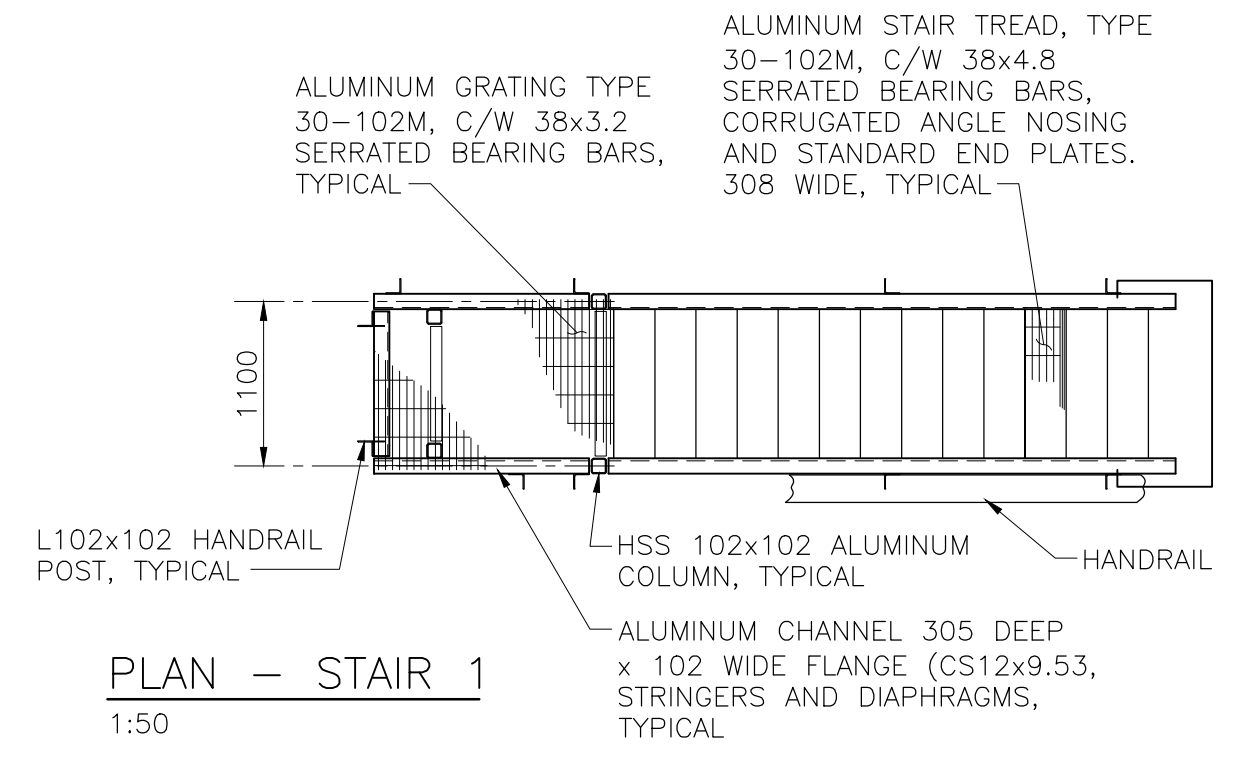
TYPICAL SECTION - LANDING
1:20



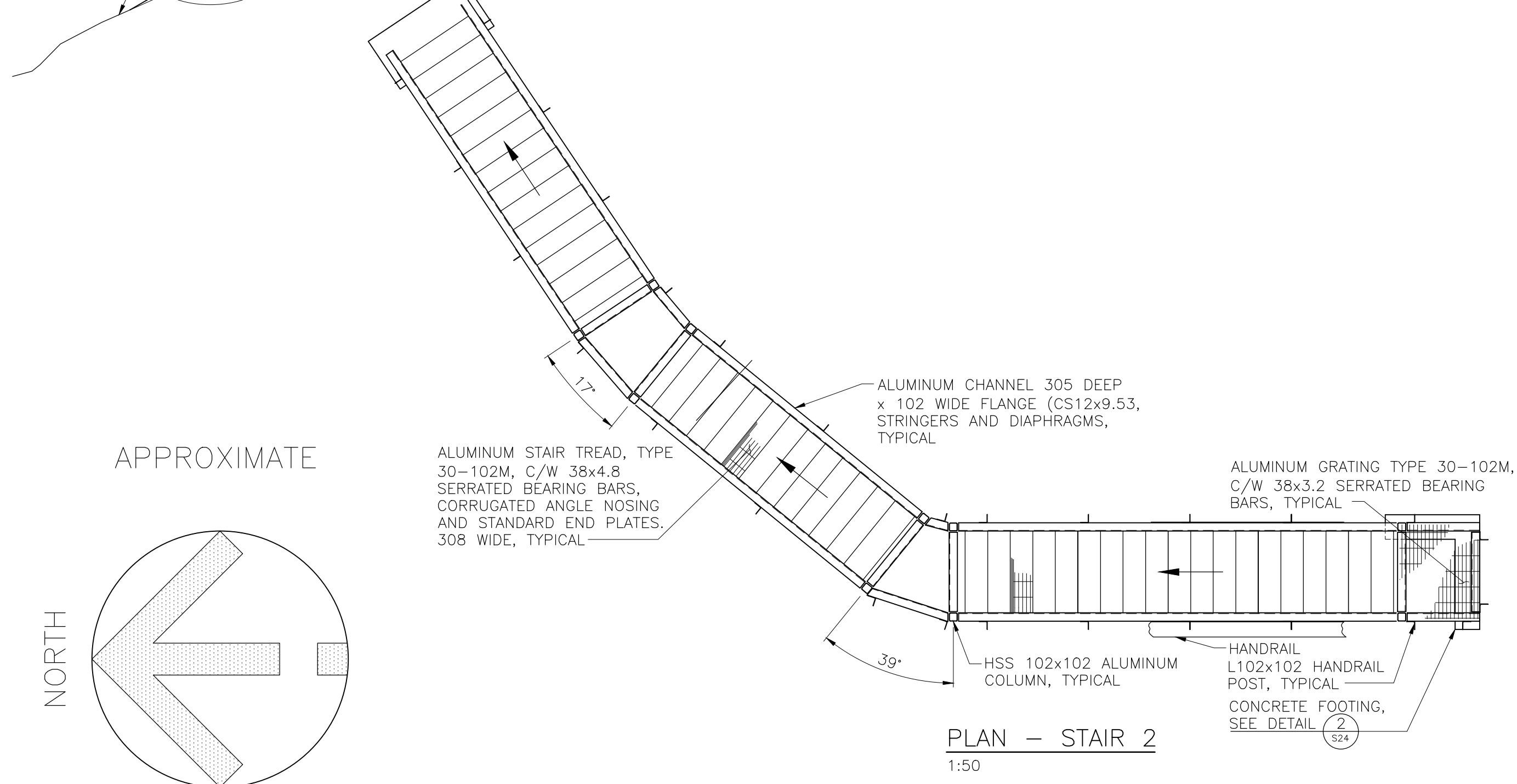
ELEVATION - STAIR 2
1:50



ELEVATION - STAIR 1
1:50



PLAN - STAIR 1
1:50



PLAN - STAIR 2
1:50

ISSUED FOR TENDER

- NOTES:
- FOR GENERAL NOTES, SEE DWG. S01
 - ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.

ISSUES				SUB CONSULTANT				
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2020.01.20	CLIENT REVIEW						
B	2020.04.06	PERMIT						
C	2020.06.10	CLIENT REVIEW						
D	2020.06.11	TENDER						

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AS

DESIGN REVIEW
-

HEROLD ENGINEERING

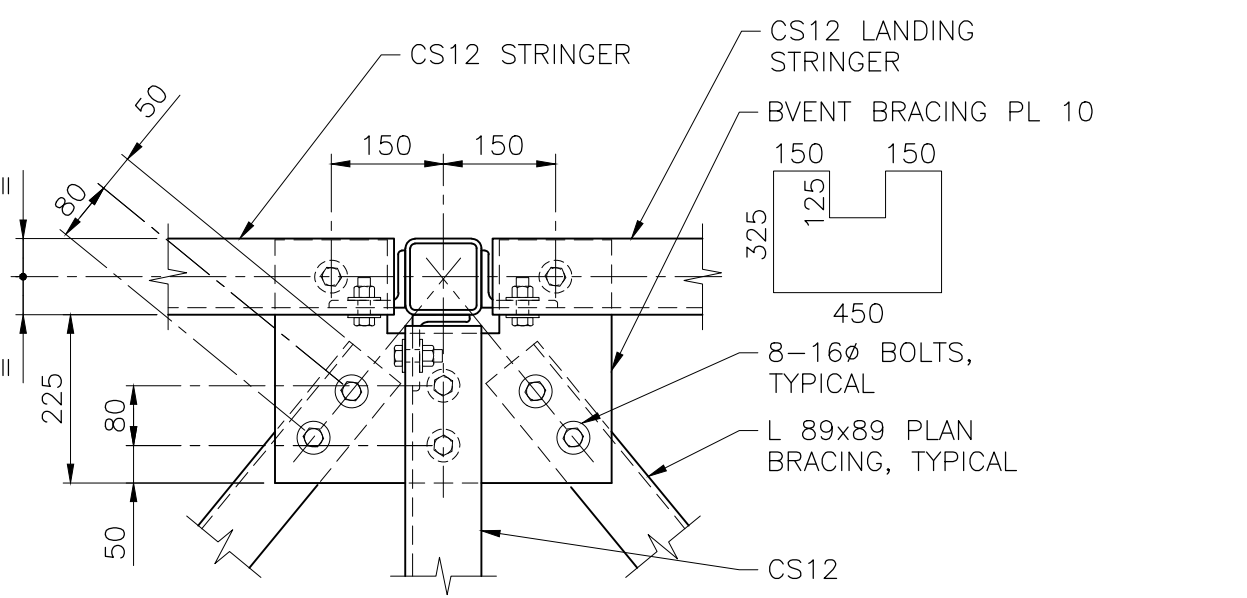
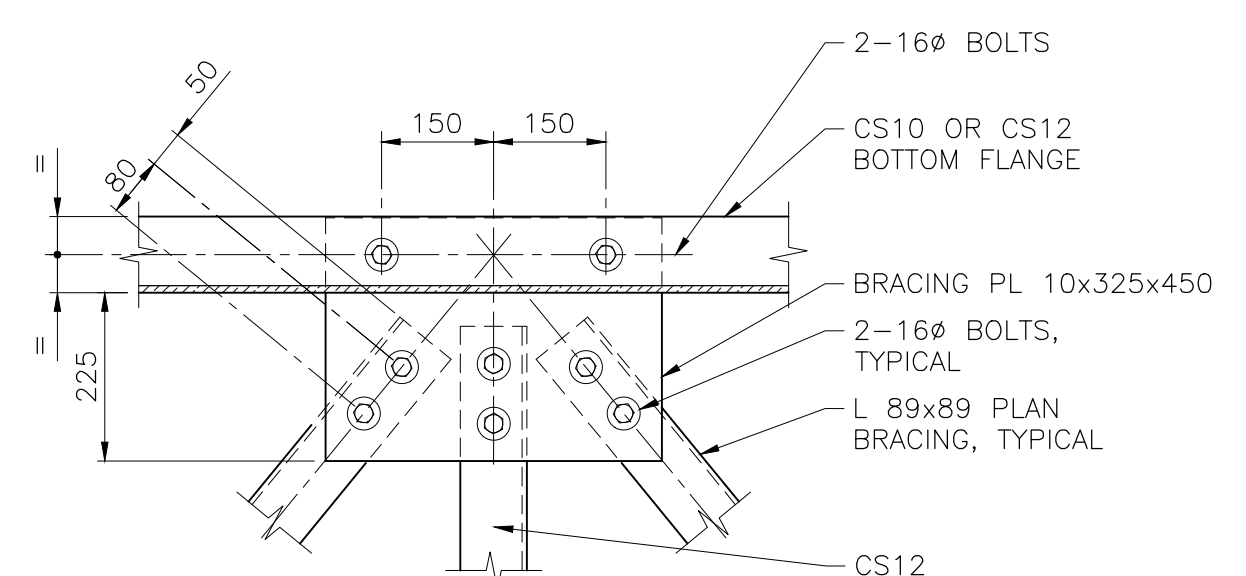
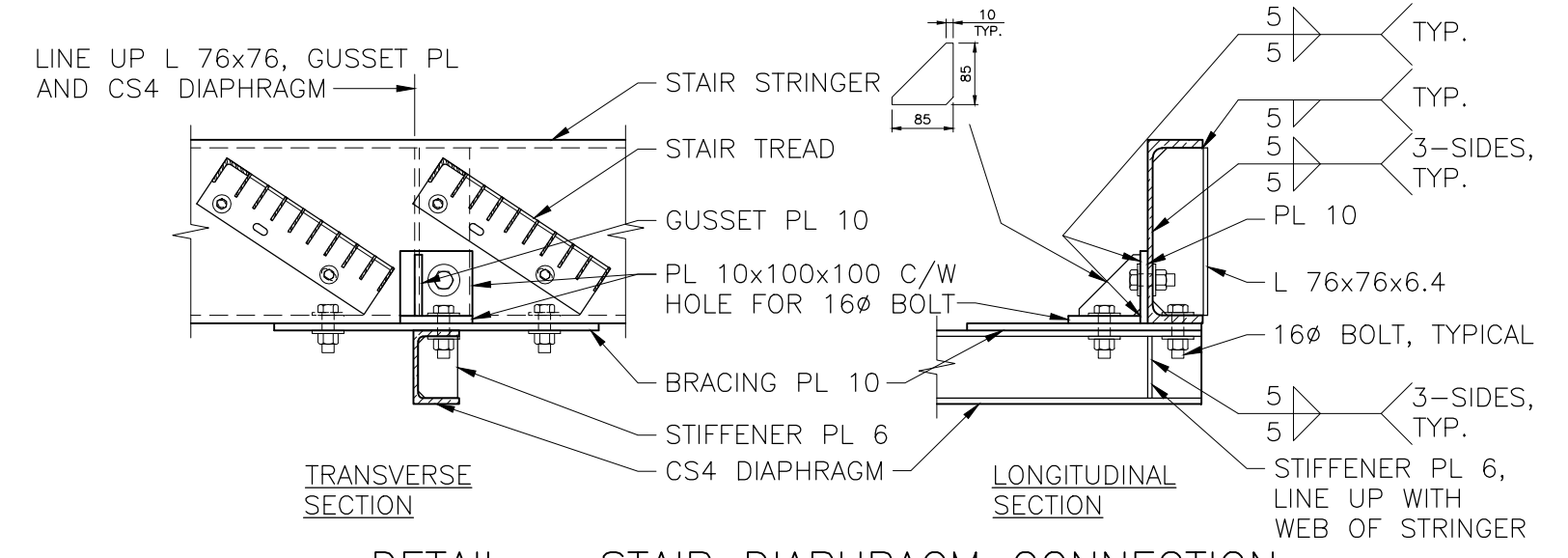
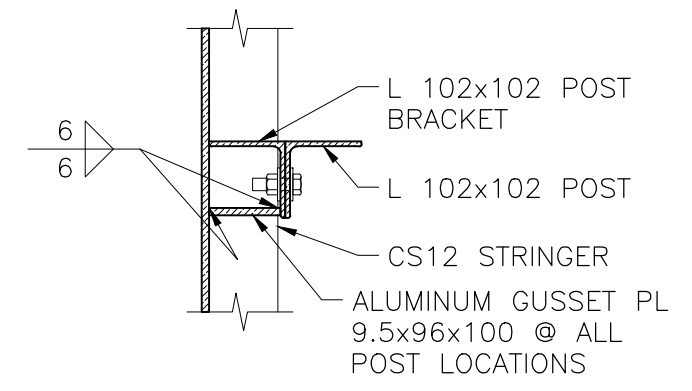
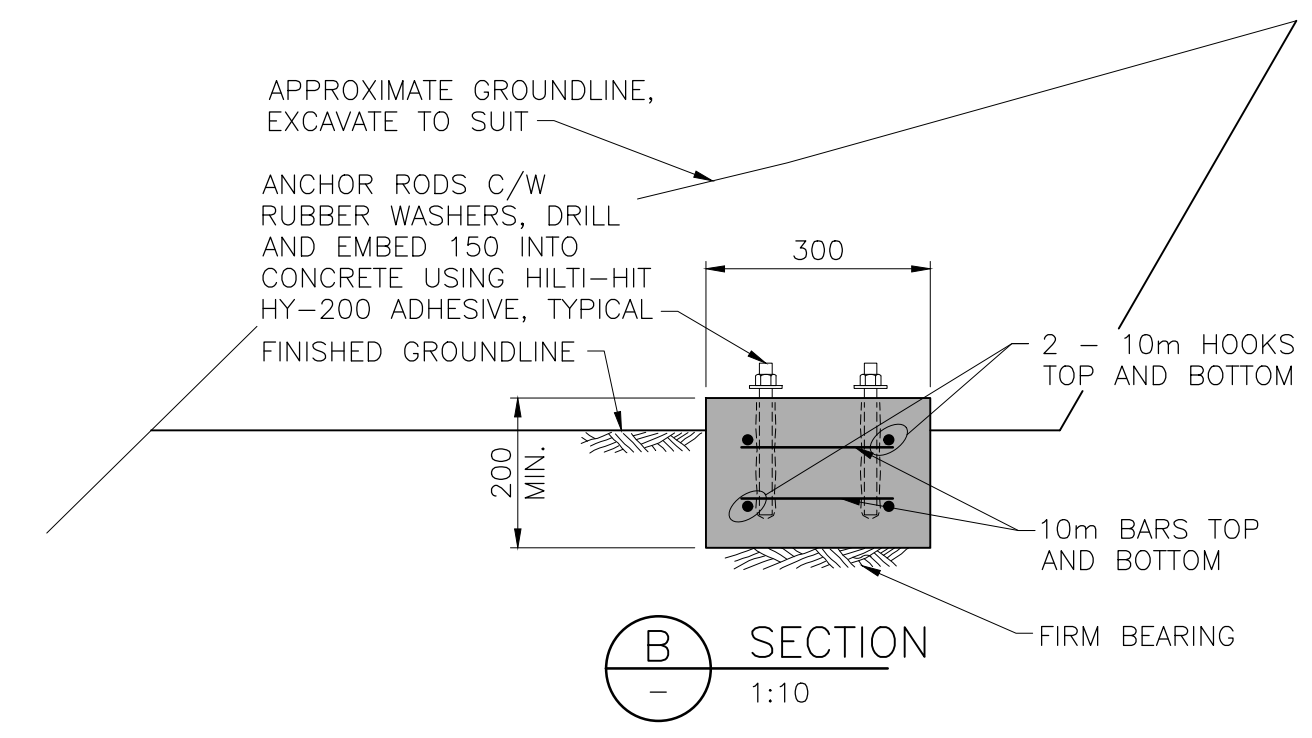
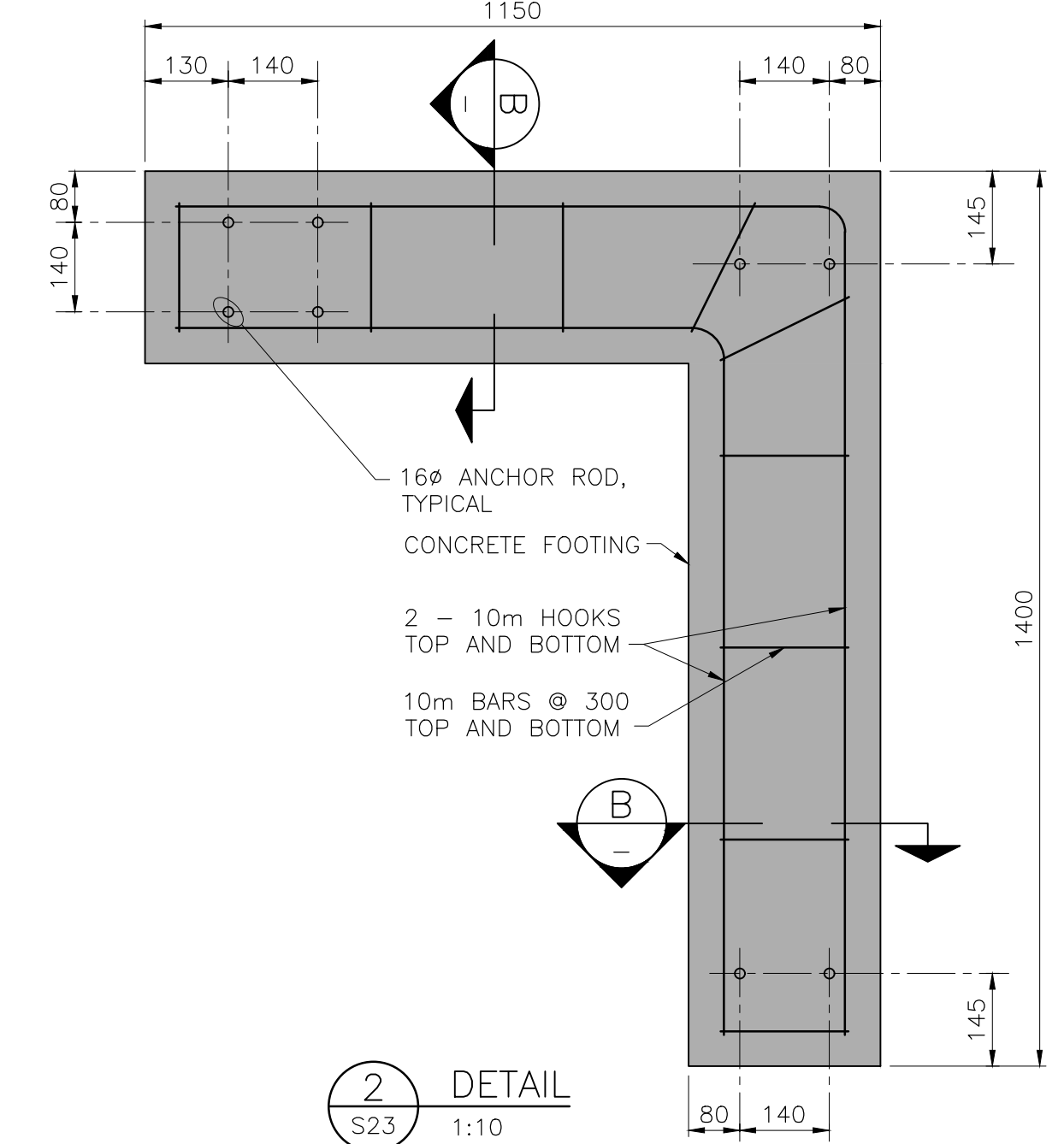
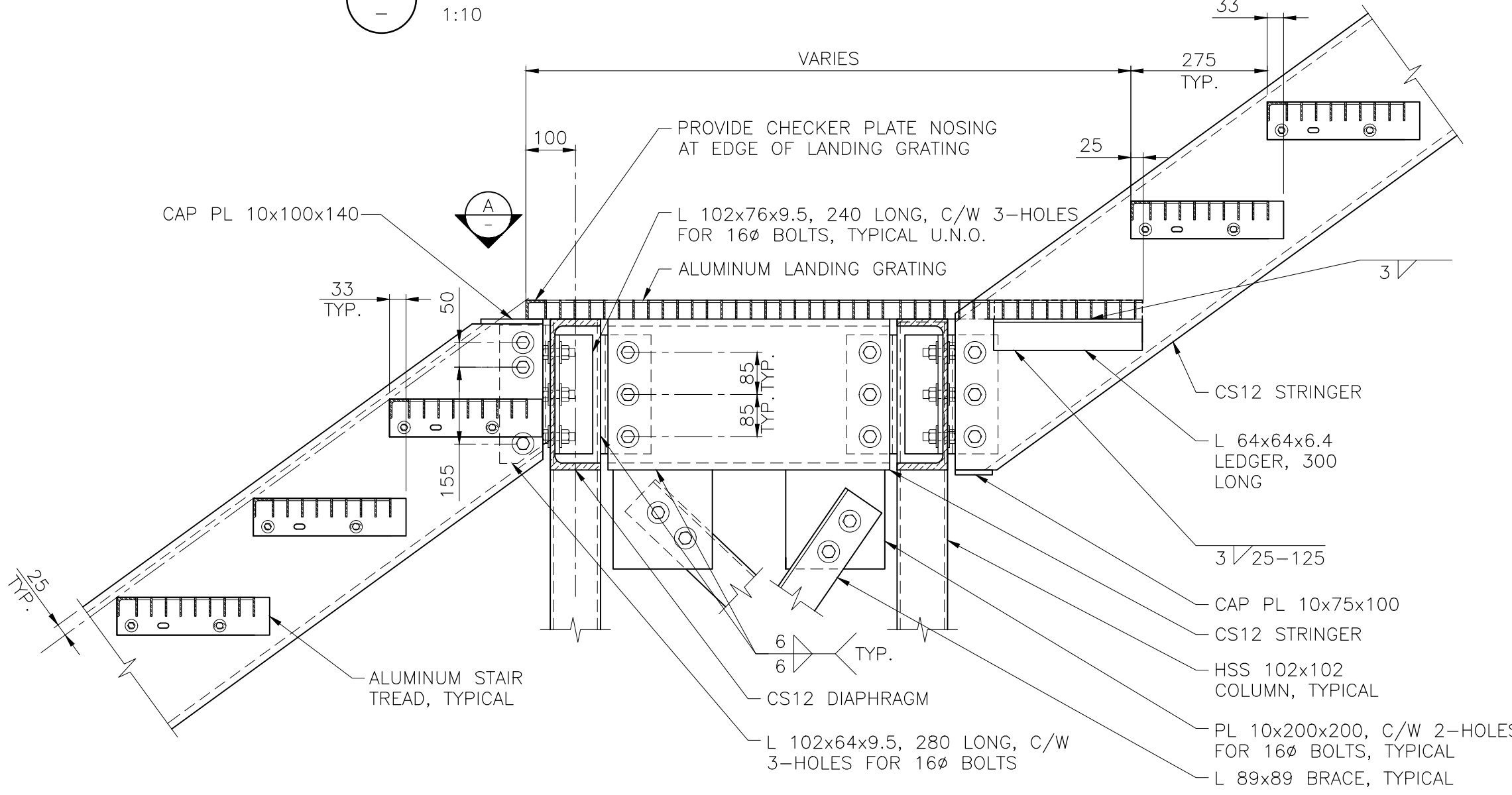
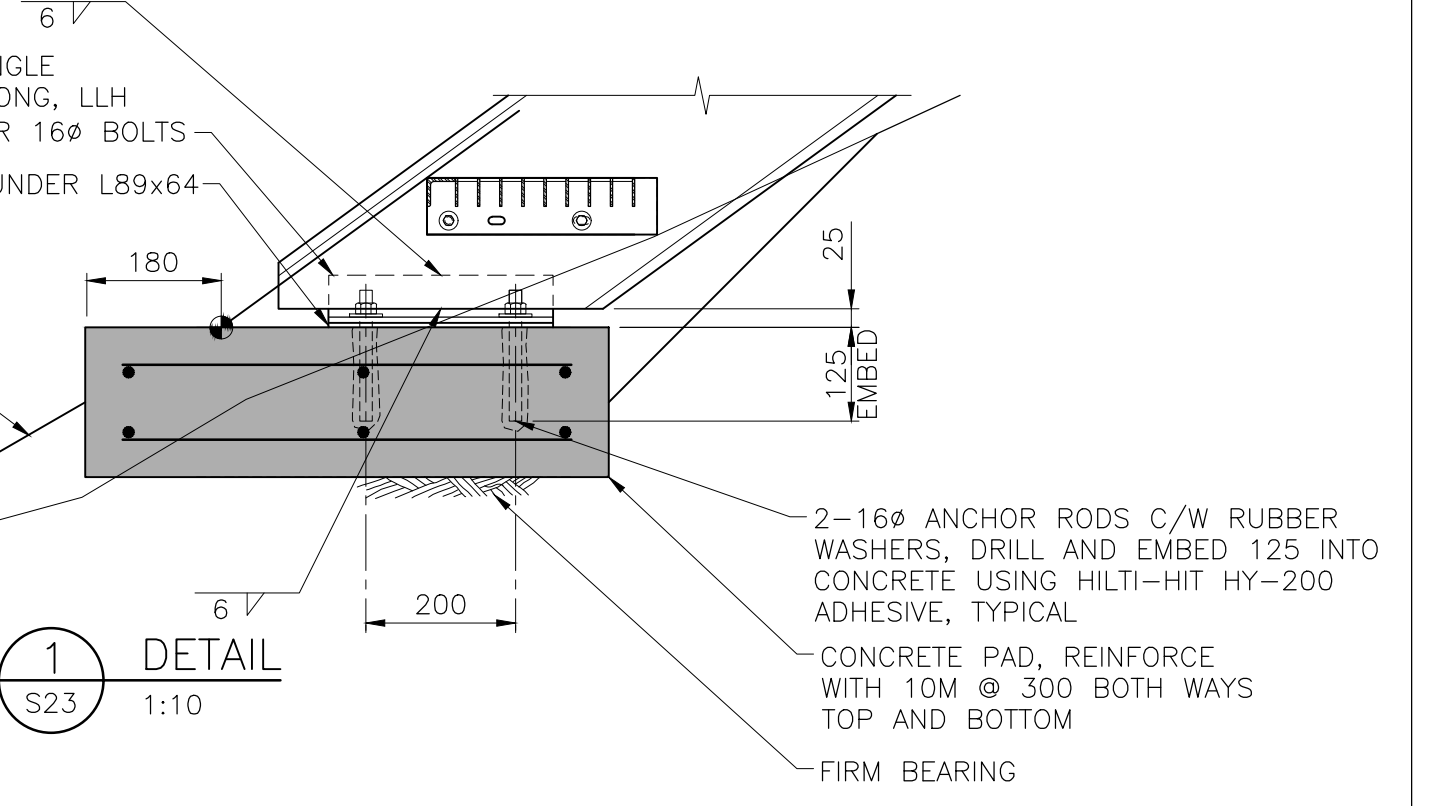
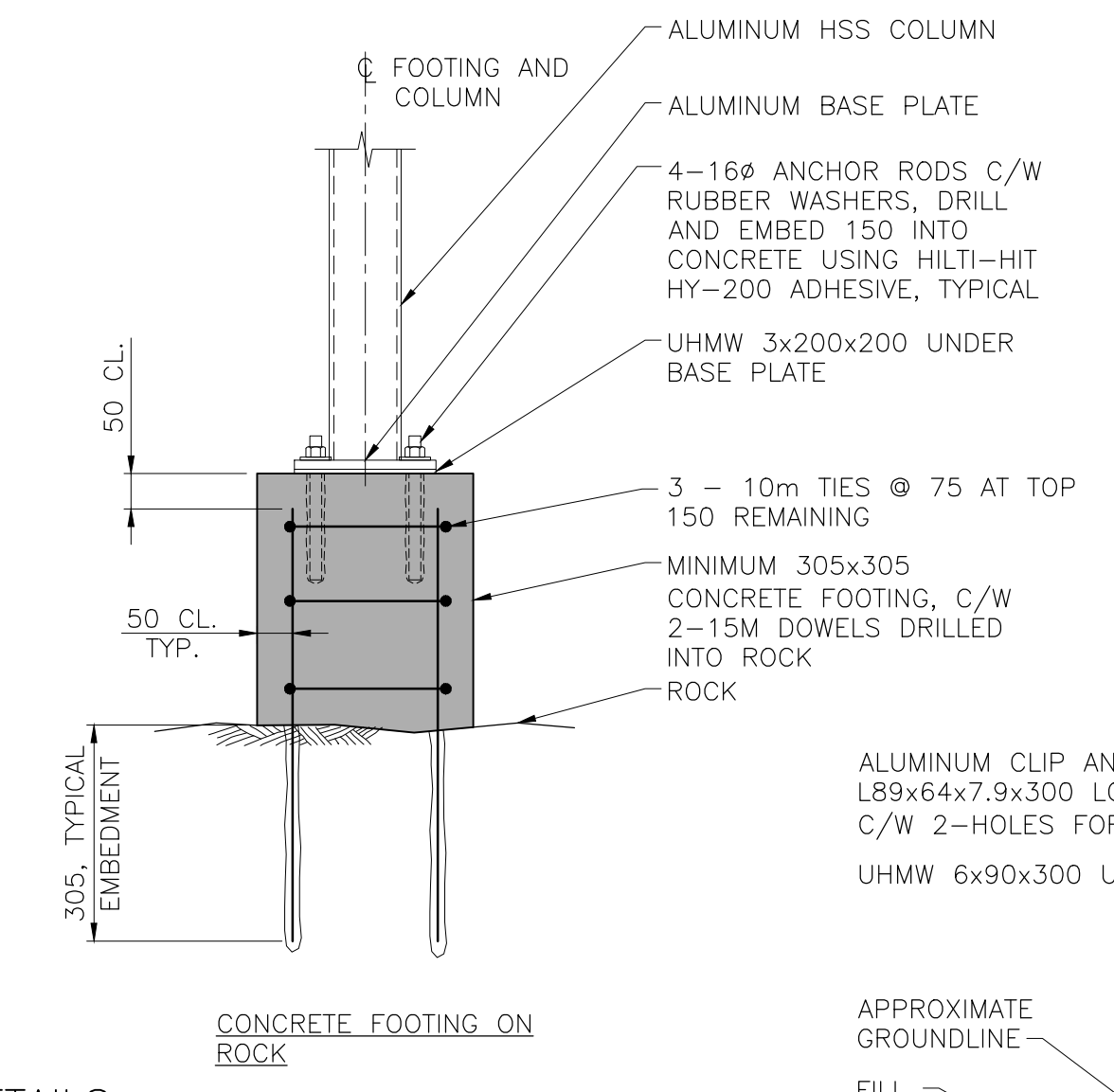
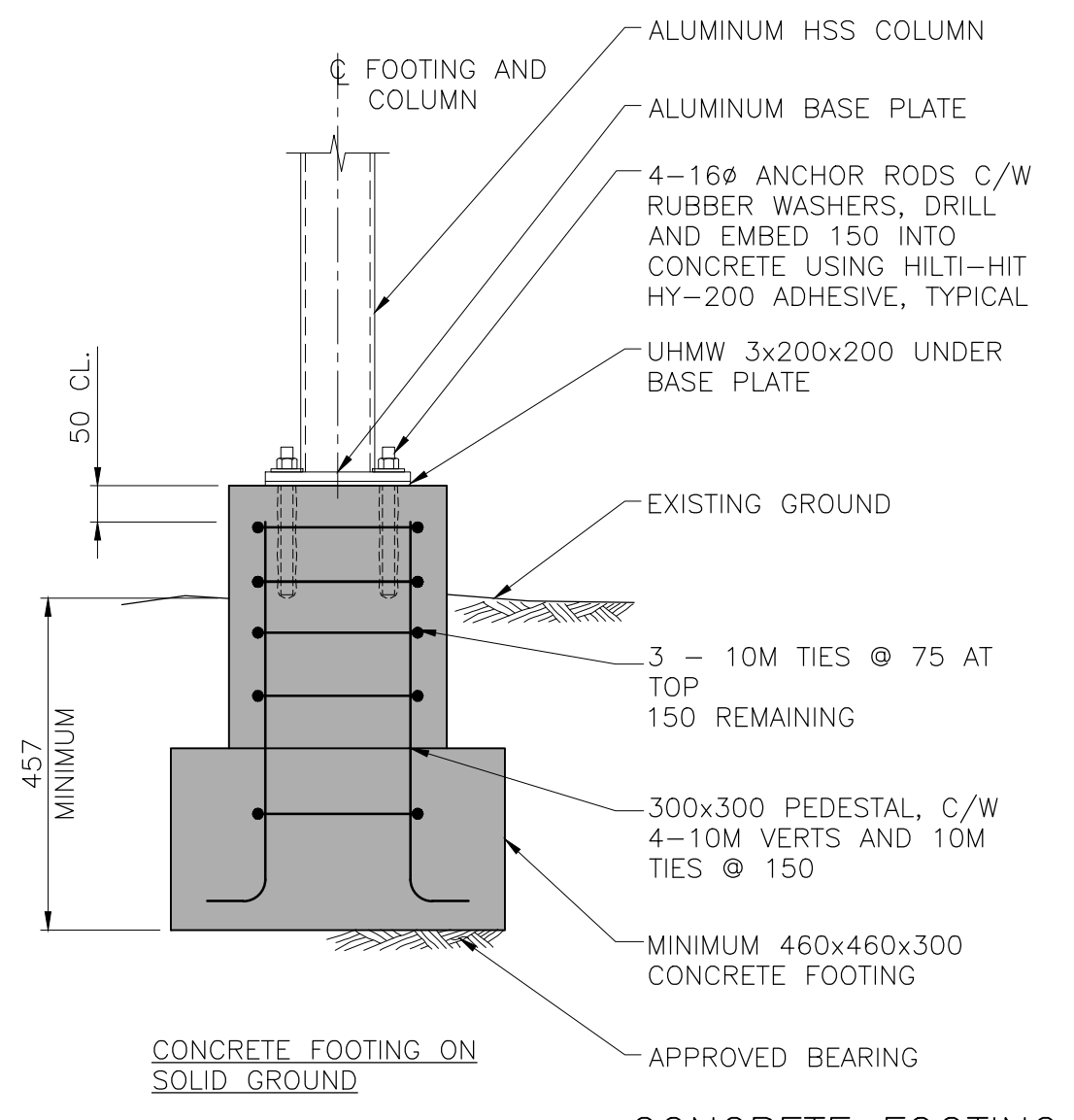
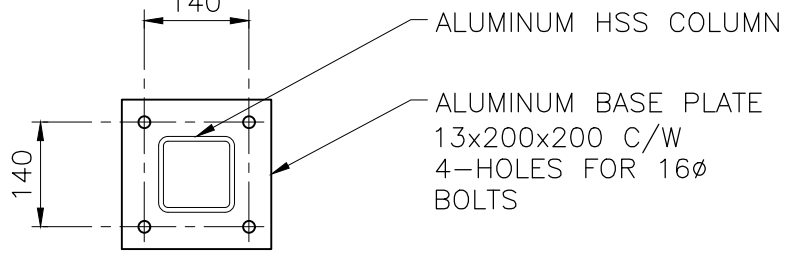
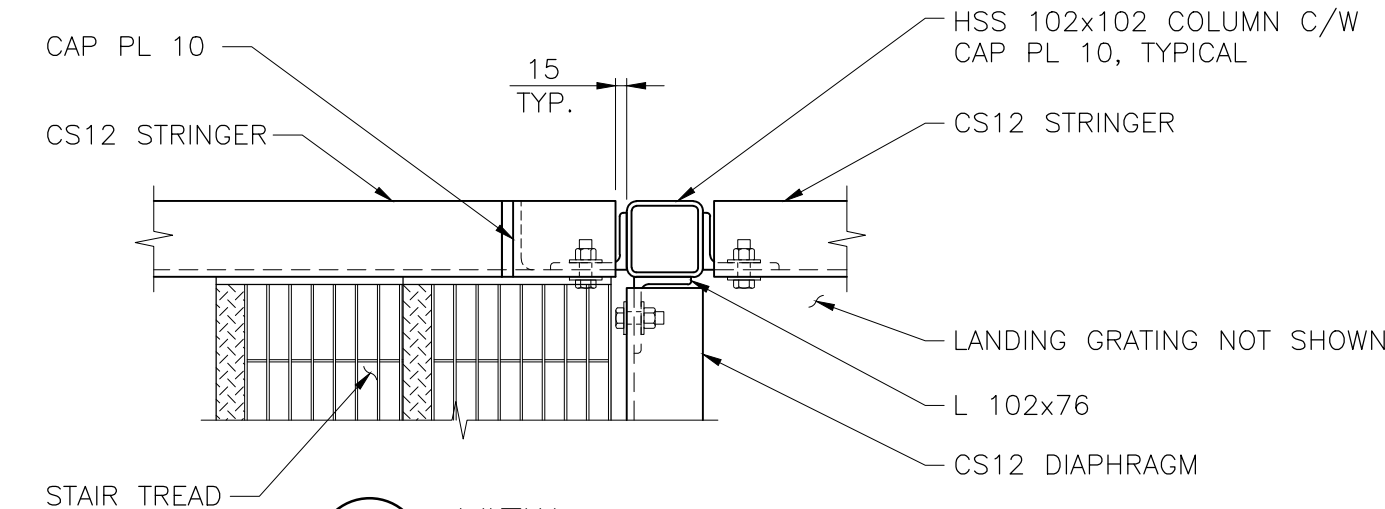
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

ENGINEERS SEAL

CREEK CROSSING
SITE 1 - TYPICAL
DETAILS SHEET 2

BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S23	REVISION D



ISSUED FOR TENDER

NOTES:
1. FOR GENERAL NOTES, SEE DWG. S01
2. ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.

