INVITATION TO TENDER 18-15

LARWOOD ERICKSON SEWER UPGRADE

MASTER MUNICIPAL CONSTRUCTION DOCUMENTS - 2009
Platinum Edition

UNIT PRICE CONTRACT

April 27th, 2018

301 St. Ann's Road, Campbell River, B.C. V9W 4C7
Telephone: 250.286.5766; Fax: 250.286.5763
clinton.crook@campbellriver.ca

INVITATION TO TENDER 18-15

LARWOOD ERICKSON SEWER UPGRADE

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The complete Contract Documents consist of the following parts:

1. The Master Municipal Construction Documents (Tender Package) consisting of the following parts (**included in this tender package)**:

   - Invitation to Tender
   - Instructions to Tenderers, Part I
   - Form of Tender
     - Appendix 1 -- Schedule of Quantities and Prices
     - Appendix 2 -- Preliminary Construction Schedule
     - Appendix 3 -- Experience of Superintendent
     - Appendix 4 -- Comparable Work Experience
     - Appendix 5 – Subcontractors
     - Appendix 6 – Tenderer's Current Projects Underway
   - Agreement - Draft
     - Schedule 1 -- Schedule of Contract Documents
     - Schedule 2 -- List of Contract Drawings
     - Appendix 7 - Safety Covenant
     - Appendix 8 - Prime Contractor Agreement
     - Appendix 10 – Letter of Acceptance – Base Course Gravel in Advance of Paving
   - Supplementary General Conditions
   - Supplementary Specifications

2. Additional reference documentation consisting of the following parts **(not distributed in this tender package) available at www.campbellriver.ca**:

   - Supplementary Specifications, City of Campbell River, Design Standards 2010, Appendix A to Subdivision and Development Servicing Bylaw 3419
   - City of Campbell River, Approved Utility Product List April 2011

3. The balance of the Master Municipal Construction Documents, Platinum, 2009 edition. These documents are available in the "MMCD - General Conditions, Specifications and Standard Detail Drawings" **(not distributed in this tender package)**.

INVITATION TO TENDER 18-15

LARWOOD ERICKSON SEWER UPGRADE

The City of Campbell River invites tenders for the Larwood Erickson Sewer Upgrade project which includes the following generalized scope of work:

Work under this contract includes, but is not limited to, all supervision, construction, equipment, labour, material, permits and related items required for the installation of approximately 1550 lineal metres of sanitary sewer piping and 230 lineal metres of storm piping including manholes, replacement service connections and connections to the existing system, as well as a culvert replacement for Larwood Creek.

This work will include provision and execution of an approved traffic management plan and all necessary restorations.

Also included is the requirement to coordinate the necessary asphalt paving with the City's paving contractor, which is delivered under separate contract, and the requirement to reinstate existing pavements markings after paving work is complete.

This Tender is available electronically by downloading from the City's website at:
http:\www.campbellriver.ca/city_services/purchasing/request_for_proposal.asp

A mandatory site meeting will **NOT** be held.

This Tender is scheduled to close at:

Tender Closing Time:	**3:00 p.m. local time**
Tender Closing Date:	**Thursday May 17th, 2018** *There will NOT be a Public Opening for this Tender*
Delivered to:	City of Campbell River City Hall 301 St. Ann's Road 1st Floor Reception Desk Campbell River, BC V9W 4C7 **ATTN: Clinton Crook** Purchasing & Risk Management Officer
Tender Enquiries:	Clinton J. Crook, SCMP, CPSM Purchasing & Risk Management Officer Email: clinton.crook@campbellriver.ca Telephone: 250.286.5766

INVITATION TO TENDER 18-15

LARWOOD ERICKSON SEWER UPGRADE

RECEIPT CONFIRMATION FORM

As receipt of this document, and to directly receive any further information, addendums, etc. regarding this competition, please return this form to:

ATTN: Clinton J. Crook, SCMP, CPSM
Purchasing & Risk Management Officer
Email: clinton.crook@campbellriver.ca
Fax: 250.286.5763

Company Name: _____

Address: _____

City: _____

Province/State: _____ Postal/Zip Code: _____

Telephone No: _____ Fax No: _____

Contact Person: _____

Title: _____

Email: _____

CITY OF CAMPBELL RIVER

INVITATION TO TENDER 18-15

LARWOOD ERICKSON SEWER UPGRADE

INSTRUCTIONS TO TENDERERS PART I

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INSTRUCTIONS TO TENDERERS - PART I

(TO BE READ WITH "INSTRUCTIONS TO TENDERERS - PART II" CONTAINED IN THE EDITION OF THE PUBLICATION "MASTER MUNICIPAL CONSTRUCTION DOCUMENTS" AND APPLICABLE CITY OF CAMPBELL RIVER BYLAWS SPECIFIED IN ARTICLE 2.2 BELOW)

Reference No.: **TENDER 18-15**

Contract: **LARWOOD ERICKSON SEWER UPGRADE**

Introduction **1**

1.1 These Instructions apply to and govern the preparation of tenders for this *Contract*. The *Contract* is generally for the following work:

The City of Campbell River invites tenders for the Larwood Erickson Sewer Upgrade project which includes the following generalized scope of work:

Work under this contract includes, but is not limited to, all supervision, construction, equipment, labour, material, permits and related items required for the installation of approximately 1550 lineal metres of sanitary sewer piping and 230 lineal metres of storm piping including manholes, replacement service connections and connections to the existing system, as well as a culvert replacement for Larwood Creek.

This work will include provision and execution of an approved traffic management plan and all necessary restorations.

Also included is the requirement to coordinate the necessary asphalt paving with the City's paving contractor, which is delivered under separate contract, and the requirement to reinstate existing pavements markings after paving work is complete.

1.2 Direct all tender inquiries regarding the *Contract*, to:

Clinton J. Crook, SCMP, CPSM
Purchasing & Risk Management Officer
Email: clinton.crook@campbellriver.ca
Telephone: 250.286.5766

Tender Documents **2**

2.1 The tender documents which a tenderer should review to prepare a tender consist of all of the *Contract Documents* listed in Schedule 1

entitled "Schedule of Contract Documents". Schedule 1 is attached to the Agreement which is included as part of the tender package. The *Contract Documents* include the Drawings listed in Schedule 2 to the Agreement, entitled "List of Drawings".

2.2 A portion of the Contract Documents is included by reference. Copies of these documents have not been included with the tender package. These documents are the Instructions to Tenderers - Part II, General Conditions, Specifications and Standard Detail Drawings contained in the publication entitled "Master Municipal Construction Documents - General Conditions, "Specifications and Standard Detail Drawings" and relevant sections of Supplementary Specifications, City of Campbell River, Design Standards 2010, Appendix A to Subdivision and Development Servicing Bylaw 3419. Refer to Schedule 1 attached to the Agreement or, if no edition has been specified, then the applicable edition shall be the most recent edition as of the date of this *Contract*. All sections of this publication are by reference included in the *Contract Documents*.

2.3 Any additional information made available to Tenderers prior to the Tender Closing Time by the *Owner* or representative of the *Owner*, such as geotechnical reports or as-built plans, which is not expressly included in Schedule 1 or Schedule 2 to the Agreement, is not included in the *Contract Documents*. Such additional information is made available only for the assistance of tenderers who must make their own judgement about its reliability, accuracy or completeness and neither the *Owner* nor any representative of the *Owner* gives any guarantee or representation that the additional information is reliable, accurate or complete.

Submission of Tenders **3**

3.1 Tenders must be submitted in a sealed opaque package, clearly marked on the outside with the above *Contract* Title and Reference No., and must be received on or before:

Tender Closing Time: **3:00 p.m. local time**

Tender Closing Date: **Thursday May 17th, 2018**
There will NOT be a Public Opening for this Tender

Delivered to: City of Campbell River City Hall
301 St. Ann's Road
1st Floor Reception Desk
Campbell River, BC V9W 4C7
ATTN: Clinton Crook
Purchasing & Risk Management Officer

3.2 Late tenders will not be accepted or considered, and will be returned unopened.

3.3 Tender Submission

.1 Tenders **must** be submitted on the Tender Forms included in these tender documents. The addition to or changing of any words in these Tender Forms by the tenderer or the failure to comply with and complete all items may be cause for rejection without consideration of the tender.

.2 The Tender Submission **must** include acknowledgement of receipt of all issued addenda.

.3 The Tender Submission **must** include the specified financial security, in the form of the "Bid Security" as required in Section 5.2 of the Instructions to Tenderers Part II.

.4 The Form of Tender **must** bear the signature of a legal signing authority of the tenderer.

.5 Other than acknowledgement of receipt of addenda, or request for withdrawal or revision, documents submitted as part of a tender will **not** be considered if received by any of the Owner's facsimile machines.

.6 Except as expressly and specifically permitted in these Instructions to Tenderers, no Tenderers 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.

Additional Instructions to Tenderers

4

Freedom of Information

4.1 The *Owner* is subject to the provisions of the Freedom of Information and Protection of Privacy Act. As a result, while Section 21 of the Act does offer some protection for third party business interests, the *Owner* cannot guarantee that any information provided to the *Owner* can be held in confidence. All tenders, after closing time and date become the property of the *Owner*.

Cost of Tender Submission

4.2 The *Owner* shall not be liable for a Tenderer's cost of submitting a tender.

Evaluation Criteria

4.3 (a) The *Owner* reserves the right to waive informalities in or reject any or all tenders or accept the tender deemed most favourable in the interests of the *Owner*. Tenders will be evaluated on the combination of information provided in the Form of Tender and Appendices, which may offer the best value and not necessarily

the lowest price. The *Owner* reserves the right to conduct pre-selection meetings with Tenderers. The *Owner* further reserves the right to conduct post-selection meetings in order to correct, change or adapt the selected Tender to the wishes of the *Owner*. **Acceptance of any tender may be subject to budgetary considerations and/or City of Campbell River Council approval, and/or the approval of other jurisdictions having authority.**

Construction Association Policies

4.4

4.4.1 The *Owner* is not a member of the Public Construction Council of British Columbia, the British Columbia Construction Association or any other construction association.

4.4.2 The *Owner* does not adopt or agree to be bound by "The Procedures and Guidelines Recommended For Use on Publicly Funded Construction Projects" produced by the Public Construction Council of British Columbia, September 1989, or any other procedure/guideline recommended, adopted or produced by any construction association in the tendering and award of the *Contract* of this project.

Good Neighbour Policy

4.5

4.5.1 The *Owner's* Good Neighbour Policy as adopted by City of Campbell River Council on April 15, 1997 shall apply to this contract.

4.5.2 The Policy states: "That Contractors working on Municipal rights-of-way or on private land where new rights-of-way are being created, be required to provide written notice to the residents in the immediate area of the works, describing what is being constructed, when the works will occur, who to contact for more information and what precautions should be taken if necessary; and that the work-site be posted for safety reasons."

Mandatory Site Meeting

4.6 A Mandatory Site Meeting will **NOT** be held.

Addition\Deletion

4.7 Tenderers are advised that the *Owner* may, at its option, and subject to available funding and budgetary considerations, delete any *Work* described in the *Contract Documents* or may require that optional work be added to the scope of *Work*.

Omissions and Discrepancies

4.8 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 omissions from or discrepancies in the *Contract Documents*, or be in doubt as their meaning, the Tenderer should notify the Owner no later than 5 days prior to the tender closing, who may cause to send a written instruction to all Tenderers in the form of an addendum, which shall become part of the contract and shall be covered in the contract price. 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. No oral interpretations made to a Tenderer as to the meaning of the *Contract Documents* shall be considered binding. Every request for an interpretation shall be made in writing, forwarded to the office referred to in paragraph 3.1 of the Instructions to Tenderers – Part I.

Amendment of Tenders

4.9

4.9.1 Delete Paragraphs 12.1 of the Instructions to Tenderers, Part II and replace with the following paragraphs 4.9.2 and 4.9.3:

4.9.2 A Tenderer may, without prejudice to itself, withdraw or revise a tender after it has been deposited with the *Owner*, provided the request for withdrawal or revision is filed with the *Owner* in writing before the time set for the Tender closing. Non-facsimile request(s) should be submitted in a sealed opaque envelope clearly marked with the contract name and reference number to the office referred to in paragraph 3.1 of the Instructions to Tenderers - Part 1. In the case of revision(s), a revised price will not be accepted, only the addition to or deduction from the tender price will be accepted. Written withdrawals or revisions must be signed by the same person or persons who signed the original Form of Tender.

4.9.3 In the case of facsimile or e-mail requests for withdrawal or revision, they will only be accepted if they are received by the *Owner's* Supply Management Department facsimile machine at 250.286.5763 or via e-mail at clinton.crook@campbellriver.ca before the scheduled tender closing time. Tenderers assume the entire risk that the facsimile and computer equipment and staff at the above office will receive the facsimile or e-mail containing the withdrawal or revision. The *Owner* assumes no risk or responsibility whatsoever that any facsimile or e-mail will be received as required and shall not be liable to any *Tenderer* if for any reason a facsimile or e-mail is not received.

For purposes of this paragraph 4.9.3,"received" means the request for withdrawal or revision is visible to the *Owner's* staff in its entirety, and is either in printed form or is capable of immediate reproduction in printed form.

Sub-Surface Conditions

4.10 Geotechnical investigations have been completed and are attached to the Tender Documents for reference only. Tenderers shall make their own assessment of the soil and groundwater conditions.

Environmental Conditions

4.11 There are several Environmentally Sensitive Areas (ESAs) along the project alignment. An Assessment of these ESAs was conducted by Mainstream Biological Consulting in 2016 and is attached to the Tender Documents. Any related environmental protection measures described within this report are to be adhered to.

Working Hours 4.12 Work inside the *Owner's* Property shall be carried out between the hours of 7:00 a.m. and 10:00 p.m. seven (7) days a week unless other arrangements are made between the *Owner* and the *Contractor*.

Commencement And Completion of Work 4.13 The *Owner* requires that the *Work* under this Contract be completed as quickly as possible after *Contract* award, and within the following milestones:

Substantial Performance of this *Contract* to be achieved within 120 days from Notice to Proceed.

Form of Tender

CITY OF CAMPBELL RIVER

Reference No.: **TENDER 18-15**

Contract: **LARWOOD ERICKSON SEWER UPGRADE**

TO OWNER:

1 I (WE), THE UNDERSIGNED:

1.1 have received and carefully reviewed all of the *Contract Documents*, including the Instructions to Tenderers, the specified edition of the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings" and the following Addenda:

_____
_____
_____
_____
_____
_____;
(ADDENDA, IF ANY) **(TENDERER TO COMPLETE)**

1.2 have full knowledge of the *Place of the Work*, and the *Work* required; and

1.3 have complied with the Instructions to Tenderers; and

2 ACCORDINGLY I (WE) HEREBY OFFER:

2.1 to perform and complete all of the *Work* and to provide all the labour, equipment and material as set out in the *Contract Documents*, in strict compliance with the *Contract Documents*; and

2.2 to achieve *Substantial Performance* of the *Work* within 120 days from receipt of a Notice to Proceed; and

2.3 to do the *Work* for the price, which is the sum of the products of the actual quantities incorporated into the *Work* and the appropriate Lump Sums set out in Appendix 1, the "*Schedule of Quantities and Prices*", plus any lump sums or specific prices and adjustment amounts as provided by the *Contract Documents*. For the purposes of tender comparison, our offer is to complete the *Work* for the "*Tender Price*" as set out on

Tenderer's Initial	Owner's Initial

Appendix 1 of this Form of Tender. Our *Tender Price* is based on the estimated quantities listed in the *Schedule of Quantities and Prices*, and excludes *GST*.

3 I (WE) CONFIRM:

3.1 that we understand and agree that the quantities as listed in the *Schedule of Quantities and Prices* are estimated, and that the actual quantities will vary.

4 I (WE) CONFIRM:

4.1 that the following Appendices are attached to and form a part of this tender:

4.1.1 the Appendices as required by paragraph 5.3 of the Instructions to Tenderers - Part II; and

4.1.2 the ***Bid Security*** as required by paragraph 5.2 of the Instructions to Tenderers – Part II stated as:

A tender must be accompanied by the *Bid Security* in the form of:

a a Bid Bond issued by a surety licensed to carry on the business of suretyship in British Columbia in a form reasonably satisfactory to the *Owner*; or

b cash, bank draft or letter of credit in a form acceptable to the *Owner*;

in an amount equal to 10% of the *Tender Price*.

5 I (WE) AGREE:

5.1 that this tender will be irrevocable and open for acceptance by the *Owner* for a period of 60 calendar days from the day following the *Tender Closing Date and Time*, even if the tender of another tenderer is accepted by the *Owner*. If within this period the *Owner* delivers a written notice ("*Notice of Award*") by which the *Owner* accepts our tender we will:

5.1.1 within 10 *Days* of receipt of the written *Notice of Award* deliver to the *Owner*:

Tenderer's Initial	Owner's Initial

a a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the *Contract Price*, issued by a surety licensed to carry on the business of suretyship in the province of British Columbia, and in a form acceptable to the *Owner*; and

b a *Construction Schedule*, as provided by GC 4.6.1; and as per *Supplementary General Condition 4.6.1*; and

c a "clearance letter" indicating that the tenderer is in WCB compliance; and

d a copy of the insurance policies as specified in GC 24 indicating that all such insurance coverage is in place; and

e a Health and Safety Program Manual pertaining to the Work;

f a Traffic Management Plan in accordance with Supplementary Specification 01 55 00;

g a Construction Environmental Protection Plan in accordance with Specification 01 57 01 and Supplementary Specification 33 42 01;

h a Excavation and Shoring Plan in accordance with Supplementary Specification 33 30 01.

5.1.2 As per General Condition 4.6.6, the Owner shall issue the Notice to Proceed within 14 days of receipt of the documentation required under item 5.1.1 above.

5.1.3 within 2 *Days* of receipt of written "*Notice to Proceed*", or such longer time as may be otherwise specified in the *Notice to Proceed*, commence the *Work*.

5.1.4 sign the *Contract Documents* as required by GC 2.1.2.

6 I (WE) AGREE:

6.1 that, if we receive written *Notice of Award* of this *Contract* and, contrary to paragraph 5 of this Form of Tender, we:

Tenderer's Initial	Owner's Initial

6.1.1 fail or refuse to deliver the documents as specified by paragraph 5.1.1 of this Form of Tender; or

6.1.2 fail or refuse to commence the *Work* as required by the *Notice to Proceed*,

then such failure or refusal will be deemed to be a refusal by me (us) to enter into the *Contract* and the *Owner* may, on written notice to me (us), award the *Contract* to another party. I (We) further agree that, as full compensation on account of damages suffered by the *Owner* because of such failure or refusal, the *Bid Security* shall be forfeited to the *Owner*, in an amount equal to the lesser of:

6.1.3 the face value of the *Bid Security*; and

6.1.4 the amount by which my (our) *Tender Price* is less than the amount for which the *Owner* contracts with another party to perform the *Work*.

7 I (WE) DECLARE THAT:

7.1 no person, firm or company other than the undersigned, has any interest in this tender or in the proposed *Contract* for which this tender is made;

7.2 this tender is made without any connection, knowledge, comparison of figures, or agreement with any other company, firm or person making a tender for the same work;

7.3 in tendering for this work, and when called upon to enter into an agreement with the *Owner*, I (we) will be bound to comply with all laws, statutes, and municipal bylaws pertaining to the work. The agreement will be governed by the laws of the province of British Columbia;

7.4 in submitting this tender I (we) did not rely upon any information provided by the *Owner*, or any of the *Owner's* employees or agents, relating to the conditions, contingencies, risks or other circumstances, local or otherwise, which might influence or affect the performance or the cost of the work, including, without limiting the nature of the ground, subsoil, substrata of the work site, the means of access to the work site, the quality, quantity, nature or location of the materials to be furnished or removed in performance of the work, and the conditions under which the

Tenderer's Initial	Owner's Initial

labour force will be employed, except the extent that any such information is expressly set forth in the *Contract Documents*. I (we) have relied on our own examination of the work site and have informed ourselves as to all conditions, contingencies, risks, and circumstances, local or otherwise, which might influence or affect the performance or the cost of the work. I (we) accept the site prior to the signing of the *Contract*.

8 WE AGREE:

8.1 The work shall be completed entirely in 120 *Days* from Notice to Proceed (The Designated Completion Period);

8.2 There shall be no exclusion of time from the Designated Completion Period for any reason OTHER than delays clearly attributable to the OWNER, its agents, employees or any Authorized Representatives.

9 I (WE) DECLARE THAT:

9.1 I (we) recognize that the lowest or any tender will not necessarily be accepted; and

9.2 I (we) recognize that the *Owner* reserves the right to reject all tenders or to accept the tender which best suits its long term objectives; and

I (we) recognize that the *Owner* reserves the right to accept or reject all or part of this Tender at any time during the period specified by paragraph 5.1 of this Form of Tender.

10 I (WE) DECLARE THAT:

10.1 I (we) do not (or any related company) have any family, ownership, and operating relationships with the City of Campbell River, or any elected official, staff or other officials holding public office in the City of Campbell River and agree that the Owner reserves the right to reject any tender that may be perceived to be in a conflict of interest.

11 I (WE) DECLARE THAT:

11.1 In this tender:

(a) "Related Party of the Tenderer" means:

- an officer or director of the Tenderer;
- a shareholder of the Tenderer;

Tenderer's Initial	Owner's Initial

- a corporation with a shareholder or director who is also a shareholder or director of Tenderer;

(b) "Public Authority" has the same meaning as under the Community Charter.

11.2 I (we) hereby declare that neither the Tenderer nor a Related Party of the Tenderer:

(a) has had a bid bond or performance bond retained or claimed against;
(b) has breached a contract for works or services with the *Owner* or other Public Authority in British Columbia;
(c) has been engaged in a legal action against the *Owner* or another Public Authority in British Columbia, or the elected or appointed officers and employees of the *Owner* or that other Public Authority, in relation to;
- any other contract for works or services;
- any matter arising from the exercise of the *Owner's* or the other Public Authority's powers, duties or functions under the Community Charter, Local Government Act or other enactment;

(d) has been charged or convicted of an offence in relation to the performance of a contract for works or services with the *Owner* or other Public Authority;

within five years of the closing date of this Tender.

Tenderers who are unable to truthfully complete this declaration must provide full particulars of the relevant circumstances. Submission of a false declaration is grounds for rejection of a tender.

11.3 I (we) hereby declare that the *Owner* may in its absolute discretion reject a Tender submitted by a Tenderer if the Tenderer or a Related Party of the Tenderer:

(a) has had a bid bond or performance bond retained or claimed against;

(b) has breached a contract for work or services with the *Owner* or other Public Authority in British Columbia;

(c) has been engaged in a legal action against the *Owner* or another public authority in British Columbia, or the elected or appointed officers and employees of the *Owner* or that other public authority, in relation to:

Tenderer's Initial	Owner's Initial

- any other contract for works or services;
- any matter arising from the exercise of the *Owner's* or the other public authority's powers, duties or functions under the Community Charter, Local Government Act or other enactment;

(d) has been charged or convicted of an offence in relation to the performance of a contract for works or services with the *Owner* or other Public Authority;

within five years of the closing date of this Tender.

11.4 I (we) hereby declare that in determining whether to reject a tender the *Owner* will consider whether:

(a) the legal action is likely to affect the Tenderers ability to work with the *Owner*, its consultants and representatives, and;

whether the *Owner's* or other public authority's experience with the Tenderer indicates that the *Owner* is likely to incur increased costs including but not limited to staff and legal costs in the administration of this contract if it is awarded to the Tenderer.

12 I (WE) AGREE THAT:

12.1 I (we) agree that if any director, officer or employee, agent or other representative of a Tenderer makes any representation or solicitation to the Mayor, any Councillor, officer or employee of the City of Campbell River, other than those specifically designated in the Tender documents, with respect to this Tender, whether before or after the submission of the Tender, the City shall be entitled to reject or not accept the Tender.

Tenderer's Initial	Owner's Initial

MY (OUR) ADDRESS is as follows:

_____
(Full Legal Name of Corporation, Partnership or Individual)

_____
(address)

_____

_____
(city, province) (postal code)

Phone: _____

Fax: _____

E-mail: _____

This Tender is executed this _____ day of _____, 2018.