ISSUES			SUB CONSULTANT		
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2020.01.20	CLIENT REVIEW			
B	2020.04.06	PERMIT			
C	2020.06.10	CLIENT REVIEW			
D	2020.06.11	TENDER			

DRAFTED PHU	 3701 Shenton Rd, Nanaimo, BC V9T 2H1 Tel: 250-751-8558 Fax: 250-751-8559 Email: mail@heroldengineering.com	ENGINEERS SEAL
DRAFTING REVIEW -		
DESIGNED AS		
DESIGN REVIEW -		

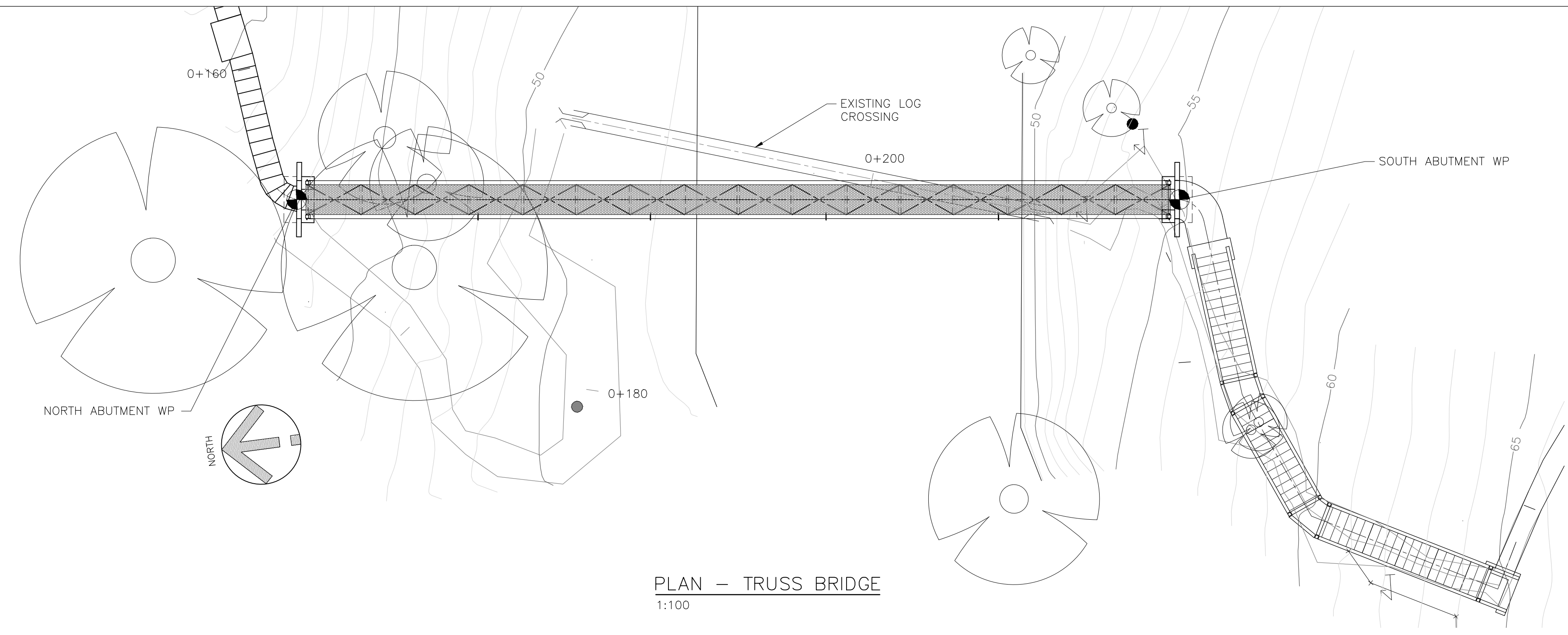
CREEK CROSSING
SITE 1 - TYPICAL
DETAILS SHEET 3

BENSON CREEK FALLS REGIONAL PARK
 ACCESS IMPROVEMENTS
 RECREATION & PARKS PARKSVILLE BC V9P 2X4
 REGIONAL DISTRICT OF NANAIMO

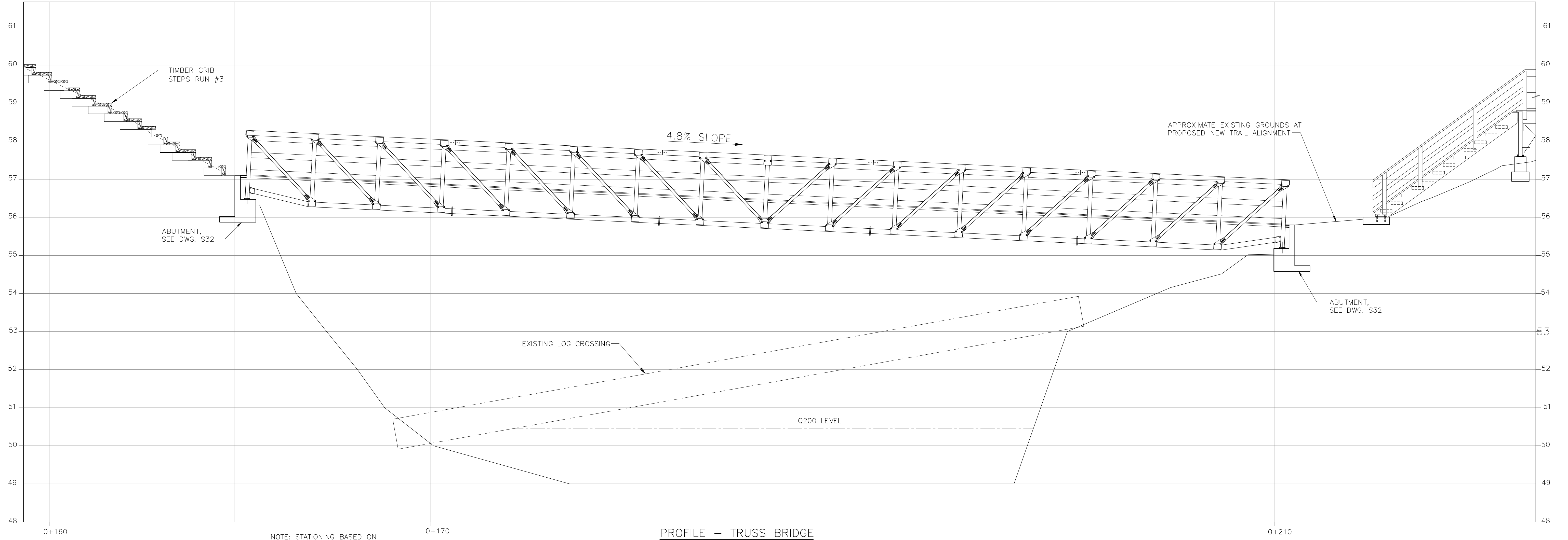
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SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S24	REVISION D

ISSUED FOR TENDER

- NOTES:**
1. FOR GENERAL NOTES, SEE DWG. S01
 2. ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.
 3. FINAL SITTING OF ABUTMENTS SUBJECT TO REVIEW BY PROJECT GEOTECHNICAL ENGINEER. ADJUSTMENTS TO WORK POINT AND MINOR ADJUSTMENT TO ABUTMENT GEOMETRY MAY BE REQUIRED



PLAN - TRUSS BRIDGE
1:100



PROFILE - TRUSS BRIDGE
1:50

NOTE: STATIONING BASED ON EXISTING TRAIL ALIGNMENT

ISSUES					
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW			
B	2020.01.20	CLIENT REVIEW			
C	2020.04.07	PERMIT			
D	2020.06.10	CLIENT REVIEW			
E	2020.06.11	TENDER			

SUB CONSULTANT	

HEROLD ENGINEERING

3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

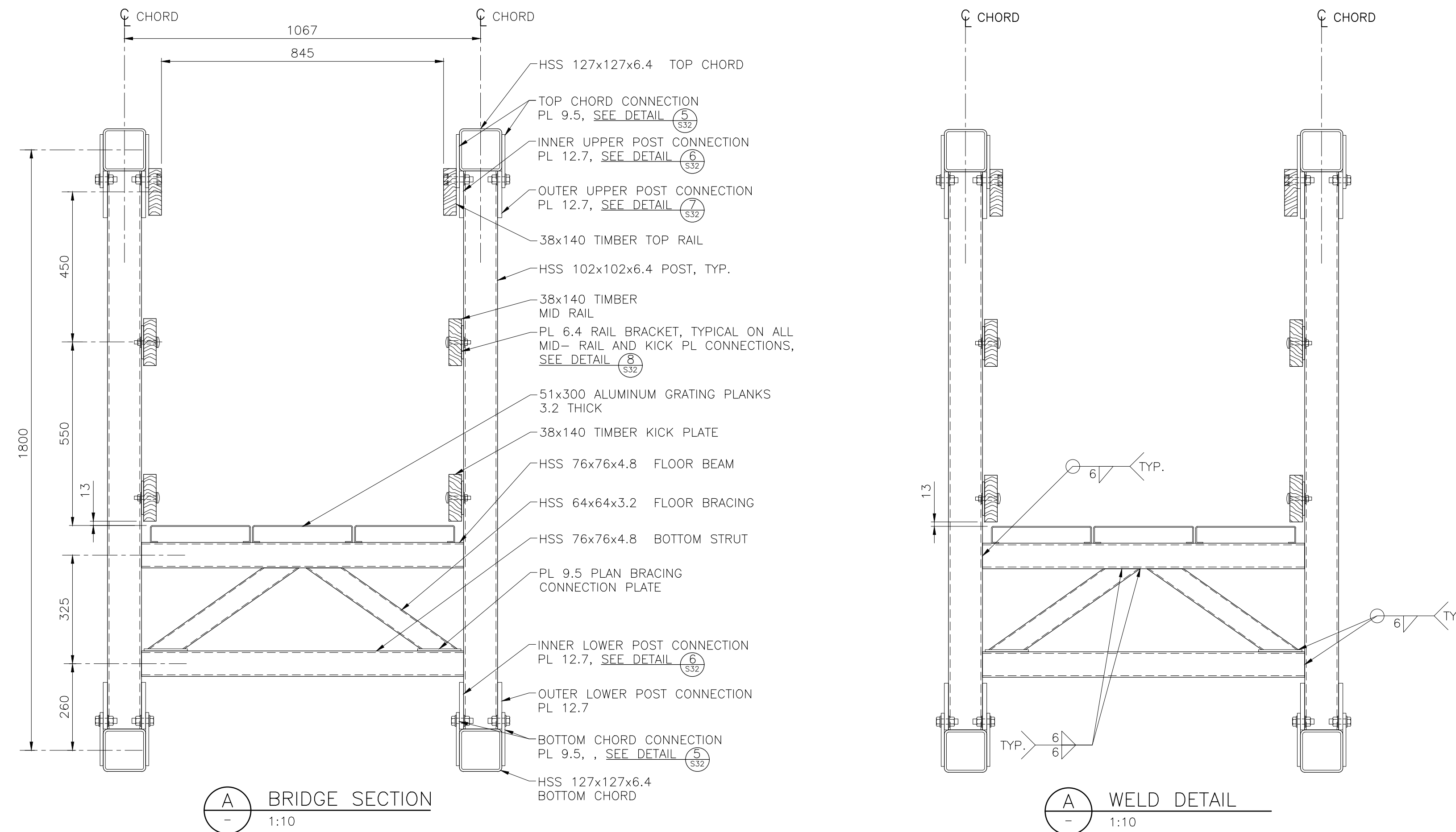
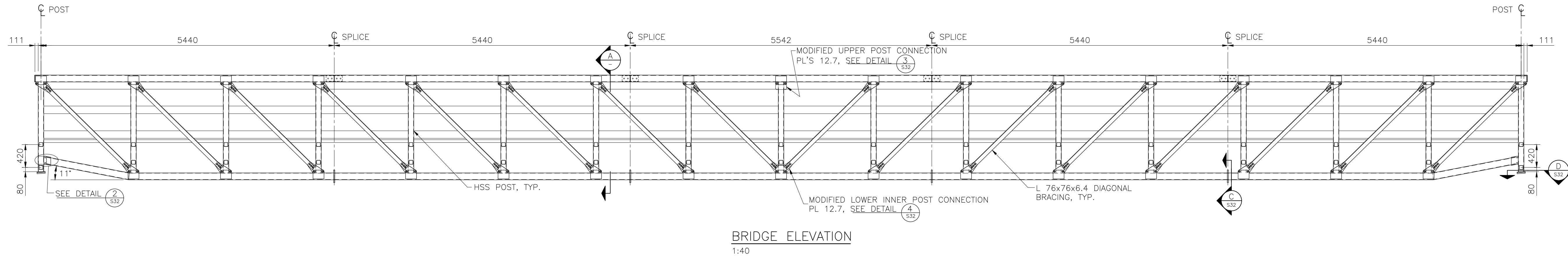
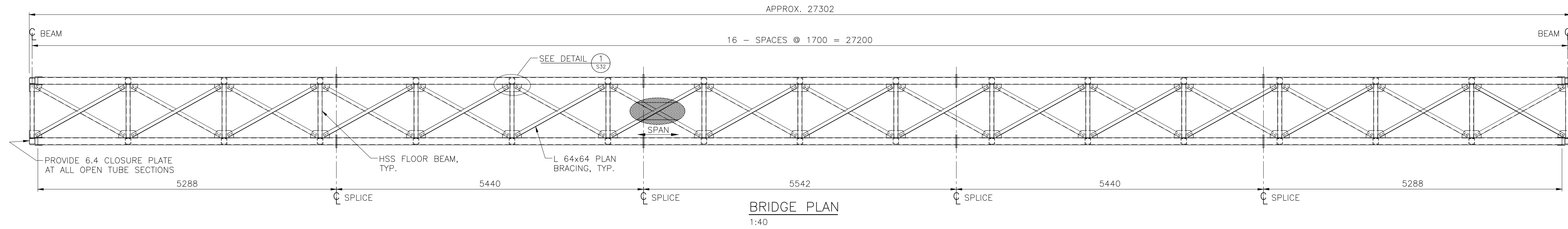
ENGINEERS SEAL

CREEK CROSSING - SITE 1 - TRUSS BRIDGE GENERAL ARRANGEMENT

BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS

RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S30	REVISION D



ISSUED FOR TENDER

- NOTES:**
1. FOR GENERAL NOTES, SEE DWG. S01
 2. ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.
 3. PROPOSED CONFIGURATION FOR THE TRUSS SHOWS CHORDS, BRACES AND CROSS FRAMES FABRICATED SEPARATELY AND FIELD ASSEMBLED. CONTRACTOR MAY SUBMIT ALTERNATE SCHEME FOR FABRICATION AND ASSEMBLY TO PROJECT ENGINEER FOR APPROVAL. CONTRACTOR'S ENGINEER TO DESIGN AND SEAL ANY PROPOSED ALTERNATE CONNECTION.

ISSUES					
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW			
B	2020.01.20	CLIENT REVIEW			
C	2020.04.07	PERMIT			
D	2020.06.10	CLIENT REVIEW			
E	2020.06.11	TENDER			

SUB CONSULTANT

DRAFTED PHU
DRAFTING REVIEW -
DESIGNED MGCS
DESIGN REVIEW -

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Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

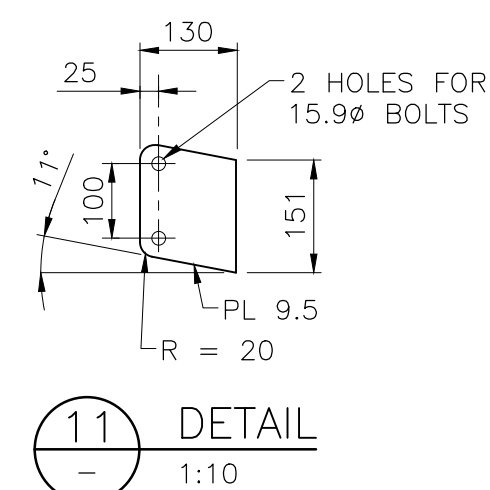
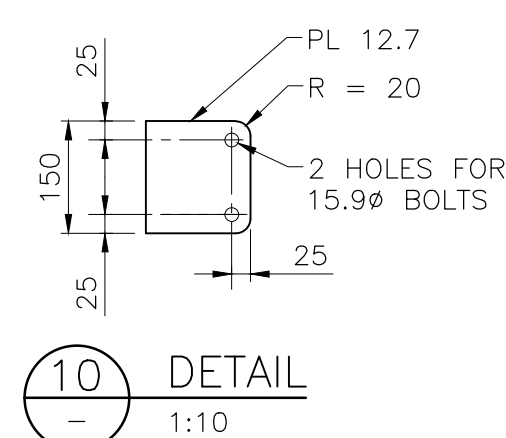
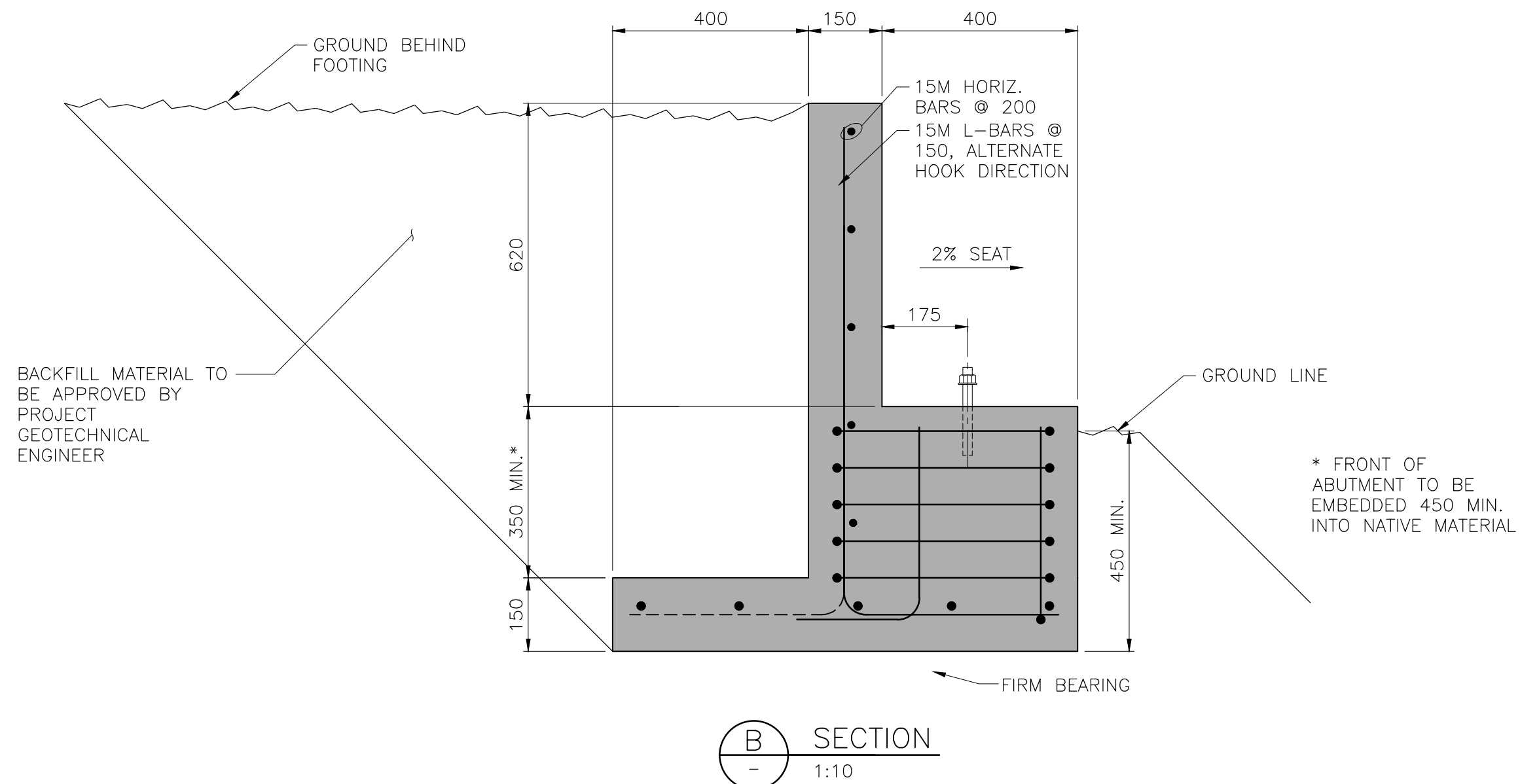
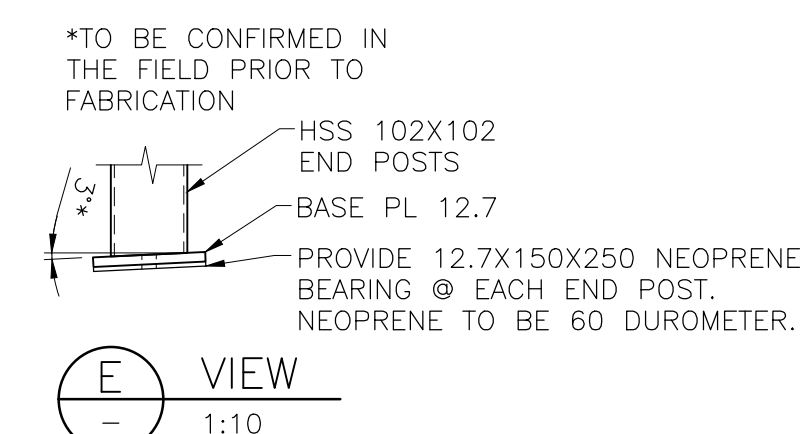
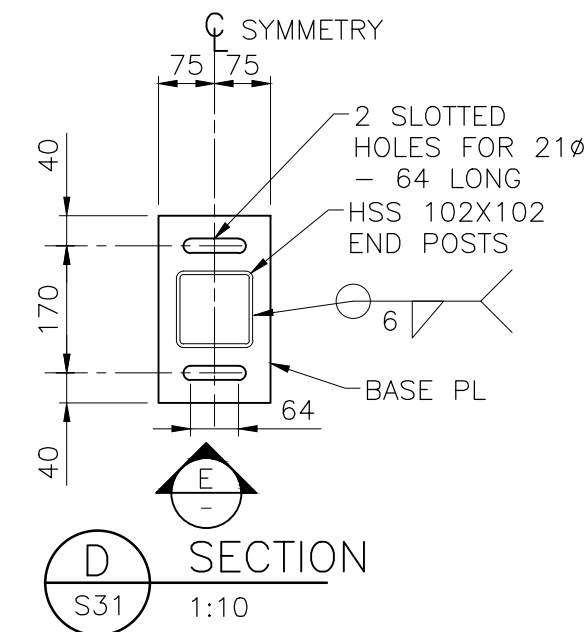
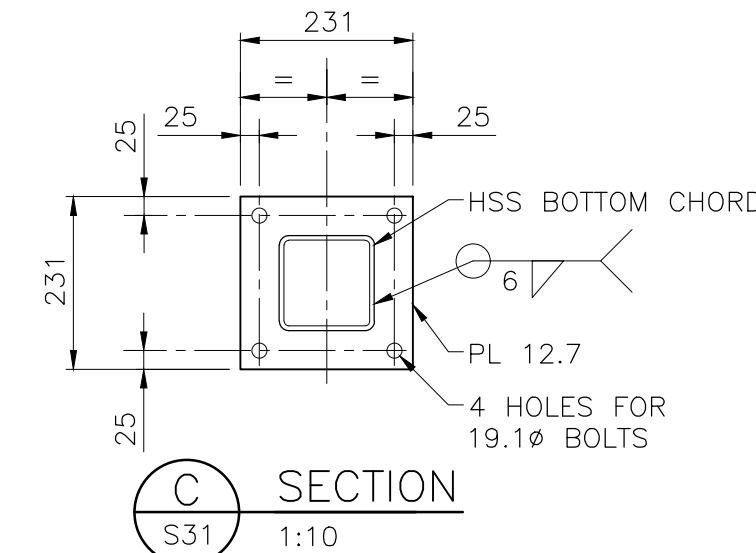
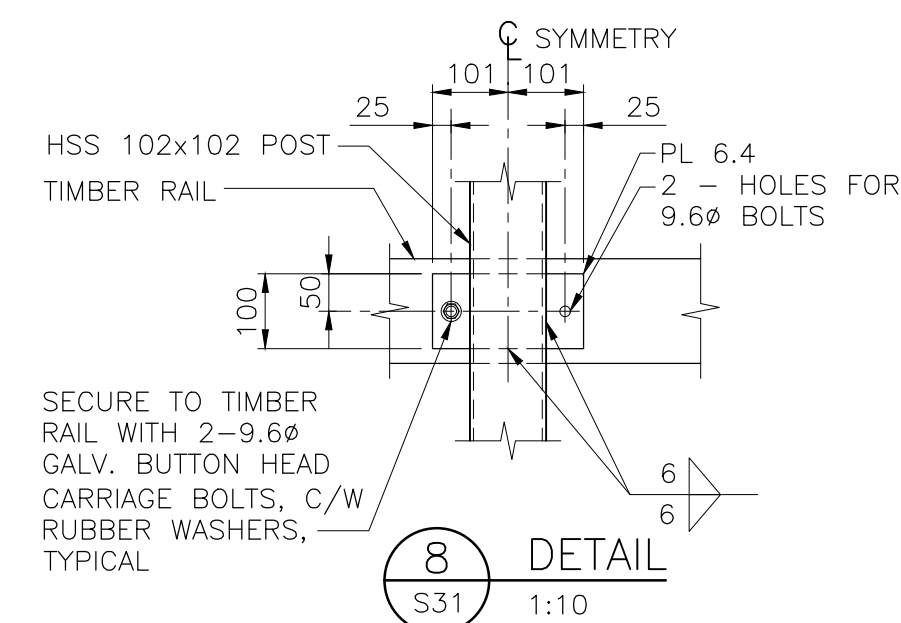
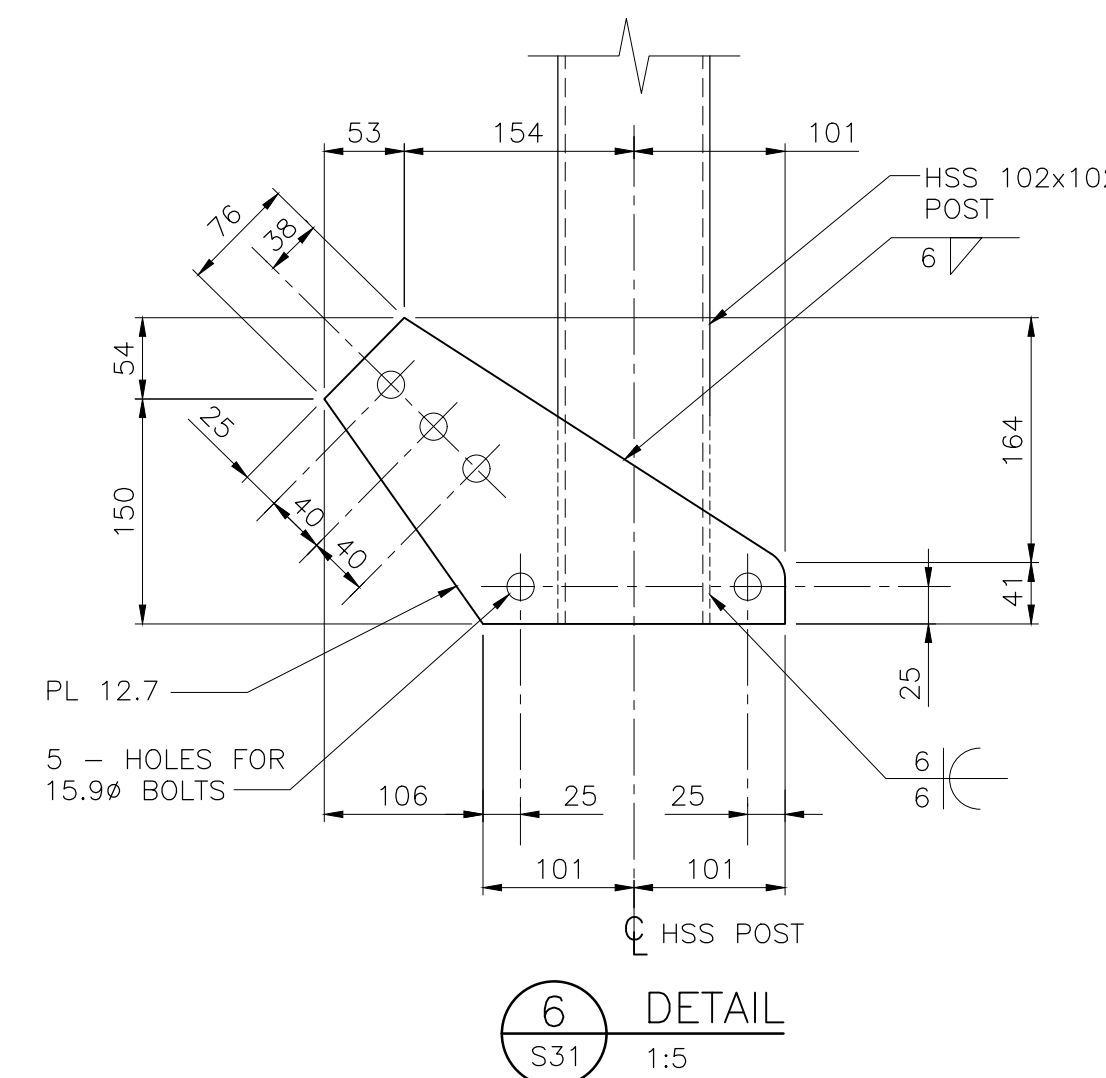
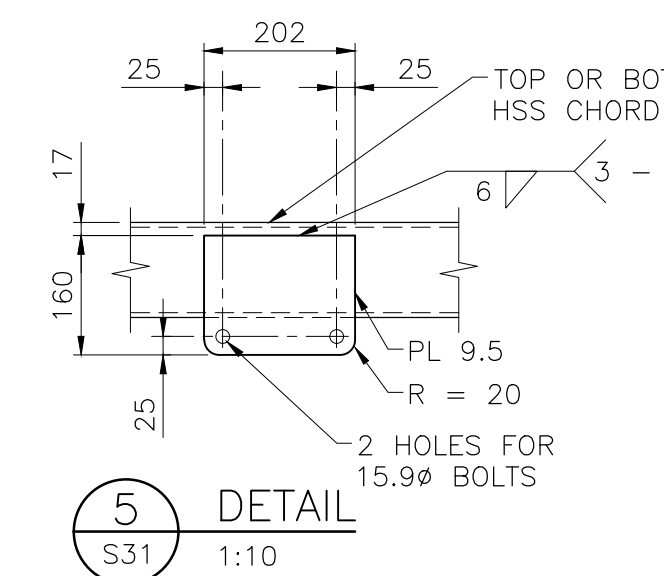
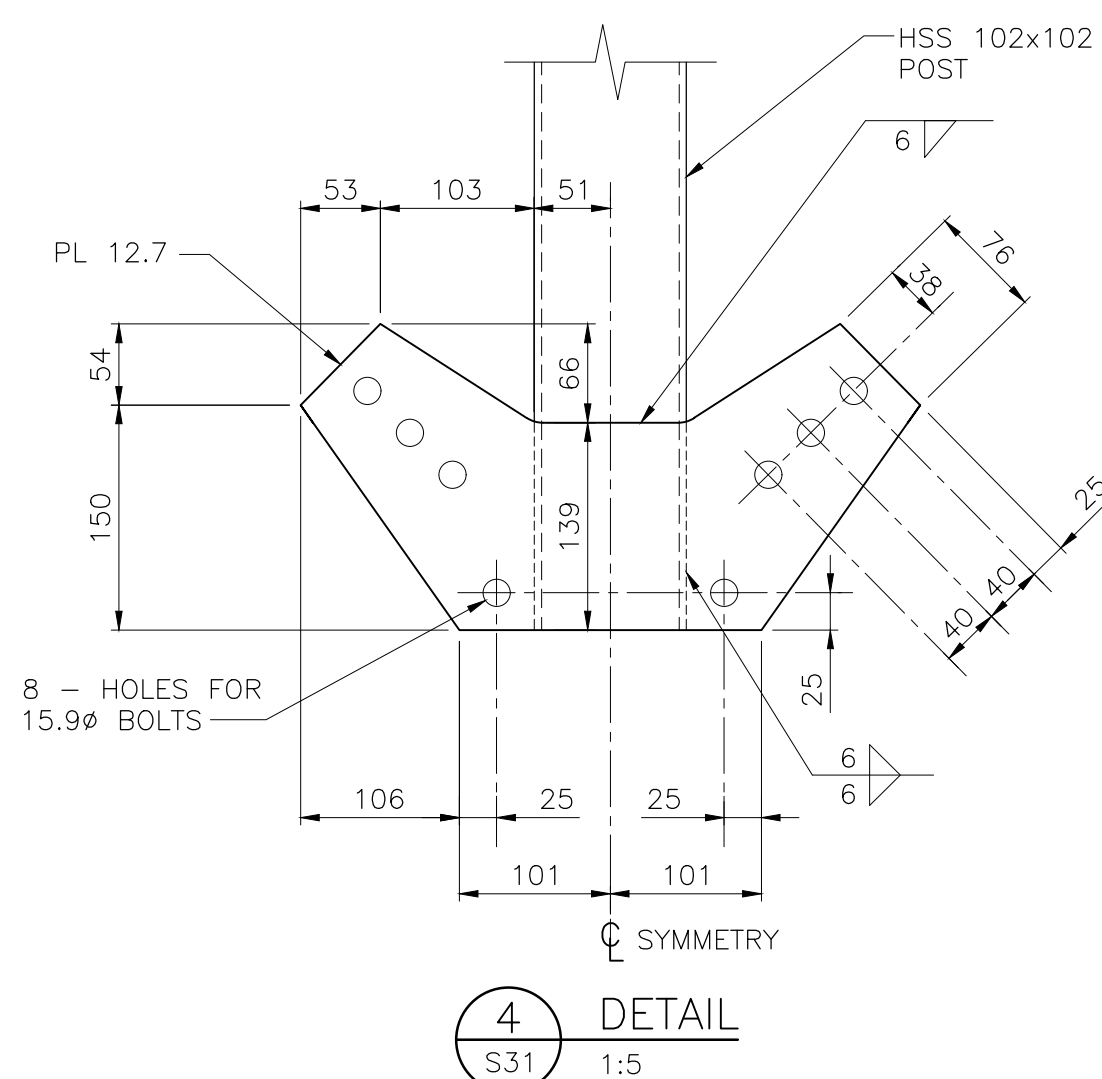
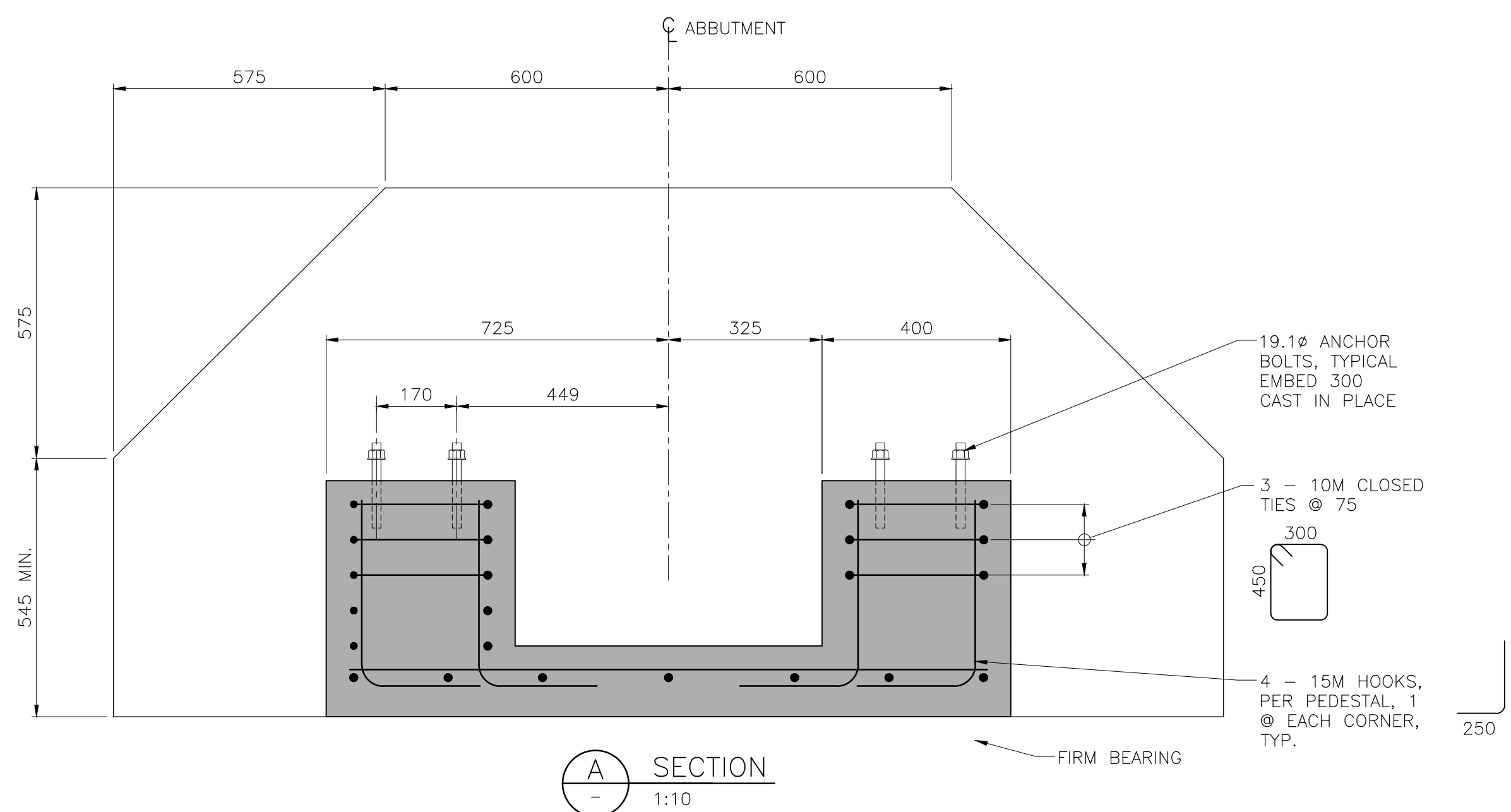
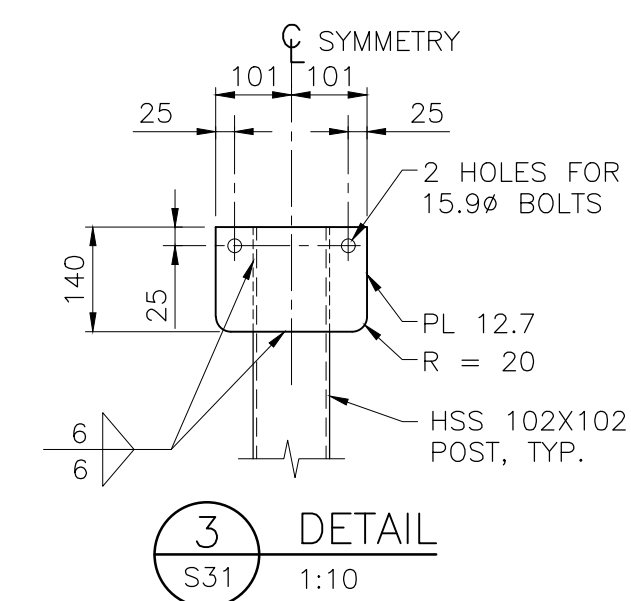
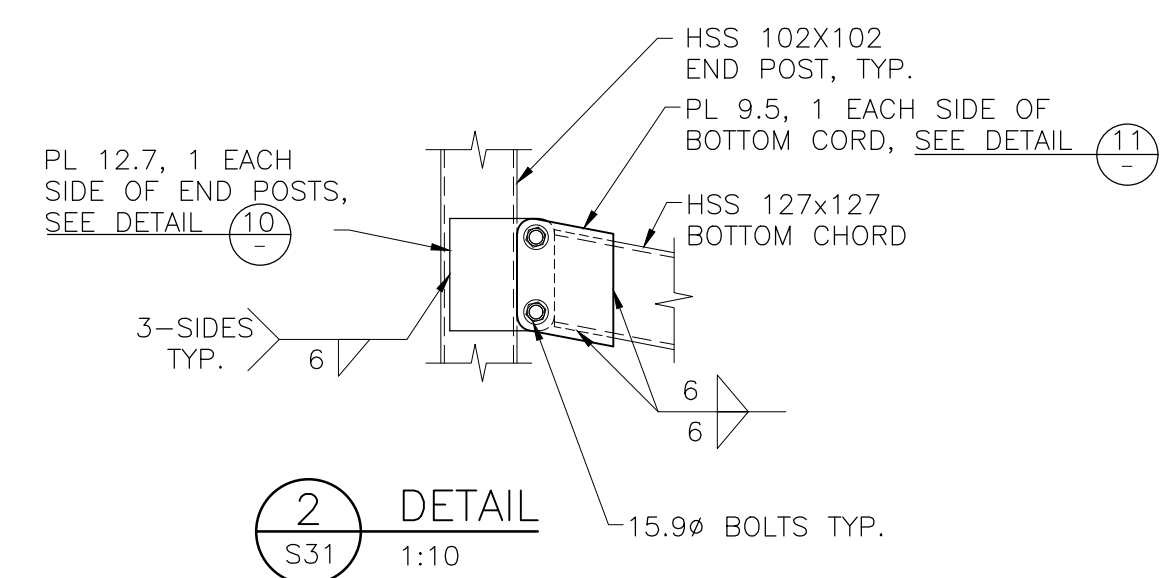
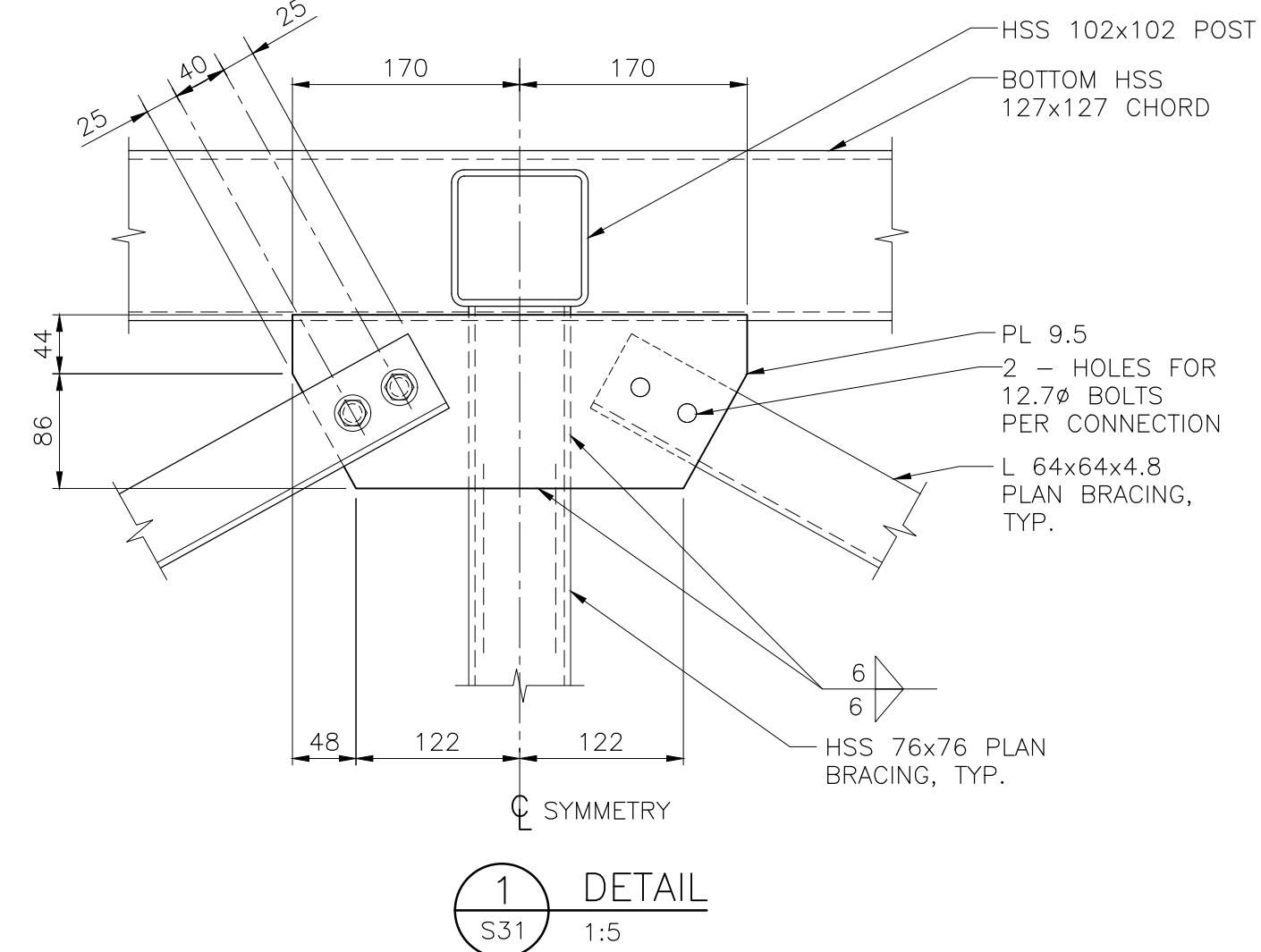
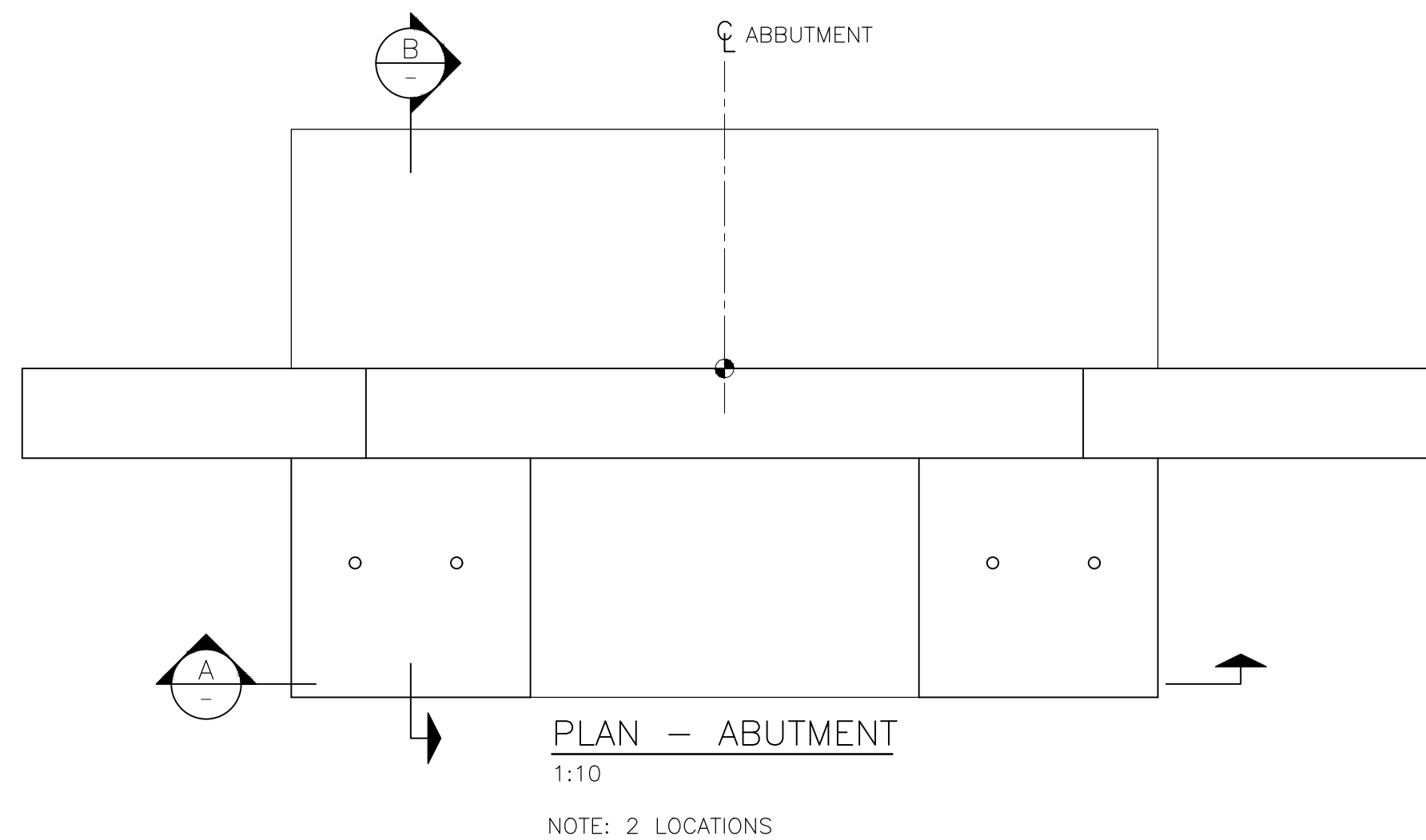
ENGINEERS SEAL

CREEK CROSSING - SITE 1 - TRUSS BRIDGE, PLAN ELEVATION AND SECTION

BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS

RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S31	REVISION D



ISSUED FOR TENDER

- NOTES:
1. FOR GENERAL NOTES, SEE DWG. S01
2. ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.

ISSUES					
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2020.04.07	PERMIT			
B	2020.06.11	TENDER			

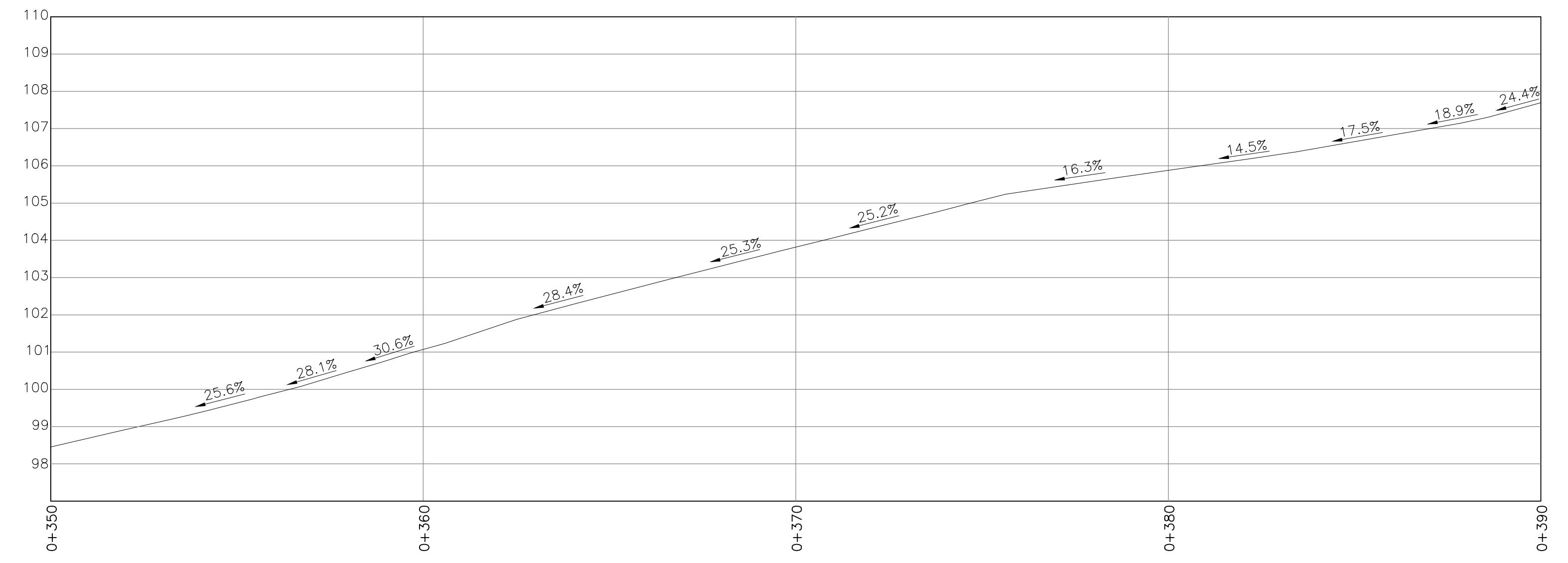
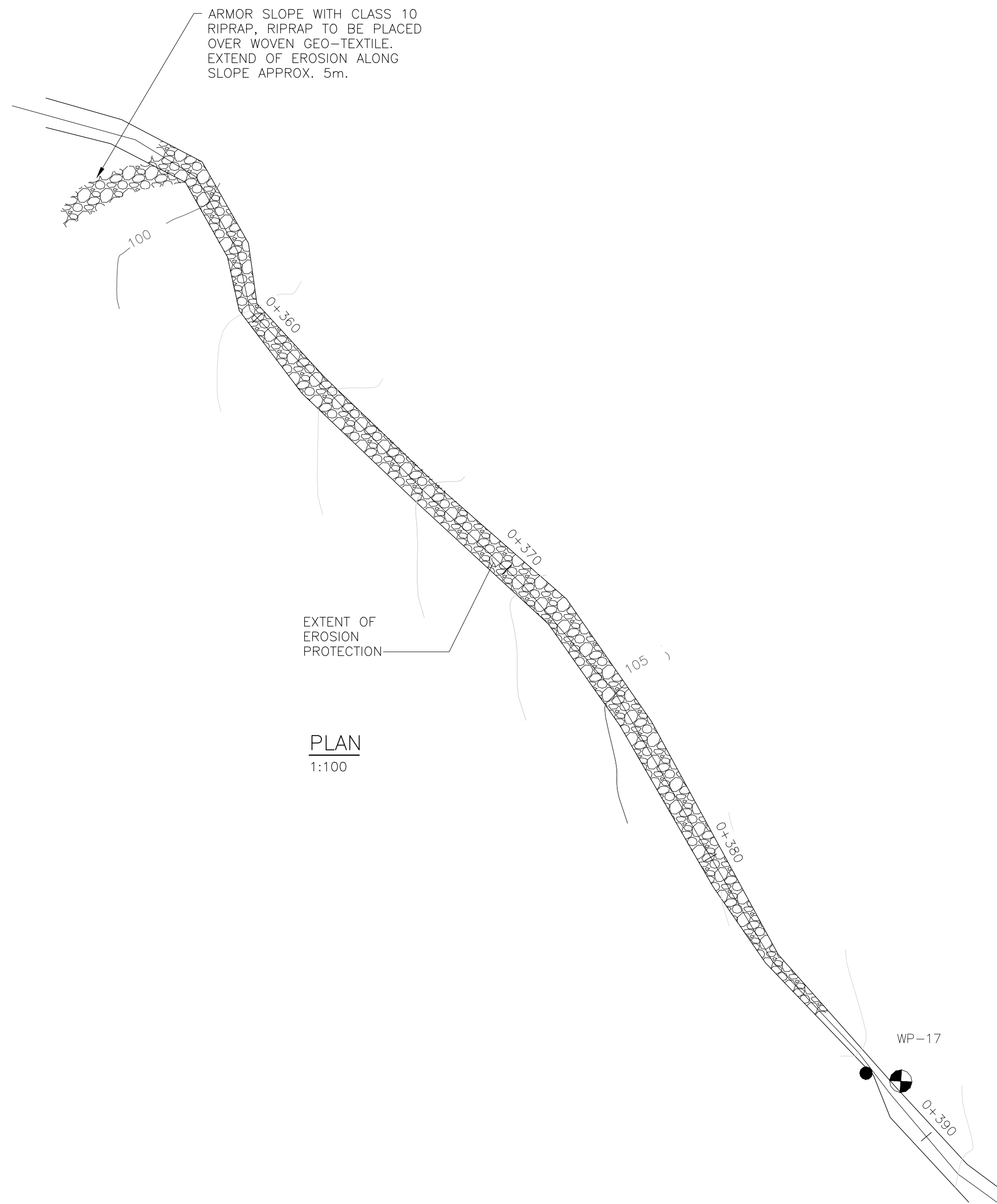
SUB CONSULTANT	
DRAFTED	PHU
DRAFTING REVIEW	-
DESIGNED	MGCS
DESIGN REVIEW	-

HEROLD ENGINEERING
3701 Shenton Rd, Nanaimo, BC V9T 2H1
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Email: mail@heroldengineering.com

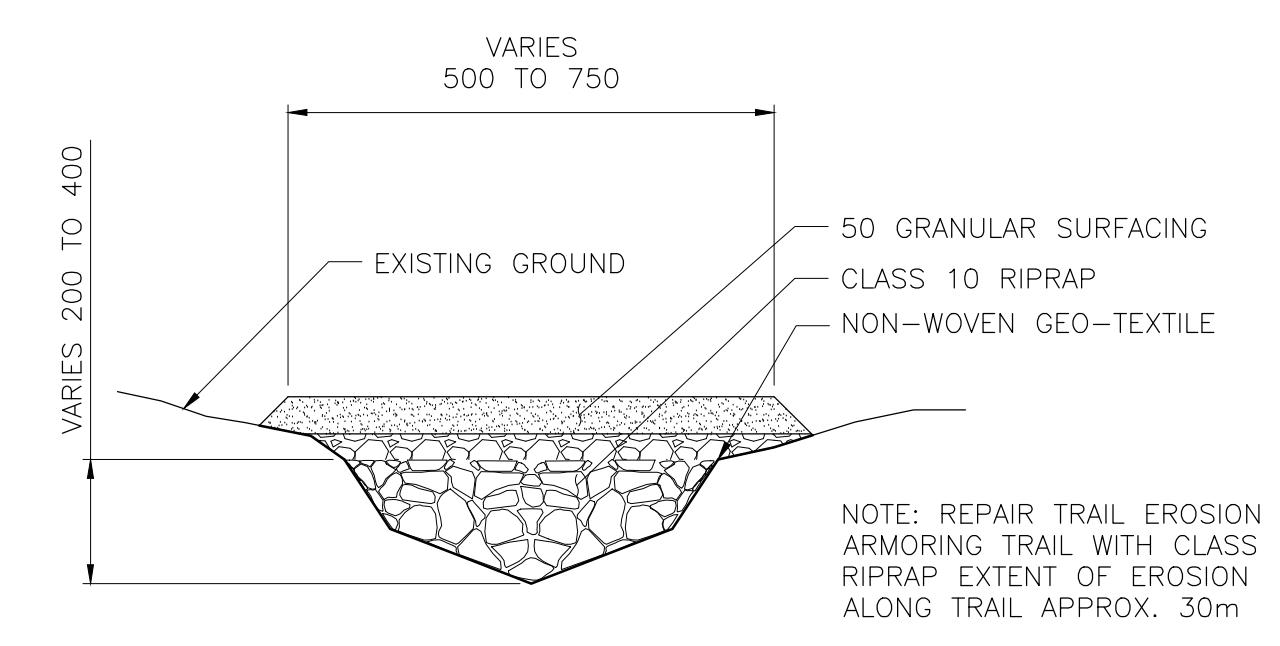
ENGINEERS SEAL
CREEK CROSSING
- SITE 1 - TRUSS
BRIDGE ABUTMENTS
AND DETAILS

BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S32	REVISION B



PROFILE
1:100



TYPICAL SECTION
1:10

APPROX. AVERAGE DIMENSIONS			
CLASS 10 RIPRAP	15% 90 mm	50% 195 mm	85% 280 mm

ISSUED FOR TENDER

- NOTES:
- FOR GENERAL NOTES, SEE DWG. S01
 - ALL ELEVATIONS ARE BASED ON A LOCAL DATUM.

ISSUES				SUB CONSULTANT				
No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR	No.	DATE	ISSUED FOR
A	2019.09.18	CLIENT REVIEW (FORMLY S24)	F	2020.06.11	TENDER			
B	2019.11.22	CLIENT REVIEW (FORMLY S24)						
C	2020.01.20	CLIENT REVIEW						
D	2020.04.06	PERMIT						
E	2020.06.10	CLIENT REVIEW						

DRAFTED PHU
DRAFTING REVIEW JJMC
DESIGNED AS
DESIGN REVIEW -

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ENGINEERS SEAL

CREEK CROSSING
SITE 2 - EROSION
CONTROL

BENSON CREEK FALLS REGIONAL PARK
ACCESS IMPROVEMENTS
RECREATION & PARKS PARKSVILLE BC V9P 2X4
REGIONAL DISTRICT OF NANAIMO

HEL PROJECT No. 0837-067	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S40	REVISION F



AQUAPARIAN
Environmental Consulting Ltd.



BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS PROJECT – PHASE 1

ENVIRONMENTAL IMPACT AND REMEDIATION ASSESSMENT

Prepared by Aquaparian Environmental Consulting Ltd.



January 27, 2020
Revised May 2020

Prepared for:
Regional District of Nanaimo

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1.0 INTRODUCTION

Aquaparian Environmental Consulting Ltd. (Aquaparian) was retained by the Regional District of Nanaimo (RDN) to complete an Environmental Impact and Remediation Assessment (EIA) Report for proposed trail upgrades within the Benson Creek Falls Regional Park located in Electoral Area C of the RDN.

As understood, Benson Creek Falls Regional Park has increased in popularity over recent years as a hiking destination due to growing awareness of the impressive Ammonite Falls waterfall also known as Benson Creek Falls. Access to the waterfall is gained from the south from Ammonite Falls Regional Trail off of Jameson Road or from the north by Benson Creek Falls Regional Park entrance accessed from Wiegles Road that both lead towards the ravine where Ammonite Falls and Benson Creek are located. The increasing foot traffic has caused extensive soil compaction and slope erosion as hikers have made their own trails down the steep banks of the ravine. The eroded slopes on either side of the ravine have multiple lengths of unauthorized ropes installed by hikers to aid in access. The current situation does not only pose a danger to the public but also negatively impacts the stream and natural vegetation by increasing sedimentation to the stream which is a known fish habitat and by preventing vegetation to fill in along the slope further decreasing bank stability. The access improvements will benefit both stream health and public safety. The trail improvements will occur in two phases. Phase 1 (addressed in this report) will involve the installation of a pedestrian bridge crossing over the creek to replace a large diameter fallen log, connecting both halves of the park (Site 2). This phase will include a series of steps and staircases and a section of fencing along the ravine. It will also include erosion control using rip rap placement to armor the slope (Site 3). Phase 1 will be completed this year. Phase 2 will address access to Ammonite Falls (Site 1). A separate report will be produced to address the improvements proposed for Phase 2 as this will be completed as a separate project in 2021.

A review of the RDN website identifies the park parcel as being zoned as RM1, B, BL500 and subject to the Freshwater and Fish Habitat Development Permit Area (DPA). Fish bearing streams and non-fish bearing tributaries of fish bearing streams are protected by the provincial Riparian Areas Protection Regulation (RAPR) which defines the Fresh Water and Fish Habitat Development Permit Area within the Regional District of Nanaimo. The Riparian Assessment Area (RAA) extends 30m from the High Water Mark (HWM) of streams that are not in ravine reaches, wetlands and lakes; for wide ravines >60m across it extends 10m beyond the top of ravine bank; and for narrow ravines <60m across it extends 30m beyond the top of ravine bank. Because the project location is within a wide ravine >60m across, the DPA extends 10m beyond the top of ravine bank. Proposed residential, commercial or industrial development within the RAA requires the completion of a RAPR Detailed Assessment to determine the Streamside Protection and Enhancement Area (SPEA) and measures to protect the SPEA from

construction. Based on the width of the stream, the SPEA would be approximately 30m extending from the HWM of the river lying within the sides of the ravine. Much if not all of the trail improvements and stairs will be inside the SPEA. However, a review of the Riparian Areas Regulation (RAA) Assessment Methodology Guidebook, Page 12, identifies the RAPR applies only to residential, commercial or industrial activities under Part 26 of the Local Government Act as “development” along streams. Furthermore, it states that parks and parklands are subject to other legislation and may, in some cases, be exempt from the Regulation. Because the trail is not associated with residential, commercial or industrial land use, the RAPR will not apply to this trail project.

Clear span bridge stream crossings require that a provincial Notification under the *Water Sustainability Act* (WSA) Section 11 be submitted to the province at least 45 days prior to scheduled work to authorize “works in and around water.” Though no work is planned in the creek, the work to install the bridge will occur in close proximity of the creek. Aquaparian submitted a Section 11 Approval in association with the proposed bridge. The province has issued an email response and a Terms and Conditions document that the work must comply with. These documents are included with this report as Appendix A.

A site location map is included as Figure 1. A selection of photographs from the site assessment is included as Appendix B.

2.0 PROJECT DESCRIPTION

The purpose of the project is to improve the safety and accessibility of the trail as well as reduce erosion within the ravine. The scope of work will include upgrades to the trail including timber crib steps, staircases and some erosion protection through riprap placement. A clear-span truss bridge is also planned downstream of the base of the waterfall which will replace the fallen log that is currently used for crossing the stream. This bridge will connect the two halves of the park and allow for safe crossing of Benson Creek. Figure 2 shows the locations of the three project sites referred to in this report as well as the approximate location of some of the proposed features for this project. The engineering drawing package produced by Herold Engineering is included as Appendix C.

Site 2 includes the pedestrian bridge and a series of timber steps, 3 staircases and some safety fencing. The proposed truss bridge will connect the north half of the park (Benson Falls Regional Park accessed from Wiegles Road) to the south half of the park. The exact material for the stair cases and the bridge are yet to be finalized. Upgrades to Site 2 will include the following components:

- Three 5m sections of cedar split rail fence (0+010m, 0+020m, 0+030m)

- A 3.5m set of timber crib steps with two landings (0+035m),
- A 3m set of timber crib steps and a staircase (0+040m),
- A 6m staircase (0+045m),
- A 22m set of timber crib steps with two landings (0+150m),
- A set of two staircases ~17m long in total (0+220m),
- A 5m set of timber crib steps (0+235m),
- A 3m set of timber crib steps (0+260m).
- A truss bridge with timber kick plates spanning approximately 27.2m long and 1.1m wide supported by reinforced concrete strip footing above the stream banks.

Site 3 is a 30m section of trail surface south of Site 2 (0+0350m) which will be armoured with riprap and capped with granular fill to control drainage and prevent further erosion.

As understood, the proposed upgrades and new trail alignments have been designed to limit the removal of vegetation, specifically mature trees. Any trees that are removed will be left in the forest to decay as large woody debris. Stumps will be left in the ground when possible to maintain bank stability. As understood, only one living tree (a small western hemlock, *Tsuga heterophylla*) and a snag are flagged for removal.

The project area requires travelling several kilometers through trails. Due to access limitations, heavy equipment and machinery will not be used to complete the upgrades. Instead, materials are expected to be transported into the works sites by all-terrain vehicles with trailers, and/or carried in by foot. Small, gas powered equipment such as augers may be used. As understood, materials will be imported to the site through gated woodlot roads leading off Jingle Pot Road and Wiegles Road. These woodlot roads have seen extensive use by logging equipment and the use of these roads to transport materials to the proposed sites is not expected to have any negative impact during the construction phase of this project. In addition, it is the contractor's responsibility to ensure that any trails used for the transport of materials are returned to the same condition they were found in. Transport of materials to the project sites along the smaller hiking trails is expected to be accomplished by foot and will also be considered low impact.

Construction activities for the trail upgrades will include the following:

- Cut and fill slope in preparation for stair and structure installation,
- Installation of timber crib steps (approximately 36.5m in total),
- Installation of concrete footings to support stair cases where needed,
- Installation of stair cases (3),
- Installation and construction of cedar split rail fencing (15m total), and
- Placement of rip rap and granular fill (~30m).

Installation of bridge span is anticipated to require a heavy lift helicopter or the bridge may be completed in sections and assembled at the site (to be confirmed by successful contractor). Construction activities for the bridge will include the following:

- Import of bridge or bridge sections,
- Splicing of bridge sections together (if imported in sections), and
- Installation of reinforced concrete strip footing to support bridge. Concrete to be poured on site.

3.0 BACKGROUND

Benson Creek (watershed code 920-396400-63100) bisects the park and flows northeast within a wide and deep ravine. A review of the provincial Habitatwizard stream report indicates that it supports cutthroat trout (*Oncorhynchus clarkii*), rainbow trout (*O. mykiss*) and steelhead (*O. mykiss*). Benson Creek has a tributary near the west boundary of the park called Flynnfall Creek (watershed code 920-395400-63100-22800) which is outside of the project area (west). The stream report for this tributary does not identify any fish species. A review of the provincial website Habitatwizard and the RDN map do not identify any other watercourses within the project area. Because the construction of the bridge crossing will include work within close proximity of Benson Creek, and construction methodology may require temporary scaffolding in the stream channel, least risk fish timing windows will apply for this project (June 15-Sept 15).

A review of the provincial BC Conservation Data Centre (BC CDC) identified that there is a mapped occurrence (Occurrence ID 8588) of the provincially blue-listed northern red-legged frog (*Rana aurora*) at Flynnfall Creek. These frogs are fairly common in the area and are not expected to be impacted by this project, nor is their habitat. The trail improvements are largely within the existing trail alignment. The work to install the bridge will only affect a small portion of either side of ravine slope above Benson Creek and is considered a low impact activity. The BC CDC iMap showing the occurrence and the species report are included with this report as Appendix D.

A search of the BC Species and Ecosystem Explorer Database for red and blue listed plant and animal species within the region resulted in 3 red-listed and 7 blue-listed wildlife species and 1 red-listed and 1 blue-listed plant species. The list of these Species at Risk has also been included in Appendix D. The following is a list of those species from the search results that have a reasonable potential of being found within the project area based on studies of habitat preferences:

Northern red-legged frog (*Rana aurora*): Blue-listed

Species occurrence record (8588) located this species near Ammonite Falls on a tributary of Benson Creek named Flynnfall Creek south of Weigles Road. Red-legged Frogs can make extensive movements between overwintering areas, breeding sites, and summer foraging areas; dispersal distances are unknown (Ovaska and Sopuck 2004). In uncut forests on northern Vancouver Island, Red-legged Frogs made extensive use of streams and riparian areas in their movements in late spring and early fall (Chan-McLeod 2003). They are frequent users of riparian forest habitat and streams. Their habitat includes the vicinity of permanent waters of stream pools, marshes, ponds, and other quiet bodies of water. This frog regularly occurs in damp woods and meadows some distance from water, especially during wet weather. Individuals (especially juveniles) seasonally can be found in and near ephemeral pools. Estivation sites include small mammal burrows and moist leaf litter in dense riparian vegetation up to at least 26 meters from water (Rathbun et al. 1993, cited by USFWS 1994). Desiccation cracks in dry pond bottoms may be used as refuges (Alvarez, 2004, Herpetol. Rev. 35:162-163). Breeding sites most often are in permanent water; eggs are attached to stiff submerged stems at the surface of the water. They breed in shallow, littoral zones of lakes, temporary and permanent pools and wetlands, and bogs and fens regardless of size but in close proximity to forest (i.e., toads may be found in all lacustrine and palustrine habitats); tadpoles associate with benthic habitats. Outside of the breeding season, Red-legged Frogs primarily utilize all forest and woodland types, but individuals are occasionally found in more open and rural areas such as shrubland/chaparral, cropland/hedgerow, old fields, and suburban/orchard. *BC CDC*. This species is found in riparian habitat throughout Nanaimo and the riparian forest within the study area provides suitable habitat for this species.

Townsend's big-eared bat (*Corynorhinus townsendii*): Blue-listed

Piaggio and Perkins (2005) concluded that subspecies *townsendii* is broadly distributed from the Pacific coast of the United States and British Columbia (including Vancouver Island) southward to coastal regions of the Sonoran Desert in Mexico, eastward to the Colorado Plateau and the Black Hills. These bats are nonmigratory or move moderate distances between breeding and nonbreeding sites. Nightly foraging bouts may be localized near the day roost or may cover more than 150 km. Throughout much of the known range, these bats commonly occur in mesic habitats characterized by coniferous and deciduous forests (Kunz and Martin 1982), but they occupy a broad range of habitats (e.g., see Handley 1959). On the West Coast, Townsend's big-eared bats are found regularly in forested regions and buildings, and in areas with a mosaic of woodland. Maternity roosts in British Columbia exist in buildings and caves (Reid et al. 2010). Diet includes various flying insects often obtained near the foliage of trees and shrubs; the species may feed primarily on moths (Barbour and Davis 1969, Leslie and Clark 2002, Dodd 2006) Their occurrence status is confident or certain for the Nanaimo area. (*BC CDC*). The study area provides forested areas suitably for this species for foraging activity.