_____
(Printed Name)

_____
(Authorized Signatory)

Tenderer's Initial	Owner's Initial

Appendix 1

SCHEDULE OF QUANTITIES AND PRICES – GST EXCLUDED
(See paragraph 5.3.1 of the Instructions to Tender – Part II)

(All prices and *Quotations* including the *Contract Price* shall include all *Taxes,* but shall not include *GST, GST* shall be shown separately)

ITEM No.	MMCD REF.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	01 GENERAL REQUIREMENTS					
1	Supp. Spec. 3.1	Mobilization and Demobilization (maximum 10% of Tender Price)	LS	1		
	01 55 00 TRAFFIC REGULATION					
2	1.5.1	Traffic control during construction	LS	1		
	03 30 20 CONCRETE WALKS, CURBS AND GUTTERS					
3	1.4.1.1	1.5m wide 120mm thick Concrete Sidewalk, Driveway Crossing (c/w Granular Base)	Lin. M.	200		
4	1.4.1.2	Barrier and Rollover Concrete Curb and Gutter (c/w Granular Base)	Lin. M.	230		
5	1.4.13	Private Concrete Driveway 100mm thick (c/w Granular Base)	sq.m.	300		
	31 EARTHWORKS					
	31 23 01 EXCAVATING, TRENCHING AND BACKFILLING					
6	1.10.4.1	Removal and Off-Site Disposal of Disused Asbestos Cement (AC) Pipe 150mm and 200mm diameter	Lin. M.	250		
7	1.10.4.2	Dump Fees for AC Pipe Disposal	Allowance	1	$ 10,000	$ 10 000
8	1.10.4.3	Removal and Off-Site Disposal of Disused Pipe (except AC Pipe) and Manhole Structures	tonne	130		
9	1.10.9	Expose and Locate Existing Sanitary Sewer Services on Non-intersecting Side of Main	each	45		
10	1.10.10	Confirming Service Connection Stubs are Abandoned	each	4		
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Tenderer's Initial | Owner's Initial

	31 23 23 CONTROLLED DENSITY FILL					
11	1.4.1	CDF (Pipe 200mm diameter with services)	Lin. M.	750		
12	1.4.1	CDF (Pipe 300mm diameter with services)	Lin. M.	580		
13	1.4.1	CDF (Pipe 450mm diameter with services)	Lin. M.	25		
	31 24 13 ROADWAY EXCAVATION, EMBANKMENT AND COMPACTION					
14	1.8.14	Roadway Asphalt Removal for All Thicknesses	sq.m.	10 800		
	32 ROADS AND SITE IMPROVEMENTS					
	32 01 16 COLD MILLING					
15	1.5.1	Milling 200mm wide for permanent pavement restoration, 50mm depth	Lin. M.	2 000		
	32 12 16 HOT-MIX ASPHALT CONCRETE PAVING					
16	1.5.7	Saw Cut Asphalt or Concrete Pavements for permanent pavement restoration	Lin. M.	2 000		
17	1.5.9	Coordination with Owner's Asphalt Concrete Supplier	LS	1		
	32 17 23 PAINTED PAVEMENT MARKINGS					
18	1.5.2	Paint Centerline on Erickson Road, school zone speed marking	Lump Sum	1		
19	1.5.3	Thermoplastic Stop Bars, Parallel Crosswalks and Zebra Crosswalks	Lump Sum	1		
	33 UTILITIES					
	33 01 30.1 CCTV INSPECTION OF PIPELINES					
20	1.6.2	CCTV Pipeline Inspection	Lin. M.	1 880		
	33 11 01 WATERWORKS					
21	1.8.14S	Wrap watermain within 3m of sanitary sewer	Each	2		
					Sub Total Page 10 to Summary	

Tenderer's Initial | Owner's Initial

	33 30 01 SANITARY SEWERS					
22	1.6.1, 1.6.2	Sewer Pipe PVC Ribbed 450mm diameter for depth of main 0-3.5m at invert; Imported Backfill	Lin. M.	845		
23	1.6.1, 1.6.2	Sewer Pipe PVC Ribbed 450mm diameter for depth of main 3.51m-4.5m at invert; Imported Backfill	Lin. M.	105		
24	1.6.1, 1.6.2	Sewer Pipe PVC Ribbed 525mm diameter for depth of main 0-3.5m at invert; Imported Backfill	Lin. M.	130		
25	1.6.1, 1.6.2	Sewer Pipe PVC DR35 525mm diameter for depth of main 0-3.5m at invert; Imported Backfill	Lin. M.	43		
26	1.6.1, 1.6.2	Sewer Pipe PVC Ribbed 525mm diameter for depth of main 3.51m-4.5m at invert; Imported Backfill	Lin. M.	290		
27	1.6.1, 1.6.2	Sewer Pipe PVC Ribbed 525mm diameter for depth of main 4.51m-5.0m at invert; Imported Backfill	Lin. M.	83		
28	1.6.1, 1.6.2	Sewer Pipe PVC ribbed 525mm diameter for depth of main 5.01m or greater at invert; Imported Backfill	Lin. M.	54		
29	1.6.3.1	Connection to existing service 450x100 Sewer Service wye, I.C. Unit c/w flap valve, Brooks Box. Imported Backfill.	Each	48		
30	1.6.3.1	Connection to Existing Service 525x100 Sewer Service wye, I.C. Unit c/w flap valve, Brooks Box. Imported Backfill.	Each	38		
31	1.6.3.2	Upgrade to Existing Service 450x100 Sewer Service wye, I.C. Unit c/w flap valve and Brooks Box. Imported Backfill.	Each	7		
32	1.6.3.2	Upgrade to Existing Service 525x100 Sewer service wye, I.C. Unit c/w flap valve, Brooks Box. Imported Backfill.	Each	1		
33	1.6.3.4	100 Vertical Riser Kit	Each	32		
34	1.6.4	Add 200 I.C. Unit and Brooks box to 200mm service pipe. Imported Backfill.	Each	3		
35	1.6.7	Install and Remove Temporary Bypass. Imported Backfill.	Each	4		
					Sub Total Page 11 to Summary	

Tenderer's Initial | Owner's Initial

36	1.6.7	Connect to Existing Main. Imported Backfill.	Each	10		
37	1.6.8	Sewer Pipe Extension PVC DR28 150mm diameter for all depth of main; Imported Backfill.	Lin. M.	3		
38	1.6.8	Sewer Pipe Extension PVC DR35 200mm diameter for all depth of main; Imported Backfill.	Lin. M.	44		
39	1.6.3.3	New Sanitary Service Connection 450x100Wye. Imported Backfill.	Each	4		
40	1.6.3.3	New Sanitary Service Connection 525x100 Wye Imported Backfill	Each	1		
	33 40 01 STORM DRAINS					
41	1.6.1, 1.6.2	Drain Pipe PVC Ribbed 600mm diameter for depth of main 0-3.5m at invert; Imported Backfill	Lin. M.	230		
42	1.6.1, 1.6.2	Drain Pipe PVC DR 35 450mm diameter for depth of main 0-3.5m at invert; Imported Backfill	Lin. M.	4		
43	1.6.3	Drain Pipe PVC DR28 150mm diameter service connection Imported Backfill	Each	2		
44	1.6.5	Catch Basin Lead PVC DR35 200mm diameter Imported Backfill	Lin. M.	12		
45	1.6.9	Tie-in to existing storm sewer at Eardley Road Imported Backfill	Each	1		
	33 42 01 LARWOOD CREEK CULVERT REPLACEMENT					
46	1.2.1	Larwood Creek Culvert Replacement and Headwalls Upgrade	LS	1		
	33 44 01 MANHOLES AND CATCHBASINS					
47	1.5.1.1	Manhole base, lid, slab, cover, frame and risers 1050mm diameter	Each	1		
48	1.5.1.2	Manhole barrell 1050mm diameter;	Lin. M.	2.6		
49	1.5.1.1	Manhole base, lid, slab, cover, frame and risers 1200mm diameter	Each	24		
50	1.5.1.2	Manhole barrell 1200mm diameter;	Lin. M.	60		
					Sub Total Page 12 to Summary	

Tenderer's Initial | Owner's Initial

51	1.5.2	Drain I.C. Unit, Brooks Box and tie-in	Each	6		
52	1.5.6	Adjust Existing Catch Basins and asphalt concrete apron preparation	each	4		
	OPTIONAL ITEMS					
	32 93 01 PLANTING OF TREES, SHRUBS AND GROUND COVERS					
53	*1.4.1*	*Shrub,Trees and Plants replacement costs (by Force Account)*	*Allowance*	*1*	*$ 60,000*	*$ 60 000*
	31 23 01 EXCAVATING, TRENCHING AND BACKFILLING					
54	*1.10.3*	*Over-Excavation including Backfilling*	*cu.m.*	*400*		
	32 01 01 GENERAL ROAD REPAIRS					
55	*1.2.1*	*Force Account Work*	*Allowance*	*1*	*$ 200,000*	*$ 200,000*
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SUMMARY

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Sub-Total Page 12	
Sub-Total Page 13	
Sub-Total:	
GST (5%):	
Total:	

Tenderer's Initial	Owner's Initial

Appendix 2

PRELIMINARY CONSTRUCTION SCHEDULE

(See paragraph 5.3.2 of the Instructions to Tenderers - Part II)

Indicate Time-Scaled Network Construction Schedule Based On *Critical Path Method*.
See Supplemental Specification 4.6.1 For Further Detail

ACTIVITY (with milestone dates)	CONSTRUCTION SCHEDULE WITH CRITICAL PATH SHOWN (weeks)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Tenderer's Initial | Owner's Initial

Appendix 3

EXPERIENCE OF SUPERINTENDENT
(See paragraph 5.3.3 of the Instructions to Tenderers - Part II)

Name: _____

Experience:

1. Dates: _____

   Project Name: _____

   Responsibility: _____

   _____

   _____

   References: _____

2. Dates: _____

   Project Name: _____

   Responsibility: _____

   _____

   _____

   References: _____

3. Dates: _____

   Project Name: _____

   Responsibility: _____

   _____

   _____

   References: _____

Tenderer's Initial	Owner's Initial

Appendix 4

COMPARABLE WORK EXPERIENCE
(See paragraph 5.3.4 of the Instructions to Tenderers - Part II)

PROJECT	OWNER/ CONTRACT NAME	PHONE NUMBER	WORK DESCRIPTION	VALUE ($)

Tenderer's Initial | Owner's Initial

Appendix 5

SUBCONTRACTORS
(See paragraph 5.3.5 of the Instructions to Tenderers - Part II)

TENDER ITEM	TRADE	SUBCONTRACTOR NAME	PHONE NUMBER

Tenderer's Initial | Owner's Initial

Appendix 6

TENDERERS CURRENT PROJECTS UNDERWAY

PROJECT	OWNER/ CONTRACT NAME	PHONE NUMBER	WORK DESCRIPTION	VALUE ($)	% COMPLETE

Tenderer's Initial | Owner's Initial

Draft Agreement

Between Owner and Contractor

THIS AGREEMENT made in duplicate this _____ day of _____, 2018.

Reference No.: **TENDER 18-15**

Contract: **LARWOOD ERICKSON SEWER UPGRADE**

BETWEEN: **CITY OF CAMPBELL RIVER**

(the "*Owner*")

AND: **TBD**

(the "*Contractor*")

The *Owner* and the *Contractor* agree as follows:

ARTICLE 1 THE WORK - START/COMPLETION DATES

1.1 The *Contractor* will perform all *Work* and provide all labour, equipment and material and do all things strictly as required by the *Contract Documents*.

1.2 The *Contractor* will commence the *Work* in accordance with the *Notice to Proceed*. The *Contractor* will proceed with the *Work* diligently, will perform the *Work* generally in accordance with the construction schedules as required by the *Contract Documents* and will achieve *Substantial Performance* of the *Work* within 120 Days of being issued a Notice to Proceed subject to the provisions of the *Contract Documents* for adjustments to the *Contract Time*.

1.3 Time shall be of the essence of the *Contract*

ARTICLE 2 CONTRACT DOCUMENTS

2.1 "*Contract Documents*" consist of the documents listed or referred to in Schedule 1, entitled "Schedule of Contract Documents", which is attached and forms a part of this Agreement, and includes any and all additional and amending documents issued in accordance with the provisions of the *Contract Documents*. All of the *Contract Documents* shall constitute the entire *Contract* between the *Owner* and the *Contractor*.

2.2 The *Contract* supersedes all prior negotiations, representations or agreements, whether written or oral, and the *Contract* may be amended only in strict accordance with the provisions of the *Contract Documents*.

ARTICLE 3 CONTRACT PRICE

3.1 The price for the *Work* ("*Contract Price*") shall be the sum in Canadian dollars of the following:

3.1.1 the product of the actual quantities of the items of *Work* listed in the *Schedule of Quantities and Prices* which are incorporated into or made necessary by the *Work* and the Lump Sums listed in the *Schedule of Quantities and Prices*; plus

3.1.2 all lump sums, if any, as listed in the *Schedule of Quantities and Prices*, for items relating to or incorporated into the *Work*; plus

3.1.3 any adjustments, including any payments owing on account of *Changes* and agreed to *Extra Work*, approved in accordance with the provisions of the *Contract Documents*.

3.2 The *Contract Price* shall be the entire compensation owing to the *Contractor* for the *Work* and this compensation shall cover and include all profit and all costs of supervision, labour, material, equipment, overhead, financing, and all other costs and expenses whatsoever incurred in performing the *Work*.

ARTICLE 4 PAYMENT

4.1 Subject to applicable legislation and the provisions of the *Contract Documents*, the *Owner* shall make payments to the *Contractor*.

4.2 If the *Owner* fails to make payments to the *Contractor* as they become due in accordance with the terms of the *Contract Documents* then interest calculated at 2% per annum over the prime commercial lending rate of the Royal Bank of Canada on such unpaid amounts shall also become due and payable until payment. Such interest shall be calculated and added to any unpaid amounts monthly.

ARTICLE 5 RIGHTS AND REMEDIES

5.1 The duties and obligations imposed by the *Contract Documents* and the rights and remedies available hereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

5.2 Except as specifically set out in the *Contract Documents*, no action or failure to act by the *Owner*, *Contract Administrator* or *Contractor* shall constitute a waiver of any of the parties' rights or duties afforded under the *Contract*, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach under the *Contract*.

ARTICLE 6 NOTICES

6.1 Communications among the *Owner*, the *Contract Administrator* and the *Contractor*, including all written notices required by the *Contract Documents*, may be delivered by hand, e-mail, fax, or by pre-paid registered mail to the addresses as set out below:

The *Owner*:
City of Campbell River
301 St. Ann's Road
Campbell River, BC
V9W 4C7
Attention: Mr. Jason Hartley, P.Eng., Capital Works Manager
E-mail: Jason.hartley@campbellriver.ca

The *Contractor*:
TBD

The *Contract Administrator*:
Highland Engineering Services Ltd.
#104-950 Alder Street
Campbell River, BC
V9W 2P8
Attention: Mr. Glenn Blake P.Eng., CCA
E-mail: glennblake@highland-eng.ca

6.2 A communication or notice that is addressed as above shall be considered to have been received:

6.2.1 immediately upon delivery, if delivered by hand; or

6.2.2 immediately upon transmission if sent and received by fax or e-mail; or

6.2.3 after 5 *Days* from date of posting if sent by registered mail.

6.3 The *Owner* or the *Contractor* may, at any time, change its address for notice by giving written notice to the other at the address then applicable. Similarly if the *Contract Administrator* changes its address for notice then the *Owner* will give or cause to be given written notice to the *Contractor*.

6.4 The sender of a notice by fax or e-mail assumes all risk that the fax or e-mail will be received properly, and the provisions of paragraph 12.5 of the Instructions to Tenderers, Part II apply to the sender.

ARTICLE 7 GENERAL

7.1 This *Contract* shall be construed according to the laws of British Columbia.

7.2 The *Contractor* shall not, without the express written consent of the *Owner*, assign this *Contract*, or any portion of this *Contract*.

7.3 The headings included in the *Contract Documents* are for convenience only and do not form part of this *Contract* and will not be used to interpret, define or limit the scope or intent of this *Contract* or any of the provisions of the *Contract Documents*.

7.4 A word in the *Contract Documents* in the singular includes the plural and, in each case, vice versa.

7.5 This agreement shall ensure to the benefit of and be binding upon the parties and their successors, executors, administrators and assigns.

IN WITNESS WHEREOF the parties hereto have executed this Agreement the day and year first written above.

***Contractor*:**

TBD

_____
(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

_____
(AUTHORIZED SIGNATORY)

_____
(WITNESS)

***Owner*:**

City of Campbell River

_____
(AUTHORIZED SIGNATORY)

_____
(WITNESS)

SCHEDULE 1

CITY OF CAMPBELL RIVER

Schedule of Contract Documents

The following is an exact and complete list of the *Contract Documents*, as referred to in Article 2.1 of the *Agreement*.

NOTE: The documents noted with "*" are contained in the "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings", 2009 PLATINUM edition. All sections of this publication are included in the *Contract Documents*.

The documents noted with "**" are available at www.campbellriver.ca

a) Agreement;
b) Addenda;
c) Supplementary General Conditions;
d) General Conditions*;
e) Supplementary Specifications;
f) Specifications*;
g) Drawings listed in Schedule 2 to the Agreement;
h) Supplementary Detail Drawings;
i) Standard Detail Drawings*;
j) Executed Form of Tender;
k) Instructions to Tenderers;
l) All other Contract Drawings;
m) Supplementary Specifications, City of Campbell River, Design Standards 2010, Appendix A to Subdivision and Development Servicing Bylaw 3419**;
n) City of Campbell River: Approved Utility Product List**;

SCHEDULE 2

CITY OF CAMPBELL RIVER

List of Contract Drawings

(Complete listing of all drawings, plans and sketches which are to form a part of this Contract, other than Standard Detail Drawings and Supplementary Standard Detail Drawings.)

TITLE	DRAWING NO.	SHEET NO.	DATE	REVISION DATE	REVISION NO.
Cover & General Notes	17-516	0	18/04/26	18/04/26	-
Erickson Road - 0+000 to 0+220	17-516	1	18/04/26	18/04/26	4
Erickson Road – 0+220 to 0+510	17-516	2	18/04/26	18/04/26	4
Erickson Road - 0+510 to 0+800	17-516	3	18/04/26	18/04/26	4
Harrogate Road - Erickson to Larwood	17-516	4	18/04/26	18/04/26	4
Larwood Road - 0+000 to 0+310	17-516	5	18/04/26	18/04/26	4
Larwood Road - 0+310 to End	17-516	6	18/04/26	18/04/26	4
Details	17-516	7	18/04/26	18/04/26	4

Appendix 7

SAFETY COVENANT

BETWEEN:

_____ of
(Company Name (Print legibly)

_____
(Address)

_____
(City) (Postal Code)

_____
(Phone no.) (Fax no.)

hereinafter referred to as the "Contractor"

AND:

CITY OF CAMPBELL RIVER

hereinafter called the "Owner"

WHEREAS:

The Contractor covenants and agrees that when performing any work for the Owner, whether directly as a contractor or indirectly as a sub-contractor, it will adhere to all of the requirements of the Occupational Health and Safety (OHS) Regulation, B.C. Reg. 296/97, as may be amended from time to time, that are applicable to the work being performed, and as well will comply with the provisions of the *Workers Compensation Act, R.S.B.C, 1996, c.492*, as amended (the 'Act').

Without limiting the generality of the foregoing, the Contractor agrees:

1) Before commencing any work for the Owner, the Contractor will consult the OHS Regulation and will determine which provisions of the OHS Regulation is applicable to the work that the Contractor is to perform. The Contractor will strictly comply with all applicable OHS Regulations when performing the work.

2) Before commencing any work for the Owner, the Contractor will review and familiarize itself with any existing policies or procedures developed by the Owner in relation to the work. If in the opinion of the Contractor, by following a policy or procedure that the Owner has established in relation to the work, the Contractor, or an employee of the Contractor or of the Owner, or any other worker, is put at increased risk, the Contractor must request a written change of policy or procedure from the Owner, applicable only to the work the Contractor is to perform, before proceeding with the work. The Owner reserves the right to refuse to amend its policies or procedures in response to any such request where the Owner, after such consultation with WorkSafe BC as the Owner considers necessary, determines that the Owner's policy or procedure does not increase the risk to any worker at the location of the work to be performed, and determines that the

Contractor's request is unreasonable, or is unnecessary for the protection of workers at the location of the work.

3) To have read every section of the OHS Regulation that pertains to the job at hand, to ensure that it understands the pertinent OHS Regulation and its application to the supervisor(s) and to all of the workers at the location of the work, and to ensure that each worker under the Contractor's supervision follows the applicable OHS Regulation. To assist Contractors with this task, the City of Campbell River directs them to consult with WorkSafe BC directly, to access the WorkSafe BC Regulations and Policies available on the WorkSafe BC website.

4) To understand, comply with and, to the full extent of the Contractor's lawful authority, to enforce all of the following provisions of the OHS Regulation as they pertains to the job at hand and to the workers employed by the Contractor, and to provide to the owner, at any time upon request, evidence of compliance with the following:

a) Rights & Responsibilities – Occupational Health & Safety Program (Part 3, including investigations, inspections, written instructions, records and statistics, adequate supervision, complete understanding by the workforce of the right and responsibility to refuse unsafe work)
b) General Conditions (Regulation – Part 4)
c) Chemical and Biological Substances (Regulation – Part 5)
d) Substance Specific requirements (Regulation – Part 6)
e) Noise, Vibration, Radiation and Temperature (Regulation – Part 7)
f) Personal Protective Clothing and Equipment (Regulation - Part 8)
g) Confined Space Entry (Regulation – Part 9)
h) Lock-out (Regulation – Part 10)
i) Fall Protection (Regulation – Part 11)
j) Tools, Machinery and Equipment (Regulation – Part 12)
k) Ladders, Scaffolds and Temporary Work Platforms (Regulation – Part 13)
l) Cranes and Hoists (Regulation – Part 14)
m) Rigging (Regulation – Part 15)
n) Mobile Equipment (Regulation – Part 16)
o) Traffic Control (Regulation – Part 18)
p) Electrical Safety (Regulation – Part 19)
q) Construction, Excavation & Demolition (Regulation – Part 20)
r) Forestry Operations (Regulation – Part 26)
s) Evacuation and Rescue (Regulation – Part 32)
t) Occupational First Aid (Regulation – Part 33)
u) Coordination of Multiple Employer Workplaces (Regulation – Part 20, s. 20.3)

PROVISIONS OF THE *WORKERS COMPENSATION ACT* – PART 3 SPECIFIC TO CONTRACTORS ON A WORKSITE:

i. Division 3 – General duties of Employers, Workers and Others (Sections 115, 116, 117, 118, 119, 120, 121, 122, 123, 124);
ii. Division 4;
iii. Division 10.

5) The *Workers Compensation Act* stipulates that the Owner (the City of Campbell River) is required to enforce any observed infraction of the Act or Regulation. The Contractor accepts that the City of Campbell River will be conducting periodic checks of the Contractor during the Contractor's work for the City of Campbell River and will be asking the Contractor to comply with the Act/Regulation in the event that any contravention is observed. If a contravention is observed and not corrected, the Contractor may be asked to leave the worksite and may result in termination of the contract for the work.

6) For the purposes of streamlining large construction projects and multiple employer worksites, the Owner reserves the right to designate a "prime contractor" amongst contractors who are working on a job-site together. A designated person employed by the "prime contractor" – appointed by the Owner - will act as the coordinator of the other contractors on that job-site and will ensure that each of the contractors on the job site are following all of the Act and WorkSafe BC Regulations as well as site-specific policies and procedures. This includes having in place an approved WorkSafe BC Safety Program and a list of the qualified persons amongst the other contractors who have been designated to be responsible for each of the other contractor's site health and safety activities.

7) In the event that a prime contractor has been designated, it is the responsibility of the Contractor to inquire who the "prime contractor" is for the worksite and to comply with the requirements for a multiple employer worksite where a prime contractor has been designated, as set out in the preceding section.

NOTE:

a) Payment of WorkSafe BC Assessments by any Contractor does not obviate the responsibility of the contractor to any of the foregoing.

b) The foregoing constitutes requirements of the Prevention Division of WorkSafe BC for any workplace in the Province of British Columbia and constitutes the Owner's expectations of contractors.

The Contractor covenants and agrees that when performing any work for the Owner, whether directly as a contractor or indirectly as a sub-contractor, it will adhere to all of the requirements of the B.C. Employment Standards Act (RSBC 1996), as may be amended from time to time, that are applicable to the work being performed, including but not limited to:

1) Section 36 (2); an employer must ensure that each employee has at least 8 consecutive hours free from work between each shift worked.

2) Section 39; despite any provision of this Part, an employer must not require or directly or indirectly allow an employee to work excessive hours or hours detrimental to the employee's health or safety.

THIS Covenant made the _____day of _____, 2018, in

_____ in the Province of British Columbia.
(City)

CONTRACTOR:

_____
Company Name

_____
Authorized Signatory

_____

Appendix 8

PRIME CONTRACTOR AGREEMENT

1. The Contractor shall, for the purposes of the Workers Compensation Act, and for the duration of the Work of this Contract:

   .1 be the "prime contractor" for the "Work site", and
   .2 do everything that is reasonably practicable to establish and maintain a system or process that will ensure compliance with the Act and its regulations, as required to ensure the health and safety of all persons at the "Work site".

.2 The Contractor shall direct all Subcontractors, Sub-subcontractors, Other Contractors, employers, Workers and any other persons at the "Work site" on safety related matters, to the extent required to fulfill its "prime contractor" responsibilities pursuant to the Act, regardless of:

   .1 whether or not any contractual relationship exists between the Contractor and any of these entities, and
   .2 whether or not such entities have been specifically identified in this Contract.

As per the requirements of the Workers Compensation Act Part 3, Division 3, Section 118(1-3) which states:

Coordination of multiple-employer Workplaces

118(1) In this section:

"multiple-employer Workplace" means a Workplace where Workers of 2 or more employers are Working at the same time;

"prime contractor" means, in relation to a multiple-employer Workplace,

(a) the directing contractor, employer or other person who enters into a written agreement with the owner of that Workplace to be the prime contractor for the purposes of this Part, or
(b) if there is no agreement referred to in paragraph (a), the owner of the Workplace.

(2) The prime contractor of a multiple-employer Workplace must

(a) ensure that the activities of employers, Workers and other persons at the Workplace relating to occupational health and safety are coordinated, and
(b) do everything that is reasonably practicable to establish and maintain a system or process that will ensure compliance with this Part and the regulation in respect to the Workplace.

(3) Each employer of Workers at a multiple-employer Workplace must give to the prime contractor the name of the person the employer has designated to supervise the employer's Workers at that Workplace.

The Contractor covenants and agrees that when performing any work for the Owner, whether directly as a contractor or indirectly as a sub-contractor, it will adhere to all of the requirements of the B.C.

Employment Standards Act (RSBC 1996), as may be amended from time to time, that are applicable to the work being performed, including but not limited to:

3) Section 36 (2); an employer must ensure that each employee has at least 8 consecutive hours free from work between each shift worked.

4) Section 39; despite any provision of this Part, an employer must not require or directly or indirectly allow an employee to work excessive hours or hours detrimental to the employee's health or safety.

I fully understand and accept the responsibilities of the prime contractor designation in accordance with the Workers Compensation Act and the B.C. Employment Standards Act while contracted by the *City* on

project location: _____ and will abide by all Workers Compensation Board Regulation requirements.

Date: _____

Project: _____

Company Name: _____

Authorized Signatory: _____

Printed Name: _____

Witness Signatory: _____

Printed Name: _____

Appendix 9

ACCEPTANCE OF BASE COURSE FOR ASPHALT PAVING

Prior to the laying of asphalt pavement, representatives from (i) the City and Tayco Paving, for direct City constructed project **or** from (ii) the City's Consultant, and the General Contractor for contracted projects, agree to the condition, surface elevations and quality of the road base.

Date: _____

Owner or Consultant's Representative:

_____

General Contractor Representative:

_____

This acceptance does not relieve the General Contractor or the City's Consultant of their responsibilities for the surface elevations and/or condition or subsequent failure of materials below the asphalt pavement. Tayco Paving will continue to be responsible for the asphalt paving relating to the asphalt material and its placement.

The general conditions and specifications for the work will apply and take the precedence over this acceptance. The "Limiting Terms and Conditions" of Tayco Paving also take precedence over this acceptance.

An acceptable method of checking elevations will be used to ensure that the road base is graded ready for asphalt. The intention of this survey is to ensure that asphalt tonnage does not exceed Tayco's calculated estimated tonnage by more than 5%.

Conversion from square metres to tonnage will be calculated at the rate of 125 Kg per square metre for a 50mm thickness of asphalt.