Northern Pygmy-owl (*Glaucidium gnoma swarthi*): Blue-listed

Their occurrence status is confident or certain for the Nanaimo area as a year-round resident and confirmed breeder. This species requires veteran large diameter trees with cavities or potential for nest cavities to provide breeding habitat. This species is widely but sparsely distributed on Vancouver Island and Gulf Islands. Populations are believed to be declining from habitat loss due to expanding urbanization, past timber harvesting on Crown Land and private land, and potential predation from Barred Owls, but empirical data is lacking. Over time, as second growth forests on Crown Land develop into mature stands with old features, where human encroachment through urbanization does not convert forest land, habitat availability should increase. Forest edges are preferred for foraging, as per Provincial Status Report (2003) and IWMS (2004), including disturbed forest edges, wetlands, and riparian areas. (BC CDC). There are a number of large diameter, veteran Douglas fir trees within the ravine in the study area that may support this species.

Broadwhorl tightcoil snail (*Pristiloma johnsoni*): Blue-listed

This species occurs from southwestern British Columbia through the north Cascades in western Washington, and south to northwestern Oregon. An uncommon, rare species with habitat in areas that are extremely vulnerable to logging, agricultural practices and human development. Little is known about this species dependence on habitat subtypes. In BC they are found in old growth and older second growth forests in leaf litter of deciduous, coniferous and mixed-wood forests up to an elevation of over 1300 m in the subalpine (Cameron 1986, cited by Forsyth 2004; Branson and Branson 1984, cited by Forsyth 2004). They are identified as being predicted or probable to occur in the Nanaimo area. (BC CDC). The forest stand within the site may provide suitable leaf litter to support this species, however as the forest stand within the park increases in age, the forest will eventually mature enough to provide suitable habitat for this species.

Ermine, *anguinae* subspecies (*Mustela ermine anguinae*): Blue-listed

This sub-species of weasel inhabits a variety of forest and woodland habitats. Their occurrence is listed as confident or certain in the Nanaimo area. They are restricted to Vancouver Island (Nagorsen 1990) and Saltspring Island (Cowan and Guiguet 1965). Their range extent is approximately 32,500 km² and they are thought to be distributed throughout Vancouver Island at low abundances (Mowat et. al 1998). Loss and fragmentation of habitat through urban and agricultural development is a negligible threat because of their wide range (D. Nagorsen, pers. comm. 2014). Work by Mowat et al. (1997) suggests that they are most common in forest openings and edges, often bordering on riparian areas. Accidental trapping takes between 1-4 animals per year (J. MacDermot, pers. comm. 2014). Marten are thought to be a major limiting factor for this subspecies due to competition (Hatler et al. 2008). However, predation by the Marten is thought to be negligible (D. Nagorsen, pers. comm. 2014). Ermine populations are

highly variable elsewhere. Reproductive output is closely tied to food abundance; when prey are at very low densities, ermine are unable to produce a litter (Korpimaki et al. 1991; King 1985; Erlinge 1983). They are able to respond quickly to prey abundance: newborn females can be impregnated shortly after birth while their eyes are still closed (King et al. 2003) and litter size can be as high as 13 (Fagerstone 1987). However, ermine exhibit delayed implantation of nine to ten months and produce only one litter a year. Ermine are highly tolerant of human presence. As Vancouver Island is somewhat lacking in numbers or variety of species in small mammal fauna this is probably a limiting factor for this subspecies. Little is known of the basic ecology of this subspecies, including habitat preferences and requirements, prey interactions, or the effects of logging. The preference for coarse woody debris and thick understories, particularly near water, appears consistent among Ermine, therefore it would be prudent to manage with this in mind. (BC CDC). Riparian forest habitats such as found within the project area may support this subspecies.

Wandering salamander (*Aenides vagrans*): Blue-listed

This species moves only short distances; 94% were recaptured within 10m of the initial capture location (Davis 2002). They are found in moist coniferous forests; in forest edge, forest clearings, talus, and burned over areas. Usually found under bark, in rotten logs, or in rock crevices. May aggregate in decayed logs in summer. They require large (greater than 20 inches in diameter) down logs of mid-decay classes with sloughing bark (Thomas et al. 1993). Logs are primary microhabitat in spring, summer, and fall on Vancouver Island (Davis 2002). They sometimes climb high into trees. They lay eggs in cavities in rotten logs, in rock crevices, under bark, or among vegetation. They are widespread on Vancouver Island and neighboring islands in British Columbia, and also have been found on the mainland. They are identified as having a confident or certain occurrence within the Nanaimo area. (BC CDC). The forest habitat and abundant downed logs within the project area would be suitable to support this species.

Olive-sided flycatcher (*Contopus cooperi*): Blue-listed

This bird species is considered an indicator species of the coniferous forest biome throughout North America, although occasionally found in mixed deciduous/coniferous forests. They are frequent users of coniferous forest and riparian forest habitats and their occurrence is identified as confident or certain occurrence in the Nanaimo area. They are aerial insectivores. Olive-sided flycatchers make the longest migrations of any flycatcher nesting in North America. Nests are placed most often in conifers (Harrison 1978, 1979), on horizontal limbs from two to 15 m from the ground (Harrison 1979, Peck and James 1987). This bird is a widespread breeder across southern BC found in moderate numbers that are thought to be declining, possibly due to loss of suitable breeding and foraging habitats (BC CDC). The forest habitat within the project area would be suitable to support this species.

Western Screech-owl (*Megascops kennicottii kennicottii*): Blue-listed

This species is resident from south-coastal and southeastern Alaska, south through coastal British Columbia to coastal Oregon (Cannings and Angell 2001). Occurrence records identifies them as confident or certain for the Nanaimo area and a year-round resident and confirmed breeder. Western Screech-Owls are non-migratory and depend year-round on older trees with cavities for roosting and during the breeding season for nesting. There is an apparent precipitous decline in numbers in core area of its range, i.e., lower mainland and southeast Vancouver Island, particularly since 2000, and earlier, in some areas. Preliminary analysis of Christmas Bird Count data from 1988 to 2004 indicated that on Vancouver Island numbers have declined 17% annually, while in the lower mainland numbers declined 32% annually (Elliot 2006). On the south coast of British Columbia, population decline is thought to be linked to the recent arrival of Barred Owls that are known to depredate and out-compete screech-owls. Barred Owls are expected to continue their range and density expansion northwards, potentially impacting screech-owl populations outside their core range. Urbanization and conversion of wooded areas to agricultural lands in the southern portion of the range reduces habitat. Populations are also impacted by forestry operations that reduce dead trees and snags that provide roosting and nesting cavities. In local areas where habitat degradation has reduced the number of potential roosting and nesting cavities, effort should be made to erect artificial nest boxes. *BC CDC*. Forest habitat in the study area provides suitable habitat for this species.

Western Water Shrew (*Sorex navigator brooksi*): Blue-listed

This species is restricted to Vancouver Island with its range extending as far west as Ucluelet. The species is relatively rare and little is known about its life history. The western water shrew is reliant on riparian or wetland habitats near watercourses. They are found in lower elevations in a variety of forest types near slow to moderately-fast flowing water. The most important habitat factor is an intact riparian area. As such, the primary threat to this species is habitat degradation and fragmentation from urbanization and forestry practices. It is likely that predation from cats has also caused a decline in the population in urbanized areas. *BC CDC*. Forest habitat in the project area provides suitable habitat for the western water shrew and the *BC CDC* lists the probability of occurrence in the region as “confident or certain.”

The project is expected to be low impact as the proposed project is located on the alignment of an existing trail and requires a very limited removal of vegetation with a relatively small total footprint within a heavily forested area. As such, no negative impacts to these species are expected.

4.0 SITE DESCRIPTION

4.1 Site Vegetation

Benson Creek Falls Regional Park is a 32 ha wooded park accessible from the north by Wiegles Road and the south from Jameson Road. The park is surrounded by a network of logging roads through a previously logged forest. Within the park boundaries, the forest transitions to a heavily wooded second growth forest with a number of old growth Douglas-fir (*Pseudotsuga menziesii*) within the sides of the ravine. The canopy is comprised of mature bigleaf maples (*Acer macrophyllum*), Douglas-fir and western redcedar (*Thuja plicata*) with an estimated density of 8 stems/10m². There is the occasional arbutus (*Arbutus menziesii*) within drier, upslope portions of the area. Trees in the understory include grand fir (*Abies grandis*) and western hemlock. Two mature western yew (*Taxus brevifolia*) were identified near the creek on the north side of the ravine in Site 2. The shrub understory is similar for all sites and is dominated by sword fern (*Polystichum munitum*), dull Oregon-grape (*Mahonia nervosa*) and salal (*Gaultheria shallon*), with lesser amounts of red huckleberry (*Vaccinium parvifolium*), evergreen huckleberry (*Vaccinium ovatum*) and deer fern (*Blechnum spicant*). Licorice fern (*Polypodium glycyrrhiza*) and thick moss grow along the trunks of the maple trees. The forest contains an abundance of large woody debris with recent windthrow on the north side of the ravine and there was evidence of a past forest fire as seen by the blackened bases of some of the mature trees along the south bank of the ravine within Site 1.

No sensitive habitat or provincially blue or red-listed species were identified within the project area during the field assessment. No heron or raptor nests were observed in the site assessment.

4.2 Watercourses

Benson Creek Falls Regional Park is bisected by Benson and Flynfall Creeks. The creeks form two waterfalls, the larger of which, known as Ammonite Falls, is on Benson Creek and is approximately 20m high, located within a deep ravine. This section of Benson Creek is approximately 30m wide at the base of the falls and narrows to approximately 10m further downstream. The stream bed is comprised of boulders, cobble and gravel and contains a reach of riffle through the project area with a 5% gradient. At the time of the winter site visit, the water level of the creek was relatively high with a strong flow.

4.3 Site 1 – Ammonite Falls

The east bank of the ravine is steep (~60-70%) and the informal trail leading down to the creek was created by hikers creating an unsafe situation. The substrate is comprised of densely packed clay mixed with cobble and gravel and is highly impacted by trail use, with much erosion evident on the slope which increases down the steeper sections of the ravine slope towards the creek. A series of ropes attached to trees has been installed by hikers along the side of the south ravine bank. A partial chain link fence has been installed by the RDN for safety above the top of the waterfall and warning signage is posted on a nearby tree trunk preceding the steep, eroded trail to the creek. Across the creek, the opposite ravine bank shows evidence of slope instability including several downed trees.

4.4 Site 2 – Benson Creek Crossing

The trail, as mentioned, continues from Site 1 by a trail extending north along the top of the ravine towards Site 2. While assessing the north ravine of Site 2, Aquaparian did not cross the fallen log to walk the south ravine portion of the alignment due to slippery conditions. Most of the conditions could be observed from the north ravine bank. Site 3 was equally inaccessible but the habitat is expected to be consistent with the rest of the project area. The south ravine bank is steep (~60-75%) and eroded, comprised of similar substrate as described for Site 1. The north bank of the ravine also has a steep gradient (~65-85%) and contains a narrow, informal trail with sharp switchbacks leading down into the ravine. A large fallen tree blocks the trail part way down the ravine and is flagged to be removed. Other smaller fallen trees obstruct the trail as well. Aquaparian visited Site 2 for a second time on January 27, 2020 and observed that many trees were downed since the initial visit and several recent breaks in tree trunks were visible. The trail along the ravine is subject to much erosion from water runoff from rainfall and many of the trees along the trail have exposed roots. In addition, there was evidence of slow slope instability observed by pistol butt trees and mature leaner trees. The north bank of Site 2 also has unauthorized ropes installed leading down to the creek. The creek is spanned by a large diameter fallen log that currently is used as a footbridge.

5.0 IMPACT ASSESSMENT

In general, the proposed trail upgrades and bridge construction are expected to have a relatively small footprint and result in a low impact to the forested habitat within the site. The upgrades were designed to include as little vegetation removal as possible. Only two trees are planned to

be removed, one of which is a dead snag, and one fallen tree across the trail within Site two will be removed. The large woody debris that results from tree removal will remain in the forest. The project area is subject to much erosion along the ravine as a result of informal trail use, so much of the vegetation within the footprint of the proposed upgrades is already sparse to non-existent. The surrounding forest does provide a high habitat value; it has a mature forest stand with a number of veteran Douglas-fir, closed tree canopy suitable for bird nesting, perching and foraging and much vegetation cover for large and small mammals, reptiles and some amphibian species near the stream, as well as a natural fish bearing stream flowing through. This project will not result in a reduction or fragmentation of habitat; once complete, it will resemble the same habitat structure as before the upgrades. The proposed project will control pedestrian traffic to limit the impact to a more formal trail alignment that will greatly improve safety for park users. There is the potential for some replanting to offset impacts to vegetation and to aid in adding stability to the slopes of the ravine. Recommendations are further described Section 6.0 below.

The principle concern for the installation of the bridge across Benson Falls Creek is preserving water quality during the minor concrete works and other installation works of the steps upslope of the bridge crossing. Aquaparian has included an Environmental Protection Plan (EPP) (Appendix E) with this report that outlines measures to avoid or minimize negative environmental impacts associated with this project during construction. The EPP is to be followed by the contractor(s) hired to complete the proposed upgrades and the bridge installation. The EPP is in compliance with the Terms and Conditions that the project must abide by as required by the province (Appendix A).

5.1 Project Impact Calculation

The impact for the proposed trail alignment upgrades and installation of structural elements including the staircases, steps and fencing along the ravine in Site 2 are expected to result in an approximate soil disturbance/minor vegetation clearing area of 94.5 m² during construction with a net benefit resulting from the improvements to the trail. Only 1 tree and 1 snag are expected to be removed from the alignment area. The installation of the 2 concrete bridge footings will result in the disturbance of soil and minor vegetation over 4m² at each end of the bridge. Site 3 will include approximately 22.5m² of soil disturbance to armour the bank. Because the area is already very eroded and bare, it is expected that vegetation removal will be minimal for Site 3. The total disturbance area is estimated to be 125m².

Although there is no permanent work within the wetted parameter of Benson Creek planned, the contractor may need to install temporary shoring for the staged construction of the bridge. The contractor may or may not choose this alternative method of construction.

6.0 RECOMMENDATIONS

- Vegetation removal should be completed outside the songbird nesting season (March 15 - August 15) or, if in the nesting season as close to the end as possible (after July 15th) following an assessment for nesting activity by a qualified nest surveyor. Though few trees are scheduled for removal, nesting can occur on the ground or low amongst the understory vegetation.
- Complete the vegetation removal and site preparation during the dry season, or minimal rain forecast. No sediment is to be allowed to migrate into the creek. If heavy rain is forecast, install silt fencing along the work area to prevent sedimentation down the ravine slope. The disturbance areas outside of the trail alignment should be mulched or vegetated as soon as possible to prevent surface erosion.
- Planting native plants along the exposed slopes will help to prevent further erosion and offset some of the vegetation removal. Left alone, the bare slopes are unlikely to infill naturally due to the hardened substrate and steep slope. A pocket planting method is suggested. Alternatively, benches can be created in the compact soil to create planting opportunities. Planting between the switchback trail planned for the creek crossing (Site 2) will help to offset the impact of the project and increase stability of the trail while further decreasing erosion. Suggested plant species include dull Oregon-grape (2 plants per m²), salal (2 plants per m²) and sword fern (1 plant per m²). The total impacted area was calculated to be 125m²; however, much of this area is within an existing trail alignment and the upgrades are planned for areas that are already subject to erosion and have sparse vegetation. Planting the sloped areas that are visually identified as bare will be sufficient to offset the impacts of the trail upgrades. The exact planting area and planting method will be determined after construction activities are complete.
- Due to proximity to a fish bearing stream, all work must be completed within the “least fish window” June 15 – September 15 (as per the Ministry of Forests, Lands and Natural Resource Operations, WSA Section 11, file #1004730) and an Environmental Monitor (Aquarian) must be on site for all works that have the potential to impact the stream.

7.0 CONCLUSION

Aquarian Environmental Consulting Ltd (Aquarian) was retained by the Regional District of Nanaimo to complete an Environmental Impact and Remediation Assessment for access upgrades to the Benson Creek Falls Regional Park. The removal of vegetation, disruption of soil and installation of steps, staircases, rip rap armoring and a truss bridge will result in

temporary, minimal habitat disruption. Vegetation removal within the ravine is expected to be minor and includes the removal of 2 trees and minor amounts of understory species that are growing along an impacted and eroding slope of the ravine. Works around a fish bearing stream are not expected to impact the watercourse or fish or fish habitat if the recommendations in this report and the measures detailed in the EPP and the province's Terms and Conditions attached are followed. The project footprint for Site 2 and Site 3 is estimated to include a total disturbance of 125m² of soil and minor understory vegetation removal. Replanting of native vegetation along the ravine slope will help offset the impacts of minor vegetation removal and further stabilize the eroding ravine banks. The access upgrades will not only contribute to public safety, but will reduce further erosion along the ravine and protect the stream from sedimentation.

Because concrete pouring is required, the work must be completed in compliance with the measures outlined in this report and the EPP. Based on findings in this EIA, it is Aquaparian's professional opinion that, if all mitigation measures outlined in this report and the EPP are followed, the access upgrades are not expected to have any lasting negative impacts on wildlife, wildlife habitat, fish or fish habitat. Because some of the work will occur around a stream, a Section 11 Water Sustainability Act Notification has been filed by Aquaparian on behalf of the RDN.

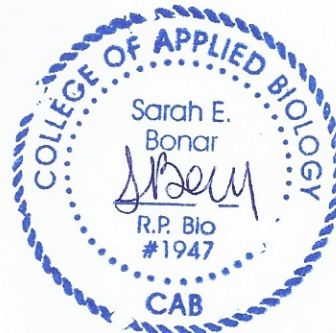
8.0 CLOSURE

This report has been completed in accordance with generally accepted biological practices and is based on site assessments, previous studies, background information from government databases and regulations current as of the time of writing this report. Anticipated impacts are based on the proposed development plan appended to this report provided by the client at the time of writing this report. If the design changes, Aquaparian is to be provided an opportunity to assess the proposed changes and revise the report accordingly. No other warranty is made, either expressed or implied.

Aquaparian trusts that the information provided in this report meets your requirements. Any questions regarding information provided in this document, please contact the undersigned at (250) 591-2258.

Respectfully submitted,

AQUAPARIAN ENVIRONMENTAL CONSULTING LTD.



Jeni Rowell, B.Sc.
Junior Biologist

Sarah Bonar, B.Sc. R.P.Bio
Senior Project Biologist / Principal

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203-321 Wallace, Nanaimo, BC V9R 5B6

SARAH BONAR 250-714-8446 CHRIS ZAMORA 250-714-8864

9.0 REFERENCES

BC CDC website: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre>. Accessed January 20, 2020.

HabitatWizard website: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard>. Accessed January 15, 2020.

Regional District of Nanaimo website: <https://www.rdn.bc.ca/>. Accessed December 19, 2019.

FIGURE 1
SITE LOCATION MAP

FIGURE 1A – SITE LOCATION

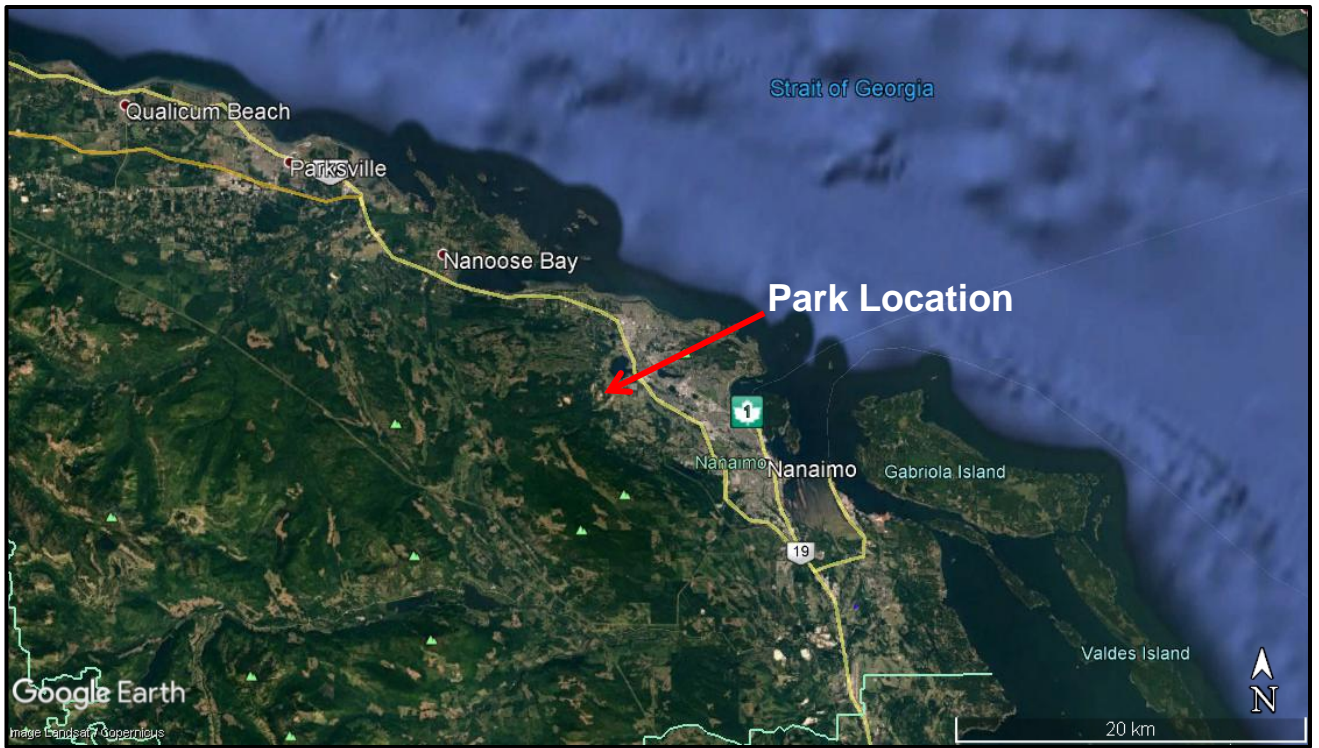


FIGURE 1B – PROJECT LOCATION

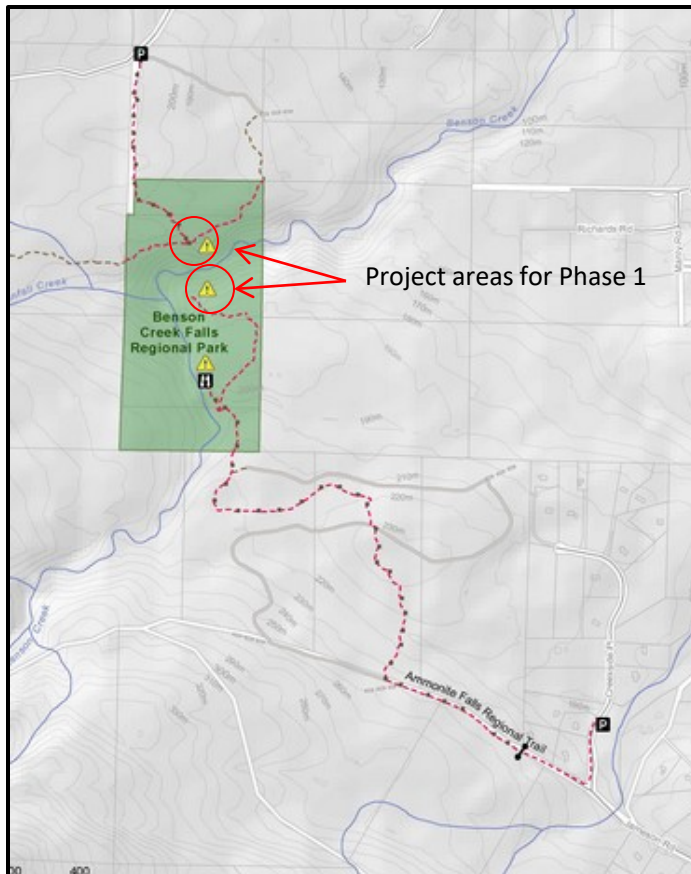
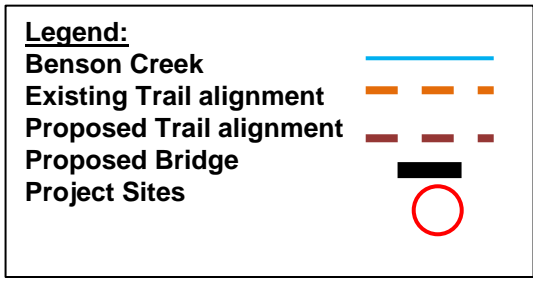
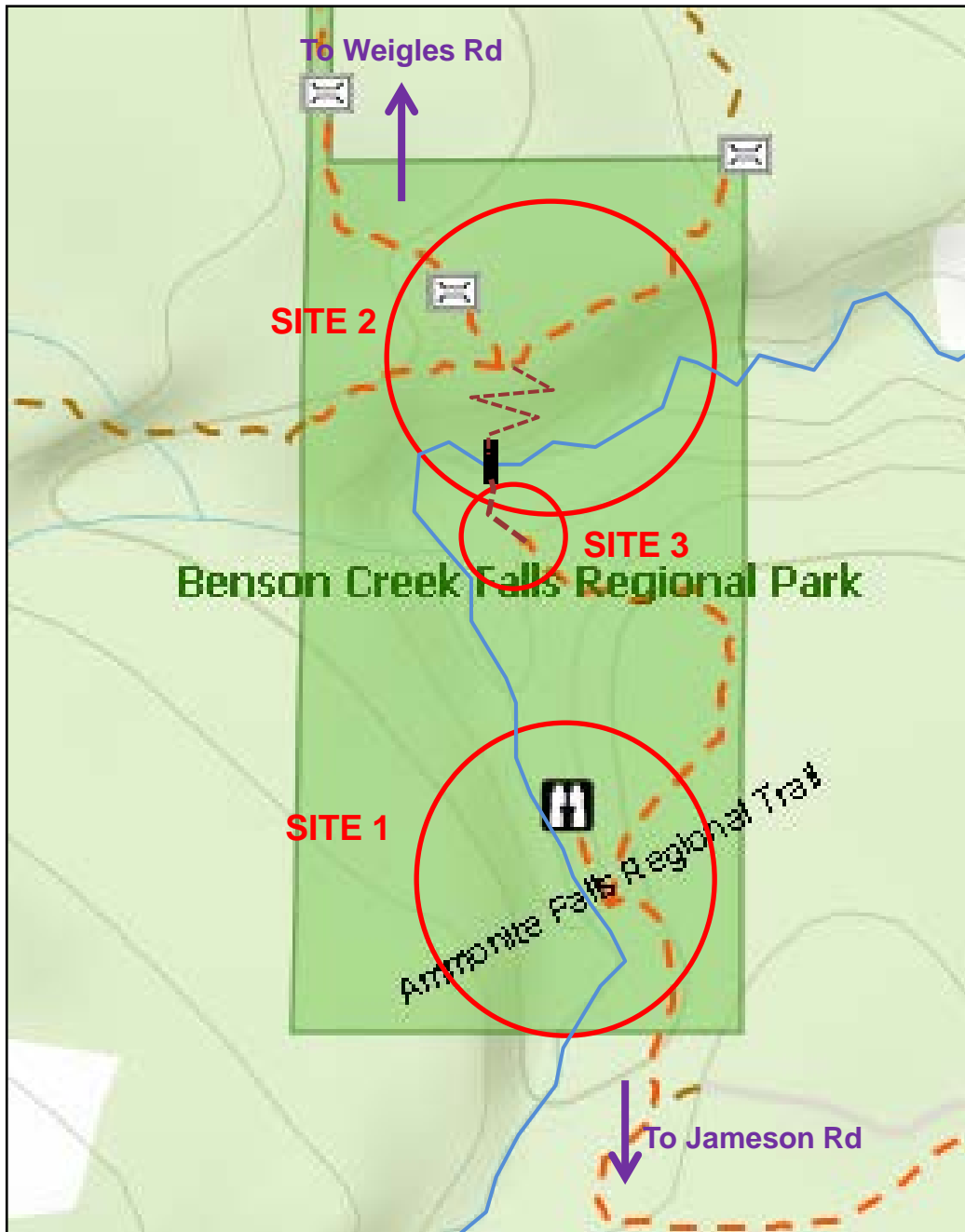


FIGURE 2
PROJECT SITES

FIGURE 2 – PROJECT SITES



APPENDIX A
SECTION 11 TERMS AND CONDITIONS



203-321 Wallace, Nanaimo, BC V9R 5B6

SARAH BONAR 250-714-8446 **CHRIS ZAMORA** 250-714-8864

**Terms and Conditions For Changes In And About A Stream Specified By
Ministry of Forests, Lands and Natural Resource Operations
Habitat Officer, West Coast Region (Vancouver Island & Gulf Islands)
(Updated February, 2011)**

Section 42 (1) of *the Water Regulation* gives authority to a Habitat Officer to add specific conditions to ensure the protection of habitat in addition to the conditions of general application. Under this authority the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) Habitat Officer for West Coast Region requires the following mandatory terms and conditions:

42 (1) To protect habitat, a person making a change in and about a stream under this regulation, other than under section 44(1) (o) to (s) or (2), must make that change in accordance with terms and conditions specified by the habitat officer with respect to

(a) the timing window or the period or periods of time in the year during which the change can proceed without causing harm to fish, wildlife or habitat,

The timing window of least risk to fish and fish habitat must be applied to all activities in fish streams as well as tributaries that have a risk of depositing sediment into fish streams. Windows of least risk are designed to protect all fish species known to occur in a stream. One way fish presence can be confirmed is through a fish inventory database.¹ Please note if using this database that the lack of fish records for a particular area is not necessarily equivalent to fish absence. All streams are assumed to have both spring and fall spawners, until proven otherwise. The Table below represent time periods when instream work must be conducted. Numbers in the Table represent an approved start or end date for instream work.

Reduced Risk Work Windows for Fish and Wildlife for Vancouver Island

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Throughout	All Species*	June 15	September 15
Throughout	Steelhead	June 15	September 15
Throughout	Rainbow Trout	August 15	September 15
Throughout	Cutthroat Trout	August 15	September 15
Throughout	Dolly Varden	June 15	September 1
Throughout	Chinook	July 15	September 15
Throughout	Chum	May 15	September 15
Throughout	Coho	June 15	September 15
Throughout	Pink	May 1	August 15
Throughout	Sockeye	June 1	September 15
Throughout	Kokanee	June 1	September 15

*The general fisheries timing window for instream work on Vancouver Island is June 15th to September 15th. When more detailed information is available w.r.t. fish species present at the (work) site, then the applicable timing window (above) for that species should be applied.

¹ Fisheries Inventory site at <http://www.env.gov.bc.ca/fish/>

Localized exceptions to this table include:

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Not specifically known	Green Sturgeon Red Listed	November 1	April 30
Misty Lake	Giant Black Stickleback Red Listed	No Work Window, Spawns in spring and summer in lakes only	
Enos Lake	Enos Lake Limnetic Stickleback Red Listed	No Work Window. Consult a Registered Professional Biologist	
Cowichan Lake, Mesachie Lake	Cowichan Lake Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist	
Morrison Creek and Tributaries (Puntledge River)	Morrison Creek Lamprey Red Listed	No Work Window. Consult a Registered Professional Biologist.	

A qualified professional (Registered Professional Biologist) must be consulted to determine whether the project will have any impact on the above Species at Risk. Please refer to the BC Species and Ecosystems Explorer for details: <http://www.env.gov.bc.ca/atrisk/toolintro.html>

Beaver: The instream work window for beaver dam removal is June 15th to September 15th.² Opening plugged culverts or removing beaver dams and draining ponds between September 15th and June 15th can result in mortalities of both beavers and fish, and will not normally be accepted. Special circumstances may warrant dam removal during this time. Request to modify or remove beaver dams, or unplug culverts outside the work window must be accompanied by a detailed request directed to a Habitat Officer. Such request will be dealt with on a case-by-case basis, and approval may be given.

Minimize the amount of time the work site is in a disturbed state by completing work as quickly as possible, while considering worker safety and minimizing environmental risk.

(b) The minimum instream flow or the minimum flow of water that must remain in the stream while the change is being made,

- The natural rate of water flow must be maintained upstream and down stream of the worksite during all phases of instream activity.

(c) The removal of material from the stream or stream channel in connection with the change,

- In fish streams, the permanent removal of stable, naturally occurring material from the stream or stream channel is not permitted.

² A beaver dam may be modified or removed only in order to protect property (e.g. a road base), as per Section 9(2) of the *BC Wildlife Act*. A “Habitat Officer” of the Ministry of Forests, Lands and Natural Resource Operations establishes terms and conditions associated with the removal or modification of beaver dams, pursuant to Part 7, Sections 42 and 44 (1) (v) of the *BC Water Act Regulation* and Section 9 of the *BC Wildlife Act*.

- In non-fish streams, the permanent or temporary removal of stable, naturally occurring material must be minimized and completed only as necessary to make the change in accordance with Part 7 of the *Water Regulation*.
- The removal of material must not lead to stream channel instability or increase the risk of sedimentation into the watercourse.
- Any spoil materials must be placed in a location which ensures that sediment or debris does not enter the watercourse.

(d) The addition of substance, sediment, debris or material to the stream or stream channel in connection with the change,

- Instream activities must be conducted in the dry and the worksite must be isolated from water flowing in the stream channel.
- All equipment must be located and operated in the dry.
- Equipment used in close proximity to the wetted perimeter must be free of deleterious material (e.g. hydrocarbons) and in good mechanical condition (e.g. no fuel or hydraulic leaks).
- Measures must be taken to ensure that no harmful material (e.g. fuel and other hydrocarbons, soil, road fill, or sediment), which could adversely impact water quality, fish and other aquatic life, and /or fish habitat, can enter the wetted perimeter as a result of the project activities.
- Erosion and sediment control structures are to be available onsite and utilized as necessary.
- Do not work in weather conditions likely to contribute to sediment production to the stream.
- If approved, beaver dam removal must occur slowly, a bit at a time, in order to minimize scouring and the addition of silt to downstream areas. Water flowing through a dam breach should normally not exceed 0.2 square metres in area (i.e., a typical breach could measure 1.0 metre x 20 centimetres in size). All material removed from a beaver dam must be side-cast in such a manner that it cannot re-enter the stream.

(e) The salvage or protection of fish or wildlife while the change is being made or after the change has been made,

- If dewatering of the worksite is necessary, fish salvage must occur on a fish-bearing stream prior to commencing works. A scientific fish collection permit must be obtained from the MFLNRO Permits and Authorization Service Bureau (<http://www.env.gov.bc.ca/pasb/applications.html>) prior to commencing salvage activities. A fish salvage permit is required from Department of Fisheries and Oceans in salmon bearing waters, contact Steve Baillie at 250 756-7227.
- If an area is de-watered as a result of beaver dam removal or modification and results in the stranding of fish, then these fish must be salvaged and returned to the stream.

- Measures must be taken to ensure that equipment (e.g. water pumps) does not harm aquatic life.
- Do not disturb wildlife and /or their residences (e.g. beaver lodges³) within the project area.

(f) The protection of natural materials and vegetation that contribute to habitat or stream channel stability,

- Minimize disturbance to natural materials (e.g. embedded logs) and vegetation that contribute to habitat or stream channel stability.
- The Riparian Areas Regulation (RAR), enacted under Section 12 of the *Fish Protection Act* in July 2004, calls on local governments by March 31, 2006 to protect Riparian Areas during residential, commercial, and industrial development by ensuring that proposed activities are subject to a science based assessment conducted by a Qualified Environmental Professional. The Riparian Areas are the 30 meter strip on both sides of the stream, measured from the high water mark. For information on the RAR, and whether it applies to your project, we suggest you visit the Ministry's website and check the Frequently Asked Questions:
http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html#extension

(g) The restoration of the work site after the change has been made, and

- Complete restoration activities (including erosion control), as required, that will lead to natural pre-disturbance conditions.
- Any disturbed areas must be restored to function as they did in their pre-disturbance condition.

(h) The requirement to obtain an approval from the federal Department of Fisheries and Oceans (DFO) in connection with the change.

- Proponents are responsible for complying with the federal *Fisheries Act*. No harmful alteration, disruption or destruction (HADD) of fish habitat is authorized by this document. Be aware that a series of Operational Statements (OS) have been developed to streamline the Habitat Management Program's (HMP) regulatory review of low risk activities. The OS outline measures and conditions for avoiding the harmful alteration, disruption and destruction (HADD) to fish habitat, and thus be in compliance with subsection 35(1) of the *Fisheries Act*.
- Project Review Application Forms (PRAF) and additional information can be found at DFO Habitat Management Website "Working Near Water" at <http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm>.

³ Beaver may only be removed by the registered trapline holder or contract problem beaver trappers. A list of trappers can be obtained through the Nanaimo Regional Office at 250 751-3100.

Proponents are not required to submit their proposal for review by Fisheries and Oceans Canada (DFO) when they incorporate the measures and conditions outlined in the OS into their plans. The Following is a list of Operational Statements:

Aquatic Vegetation Removal
Bridge Maintenance
Clear Span Bridges
Culvert Maintenance
Directional Drilling
Dock Construction
Ice Bridges
Routine Maintenance Dredging
Underwater Cables

To obtain this material, please visit the following website:

http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm

- The central DFO contact telephone number for Vancouver Island is as follows:

DFO Habitat Information Line 250 740-0544

Section 44 of the *Water Regulation* is important, as it provides the requirements for the installation of culverts in streams. **Fish passage in pipe culverts** has historically been a problem in the Pacific Northwest, and Vancouver Island is no exception. This follows in part from the emphasis on culvert efficiency and capacity to convey storm flows. Characteristics of culverts that make them efficient may create high velocities, and shallow flow that are impassable to fish. Perched outlets, inadequate jump pools, culvert obstructions, inlet drops, and inaccessible outlet weirs or rock aprons are examples of problems frequently associated with pipe culverts. Investment in stream enhancement is offset by loss of accessible fish habitat by installation of culverts that do not pass fish. If your project involves the installation of a culvert, please make special reference to Part 7 of the *Regulation*, Section 44, where it states:

44 (1) For the purposes of section 9 of the Water Act, the following changes in and about a stream may be made without the necessity of obtaining an approval or licence for that change, provided that the change is made in accordance with this regulation and in accordance with the terms and conditions, described in section 42, specified by a habitat officer:

(a) the installation, maintenance or removal of a stream culvert for crossing a stream for the purposes of a road, trail or footpath, provided that:

(ii) in fish bearing waters, the culvert allows fish in the stream to pass up or down stream under all flow conditions,

Important terms to note:

"fish bearing waters" means a stream having a fish population present at some time during the year;

"stream" includes a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch;

Fish Passage Criteria:

Fish passage design should provide for weakest swimmers including the smallest fish. If small fish are able to pass, this provides reasonable confidence that the majority of fish can pass through the culvert.

Fish passage includes any related downstream works that may affect access to the outlet of the culvert. If the culvert is accessible and not obstructed, fish passage is determined by the hydraulics of the culvert that affect velocity and depth of flow. This is governed by slope and geometry of the culvert relative to assumed levels of discharge and accounting for backwatering effects.

Mitigation to and/or to reduce inlet and barrel velocities and/or maintain adequate swim depth is likely to be required for most culverts installed at greater than 0.5% slope. Culverts installed above 0.5% are generally likely to require backwatering to mitigate against adverse velocities and shallow depth of flow. This may involve constructing a weir or series of weirs downstream of the outlet or use of an alternative design such as embedding the culvert into the stream, so that 1/3rd of the culvert is filled with natural substrates.

Backwatering requires hydraulic design because it influences culvert capacity and results in varied flow conditions in the culvert. Culverts installed above 0.5% will generally involve hydraulic assessment of fish passage in the design. Proposed use of baffles are subject to maintenance to clear obstructed baffle slots or notches. Similarly, downstream weirs must be sufficiently robust to withstand design storm flows. Weir structures including baffle weirs need to be maintained and may require repair over the life of the culvert. This may be problematic where the responsibility for long term maintenance cannot be secured. Local government should be consulted to determine acceptance.

Culverts at less than 0.5% slope may require backwatering if depth of flow is inadequate at the inlet. Culverts should not be installed flat if there is a difference in slope between the culvert and the stream of more than 2% resulting in an inlet drop exceeding 30cm or outlet drop.

Where feasible, open bottom structures, or embedded culverts that preserve or simulate the natural stream bed, are preferred. These structures are generally more likely to be fish passable and are not subject to the same degree of hydraulic design considerations as bare pipe culverts. Provincial guidelines are contained in the Fish Stream Crossing Guidebook available for download at:

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>.

These guidelines were developed for the forest industry, but have equal applicability in other settings.

Assessment of fish passage in non-embedded pipe and closed bottom box culverts is based on the following criteria that have been adapted from similar criteria used in Oregon. While they are not in regulation, they are considered to be based on best available science and research on fish passage.

Fish passage should be based on juvenile fish swimming capabilities:

- Generally, this will require limiting velocities in the culvert to less than 0.6m/sec^2 .
- The minimum swim depth is 20cm to facilitate both juvenile and adult fish passage.
- Maximum outlet jump or hydraulic drop at the inlet or within the culvert should not exceed 15cm. If an outlet drop exists there must be a jump pool. Outlet jumps are not a desired feature, but may be present as a mitigating measure to a previously installed culvert. The jump pool should be the greater of 1.5 times the outlet drop or 60cm. Added depth is required to facilitate fish accelerating into a jump. The deep point of the pool must be close enough to the outfall for fish to utilize the full depth of the pool to make the jump into the culvert barrel.
- Backwatering to the inlet is important to ensure that fish do not become exhausted short of the inlet. This may happen as a result of accelerated flows at the inlet caused by inlet constriction relative to stream width, steepness of the culvert, or increased velocity associated with high fish passage flows.
- The flow velocities of the culvert need to be checked against a high fish passage discharge estimate for the culvert. Flows that are not exceeded more than 10 percent of the time during the maximum discharge month when fish may be present may be used as a high fish passage flow guideline.
- A range of low flows should be examined to ensure that the culvert will have sufficient depth of flow during low flow periods when fish may be present based on expected flows in the adjacent stream.

The foregoing considerations do not replace the need for adequate professional design or input from a professional biologist with fisheries experience. They do not cover all circumstances that may be encountered. Local government may have additional bylaws or requirements that restrict what is acceptable. Fisheries and Oceans Canada also has requirements and policies relating to fish passage pursuant to the federal *Fisheries Act*.

Confirming Fish Bearing Status of the Stream:

The presence of fish refers to migrating, spawning, and rearing fish and includes all species and life stages that may be present at any time of the year. Fish bearing status is confirmed on the basis of known presence/absence as confirmed by fish observations or inventory.

The alternative to conclusively determining fish absence is to accept that fish may potentially be present and to develop the crossing to pass fish.

Most available information on fish distribution and habitat has been compiled into the Fisheries Information Summary System (FISS) provincial database. FISS provides a standardized, systematic summary of information about fish, fish habitat and resource use (fishing). If information confirming the absence of fish is not available, a reach level survey may be required to prove fish absence.

The Fisheries Information Summary System (FISS) is maintained by the Ministry of Forests, Lands and Natural Resource Operations and Fisheries and Oceans Canada. Information may be accessed through the BC Ministry of Forests, Lands and Natural Resource Operations Fisheries Inventory Data Queries website. Much of the mapping of fish presence is interpreted at a scale of 1:20,000, the FISS misses many small streams that may contain fish in urban and rural areas. Many fish observations are single location spot observations that enable inference of fish presence upstream in the absence of documented barriers.

The Resources Inventory Committee manual Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Manual is an essential reference on data recording protocols for fish-stream identification. The manual is available on the Ministry of Forests, Lands and Natural Resource Operations website: <http://ilmbwww.gov.bc.ca/risc/pubs/aquatic/recon/index.htm>. This manual contains standard data collection forms for stream reaches, reach sample sites, and fish collection records which are recommended for use. The standard for database management is the Field Data Information System (FDIS) which is available to capture and store reach, sample-site, and fish collection data. Copies of the field forms can be obtained from Crown Publications. The RIC manuals contain much more information than that required to identify fish bearing stream reaches.

The basic information needed for fish-stream identification is fish presence or absence; therefore, describing the distribution of fish in a drainage basin is far more important than gathering data on fish abundance or population age structure.

Similarly, habitat quality is not a primary factor for fish-stream identification: fish-bearing status is not based upon the potential of the habitat to produce fish. However, habitat information can provide important clues to the type of fish-habitat use that can occur in an area, and it can identify operational considerations for locating stream crossings.

Fish presence can be determined by a number of acceptable techniques that cover a range of efficiency and sampling intensity. The simplest technique might be sufficient to determine presence. Fish presence is confirmed once an individual specimen of the appropriate species is properly identified.

Determination of the absence of fish from a body of water is much more difficult. While no fish may be captured at successively greater levels of sampling intensity, the ultimate “proof” of absence must be associated with the most intensive and efficient procedure appropriate for the species, life stage and time of year. For example, when sampling for quantitative purposes, baited traps are ideally set over 24 hours for juvenile fish, or two-trial electrofishing is performed. It is recognized that these levels of effort are sometimes difficult to achieve.

Ultimately, an acceptable survey has been performed when there is, in total, sufficient evidence to support the conclusion that fish do not occur in a given stream reach. The evidence must include, *in addition to fish capture results*:

1. Any known information on fish presence upstream and downstream of the reach sampled.
2. Type and location of obstructions to fish migrations.
3. Sampling conditions including stream flow, temperature and conductivity.
4. Sampling methods and effort (include gear selection sample timing).
5. Judgment of seasonal habitat availability.
6. Evaluation of seasonal fish use of stream and off-channel habitats.

A summary of fish presence or absence should reference existing inventories and fish observation mapping. It is recommended that fish sampling results and methods used, be recorded in on standard fish collection forms. Contractors that have the capability are encouraged to enter the information into the FDIS database management system. These data standards will ensure data are captured and available for future uses including the review of the stream classifications.

Sampling should be carried out at least 2 times during the year. The critical sampling periods include:

- Winter periods to capture spawning and fish rearing in headwater streams
- Summer periods during the low flow periods in areas where juveniles may be rearing.

All stream reaches for which non-fish-bearing status is proposed require a short, concise, written justification for this designation. This non-fish-bearing status report contains information that, in the professional opinion of the person responsible for the survey, provides sufficient evidence to support the conclusion that fish do not occur in the stream reach in question. Information that should be provided includes:

1. Date and time of sampling events, including initial and any follow-up sampling efforts.
2. Fish sampling methods and effort employed.
3. Capture methods used (e.g., electrofisher; Gee traps; use of barrier nets at either downstream limit, upstream limit, or at both ends of the sampled site).
4. Sampling area covered (number, length and area of sample site).
5. Sampling effort (e.g., number of traps, electrofishing seconds).
6. Stream conditions during sampling (e.g., specific conductance; flow stage of high, medium or low; temperature; turbidity).
7. Supporting evidence:
 - i. Known fish species presence both upstream and downstream.
 - ii. Type and location of obstructions to fish migrations.
 - iii. Seasonal habitat availability.
 - iv. Seasonal fish use of stream and off-channel habitats.
 - v. Results of any 1:20 000 reconnaissance fish and fish habitat inventory conducted in the watershed.

Downstream barriers must be confirmed as permanent and described as to whether they are assessed as natural or manmade, and whether the barrier is year round or seasonal. Absence of resident fish above barriers must be confirmed.

This document does not supersede the requirements of the *Water Act and Regulations*, *Federal Fisheries Act* or any other related legislation. The proponent is obligated to comply with all applicable federal, provincial or municipal enactments.

Where the West Coast Habitat Officer has an agreement with a company or agency pursuant to the *BC Water Act* Section 9 and Regulation 204/88, Part 7, the agreed Standard Operation Procedures (SOP) will be considered as satisfying the above conditions.

For enquiries regarding Terms and Conditions, please contact:

Habitat Officer
West Coast Region
Ministry of Forests, Lands and Natural Resource Operations
2080A Labieux Road
Nanaimo BC V9T 6J9
250 751-3100

From: [Jeni Rowell \(Aquaparian\)](mailto:Jeni.Rowell@aquaparian.com)
To: [Sarah Bonar \(Aquaparian\)](mailto:Sarah.Bonar@aquaparian.com)
Subject: FW: Response to Section 11 Notification - 1004730 - Benson Cr
Date: March 2, 2020 10:54:56 AM

From: Roden, Jacqueline FLNR:EX [mailto:Jacqueline.Roden@gov.bc.ca]
Sent: March 2, 2020 10:54 AM
To: kramer@rdn.bc.ca; jeni.rowell@aquaparian.com
Subject: Response to Section 11 Notification - 1004730 - Benson Cr

Habitat Officer Annette Bailey has reviewed your application and you may proceed with your proposed changes with the following conditions and comments:

Conditions:

Due to proximity to water all work must be completed in least fish window June 15 – September 15, 2020;

Must adhere to Environmental Impact and Remediation Assessment dated January 27, 2020;

Must adhere to Environmental Plan dated January 27, 2020;

Environmental monitor must be onsite during works that have potential to impact the stream, the Monitor must have a shutdown procedure in case of increased flow or heavy rains;

All equipment must be located and operated in the dry and spill kits must be onsite;

Any disturbed area next to project must be restored to function;

Ensure that all works involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any water body. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life; and

There must be a sediment fence below the works to avoid any debris entering stream.

Comments:

Agent letter on file dated January 23, 2020 for Aquaparian Environmental Consulting Ltd;

Environmental Impact and Remediation Assessment on file dated January 27, 2020; and

Environmental Protection Plan on file dated January 27, 2020.

Notifications received by this office will be used to plan and carry out on-site inspections and monitoring during and after the works are completed.

This email provides direction under Section 11 of the Water Sustainability Act only, and does not constitute permission or consent under any other Act or Authority. It is your responsibility to consult with other Provincial program areas, Fisheries and Oceans Canada (DFO) and the local government (municipality or regional district) to determine if there are any additional requirements for your proposed works.

Thank you,

Jacqueline Roden

Program Assistant

Phone (250) 751-7352

**Forest Lands, Natural Resource Operations
and Rural Development**

From: Roden, Jacqueline FLNR:EX

Sent: February 4, 2020 3:56 PM

To: 'kramer@rdn.bc.ca' <kramer@rdn.bc.ca>; 'jeni.rowell@aquaparian.com' <jeni.rowell@aquaparian.com>

Subject: Section 11 Notification - 1004730 - Benson Cr

File: 1004730

Tracking Number: 100309038

Ministry of Forests, Lands and Natural Resource Operations has received your *Water Sustainability Act* Section 11 Notification. Please quote the above file number, if you have any questions.

We have noted that you propose carrying out a project during a time period not normally authorized for in-stream works. The Ministry expects applicants to complete in-stream projects within the general “work window” (June 15th to September 15th), in order to minimize the risk of damage to fish and fish habitat or to downstream water users. For projects proposed to occur outside the work window, a technical rationale prepared by a qualified professional should be submitted that addresses these concerns. The rationale should include a detailed Sediment and Erosion Control Plan which will identify contingency measures and emergency procedures.

It is the applicant's responsibility to ensure that all sections of the notification form are complete, as processing of this notification will not commence until we have a complete application. We remind you that by signing the notification, ***you are accepting the legal responsibility for this work.***

The Habitat Officer will usually confirm acceptance of the application or ask for clarification of details of the project within 10 working days. Once the Habitat Officer has completed the review, you will receive a response that may include further conditions and or information. If after 45 days you have not received a response from the Habitat Officer, you may proceed with the work, subject to the following:

West Coast Region *Terms and Conditions of the Habitat Officer (please see the attached pdf)*

<< File: VI-HabitatOfficer_TermsandConditions_Feb11.pdf >>

Guide to Working In and Around Water

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water>

We recommend that you also review the following information:

Best Management Practices (BMP's) Instream Works

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices>

If you plan to remove/salvage fish, you will require a Fish Salvage Permit before work can proceed. Please contact FrontCounter BC at 1 877-855-3222 or go to http://www.env.gov.bc.ca/pasb/applications/process/scientific_fish_collect.html#new for application forms and information. Please provide our office with a copy of your approved permit.

Thank you,

Jacqueline Roden

Program Assistant

Phone (250) 751-7352

**Forest Lands, Natural Resource Operations
and Rural Development**

APPENDIX B

SITE PHOTOGRAPHS

Appendix B – Site Photographs

SITE 2 – Benson Creek Crossing:



Photo 1: Looking up towards the top of bank on the north ravine of Site 2. The trail is very slippery with mud from hikers and wet weather.



Photo 2: Looking up towards the fallen tree that is flagged for removal along the north ravine.



Photo 3 Looking down the north ravine where recent windthrow has occurred.



Photo 4: Looking down the north ravine towards Benson Creek near a switchback before the toe of slope. The fallen log that currently acts as a footbridge can be seen.

SITE 2 – Benson Creek Crossing Cont'd:



Photo 5: The fallen log crossing as seen from the toe of slope on the north side of Benson Creek. This will be replaced by a proposed truss bridge.



Photo 6: The south ravine of Site 2 as viewed from the north side of Benson Creek. The portion of the trail alignment visible is planned to have timber crib steps and aluminum stairs installed.



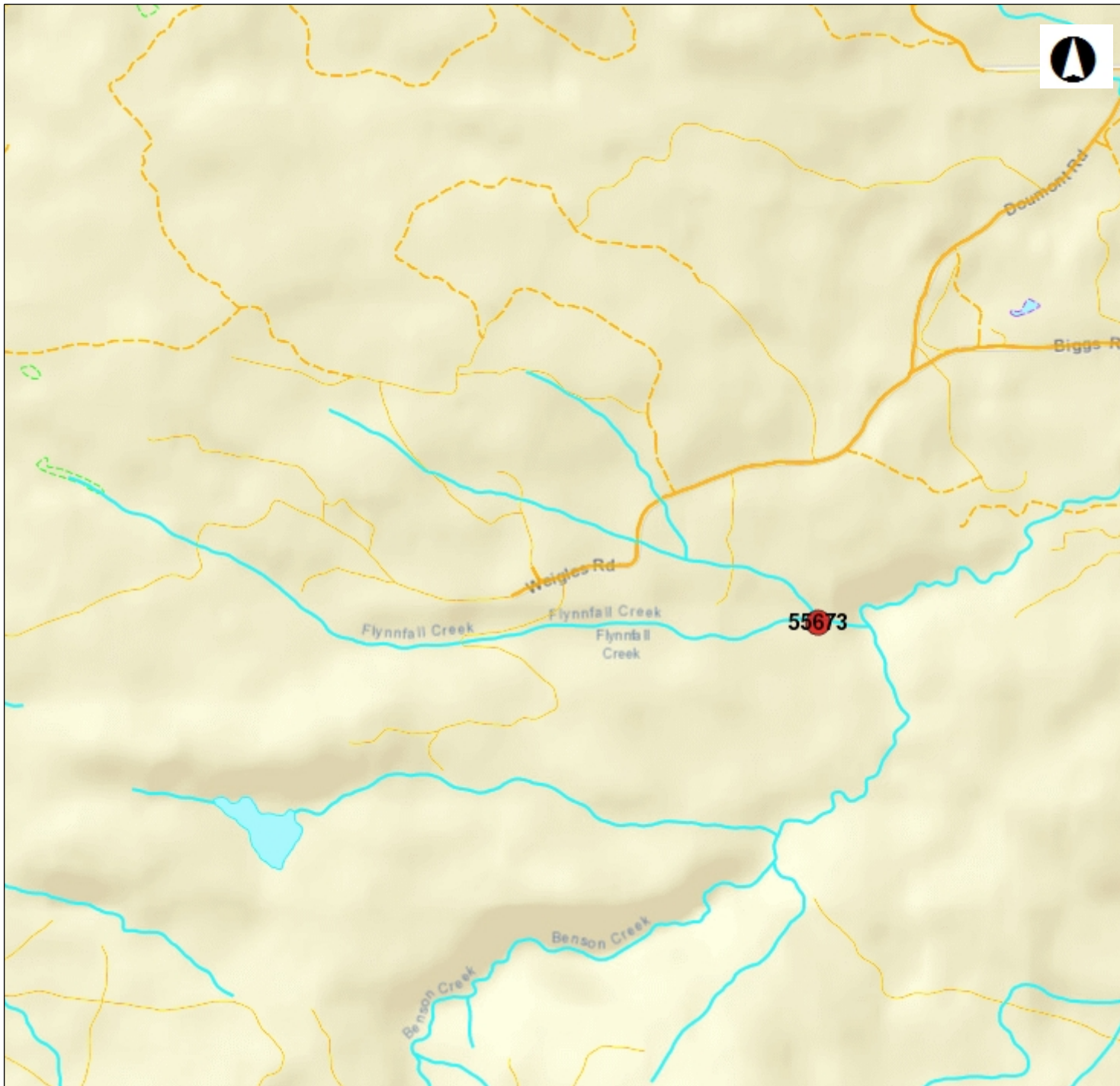
Photo 7: A mature Douglas-fir leans over the project area along the north ravine. This photo is taken from the top of (north) bank.

APPENDIX C
HEROLD ENGINEERING DESIGNS

REFER TO IFT TENDER DRAWINGS

APPENDIX D

SPECIES AT RISK



CDC Occurrence Map

Legend

Species and Ecosystems at Available Occurrences - CD

FEATURE_CODE

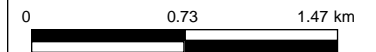
- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

■ Species and Ecosystems at Secured) Publicly Available

Species and Ecosystems at and Historical) Publicly Available CDC

FEATURE_CODE

- Animal - Vertebrate



1: 36,112

Copyright/Disclaimer

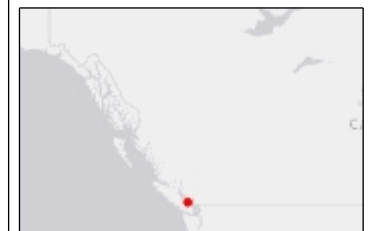
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CAUTION: Maps obtained using this site are not designed to assist in navigation. These maps may be generalized and may not reflect current conditions. Uncharted hazards may exist. DO NOT USE THESE MAPS FOR NAVIGATIONAL PURPOSES.

Datum: NAD83

Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

Key Map of British Columbia





BC Conservation Data Centre: Species Occurrence Report

Shape ID: 55673

Scientific Name: *Rana aurora*
English Name: Northern Red-legged Frog

Identifiers

Occurrence ID: 8588
Shape ID: 55673
Taxonomic Class: amphibians
Element Group: Vertebrate Animal

Status

Provincial Rank: S3
BC List: Blue
Global Rank: G4
COSEWIC: SC (MAY 2015)
SARA Schedule: 1

Locators

Survey Site: BENSON CREEK, WEST OF NANAIMO
Directions: South of Weigles Road, Benson Creek (tributary known as Flynnfall Creek), near Ammonite Falls, Nanaimo.

Biogeoclimatic Zone:

Ecosection: NAL

Area Description

General Description:

Stream habitat.

Vegetation Zone:

Min. Elevation (m):

Max. Elevation (m):

Habitat: RIVERINE: Creek

Occurrence Information

First Observation Date: 2003-08-17

Last Observation Date: 2003-08-17

Occurrence Data:

2003: 5 metamorphs observed in the stream (SPI database - incidental sightings, accessed July 19, 2010).

Occurrence Rank and Occurrence Rank Factors

Rank: E : Verified extant (viability not assessed)

Rank Date: 2003-08-17

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

5 metamorphs observed.

Landscape Context:

Version

Version Date: 2011-02-02

Version Author: Marks, D.J.

Mapping Information

Estimated Representation Accuracy: High

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence: N

Confidence Extent Definition: Confident full extent of EO is NOT known

Additional Inventory Needed: Y

Inventory Comments:

Documentation

References:

SPI database - incidental sightings. Extract from Ministry of Environment's Species Inventory database, Incidental Sightings table. Project 0. Ecosystems Information Section, Victoria, BC. Available from <http://a100.gov.bc.ca/pub/siwe/details.do?id=0>

Specimen:

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 55673, Northern Red-legged Frog. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 7, 2020).

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Status			Provincial FRPA	Land Use Objectives
					Global	COSEWIC	SARA		
<i>Accipiter gentilis laingi</i>	Northern Goshawk, <i>laingi</i> subspecies	CDF CWH	S2 (2010)	Red	G5T2 (2016)	T (2013)	1-T (2003)	Y	
<i>Aneides vagrans</i>	Wandering Salamander	CDF CWH	S3 (2016)	Blue	G4 (2005)	SC (2014)	1-SC (2018)		
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> subspecies	CDF CWH	S2S3B, S4N (2018)	Blue	G5T4 (2016)	SC (2008)	1-SC (2010)	Y	
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	CDF CWH MH	S3B,S3N (2015)	Blue	G3 (2016)	T (2012)	1-T (2003)	Y	
<i>Coenonymphea tullia insulana</i>	Common Ringlet, <i>insulana</i> subspecies	CDF CWH	S1 (2013)	Red	G5T3T4 (1998)				
<i>Contopus cooperi</i>	Olive-sided Flycatcher	BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G4 (2016)	SC (2018)	1-T (2010)		
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	BG CDF CWH ICH IDF PP	S3S4 (2015)	Blue	G4 (2016)				

<i>Glaucidium gnoma swarthi</i>	Northern Pygmy-owl, <i>swarthi</i> subspecies	CDF CWH MH	S3S4 (2018)	Blue	G4G5 T3Q (2019)		Y
<i>Hemphillia dromedarius</i>	Dromedary Jumping-slug	CDF CWH	S2 (2015)	Red	G3G4 (2005)	T (2014)	1-T (2005)
<i>Hemphillia glandulosa</i>	Warty Jumping-slug	CDF CWH	S2? (2015)	Red	G3G4 (2005)	SC (2013)	1-SC (2005)
<i>Hirundo rustica</i>	Barn Swallow	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G5 (2016)	T (2011)	1-T (2017)
<i>Megascops kennicottii kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> subspecies	CDF CWH MH	S2S3 (2017)	Blue	G4G5 T4 (2016)	T (2012)	1-T
<i>Mustela erminea anguinae</i>	Ermine, <i>anguinae</i> subspecies	CDF CWH MH	S3 (2010)	Blue	G5T3 (2016)		
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	CDF CWH ICH IDF MS SBS	S3S4 (2015)	Blue	G4 (2016)	SC (2008)	1-SC (2011)

<i>Phalacrocorax auritus</i>	Double-crested Cormorant	BWBS CDF CWH ICH IDF PP SBPS SBS	S3S4 (2015)	Blue	G5 (2016)	NAR (1978)
<i>Pristiloma johnsoni</i>	Broadwhorl Tightcoil	CDF CWH MH	S3 (2015)	Blue	G3 (2013)	
<i>Progne subis</i>	Purple Martin	BWBS CDF CWH ICH	S3B (2015)	Blue	G5 (2016)	
<i>Viola howellii</i>	Howell's violet	CDFmm CWHmm CWHxm MHmm	S1S2 (2019)	Red	G4 (1988)	

Search Summary

Time Performed Thu Jan 23 16:19:54 PST 2020

Results 18 records.

Search Criteria BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
AND Forest Districts: South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions: 1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND Habitat Subtypes: Conifer Forest - Mesic (average), Conifer Forest - Moist/wet (Restricted to Red, Blue, and Legally designated species)
AND BGC Zone:
Sort Order: Scientific Name Ascending

Notes 1. Citation: B.C. Conservation Data Centre. 2020. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jan 23, 2020).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

3. The data contained in the Results Export in BCSEE are provided under the [Open Government License - BC](#).

BC Species and Ecosystems Explorer Search Results

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Status			Provincial FRPA	Land Use Objectives
					Global	COSEWIC	SARA		
<i>Anaxyrus boreas</i>	Western Toad	BG BWBS CDF CWH ESSF ICH IDF PP SBS SWB	S4 (2016)	Yellow	G4 (2008)	SC (2012)	1-SC (2018)		
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	CDF CWH MH	S3B,S3N (2015)	Blue	G3 (2016)	T (2012)	1-T (2003)	Y	
<i>Butorides virescens</i>	Green Heron	BG CDF CWH ICH IDF PP SBS	S3S4B (2015)	Blue	G5 (2016)				
<i>Chordeiles minor</i>	Common Nighthawk	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4B (2015)	Yellow	G5 (2016)	SC (2018)	1-T (2010)		
<i>Cypseloides niger</i>	Black Swift	BAFA BG CDF CMA CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S2S3B (2015)	Blue	G4 (2016)	E (2015)	1-E (2019)		
<i>Dryopteris arguta</i>	coastal wood fern	CDFmm	S3 (2019)	Blue	G5 (2011)	SC (2001)	1-SC (2003)		
<i>Falco peregrinus pealei</i>	Peregrine Falcon, <i>pealei</i> subspecies	CDF CWH	S3S4 (2019)	Blue	G4T3 (2016)	SC (2017)	1-SC (2003)		
<i>Hirundo rustica</i>	Barn Swallow	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G5 (2016)	T (2011)	1-T (2017)		
<i>Ophiogomphus occidentis</i>	Sinuous Snaketail	BAFA BG CDF CMA CWH ESSF ICH IDF IMA MH MS PP SBPS	S3 (2015)	Blue	G5 (2015)				

<i>Phalacrocorax auritus</i>	Double-crested Cormorant	BWBS CDF CWH ICH IDF PP SBPS SBS	S3S4 (2015)	Blue	G5 (2016)	NAR (1978)		
<i>Progne subis</i>	Purple Martin	BWBS CDF CWH ICH	S3B (2015)	Blue	G5 (2016)			
<i>Promenetus umbilicatus</i>	Umbilicate Sprite	BG CDF IDF PP	S2S3 (2015)	Blue	G4 (2015)			
<i>Rana aurora</i>	Northern Red-legged Frog	CDF CWH MH	S3 (2016)	Blue	G4 (2015)	SC (2015)	1-SC (2005)	Y
<i>Ranunculus alismifolius</i> var. <i>alismifolius</i>	water-plantain buttercup	CDFmm	S1 (2019)	Red	G5T5 (1995)	E (2009)	1-E (2003)	
<i>Sorex navigator brooksi</i>	Western Water Shrew, brooksi subspecies	CDF CWH	S2S3 (2018)	Blue	G5T2T3 (2019)			Y
<i>Sympetrum vicinum</i>	Autumn Meadowhawk	CDF CWH	S3S4 (2015)	Blue	G5 (2015)			

Search Summary

Time Performed Fri Jan 24 13:07:57 PST 2020

Results 16 records.

Search Criteria Forest Districts: South Island Forest District (DSI) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions: 1- Vancouver Island (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Nanaimo (RDN)
AND Habitat Types: Stream/River (Restricted to Red, Blue, and Legally designated species)
AND BGC Zone:
Sort Order: Scientific Name Ascending

Notes 1. Citation: B.C. Conservation Data Centre. 2020. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jan 24, 2020).

2. Forest District, MoE Region, Regional District and habitat lists are restricted to species that breed in the Forest District, MoE Region, Regional District or habitat (i.e., species will not be placed on lists where they occur only as migrants).

3. The data contained in the Results Export in BCSEE are provided under the [Open Government License - BC](#).

[Modify Search](#) | [New Search](#) | [Results](#)

APPENDIX E
ENVIRONMENTAL PROTECTION PLAN (EPP)



203-321 Wallace, Nanaimo, BC V9R 5B6

SARAH BONAR 250-714-8446 CHRIS ZAMORA 250-714-8864



AQUAPARIAN

Environmental Consulting Ltd.



January 27, 2020
Revised May 2020

Kelsey Cramer, Parks Planner
Regional District of Nanaimo
1490 Springhill Road
Parksville BC, V9P 2T2

Via Email: kcramer@rdn.bc.ca

**RE: ENVIRONMENTAL PROTECTION PLAN
BENSON CREEK FALLS REGIONAL PARK ACCESS IMPROVEMENTS PROJECT
PHASE 1**

1.0 INTRODUCTION

Aquaparian Environmental Consulting Ltd. (Aquaparian) was retained by the Regional District of Nanaimo (RDN) to complete an Environmental Impact and Remediation Assessment (EIA) Report for proposed trail upgrades within the Benson Creek Falls Regional Park located in Electoral Area C of the RDN.

As understood, Benson Creek Falls Regional Park has increased in popularity over recent years as a hiking destination due to growing awareness of the impressive Ammonite Falls waterfall (also known as Benson Creek Falls). Access to the waterfall is gained from a trail from the south accessed from Jameson Road (Ammonite Falls Regional Trail) or from a trail to the north accessed from Wiegles Road (Benson Creek Falls Regional Park) that both lead towards the ravine where Ammonite Falls and Benson Creek are located. The increased foot traffic has caused extensive erosion as hikers have made their own trails down the steep banks of the ravine to view the waterfall. The current situation does not only pose a danger to the public but also impacts the stream and natural vegetation negatively, increasing sedimentation to the stream, a known fish habitat, and preventing vegetation to fill in along the slope which further decreases bank stability.

The access improvements outlined in the EIA will benefit both stream health and public safety. The planned activities include the following:

- Transport of materials and tools into the park;
- Cutting and filling slopes;
- Installation of timber crib steps;

- Installation of three staircases;
- Installation of a pedestrian truss bridge which will require import of the bridge or segments of the bridge and, if required, splicing of bridge pieces together;
- Concrete pouring for bridge and staircase footings;
- Rip rap and granular material placement; and
- Installation of cedar split rail fencing.

The purpose of the following Environment Protection Plan (EPP) is to provide the contractor with environmental protection measures that can help to minimize accidental impacts to the stream (i.e. water quality, fish habitat) or the forest while completing specific tasks. The EPP is to be considered as a living document that may need to be amended to include and/or meet any terms and conditions that may be imposed by permits, licenses, or other approvals. This document is intended to support the Environmental Impact Assessment report but has been formatted as a stand-alone document that is to be provided to the construction contractor awarded to carry out the project. The General Contractor shall be required to review and have a copy of this document on site at all times during the construction of the project. The EPP has been created to mitigate potential environmental impacts during the construction phase of the project.

2.0 ENVIRONMENTAL MONITOR ROLES AND RESPONSIBILITIES

Environmental monitoring is expected to be completed by Aquaparian as per the Regional District of Nanaimo (RDN). Regular inspection for erosion and sediment control during stair construction will likely be limited to part time inspections while high risk activities such as concrete pouring for bridge and stair footings and any other construction activities that have the potential to impact the stream will be monitored full time (as per the Ministry of Forest, Lands and Natural Resource Operations (Section 11 of the *Water Sustainability Act*)). The role of the Environmental Monitor (EM) is to inspect, evaluate and report on the compliance and effectiveness of work practices and environmental protection and mitigation procedures as identified in this EPP and associated permits or approvals and to recommend and oversee improvements to the plan as necessary.

The EM shall have the authority to advise the contractor(s) to modify or halt construction operations that conflict with safe environmental practices and procedures. Mitigation measures include general objectives related to environmental protection and a site specific action plan to control impacts to fish and wildlife during construction activities.

The contractor shall review this EPP document prior to start of the project. The EM will hold a pre-construction meeting with the construction crew(s) to review environmental protection



requirements identified within this document and all associated regulatory documents. During the construction phase of the project, the EM will have the primary responsibility to confirm that environmental management measures, controls and specifications are implemented in accordance with the EPP and are operating in compliance with terms and conditions of regulatory permits and approvals and Industry Best Management Practices (BMPs).

2.1 ROLES AND RESPONSIBILITIES OF THE EM

Roles and responsibilities of the EM include, but are not limited to the following:

- Have an understanding of all aspects of the project including the contract documents, project-related authorizations, agency guidelines and other documents, and confirm if all mitigation measures contained within are being appropriately implemented;
- Review the contractor's work plans to confirm if the conditions of the EPP are met, and make recommendations to address any deficiencies;
- Monitor contractor work activities as required and be on call should an emergency arise. A monitoring report is to be generated following every site inspection documenting project activities, mitigation measures and any recommendations made. Site photographs are to be included;
- Consult with the construction Project Manager should a Work Stoppage be necessary if environmental protection is compromised;
- Inventory contents of Emergency Spill Kits and confirm if they are appropriately stocked and maintained;
- Large machinery is not expected to be used for this project. Access limits the equipment to smaller, portable gas powered equipment and hand tools. Monitor on-site equipment for oil or fuel leaks and follow-up any repairs prior to machinery being mobilized on site;
- Complete Environmental Incident Reports (EIR) when required. The EM or project manager is to observe, document and report spills and spill cleanup and contact appropriate authorities (i.e. Emergency Management BC (EMBC)) in the event of an environmental incident or development of unforeseen site conditions with potential for serious environmental degradation;

- Have a shutdown procedure in case of heavy rains; and,
- Review contractor final site cleanup.

2.2 CONTRACTOR ENVIRONMENTAL REONSIBILITIES

The contractor's environmental responsibilities include:

- Be completely familiar with mitigation measures outlined in this EPP document;
- Implement and maintain mitigation measures to meet the objectives identified in this report;
- Frequent inspection of equipment for wear and leaks;
- Spill prevention and management, waste management and disposal;
- Maintain supplies of emergency spill management equipment and crew response training;
- Report spills to the EM and other relevant personnel/agencies as per the Spill Reporting Procedure (SRP); and,
- Work with the EM if additional measures are necessary to meet the guidelines set out in this report.

2.3 ENVIRONMENTAL INCIDENT REPORTS (EIR)

Spill prevention and emergency response procedures shall be communicated to all construction crew at the start of the project and thereafter at regular intervals throughout the contract. The EM will be required to report environmental incidents, including non-compliance issues to the Project Manager and to external agencies such as EMBC if required by the nature of the incident within 24 hours.

An environmental incident is one that has caused, or has the potential to cause, one or more of the following:

- Environmental damage;
- Adverse effects to fish, wildlife or other environmental resources;
- Adverse publicity with respect to the environment; and,
- Legal action with respect to violation of statutes or environmental damage.

Examples of an environmental incident include, but are not limited to:

- Spills of oil, hydraulic fluid or other hazardous chemicals; and,
- Discharges of deleterious substances into the freshwater environment.

An emergency contact list is to be generated by the contractor at the beginning of the project and the list is to be kept onsite and available to all crew members in the event of an emergency.

For incidents that pose a threat to the environment or human safety as identified by the *Environmental Management Act* Spill Reporting Regulation, the first external call shall be made to the EMBC (formerly PEP) 1-800-663-3456 (24 hour).

The Project Manager or EM (if on site) should be notified as early as possible following an incident and the spill must be documented by Environmental Incident Report (EIR). In addition, it may be necessary in some situations for the EM to notify regulatory agencies with respect to environmental incidents. Agency reporting requirements are provided in Table 1 and shall be included in any Spill Prevention and Emergency Response documentation prepared for the project.

TABLE 1. SPILL REPORTING MATRIX

Substance	Quantity	External Reporting Requirements	Internal Reporting Requirements
Any spill into water	Any	EMBC	EIR
Oil & waste oil	>100L	EMBC	EIR
Oil with >50ppm PCB	>1kg	EMBC	EIR
Flammable or non- flammable gas	10kg	EMBC	EIR
Toxic or corrosive waste	>5kg	EMBC	EIR
Hazardous waste	>5L	EMBC	EIR

Where a spill occurs, the person who immediately before the spill had possession, charge or control of the spilled substance shall take all reasonable and practical action, having due regard for the safety of the public and of himself or herself, to stop, contain and minimize the effects of the spill. Environmental incidents are to be reported to the project team within 24 hours.

The incident report is to include the following information:



- (a) The reporting person's name and telephone number,
- (b) The name and telephone number of the person who caused the spill,
- (c) The location, date and time of the spill,
- (d) The type and quantity of the substance spilled,
- (e) The cause and effect of the spill,
- (f) Details of action taken or proposed to comply with Section 3,
- (g) A description of the spill location and of the area surrounding the spill,
- (h) The details of further action contemplated or required,
- (i) The names of agencies on the scene, and
- (j) The names of other persons or agencies advised concerning the spill.