SUPPLEMENTARY GENERAL CONDITIONS

**TO BE READ WITH "General Conditions"
CONTAINED IN THE PLATINUM EDITION (printed 2009) OF THE PUBLICATION
"MASTER MUNICIPAL CONSTRUCTION DOCUMENTS"**

Reference No.: TENDER 18-15

Contract: LARWOOD ERICKSON SEWER UPGRADE

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DEFINITIONS **1.0**

1.67.1 ***(delete clause 1.67.1 and replace as follows)***
"Substantial Performance" means the stage of completion of all of the *Work*, as certified by the *Payment Certifier*, when:

a) the *Work* is ready for use or is being used for its intended purpose; **and**

b) the total of the incomplete, defective and deficient Work can be completed at an estimated cost of no more than:

3% of the first $500,000 of the *Contract Price*
2% of the next $500,000 of the *Contract Price*
1% of the balance of the *Contract Price*

1.79 ***(add new clause 1.79 as follows)***
"(amend clause X.XX as follows)" preceding a supplementary clause means this clause provides additional information or restrictions to the referenced clause in the Master Municipal Construction Documents, Volume II.

1.80 ***(add new clause 1.80 as follows)***
"(add new clause X.XX as follows)" preceding a supplementary clause means this clause provides additional requirements or information not found in the Master Municipal Construction Documents, Volume II.

1.81 ***(add new clause 1.81 as follows)***
"(delete clause X.XX and replace as follows)" preceding a supplementary clause means this clause replaces the referenced clause in the Master Municipal Construction Documents, Volume II, in its entirety.

1.82 ***(add new clause 1.82 as follows)***
"Payment Certifier" has the meaning set out in SGC 18.6.6.

1.83 ***(add new clause 1.83 as follows)***
"Provide" or "Provision of" means supply and placement of an item.

1.84 ***(add new clause 1.84 as follows)***
"Engineer" shall mean the *Owner's* engineer appointed to provide technical support during the course of the *Work.*

1.85 ***(add new clause 1.85 as follows)***
"***Critical Path Method***" (CPM) means the method of scheduling a project as follows:

The essential technique for using CPM is to construct a model of the project that includes:

(1) A list of all activities required to complete the project (typically categorized within a work breakdown structure),
(2) The time (duration) that each activity will take to completion, and
(3) The dependencies between the activities.

Using these values, CPM calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer. This process determines which activities are "critical" (i.e., on the longest path) and which have "total float" (i.e., can be delayed without making the project longer). This determines the shortest time possible to complete the project. Any delay of an activity on the critical path directly impacts the planned project completion date (i.e. there is no float on the critical path). A project can have several, parallel, near critical paths. An additional parallel path through the network with the total durations shorter than the critical path is called a sub-critical or non-critical path.

DOCUMENTS	**2.0**	
Interpretation	2.2.5	***(add new clause* 2.2.5 *as follows)*** The Contract Drawings shall not be used for the construction of the Work unless Issued For Construction by the *Contract Administrator.*
CONTRACTOR	**4.0**	
Protection of Work, Property and the Public	4.3.7	***(add new clause 4.3.7 as follows)*** The *Contractor* shall locate, mark and protect from damage or disturbance, any and all stakes, survey pins, monuments and markers at the *Place of the Work.* All survey stakes, pins, monuments or markers which, in the opinion of the *Owner*, have been damaged or disturbed shall be made good following construction by a registered B.C. Land Surveyor at the *Contractor's* expense.
Good Neighbour Policy	4.3.8	***(add new clause 4.3.8 as follows)*** The *Owner's* Good Neighbour Policy as adopted by City of Campbell River Council on April 15, 1997 shall apply to this contract. The Policy states: "That *Contractors* working on Municipal rights-of-way or on private land where new rights-of-way are being created, be required to provide written notice to the residents in the immediate area of the works, describing what is being constructed, when the works will occur, who to contact for more information and what precautions should be taken if necessary; and that the work-site be posted for safety reasons."
Damage to Improvements and Utilities	4.3.9	***(add new clause 4.3.9 as follows)*** The *Contractor's* Work shall be confined to the *Owner's* premises, including statutory right-of-ways easements and construction permit limits, whenever possible. The *Contractor* shall not enter upon or place materials on other private premises except by written consent of the individual *Owners* and shall save the *Owner* harmless from all suits and actions of every kind and description that might result from use of private property.
Use of Working Site	4.3.10	***(add new clause 4.3.10 as follows)*** The *Contractor* shall confine his equipment, storage of materials and operation of Work to the limits indicated by law, permits, or direction of the *Contract Administrator*, and shall not unreasonably encumber the premises with his materials. The *Contractor* shall comply with the *Contract Administrator* instructions regarding signs, advertisements, fires and smoking.

The working site shall at all times be kept free of rubbish and unnecessary hazards to persons, materials, and equipment.

Local, Emergency Traffic and Property Access 4.3.11 ***(add new clause 4.3.11 as follows)***

Local traffic shall be provided access to private properties at all times.

Emergency traffic such as Police, Fire, and Disaster Units shall be provided reasonable access at all times. The *Contractor* shall be liable for any damage which may result from his failure to provide such reasonable access.

Traffic Management Plan 4.3.12 ***(add new clause 4.3.12 as follows)***

The *Contractor* shall submit a Traffic Management Plan in accordance with Part 5.1.1 f of the Form of Tender and Supplementary Specification 01 55 00.

Temporary Structures and Facilities 4.4.3 ***(add new clause 4.4.3 as follows)***

The *Contractor* shall provide clean sanitary latrine accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the Ministry of Health and other bodies having jurisdiction. The *Contractor* shall permit no public nuisance.

Construction Schedule 4.6.1 ***(delete clause 4.6.1 and replace as follows)***

The Contractor shall, within the time set out in the *Form of Tender*, prepare and submit to the *Contract Administrator* a time-scaled construction schedule (the "*Baseline Construction Schedule*") prepared using the *Critical Path Method* (CPM). The schedule shall:

.1 Show all significant construction activities, shop drawing submittals and procurement activities.
.2 Show the dependencies between activities so that it may be established what effect the progress of any one activity has on the schedule.
.3 Show completion time and all specific dates and sequencing requirements. Identify activities making up the critical path.

Unless specifically approved by the Contract Administrator, show activities on the schedule with a duration not longer than 15 working days or an assigned value not greater than $100,000 (except activities showing only submittal, fabrication or delivery of material or equipment). Divide activities which exceed these limits into more detailed components. The schedule shall include allowances made for legal holidays and normal weather conditions.

The *Baseline Construction Schedule* shall indicate completion of the *Work* in compliance with the *Milestone Dates.* The *Contractor* shall ensure that the *Baseline Construction Schedule* is in more detail than the *Preliminary Construction Schedule* so as to enable the *Contract Administrator* to compare actual construction progress during the performance of the *Work* with the *Baseline Construction Schedule* as adjusted pursuant to GC 4.6.2.

Fair Wages 4.8.2 ***(add new clause 4.8.2 as follows)***

The *Contractor* attests to compliance with Section 5 of the Skills Development and Fair Wage Act in projects where the provincial contribution to a Municipal project exceeds $250,000.

Test and Inspections 4.12.4 ***(delete clause 4.12.4 and replace as follows)***

The Contractor shall as part of the Work perform, or cause to be performed, all tests, inspections and approvals of the Work as required in the Contract Documents or as required by the Contract Administrator as part of the Quality Control. Any reference in the specifications to inspection and testing shall mean that the Work described in the specification must be inspected and approved in a manner approved by the Contract Administrator. The Contractor shall only employ or engage, as an agent or consultant for testing, a person approved by the Owner. Where the specification indicates that the Contract Administrator will arrange for testing, the Contractor continues to be solely responsible for testing of the Work. The Contract Administrator may perform additional tests for the Owner's sole benefit. The costs of these additional tests will be the responsibility of the Owner.

Truck Routes and Disposal Sites 4.17.1 ***(add new clause 4.17.1 as follows)***

In hauling of material to and from the work site, the routes to be followed by trucks shall be confined to designated arterial and collector roads as shown on the road classification plan as issued by the City. Where a dumpsite can only be accessed by way of a local road, the route shall be the shortest possible way from an arterial or collector road, and shall be agreed to by the *Contract Administrator* in advance of the work. The *Contractor* shall be responsible for road cleanup along all trucking routes used in association with the work. The cost of this cleanup shall be paid by the *Contractor* and considered incidental to the work. It should be noted that a "Soil Deposition Permit" is required for any dumpsite within the City of Campbell River. The *Contractor* shall be responsible for obtaining and securing a legal dumpsite. All costs associated with that dumpsite shall be the responsibility of the *Contractor* and shall be considered incidental to the *Work*.

Disposal of Wood Debris, Organic Debris, and/or Waste Excavated Material 4.18.1 ***(add new clause 4.18.1 as follows*)**

Prior to disposal of any wood debris, organic debris and/or waste excavated material, the *Contractor* shall submit a disposal management strategy in accordance with all applicable Laws, Bylaws and Regulations to the *Contract Administrator* for approval. Subject to the *Contract Administrator's* approval, the *Contractor* shall ensure that all wood debris, organic debris and/or waste excavated material that is removed from the work site is managed in accordance with this approved disposal management strategy. The *Contractor* shall be required to employ acceptable methods of disposal, approved disposal site location(s), and shall be required to obtain and submit copies of all relevant permits and/or approvals prior to the disposal of any wood debris, organic debris and/or waste excavated material

Regardless of the aforementioned, the *Owner* reserves the right to disallow any or all of the *Contractor*'s proposed disposal management strategy if it is determined that they will result in undesirable environmental impacts.

OTHER CONTRACTORS	**6.0**	
Coordination and Connection	6.2.2	***(add new clause 6.2.2 as follows)*** If the performance of any Contract for the project is likely to be interfered with by the simultaneous execution of some other Contract or Contracts, the *Contract Administrator* shall decide which *Contractor* shall cease Work temporarily and which *Contractor* shall continue, or whether the Work under the Contracts can be coordinated so the Contracts may proceed simultaneously. The *Owner* shall not be responsible for any damages suffered or extra costs incurred by the *Contractor*, resulting directly or indirectly from the award or performance or attempted performance of any other Contract or Contracts on the project, or caused by any decision or omission of the *Contract Administrator* respecting the order of precedence in the performance of the Contracts other than for the extension of time.

VALUATION OF CHANGES AND EXTRA WORK	**9.0**	
Valuation Method	9.2.1.3	***(add new clause 9.2.1.3 as follows)*** Should a lump sum method be used for determination of the value of a *Change*, the *Contractor* shall determine the value of the *Change* by calculating the cost for each item contained within the *Change* and applying a 10% mark up on all costs associated with the *Change* for Overhead and Profit. All costs are required to be supported by documentation satisfactory to the *Contract Administrator* and all applicable rates are to be satisfactory to the *Contract Administrator.*
FORCE ACCOUNT	**10.0**	
Force Account Costs	10.1.1.4	***(delete 10.1.1.4 and replace as follows)*** *Force Account Work* performed by a *Subcontractor* shall be paid for in the lesser of: (i) the amount as provided by subparagraphs (1), (2) and (3) of this GC, plus a markup of 5%, or (ii) the actual amount the *Contractor* pays the *Subcontractor* including a markup of 10% on such actual cost to cover all overhead and profit.
DELAYS	**13.0**	
Liquidated Damages for Late Completion	13.9.1.1	**(*delete 13.9.1.1 and replace as follows*)** as a genuine pre-estimate of the *Owner's* increased costs for the *Contract Administrator* and the *Owner's* own staff caused by such delay an amount of $1,000 per day or pro rata portion for each calendar day that actual *Substantial Performance* is achieved after the *Substantial Performance Milestone Date*; plus
PAYMENT	**18.0**	
Holdbacks	18.4.1	***(delete 18.4.1 and replace as follows)*** The *Owner* will retain a holdback but will not establish a Holdback Trust Account pursuant to Section 5 of the *Builders Lien Act.*
Substantial Performance	18.6.5	***(delete clause 18.6.5 and replace as follows)*** The *Owner* will release any builder's lien holdback on the 56th day following the date of *Substantial Performance*, or other date as required by law, but the *Owner* may holdback the amounts for any deficiencies or filed builders liens as provided in GC 18.4.2, GC 18.4.3 and 18.4.4, or the Maintenance Period Financial Security if not received by this date.
Payment Certifier	18.6.6	***(delete clause 18.6.6 and replace as follows)*** The *Contract Administrator*, as defined herein, shall be the *Payment Certifier* responsible under Section 7 of the *Builders Lien Act* for certifying *Substantial Performance* of the *Work* of the *Contractor*, but not the *Work* of *Subcontractor*s. The *Contractor* shall co-operate with and assist the *Contract Administrator* by providing information and assistance in as timely manner as the *Contract Administrator* considers necessary to carry out the duties of the *Payment Certifier* for the Contract. The *Contractor* shall be the *Payment Certifier* responsible under Section 7 of the *Builders Lien Act* for certifying *Substantial*

Performance of the *Work* of each *Subcontractor*. Prior to certifying completion for a *Subcontractor*, the *Contractor* shall consult with the *Contract Administrator* and obtain the *Contract Administrator's* comments on the status of completion by the *Subcontractor,* including any deficiencies or defects in the *Subcontractor's Work* noted by the *Contract Administrator*. The *Contractor* will indemnify and save the *Owner* harmless from any and all liability the *Owner* may have to anyone arising out of the certification by the *Contractor* of *Substantial Performance* for that *Subcontractor.*

Notwithstanding any other provision of the *Contract,* no payments will be due or owing to the *Contractor* so long as a Lien filed by anyone claiming under or through the *Contractor* remains registered against the Project or any lands, or interest therein, on which *Work* for the project was performed. Failure of the *Contractor* to remove all Liens promptly will entitle the *Owner* to damages.

WORKERS COMPENSATION REGULATIONS **21.0**

Contractor is "Prime Contractor" 21.2.2 ***(add new clause 21.2.2 as follows)***
If the *Work* is being completed as part of a project for which the *Owner* already has a *Prime Contractor* designated then the *Contractor* will be responsible to ensure that they assume direction from the *Prime Contractor* as per the requirements of the Workers Compensation Act Part 3, Division 3, Section 118(1-3).

INSURANCE **24.0**

Required Insurance 24.1.7 ***(add new clause 24.1.7 as follows)***
The *Contractor* shall ensure the following are additional named insured under this contract:

- The City of Campbell River
- Highland Engineering Services Ltd.
- WSP Canada Inc.
- Mainstream Biological Consulting

MAINTENANCE PERIOD **25.0**

Correction of Defects 25.1.4 ***(add new clause 25.1.4 as follows)***
The *Owner* is authorized to make repairs to defects or deficiencies if, ten days after giving written notice, the *Contractor* has failed to make or undertake with due diligence the required repairs. However, in the case of emergency where, in the opinion of the *Owner*, delay is not reasonable, repairs may be made without notice being sent to the *Contractor.* All expenses incurred by the *Owner* in connection with repairs made pursuant to GC 25 shall be paid by the *Contractor* and may be deducted from the Maintenance Security, or other holdbacks. The *Contractor* shall promptly pay any shortfall.

Maintenance Period Financial Security 25.4.1 ***(add new clause 25.4.1 as follows)***
within 10 days of the issue of the Certificate of substantial Performance deliver to the Owner, a Maintenance Period Financial Security in the form of cash, or a clean, irrevocable Letter of Credit in

a form acceptable to the Owner in the amount of 5% of the Contract Price, issued by a major Canadian chartered bank which has a branch in Campbell River BC, payable to the Owner within the Maintenance Period.

SUPPLEMENTARY SPECIFICATIONS

TO BE READ IN CONJUNCTION WITH THE
"MASTER MUNICIPAL CONSTRUCTION DOCUMENTS"

Reference No.: **TENDER 18-15**

Contract: **LARWOOD ERICKSON SEWER UPGRADE**

General

1.1 a) Payments will be made on the basis of the unit prices bid in the Tender, and in accordance with Article 18 of the General Conditions.

b) The unit prices bid, unless specifically noted otherwise, shall include the supply of all *LABOUR*, *PLANT, MATERIAL* and *PRODUCT* equipment necessary to construct *THE WORK* in accordance with the specifications.

c) The prices bid for supply and installation shall be full compensation for supplying, hauling, installing, cleaning, testing, and placing in service together with all other work subsidiary and incidental thereto for which separate payment is not provided elsewhere.

d) Other materials on site, whether existing structures, vegetation, topsoil, gravel, sand or other excavated or piled materials, are the property of the *OWNER* or of the owner of the land on which *THE WORK* is located. Only those materials specifically noted in the specification or on drawings, as belonging to the *CONTRACTOR* shall become the *CONTRACTOR's* property.

e) Where there are excess excavated materials, unsuitable materials excavated or materials of any kind that are excavated but not used in *THE WORK*, such materials are not the property of the *CONTRACTOR* unless authorized in writing by the *CONTRACT ADMINISTRATOR* or specified to be disposed of by the *CONTRACTOR*.

Unit Price Contracts

2.1 a) Payments will be made on the basis of the following:

.1 Unit Price items in the Schedule of Quantities and Unit Prices. Where payment terms are listed in the Schedule of Quantities and Prices, these will take precedence over those payment terms listed elsewhere in the Contract Documents.

.2 Changes in *THE WORK* for items not covered by unit prices, in accordance with Article 7 - *CHANGES IN THE WORK* of the General Conditions.

b) For each item in the Schedule of Quantities and Unit Prices, the *Contract Administrator* will, in cooperation with the *Contractor*, measure the quantity of the item completed at the end of the payment period and this will be shown as a percentage of the work completed against the appropriate value for the lump sum assigned to the respective line item.

Mobilization and Demobilization

3.1 a) Mobilization and demobilization shall include the *Contractor's* costs of mobilization at the beginning of the project; and the costs of demobilization at the end of the project.

b) Included in mobilization are such items as bonding, insurance, permits, moving personnel, materials and equipment to the site, setting up temporary facilities, First-Aid, Site Safety, temporary utilities and all preparation for performing *THE WORK*.

c) Included in demobilization are preparation and submission of operation and maintenance manuals, As-Constructed Record Drawings, comprehensive Bill Of Materials, removal of all personnel, materials and equipment; and cleanup of the site and *THE WORK*.

d) The lump sum price bid for this work shall be relative to the costs involved but shall not exceed ten percent of the Tender Price.

e) Payment will be made as follows, as approved by the *CONTRACT ADMINISTRATOR*:

I. 60% of the lump sum bid will be included in the first progress payment certificate;
II. 40% of the lump sum bid will be included in the final progress payment certificate.

The *CONTRACT ADMINISTRATOR* may at his discretion recommend partial payment if mobilization or demobilization is not complete.

f) With respect to Division 1 General Requirements, payment will be made as specified for demobilization and mobilization. The costs of other items specified under General Requirements shall be considered, as incidental to *THE WORK*; and separate payment will not be made for any other items of General Requirements.

Dust Control

4.1 During the performance of *THE WORK*, the *CONTRACTOR* is to at all times keep the worksite and such immediate surrounding areas which it may utilize free from waste materials, debris or rubbish and is to employ adequate dust control measures. Water shall be the only material acceptable for dust suppression. If accumulation of such materials, debris, rubbish or dust constitutes a nuisance or safety hazard or is otherwise objectionable in any way, as reasonably determined by the *OWNER* or *CONTRACT*

ADMINISTRATOR, the *CONTRACTOR* is to promptly remove it. If any claim, suit, losses, or action is brought by a person affected by the transportation of materials, equipment, goods or wastes to and from the worksite, the *CONTRACTOR* shall defend, indemnify and hold harmless all indemnified parties.

Underground Utilities 5.1 It is the *CONTRACTOR'S* responsibility wherever necessary to determine location of existing pipes, valves, conduits, vaults, or other underground structures. Wherever it is necessary to explore and excavate to determine the location of the existing underground structures, the *CONTRACTOR,* at his own expense, shall make explorations and excavations for such purposes. The *CONTRACTOR* shall notify the *CONTRACT ADMINISTRATOR* or his representative of any conflicts.

The *CONTRACTOR* shall, at his own expense, provide for the uninterrupted flow of all watercourses, sewers, drains, and any other utility encountered during the work. Water control and siltation control shall be under the direction of a qualified environmental monitor engaged by the *CONTRACTOR*.

When any existing mains and/or service pipes, utility ducts, vaults or other utility structures are encountered, the *CONTRACTOR* shall support them to the satisfaction of the *CONTRACT ADMINISTRATOR* so as to protect them from injury. The *CONTRACTOR* shall, at his own expense, at once repair and make good any injury which may occur to any mains, service or utility pipes or ducts, or facilities, or to any electrical conductor, telephone, cable or natural gas facility or to any sidewalk, crosswalk as a result of this operation.

Support of power, telephone poles, underground mains, wiring and light standards required to complete the work, shall be the responsibility of the *CONTRACTOR* and completed in accordance with utility company standards. The *CONTRACTOR* shall schedule the work with the appropriate utility company in advance, so as not to delay the work. All costs associated with the work shall be considered incidental and no separate payment be made for this item.

Construction Surveys 6.1 The *CONTRACTOR is responsible for all survey layout, including stakes, hubs, and grade control*.

The *CONTRACTOR* shall survey and layout the work including, but not limited to, as-built invert elevations, offsets and stations of all grade changes, miscellaneous appurtenances, and all existing utilities exposed during construction.

The *CONTRACTOR* shall provide all stakes, hubs, nails, flagging, and including the supply of casual labour for checking of the work, as required by the *CONTRACT ADMINISTRATOR*.
The *CONTRACTOR* shall provide the *CONTRACT ADMINISTRATOR* with records of the actual surveys, and "as-built" information pick-up.

No separate or additional payment will be made for this work.

General Coordination

7.1 The *CONTRACTOR* shall work cooperatively with B.C. Hydro, Telus, Shaw and Fortis to locate private utility ducting.

No additional payment shall be made for this work.

Supplementary Specifications

8.1 The following Supplementary Specifications are complementary to the MMCD.

Section	Title
01 55 00	Traffic Control, Vehicle Access & Parking
03 30 20	Concrete Walks, Curbs and Gutters
31 23 01	Excavating, Trenching & Backfilling
31 23 23	Controlled Density Fill
31 24 13	Roadway Excavation Embankment & Compaction
32 01 01	General Road Repairs
32 12 16	Hot-Mix Asphalt Concrete Paving
32 93 01	Planting of Trees, Shrubs and Ground Covers
33 01 30.1	CCTV Inspection of Pipelines
33 11 01	Waterworks
33 30 01	Sanitary Sewers
33 42 01	Larwood Creek Culvert Replacement

1.0 GENERAL

.4 ***(Delete and replace as follows)***
Give minimum 72-hour notice to Owner prior to beginning construction and comply in all respects with their requirements. The Contractor will be responsible for any and all local permits required to execute the work.

.6 ***(Add the following clause)***
The Contractor shall prepare, or cause to be prepared, a Traffic Management Plan (TMP). The TMP shall be submitted to the Owner for approval and the approved TMP shall be implemented and maintained during the Work. A separate TMP will be required for each road (Erickson Road, Harrogate Road and Larwood Road) that the Work is to be performed on.

.7 ***(Add the following clause)***
The following provisions must be included in the TMPs:

.1 Road closures on Larwood Road shall be permitted between Highway 19A and Eardley Road only, and between Eardley Road and Harrogate Road only. Complete closure of Larwood Road will not be permitted.

.2 Larwood Road closures must always provide local access for residents, Fire Hall No. 2, Ford Centre and Willow Point Elementary School. Access to / from Eardley Road must also be maintained always.

.3 Road closures on Harrogate Road shall be permitted but passage for transit vehicles and emergency vehicles must be maintained always.

.4 Road closures on Erickson Road shall not be permitted. At a minimum, single lane alternating traffic must be maintained always on Erickson Road.

.5 Outside of working hours, the road is to be opened to two-way traffic unless otherwise authorised by the Contract Administrator.

.6 Transit access through the site must be maintained at all times.

.7 Safe pedestrian movement must be maintained.

.8 Pedestrian and cyclist traffic should be accommodated by maintaining the sidewalks and using fencing and other protection measures to segregate this traffic and the construction activities. If the Contractor deems it necessary to close a section of sidewalk and eliminate non-motorized traffic through the work section, then a Pedestrian Management Plan must be submitted to the Owner in accordance with part 1.11 of this Section.

.9 ***(Add the following clause)***
The TMPs shall:

.1 Include an accurate road configuration, with road names, north arrow marker, speed limit and proposed extents of the Work.

.2 Indicate placement and distance of signs, delineators, cones, barricades, position of certified TCP's and traffic control equipment.

.3 Identify the number of lanes to be obstructed, along with taper lengths and widths of lanes.

.4 Identify impacts to driveways and bus stops, intersections, turning isles, sidewalks, and bike lanes. Include measures to facilitate and maintain access.

.5 Consider project specific restrictions (work hours etc) as outlined in the Contract Documents.

.6 Include a map of full detour routes including the above requirements along each route.

.10 ***(Add the following clause)***
The Larwood Road TMP (or other road if Contractor intends to start Work elsewhere) is to be submitted as per Item 5.1.1.f of the Form of Tender. The Contractor will not be permitted to start any of the Work until the TMP has been approved by the Owner.

Other TMP's are to be submitted 15 Days prior to commencing Work at other locations.

.11 ***(Add the following clause)***
If required, the Contractor shall prepare, or cause to be prepared, a Pedestrian Management Plan (PMP). The PMP shall be submitted to the Owner for approval and the approved PMP shall be implemented and maintained during the Work.

1.4 Traffic Control

.4.8 ***(Delete and replace as follows)***
Maintain uninterrupted access / egress to / from all properties within or in the vicinity of the Work, unless authorized as part of the approved Traffic Management Plan or by the Contract Administrator.

.4.10 ***(Delete first paragraph and replace as follows)***
Provide Traffic Control Personnel (TCP), trained and certified by the BC Construction Safety Alliance (BCCSA), and properly equipped for the following situations:

1.5 Payment

.1 ***(Delete and replace as follows)***
Payment for all work performed under this Section will be on a lump sum basis. Payment shall be 30% upon preparing TMP(s) (and PMP(s)), securing permits and erecting traffic control devices; 60% distributed in monthly Progress

Payments for traffic control persons and related control devices; and 10% upon Substantial Performance.

END OF SECTION 01 55 00

1.4 Measurement and Payment

.1 ***(Delete Sections .1 - .9 and replace as follows)***

.1 Payment for 1.5m wide, 120mm thick sidewalk or Driveway Crossing (c/w Granular Base) includes supply and placing of the concrete and granular base (up to 300mm wider than the width of the sidewalk) under the concrete sidewalk or driveway.

.2 Payment for Barrier and Rollover Concrete Curb and Gutter (c/w Granular Base) includes supply and placing of the concrete curb and gutter and granular base (up to 300mm wider than the width of the sidewalk) and will cover all straight and curve sections.

.3 Payment for Private Concrete Driveway 100mm thick (c/w Granular Base) includes supply and placing of the concrete and granular base (up to 300mm wider than the width of the driveway) under the concrete driveway and includes all finishes to match the existing driveway.

END OF SECTION 30 30 20

1.5 Safety Requirements

.2 ***(Add the following clause)***

For all excavations more than 2.0m in depth, the Contractor will be required to submit an *Excavation and Shoring* Plan to the Contract Administrator for review prior to start of any excavation. The *Excavating and Shoring Plan* shall clearly demonstrate the Contractor's methodology for maintaining the allowed trench width as shown in the Utility Trench Detail in the Contract Drawings. The purpose and limitations of review by the Contract Administrator will be consistent with the purpose and limitations of GC 5.4.

1.10 Measurement & Payment

.4 ***(Delete and replace as follows)***

Payment for removals will be in addition to trenchwork with no deduction made from such trenchwork and shall be made as follows:

.1 Payment for removal and off-site disposal of disused AC pipe includes all necessary means for protection of workers, and removal, testing, permitting, wrapping, transport and disposal (except dump fees) of AC pipe and all other work and materials necessary to complete the removal and disposal as shown on the Contract Drawings and specified under this Section.

.2 Payment of dump fees for AC pipe disposal charged at disposal site will be paid separately. A markup of 5% shall be added to the dump fee and the amount shall be payable under an allowance in the Schedule of Quantities and Prices. Accurate records shall be submitted to the Contract Administrator in accordance with GC 10.3 showing all costs related to this item.

.3 Payment for removal and off-site disposal of disused pipe (except AC) and structures includes the removal and disposal of manholes (including lid, slab, cover frame and risers), concrete diversion chamber (including lid, slab, cover, frame), disused pipe of any kind, and all other pipe or structures encountered during the work and all other work and materials necessary to complete the removal and disposal as shown on the Contract Drawings and specified under this Section.

.4 Payment will be based on weight slips submitted to the Contract Administrator in accordance with GC 10.3.

.9 ***(Add the following clause)***

Payment for exposing and locating non-intersecting sanitary services will be made separately for each location regardless of depth, and will include exposing the utility, locating the utility

using 3D survey instruments, and backfilling and temporary surface restoration upon completion of the location work. Survey data is to be supplied to the Contract Administrator in point file (.csv) format.

.10 ***(Add the following clause)***
Payment for confirming service connection stubs are abandoned includes all work necessary to confirm, to the satisfaction of the Contract Administrator, that each service connection stub identified on the Contract Drawings as "Contractor to confirm services aren't live", is abandoned. This may include but not be limited to research of service connections record, location / exposure of the service and / or CCTV inspection. Payment will be made per service connection stub.

.11 ***(Add the following clause)***
All costs related to the preparation and execution of the excavation and shoring plans will be considered incidental to the work.

.12 ***(Add the following clause)***
Payments made under this Section are exempt from GC 9.4 Quantity Variations.

2.2 Use of Specified Materials

.1 ***(Delete and replace as follows)***
Backfill for over-excavated trench or structure excavations to be Select Granular Sub-base.

.3 ***(Delete and replace as follows)***
Trench and excavation backfill to be 75mm Pit Run Gravel.

3.1 Site Preparation

.2 ***(Add to this clause)***
Saw cutting along the permanent pavement reinstatement lines as per the trench and pavement reinstatement detail for pipe laying work is not permitted.

3.5 Backfill and Compaction

.4 ***(Add the following clause)***
.4 The frequency of density tests shall be one test per 50 lineal metres per lift.

3.6 Surface Restoration

.8 ***(Add the following clause)***
Curb and gutter:
.1 Restore curb and gutter in accordance with Section 03 30 20 - Concrete Walks, Curbs and Gutters and City Supplementary Specification 03 30 20.

.9 ***(Add the following clause)***
Asphalt and concrete sidewalk:
.1 Restore asphalt sidewalks and private driveways to 50mm depth and in accordance with Section 32 12 16 - Hot-Mix Asphalt Concrete Paving.
.2 Restore concrete sidewalk, driveway crossings and private driveway in accordance with Section 03 30 20

- Concrete Walks, Curbs and Gutters and City Supplementary Specification 03 30 20.

END OF SECTION 31 23 01

1.4 Measurement and Payment

.1 ***(Delete and replace as follows)***

Payment for Controlled Density Fill (Pipe) includes preparation of the pipe and service connections, formwork, temporary piping, supply and placement of the Controlled Density Fill, protection during curing and all other work and materials necessary to complete the installation as shown on the Contract Drawings and specified under this Section.

Payment will be made by lineal pipe metre of main sanitary sewer pipe based on the size of pipe to be filled, as shown on the Contract Drawings.

2.2 Mixes

.1 ***(Delete and replace as follows)***

Proportion Controlled Density Fill to meet the following design criteria:

.1	Compressive strength:	0.5MPa at 28 days
.2	Cement content:	25kg per m^3
.3	Slump:	150-200mm
.4	Air entrainment:	4-6%

3.1 General

.1 ***(Delete and replace as follows)***

Completely fill pipe with Controlled Density Fill. Ensure no voids are left inside pipe.

END OF SECTION 31 23 23

1.8 Measurement and Payment

.5 ***(Delete first paragraph and replace as follows)***
Payment for common excavation includes removal of existing, curbs and gutters, sidewalks, utilities strips, driveways, pipes and conduits which are removed as part of the operation for common excavation. Removal of existing asphalt pavements is paid separately under this Section.

.14 ***(Add the following clause)***
Payment for removal of existing asphalt pavements includes removal and off-site disposal of asphalt pavement. Payment will be made on a square metre basis as specified in the Schedule of Quantities and Prices.

3.5 Compaction

.7 ***(Add the following clause)***
The frequency of density tests shall be one test per 250 sq.m. per 300 mm vertical lift.

END OF SECTION 31 24 13

(Add Supplementary Specifications Section 32 01 01)

1.0 GENERAL

.1 Section 32 01 01 refers to those portions of the work that are unique to roadway repair beyond the extent of trenching and as directed by the Contract Administrator. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Traffic Control, Vehicle Access and Parking	Section 01 55 00
.2	Environmental Protection	Section 01 57 01
.3	Aggregates and Granular Materials	Section 31 05 17
.4	Dust Control	Section 31 15 60
.5	Excavating, Trenching and Backfilling	Section 31 22 01
.6	Roadway Excavation, Embankment and Compaction	Section 31 24 13

1.2 Measurement and Payment

.1 Payment for all road repair work undertaken beyond the extent of trenching includes removal of existing gravels and sub-grade as directed, and supply and placing of imported gravels as directed. Payment will be made under Force Account.

.2 Removal of existing asphalt pavement will be paid under Supplementary Specification 31 24 13.

.3 For clarification, the extent of road repair work is anticipated to be as shown on the Contract Drawings. The scope of road repair work may be increased or decreased at the sole discretion of the Contract Administrator.

2.0 PRODUCTS

.1 Not used

3.0 EXECUTION

.1 Not used

END OF SECTION 32 01 01

1.5 Measurement and Payment

.9 ***(Add the following clause)***
Payment for Coordination with Owner's Asphalt Concrete Paving Contractor will be made by lump sum, and will be paid upon completion of all paving works. This item shall include all work necessary to coordinate scheduling of paving work with the Owner's Asphalt Concrete Paving Contractor and coordinate and complete surface preparation in advance of paving works as shown on the Contract Drawings

3.3 Preparation

.6 ***(Add the following clause)***
Contractor is responsible for maintaining the road base until the paving operations has been completed.

END OF SECTION 32 12 16

1.9 Measurement and Payment

.1 ***(Delete first two sentences and replace as follows)***
Payment for the removal and replacement of trees, shrubs and ground cover (with the exception of Lawn restoration) will be made by Force Account as directed by the Contract Administer in accordance with the terms of the Contract. The restoration of Lawn ground cover is included in item 16.2 of Section 33 30 01.

END OF SECTION 32 93 01

1.5 Scheduling of Work

.2 ***(Delete and replace as follows)***

Schedule work as follows:

.1 Larwood Road – prior to connection of Harrogate Road sewers at SMH 14, clean and flush section of new sewer and undertake video inspection.

.2 Harrogate Road & Erickson Road - clean and flush section of new sewer and undertake video inspection during low flow period (night time period during dry weather).

END OF SECTION 33 01 30.1

1.8 Measurement and Payment

.14 ***(Add the following clause)***
Payment for wrapping watermain within 3m of sanitary crossing includes supply and placement of joint wrap and all work described under 1.8.2 of this Section.

2.2 Mainline Pipe, Joints and Fittings

.7 ***(Add the following clause)***
Joint Wrap to meet or exceed B.C. Ministry of Health requirements for watermain joint protection and AWWA / ANSI standards C209. (Canus "JointWrap" or approved equivalent).

END OF SECTION 33 11 01

1.6 Measurement and Payment

.2 ***(Add the following clause)***
For clarification, payment for sanitary sewer does not include asphalt pavement removal which is paid under Supplementary Specification 31 24 13. It does include restoration of gravel driveways and grassed surfaces.

.3 ***(Delete and replace as follows)***
.1 Payment for **replacement** service connection includes capping existing service connection if required, testing and connecting to the existing services, wye connection at the new main, long radius curves, inspection chamber, risers, Brooks Boxes, backflow valves, couplers, and all related fittings and components specified and/or shown on Contract Drawings and Standard Detail Drawings S7 and S9. Payment includes all applicable service pipes, materials and work described in 1.6.2 of this Section. Measurement for service connection will be for each complete service installed with no regard for the length of service installed or diameter of main except as noted in the Schedule of Quantities.

.2 Payment for **upgrading** existing service connection includes connecting to the new main, installation of inspections chambers, risers, Brooks Boxes, backflow valves, and all related fittings and components specified and/or shown on Contract Drawings and Standard Detail Drawings S7 and S9 on an existing service pipe. Payment includes all applicable service pipes, materials and work described in 1.6.2 of this Section. Measurement for service connection will be for each complete service installed with no regard for the length of service installed or diameter of main except as noted in the Schedule of Quantities.

.3 Payment for **new** service connection includes, testing, wye at the new main, inspections chambers, risers, Brooks Boxes, backflow valves, plugs, long radius curves, couplers, reducers and all related fittings and components specified and/or shown on Contract Drawings and Standard Detail Drawings S7 and S9. Payment includes all applicable service pipes, materials and work described in 1.6.2 of this Section. Measurement for service connection will be for each complete service installed with no regard for the length of service installed or diameter of main except as noted in the Schedule of Quantities.

.4 Payment for the Vertical Riser Kit is for the supply and installation of a restrained slip coupling assembly on each sanitary service in Larwood Road in the location as shown on the Contract Drawings. Payment includes all applicable service pipes, materials and work described in 1.6.2 of this Section.

.4 ***(Delete and Replace as Follows)***
Payment for installation of an inspection chamber, Brooks Box, couplers, risers on 200mm pipes in the locations as

shown on the Contract Drawings and Standard Detail Drawings S7 and S9.

.8 ***(Add the following clause)***
Payment for Sewer Pipe Extension includes all applicable pipes, materials and work described in 1.6.2 of this Section. Payment also includes supply and installation of couplers as shown on Contract Drawings.

1.8 Submittals

.1 ***(Add the following clause)***
Contractor shall submit shop drawings for all manholes prior to ordering.

2.0 PRODUCTS

2.2 Plastic Pipe, Mainline Smooth Profile

.6 ***(Add the following clause)***
PVC Ribbed extruded seamless pipe meeting the requirements of the City of Campbell River Approved Products List as of the date of the release of the tender documents shall be permitted for use in the mainline ditch. All pipe must comply with CSA Standard B182.4, ASTM Standard F794-89 and D2412. Approved products are: Kor Flo (200mm-900mm), Ipex Ultra Rib (200mm-600mm) and Rahau ARauRib (375-450mm).

2.3 Service Connections

.11 **(Add *the following clause*)**
Vertical Riser Kits for 100mm sewer service pipes shall be used on service connections in locations as shown on the contract drawing. All riser kit shall be fabricated from pipe manufactured to ASTM Standard D3034, F1336. All fittings used in the Vertical Riser Kit shall be manufactured in accordance with CSA B182.2, ASTM D3034, F1336 and listed by NSF.

3.5 Granular Bedding

.5 ***(Add the following clause)***
The frequency of density tests shall be one test per 50 lineal metres per lift.

3.7 Pipe Surround

.3 ***(Add the following clause)***
The frequency of density tests shall be one test per 50 lineal metres per lift.

3.9 Backfill

.3 ***(Add the following clause)***
The frequency of density tests shall be one test per 50 lineal metres per lift.

.4 ***(Add the following clause)***
Shoring: during backfill and compaction of trench, remove shoring in such a manner as to allow proper compaction and to prevent trench walls from collapsing. Remove all bracing and shoring from trench.

END OF SECTION 33 30 01

(Add Supplementary Specifications Section 33 42 01)

1.0 GENERAL

.1 Section 33 42 01 refers to those portions of the work that are unique to the replacement of the Larwood Creek culvert. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Traffic Control, Vehicle Access and Parking	Section 01 55 00
.2	Environmental Protection	Section 01 57 01
.3	Aggregates and Granular Materials	Section 31 05 17
.4	Dust Control	Section 31 15 60
.5	Excavating, Trenching and Backfilling	Section 31 22 01
.6	Roadway Excavation, Embankment and Compaction	Section 31 24 13
.7	Storm Sewers	Section 33 40 01
.8	Pipe Culverts	Section 33 42 13

1.2 Measurement and Payment

.1 Payment for Larwood Creek Culvert Replacement and Headwalls Upgrade includes preparation of a Construction Environmental Management Plan, provision of all necessary environmental protection measures and monitoring prior to, during and post-construction, supply and installation of all items shown on the Contract Drawings, and all other work and materials necessary to complete the installation as shown on the Contract Drawings and specified under this Section.

2.0 PRODUCTS

.1 As specified on Contract Drawings.

3.0 EXECUTION

.1 A Construction Environmental Management Plan shall be prepared by a Registered Professional Biologist and submitted to the Contract Administrator in accordance with Section 5.1.1 of the Form of Tender.

.2 Full flow is to be maintained within the creek at all times.

.3 Catch basin leads are to be connected to the replacement culvert.

END OF SECTION 33 42 01

October 2, 2007
File Ref: 607-0240

DRAFT

McElhanney Consulting Services Ltd.
1371B Cedar Street
Campbell River, BC
V9W 2W6

Attn: Mr. Mark Dehahagne, P.Eng.
Project Manager

Dear Sir:

Re: Interim Geotechnical Report
Larwood/Harrogate Road Upgrade Design

1. Introduction

As requested, Levelton Consultants Ltd. (Levelton) is pleased to present this interim geotechnical information in support of the above project. This interim information will be superseded by a final geotechnical report, which will be presented once we have received feedback and once a more complete review of the recently available data has been prepared.

2. Subsurface Conditions

A total of eight (8) boreholes were advanced on September 26, 2007 using a track mounted drill rig owned and operated by Drillwell Enterprises of Duncan. As noted on the attached draft Figure 1, seven of the boreholes were advanced on Larwood Road; with BH07-01 being located closest to the Island Highway. The last borehole (BH07-08) was located on Harrogate Road. The Boreholes were advanced using a combination of solid and hollow stem continuous flight augers to depths of between 4.5 and 6.6m. Slotted standpipe piezometers were installed in Boreholes BH07-04 and 08 and the installations were completed with flush mounted steel covers. The remaining boreholes were backfilled with drill cuttings and capped with compacted cold-mix aphaltic-concrete.

The conditions encountered at the boreholes locations are shown on the attached draft borehole logs. In summary of the logs, ground conditions included a variable thickness of road aggregates underlain by a complex mixture of marine silt, sand and clay deposits which in turn rested upon glacial tills. This general sequence of deposits is generally in accordance with the local published geological mapping and is described in greater detail below.

The thickness of the asphaltic-concrete on Larwood Road ranged from 70 to 105 mm and appeared to include at least one 40 mm thick overlay. BH07-08 on Harrogate Road encountered approximately 50 mm of asphaltic-concrete. Underlying the asphaltic-concrete at most locations was approximately 100mm of crushed base course gravel and 300 to 400 mm of 70 mm minus sand and gravel subbase. At certain locations the base gravel was not observed, such as BH07-07.

The complex mix of silt, sand and clay deposits is inferred to be associated with marine inundation and subsequent regression following isostatic uplift from the last (Vasion) period of glaciation. In general, the lower potion of these marine deposits in the Campbell River area is dominated by fine grained clays/silts which coarsen upwards in particle size to sands. This succession was generally encountered at Larwood/Harrogate with the exception that a silt deposit several metres thick was encountered above the sand deposit in the lower elevations of Larwood Road (BH07-01 to 4). At BH07-05 (near the intersection at the school), the marine soils were locally absent and a dense weathered till like sand deposit was encountered close to surface.

The total thickness of the complex mix encountered at the borehole locations was about 6 m thick in the lower elevations of Larwood Road and about 4.5 m in the upper elevation of Harrogate Road. The marine clays in the lower portion of the sequence were soft, blue grey and up to about 3 m thick at BH07-03. The overlying sands ranged from being locally absent up to about 1 to 2 m in thickness. The sands were typically saturated and in a loose to compact and locally dense condition. The overlying silt deposit encountered in BH07-01 to 04 was 2 to 3 m thick with a firm to stiff consistency.

Seepage was observed during drilling at several of the borehole locations. In the lower elevation portions of Larwood Road the depth to seepage was associated with the sand deposit and was observed at about 2 to 3m. In the area of high elevation, seepage was observed at depths of about 4 m. Initial readings in the standpipe at BH07-4 suggest that the groundwater in the sand may be slightly pressurized i.e. the piezometric surface was up into the overlying silt deposit..

3. Discussion

Levelton will produce a final report that will provide discussion and recommendations related to the assessed seismic response of the ground and relative to conventional items of pipe excavation and installation. This interim report has been prepared in a relatively short time frame to convey the initial key findings. As noted in the introduction, this report will be superseded by a final report.

Qualitative Seismic Response

Based on a review of the published mapping in conjunction with a preliminary assessment of the borehole information, we anticipate the following seismic performance from the various deposits:

Deposit	Anticipated Seismic Response
Granular road fills – dense, generally above the watertable	Generally resistant to liquefaction
Upper stiff silt	Generally located above the watertable, and is judged to be resistant to liquefaction.
Loose to compact, locally dense, sand	Saturated portion judged to be susceptible to local liquefaction
Lower clay – soft, low to medium plastic	Possible strain softening but generally resistant to liquefaction
Glacial till	Generally resistant to liquefaction

As noted, the saturated portion of the sand encountered in the upper mixture of marine deposits is judged to be prone to localized liquefaction. Based on the borehole information, the layer has a relatively limited thickness and seismic induced vertical settlements associated with liquefaction are expected to be limited to less than about 50 mm. Lateral ground displacements associated with liquefaction are highly dependent upon the topography and more difficult to predict. However, we note that the area of steepest grades occurs in the lower area of Larwood Road where the liquefaction would be most likely to occur. Differential lateral ground displacements has the potential to cause pipe joint separation in a conventional PVC pipe and possibly at cross connections. The potential for such a circumstance would be most likely in the lower Larwood Road area represented by BH07-1 to 04 and less likely in the higher area represented by BH-7-5 to 07.

Given the nature of dense granular trench fills (and a low watertable) we would not expect pipe buoyancy to be a significant issue in the Larwood/Harrogate Road area.

Conventional Aspects of Pipe Installation

Conventional aspects of pipe installation include trenching, temporary trench stability, dewatering, pipe support conditions and backfilling. The conventional aspects of pipe installation are judged to be relatively favourable where pipe depths are limited to about 1.5 m and the pipe invert is maintained within the stiff silt or dense till like sand above the watertable. However, where pipe invert depths are greater than about 2.5 to 3 m, there is an increased risk that the trench excavation will encounter water bearing sands or soft clays and that excavation stability will be adversely impacted. The use of a trench box should be anticipated where it is necessary to install pipe work into or below the water bearing sand deposit or soft clays. In addition, temporary dewatering requirements are expected to become more onerous in and below the sand deposit, as is ensuring suitable bearing support for the pipe. Where the pipe is located on the soft grey clays, it may be necessary to utilize a non-woven geotextile to separate the pipe bedding from punching into the soft clay. In such cases, the use of pea gravel bedding would be advantageous to avoid/reduce requirements for compaction.

In terms of trench backfill materials, the upper granular road fill materials are considered to be suitable for reuse and these materials should be separated from the underlying silts. The underlying silts are judged to be unsuitable for reuse under the roadways. The natural sands may be suitable if moisture conditioned (dried), although their reuse is not likely to be practical on this project. The geotechnical engineer should review conditions during construction and advise on the potential for reuse of the natural on-site soils.

4. Closure

This interim report has been prepared for exclusive use of McElhanney Consulting Services Ltd for application to the proposed upgrading of Larwood Road and Harrogate Road. As noted previously, this interim report will be superseded by a final report. Any use that a third party makes of this interim report is the responsibility of that party. The attached terms of reference for geotechnical report form an integral part of the report.

We trust that this information meets your immediate needs. Please do not hesitate to contact the undersigned for further information.

Yours truly,
LEVELTON CONSULTANTS LTD.

DRAFT

Carl Miller M.Sc., P.Eng.
Geotechnical Project Manager

Attachments: Draft Borehole Location Plan
Draft Borehole Logs
Terms of Reference for Geotechnical Reports.

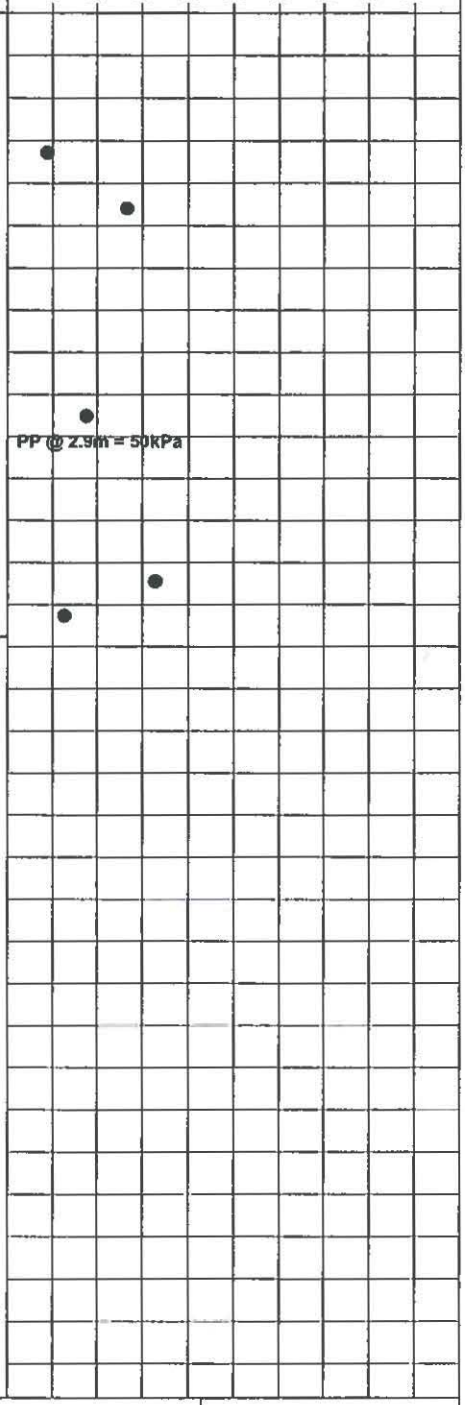
LEVELTON Engineering Solutions
1935 Bollinger Road
Nanaimo, BC V9X 5W9
Telephone: 250-753-1077
Fax: 250-753-1203

Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-1

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
		ASPHALT- 65mm lower lift, 40mm upper lift.				
		GRAVEL AND SAND (FILL) Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.				
	2	**SAND AND GRAVEL (FILL?)** Some silt, cobbles sizes to 100mm diameter, trace clay, dense, reddish brown, moist.			G	
	4	**SILT** - Clayey, trace fine grained sand, firm to stiff, light brown, damp.			G	
2	6					
	8					
	10	- wet, sand lenses observed between 3.0 to 3.2m depth.			G	
4	12					
	14	**SILT** - Sandy, some clay, little gravel sizes to 50mm diameter, brown, moist.			G	
					G	
		Bottom of hole at 4.5 meters On completion slough at 2.8 meters				
6	16					
	18					
	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- Moisture Content %
- Plastic Limit
- Liquid Limit
- Ground Water Level
- Shear strength in kPa (Torvane or Penetrometer)
- Shear strength in kPa (Unconfined)
- Shear strength in kPa (field vane)
- Remolded strength in kPa
- Percent Passing # 200 sieve

Drill Method:
Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

1 LOG PER PAGE 607-0240.GPJ LEVELTON.GDT 10/1/07

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Engineering Solutions
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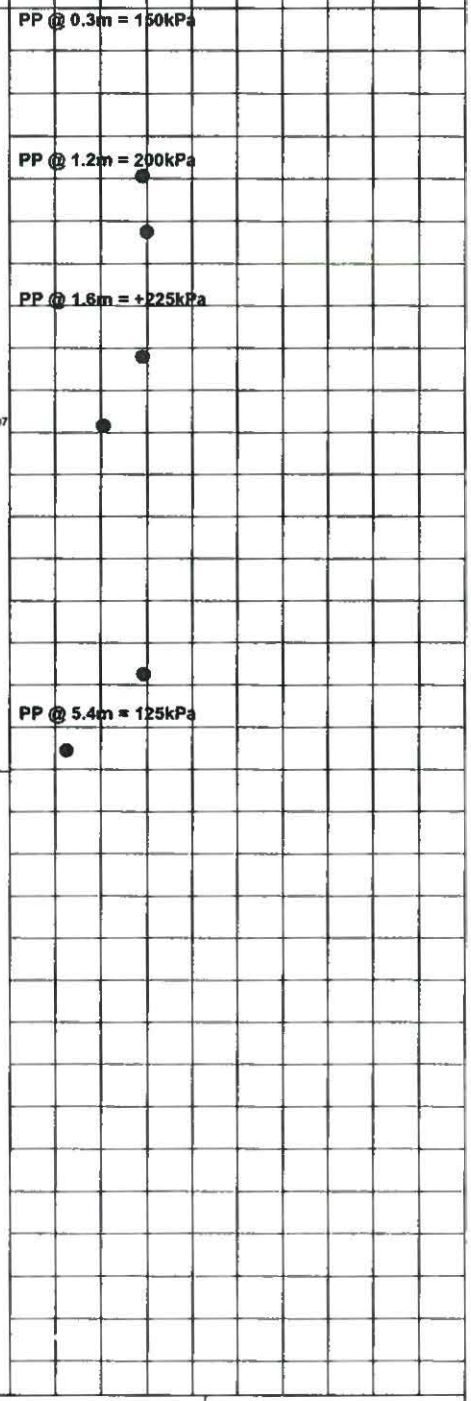
Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-2