3.0 ENVIRONMENTAL PROTECTION PLANS (EPPS)

3.1 GENERAL ENVIRONMENTAL PROTECTION MEASURES

- Aquaparian will be monitoring full-time for all activities with a risk to the freshwater environment, primarily for activities around the HWM, and part-time for all other construction activities. The EM is to conduct a project start-up meeting with the contractors to review requirements of this EPP and verify environmental protection equipment is on site including spill prevention kits, filter fabric, site safety signage, hazardous material storage, garbage storage, permits etc;
- Inspect and verify all equipment is in good working order, clean and free of leaks prior to mobilizing on site;
- Store food and food waste in a secure container during works and remove off site when personnel are not on site to prevent attracting wildlife;
- Prepare a plan to remove equipment, fuel supplies and/or waste materials from the forest and project area at night to prevent wildlife from accessing it or causing a spill;
- Complete regular inspection of the emergency response plan and spill containment / recovery equipment, and spill response training programs;
- Inspection of the effectiveness of contractor's construction waste management program;
- Completion of monitoring reports and incident reports as necessary;

- Hazardous waste material generated in the course of the project (oil adsorbent pads, oily & grease covered rags, containers, etc.) shall be disposed of in compliance with hazardous waste regulations; and,
- A Spill Response Plan and Emergency Response Plan are to be developed by the contractor and kept in the site foreman's vehicle.

3.2 EXCAVATION OF SOILS AND VEGETATION REMOVAL

- Tree clearing is expected to be minimal (one tree). Clearing of trees or understory vegetation should be done outside of the migratory bird nesting season (March 1 – August 15). If not, a nesting survey must be completed within a week of the proposed clearing date, preferably no more than three days prior;
- Sediment and erosion control measures are to be put in place during earthworks along the slope. This includes the following measures:
 - Earthworks are to be completed in dry weather whenever possible;
 - If there is sufficient room at the top of the slope to stockpile soils temporarily, soil stockpiles are to be protected from erosion during heavy rain i.e. covered with poly or tarp; and,
 - A silt fence must be installed at the toe of slope to prevent sediment migration into the stream due to the steep slope of the ravine. It may also be necessary to cover exposed soils with poly sheeting overnight or over weekends if heavy rain is forecast.
- Upon completion, exposed soils should be covered with straw or composted bark mulch to protect the slope from erosion. The recommended restoration area is to be replanted upon completion with native plants suitable for shady understory including sword fern, dull Oregon-grape and salal. Planting density should be at least 2 plants per square meter or one plant per square meter for sword fern. The exact area of the planting requirement is unknown at this time and will be determined following the completion of construction activities. The exact planting method can be determined at this time as well.

3.3 SPILL PREVENTION & REPORTING

- The contractor is to have Spill Prevention & Reporting procedures and Emergency Response Plan in place prior to the start of works;
- All work will be conducted in a manner that does not result in the deposit of a toxic or deleterious substance into the waters frequented by fish;
- Equipment fueling is assumed to use Gerry cans and will be completed in the upland away from the top of slope;
- Gerry cans of fuel will be stored in a Rubbermaid tub with a tight fitting lid when not in use to prevent spillage;
- The Environmental Monitor (EM) is to be made aware of all fuel, oil and / or chemical spills that occur during the project;
- Containment, recovery and clean-up procedures are to be in place prior to the start of work;
- All equipment must be located and operated in the dry and spill kits must be on site;
- At least one spill containment boom should be on site for immediate deployment into the stream in case of accidental spill; and
- If a fuel or hydraulic oil spill occurs, the operator of the machine or equipment shall stop work immediately, address the immediate containment and clean-up of the spill and undertake the repair or replacement of the machinery before work is allowed to continue. The following spill response procedure is to be followed:
 1. MAKE THE AREA SAFE
 2. STOP THE FLOW (when possible)
 3. SECURE THE AREA
 4. CONTAIN THE SPILL
 5. NOTIFY/REPORT
 6. CLEAN-UP
 7. SPILL REPORT

1. MAKE THE AREA SAFE

- Evaluate risk to Personal/Public and Environmental Safety;

- Wear appropriate Personal Protective Equipment (PPE);
- Never rush in, always determine the product spilled before taking action;
- Warn people in the immediate vicinity; and,
- Ensure no ignition sources if spill is a flammable material.

2. STOP THE FLOW (when possible and safe to do so)

- Act quickly to reduce the risk of environmental impacts;
- Close valves, shut off pumps or plug holes/leaks; and,
- Stop the flow or the spill at its source.

3. SECURE THE AREA

- Limit access to the spill area; and,
- Prevent unauthorised entry onto the site.

4. CONTAIN THE SPILL

- Prevent spilled material from entering the stream;
- Use spill sorbent material or containment boom to contain the spill;
- If necessary, use a dyke or any other method to prevent any discharge on site; and,
- Make every effort to minimize contamination.

5. NOTIFY/REPORT

- Verbally report all spills to the EM and the Project Manager immediately. All spills to the freshwater environment are to be reported to **EMBC (1-800-663-3456)**.

6. CLEAN-UP

- Determine required cleanup options;
- Mobilize recovery equipment and cleanup crew and direct cleanup activities;
- Dispose of all equipment and/or material used in clean up (e.g., used sorbent, oil containment materials, etc.) in accordance with MFLNRO requirements;
- Accidental spills may produce hazardous wastes (e.g., material with > 3% oil by mass) and contaminated soil. All waste disposals must comply with the *Environmental Management Act* and Regulations; and
- Replenish spill response kits and equipment.

7. SPILL REPORT

- Provide necessary spill details. A spill report should be completed and submitted to the Project Manager within 24 hours of the incident documenting the type and volume of spill, clean up and if external reporting was required; and,

- The EM will have the authority to shut down the work should fish or fish habitat be at risk. If directed by the project manager, the EM will make an external call to EMBC if necessary.

3.4 Concrete Management

- No uncured concrete or concrete pour water is to enter the stream. High pH caused by uncured concrete is harmful to fish. Manage concrete pours (i.e. bridge and stair footings) to prevent spillage (ensure adequate seals, cover drying concrete with plastic when necessary to protect from rain etc);
- The contractor will be required to have a concrete pouring management plan in place before the pouring takes place in order to mitigate concrete laden pour water from being released to the freshwater environment;
- No concrete equipment / tools are to be washed down near the stream. Concrete sediments, debris, fines, waste, wash or contact water must not the stream and will be disposed of offsite;
- Concrete materials cast in place must remain inside sealed formed structures; and
- Work in dry (no or low precipitation) weather conditions if possible during concrete pours.

4.0 CONCLUSION

This EPP has been formulated using standard environmental protection guidelines and regulations for working within and around a stream. Based on our findings in the Environmental Impact Assessment, the project is not expected to result in a negative impact to fish and fish habitat if all precautions outlined in this document are followed. Additionally, this project is not expected to affect the forest or wildlife habitat if the above precautions are followed.

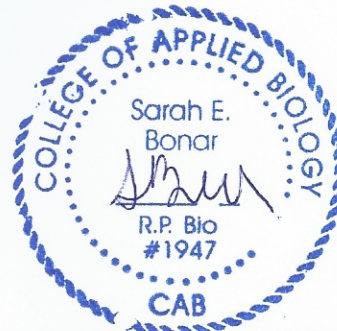
The contractor(s) will be required to review this document and the Environmental Protection Measures outlined within it prior to the commencement of works. The contractor is to have a copy of this document on site at start-up.

If there are any questions regarding the content of the EPP, please contact the undersigned.

AQUAPARIAN ENVIRONMENTAL CONSULTING LTD.

Prepared by:

Reviewed by:



Jeni Rowell, B.Sc.
Junior Biologist

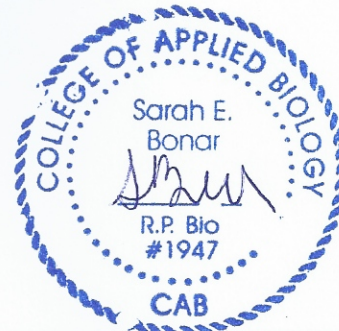
Sarah Bonar, B.Sc. R.P.Bio
Senior Biologist / Principal

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Regional District of Nanaimo Parks and Trails Guidelines



January | 2014



This document was prepared by Stantec Consulting Ltd. in collaboration with the Regional District of Nanaimo.



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1 INTRODUCTION

The Regional District of Nanaimo (RDN) is a popular recreation and tourism destination. The RDN is responsible for managing a comprehensive system of [regional](#) and [community](#) parks and [trails](#). There are 12 regional parks encompassing 2,061 hectares of land, 60 kilometres of developed regional trail, and over 180 community parks in 7 electoral areas.

Regional and community parks and trails provide diverse and memorable recreation and tourism experiences for residents and tourists alike. The RDN purposefully plans, designs and manages its parks and trails system to protect sensitive ecosystems, provide quality visitor experiences and actively manage the environmental and social impacts of visitation. Easy access to quality parks and trails also enhances community involvement, individual health, early childhood development, environmental awareness and overall quality of life.

Providing consistent park and trail design guidance to staff, contractors, developers, and the community is an important foundation in ensuring the delivery of the highest quality visitor experiences in a manner that avoids or effectively mitigates environmental impacts.

1.1 Purpose

The intent of this document is to provide consistent direction for the planning and design of community and regional parks and trails and associated staging areas (e.g. entrances) and amenities. The guidelines also address the process of developing and maintaining parks and trails for the RDN. Design guidelines for trails and staging areas are provided based on clearly articulated classification systems. This document should be referred to to support the conceptual planning stage of regional and community parks and trails while directly incorporated into all detailed design processes.

This document provides planning and design guidance for:

- Conceptual park and trail planning and design process,
- Trails,
- Staging areas,
- Park and trail Signage,
- Site structures and
- Site furnishings.

These guidelines outlined are not intended to be static. Recreation demands, park conditions, technologies, and political interests evolve; and can necessitate changes to priorities and how we view, use and therefore design our parks and trails system. Periodic reviews of these guidelines will be undertaken to ensure they remain relevant to the priorities of the RDN and the visitors who enjoy the parks and trails.

The diagrams and details contained in this document are intended as guidelines only. Further contract specifications will be required for construction.





Mount Benson Regional Park trailhead



Descanso Bay Regional Park campground

2 OVERVIEW OF RDN REGIONAL AND COMMUNITY PARKS AND TRAILS

This document provides guidance for both community and regional parks and trails.

- **Community Parks and Trails** serve neighborhoods and residents locally and are typically acquired through new development. Local taxes in each Electoral Area support the development of community parks and trails within that Electoral Area. Community parks tend to be smaller parcels of land. Community trails link parks and amenities at the neighbourhood level.
- **Regional Parks and Trails** are intended to serve residents from the entire region and visitors from outside the region. They tend to be larger areas of land outside urban zones. They have an emphasis on environmental protection and outdoor recreation. Regional parks and trails are funded by the entire Regional District. Regional trails provide connections throughout the region linking parks to parks, communities and the RDN to other regions.

2.1 Parks Classification and Zoning System

Regional and community parks are further separated into park classes, providing clear management direction for each site (see tables 1–3). Recognizing the size and complexity of some regional parks, a park zoning system is also utilized to spatially communicate management direction within a single regional park site. In designing and planning for amenities and trails within RDN parks, consideration should be made of the park and trail type, classification and park zoning.

Park and trail design guidelines within this manual have been prepared with the park and trail type, classification and zoning in mind. Guidelines also consider the intended target markets and the desired visitor experience to be provided by each park and trail.

Table 1 RDN Community Park Classification

COMMUNITY PARK CLASSIFICATION	PRIMARY FOCUS
Neighbourhood Park	Providing active recreation facilities (e.g. playground, sport court, washroom). Secondary uses may include protection of natural areas and provision of trails.
Natural Park	Protection of a significant cultural/heritage/environmental feature or function. Providing local 'greenspace' for aesthetics and nature appreciation is also important.
Linear Park	Connectivity to community destinations through active transportation (non-vehicle). Access to nature is secondary. Can also provide emergency access/egress.
Water Access	Providing public access to ocean, river or lake frontage. Secondary uses include natural area protection and viewing opportunities.
Surplus	Lands acquired in past without any Environmentally Sensitive Area (ESA) or active park value or potential

Table 2 Regional Park Classifications

REGIONAL PARK CLASSIFICATION	PRIMARY FUNCTION
Regional Conservation Area	Protection of the natural environment. Limited, low impact outdoor activities permitted but may be restricted to specific areas. Environmental interpretive facilities permitted provided they have minimal impact.
Regional Natural Area	Protect the natural environment and provide opportunities for range of appropriate outdoor experiences and activities. These areas protect key natural areas that are significant to the environmental character of the region. They are not as ecologically sensitive as RCA's but may contain some sensitive ecosystems.
Regional Recreation Area	Provide opportunities for a wide range of outdoor experiences, adventure activities and events; managed to accommodate a relatively high number of visitors.
Regional Trail	Connect regional parks to other parks and trails, key points of interest (natural and cultural) and communities. In or near urban areas, to encourage non-vehicular modes of transportation.

Zoning is a tool used by park managers to spatially communicate management objectives for defined areas within a park. Regional Park Management Plans employ park use zones to define areas having different levels of protection and public use, to protect the ecological integrity and special environmental and cultural features of a park, and to reduce conflicts between protection and public use. When developing park infrastructure and trails, it is essential to consider how those developments align with the particular park zone where the development is to occur. RDN's park zones include:

- Intensive Recreation
- Natural Environment
- Conservation

The management intents of these zones mirror the management intents of the park classifications.

2.2 Trail Classification System

Trail classification allows for consistent design of facilities; improved visitor safety and experience; and environmental sustainability of trails within the RDN. Trails within the RDN are classified into one of three classes (Table 3):

- Type 1
- Type 2
- Type 3

Table 3 Trail Classification System

CLASSIFICATION	PRIMARY FOCUS	TYPICAL VISITORS & ACTIVITIES
Type 1	<ul style="list-style-type: none"> » Universally accessible two way path » Connects communities to parks and to other communities » Typically provides a front-country recreation experience » Offers most amenities » Opportunity for a wide range of human-powered outdoor activities » Designed to accommodate a high number of users 	<ul style="list-style-type: none"> » Active transportation, tourism, and recreational users » Typical user activities include walking and cycling » Suitable for strollers and mobility impaired individuals
Type 2	<ul style="list-style-type: none"> » Slightly narrower than trail type 1, and provides fewer amenities » Typically provides a mid-country and front-country recreation experience » Designed for a variety of trail activities and users » May be universally accessible if suitable conditions and demand exist 	<ul style="list-style-type: none"> » Recreational and tourism users » Primarily accessed by local residents » Accommodates a variety of activities including hiking, walking, cycling, and mountain biking » Moderate level of use » May be universally accessible if suitable conditions and demand exist
Type 3	<ul style="list-style-type: none"> » Limited access trail, which is not universally accessible due to slope and surface treatment » Provides a mid-country and back-country recreational experience » Offers few amenities 	<ul style="list-style-type: none"> » Recreational and tourism users » Accessed by local residents and tourists » Opportunity for hiking, walking, equestrian, and mountain biking » Moderate to low level of use

2.2.1 Trail Design Guideline Matrix

The following section provides design guidelines for each trail type. In addition to cross sections and typical construction details, the design guideline matrix also provides direction regarding design elements, amenities, staging areas and maintenance levels. It is important to recognize that flexibility in design is necessary given local constraints and unique situations.



Arrowsmith CPR Regional Trail



Table 4 RDN Trail Design Guidelines Matrix

Trail Type 1

TYPE 1 - HARD /COMPACTED SURFACE TRAIL (HIGHEST LEVEL OF DEVELOPMENT)			
DESCRIPTION	EXAMPLES	RELATIVE LEVEL OF USE	MAINTENANCE
<ul style="list-style-type: none"> » Urban or Rural » Active transportation corridor » Accessed by local residents and visitors » Recreational Use » Several amenities 	Lighthouse Country Regional Trail	High	High

DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Paved / Compacted Gravel	Gentle (0 - 5%) Max. 10%	2-4	1	3	1 - 2%	10 - 20

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

Trail Type 2

TYPE 2 - SOFT SURFACE TRAIL (MEDIUM DEVELOPMENT)			
DESCRIPTION	EXAMPLES	RELATIVE LEVEL OF USE	MAINTENANCE
<ul style="list-style-type: none"> » Accessed primarily by local residents » Recreational Use » Fewer amenities 	Englishman River Regional Park	Moderate	Medium

DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Crushed Gravel or Natural Surface	Up to 30%	1-1.5	1	3	1-2%	Provide safe sight lines

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

Trail Type 3

TYPE 3 - NATURAL SURFACE (MINIMUM DEVELOPMENT)			
DESCRIPTION	EXAMPLES	RELATIVE LEVEL OF USE	MAINTENANCE
<ul style="list-style-type: none"> » Rural or backcountry » Recreational Use » Few or no amenities 	Mount Benson Regional Park	Low	Low

DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Natural Surface/ gravel added where needed	Up to 30%	0.5-1	0.5	2.5	2-4%	Provide safe sight lines

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

TYPICALLY PROVIDED

OCCASIONALLY PROVIDED

Table 5 Trail Type 1

TRAIL TYPE 1 - HARD/COMPACTED SURFACE		
DESCRIPTION	RELATIVE LEVEL OF USE	MAINTENANCE
Well-developed, supporting high number of users. Surfaced with asphalt or compacted gravel, wide enough for two-way travel. Universally accessible where possible. Provides many amenities. Typically provides front-country recreation experience. Designed for a variety of trail activities and users. Examples: Lighthouse Country Regional Trail, Meadow Drive Community Park.	High	High

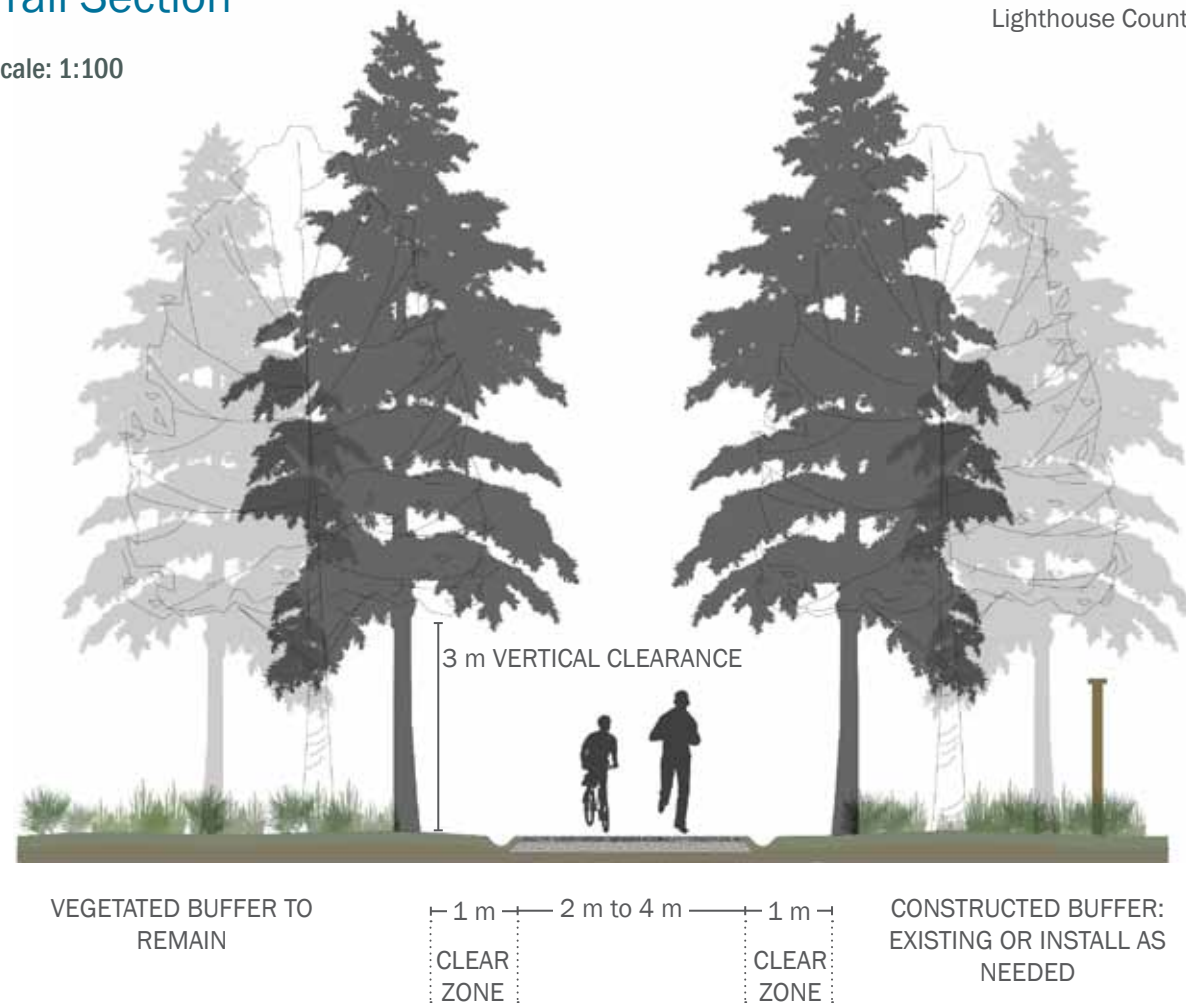
Sample Image



Lighthouse Country Regional Trail

Trail Section

Scale: 1:100



DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Paved / Compacted Gravel	Gentle (0-5%) Max. 10%	2-4	1	3	1-2%	10-20

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

TYPICALLY PROVIDED

OCCASIONALLY PROVIDED

Concept Detail

Scale: 1:50

OPTION: SURFACE TO BE 50 mm ASPHALT OR 75 mm DEPTH OF 9 mm (3/8") MINUS AGGREGATE COMPACTED TO 95% PROCTOR DENSITY WHEN SPECIFIED.

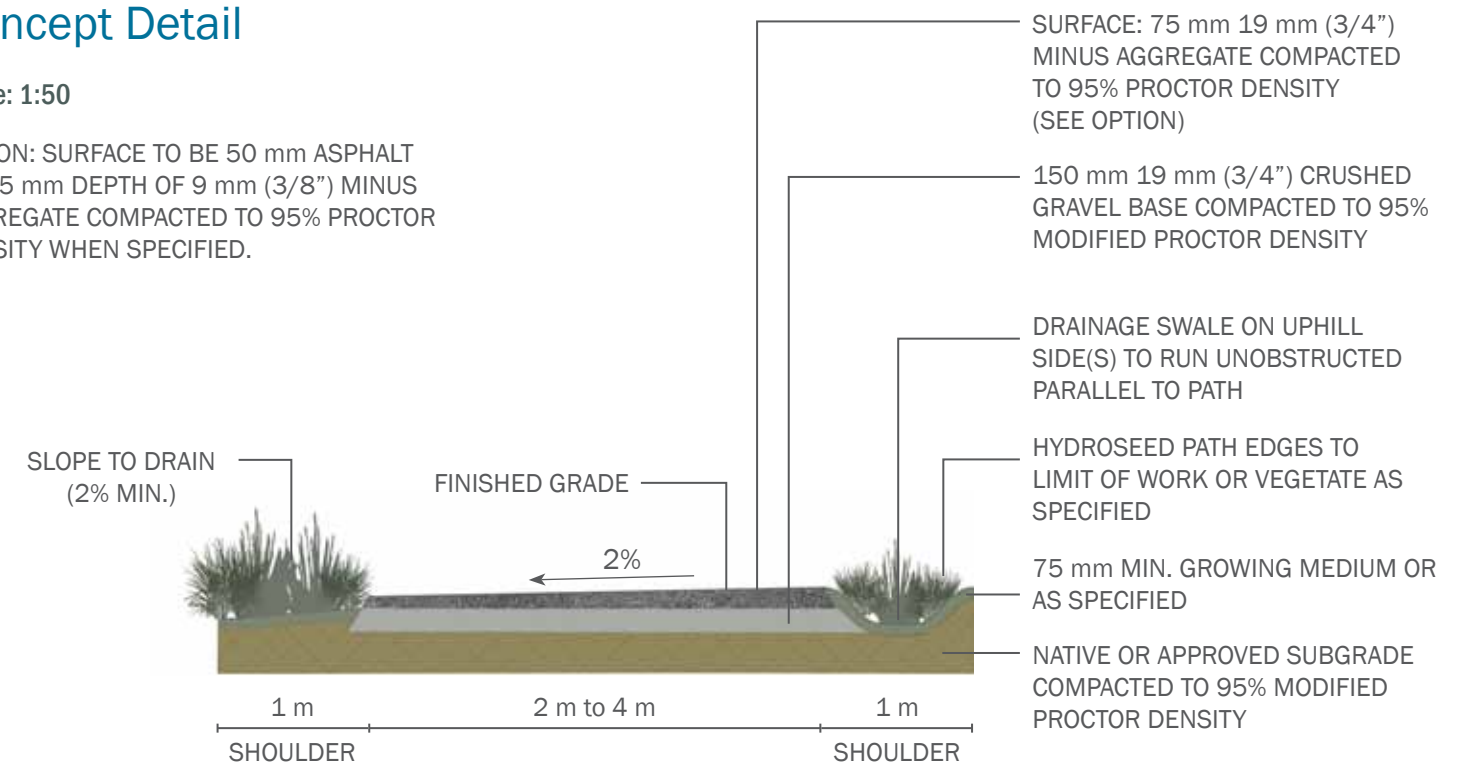


Table 6 Trail Type 2

TRAIL TYPE 2 - SOFT SURFACE		
DESCRIPTION	RELATIVE LEVEL OF USE	MAINTENANCE
Typically provides a mid-country and neighbourhood level recreational experience, fewer amenities. Soft surface, over more varied terrain. Not typically accessible to mobility impaired. Supports most other user groups. Example: 707 Community Park, Englishman River Regional Park	Moderate	Medium

DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Crushed Gravel or Natural Surface	Up to 30%	1-1.5	1	3	1-2%	Provide safe sight lines

Sample Image



Englishman River Regional Park

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

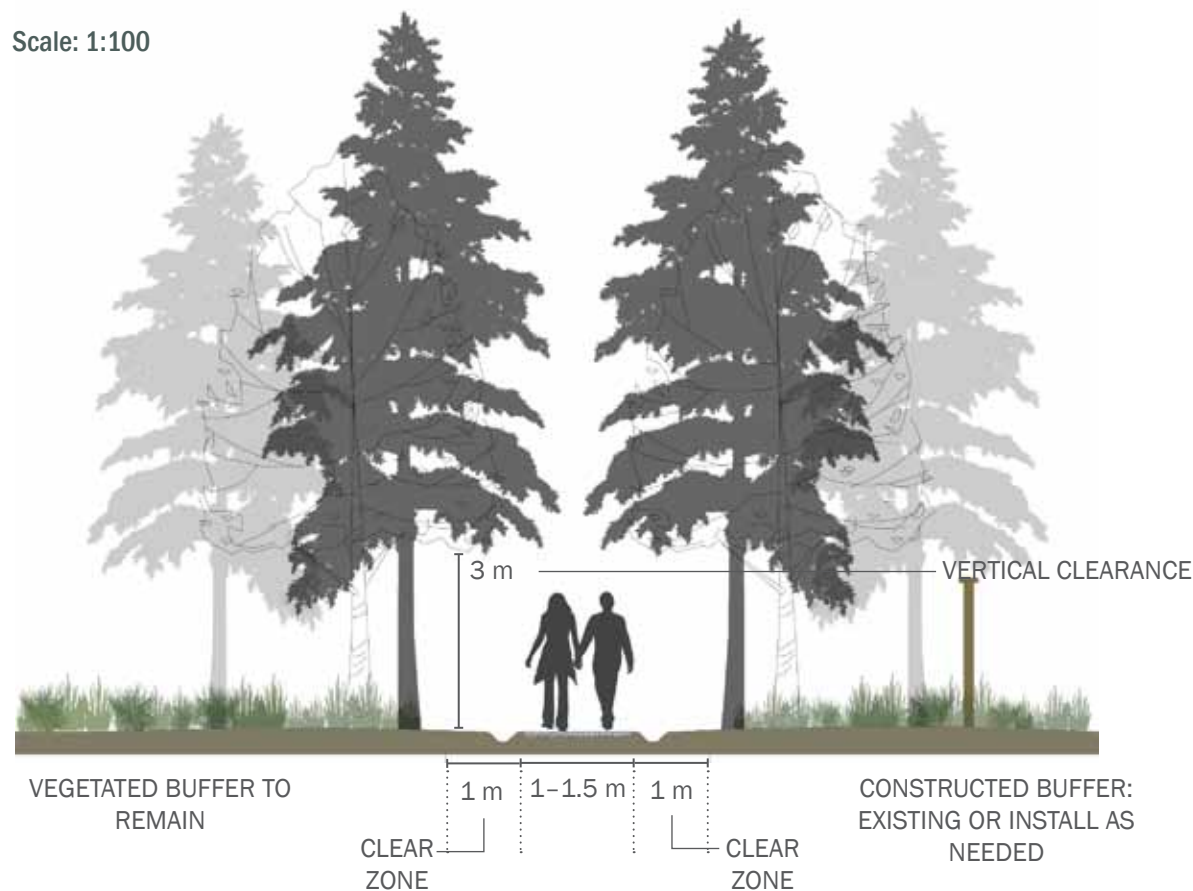
AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

TYPICALLY PROVIDED

OCCASIONALLY PROVIDED

Trail Section

Scale: 1:100



Concept Detail

Scale: 1:50

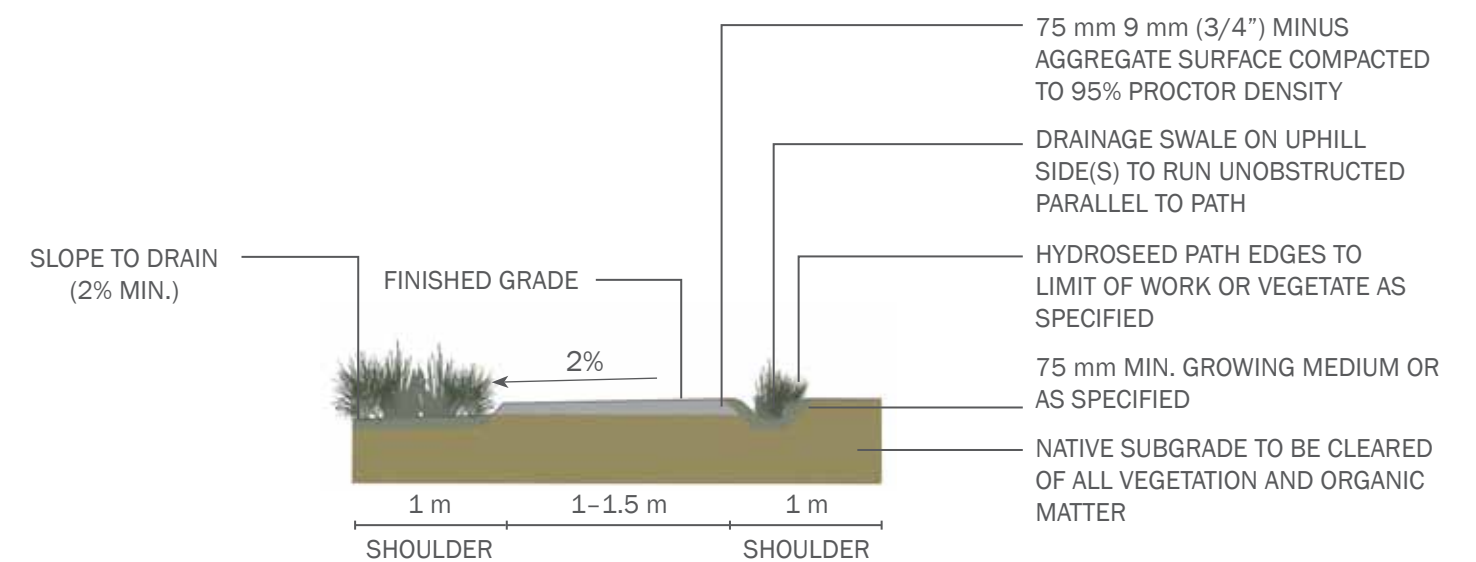


Table 7 Trail Type 3

TRAIL TYPE 3 - NATURAL SURFACE		
DESCRIPTION	RELATIVE LEVEL OF USE	MAINTENANCE
Single-track trail, typically not universally accessible due to surfacing and terrain. Provides a back-country recreation experience and very few amenities. The narrow natural surface trail has fewer environmental impacts, protects sensitive ecosystems, and enhances user experience.	Low	Low
Trail examples: Arrowsmith CPR Trail, Mount Benson Regional Park		

Sample Image



Benson Creek Falls Regional Park

DESIGN ELEMENTS						
SURFACING	SLOPE	TRAIL WIDTH (M)	CLEARING WIDTH ON EACH SIDE OF TRAIL (M)	CLEARING HEIGHT (M)	CROSS SLOPE	SIGHT LINES (M)
Natural Surface/ gravel added where needed	Up to 30%	0.5-1	0.5	2.5	2-4%	Provide safe sight lines

TYPICAL USERS					
HIKING	WALKING	EQUESTRIAN	MOUNTAIN BIKING	CYCLING	UNIVERSAL ACCESS

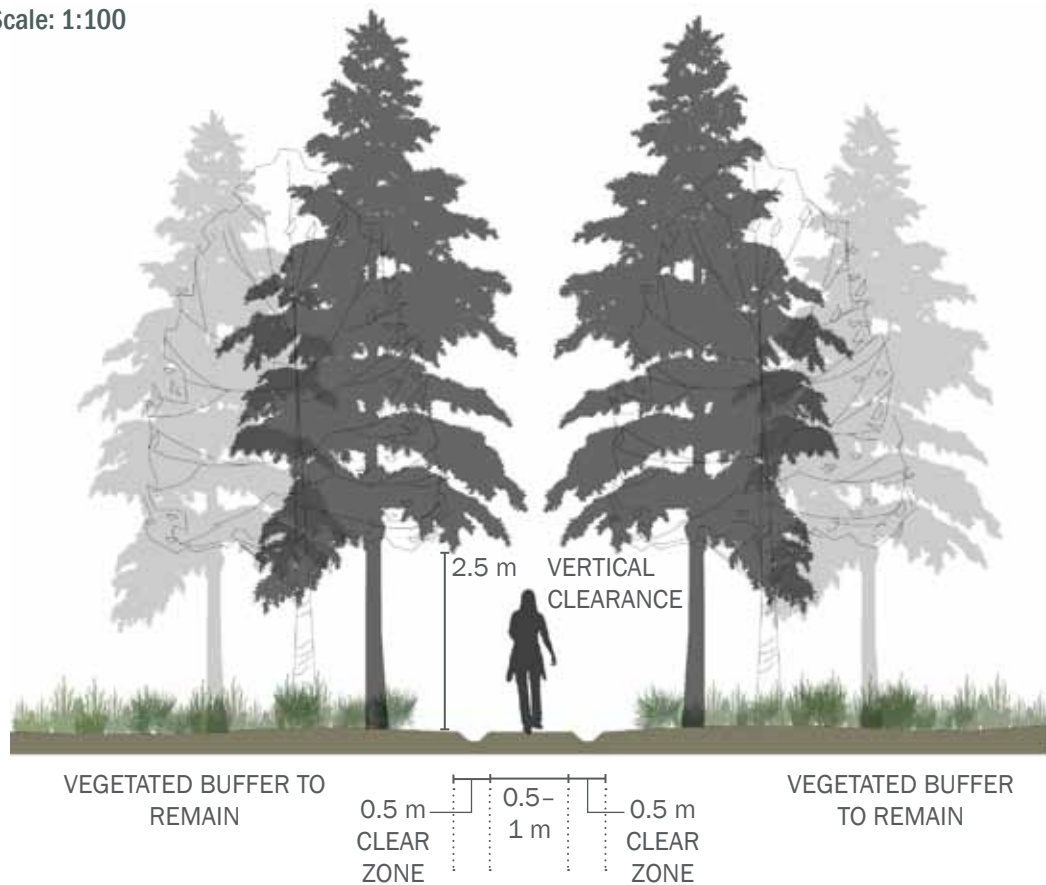
AMENITIES						
FURNISHINGS	GARBAGE RECEPTACLES	KIOSK	REST AREAS	TOILETS	BICYCLE PARKING	VEHICLE PARKING

TYPICALLY PROVIDED

OCCASIONALLY PROVIDED

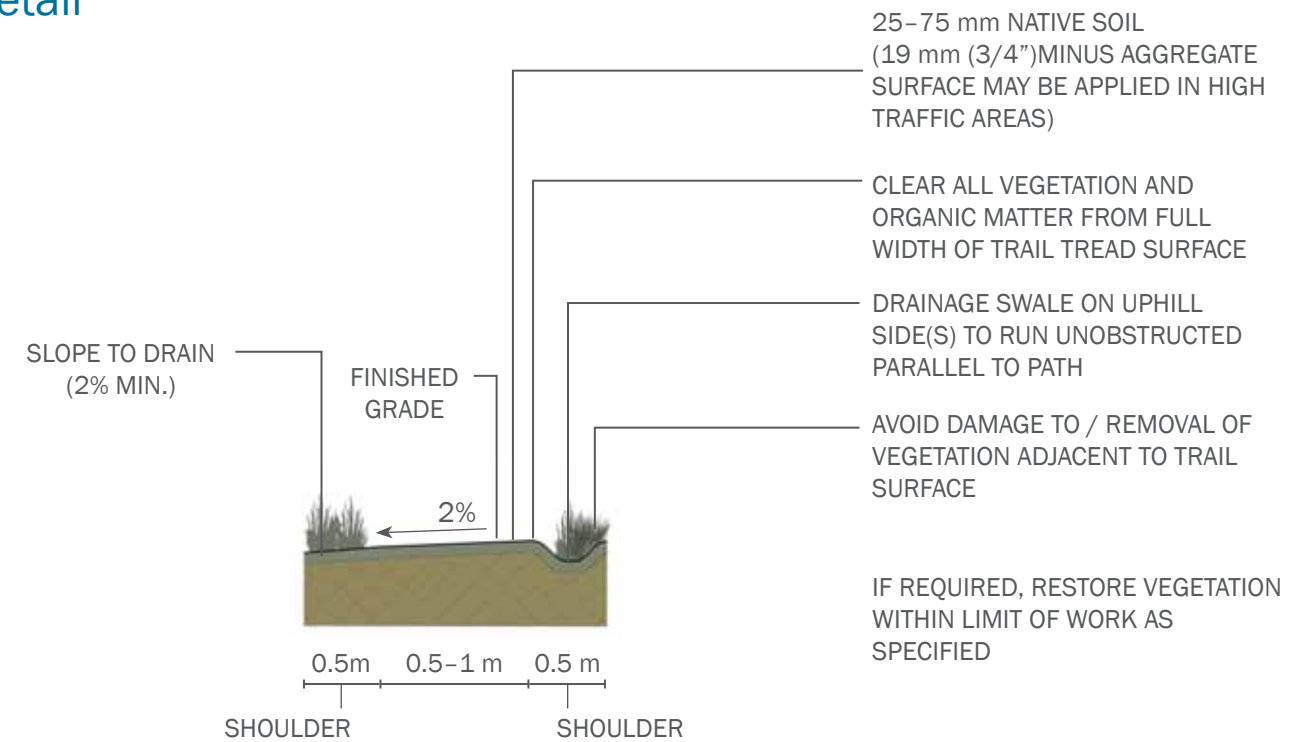
Trail Section

Scale: 1:100



Concept Detail

Scale: 1:50



2.2.2 Trail Type Compatibility




When determining which trail is appropriate in a regional or community park, it is important to consider compatibility with the park type and classification. The following compatibility matrix identifies which trails are most appropriate in each of the regional and community park categories and park zones used within regional parks.

In addition, it is also important to consider the desired recreational experience when evaluating which trail is most appropriate for a particular site. A single park or trail cannot meet the recreation desires of every visitor. Trails and parks infrastructure should be appropriate to the recreation setting managers are looking to provide. For example, more developed trails with greater comfort amenities are less appropriate in parks, or park zones, where the RDN is working to provide more remote backcountry recreation experiences. Recreation settings can be generally classified as 1) Backcountry, 2) Mid-country or 3) Front-country.

- **Backcountry** – generally un-modified natural landscapes with minimal recreation infrastructure and limited evidence and interaction with other visitors. The area is typically not easily accessed by vehicles. Visitors experience solitude, closeness to nature, risk and personal challenge.
- **Mid-country** – mostly natural appearing landscape where human modifications exist but harmonize with the surroundings. Recreation and tourism infrastructure and management controls are obvious and desired. Evidence and interaction with other visitors exist, and may be common. Visitors can experience some isolation from civilization, interaction with the nature, and a moderate degree of risk and personal challenge.
- **Front-country** – a modified landscape with obvious infrastructure development and resource use. Recreation and tourism infrastructure and management controls are common and desired. Evidence and interaction with other visitors is frequent and desired. The visitor experiences some modern conveniences and a feeling of security from personal risk.

Table 8 Trail Type Compatibility Matrix

TRAIL TYPE	REGIONAL PARK				COMMUNITY PARK				ZONING			RECREATION EXPERIENCE		
	CONSERVATION AREA	NATURAL AREA	RECREATION AREA	REGIONAL TRAIL	NEIGHBOURHOOD PARK	NATURAL PARK	LINEAR PARK	WATER ACCESS	INTENSIVE RECREATION	NATURAL ENVIRONMENT	CONSERVATION	BACKCOUNTRY	MID-COUNTRY	FRONT-COUNTRY
Type 1	NO	MAYBE	YES	YES	MAYBE	NO	MAYBE	MAYBE	YES	MAYBE	NO	NO	MAYBE	YES
Type 2	YES	YES	YES	YES	YES	YES	YES	YES	YES	MAYBE	MAYBE	MAYBE	YES	YES
Type 3	YES	YES	YES	NO	YES	YES	MAYBE	YES	MAYBE	YES	YES	YES	MAYBE	NO

 Compatible
  Possibly compatible, but generally not
  Incompatible



2.3 Other Unique RDN Trail Types

Roadside Trail Network – Roadside trails are built along existing roads within the Ministry of Transportation and Infrastructure (MOTI) road allowance. The purpose of this trail is active transportation with quick connection as the main theme. The roadside network may link into a nature trail network. The design guidelines for roadside trail are determined in consultation with MOTI.

2.3.1 Rail with Trail

Rail with trail are trails developed within the rail ROW, adjacent to the rail line.

On Vancouver Island, the Esquimalt and Nanaimo Railway (E&N) runs through many regional districts, including the RDN. Several municipalities and regional districts (City of Nanaimo, District of Lantzville, Cowichan Valley Regional District and in the Capital Regional District) have already developed E&N rail with trail in their jurisdictions. The development of rail with trail in the RDN should refer to the 2009 document: “Vancouver Island Rail Corridor Rail-with-Trail Design Guidelines.”



Parksville Qualicum Links Trail



E&N Rail trail in CVRD

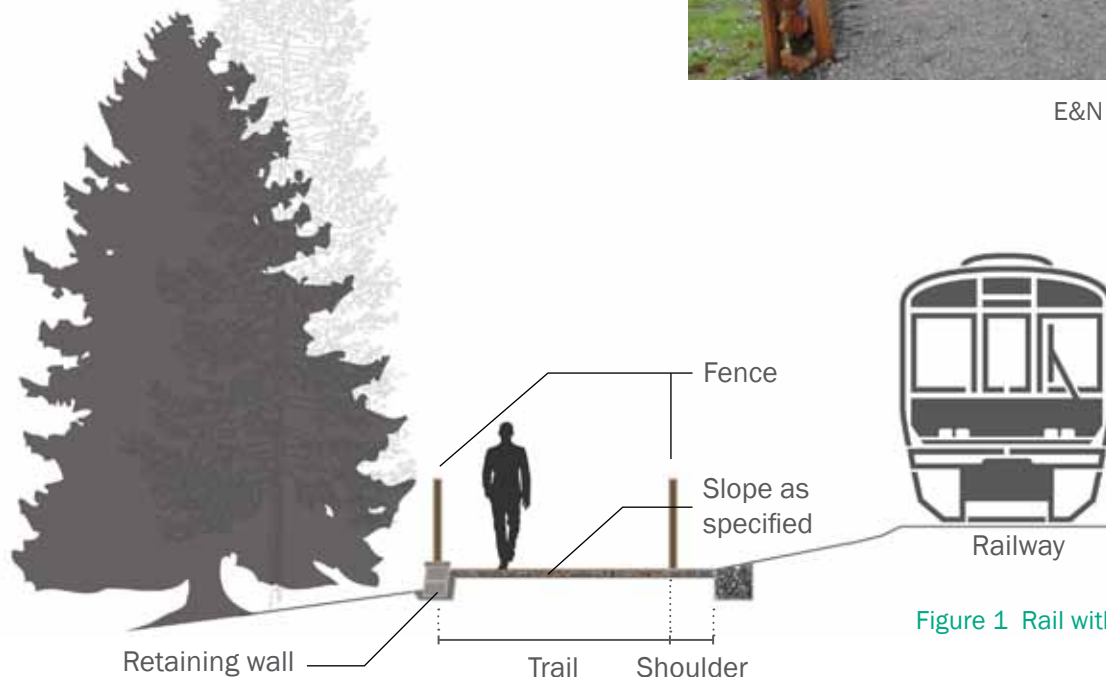


Figure 1 Rail with Trail

3 PARKS AND TRAILS PLANNING AND DESIGN PROCESS

Park and trail development projects are to follow a consistent planning and design process (see Figure 2). Where public engagement is anticipated in park and trail planning, the protocols and practices under the RDN Policy A1.23 for Public Consultation/Communication Framework are to be followed.

Figure 2 Planning and Design Process Flow Chart



3.1 Project Planning

The project planning stage includes forming the ideas, purpose, goals, and vision of the project. Community consultation is used to help clarify and establish the project aims, objectives and opportunities and constraints and to determine the user type, accessibility, and recreational activities for the site. This stage is a broad overview of what the site will be used for, who will use it, and where the amenities will be located. The locations of potential activities and amenities in the site are determined through site inventory and analysis.

3.2 Community Engagement

According to RDN Policy A1-23 for Public Consultation, consistent and effective methods of public engagement should be used that are appropriate to the park project and the community.

Some key principles of public engagement include:

- 1) Have a clear objective of what we are asking the public, i.e. focused message, effective and appropriate tools for effective public input in the project planning.
- 2) Communication with the public should begin at the earliest stages of the project.
- 3) All those likely to be affected by a decision should have opportunities for input into that decision, therefore avenues of communication should be inclusive as well as targeted.
- 4) The consultation process shall allow for a meaningful level of involvement, making it clear to the public, that, while all positions and input received will be considered, not all input can and will be accommodated.





Hosting an open house near the park

- 5) The process shall recognize and take into account the different characteristics and abilities of the community, e.g. providing accessible open house venues.
- 6) The integrity of broad public involvement must be paramount to the process and must not be superseded by any individual or interest group.
- 7) The RDN shall provide feedback, in a timely manner, about how public input has been utilized in Board decisions, and how the public will be affected.
- 8) The public should be kept informed through a range of effective and avenues of communication that are appropriate to the project, such as:
 - a) Advertising and Public Service Announcements in newspapers, radio, community newsletters; press releases
 - b) The Regional Perspectives Newsletter and Electoral Area Updates
 - c) Mall/library/community centre displays
 - d) Post updated project information and public engagement opportunities on the RDN events calendar and specific parks webpage
 - e) On-line and web-based networking and input tools such as on-line surveys;
 - f) Promotions and dialogue through the RDN social media calendar
 - g) On-line photo pages/displays
 - h) Town hall or community meetings, workshops, open houses (held in communities as appropriate)



Public engagement materials

3.3 Project Fundamentals

The project fundamentals include the details required for the project to happen, such as land use planning, permits and regulations affecting the property. Any environmentally sensitive areas must be noted, as this may impact the trail or park design. The site must be reviewed for any culturally sensitive areas (e.g. the Provincial RAAD system). If any of these sites are identified in the area then an archeological assessment must take place and any required First Nations consultations undertaken. Any land regulations or planning procedures also need to be followed. A budget for the project will be determined, and funding arrangements need to be in place.

3.4 Site Inventory and Analysis

Thorough inventory and analysis of the site is to be completed before the design stage can start. Taking inventory of the existing site can reveal important site elements such as, commonly used access points (i.e. ‘desire lines’), bodies of water, slopes, special features (both natural and cultural), use patterns, adjacent property features, ownership and land use. Information from reference books, maps, on-site investigations, photographs, field surveys and discussion with locals can be used for site inventory.

An opportunities and constraints report created from the site inventory information will document the conclusions from the assessment. Inventory and analysis should result in a general idea of where the amenities could be located, and provide insight on any problems which should be avoided during the design stage.

3.5 Design

During design, the layout pattern of the site is to be determined. The first step in this process is to produce a base map of the site at an appropriate scale that includes current physical features, infrastructure, amenities, contours/elevations, micro climates, sightlines and design constraints. It may be helpful to get a basic survey done at this point or at least GPS coordinates of basic elements of the site. A second site conditions map can be created which notes the constraints and opportunities for this project.

The base map should be taken out to the field for evaluation and on-site observation as a preliminary design concept begins to formulate. Walking and observing the planned route or area allows for the best layout conditions and alignment to be found. For example, during the on-site observation changes and improvements to the route or staging areas may occur, management and maintenance issues noted. The preliminary design concept is evolved with these insights.

Once a draft concept plan is created, public consultation should occur. At this stage an opinion of probable cost budget can be created based on the amenities in the draft concept plan. After the plan is finalized, detailed design should be undertaken and approved. Following detailed design approval, construction plans and tender documents are prepared. A development plan indicates the final trail alignment, areas where structures will be built, environmentally sensitive areas, and routes for construction vehicles and equipment to take during the construction stage and maintenance issues.



3.6 Construction

Construction includes the building of the project, the staging areas, and any structures. Placement of the amenities and signage is also included. Care should be taken to have the minimum development footprint needed and to retain as much natural area as possible as well as protecting trees and root zones during the construction period.

There are a variety of trail building machines which can reduce trail building costs, such as trail dozers or mini excavators. Operator experience is important to ensure that construction is safe, efficient and environmentally responsible. It is important to construct parks and trails with future maintenance in mind to limit future problems.

3.7 Maintenance and Management

Consideration of routine maintenance and management for new parks and facilities is a mandatory component to design and planning. After the park or trail is fully developed and construction has ended, clean up, risk management, structure maintenance, and walk-through inspections and assessments should take place on an established schedule. Findings from inspections should be documented in an asset management system as should the results of any maintenance or corrective actions that are undertaken to address deficiencies. Routine maintenance will be ongoing and continue to ensure safe, quality and enjoyable visitor experiences.

See section 10 of this document for design considerations that affect park and trail maintenance.



Ballenas School students help build a split rail fence at Moorecroft Regional Park



4 PARKS AND TRAILS DESIGN PRINCIPLES

Visitors to the RDN's regional and community parks and trails seek a diversity of recreation experiences. Some prefer interacting with nature in its most natural state, with limited facilities and few encounters with others along the way. Others prefer more developed settings with greater public interaction and comfort and convenience amenities.

Regardless of the park or trail type, classification or desired visitor experience, there are a number of fundamental design principles that should be considered in all RDN park and trail development, redevelopment and management initiatives.

4.1 Design and Construct with the Environment in Mind

Protection of ecosystems and sensitive features are the primary goals of conservation-focused parks, and natural settings add to the appeal of recreation-focused parks. Increased visitation to parks and trails can lead to degradation of natural values, conflicts between visitors or user groups and a diminishing of the visitor experience. Designing with nature, rather than imposing upon it, can avoid or mitigate undesirable impacts.

When designing parks and trails, emphasis needs to be placed on preserving the natural environment and sensitive ecosystems. Special design considerations and strategies are to be applied when constructing parks or trails around sensitive areas, such as wetlands, riparian areas and rare plant and animal habitats. During the design process the location, activity, and classification of a trail or park must be decided with potential environmental impacts in mind.

Natural and non-toxic materials should be incorporated and native plantings should be utilized to enhance habitat, minimize water consumption and reduce the spread of non-native invasive species. The ultimate goal is for the park or trail to protect environmentally significant areas and provide opportunities for visitors to experience a truly natural region. Where possible, parks and trails should work with the landscape (such as natural landforms and topography) with minimal interference to natural features.



Sign to indicate habitat protection area



Kiosk at Mount Benson Regional Park trailhead

4.2 Design with the Recreation Experience in Mind

The desired recreation experience of a park or trail should determine the design approach, nature of the development and amenity provision. A recreation experience is commonly described as the “ability for a person to engage in a preferred activity within a preferred setting to obtain a desired experience” (Clark & Stankey 1979; USDA For. Serv.1982). A recreation setting is the “combination of physical, biological, social and managerial conditions that give value to a place for recreation purposes” (Clark & Stankey, 1979).

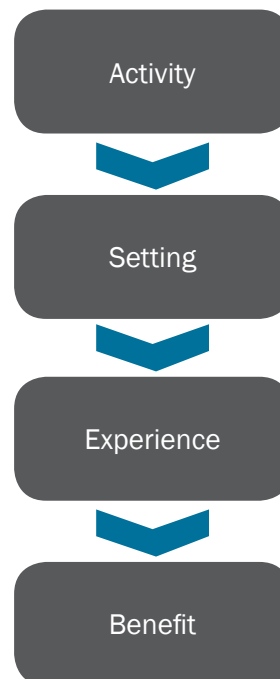
An individual’s choice to participate in a recreational activity is largely determined by setting. People generally search for settings which will give them a desired recreation experience. A quality recreation opportunity is as much dependent on the activity as it is on the setting. As both aspects are critical in the design and development, it is necessary to match the desired recreation experience with the design of the amenity and the degree of development.

Figure 3 Factors in a Recreation Opportunity

RECREATION OPPORTUNITY						
ACTIVITY	+	SETTING	=	EXPERIENCE	»	BENEFITS
Many activities		Biophysical attributes, social conditions, managerial conditions		» Many dimensions » Multiple senses		» Individual » Community » Economic » Environmental
Managers manage				Recreationists consume		Society gains

Specific environmental conditions can influence the appeal of the site and quality of the visitor experience. When planning and designing parks, trails and park infrastructure, consider the implications of:

- Aspect (shade, shelter and sun exposure)
- Elevation
- Site slope and drainage
- Local wind patterns
- Flood plains and high water lines
- Quality of views
- Current use patterns of the area



4.3 Design for Visitor Safety and Crime Prevention

RDN’s regional and community parks and trails provide memorable visitor experiences; however, there are inherent, and at times uncontrollable, risks when recreating in natural settings. The use of best practices for the planning and design of parks and trails and sharing of information with visitors can limit the potential risks to park and trail users by:

- Controlling the type and speed of users
- Conducting regular inspections
- Maintaining an enforcement presence
- Undertaking prompt responses to safety concerns
- Conducting regular maintenance
- Providing visitors with effective education and communications about known safety risks and preparedness.

Crime is a possibility in any park, trail or recreation area. However, well-considered design can help to minimize the potential for transient, illegal or potentially threatening activities in regional and community parks and trails. As such, **Crime Prevention through Environmental Design (CPTED)** practices are to be applied, where appropriate, in all RDN regional and community parks and trails design and development projects. Careful design must be applied to ensure safety objectives are met while retaining the character of the site and its recreational appeal.

Some practices to help minimize crime:

- Post signs informing users of any safety hazards and rules at trailheads and key locations, and provide RDN contact information
- Minimize concealed and isolated routes
- Provide clear trail site lines and visibility on trails by limbing up trees; not planting dense hedging; providing openings in the plantings
- Provide clear separation between private property and public parks and trails through boundary markers, signs, fencing (appropriate to the site character)
- Clearly mark the hours the park is open to the public and ensure park gate closure schedules are maintained
- Remove or repair vandalism and graffiti as soon as possible



Clear sight lines on trails

4.4 Design for Inclusivity and Accessibility

The regional and community parks and trail system aims to ensure recreation opportunities for everyone, regardless of ability, income or ethnicity. The design of parks and trails can have a profound effect on visitor accessibility and inclusivity. In general, parks and trails should be designed to accommodate a variety of needs and abilities, and efforts should be made to minimize mobility barriers where it is consistent with the park type, classification and intended visitor experience.

Community parks and trails should be “barrier free” where possible. Due to diverse and rugged terrain in regional parks and trails, it is not always possible or appropriate to design for accessibility. All projects in regional parks and trails should evaluate whether a barrier free design is possible and appropriate based on regional park class, trail type and intended visitor experience.

Where barrier-free areas and facilities are intended, current universal accessibility standards must be applied, and local accessibility groups should be consulted at the appropriate stages of the project.

Some accessibility guidelines:

- If a trail or park is accessible it should have no barriers along the whole route, ensuring that people are not stranded, i.e. bring person from vehicle to trail to table.
- Accessibility requires solid level surfaces (e.g. asphalt, compacted gravel, concrete)
- Ensure there are no lips or edges, higher than 1.3 cm, (e.g. at toilet, on bridges, boardwalks, parking lot transitions),
- Accessible toilets, and the fronts of all amenities should provide 1.5 m of maneuvering space,
- There should be less than 5% grade overall, with landings at intervals
- Interpretive signs should be at wheelchair height (1 m max.),
- Ensure adequate turning radius around baffles, bollards and other vehicle controls,
- Ensure there are siderails on boardwalks and taprails on trails (e.g. Lighthouse Country Regional Trail (LCRT)).



Accessible trail



Accessible parking at Lighthouse Country Regional Trail portable toilet facility



Lighthouse Country Regional Trail is a fully accessible trail



5 GENERAL TRAIL DESIGN GUIDELINES

In order to be enjoyable and enduring over the long-term, with low maintenance costs, trails must be designed and built using high quality standards. The following design guidelines describe typical trail design, recognizing that in some situations, design flexibility may be required.

5.1 Trail Siting

Careful route selection is essential to the creation of enjoyable and sustainable trails. Many factors influence the siting and placement of trails, including trail connectivity, current site use and 'desire lines', site conditions, soil types, environmental sensitivity, biophysical conditions, hillside slopes, vegetation, drainage patterns and adjacent land use.

The siting of trails in the RDN will:

- Be designed to complement and respect the surrounding ecology and landscape,
- Route of the trail following the natural contours of the land as much as possible,
- Be designed in consultation with users, neighbours and stakeholders,
- Seek opportunities to utilize existing routes and corridors if they can be sustainable and provide a quality visitor experience,
- Minimize impacts to environmentally sensitive areas and wildlife corridors,
- Avoid riparian areas, wet areas and wetlands, or utilize appropriate infrastructure to mitigate impacts to these areas,
- Avoid steep or unstable slopes and erodible soils, or utilize appropriate infrastructure to mitigate impacts to these areas,
- Create connections and convenient access between existing trails, parks and community destinations,
- Allow users to experience interesting, unique and appealing natural and built features,
- Integrate effectively with adjacent land uses.





Turns make trails interesting

5.2 Turns and Curves Make Trails Interesting

Depending on the trail type, incorporating turns and curves into trails make them more interesting. Turns add an element of mystery and intrigue. Users are left wondering and anticipating what is around the next corner. Meanwhile, straight trails leave little to the users' imagination; however, they do enable speed and efficient travel.

Depending on the trail type and desired function, turns should be incorporated into trails where it can be done safely, while retaining the sight lines appropriate for the type and speed of users. Turns are less appropriate on trails with a primary purpose of active transportation (i.e. need for efficient travel and direct routes).



Culvert under trail

5.3 Grading and Drainage

Trail grading and drainage is the most important sustainability consideration in trail design. If not addressed properly, erosion and standing water will be an ongoing management challenge. When implemented effectively, good drainage improves trail lifespan by enabling water to move off of or under the trail (both surface and subsurface water movement) with no to little impact to the trail.

In some cases, trails will require additional structures to ensure appropriate drainage such as waterbars, swales and culverts.

Trail siting should:

- Follow the lay of the land as much as possible to minimize cut and fill and steep grades and cross slopes,
- Avoid tree fall lines (or the shortest route down a hill)
- Provide appropriate gradients for users by establishing generous switchbacks.
- Maximize the retention of native vegetation

Grading principles:

- Implement effective drainage patterns
- The grade of the trail and the surrounding terrain will dictate both water and user movement.
- Optimal grades, as determined by the trail type, should be applied. Trail treads should be built up and incorporate slight undulations and cross slopes to avoid standing water.
- These practices will help to retain natural drainage patterns, promote the natural flow of water off of the trail and minimize the potential for problematic erosion.



Bioswale



Culvert under parking area

5.3.1 Waterbars

A water bar or interceptor dike is a trail structure that is used to prevent erosion on sloping trails by reducing flow length. It is a diagonal channel cut (and reinforced) across the trail surface that collects and diverts surface water that would otherwise flow down the middle of the trail causing erosion and ultimately, trail washouts. Waterbars are constructed from rocks, logs, perforated pipe or a dug channel in stable substrate. By constructing a series of waterbars at intervals along a trail, the volume of erosive water flowing down the road is reduced, and flooding, washouts, and trail degradation is prevented. Waterbars should be inspected regularly to ensure that they are free of obstructions and functioning properly.

5.3.2 Bioswales

Bioswales are shallow-sided ditches that are designed to catch and infiltrate water before it can flow over trail surfaces. The drainage course is constructed on the uphill slope of the trail, and has gently sloped sides (less than six percent) typically lined with native vegetation, woody debris and/or riprap. The water's flow path, along with the wide and shallow ditch, is designed to maximize the time water spends in the swale allow natural infiltration, sediment control and pollutant sequestration.

5.3.3 Culverts

Should be used in very wet areas or when trails cross small water courses where bridges or boardwalks are not necessary.

- Culverts should be sized for seasonal water flows and PVC plastic or corrugated galvanized metal.
- Set culvert at a level that will facilitate drainage.
- Design culverts to Canadian best practice engineering standards, for appropriate seasonal water flows, erosion protection and appropriate surface for trails or vehicles.
- Protrusion of the culvert beyond the trail tread should be avoided. Ends can be cut at 45 degree angle to conceal the culvert. The area or 'apron' around the culvert should be sloped enough to prevent erosion. Rocks, grass seeding or native planting the 'apron' can help stabilize the area around the culvert and further screen the structure.
- Use appropriate geotextiles and/or natural stone or vegetation.

Where culverts are not appropriate due to the volume of water, environmental sensitivities (e.g. fish bearing streams) or other site constraints, boardwalks and bridges should be considered in order to retain trail connectivity (see section 6.2 Bridges and section 6.3 Boardwalks).

5.4 Trail Intersections

The location where a trail crosses a road is a critical safety site for both trail users and vehicles. While it is best practice to avoid placing vehicle routes across trails, there are different crossing treatments which will promote user safety on road/trail crossings and minimize vehicle conflicts. The type of crossing depends on the road design, traffic volume, and trail type. Intersection design will be completed in conjunction with the MOTI, and is subject to MOTI approval.

Signed crossings are typically used when trails intersect roads with low traffic volumes. Signs and crosswalk markings should be used to clearly indicate the crossing to trail users and vehicles. For higher speed roads additional features may be added to increase safety levels. For example, advanced warnings, raised medians, and curb extensions can be used at trail intersection points. For high volume trails “yield to pedestrian” signs/flashers can be used to alert vehicles of the trail crossing.

Trail crossings should be perpendicular to the roadway to increase safety and visibility. Where possible, trail crossings should be located at intersections and mid-block sites. Trail intersections should be well marked for trail users and vehicles. Barriers, such as baffles or posts, can be used at road intersections of trails to prevent vehicle access. See section 6.6 Fences, Barriers and Gates for more information.

Crossing of the rail line may be required as part of the Rail Trail system. The type of crossing and engineered design must be approved by the Rail authority.



Top Bridge Regional Trail





Privacy fence as buffer

5.5 Trail Buffers

Adequate buffering separates parks and trails from adjacent land uses, so that the quality of the trail experience is not impaired by undesirable sights or sounds. Buffering also makes sure that neighboring land owners are not disrupted by the actions or sounds of trail users. Trails within parks generally do not require buffering. However, buffering trails that are located outside of parks should be considered particularly when they are adjacent to road and rail right of ways, residential, industrial and commercial uses. Buffers and/or landscaping should be used to separate the public and private realms.

Using vegetation as natural buffering can enhance the environmental quality and function of the park or trail. Existing forests, planting trees and shrubs, and placement of woody debris, rocks or boulders are examples of natural buffering. In areas where it is important to manage public access, buffers can be an effective, and appealing way of limiting access and can deter users from going off the trail. On roadside trails and rail trails there should be an open space that separates the trail from the road or rail line.

Buffers for trails within provincial road right-of-way should be determined through consultation the BC MoTI. In all cases, buffering design should consider Crime Prevention Through Environmental Design (CPTED) guidelines (see section 4.3).

The width and composition of the buffer is dependent on each situation.

Buffers should:

- Maintain the quality of the visitor experience
- Screen the trail users from undesirable views, sounds and other factors that may detract from the visitor experience
- Fit with the character of the surrounding landscape
- Minimize conflicts between trail users and adjacent land owners and land uses
- Improve or maintain public safety
- Enhance environmental values and ecosystem function.



Trail surface of gravel and bark mixture

5.6 Sight Lines

To ensure visibility and safety on trails, adequate sight lines must be provided and be based on the trail type and users. For all trail types, curve radii and sight lines should be adequate to serve two-way travel. Safe sighting distances should be provided wherever possible. Signage should be used to indicate to users that they are approaching an area with limited sight lines. Specific sight line guidelines are provided in the design guideline for each trail type.

5.7 Trail Tread Surface

Trail surfacing has a significant impact on trail use, accessibility and maintenance. The material used for trail tread surfacing varies depending on the trail type, user activities, usage level and desired level of accessibility.

Natural materials complement the existing park environment, and reduce cost. Hard surfacing is typically used for flat, wide trails which are multi-use. Examples of hard surfacing are crushed aggregate and hard packed gravel. Hard surfacing is best for activities such as cycling, and for individuals in wheelchairs or pushing strollers. High traffic commuter routes usually have hard surfacing so users can travel at a faster speed.

Soft surfacing is best for natural trail settings, as it blends into the surrounding environment. An example of soft surfacing is native soil, mulch/gravel mix, bark mulch. Traffic is typically slower on soft surfacing trails and upgrades and maintenance are required more often than with hard surfaced trails.

When selecting the trail tread surfacing, the following principles should be considered:

- Integrates with the surrounding landscape
- Appropriate for the desired visitor experience and expected visitor activities
- Promotes permeability and water infiltration
- Resists erosion and mucking
- Cost effective, locally sourced if possible, durability and minimal maintenance

For details about specific trail type surfacing see “Table 4 RDN Trail Design Guideline Matrix” on page 7.



Ledges or lips should be no higher than 15mm (.5 in)

5.8 Trail Accessibility

Due to the landscape and topography, universal accessibility on all RDN trails is not possible. The RDN aims for accessibility in parks and on trails where it is feasible to do so. The aim is to provide accessibility within the parks system but not necessarily at every site.

Trail type 1 and type 2 are intended to be used by a wide variety of user and for various recreational activities. These trails are intended to be accessible where possible and require specific consideration in the design, construction and maintenance of the trails. For fully accessible trails, universal accessibility standards are to be followed. Trail type 3 is not fully accessible.

To minimize barriers to mobility on Type 1 trails:

- Maximum slopes should not exceed 5% for long distances. If slopes exceed 5% landings should be provided.
- Cross slope should range from 1–2%.
- Trail tread widths should be large enough to safely accommodate mobility-assisted devices.
- Surfacing should be hard packed and uniform with no obstructions and minimal depressions.
- Parking should include a minimum of one accessible parking stall.
- Curb cuts will be provided where trails cross roads and in transitions from parking lots, where required.
- Rest areas with seating will allow wheelchairs to pull off the trail at regular intervals.
- Signs, light standards, power poles, bus stops, power boxes, and mail boxes can all obstruct the flow of a wheelchair or stroller. Install structures with consideration of their visual and physical impacts.
- If the trail contains any stairs an alternate ramped route must be provided.
- Accessible washroom facilities should be provided at staging areas, where possible.
- Bollards and baffles should be spaced to allow access for wheel chair movement.

5.9 Vegetation and Hazard Trees

5.9.1 Tree Protection

Vegetation and trees add to the aesthetic and environmental value of parks and trails. Where trees do not negatively impact the trail route, safety, or clearance, precaution is to be taken to protect them.

Where possible:

- Trails should be routed around the drip line of significant trees
- Avoid damaging tree roots during construction if the tree is to be preserved
- Changes in drainage patterns should be minimized
- Remove roots below paved surfaces before construction
- Use root barriers to protect trees and trails
- Avoid cuts to tree bark by construction equipment
- Do not post signs on trees.



Preserving wildlife trees

5.9.2 Hazard Trees

When new trails are created in forested areas, it is possible that some existing trees will become a danger to trail users.

- Hazard tree assessments are to be undertaken by qualified personnel to determine if any hazard trees exist and decide on the appropriate actions to be taken.
- When removing or cutting back hazardous trees, it is important to maximize visual aesthetics wherever possible.
- Instead of removal, where possible trim hazard trees into wildlife snags.
- Debris from hazard tree removal should be incorporated into trail or amenity development, such as using parts of a tree as logs to keep users from straying off a trail.
- As appropriate, removed limbs and woody debris should be left on site to maintain biomass.

5.10 Landscaping

As a general rule, the RDN does not install landscaping and gardens at parks and trails, as there is typically no irrigation available. In most natural settings, on-site seed stocks and plants will be allowed to re-establish and re-vegetate disturbed areas.

Planting of vegetation should be considered in the following circumstances:

- With construction of new trails, structures or removal of old structures, vegetation may be required for slope stabilization, prevention of erosion and to help restore the natural setting or native ecosystems.
- Large disturbed areas may need to be replanted or overplanted to prevent invasive species spread (e.g. broom in hydro corridors).
- In natural areas where there is a major invasive problem (e.g. broom), a strategy of overplanting larger native conifers and shrubs will help to shade out invasive species.
- Dedication or donated trees and shrubs will be planted, but will be allowed to establish naturally.
- Where screening or buffering of neighbouring properties is required, a revegetation plan will be prepared, using native species as much as possible.

Where planting is required, the following guidelines should be followed:

- All landscape work and maintenance practices should conform to the BCSLA/ BCLNA Landscape Standards.
- As RDN parks do not have irrigation, plant material selection will be drought tolerant, low maintenance and preferably native selections.
- No trees or shrubs shall be planted within the vertical or horizontal clearances as specified in the Trail Standards.
- Plants and plant groupings will not be planted where they impede visibility along the trail.
- Ensure that adequate silt control measures and other best practices are used during construction.
- Where trails are close to residential properties, plantings will be used for privacy screening, trail softening and aesthetics, however, tall and dense plantings will be avoided for safety and security reasons (see Section 4.3).
- Use reputable sources for plant and seed stock (e.g. NALT Natural Abundance Nursery; Streamside Native Plants in Bowser)



Natural vegetation along a trail

5.11 Construction Protocols

During trail construction, or the installation of other park amenities, care should be taken to minimize additional impacts to the site. The Contractor should follow detailed specifications, provided by the landscape designer or engineer.

The Master Municipal Construction Documents is one source that includes detailed specifications for works relevant to park and trail development including, but not limited to:

- Clearing and Grubbing
- Tree Preservation
- Erosion and Sediment Control
- Topsoil
- Hydroseeding



Restoration planting at Moorecroft Regional Park



Accessible toilet surround construction



Regular trail inspection



6 PARKS AND TRAIL STRUCTURES

6.1 General Guidelines

Structures are built forms that provide a safe and enjoyable park and trail experience. The following guidelines describe typical structure design. When designing and constructing any structures, the RDN Bylaws and the British Columbia Building Code must be followed; consideration should be made if the structure needs any professional services (e.g. engineering, geotechnical); and time should be allowed for any permits or referrals.

General guidelines related to structures include:

- All imported lumber should be dimensional cedar or pressure treated lumber.
- Wood surfacing used for walking should be rough sawn to reduce slipping.
- Place wood decking perpendicular to the direction of travel, with 10–15 mm spacing between boards for drainage and to maintain life of the structure.
- Place boards with rings in convex direction to avoid cupping.
- The top wood member of guardrails and handrails should be sanded and beveled for user comfort and for an aesthetic finish.
- All metal used for fences, bollards and baffles should be of welded construction and with a powder coated finish.
- All metal fasteners should be hot dipped galvanized.
- Ensure the fasteners are placed to avoid sharp edges, potential snagging of clothing or trip hazards.
- All posts for fences, barriers, bollard and baffles should be set in concrete footings.



Stairs constructed with stringers from demolition project





Steel bridge at the Lighthouse Regional Country Trail



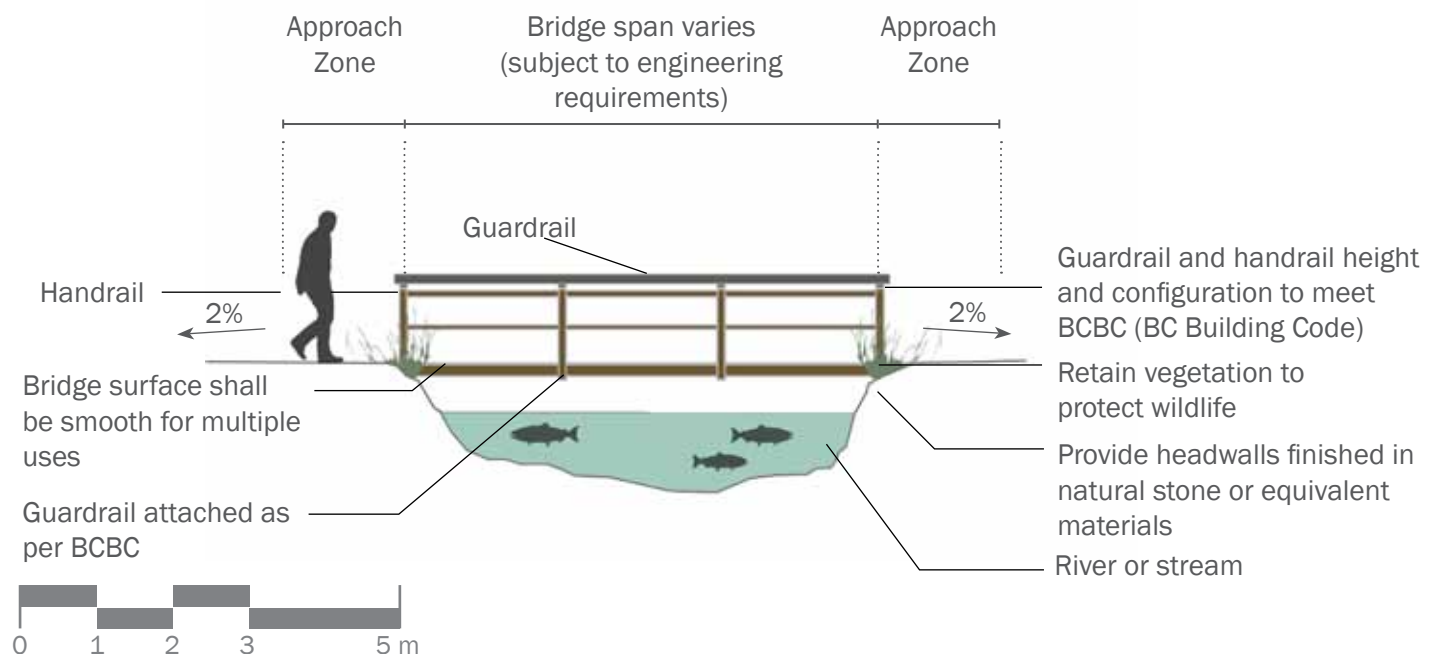
Steel bridge at the Top Bridge Regional Trail

6.2 Bridges

Bridges are to be used in the trail network to provide access over larger watercourses, and to function as landmarks and viewing platforms. The bridge design will depend on trail width, size of environmentally sensitive areas, recreational uses and the load expected on the bridge. Before going very far in the design process, the proper authorities should be consulted for permissions/considerations (Provincial Ministries of environment, transportation, engineering, RDN Planning and bylaw).