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
0	0	**ASPHALT** - (80mm)				
		GRAVEL AND SAND (FILL) Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.				
	2	**SILT** - Clayey, some fine to medium grained sand, stiff, mottled brown and grey, damp.				
	4				G	
	6			11	SPT	
2	8				G	
	10	**SAND** - Trace silt, medium to fine grained, dense, brown, wet to saturated.		23	SPT	Sep/26/07
4	12					
	14	**CLAY** - Silty, trace fine grained sand, soft, grey-blue, wet.			G	
	16	**SAND** - Silty, trace gravel sizes to 20mm diameter, little clay, stiff.			G	
	18	Bottom of hole at 5.5 meters Effective refusal On completion no slough				
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- ● Moisture Content %
- ▶ Plastic Limit
- ◀ Liquid Limit
- ⧩ Ground Water Level
- ⊠ Shear strength in kPa (Torvane or Penetrometer)
- × Shear strength in kPa (Unconfined)
- ⊗ Shear strength in kPa (field vane)
- ⊠ Remolded strength in kPa
- ■ Percent Passing # 200 sieve

Drill Method:
Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

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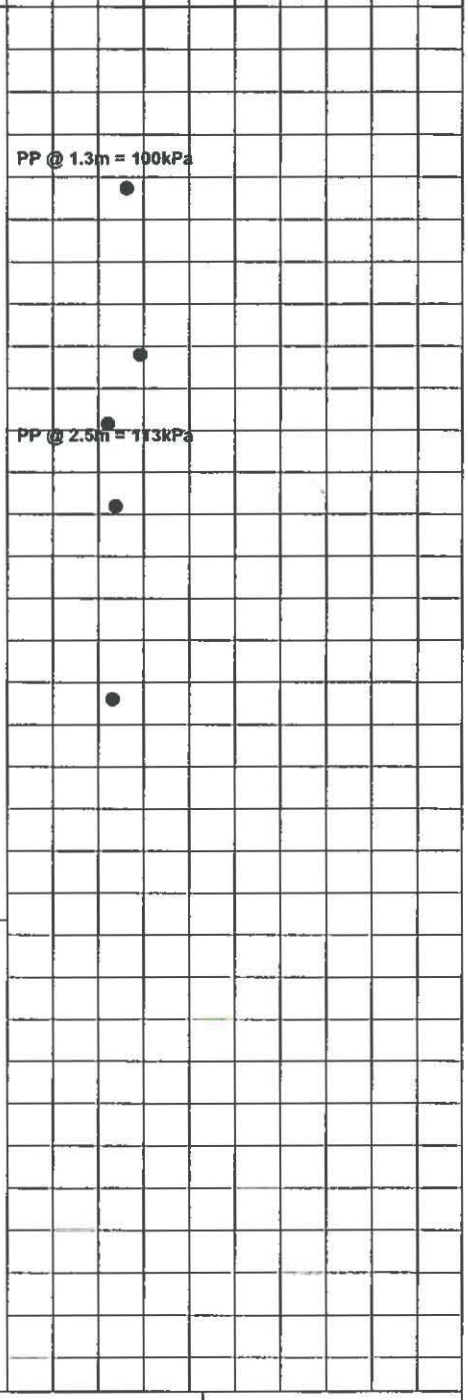
Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-3

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
		ASPHALT- (70mm)				
	2	**GRAVEL AND SAND (FILL)** Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.				
		GRAVEL AND SAND (FILL) Cobble sizes to 100mm diameter, pit run, well graded, dense, brown, damp.				
	4	**SILT** - Clayey, some fine to medium grained sand, stiff, mottled brown and grey, damp.			G	
2	6					
	8				G	
		SAND - Trace silt, medium to fine grained, dense, brown, wet to saturated.				
	10				G	
		- grey below 3.5m depth.				
	12				G	
4		**CLAY** - Silty, trace fine grained sand, soft, blue-grey, wet.				
	14					
	16				G	
	18					
6	20					
	22	Bottom of hole at 6.6 meters Effective refusal On completion slough at 1.2 meters				
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- Moisture Content %
- Plastic Limit
- Liquid Limit
- Ground Water Level
- Shear strength in kPa (Torvane or Penetrometer)
- Shear strength in kPa (Unconfined)
- Shear strength in kPa (field vane)
- Remolded strength in kPa
- Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

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Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-4
Pg 1 of 1

Project No: 607-0240

Depth (m)	Depth (ft)	Description	Piezo 1	C	N	Type	Water Level
0	0	**ASPHALT**- (70mm)					
		GRAVEL AND SAND (FILL) Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.					
	2	**GRAVEL AND SAND (FILL)** Cobble sizes to 75mm diameter, pit run, well graded, dense, brown, damp.				G	
	4	**SILT** - Clayey, some fine to medium grained sand, stiff, mottled brown and grey, damp.					Sep/26/07
2	6						
	8					G	
	10	**SAND** - Trace silt, medium to fine grained, dense, brown, wet to saturated.					
	12					G	
4	14	**CLAY** - Silty, trace fine grained sand, soft, grey-blue, wet.				G	
		Bottom of hole at 4.5 meters On completion slough at 2.5 meters					
	16						
	18						
6	20						
	22						
	24						
8	26						
	28						
	30						
	32						

10 20 30 40 50 60 70 80 90

PP @ 1.0m = 200kPa

PP @ 2.5m = 200kPa

PP @ 4.4m = 0kPa

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- ● Moisture Content %
- ▶ Plastic Limit
- ◀ Liquid Limit
- ⧩ Ground Water Level
- ⊠ Shear strength in kPa (Torvane or Penetrometer)
- × Shear strength in kPa (Unconfined)
- ⊗ Shear strength in kPa (field vane)
- ⊠ Remolded strength in kPa
- ■ Percent Passing # 200 sieve

Bentonite/Grout Plug
Solid Pipe
Cuttings
Slotted Pipe
Sand/Pea-Gravel

Drill Method:
Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

1 LOG PER PAGE 607-0240.GPJ LEVELTON.GDT 10/1/07

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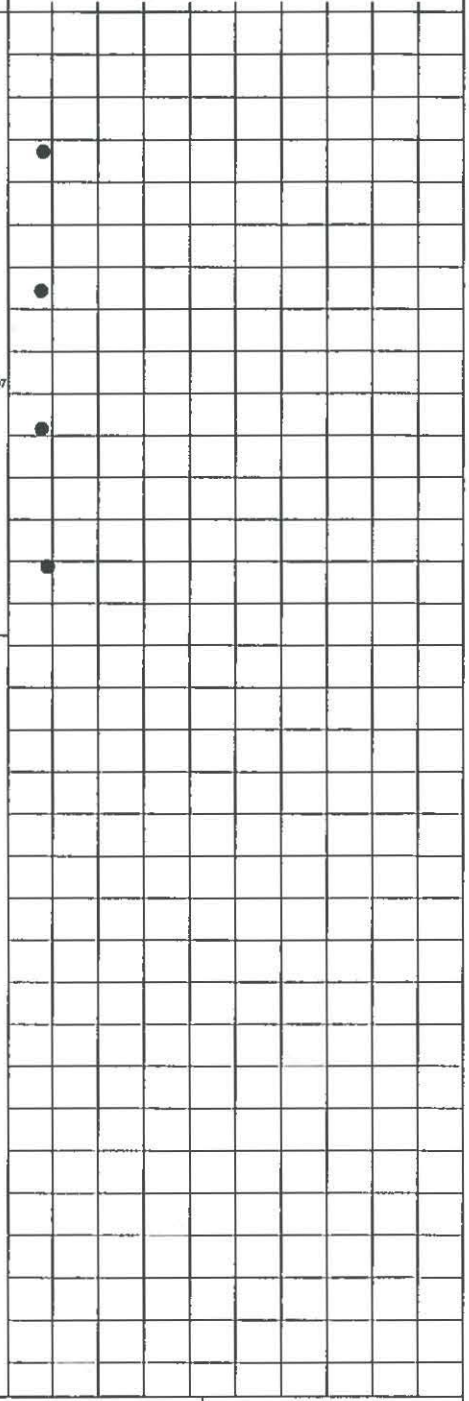
Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-5

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
		ASPHALT- (100mm)				
		GRAVEL AND SAND (FILL) Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.				
	2	**SAND** - Gravelly, little silt, pit run, cobbles sizes to 75mm diameter, medium to fine grained, dense, light brown, damp to moist.			G	
	4					
	6				G	
2	8					Sep/26/07
	10	- increased drilling resistance observed at 3.0m depth - wet below 3.2m depth			G	
	12					
4	14	- increased silt with depth.			G	
	16	Bottom of hole at 4.5 meters On completion slough at 2.8 meters				
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- ● Moisture Content %
- ► Plastic Limit
- ◄ Liquid Limit
- ⧩ Ground Water Level
- (X) Shear strength in kPa (Torvane or Penetrometer)
- X Shear strength in kPa (Unconfined)
- ⊗ Shear strength in kPa (field vane)
- ⊠ Remolded strength in kPa
- ■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

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Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-6
Pg 1 of 1

Project No: 607-0240

Depth (m)	Depth (ft)	Description	Piezo 1	C	N	Type	Water Level
0	0	**ASPHALT**- (100mm)					
		GRAVEL AND SAND (FILL) Crushed, gravel sizes to 20mm diameter, well graded, dense, brown, moist.				G	
	2	**GRAVEL AND SAND (FILL)** Pit run, cobble sizes to 70mm diameter, well graded, dense, brown, moist.					
	4	**SAND** - Some silt, some gravel sizes to 25mm diameter, trace clay, medium to fine grained, dark brown, moist.				G	
	6	**SAND** - Trace silt, medium to fine grained, clean, dense, mottled rusty brown and grey, moist.			5	SPT	
2	8	**SAND** - Silty, trace clay, fine grained, compact, mottled brown and grey, moist.					
	10	**CLAY** - Silty, trace fine grained sand, firm, grey, moist to wet.				G	
	12				3	SPT	
4		- softer with depth.					See 25/10/7
	14				0	SPT	
	16	Bottom of hole at 4.9 meters					
6	18						
	20						
	22						
	24						
8	26						
	28						
	30						
	32						

PP @ 1.3m = 100 to 125kPa
PP @ 2.5m = 125kPa
PP @ 2.9m = 50kPa

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- Moisture Content %
- Plastic Limit
- Liquid Limit
- Ground Water Level
- Shear strength in kPa (Torvane or Penetrometer)
- Shear strength in kPa (Unconfined)
- Shear strength in kPa (field vane)
- Remolded strength in kPa
- Percent Passing # 200 sieve

Bentonite/Grout Plug
Solid Pipe
Cuttings
Slotted Pipe
Sand/Pea-Gravel

Drill Method: Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

1 LOG PER PAGE 607-0240.GPJ LEVELTON.GDT 10/1/07

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Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-7

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
		ASPHALT- (100mm)				
		SAND AND GRAVEL-				
	2	**SILT** - Some fine grained sand, little to trace clay, firm to stiff, mottled brown and grey.				
	4					
2	6			9	SPT	
	8	**SILT** - Some clay, trace to little fine grained sand, firm to stiff, grey, moist.				
	10			7	SPT	
	12					
4	14	**SILT** - Some clay, little fine grained sand, little gravel sizes, soft, grey, wet.				
	16			1	SPT	Sep/26/07
		Bottom of hole at 4.95 meters				
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- Moisture Content %
- Plastic Limit
- Liquid Limit
- Ground Water Level
- Shear strength in kPa (Torvane or Penetrometer)
- Shear strength in kPa (Unconfined)
- Shear strength in kPa (field vane)
- Remolded strength in kPa
- Percent Passing # 200 sieve

Drill Method: Hollow Stem Auger
Date Drilled: 9/26/2007
By: SRJ

1 LOG PER PAGE 607-0240.GPJ LEVELTON.GDT 10/1/07

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Larwood/Harrogate Road Upgrade
Campbell River, BC
Geotechnical Assessment

TH07-8

Project No: 607-0240

Depth (m)	Depth (ft)	Description	C	N	Type	Water Level
		ASPHALT- (50mm)				
		GRAVEL AND SAND (FILL) Gravel sizes to 20mm diameter, crush, well graded, dense, brown, damp.				
	2	**GRAVEL AND SAND (FILL)** Cobble sizes to 75mm diameter, pit run, well graded, dense, brown, damp.				
		SAND AND GRAVEL- Silty, cobble sizes to 75mm, trace clay, dense, dark brown, moist.			G	
	4					
	6					
2		**SAND**- Silty, some clay, some gravel sizes to 50mm diameter, firm to dense, grey, moist to wet.				
	8				G	
	10	- very wet below 3.2m depth				
	12				G	
4						
	14	*- increased drilling resistance observed at 4.2m depth*			G	
		- till-like, dry below 4.2m depth.				
	16	Bottom of hole at 4.5 meters Dry on completion Slough at 3.4 meters				
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
S : Shelby
FP : Fixed Piston
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type: Trip Hammer

- ● Moisture Content %
- ▶ Plastic Limit
- ◀ Liquid Limit
- ⧩ Ground Water Level
- ⊠ Shear strength in kPa (Torvane or Penetrometer)
- × Shear strength in kPa (Unconfined)
- ⊗ Shear strength in kPa (field vane)
- ⊠ Remolded strength in kPa
- ■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 9/26/2007
By: SRJ

1 LOG PER PAGE 607-0240.GPJ LEVELTON.GDT 10/1/07

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Table 1. Summary of Road Condition Observations September 6th 2007.

Harrogate Road – traversed south from intersection with Larwood Road	
Approximate stationing	Comment
0 to 190 m	Asphaltic road surface in a reasonably good condition. No deeper seated base failures observed. No tears or alligator cracking observed. No raveling observed. A number of trench lines are present as detailed below
35 m	Transverse trench patch (to watermain). Previous crack sealing observed. New sealing required.
55 m	Transverse trench patch (to watermain). Previous crack sealing observed. Minor amount of new sealing required.
110m	Relative new transverse trench patch (to watermain).
150 m	Relative new transverse trench patch (to watermain).
170 m	Relative new transverse trench patch (to watermain).
190 m	Intersection with Erickson Road
Larwood Road – traversed east from intersection with Harrogate Road to Eardley Road	
0 to 340 m	Asphaltic road surface in a reasonably good condition aside from longitudinal trench patch in north lane for new watermain. Local areas of trench settlement and asphalt tears above sanitary trench in centre of road. No significant raveling observed. A number of trench lines and local patched areas as detailed below
10 m	Transverse joint in mats
60 m	Transverse trench patch (to watermain). Previous crack sealing observed.
115 m	Transverse trench patch (to watermain). Previous crack sealing observed.
135 m	Tears in AC surface over a 1.5 by 15 m long area above the approximately 3 m deep sanitary sewer trench in the center of the road.
155 m	Transverse trench patch (to watermain). Previous crack sealing observed.
180 m	Transverse trench patch (to watermain). Previous crack sealing observed. 10 mm of settlement – need re-sealing of cracks.
195 m	Transverse trench patch (to watermain). Previous crack sealing observed.
225 – 230 m	Two transverse trench patches (to watermain). Previous crack sealing observed. Some re-sealing required.
250m	Transverse trench patch (to watermain). Previous crack sealing observed.
280 m	Local patch 0.5 m2 on south lane.
285m	Transverse trench patch (to watermain). Previous crack sealing observed.
300 – 340 m	Various repair and transverse trench patches. Previous crack sealing observed.
Larwood Road – traversed east from intersection of Eardley Road to Island Highway	
0 to 325 m	Asphaltic road surface in a reasonably good condition aside from longitudinal trench patch in north lane for new watermain. Local areas of trench settlement and asphalt tears above sanitary trench in centre of road. No significant raveling observed. A number of trench lines and local patched areas as detailed below.
Intersection	Several trench patches to watermain. Local tearing within AC mat over sanitary sewer (4 m deep).

13m	Square 4m2 patch on south side – plus possible old borehole repair.
40m	Transverse trench patch (to watermain). Previous crack sealing observed.
65m	Transverse trench patch (to watermain). Previous crack sealing observed.
80m	Tears in AC mat over sanitary sewer for area about 1.5 m by 10 m
95m	Transverse trench patch (to watermain). Previous crack sealing observed.
110m	Transverse trench patch (to watermain). Previous crack sealing observed.
120m	Possible old borehole patch in south lane.
122m	Transverse trench patch (to watermain). Previous crack sealing observed.
130 m	Transverse trench patch (to watermain). Previous crack sealing observed.
130 – 160m	Local settlement over sanitary trench.
150m	Local settlement around sanitary sewer manhole with tears in AC surface.
170m	Transverse trench patch (to watermain). Previous crack sealing observed.
185m	Transverse trench patch (to watermain). Previous crack sealing observed. New sealing required.
190m	Local 0.5 m2 patch in south lane has settled about 10 mm. Grass in cracks. Repair advised. .
205 to 215m	Local settlement and tears in AC mat over sanitary trench.
220 to 230m	Local settlement and tears in AC mat over sanitary trench.
235m	Transverse trench patch (to watermain). Previous crack sealing observed.
250 to 265m	Local settlement and tears in AC mat over sanitary trench.
270m	Diagonal joint with new AC mat from Island Highway works.
325 m	Island Highway

ERICKSON ROAD SANITARY SEWER REPLACEMENT GEOTECHNICAL ASSESSMENT

Highland Engineering Services Ltd.

Project No: 161-13554-00
Date: November 2016

WSP Canada Inc.
1935 Bollinger Road
Nanaimo, BC
V9S 5W9

Phone: 250-753-1077
Fax: 250-753-1203
www.wspgroup.com

1 INTRODUCTION

As requested, WSP Canada Inc. (WSP) has carried out a geotechnical assessment relating to the proposed Erickson Road sanitary sewer main replacement in Campbell River, BC. The purpose and scope of the assessment were outlined in WSP's proposal dated 14 July 2016 (file reference: P16-11097-97) and addendum dated 22 August 2016. Authorization to proceed with the work was received from Highland Engineering Services Ltd. (Highland Engineering) via email on 12 September 2016.

WSP understands that the proposed new sanitary sewer main would serve as a replacement and upgrade to the existing sewer line and that currently two routing options are being considered:

1. Option 1 starts at the intersection of Fairmile Road and Erickson Road and goes east along Erickson Road for approximately 750 m to Harrogate Road, then north along Harrogate Road for approximately 180 m, then east along Larwood Road for approximately 600 m to terminate at the intersection of Larwood Road and the Island Highway; and
2. Option 2 starts at the intersection of Fairmile Road and Erickson Road and goes east along Erickson Road for approximately 975 m, then north along a foot path for approximately 220 m to Larwood Road, then east along Larwood Road for approximately 400 m to terminate at the intersection of Larwood Road and the Island Highway.

Based on information provided by Highland Engineering, the new installation will be at a similar depth to the existing sewer – which, over the majority of the alignment, is at about 3 to 3.5 m. The exception is within the eastern portion of Larwood Road, where installation depths will be between about 3.5 to 4.5 m. It is understood that directional drilling could be considered for installation of the relatively deep pipes along Larwood Road.

The proposed routes are shown on the attached Figure 1.

A subsurface assessment was carried out along both routes in October 2016. The following presents the results of the subsurface work along with geotechnical discussion and recommendations relating to the design and construction of the new sanitary sewer main.

2 SUBSURFACE ASSESSMENT

A subsurface assessment - consisting of fifteen boreholes advanced with a track-mounted auger drill rig operated by Blue Max Drilling of Courtenay – was carried out on the 21st and 28th of October 2016.

Prior to drilling, WSP visited the site with a service locates contractor (Kelly's 1st Call of Nanaimo) to clear the proposed borehole locations from conflicts with known underground utilities.

During the service locates and drilling, WSP acted as Prime Contractor for those aspects of the work. WSP also obtained a Works on City Lands & Infrastructure Permit from the City of Campbell River prior to the field work. During the service locates and the drilling, a traffic control contractor (JSK) was hired to direct traffic around the work areas.

Eight of the boreholes were completed within sections that both of the proposed routes have in common: five on Erickson Road and three on the east end of Larwood Road. Three additional holes were completed along the proposed Option 1 route: one on Harrogate Road and two on the west end of Larwood Road. An additional four holes were competed along the proposed Option 2 route: three on Erickson Road and one at along the walking path.

The boreholes were located, logged, and sampled by WSP field personnel. Samples obtained during drilling were returned to the WSP laboratory in Nanaimo for visual classification, moisture content determination, and Atterberg Limits testing, where appropriate.

After drilling, the boreholes were backfilled with the cuttings and patched at the surface with cold-mix asphalt, where needed.

The approximate locations of the boreholes are shown on the Site Plan attached as Figure 1. Detailed descriptions of the conditions encountered in each borehole – along with the results of the laboratory testing results – are presented in the attached Borehole Summary Logs.

3 SUBSURFACE CONDITIONS

The subsurface conditions encountered during the drilling program are presented in the following sections. For discussion purposes, the alignment has been divided into discrete sections based the proposed alignment options and typical soil conditions.

Note that the description of the consistency of the soil deposits presented below are based on interpretation of drilling resistance and sample condition. Where appropriate, a Pocket Penetrometer was used to estimate the unconfined compressive strength (penetration resistance) on disturbed hand-samples of fine grained soils.

3.1 ERICKSON ROAD - FAIRMILE ROAD TO HARROGATE ROAD

The initial approximately 300 m of this section of Erickson Road sloped down to the east from an elevation of approximately 28 m at its intersection with Fairmile Road to approximately 14 m near Martin Road. The remaining approximately 450 m of this section was relatively flat lying with a slight slope down to the east to an elevation of approximately 10 m at the intersection with Harrogate Road.

Five boreholes (BH16-01 to BH16-05) were advanced in this section. In general, the boreholes encountered asphalt surfacing (where drilled directly through the road surface) and associated gravelly sand (road base) fill overlying deposits of compact to dense sand with varying amounts of gravel and silt. The majority of boreholes terminated in the sandy deposit at depths of between 4 and 5 m.

The exception was in Borehole BH16-04 in which a deposit of soft, grey, silty clay was encountered below the sand at 3.2 m depth. The clay continued to the target termination depth of 5.2 m.

Atterberg Limits determination on a sample of the silty clay indicated it is an inorganic clay of medium plasticity (CI) with a Liquid Limit of about 32 percent and a moisture content of about 34 percent.

Both BH16-01 and BH16-05 met inferred penetration refusal on cobbles at shallow depths initially and were re-drilled at a location nearby. BH16-05 was terminated due to refusal on a cobble at 3.5 m depth on the second drilling attempt.

Measurements of groundwater levels in the open boreholes at the time of drilling indicated a groundwater level of between 0.8 m to 3.4 m below ground surface.

3.2 OPTION 1 ROUTE - HARROGATE ROAD AND LARWOOD ROAD

This portion of the proposed sewer alignment was relatively low-lying and level with ground surface elevations of about 9 m. This section also included a natural water course crossing along Larwood Road.

Three boreholes (BH16-09 to BH16-11) were advanced in this section: one (BH16-09) on Harrogate Road; and the other two toward the west end of Larwood Road. In general, the boreholes encountered asphalt surfacing and associated gravely sand (road base) fill at surface. In BH16-09, the fill was underlain by deposits of compact to dense sand with varying amounts of gravel and silt. BH16-09 was terminated due to refusal within the sand deposit (due to inferred presence of cobbles) at a depth of 4.0 m. In BH16-10, a 0.5 m thick layer of organics was encountered at a depth of 1.8 m and may be associated with fill material used for the road construction near the watercourse crossing. Directly below the organics, at a depth of 2.3 m, was a deposit of soft, grey, silty clay with intermediate plasticity. The borehole was terminated in the clay at a depth of 4.0 m. BH16-11 encountered compact to dense, silty sand to a depth of 1.4 m underlain by stiff, silt and clay. The hole was terminated within the silt and clay at a depth of 3.7 m.

Atterberg Limits determination on a sample of the silty clay indicated it is an inorganic clay of medium plasticity (CI) with a Liquid Limit of about 34 percent and a moisture content of about 33 percent.

No groundwater was present at the time of drilling within BH16-09 and BH16-10. Measurements of groundwater levels in the open hole of BH16-11 at the time of drilling indicated a groundwater level of 3.0 m below ground surface.

3.3 OPTION 2 ROUTE 2 - ERICKSON ROAD AND THE WALKING PATH

This portion of the alignment was relatively low-lying and level with ground surface elevations of about 8 m. This section also included a natural watercourse crossing on Erickson Road. The walking path was parallel to the watercourse channel and provided foot access from Erickson Road to the parking lot a fire hall that fronts onto Larwood Road.

Four boreholes (BH16-06 to BH16-08) were advanced in this section: three along Erickson Road; and one (BH16-08) on the walking path between Erikson Road and Larwood Road. In general, the boreholes drilled along Erickson Road encountered asphalt (where the hole was drilled through the road surface) and/or gravelly sand fill. BH16-08 encountered compact silty sand fill with organics to a depth of 1.7 m, which was likely reworked local soil from the construction of the adjacent fire hall. Underlying the fill in all boreholes was compact to dense sand with varying amounts of silt and gravel.

BH16-07A and BH16-08A were terminated due to drilling refusal on cobbles at about 2.6 m depth. Three attempts to drill past 2.6 m at slightly different locations were made at BH16-07A, but each attempt met with refusal. Underlying the sand in BH16-07 at a depth of 2.1 m was soft, grey, silty clay that continued to the drilling termination depth of 4.6 m.

Atterberg Limits determination on a sample of the silty clay indicated it is an inorganic clay of medium plasticity (CI) with a Liquid Limit of about 34.5 percent and a moisture content of about 33 percent.

Measurements of the groundwater level in the open hole of BH16-07 at the time of drilling indicated a water level at a depth of 2.0 m below ground surface. No groundwater was present at the time of drilling within the completed depths of BH16-06, BH16-07A and BH16-08.

3.4 LARWOOD ROAD - THE WALKING PATH TO THE ISLAND HIGHWAY

This portion of the alignment was relatively low-lying and level with ground surface elevations of about 8 m. For the final approximately 50 m of this section, Larwood Road sloped down to intersect the Island Highway at an elevation of approximately 4 m.

Three boreholes (BH16-12 to BH16-14) were advanced in this section of Larwood Road. In general, the boreholes encountered asphalt surfacing (where drilled directly through the road surface) and associated gravely sand (road base) fill overlying deposits of compact to dense sand with varying amounts of gravel and silt. In BH16-12- at a depth of a 2.9 m - very loose, wet sand was encountered which continued to the termination depth of 5.2 m. In BH16-13, stiff to very stiff, sandy silt was encountered from 1.4 m to 3.6 m where it overlay dense sand to the termination depth of 5.2 m. In BH16-14, compact, coarse grained sand was encountered from 1.4 m to the termination (from drilling refusal) depth of 2.7 m.

Measurements of groundwater levels in the open holes of BH16-12 and BH16-13 at the time of drilling indicated groundwater levels at depths of 1.2 m and 1.7 m below ground surface, respectively. No groundwater was present at the time of drilling within the completed depth of BH16-14.

4 DISCUSSION AND RECOMMENDATIONS

4.1 GENERAL

The following sections present geotechnical discussion and recommendations relating to the design and construction of the proposed sewer main based on the results of the subsurface assessment.

4.2 POTENTIAL SUBGRADE CONDITIONS

As described above, it is understood that the typical installation depth will be about 3 to 3.5 m below current ground surface, with a relatively deeper installation (between 3.5 and 4.5 m) along the eastern extent of Larwood Road.

The information from the boreholes along this section of Erickson Road (BH16-01 to BH16-6) indicated that the potential subgrade for the proposed installation over the majority of the proposed alignment will consist of natural, compact/dense sand with varying amounts of gravel and cobbles. There were exceptions to this condition in the areas of BH16-04, BH16-07, and BH16-10, where the subgrade could consist of soft, silty clay. In general, the presence of this silty clay appeared to be associated with a local low lying area and/or an existing watercourse.

Based on the subsurface information, an important geotechnical consideration will be the presence of relatively soft, fine grained soil. In this case, some modest over-excavation and replacement of the softer soils (estimated to be in the order of 0.3 m) may be required to stabilize trench bottom conditions. Materials that are used to replace the over-excavated soil could consist of pea gravel or drain rock. However, drain rock, pea gravel, and other uniform soils rely on permanent confinement to provide internal shear strength. If these soils are considered to support the pipe, future excavation work in this area must consider the difficulty in stabilizing the soil and pipe. In addition, a suitable separation of unlike materials should be accounted for to prevent migration of soils that could lead to future trench settlements. A non-woven geotextile (such as Nilex 4545 or equivalent) should be used to separate the natural fine grained soils from the trench backfill or pipe bedding. The geotextile should surround and overlap the backfill material.

Alternative pipe support materials could also be considered in the softer soil. WSP would be pleased to discuss other alternatives, if considered.

The intermediate plastic clays in the area are considered as ‘moderately susceptible’ to liquefaction or cyclic mobility in response to earthquake shaking according to criteria presented in the Canadian Foundation Engineering Manual 4th Ed. (Section 6.6.3.2(6)). If earthquake stability is considered for the sewer line, flexible connections should be considered at the interface of the dense sand and soft clay soils. A flexible pipe such as HDPE could also be considered.

4.3 EXCAVATION CONSIDERATIONS

4.3.1 GENERAL

In general, the excavation for the majority of the proposed installation will take place through compact to dense natural granular soils, consisting primarily of sand. Typically, these soils can be provide reasonable, short term, side slope stability under well drained conditions. Note that the local granular soils exhibited minor sloughing within the boreholes in areas where groundwater seepage was present.

It is not expected that the sand with gravel observed in the boreholes would stand vertically when excavated – even in the short term. It should be expected that the trench side walls will require grading to about 3/4H:1V (horizontal:vertical) during construction. These gradients could be flatter in the case where groundwater and water seepage is encountered.

Temporary excavation side slopes should be confirmed through field review by a geotechnical engineer during construction. All excavation should conform to WorkSafeBC requirements and regulations.

To reduce the volume of excavation during construction (through use of near vertical side walls), there should be a contingency for use of a trench box to provide adequate temporary stability and/or worker protection – especially through the sections of relatively deep (greater than about 3.5 m) installation.

In general, the soils encountered in the test pits would be susceptible to generation of sediment once exposed to the weather, especially rainfall. Depending on the time of year for construction, an erosion and sediment control plan could be required to reduce the potential for sediment laden runoff to enter the local storm water system.

4.3.2 DIRECTIONAL DRILLING

Based on conversation with Highland Engineering, it is understood that – due primarily to the potential depth of installation - the proposed section of new sewer along Larwood Road would be installed using directional drilling or pipe bursting rather than open excavation.

Based on the subsurface information along Larwood Road (BH16-11 to BH16-13), and the potential installation depths provided by Highland Engineering, directional drilling would take place through relatively uniform deposits of soft, silt/clay and/or sand with gravel. The soils encountered within this section of the proposed alignment could be considered for directional drilling – subject to review and input from a qualified drilling contractor.

Outside of this section, however, the boreholes encountered relatively gravelly soil conditions with cobbles and (inferred) boulders. In some cases, the auger drilling was terminated due to encountering large rock particles. It is understood that use of a directional drill can be sensitive to, and deflected by, obstructions such as cobbles and boulders.

4.4 TRENCH BACKFILL

The majority of natural soil encountered during the subsurface assessment consisted of natural sand with varying amounts of silt, gravel, and (inferred) cobbles and boulders. The City of Campbell River Design Standards references the MMCD Specifications for trench backfill below paved or settlement sensitive areas as clean, well graded, 75 mm minus sand and gravel.

For trench backfill and reconstruction of the roadway, it is considered that the local natural soils would be outside of the specified City specification limits and would not be suitable for re-use due to the inconsistency in composition, potentially high fines (silt/clay) and moisture contents, and inclusion of oversize particles, such as cobbles and boulders.

WSP could discuss potentially re-using natural soils in non-settlement sensitive areas, if requested.

Where encountered, the natural silty clay should not be considered for re-use anywhere on the project and should be removed from the site and replaced with suitable imported sand and gravel.

It is recommended that, during excavation, the granular material be reviewed in the field by the geotechnical engineer to assess its potential for reuse.

4.5 ROUTE SELECTION

As outlined above, there are two optional routes for the new sewer alignment. From a geotechnical standpoint, the Option 1 Route (including Harrogate Road and the western extent of Larwood Road) would be more favourable. This would be due primarily to: a lesser extent of fine grained soils at the potential installation depth; avoidance of the (apparent) presence of fine grained soils on both sides of the creek crossing on Erickson Road; potential encounter of organic soils; and construction/support of a creek crossing.

5 FUTURE GEOTECHNICAL WORK

Based on the information from the subsurface assessment, the following geotechnical work could be anticipated for this project:

- Review of the final sewer main profile in relation to the subsurface conditions encountered in the boreholes;
- Discussions and recommendations on alternate bedding and backfill requirements;
- Interaction with potential directional drilling contractors in relation to suitability of subsurface conditions for this type of installation;
- Design of reinforced backfill that incorporates local granular soils and still meets the performance expectations for the roadways;
- Input to the proposed water crossing of Erickson Road;
- Development of an erosion and sediment control plan, if necessary; and
- Field reviews, consultation, and testing during construction.

WSP would be pleased to discuss the requirements for further geotechnical input to the project and prepare associated work scopes and cost estimates, if requested.

6 CLOSURE

The work outlined above was carried out in accordance with our current contract with Highland Engineering Ltd. and the attached Terms or Reference for Geotechnical Reports.

We trust that the information presented herein meets your current requirements. If you have any questions, or require further information, please contact the undersigned.

Yours truly,
WSP Canada Inc.

Reviewed by:

Signatures on File

Per:	Tom Oxland, P.Eng. Senior Geotechnical Engineer	Don Kaluza, P.Eng. Senior Geotechnical Engineer

Attachments: Figure 1 – Site Plan – Borehole Locations
Borehole Summary Logs
Terms of Reference for Geotechnical Report

WSP	PROJECT: ERICKSON ROAD SANITARY SEWER MAIN REPLACEMENT				
	TITLE: SITE PLAN – BOREHOLE LOCATIONS				
	CLIENT: HIGHLAND ENGINEERING SERVICES LTD.				
FIGURE NO.: 1	DATE: NOVEMBER 2016	FILE NO.: 161-13554-00	SCALE: NTS	DRAWN BY: LM	REV NO.: 1

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-01

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (152 mm)				
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.			G1	
	2	compact, brown, SAND and GRAVEL, some silt, poorly graded, maximum particle size = 60 mm, moist, cobbles.			G2	
	4	compact, grey, SAND, trace gravel, trace silt, poorly graded, moist.			G3	
2	6					
	8	- below 2.4 m, some gravel, cobbles.				
	10				G4	P1 Oct 21 2016
4	12	- below 3.3 m, wet				
	14					
	16	End of hole at 4.6 m. Minor sloughing. Free water at 3.3 m.				
6	18					
	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

1 LOG PER PAGE 23/11/16

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-02

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (102 mm)			G1	
	2	dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 50 mm, moist.				
		dense, brown, SAND and GRAVEL, some silt, poorly graded, maximum particle size = 100 mm, moist, cobbles.				
	4	compact, grey, SAND, some silt to silty, some gravel, poorly graded, moist, cobbles.			G2	
2	6					
	8	- below 2.3 m, wet				P1 Oct 21 2016
	10					
	12				G3	
4	14	End of hole at 3.8 m. Minor sloughing. Free water at 2.3 m.				
	16					
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

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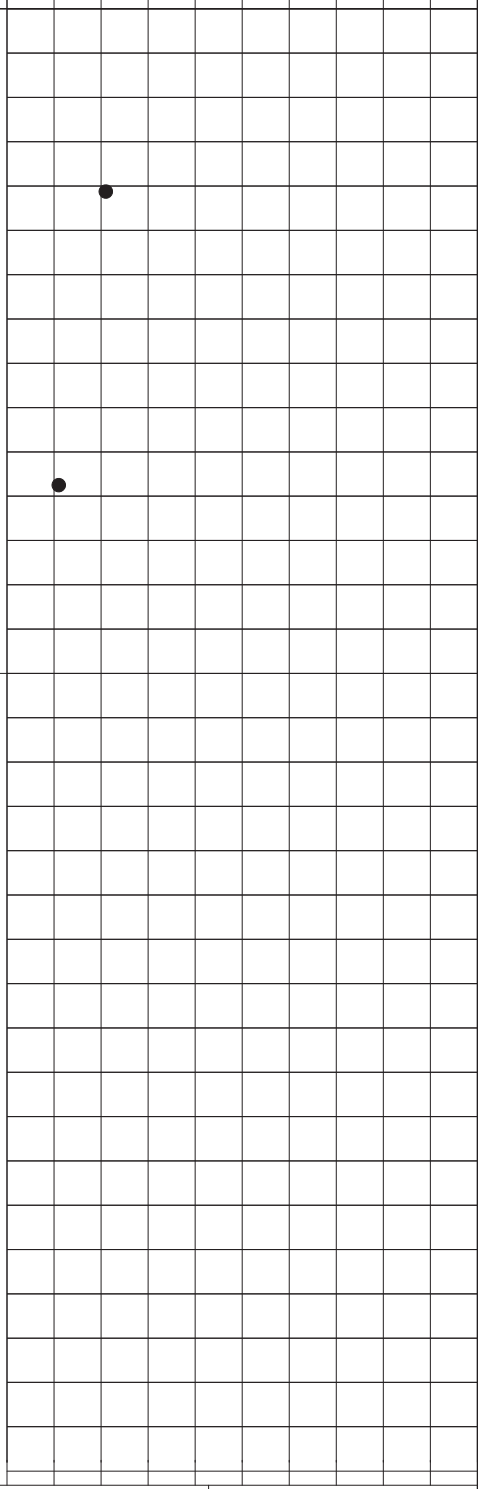
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-03

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		compact, grey, sandy, GRAVEL (FILL)				
	2	dense, brown with grey streaks, SAND, some gravel, trace silt, poorly graded, maximum particle size = 30 mm, moist.				P1 Oct 21 2016
	4	- below 0.8 m, wet			G1	
2	6					
	8					
	10	- below 2.6 m, grey, cobbles		88	SPT1	
	12					
4	14	- below 4.0 m, silty				
	16	End of hole at 4.6 m. Minor sloughing. Free water at 0.8 m.				
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

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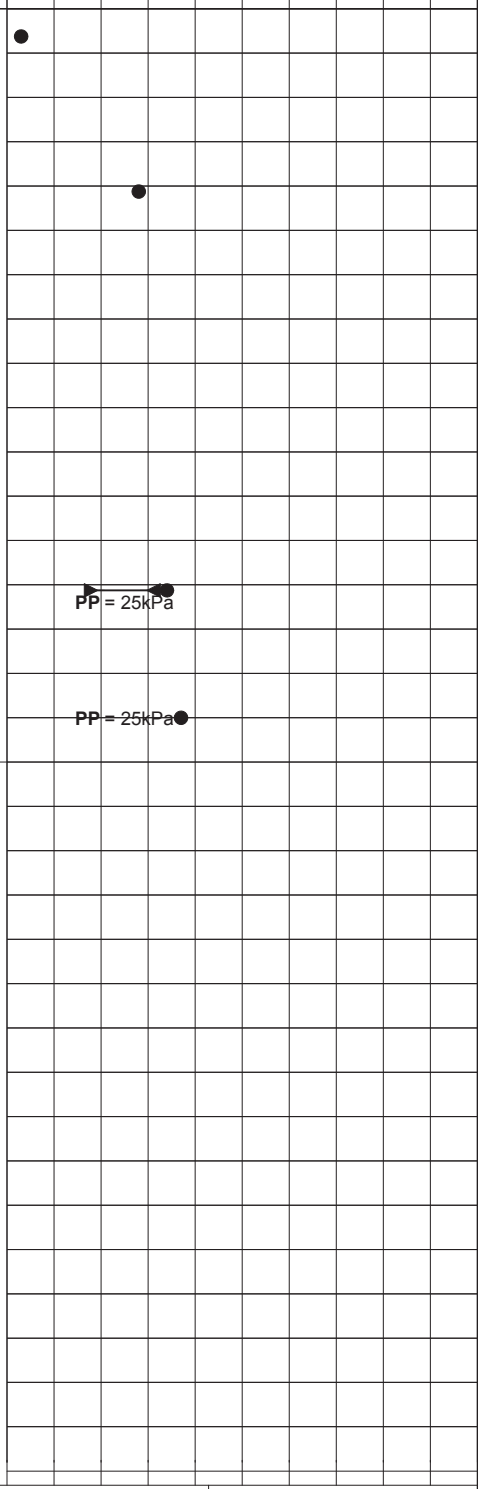
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-04
Pg 1 of 1
Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (140 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 60 mm, moist.				
	2	compact to dense, brown, SAND, some silt, trace to some gravel, poorly graded, maximum particle size = 40 mm, moist, organics to 0.8 m depth.				
	4				G2	
2	6					
	8					P1 Oct 21 2016
	10	compact, grey, SAND, trace gravel, trace silt, poorly graded, wet.				
	12	soft, grey/blue, silty, CLAY, trace sand, intermediate plasticity, moist.				
4	14				G3	
	16			2	SPT1	
	18	End of hole at 5.2 m. Minor sloughing. Free water at 2.7 m.				
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-05

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		dense, brown, SAND, some gravel, trace silt, poorly graded, maximum particle size = 60 mm, moist, cobbles.			G1	
		dense, grey, silty, SAND, some gravel, poorly graded, maximum particle size = 30 mm, moist, cobbles.			G2	P1 Oct 21 2016
		- below 3.0 m, wet				
		End of hole at 3.5 m due to refusal on cobble. Minor sloughing. Free water at 3.0 m.				

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-06

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		dense, brown, SAND (FILL?), some gravel, some silt, poorly graded, maximum particle size = 40 mm, moist, cobbles.				
		- between 0.15 m and 0.9 m, organics				
		dense, brown, silty, SAND, some gravel, poorly graded, maximum particle size = 80 mm, moist, cobbles.			G1	
					G2	
		- below 3.9 m, grey				
		End of hole at 4.1 m due to refusal on cobble. Hole sloughing. No free water.				

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
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Checked by: TWO

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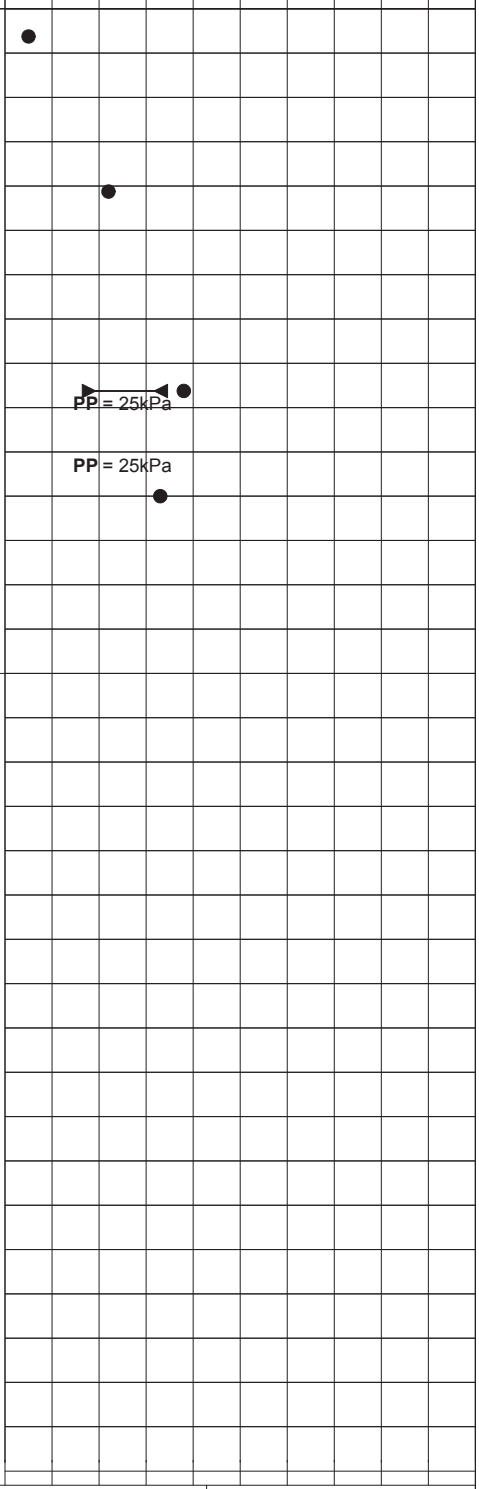
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-07

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (114 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 40 mm, moist.				
	2	compact, light brown, SAND, some silt, trace gravel, poorly graded, maximum particle size = 10 mm, moist.				
	4				G2	
	6					P1 Oct 21 2016
2		- below 2.0 m, wet				
	8	soft, grey/blue, silty, CLAY, trace sand, intermediate plasticity, moist.			G3	
	10					
	12			2	SPT1	
4						
	14					
	16	End of hole at 4.6 m. Minor sloughing. Free water at 2.0 m.				
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-07A

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (76 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.				
	2	compact, light brown, SAND, trace gravel, trace silt, poorly graded, maximum particle size = 10 mm, moist.				
	4				G2	
	6					
2		- below 1.8 m, some gravel, cobbles.				
	8					
		End of hole at 2.6 m due to refusal on cobble. Minor sloughing. No free water.				
	10					
	12					
4						
	14					
	16					
	18					
6						
	20					
	22					
	24					
8						
	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 21/10/2016
Logged by: TWO
Checked by: TWO

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-08

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		compact, brown/black, silty, SAND (FILL), some gravel, poorly graded, maximum particle size = 100 mm, moist, cobbles, organics.			G1	
2	6	dense, brown, silty, gravelly, SAND, poorly graded, maximum particle size = 20 mm, moist cobbles.			G2	
	8	End of hole at 2.6 m due to refusal on cobble. Minor sloughing. No free water.				
4	14					
6	20					
8	26					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
Logged by: TWO
Checked by: TWO

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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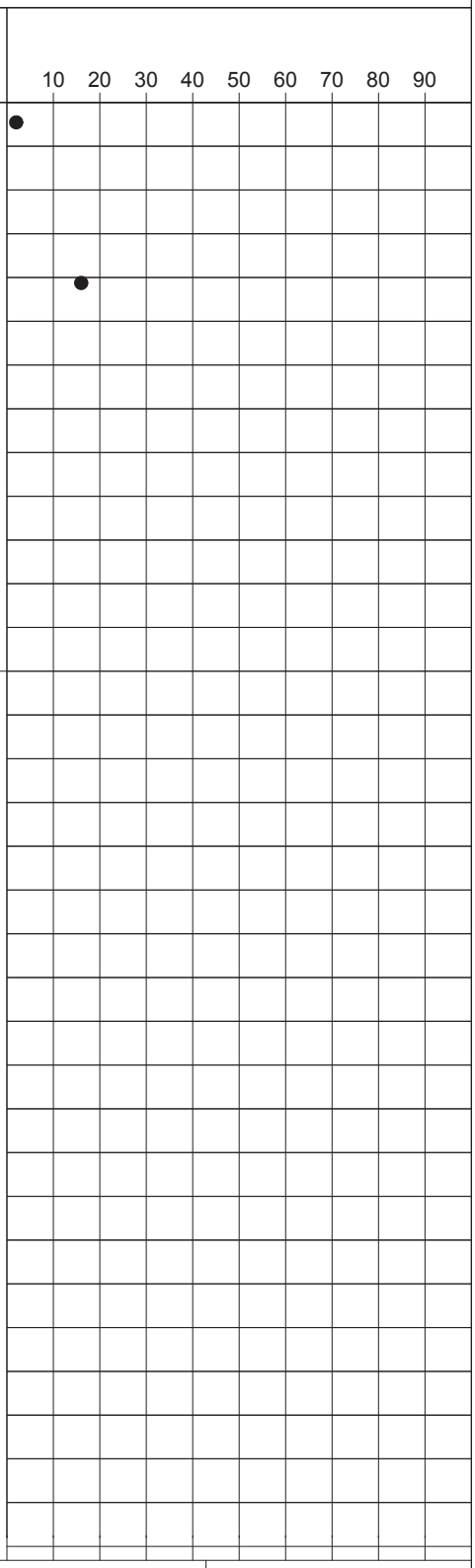
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-09

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (51 mm)			G1	
		dense, brown, SAND and GRAVEL (FILL), trace silt, poorly graded, maximum particle size = 40 mm, moist.				
	2	dense, brown, silty, SAND, some gravel, poorly graded, maximum particle size = 100 mm, moist, cobbles.				
	4				G2	
	6					
2						
	8	- below 2.1 m, moist to wet				
	10					
	12					
4		End of hole at 4.0 m. Minor sloughing. No free water.				
	14					
	16					
	18					
6						
	20					
	22					
	24					
8						
	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
Logged by: TWO
Checked by: TWO

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-10

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level	10 20 30 40 50 60 70 80 90
		Asphalt (127 mm)			G1		●
	2	dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.					
		compact, brown, SAND (FILL?), some silt, some gravel, poorly graded, maximum particle size = 60 mm, moist, organics.					
	4				G2		●
2	6						
	8	- at 1.8 m, 0.5 m thick layer of organics			G3		PP = 25kPa ●
		soft, grey/blue, silty, CLAY, trace sand, intermediate plasticity, moist.					
	10						
	12						
4		End of hole at 4.0 m. Hole sloughing. No free water.					
	14						
	16						
	18						
6	20						
	22						
	24						
8	26						
	28						
	30						
	32						

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) ▶ ● ◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger / DCPT
Date Drilled: 28/10/2016
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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-11

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (102 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 40 mm, moist.				
	2	compact to dense, brown, silty, SAND, some gravel, poorly graded, maximum particle size = 60 mm, moist, cobbles.				
	4				G2	
		stiff, grey with brown streaks, SILT and CLAY, some sand, trace gravel, low plasticity, moist.				
2	6					
	8				G3	
	10					P1 Oct 28 2016
		- below 3.0 m, firm, grey		7	SPT1	
	12					
		End of hole at 3.7 m. Minor sloughing. Free water at 3.0 m.				
4	14					
	16					
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

PP = 150kPa

PP = 100kPa

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
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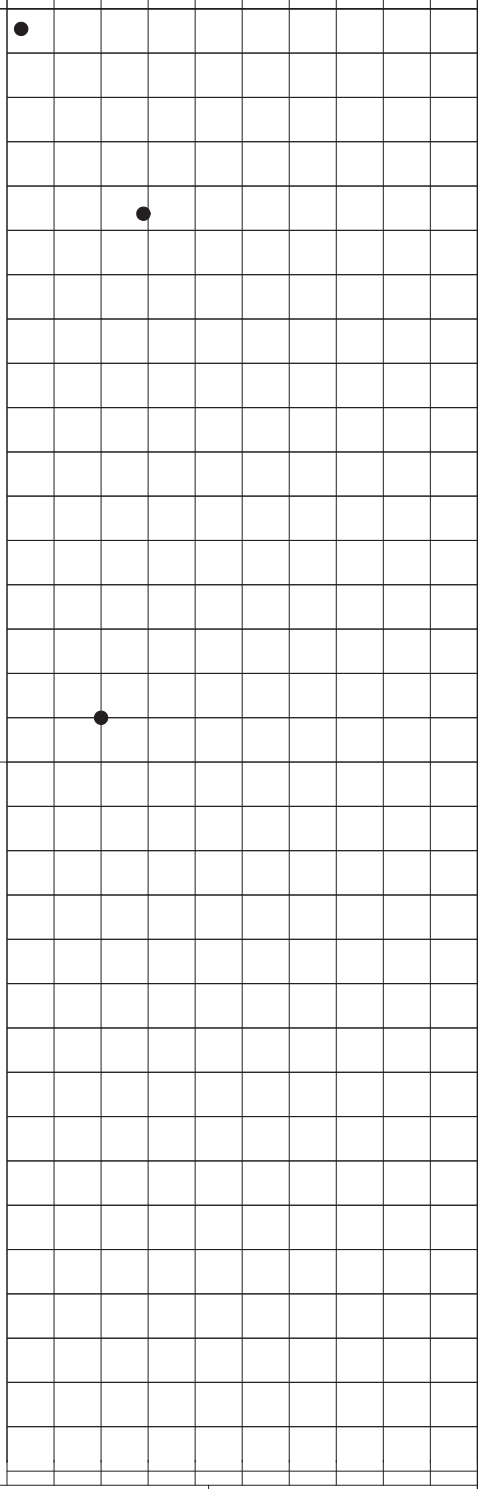
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-12

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (76 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.				
	2	compact, brown, silty, SAND, some gravel, poorly graded, maximum particle size = 60 mm, moist to wet, cobbles.				
	4					P1 Oct 28 2016
					G2	
2	6					
	8					
	10	very loose, grey, SAND, trace silt, poorly graded, maximum particle size = 5 mm, wet.				
	12					
4						
	14					
	16			1	SPT1	
		End of hole at 5.2 m. Hole sloughing below 3.0 m. Free water at 1.2 m.				
	18					
6						
	20					
	22					
	24					
8						
	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
Logged by: TWO
Checked by: TWO