Bridge deck width needs to be wide enough to safely accommodate the type of activities occurring of the trail. The deck must include an expanded metal section to prevent slippage in wet weather. Guardrails with handrails are always required when the bridge is raised more than 0.6 m above the ground. Bridges should be aligned along the path to avoid sharp turns at the end of the bridge. Clear indication of the intersection between the bridge and trail is required. Bridge designs should be reviewed and approved by relevant professionals.

Figure 4 Bridge Conceptual Cross Section



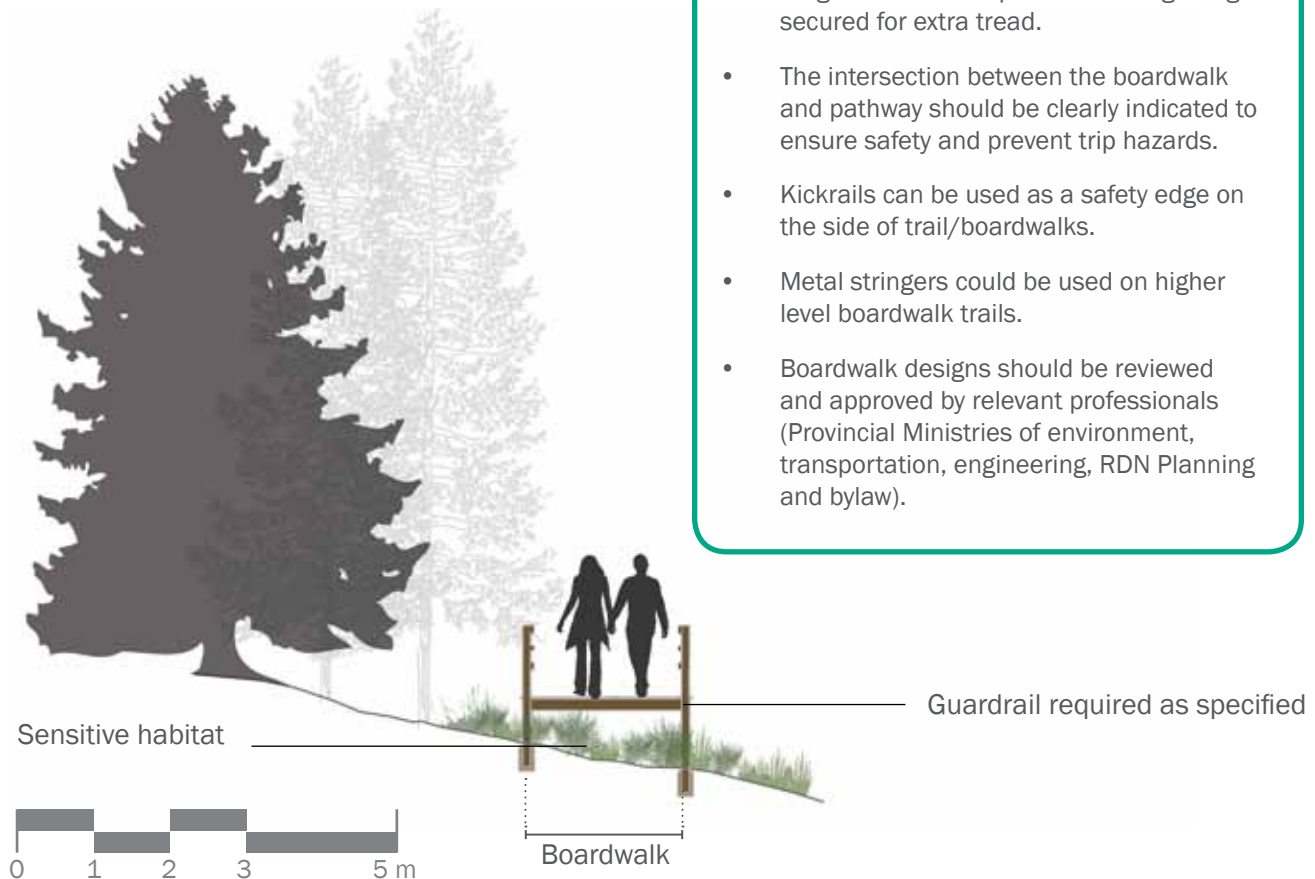
6.3 Boardwalks

Boardwalks should be incorporated in the trail system in order to protect environmentally sensitive areas, to cross wet areas and to discourage walking off the trail. They also provide opportunity for nature appreciation. Trail width, size of environmentally sensitive areas, and the carrying capacity will determine the boardwalk design. Boardwalks are used when trails cross smaller watercourses, wetlands, and sensitive vegetation.



Floating boardwalk at Witchcraft Lake Regional Trail

- They are low in height and span slow moving water. Boardwalks deck width needs to be wide enough to safely accommodate the type of activities occurring on the trail.
- Boardwalks range from 1 to 3 m wide with a raised edge or railing if more than 0.6 m above finished grade.
- The deck of the boardwalk is typically rough cedar with expanded metal grating secured for extra tread.
- The intersection between the boardwalk and pathway should be clearly indicated to ensure safety and prevent trip hazards.
- Kickrails can be used as a safety edge on the side of trail/boardwalks.
- Metal stringers could be used on higher level boardwalk trails.
- Boardwalk designs should be reviewed and approved by relevant professionals (Provincial Ministries of environment, transportation, engineering, RDN Planning and bylaw).



6.4 Decks

Decks can add visual appeal, functional use, and recreational activities to parks and trails. For instance, a deck may be used as a viewing or rest area off a bridge or boardwalk. When designing a deck which is connected to, or is a part of a bridge or boardwalk, the bridge or boardwalk guidelines apply. Decks may also be used at beach accesses to provide a safe viewpoint while protecting the surrounding environment. Deck designs should be reviewed and approved by all relevant professionals.

6.5 Stairs

Considering the rugged topography of the RDN, stairs are often required to take visitors to a viewpoint, gain access to recreational areas or maintain trail connectivity. Some stair systems are simple while others can be very complex.



Engineered stairs to beach area

Quick Idea

On trails with cycling use, consider installation of a bike channel to facilitate walking a bicycle up or down the stairway. The channel is intended to guide a variety of bicycle tires without binding or causing damage. Cross-section shapes vary, but can be flat, rectangular or V- or U-shaped. Depth is typically 2 to 6 cm and width 6 to 13 cm. Channel can be constructed of wood or metal.

General design guidelines include:

- Stairs should be used for steep sections of trail for safety and to prevent further erosion of banks.
- Step construction and material depends on the site's drainage and soil or rock substrate. Unstable slopes or poorly drained soils may require specialized footings for stairs.
- Standard rise measurement is critical, and should be consistent unless separated by landings and should comply with local building codes. The step tread ratio is to be 2:1.
- Landings should be provided between flights of 12 steps or more.
- Handrails should be provided on at least one side of the stair case if the flight is long or steep.
- To prevent slips and falls, expanded metal should be used on landings and stair treads.
- On shallow grades, box steps should be used. These are secured log or timber frames filled with compacted earth or gravel. The length of the box step is dependent on the grade, but minimum rise/run ratios should be followed.
- In some sites, such as wet environments or beach accesses, concrete steps with metal construction may be a more durable and safe solution.
- In areas of high winter tides or water flows consideration will be given to removable non-corrosive metal stairs at the base. Stair designs should be reviewed and approved by all relevant professionals. Some situations may require geotechnical studies and engineered stair design.

6.6 Fences, Barriers and Gates

Fences, barriers and gates are used to direct pedestrian movement, prevent vehicle access on trails and in places where barriers are needed on park boundaries (to protect private property). On the trails that are universally accessible, wheelchair access must be ensured. Barriers must be removable for emergency and service vehicles, and parks equipment access. Ensure that emergency services and park staff have keys to all locking apparatus.

6.6.1 Bollards

Bollards, posts, or sleeves are common removable barriers, and should be located at trail heads where there is a need to control vehicle access.

- In areas with equestrian and cyclist access, ensure barriers are of appropriate height.
- Sleeve barriers can be used to prevent vehicle access.
- Barrier posts are typically installed in odd numbers so that the center post is positioned in the center of the trail.
- A bollard with sign combines barrier with a sign, and is useful to relay information such as, 'emergency access only', 'no parking'

6.6.2 Baffles

Baffle gates may be used to control cyclist speeds. Where used to control speeds, signage and notifications should be provided in advance of the barrier to warn trail users. Baffle gates, rather than bollards, may be used where bicycles are prohibited. On accessible trails, ensure width between baffles is adequate for rolling traffic, e.g. wheelchairs, medi-scooters, strollers.



Removable bollard with sign



Boulders provide a natural form of bollard



Accessible railroad baffles



A stile fence insert prevents motorized traffic but allows pedestrians



Split rail fence for conservation

6.6.3 Gates

Gate type is determined by the site needs. Where ATV trespass is an issue, lockable, ram-resistant steel gates are needed. In areas with low trespass issues, a lockable steel farm gate may be adequate.

To allow pedestrian access beside a locked gate, a stile can be incorporated.

6.6.4 Fences

Fences are used in RDN parks and trails to protect environmentally sensitive areas, to direct visitors flows, as a safety barrier, and to separate parks and trails from adjacent land uses. Examples of the type of fences used in RDN parks include split rail, cedar, cement board, chain link, solid board, and page wire on post. Fencing is expensive, requires regular maintenance and can detract from a natural setting. Therefore fencing should be installed judiciously and conservatively.

- Split rail fence will be used in natural settings, either 2-rail or 3-rail.
- Dimensioned lumber or concrete rail fences will be used in parks with a more urban design.
- Low wood rail fences may be used at viewpoints.
- Black chain link safety fencing should be provided along steep sloping trails, cliffs and other areas with fall hazards. Safety fencing must be at least 0.5 m from the edge of the pathway, must be built according to the BC Building Code and should display appropriate caution signage. Black chain link fencing will also be used where wood vandalism incidents are high.

- In sites needing privacy screening and to deter trespass, consider a vegetation screen (conifer), solid board fencing or split rail cedar fencing.

6.7 Retaining Walls

Avoid the use of retaining walls where possible through strategic trail siting and grading. Steep or unstable slopes, as well as erodible soils, should be avoided when designing trails. If the side slope cannot be avoided, retaining walls may be required to prevent side slopes from collapsing onto trails or boardwalks. Where retaining walls are required in natural areas, use cedar timbers or natural stone.

- Where walls must be installed, proper drainage and anchoring must be in place.
- Retaining walls higher than 1.2 m should be designed and approved by a professional engineer registered in BC, and retaining walls over 1.2 m tall on a trail, require a railing.
- Consider other methods of retaining banks such as bio-engineering which uses live staking of quick rooting native species such as willow on steep slopes.
- Professional services such as geotechnical engineering may be required to ensure slope stability and proper design and construction method.

7 STAGING AREAS, DAY USE AREAS, AND FURNISHINGS

7.1 Staging/Parking Areas

Staging areas are situated at the entrance of certain parks and trails. Staging areas create a first impression and set the tone for the recreation experience. Staging areas vary, based on the type of park or trail, location, usage level, demand, and space provided. Considering the diversity of conditions through the RDN, staging areas are grouped into three distinct classes each with unique design guidelines and amenities.



Mount Benson Regional Park staging area

The following matrix outlines the three different types of staging areas:

Table 9 RDN Staging Area Classification

STAGING TYPE	VEHICLE PARKING	HANDICAP PARKING	BICYCLE PARKING	TOILETS	GARBAGE RECEPTACLES	MAP KIOSK DIRECTIONAL	SEATING
1 High Use							
2 Medium/Low Use							
3 Access Point							

 REQUIRED

 OPTIONAL

¹ Minimum of 10 stalls

² Minimum of 5 stalls

³ If trail is universally accessible



Type 1 staging area



Type 2 staging area

7.1.1 Type 1 Staging Area – High Use

The high use staging area is designed for large multi or single use trails or popular parks with a high demand and substantial traffic flow.

- The parking area should have a minimum of 10 parking stalls, and must include a minimum of one accessible parking space, if the trail is universally accessible (indicated by designated wheelstops/signs).
- If space allows and there is a high level of equestrian use, then the design should include space for horse trailers as well as hitching rails and/or corrals.
- Design of the staging area must consider the needs of emergency vehicles and should also consider the need for bus access.
- Bicycle parking should be provided.
- Toilet facilities, mainly portable toilets, should be provided.
- Garbage receptacles should be provided and should be animal proof, with an option for recyclables.
- A map kiosk of the park or trail is required. Information should include orientation signage which shows the user's current location, rules and regulations of the park or trail, permitted uses, and potential hazards, RDN contact information and hours of operation.
- At least one picnic table or bench should be provided for seating.

7.1.2 Type 2 Staging Area – Medium/Low Use

The medium use staging area is designed for multi or single use trails and parks and trails with intermediate demand level, and less traffic flow than the high use staging area.

- The parking area should have a minimum of 5 parking stalls, and must include an accessible parking space if the trail is universally accessible (indicated by designated wheelstops/signs).
- Design of the staging area must consider the needs of emergency vehicles and also have trailhead barriers for ATVs (e.g. bollards).
- Bicycle parking, washrooms, and seating are typically not provided, except in certain situations.
- A map kiosk of the park or trail is required. Information should include orientation signage which shows the user's current location, rules and regulations of the park or trail, permitted uses, and potential hazards, RDN contact information and hours of operation.



Type 3 staging area



Rest area at Nile Road Community Park

7.1.3 Type 3 Staging Area – Access Point

The Access Point staging area is designed for trails or parks with a low traffic flow and demand level. This trailhead may also be used at a secondary access point of a higher demand trail, or as an access point to a trail where no parking is required, such as a small trail in a community neighborhood.

- There are no parking spaces, and bicycle parking and washrooms are not provided.
- Barriers (e.g. bollards, boulders) are included to restrict motorized access.
- Garbage receptacles are not required.
- Generally no kiosk is provided, but directional signage and maps showing the user’s location, rules and regulations of the trail, trail uses, and potential hazards should be included.

7.2 Rest Areas

Rest areas add to the user experience of a park or trail. They are located at appropriate intervals and ideally, at picturesque settings or park features. Rest stops are necessary for type 1 and type 2 trails, especially those that are universally accessible, as young children, older adults, and those with disabilities will need to rest more frequently than others.

General guidelines include:

- Rest areas should be level spots on the side of a trail, wide enough to provide users a place to rest.
- Rest areas should be sited to avoid disruption of trail traffic by allowing visitors to get off of the trail tread.
- For heavily used trails, such as type 1 and possibly type 2, some form of seating should be provided at a maximum of every kilometer, and should be considered more frequently, taking available resources and visitor needs into consideration.
- Rest areas could include a bench or natural seating such as flat boulders or logs, and a garbage receptacle if feasible.





Enjoying the view at Vesper Point, Moorecroft Regional Park



Bicycle Parking

7.2.1 Lookouts and Viewpoints

Lookouts or points of interest add visual appeal to a trail, and make a trail more exciting and interesting for the user. A viewing area may be to the side of a bridge or boardwalk, in the form of a deck, or simply at the side of a trail. Often, rest areas and lookouts can be combined, making the rest and lookout area a more pleasant experience.

- Lookouts should avoid disruption of trail traffic by allowing visitors to get off of the trail tread.
- Lookouts should provide a bench or natural seating to rest, and a map for users to determine their location.
- A garbage receptacle may also be provided on heavily used trails, such as type 1 and 2.
- Interpretive signs are often located at lookouts to inform users about natural, historical, and cultural facts of the area.

7.3 Furnishings & Convenience Amenities

Regional and community parks and trails provide a wide range of furnishings and convenience amenities. These amenities help to enhance the visitor experience but need to be purposefully located and appropriately designed to fit the site context, desired recreational experience, while ensuring sustainability and functionality. Design guidelines for site furnishing and amenities are essential to ensuring a consistent level of service and brand to the RDN. Guidelines for common furnishing and convenience amenities are outlined for the most common elements in regional and community parks and trails.

7.3.1 Bicycle Parking

Bicycle parking at park features, staging areas, campsites, and beach accesses is suggested. If a trail has sections with different allowed uses, bicycle parking may be required. For instance, a multi-use trail connecting to a pedestrian-only trail would require bicycle parking at the junction point, so users could continue on the trail network.



Portable toilet with surround



Animal proof garbage receptacle

7.3.2 Toilets

Due to the rural nature of the RDN parks system, portable toilets or pit toilets will be used. Washrooms will be typically be installed at type 1 and 2 staging areas, high use regional parks, high use community parks, high use beach accesses and playgrounds. Flush toilets would only be considered in Type 1 staging areas and campgrounds where there is a water and sewage system in place. In level terrain with low water tables, pump out vault pit toilets can be considered. In all cases washrooms should be sensitively incorporated into the surrounding context through appropriate materials and screening (e.g. vegetation).

- Portable toilets will be enclosed by a surround built of wood or concrete.
- In siting a portable toilet, consider that the toilet needs to be reached by toilet cleaning service vehicles. Typically cleaning hoses reach 15 m from the service vehicle. It is important to check with the service provider when planning pump-out toilets.
- For accessible sites, a universally-accessible toilet and associated amenities should be provided (i.e. hard, level surface trail, parking close by). At water accesses, a universally accessible toilet allows more room for changing into swimming gear.
- Ensure all toilets are cleaned and stocked regularly and more often in high season and in high use sites, (e.g. swimming areas, popular trails).

7.3.3 Garbage Receptacles

Garbage receptacles with regularly scheduled garbage removal should be provided at type 1 and 2 staging areas, high use parks and beach accesses, picnic and rest areas and along type 1 and 2 trails if warranted. Garbage receptacles should be vehicle accessible by a contractor. Bear-proof receptacles should be used where foraging animals (e.g. bears and raccoons) are known to be in the area. In high use sites, the deep can are to be used. In other areas the concrete/plastic cover model (McKay Precast) are to be used.

For all garbage receptacle locations, a pickup and maintenance schedule must be established. Where possible, recycling receptacles should be provided.





Concrete bench with cedar slats



Cedar picnic table

7.3.4 Seating

Seating is provided in parks and along trails to accommodate users. In general, the more developed and urban the park or trail setting, the more durable and modern the park or trail furnishings should be. Along trails benches are placed at rest areas and lookouts to provide rest and view spots for trail users. Benches should also be placed along trails and within parks at features of interest, playgrounds and gathering areas.

Suggested bench models:

- Concrete bench (Precast) with and without back, exposed aggregate surface, mounted on concrete pad in areas prone to fire vandalism. Bench slats can be concrete or clear stained cedar. Bench back can receive a dedication plaque (with RDN permission).
- Natural benches can be placed in Type 2–3 trails. Flat boulders and logs are either from the site or transported locally. These benches are meant to be natural, low maintenance, durable park amenities that fit into the park surroundings.

7.3.5 Picnic Tables

In front country areas, pre-cast concrete tables with concrete bases (exposed aggregate, e.g. Precast), wooden seats and tops are used. In areas of high fire vandalism, the table should be all concrete. Tables are precast and mounted on concrete pad.

In Type 1 staging areas that are designated as accessible, a wheelchair accessible table and level compacted surface or poured pad should be used.

Wooden picnic tables are portable, and can be moved around for larger functions. Tables should be anchored if theft is an issue. Varnished cedar picnic tables may be locally supplied.



Accessible table at Meadowood Drive Community Park

8 SPECIALTY AREAS

8.1 Water Accesses

Within the RDN, water access points occur under various forms of tenure. Some parks and trails located near the ocean offer beach access – these may be RDN owned land, or land leased or managed by the RDN, but owned by another organization. For example, Ministry of Transportation and Infrastructure (MOTI) road allowances may dead-end at a lake or the ocean, and could be managed as RDN an park or trail by way of license. In all cases, development of water accesses should have the appropriate permissions (e.g. MOTI Permit to Construct) and should follow the design guidelines outlined in this document, considering classification, users, environment and maintenance objectives.

Any interest in development within the high water mark (e.g. a boat launch) must first be reviewed by the relevant government departments (e.g. Provincial, Federal).

8.2 Campgrounds

The RDN manages two parks offering camping facilities: Descanso Bay Regional Park and Horne Lake Regional Park. These campgrounds are vehicle accessible and attract local residents and visitors from a broad area. The guidelines described in this document apply specifically to the development of Parks and Trails. Guidelines for the design of specific campground amenities are beyond the scope of this document (e.g. potable water, firewood corrals, campsite layout). Any development within Descanso Bay Regional Park and Horne Lake Regional Park outside the camping facilities should refer to this document. Specific guidelines for the design and development of the camping facilities, should reference management plans and concept plans for each park.



Beach access



Entrance to Descanso Bay Regional Park Campground



Playground at Meadow Drive Community Park

8.3 Playgrounds

Depending on the community interests, playgrounds may be desired elements in neighbourhood parks. Playgrounds need to meet strict Canadian Standards Association (CSA) safety design and maintenance requirements. Playgrounds should be very carefully designed to serve the demographics and future growth projection of the area (up to 20 years ahead).

Playgrounds should be located with easy access from main roads, clear site lines for safety, and on level ground with good drainage. The site should be checked for hazard trees, and noxious vegetation such as stinging nettle, brambles.

The types of playgrounds range from very natural play elements using boulders, wood and live vegetation, to very colourful, complex and very expensive structures. The design of the playground should be appropriate to the park setting and the community, and should reference the CSA for playground design as well as emerging best practices such as Design For Play: A guide to creating successful play spaces (Play England, 2008).

8.4 Other Recreation Amenities

There may be community interest in the development of other recreation elements in local parks, for example, pump tracks or skate parks. Park type, environmental setting, budget (including maintenance budget), safety, liability, community demographics should be considered before planning for these facilities.



Henry Morgan Community Park playground

9 PARK AND TRAIL SIGNAGE

9.1 Signage Design Guidelines

Signs are essential to effective trail and park management. They provide valuable information to visitors, allowing them to make informed decisions, enhance their experience and helping them to stay safe.

Too many signs can detract from the visitor experience. Signage should be used sparingly and should be appropriate for the service level and setting of the park or trail. For example, signage in backcountry areas should be limited to the most essential notices, while signage in front-country areas should be concentrated at the parking area, entrance and trail access points.

A standardized system of signs, typefaces and graphics will ensure the successful communication of information to visitors of RDN parks and trails. The consistent use of the RDN logo, colours and typefaces will increase visitor awareness of the RDN's role in land conservation and responsible park management (see RDN Sign Manual for community parks and trails for details).



Approach sign on secondary highway

General guidelines for sign placement:

- Signs should not be placed in a location where they will pose a safety hazard to park or trail users.
- Care should also be taken not to place signs in a location that will obstruct natural viewscapes or lines of sight to a park's aesthetic qualities.
- Signs should not be obstructed by vegetation or other features. Tree branches or other vegetation may need to be trimmed on a regular basis to maintain clear sign views.
- A natural environment should be preserved as much as possible and where practical, the number of signs should be limited. Multiple signs should be grouped in one location or on a single mount as opposed to spread out along a trail's length or throughout the park.
- In most circumstances signs should be placed in a location where maximum viewing can occur, i.e., on posts at eye level, on the right side of the trail facing the anticipated direction of travel.
- Signs should be installed at appropriate heights for the visitor. In some cases, signs may be needed at varying heights (e.g. parks or trails frequented by equestrian users).
- Signs should NOT be secured to trees, but instead securely fastened with tamper proof screws onto minimum 15x15 cm cedar posts.
- No signs should be placed on private or crown property unless the proper permissions, agreements or permits are in place.

Sign types associated with RDN parks include:

- Approach signs (signs on roads to guide people to the park)
- Entry signs displaying park name
- Orientation Kiosk (with map and park information)
- Wayfinding signs, e.g. directional arrows, 'you are here' maps and distance signs
- Regulatory signs providing park rules and permissible activities
- Information signs including safety, caution, traffic
- Temporary signs (e.g. fire closures, high water, construction)
- Interpretive/Educational signs

9.1.1 Approach Signs

These signs are to guide vehicle or pedestrian traffic to regional parks. Typically, approach signs are not used for community parks, which are meant for neighbourhood use.

- Approach signs will typically be mounted on the side of highways under consultation and permit with MOTI.
- Approach signs will display the name of the park and arrows indicating the direction to travel. They may also contain distance information if required.

9.1.2 Entry Signs

Entry or entrance signs, displaying the park or trail name, inform users that they are in an RDN recreation area.

- Should be placed at the main access point of a park or trail, and at relevant staging areas.
- Should also be placed at the beginning and end of trails, or at connecting points informing users of the trail network.
- Should be simple and large enough to read at a distance.



Approach sign to Descanso Bay Regional Park campground

The RDN maintains five different types of entry signs:

Type 1 – Large Wood Entry Sign

These signs will be placed at the main entrance to regional parks, in Type 1 staging areas.

- Constructed of Cedar or High Density Plastic, typically 91x182 cm in size, and installed on a concrete base with cedar cedar posts.
- Text on the sign face is to be routed into the wood and painted.
- Shall include the name of the park, the RDN logo, contact info and names of any partners.



Type 1 - Large wood entry sign

Type 2 – Small Wood Entry Sign

These are a smaller version of the Type 1 sign are to be used in Type 2 staging areas, and neighbourhood community parks.

- Constructed of cedar and are typically 60x100 cm in size, mounted on a concrete base.
- Includes the park or trail name, the RDN logo and contact information.



Type 2 - Small wood entry sign

Type 3 – Two-post Entrance Sign

This entrance feature is a smaller scale sign, approx. 60x90 cm for use in Type 2 Staging Areas and for regional trails.

- These signs may also be used within a park or along a trail where it is deemed that the type of information provided by a kiosk is needed.
- The signs are mounted on two post supports with the park or trail map and information about the park.



Type 3 - Two-post entrance sign

Type 4 – Small Metal Entry Sign

These are used at access points to community parks or trails, at secondary access points to regional parks and trails.

- Constructed of vinyl-coated aluminum or Dibond and are typically 30x38 cm in size, mounted on 15x15 cm posts.
- Designed with white lettering on a blue background.
- Include the park name, RDN Logo and contact information.



Type 4 - Small Metal Entry Sign

Type 4 – Identity Post

These are smaller post signs (typically 15x15 cm) signs with the park/trail name and possibly an arrow.

- The name of the trail will appear along with other information for the trail user including distance markings, icons and directional arrows.
- In parks with complex trail networks, small maps on posts should be mounted at important trail junctions.



Identity post

Type 5 – Water or beach access (BA) sign

Depending on the location of the water access, the sign can be either the small metal entry sign or similar to the identity post. Water/beach accesses on the road right of way will require the appropriate permissions for development and signage (e.g. MOTI Permit to Construct).



Beach access sign

Specialized Entry Signs

In some parks, community members have created entry signs that have existed for years in some cases, before the RDN took over management of the site and are often important and valued by the community.

- Examples of these signs include Maple Lane CP, Thelma Griffiths CP and Huxley Park.
- When existing entry signs are used, the signs should be modified, or a new panel added to include the RDN logo and contact information.

9.1.3 Orientation Kiosks/Signs

An orientation kiosk informs recreational users about all aspects of a park or trail in one convenient location. The purpose of kiosks is to show the location of the user and familiarize the user with the setting, protocols and safety hazards of the site. General guidelines for kiosks include:

- Should be located at trailheads, key destination points, and main trail junctions.
- Includes the park or trail name, a map with a 'You are here' marker, amenities and the rules and regulations of the park or trail.
- Kiosks in regional facilities also include a map of the regional park system.
- Other significant information may be added if it enhances the visitors' experience, such as hiking tips, information on the park's geological or historical features.

There are different types of kiosks for various park and trail locations.

Type 1 – Large four post kiosk

This kiosk is used at Type 1 staging areas and highly used regional parks.

- The four posts allow for a sheltered space within the kiosk and there is room for a posting board on the ends.
- The sign board consists of two distinct areas; one provides a map and information on the park and the second panel provides a map of the regional parks system.



Specialized entry sign



Type 1 - Large four post kiosk

Type 2A- Two-Post Kiosk

A two-post smaller version of the timber kiosk, with information panels on front and back.

- Front panel includes a map and general information, plus a notice board, and the back panel has the regional map and an additional panel to feature park specific information such as park donor, ecological information, cultural features, etc.



Type 2A - Two-Post Kiosk

Type 2B- Modified Two-Post Kiosk

A two-post smaller version of the timber kiosk, with information panels on front and back.

- Front panel includes a map and general information, plus a notice board, and the back panel has the regional map and an additional panel to feature park specific information such as park donor, ecological information, cultural features, etc.



Type 2B - Modified Two-Post Kiosk

Specialized Kiosks

In some instances, specialized kiosks have been designed to serve a special need or to fit to a particular theme of a park such as the kiosk at Extension Miners Community Park.

- Existing kiosks in RDN campgrounds are unique and do not fit the Type 1 or 2 standard.
- Key RDN information, including park and regional maps, can be inserted into the existing structures to keep the theme of other RDN kiosks.



Specialized kiosk



Directional / wayfinding sign



Witchcraft Lake Regional Trail markers



Totem style regulatory sign

9.1.4 Directional/ Wayfinding Signs

Directional signs are located at regular intervals along the trail for way-finding purposes. These signs inform the user that they are on a network trail, inform the user how far they are from the next junction or destination, and illustrate the route of the trail or road from their point forward.

- Typically these are 15x15 cm signs on cedar post with sign mounted at 1 m height with the trail name, directional arrow RDN logo and contact information. Longer trails may include distance markings.
- In parks with complex trail systems a map with 'you are here' information will be included at important trail junctions.
- For back country trails, where the installation of posts is impractical, small aluminum or durable brightly coloured markers, mounted on trees at regular visual intervals, will aid navigation (e.g. Witchcraft Lake Regional Trail).

9.1.5 Regulatory Signs

All entry points will have posts noting allowable and prohibited activities. Examples of a regulatory sign are "pedestrians only" or "pets must be on leash at all times". This information will be conveyed by the use of icons and the prohibited red slash. These signs will be installed on a 15x15 cm post with the signs mounted in totem fashion onto the post.

Other signs may be needed in parks to relay information that is not included elsewhere such as parks or trail hours, seasonal use information, restoration and ecologically sensitive areas, user etiquette, etc. Some of this information can be included in kiosks but other information, such as park hours, needs to be located in the area where the subject of the sign is.

9.1.6 Park Boundary Signs

It is impossible to sign the boundary of every park property in the RDN due to the size and accessibility. Boundary signs should be placed where trails leave park property, and at locations where there are issues such as ATV trespass, tree cutting, encroachment.

9.1.7 Informational Signs

Informational signs inform users of hazards, safety precautions, and park or trail insight. They are used to notify users of important aspects of the park or trail to benefit their recreation experience. Some examples of information signs includes:

- Hazards/risks
- Park boundary
- Park or trail hours
- Seasonal use
- User etiquette
- Restoration areas

Safety signs are used to alert visitors of possible dangerous conditions or unusual activities within the park or on the trail. Considerable care must be taken to ensure the most effective placement of these signs. Any hazardous or unexpected obstacles, conditions, or natural landscape features must be assessed for risk management to determine if their existence requires the installation of such signage.

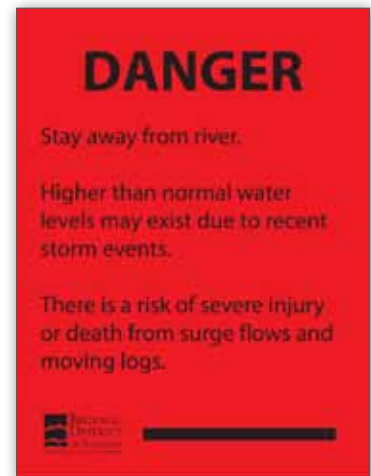
Safety signage is divided into two categories
1) Danger and 2) Caution.

Danger signs are red, display strong messages and are used in situations where the visitor should not proceed or must take a specific course of action.

Caution or warning signs are yellow, alerting visitors to potential hazards and suggest the action to be taken. Safety signs must be concise and use universally recognized iconography wherever possible.



Park boundary sign



Danger sign



Caution sign

9.1.8 Temporary Signs

In some situations it may be necessary to post temporary signage warning of hazardous conditions, as would be the case with construction or development projects in the vicinity of trails or in areas actively used by park visitors. Bridge or trail upgrades, hazard tree falling operations, salmon or creek bank enhancement projects (particularly those involving the use of heavy equipment) are further examples of conditions requiring the use of safety signage.

All temporary signage must be reviewed and approved by the RDN prior to installation. Once the temporary hazard or issue is controlled, all warning signs should be immediately removed.

9.1.9 Traffic

Parks and campgrounds having vehicle access need signs to inform visitors of the road speed, directions and hazards. MOTI standards are to be used for all traffic signs. Their icons and text are readily recognized by visitors. Details for design and placement of these signs may be found in the MOTI Manual of Standard Traffic Signs and Pavement Markings.



Temporary sign on a kiosk



Traffic sign at Horne Lake Regional Park campground



Interpretive sign at Englishman River Regional Park

9.1.10 Interpretive / Education Signs

Interpretive signs are located at main trail/park features that have a story or interesting facts to share with the users. The feature may be natural, historical, or cultural. Interpretive signs should be clear and visual to increase user understanding. Interpretive signs are usually found at lookout areas, areas with a special species or ecosystem, and at trailheads or staging areas to inform users about the area or to help reinforce why people and their pets should stay out of sensitive areas.

- Signs should be placed at a height appropriate for the target user (e.g. higher for adults than those targeting children).
- Given the increased visitation and potential for vegetation trampling and soil compaction, interpretive signs should be located in durable areas or the site should be shielded with appropriate surface to prevent undesirable damage.
- Where possible, interpretive signs should be located to allow visitors to exit the trail tread and prevent conflict with other trail users.

9.2 Donor Recognition

The RDN fosters relationships with the public and agencies through cooperation on park development and maintenance projects. If a group or agency makes a significant contribution to a development or maintenance project, then a method of acknowledgement may be considered. Depending on the park and project, donations can be recognized through a sign, plaque on a structure or mention on a kiosk. Certain grant programs may require a plaque or sign recognizing the funding provided.

The sign or plaque should be tastefully designed, and placed at an appropriate location in the park.

NOTE: The RDN Parks is currently developing its donations policy, therefore at this time, only partner recognition (e.g. funding partner, conservation agency) will take place as needed. No donation benches or plaques can be installed without permission from RDN Parks management.

10 PARK AND TRAIL MAINTENANCE

Once parks and trails are established, ongoing maintenance and management is required to keep the area and surrounding environment in the intended condition. Maintenance activities include a broad range of tasks, varying in budget requirements and frequency, and ultimately aim to ensure environmental sustainability, visitor safety and quality user experiences.

10.1 Design with Maintenance in Mind

When planning and designing parks and trails, attention to maintenance requirements should be considered early in the process. Anticipating potential problems during the design process can reduce maintenance requirements. Many decisions when planning a park or trail will influence maintenance, including material choice and location. Some materials are more durable and will last longer than others. Although more durable materials are usually more costly, they often require less repair and replacement.

Another factor to consider is whether the maintenance needs will be handled by RDN staff or whether private contractor services will be required. This has a direct effect on budget, but can also be a way of establishing longer-term maintenance programs for sites through maintenance contracts.



Footbridge under repair

Specific maintenance requirements vary with the type of park or trail, its location, level of use, and surrounding area. Typical park and trail maintenance activities to consider during design and planning include:

- 1) **Drainage/Erosion** – Proper drainage is essential to the longevity of a trail system. Culverts must be placed across trails as needed and must be kept free of debris. Swales on the uphill sides of trails also need to be built and examined to prevent water from flowing onto trails. Poorly drained areas must be redesigned to minimize trail damage by water.
- 2) **2. Surfacing** – Hard surfaced trails have the potential for cracks, heaving or pull-up of pavers if used, and should be carefully located and constructed to avoid these issues. Soft surfaced trails must be monitored to assess material depths, ruts, and eroded surfaces over time and with increased use. Parking areas and park access roads may also require routing grading or repairs to deal with pot-holes or clearing seasonal debris.



- 3) **3. Vegetation Control** – Trails must be cleared of vegetative material and specified vertical and horizontal clearances must be maintained. Vegetation clearing regimes depend on the weather and trail; maintenance schedules will be followed as per their site specific requirements.
- 4) **Tree Removal** – Dead and unsafe trees in parks and along trails will require periodic monitoring by a Certified Arborist, who will provide recommendations for tree removal based on potential risk. Tree removal greater than 15 cm in diameter requires the services of a certified tree removal company.
- 5) **Boardwalk and Bridge Maintenance** – Boardwalks and water crossings will require periodic inspections to identify potential safety hazards and general maintenance tasks. Depending on the bridge usage and design (whether it's engineered or a simple footbridge) certain bridges will require an engineer inspection with stamp.
- 6) **Signage** – Signs should be planned for the long-term, ensuring information is not time sensitive and remains up-to-date, informative, and correct. Maintenance requirements will include checking for and repairing graffiti or vandalism, and monitoring wood signs and posts for decay or rot.
- 7) **Garbage** – Levels of service vary with seasons and park and trail use. Garbage receptacles should be located for easy access, as well as in a location that makes sense for park users.
- 8) **Toilets** – Levels of service vary with seasons and park and trail use. Toilets should be located for easy access, as well as in a location that makes sense for park users.
- 9) **Obstacles** – Other hazards such as sloughing slopes, loose rocks, fallen trees and exposed tree roots may occur over time and will require immediate and ongoing attention.

10.2 Maintenance Reporting

In addition to routine maintenance of trails, it is important that maintenance issues be dealt with promptly. On-site signage generally displays phone numbers for the Parks Department to allow the public to report safety or maintenance concerns. In addition, Volunteer Park Wardens provide frequent monitoring and notify Parks staff of maintenance issues.



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