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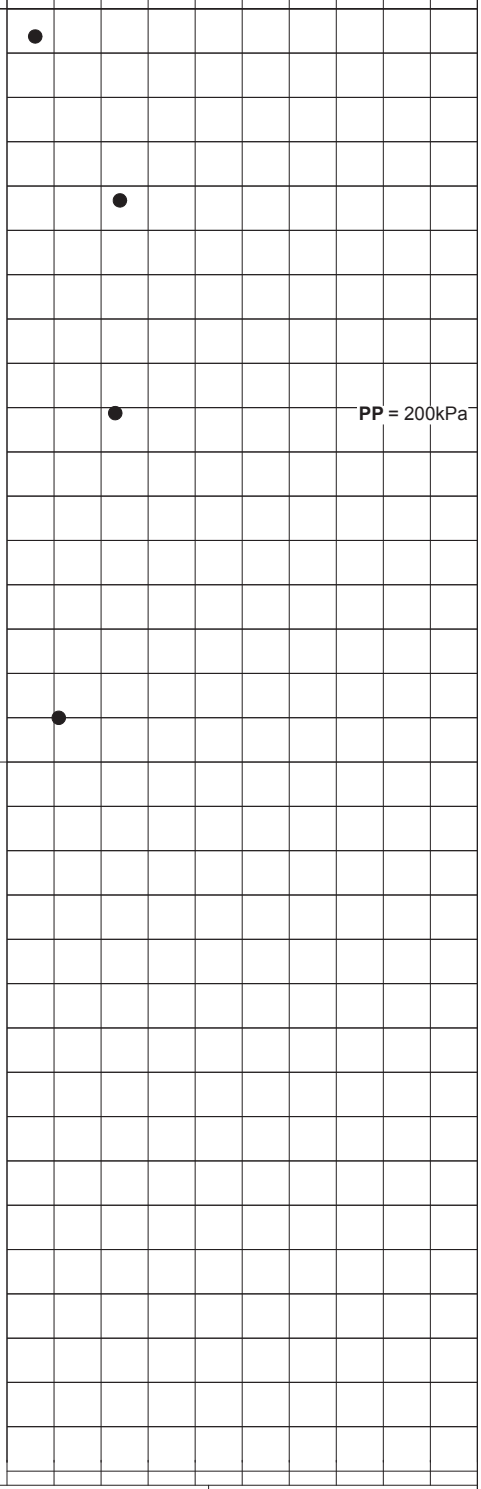
Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-13

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (127 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.				
	2	compact to dense, brown, SAND and SILT, some gravel, poorly graded, maximum particle size = 80 mm, moist.				
	4				G2	
		stiff to very stiff, brown, sandy, SILT, trace gravel, low plasticity, moist.				P1 Oct 28 2016
2	6					
	8				G3	
	10					
	12	dense, grey, SAND, some gravel, trace silt, poorly graded, maximum particle size = 40 mm, wet.				
4	14					
	16			39	SPT1	
	18	End of hole at 5.2 m. Minor sloughing. Free water at 1.7 m.				
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					



C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
Logged by: TWO
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Erickson Road Sanitary Sewer Replacement
Geotechnical Assessment

BH16-14

Project No: 161-13554

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Asphalt (102 mm)			G1	
		dense, brown, gravelly, SAND (FILL), trace silt, poorly graded, maximum particle size = 20 mm, moist.				
	2	compact to dense, red brown, silty, SAND, trace gravel, poorly graded, maximum particle size = 60 mm, moist.				
	4				G2	
	6	compact, brown, coarse grained SAND, some gravel, poorly graded, maximum particle = 100 mm, moist, cobbles.				
2	8				G3	
	10	End of hole at 2.7 m due to refusal on cobble. Minor sloughing. No free water.				
	12					
4	14					
	16					
	18					
6	20					
	22					
	24					
8	26					
	28					
	30					
	32					

10 20 30 40 50 60 70 80 90

C: Condition of Sample
Good
Disturbed
No Recovery

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:
DCPT Blow/300 mm

Plastic Limit (%) — Liquid Limit (%)
Moisture Content (%)
Ground Water Level
(X) Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Solid Stem Auger
Date Drilled: 28/10/2016
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October 17, 2016

Richard Stephens, P.Eng.
Highland Engineering and Surveying
104-950 Alder Street
Campbell River, BC. V9W 2P8

Re: Larwood – Erickson Sewer Upgrade, ESA Assessment

Dear Mr. Stephens,

An overview assessment of the proposed Larwood – Erickson sewer upgrade connection routes was completed on September 15, 2016 at your request to determine any environmental and regulatory constraints related to exploratory geotechnical drilling, as well as the proposed connection routes. The purpose of the drilling is to determine if the two potential routes are appropriate for completing upgrades to the municipal sanitary sewer line. The request for an assessment was triggered because the proposed routes of the sewer upgrade occur in close proximity to several Environmentally Sensitive Areas (ESA) including Bald Eagle nest trees, Larwood Creek and Willow Creek.

Proposed Route 1 follows paved roadways along Erickson Road, Harrogate Road and Larwood Road (Figure 1). Route 2 provides an alternate connection from Erickson Road to Larwood Road, via an unpaved walking trail adjacent to Larwood Creek rather than Harrogate Road.

Exploratory drilling will be completed using a truck mounted drill rig resulting in a disturbed area of approximately 1 square foot per hole or a 6 inch diameter hole in pavement. Cuttings will be put back into the holes and the holes will be topped with gravel. Completion of the sewer upgrade work will require the excavation of a linear trench to install the sewer line along the selected route, involving heavy equipment. The amount of ground and vegetation disturbance that would be required for services installation varies between the two proposed routes.

This letter describes the current conditions of the ESAs along the potential routes, evaluates the potential regulatory restrictions to construction activities associated with the sewer update (including geotechnical drilling along the proposed routes), and provides recommended Best Management Practices (BMPs) to be followed during those activities to ensure the protection of the aquatic and wildlife tree resources. The applicable BMPs are summarized from *Develop with Care 2014 Environmental Guidelines for Urban and Rural Land Development in British Columbia (2014)* and the

Develop with Care companion document *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013)*.

Regulatory Considerations

The construction activities associated with the sewer upgrade that fall within the City of Campbell River Streamside Development Permit Areas and Bald Eagle Nest Tree Development Permit Areas do not trigger the formal development permit approval process because construction, repair, or maintenance of public works by the City or its authorized agents and contractors are exempt from the formal development approval process. However, the works must be completed in accordance with the assessments and recommendations of a Qualified Environmental Professional (QEP) and in accordance with the *Riparian Areas Regulation* (RAR) assessment methodology and other applicable environmental regulations.

Provincial legislation relevant to the proposed project includes the RAR and the *Water Sustainability Act* (WSA). A single linear crossing of a stream is considered "instream works" and is regulated under the requirements of the *Water Sustainability Regulation* (Part 3 Section 39(c)). The work must be done according to the following conditions:

- The pipeline and associated works are installed in a dry stream channel at a depth so that the top of the pipe is at least 1 m below the lowest elevation of the bed of the stream.

- In the case of an aerial crossing, the crossing is construction in accordance with the conditions required for a clear span bridge (Part 3 Section 39 (b)).

Under this regulation, Notification of the work must be provided to the regional Habitat Officer at least 45 days prior to the start of work and follow the conditions stated for the protection of water quality (Section 43) and protection of aquatic ecosystem (Section 44).

Proposed development activities, including the provision and maintenance of sewer services, within 30 m of a stream that extend beyond a single perpendicular linear crossing trigger the requirement for an assessment under the RAR. The intent of this assessment is to determine the required Streamside Protection and Enhancement Area (SPEA) and any measures required to protect that habitat, as specified by the regulation.

The federal *Fisheries Act* states "no person shall carry on work or undertaking that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery" and "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other substance that results from the deposit of the deleterious substance may enter any such water". Failure to show due diligence in the protection of fish and fish habitat could result in violations of the *Fisheries Act* (Government of Canada, 2014). If disturbance to the stream channel is required for the geotechnical drilling and / or sewer main installation, a Project Review by Fisheries and Oceans Canada (DFO) will be required.

Assessment Results

The five identified ESAs associated with the proposed connection routes are associated with either streams or Bald Eagle nest trees. The environmental protection recommended for each of these types of ESAs is discussed in the following sections, with specific details included for each ESA.

Results of the desktop information review and field visit indicate that the proposed sewer upgrade routes either cross or are located in close proximity to five ESAs as shown on Figure 2. A brief description of those ESAs is provided below:

1. The connection route overlaps slightly with the 50 m Streamside Development Permit Area (DPA) of Willow Creek (WSC 920-614400) along Erickson Road and is identified as ESA 1 on Figure 2. According to the BC Ministry of Environmental Fisheries Inventory Data (FIDQ), Willow Creek supports chinook, chum, coho, and pink salmon species, as well as coastal cutthroat trout, steelhead / rainbow trout, coastrange sculpin, threespine stickleback and lamprey fish species[1].
2. Route 1 crosses Larwood Creek on Larwood Road at ESA 2 on Figure 2 (Photo 1). Larwood Creek is one of four main tributaries of Willow Creek and is a confirmed fish bearing stream[2].
3. Route 2 crosses Larwood Creek on Erickson Road (Photo 2) and then parallels the creek. These areas are identified as ESA 3 on Figure 2.
4. ESA 4 as shown on Figure 2 is associated with a Bald Eagle nest (BAEA-106-334) that was confirmed to support two chicks in June of 2016[3] (Photo 3). This nest tree is located approximately 20 m from the proposed Route 2 in an area adjacent to the footpath that connects Erickson Road to Larwood Road (Photo 4). Other Bald Eagle nests identified on Map 9 of the City of Campbell River Sustainable Official Community Plan (SOCP)[4] were documented as nests that were no longer present.
5. ESA 5 is associated with Bald Eagle nest BAEA-106-363. This nest is mapped on the Wildlife Tree Stewardship Atlas[5].

Recommendations for Stream Habitat

The recent field assessment confirmed that the location of construction activities associated with the sewer upgrade project is greater than 30 m from the high water mark of Willow Creek (ESA 1). Therefore the RAR is not triggered and further assessment by a QEP is not required at this location.

Proposed Route 1 includes a perpendicular linear crossing of Larwood Creek (ESA 2) on an existing built road. Geotechnical drilling locations should be positioned outside of the

[1] Fisheries Inventory Data Query Tool (FIDQ). http://www.env.gov.bc.ca/fish/fidq/queries.html. Accessed September 19, 2016.
[2] Urbans Systems. 2005. Integrated Stormwater Management Plan (ISMP) Willow Creek Watershed. Appendix B.
[3] Wildlife Tree Stewardship Atlas (WiTS). http://www.wildlifetree.ca/about.html. Accessed September 15, 2016.

[5] Wildlife Tree Stewardship Atlas (WiTS). http://www.wildlifetree.ca/about.html. Accessed September 15, 2016.

channel banks (as defined by the crossing structure at this location). If instream drilling is required, measures must be in place to isolate the work area and protect water quality downstream. A site specific environmental work plan is recommended for that type of activity and should be provided to the regional Habitat Officer as part of the Notification submission. Disturbance of the stream bed at this location would also require Project Review by DFO.

Proposed Route 2 includes a linear crossing of Larwood Creek and then parallels the creek for approximately 125 m (ESA 3). This route would require the application of the requirements of both the RAR and the WSA. The requirements for the linear crossing would be the same as described above for ESA 2.

Assessment under RAR is required for the section of the proposed route that would parallel the creek. The bankfull width of Larwood Creek (ESA 2 and 3) between Larwood Road and Erickson Road ranges from 2.0 m to 3.0 m. The preliminary Streamside Protection and Enhancement Area (SPEA) that would be required for this stream for activities regulated under the *RAR* would be 10 m measured from the high water mark of both sides of the stream.

The SPEA is a no-disturbance zone intended to protect the features, form and function of the riparian habitat and associated stream habitat. No new development or disturbance of ground is permitted within this zone. If the section of the route paralleling the creek can be located outside of the SPEA, a full assessment conducted in accordance with the *RAR* would be required prior to the start of the work. Local governments are permitted to consider local variances to the SPEA (also known as "flexing" the SPEA) but are instructed to not permit a SPEA width less than 10 m adjacent to stream habitat. At this time, there is no formal process to request a SPEA variance approval from the Province or DFO.

Recommendations for Bald Eagle Nest Trees

Section 34 of the *Wildlife Act* provides for the protection of Bald Eagles, their eggs and young, as well as a Bald Eagle nest at all times (active or inactive). This prevents the cutting or removal of a tree that supports a Bald Eagle nest. Several Bald Eagle nest trees are identified on Map 9 of the City of Campbell River SOCP within the general vicinity of the proposed connection routes for the sewer upgrade project. Although the development permit process is not triggered by the proposed sewer upgrade activities, following the guidelines presented in the CCR SOCP for Bald Eagle nest tree protection is recommended.

Under the guidelines, no vegetation clearing would be permitted within 60 m of a known nest while the nest remains active and for at least five years past the last known active year. If the sewer main installation along Route 2 is desired and requires vegetation removal, further review by a QEP of the potential impacts to the nest buffer would be required. In addition, excavation and installation work should be completed in a manner that prevents or avoids impact to root systems of the mature trees bordering the trail route within the buffer zone. Where impacts to root systems and potential tree survival are possible, consultation with an arborist is recommended to provide guidance on methods to reduce impact and future monitoring of tree survival may be required.

If vegetation removal is not required for the sewer upgrade activities, these could occur within 60 m of an active Bald Eagle nest (ESA 4) located along proposed Route 2, as long as it is completed outside of the breeding season. The active breeding season for Bald Eagles is from January 1st to September 1st. The *Guidelines for Raptor*

Conservation[6] recommend a breeding season "quiet" buffer that extends an additional 100 m beyond the 60 m buffer designated by the SOCP. During the active breeding season for Bald Eagles no vegetation removal, land contouring, construction, or any unusual or sudden loud activities (e.g. tree felling, chain saws, concrete cutters, large trucks, whistles, fireworks or banging devices) are to take place within the 160 m zone. This combined 160 m breeding season "quiet" buffer would also apply to Bald Eagle nest BAEA-106-363 (ESA 5) which is located 97 m from Larwood Road (Figure 2).

Scheduling construction works to occur within the least risk work window for Bald Eagles of September 1st to December 31st will avoid any restrictions on the timing of development activities related to Bald Eagles. If construction work is proposed during the active breeding season for Bald Eagles within 160 m of BAEA-106-334 or BAEA-106-363 (Figure 2), assessment of the Bald Eagle nest territory by a QEP is suggested prior to any activities to determine if the nests in the territory are active.

General Environmental Protection Measures for Construction

The following measures are recommended for potential construction activities along Routes 1 and 2 of the proposed sewer connection upgrade project for protection of the ESAs and to ensure regulatory compliance:

1. Conduct works during the least risk work window for Bald Eagles of September 1st to December 31st for work proposed within 160 m of BAEA-106-334 and BAEA-106-363 (Figure 2).
2. No clearing of vegetation (i.e. trees, shrubs or groundcover) or other construction related activity is to occur within the 60 m of the active Bald Eagle Nest BAEA-106-334 (ESA 4) without prior consultation with a QEP.
3. Minimize area of disturbance to the stream channel for linear channel crossings.
4. Confirm the required SPEA associated with Larwood Creek if Route 2 is selected and ensure all ground disturbance and vegetation removal activities will occur outside of the SPEA.
5. Equipment should be positioned on previously disturbed areas (i.e. road, sidewalk) whenever possible when working near stream habitat (ESA 2 and 3).
6. Equipment must be inspected for leaks and must be cleaned of all dirt / mud / grease etc. prior to coming to site.
7. A spill kit with materials adequate to contain the volume of hydrocarbons present in any equipment working is to be on site at all times. Workers associated with the equipment must be trained in spill response.
8. No fueling of equipment is permitted within 30 m of Willow Creek or Larwood Creek or associated storm drains.
9. Deleterious substances including drill cuttings or uncured concrete must not enter the creeks or storm drains. Any waste materials must be removed from the site or stored in an appropriate storage container on the day of drilling and with protection from precipitation.

[6] Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia, 2013.

10. Any soil disturbed by movement of heavy equipment is to be stabilized and / or revegetated to avoid erosion and the generation of turbid surface run-off that could drain towards Willow Creek, Larwood Creek, or the stormwater receptors.

Route Evaluation Summary

A discussion of the ESAs and associated restrictions to both proposed service installation routes is presented for consideration of route selection. Route 1 involves a linear perpendicular crossing of Larwood Creek downstream of Harrogate Road (ESA 2). This is the only ESA encountered by this route and would require conducting the work according to the requirements of the *Water Sustainability Regulation*. As there is an existing linear road crossing at this location there are no projected impacts on riparian habitat but potential instream impacts would require mitigation measures to protect water quality during construction. Environmental risks could be mitigated through best management practices.

Route 2 involves paralleling Larwood Creek for approximately 125 m within a 30 m Riparian Assessment Area (under RAR) and the route is located directly adjacent to a Bald Eagle nest (ESA 3 and 4). If the preference was to use the existing footpath for services installation, preliminary mapping indicates appears that there would be some overlap of this route option with the required SPEA for Larwood Creek (Figure 3). If the route followed the existing footpath and the installation could be completed without any vegetation removal then this may be a viable option. There are several mature Douglas-fir trees located directly adjacent to this footpath and their roots could be damaged during sewer line installation which could result in tree loss within the SPEA of Larwood Creek or within the Bald Eagle buffer. In addition, there would be timing restrictions for construction within this area if the Bald Eagle nest is confirmed to be active during the year that service installation is proposed. This would require work to be completed after September 1st and before January 1st.

Based on this comparison, Route 1 is preferable as there would be less disturbance within environmentally sensitive areas, minimal regulatory paperwork and less restrictions on the timing of construction activities. Proceeding with the Route 2 option would involve additional survey of the stream and Bald Eagle habitat areas, development of site specific work plans to minimize impacts (include construction timing restrictions), possible long term monitoring of tree health and the submission of regulatory documentation to satisfy *Water Sustainability Regulation* and *Riparian Areas Regulation* requirements.

I hope this assessment of the ESAs and prescribed measures for the Larwood – Erickson sewer upgrades geotechnical drilling project satisfies your requirements. If you require any additional information or assistance please do not hesitate to contact me.

Yours Truly,

COLLEGE OF APPLIED BIOLOGY
Monica C. Stewardson
17/10/16
R.P. Bio #1291
CAB

Monica Stewardson, RPBio, CSEPC

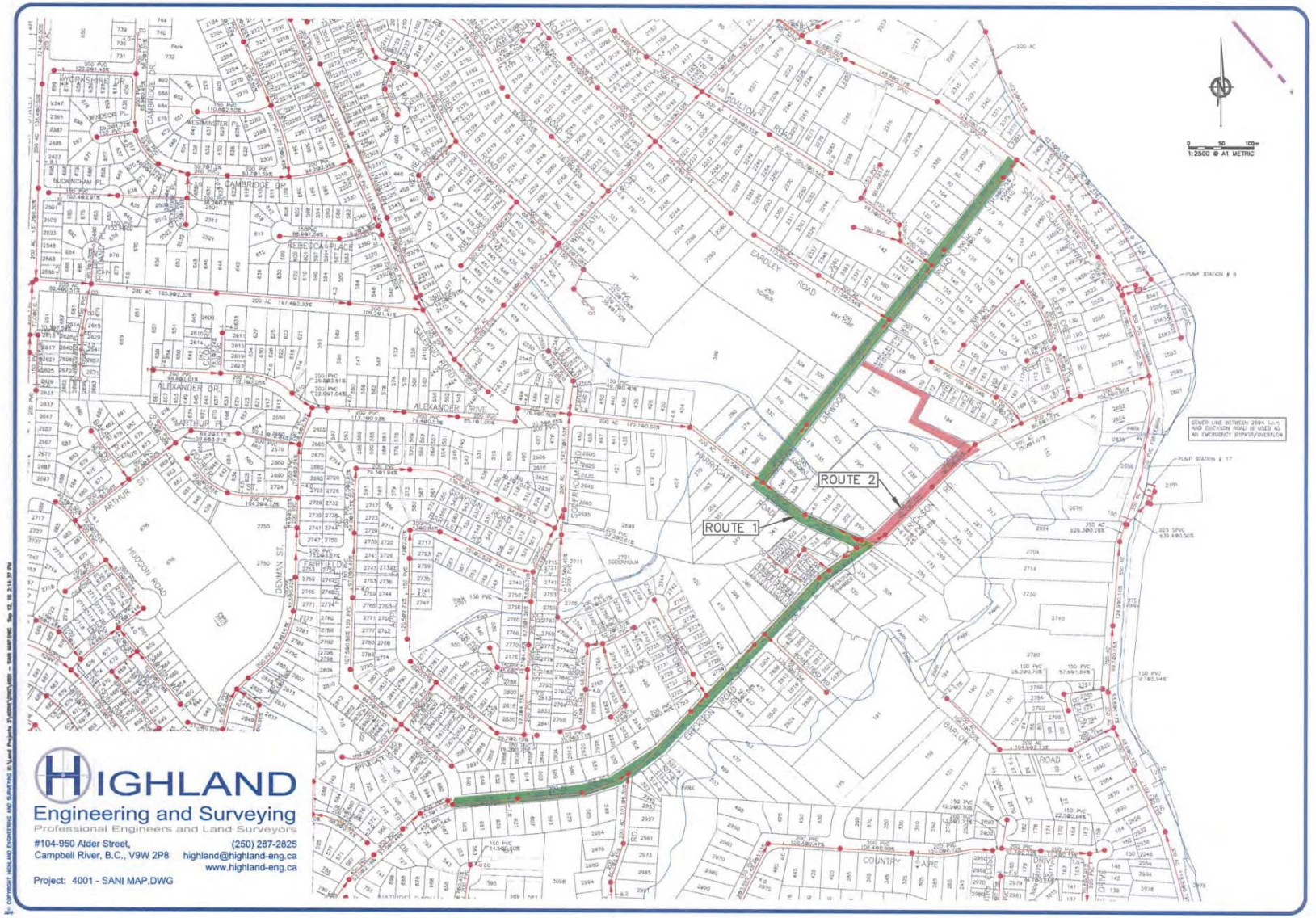


Figure 1. Proposed routes for the Larwood – Erickson Municipal Sanitary Sewer Upgrade Project.

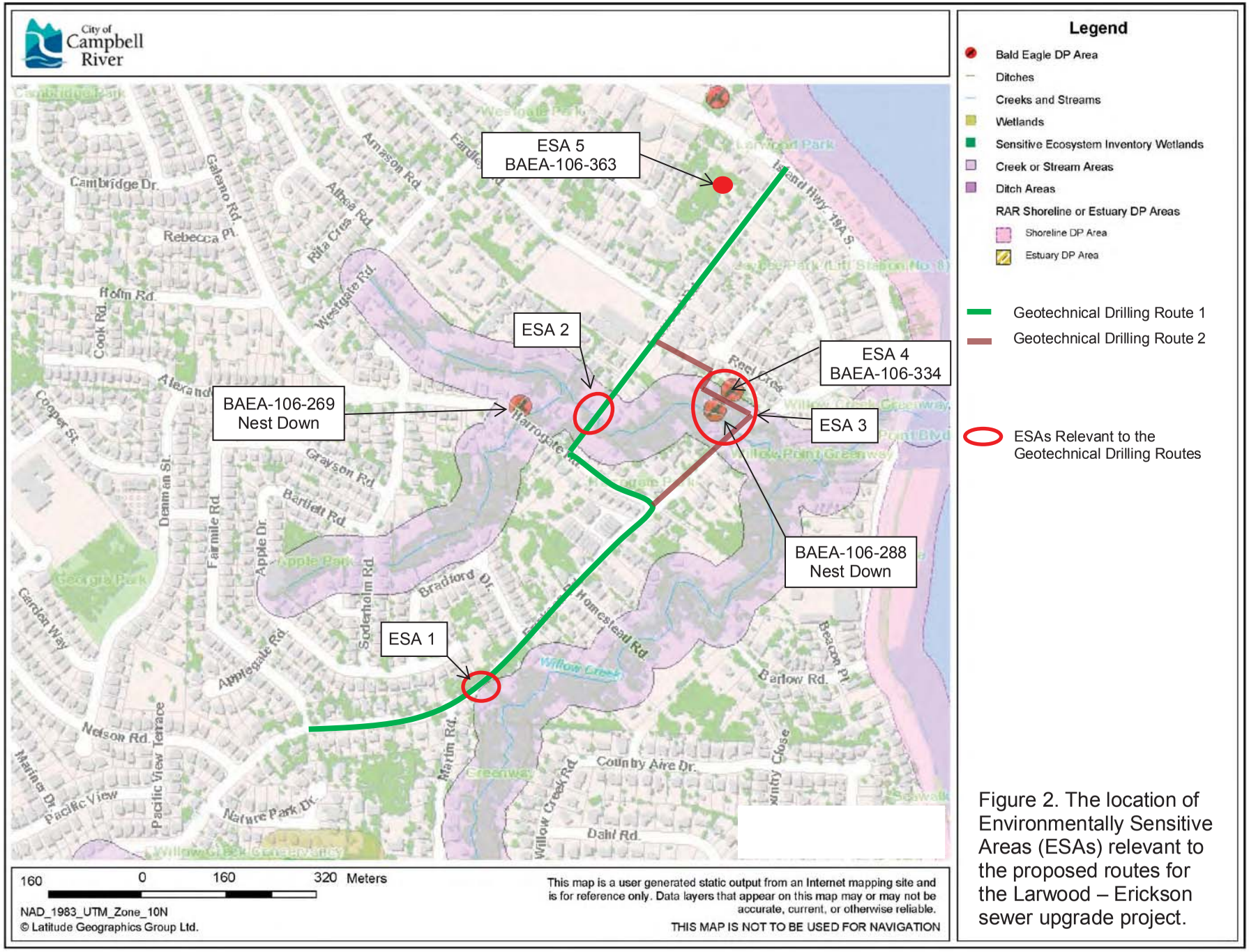


Figure 2. The location of Environmentally Sensitive Areas (ESAs) relevant to the proposed routes for the Larwood – Erickson sewer upgrade project.

Figure 3. Environmentally Sensitive Area boundaries adjacent to Larwood Creek at Erickson Road along proposed Route 2 for the Larwood – Erickson Municipal Sanitary Sewer Upgrade Project, Campbell River, BC.

Photo 1

An upstream view of Larwood Creek where Route 1 crosses Larwood Road (ESA 2) on September 15, 2016.

Photo 2

A downstream view of the Larwood Creek crossing at Erickson Road on Route 2 (ESA 3) on September 15, 2016.

Photo 3

The Bald Eagle Nest Tree (BAEA-106-334, ESA 4) approximately 20 m northeast of the footpath along Route 2 on September 15, 2016.

Photo 4

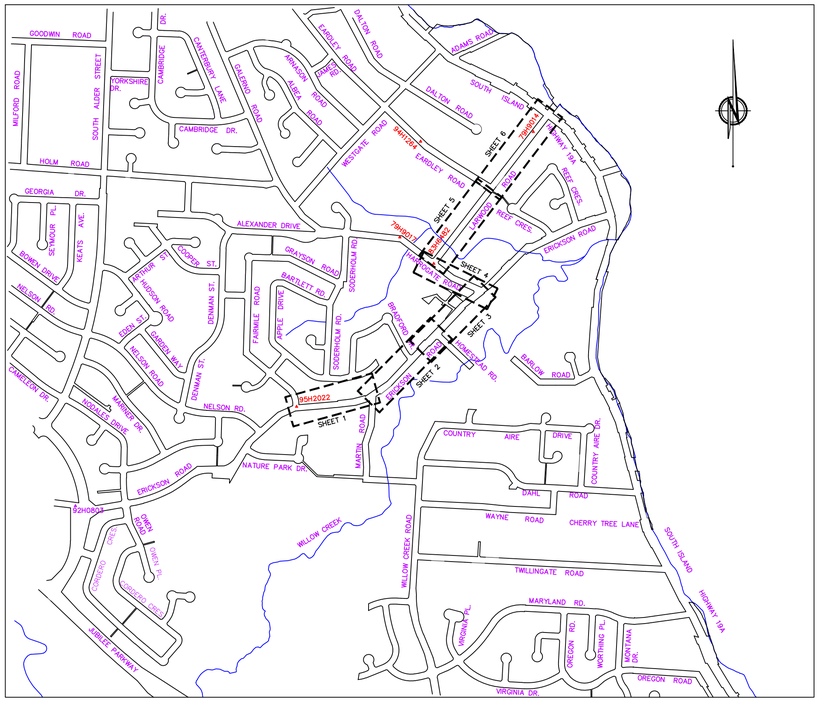
A southeast view of the footpath connecting Erickson Rd. to Larwood Rd. (Route 2) on September 15, 2016.

LARWOOD – ERICKSON SEWER UPGRADE

Prepared For:

City of Campbell River

APRIL 2018



KEY PLAN

NTS

GENERAL NOTES:

ALL ELEVATIONS ARE GEODETIC BASED ON INTEGRATED SURVEY MONUMENT 79H9014 (ELEV: 8.909m) LOCATED ON LARWOOD RD, ±65m FROM ISLAND HIGHWAY
94H1264 (ELEV: 11.495m) LOCATED ON EARDLEY RD, ±275m FROM LARWOOD RD
83H6482 (ELEV: 8.709m) LOCATED BY LARWOOD & HARROGATE RD
79H9017 (ELEV: 8.876m) LOCATED ON HARROGATE, ±135m FROM LARWOOD RD
95H2022 (ELEV: 26.975m) LOCATED BY ERICKSON & FAIRMILE RD

SPECIFICATIONS, PERMITS AND SAFETY
ALL WORKS TO THE M.M.C.D. (2009) AND THE CITY OF CAMPBELL RIVER CONSTRUCTION SPECIFICATION (2010).
THE CONTRACTOR IS SOLELY RESPONSIBLE FOR OBTAINING ANY NECESSARY PERMITS REQUIRED TO COMPLETE THE WORKS.
THE CONTRACTOR IS RESPONSIBLE FOR ALL SAFETY AS PER THE CONTRACT DOCUMENTS.

EXISTING UTILITIES
LOCATIONS OF EXISTING UTILITIES SHOWN ARE DERIVED FROM FIELD SURVEY, AS CONSTRUCTED DRAWINGS AND THIRD PARTY SOURCES. THIS INFORMATION CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATIONS OF ALL UTILITIES AT THE START OF THE CONTRACT AND INFORM THE ENGINEER OF ANY DISCREPANCY.

PIPE BEDDING AND BACKFILLING
ALL PIPE BEDDING AND BACKFILLING MATERIALS TO CONFORM TO MMCD SECTION 3105 17 SUBSECTION 2.7 GRANULAR PIPE BEDDING AND SURROUND AND SUBSECTION 2.3 PIT RUN GRAVEL, 100MM MINUS.

ACCESS
ENSURE CONTINUOUS AND SAFE ACCESS FOR VEHICLES AND PEDESTRIANS TO ALL LOTS DURING CONSTRUCTION AS PER THE CONTRACT SUPPLEMENTAL SPECIFICATIONS.

SITE SPECIFIC NOTES AND INSTRUCTIONS
REFER TO DRAWINGS FOR SITE SPECIFIC NOTES AND INSTRUCTIONS.

QUANTITIES AND TRENCH EXCAVATIONS
QUANTITIES FOR SURFACE RESTORATION ASSOCIATED WITH THE PIPELINE WORKS HAVE BEEN CALCULATED ASSUMING THE EXCAVATION LIMITS SHOWN ON THE UTILITY TRENCH DETAIL AND THAT SHOWN ON THE CONTRACT DRAWINGS. CONTRACTOR MAY ONLY EXCAVATE OUTSIDE OF THE LIMIT AS SHOWN WITH THE CONTRACT ADMINISTRATORS WRITTEN PERMISSION. CONTRACTOR TO PROVIDE ADEQUATE TRENCH SHORING TO ENSURE TRENCHING DOES NOT EXCEED THE LIMITS SHOWN. UNAUTHORIZED TRENCH EXCAVATION OUTSIDE THE APPROVED LIMITS RESULTING IN ADDITIONAL SURFACE RESTORATION WILL NOT BE COMPENSATED.

CONSTRUCTION LAYOUT
THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION LAYOUT. HIGHLAND WILL PROVIDE A DIGITAL DRAWING FOR LAYOUT PURPOSES. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING ALL LINES, GRADES AND ELEVATIONS PRIOR TO INSTALLATION OF THE WORKS.

WATERWORKS
MINIMUM VERTICAL SEPARATION BETWEEN A WATERMAIN AND ANY PIPE SHALL BE 0.15m.
WHERE WATERMAIN CROSSES OVER STORM/SANITARY WITH LESS THAN 0.50m VERTICAL SEPARATION WRAP ALL WATERMAIN JOINTS WITHIN 3.0m OF CROSSING.
WHERE WATERMAIN CROSSES UNDER STORM/SANITARY WRAP ALL WATERMAIN, STORM AND SANITARY JOINTS INCLUDING TEES, BENDS, CROSSES, REDUCERS, VALVES ETC. WITHIN 6.0m OF CROSSING.
WRAP ALL WATERMAIN JOINTS WITH LESS THAN 3.0m HORIZONTAL SEPARATION TO ANY PIPE.
JOINT WRAP SHALL MEET OR EXCEED THE B.C. MINISTRY OF HEALTH REQUIREMENTS FOR WATERMAIN JOINT PROTECTION AND AWWA/ANSI STANDARD C209.(CANUS "JointWrap" COLD APPLIED PIPE JOINT SLEEVE, OR EQUAL).

SANITARY SEWER AND STORM DRAIN
ALL WORKS SHALL BE SUPPLIED AND CONSTRUCTED IN ACCORDANCE WITH THE M.M.C.D. (2009) SPECIFICATIONS, CITY OF CAMPBELL RIVER CONSTRUCTION SPECIFICATIONS (2010) AND CITY OF CAMPBELL RIVER "APPROVED UTILITY PRODUCT LIST 2017"
ALL SANITARY AND STORM MANHOLES ARE TO BE 1050mm IN DIAMETER EXCEPT WHERE NOTED.
ALL PIPE TYPES AND SIZES ARE AS SHOWN ON THE DRAWINGS.
THERE SHALL BE NO SUBSTITUTIONS WITHOUT THE WRITTEN CONSENT OF THE CONTRACT ADMINISTRATOR.
GASKETED MOLDED FITTINGS SHALL BE USED AT ALL TEES, WYES, BENDS AND TERMINAL ENDS.

LOT SERVICES
UNLESS NOTED OTHERWISE LOT SERVICES SHALL BE:– WATER – 19mm C901–22 CL160 HDPE c/w TRACER WIRE
SANITARY – 100mm PVC DR28 c/w I.C. UNIT, BACKFLOW FLAP & #37 BROOKS BOX
(REPLACEMENT SERVICES NOT CONNECTED TO AN EXISTING SERVICE TO BE COMPLETED WITH PLUG IN I.C UNIT)
DRAIN – 150mm PVC DR28

THIRD PARTY UTILITIES
THE OVERHEAD BC HYDRO, TELUS AND SHAW CABLESYSTEMS WIRES ARE NOT SHOWN IN DETAIL ON THE CONTRACT DRAWINGS. THE CONTRACTOR SHALL MAKE THEMSELVES AWARE OF THE LOCATIONS OF AND CLEARANCE FROM THESE WIRING SYSTEMS AND SHALL MAKE ALLOWANCE IN THEIR PROCEDURES FOR CONSTRUCTION OF THE WORKS UNDER OR NEAR THEM IN ACCORDANCE WITH WORKSAFE BC RULES AND GOOD WORK PRACTICES..

UTILITY SUPPORT
SUPPORT OF ALL UTILITY POLES BY THE CONTRACTOR SHALL BE CARRIED OUT BY A BC HYDRO CERTIFIED POWER LINE INSTALLER. THE COST OF THIS WORK IS CONSIDERED INCIDENTAL TO THE WORKS AND SERVICES INSTALLED FOR THIS CONTRACT.

FORTIS NATURAL GAS
THE CONTRACTOR WORKING IN THE VICINITY OF THE NATURAL GAS LINE SHALL BE RESPONSIBLE TO EXCAVATE AND BACKFILL THE AREA IN ACCORDANCE WITH THE CONSTRUCTION STANDARDS OF FORTIS BC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MEET WITH A REPRESENTATIVE OF FORTIS BC AND TO RECEIVE INSTRUCTION ON MANAGING THEIR WORK IN THE VICINITY OF THE NATURAL GAS LINE TO THE SATISFACTION OF FORTIS BC.

DRAWING SET STATUS TENDER		ISSUED 18/04/26
SHEET #	DESCRIPTION	ISSUE
0	COVER & GENERAL NOTES	
1	ERICKSON ROAD – 0+000 TO 0+220	4
2	ERICKSON ROAD – 0+220 TO 0+510	4
3	ERICKSON ROAD – 0+510 TO 0+800	4
4	HARROGATE ROAD – ERICKSON TO LARWOOD	4
5	LARWOOD ROAD – 0+000 TO 0+310	4
6	LARWOOD ROAD – 0+310 TO END	4
7	DETAILS	4

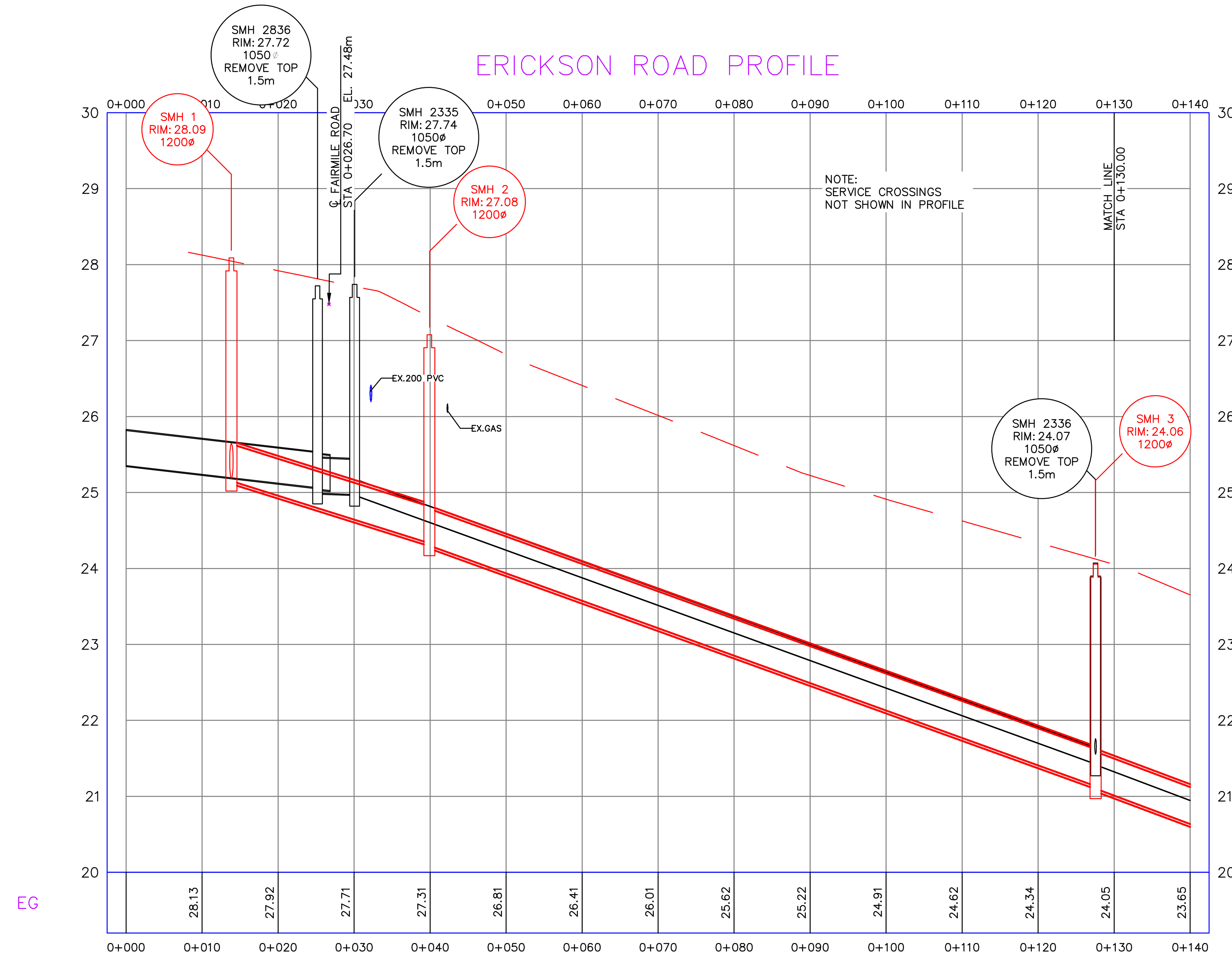
NOTES:
1. CONTRACTOR TO RESTORE ALL DISTURBED DRIVEWAYS TO ITS ORIGINAL CONDITION OR BETTER (50mm THICK ASPHALT, 100mm CONCRETE OR 75mm CRUSHED GRAVEL BASE COURSE).
2. RESTORE DISTURBED SIDEWALK (120mm) AND CURB AND GUTTER AS PER MMCD DETAILS C1 TO C9.
3. RESTORE ALL DISTURBED BOULEVARDS & DITCHES c/w LANDSCAPING & SEED WITH LAWN MIX (MIN.100mm OF TOP SOIL). MMCD SECTIONS 32 91 21 TOPSOIL AND FINISH GRADING, SECTION 32 92 19 HYDRAULIC SEEDING. MOW 3 TIMES AS PER SPECIFICATIONS.
4. CONTRACTOR TO CONFIRM INSPECTION CHAMBER DOES NOT EXIST PRIOR TO INSTALLATION. IF EXISTING, CONNECT TO SERVICE IN BOULEVARD. REFER TO TYPICAL SANITARY SERVICE REPLACEMENT DETAIL SHEET 7.
5. REMOVE EXISTING A.C. WATER OR SANITARY SEWER PIPE WHERE CONFLICT EXIST w/REPLACEMENT PIPE. REMOVE, TRANSPORT & DISPOSE AT LOCAL LANDFILL IN ACCORDANCE w/WORKSAFE B.C. POLICIES & GUIDELINES (TYP.)
6. TRANSFER OF SERVICE
6.1. INSTALL REPLACEMENT MAIN AND LOT SERVICES TO CAP ON A STREET BY STREET OR SECTION BY SECTION BASIS.
6.2. TEST REPLACEMENT MAIN TO MMCD SECTION 33 30 01 SUBSECTION EXECUTION 3.14 AND 3.18.
6.3. TEST MANHOLES TO MMCD SECTION 33 30 01 SUBSECTION 3.15.
6.4. CONNECT TO EXISTING LOT SERVICE CONNECTIONS.
6.5. WHEN UPSTREAM BYPASS IS IN PLACE CONNECT AT INTERSECTING MANHOLES IN AN UPSTREAM TO DOWNSTREAM ORDER.
6.6. DISCONNECT DOWNSTREAM BYPASS UPON COMPLETION OF ALL SERVICE TRANSFERS WITHIN SECTION.
6.7. FILL ABANDONED SANITARY SEWER MAIN & SERVICES WITH C.D.F.
6.8. COMPLETE RESTORATION OF SURFACE WORKS.
6.9. PAINT ERICKSON ROAD CENTERLINE, SCHOOL ZONE SPEED SIGNS AND REPLACE STOP BARS AND CROSSWALKS WITH THERMOPLASTIC TAPE.

HIGHLAND Engineering Services Ltd.
#104-950 Alder Street,
Campbell River, B.C., V9W 2P8
(250) 287-2825
highland@highland-eng.ca
www.highland-eng.ca

Project: 4067

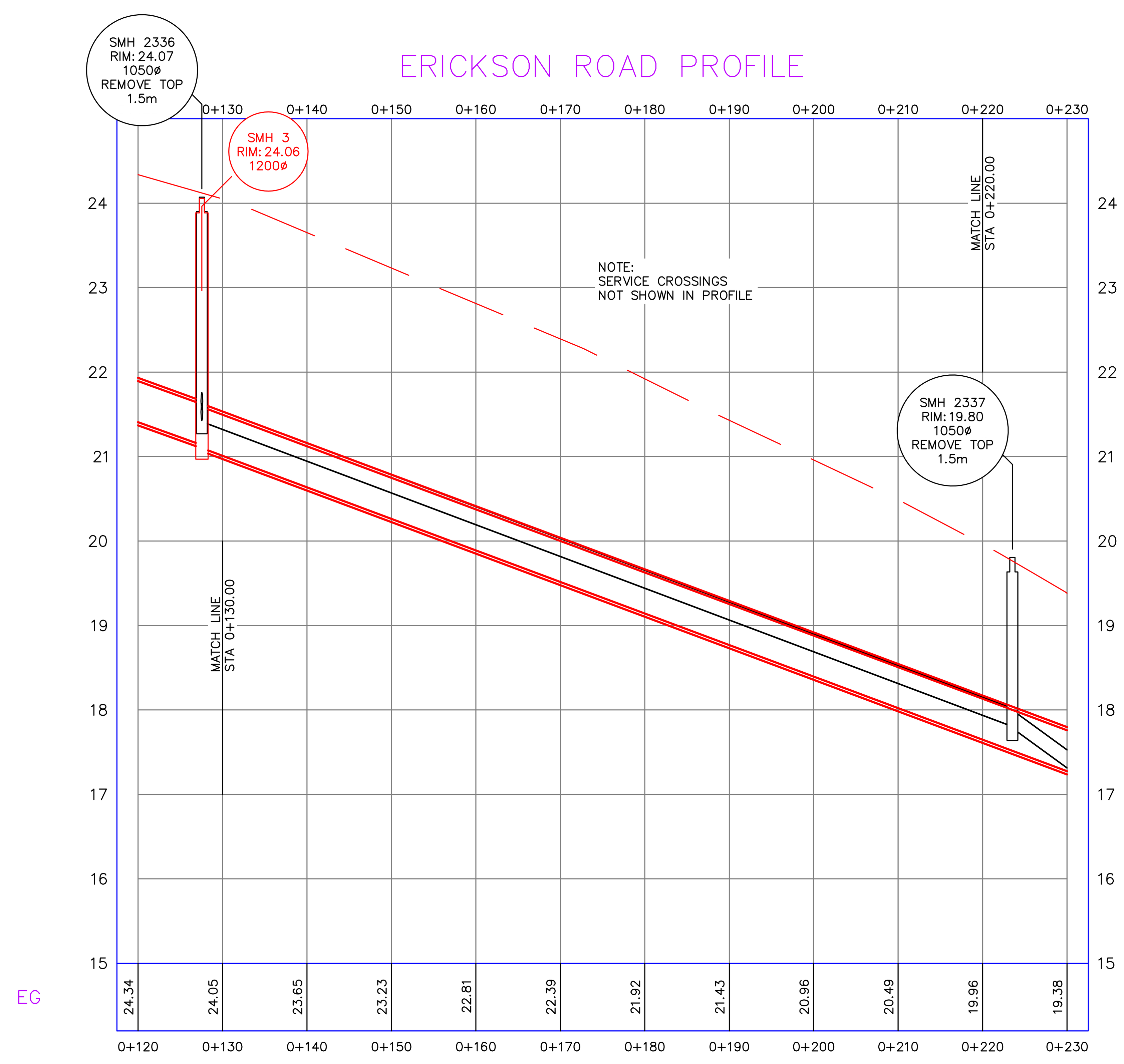
CCR FILE 17-516

ERICKSON ROAD PROFILE

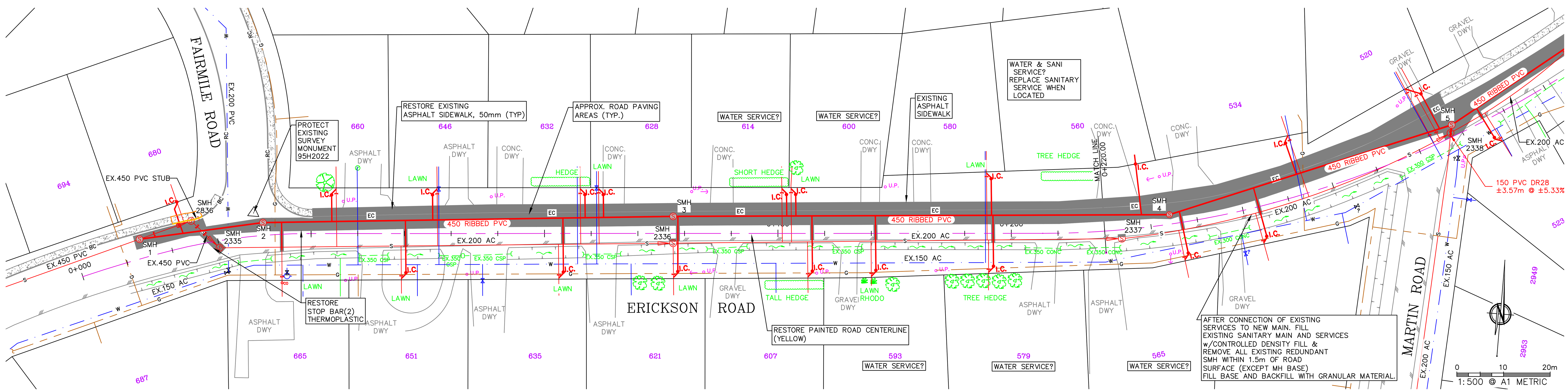


EXISTING DRAIN	1.75m @ 1.00% EX.450 PVC STUB; 96.12m @ 3.76% EX.200 AC
EXISTING SANITARY	45.30m @ 1.13% EX.450 PVC; SE: 25.00 NE: 25.05 SW: 25.07 NW: 24.98 E: 24.97; 8.39m @ 0.24% EX.450 PVC; 97.16m @ 3.64% EX.200 AC; W: 21.43 S: 21.56 E: 21.42
SANITARY	SW: 25.20 E: 25.17; 26.67m @ 3.07% 450 RIBBED PVC; W: 24.35 E: 24.32; 87.87m @ 3.60% 450 RIBBED PVC; W: 21.15 E: 21.12; 106.31m @ 3.75% 450 RIBBED PVC

ERICKSON ROAD PROFILE



EXISTING DRAIN	74.47m @ 7.22% EX.200 AC
EXISTING SANITARY	W: 21.43 S: 21.56 E: 21.42; 96.12m @ 3.76% EX.200 AC; W: 17.81 E: 17.79
SANITARY	87.87m @ 3.60% 450 RIBBED PVC; W: 21.15 E: 21.12; 106.31m @ 3.75% 450 RIBBED PVC



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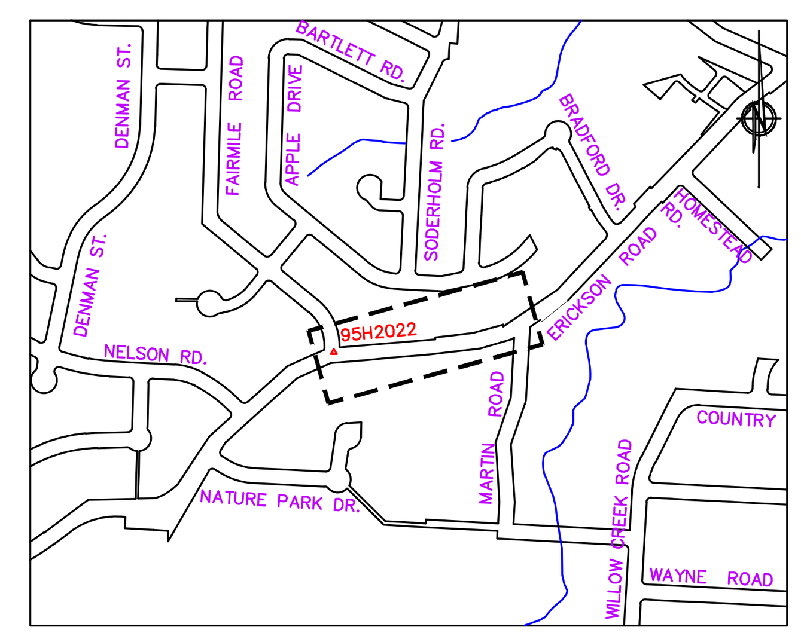


LOCATION PLAN

NTS

BC 1 CALL — CALL BEFORE YOU DIG! 1-800-474-6886 or by CELLULAR *6886 — CALL AT LEAST 3 FULL WORKING DAYS BEFORE YOU PLAN TO DIG

TENDER

NO.	ISSUE	BY	DATE
–	–	–	–
–	–	–	–
–	–	–	–
4	TENDER	HT	18/04/26
3	90% SUBMISSION (2)	HT	18/02/26
2	90% SUBMISSION	HT	17/11/17
1	50% SUBMISSION	HT	17/06/26

EXISTING	LEGEND	DESIGN
T	U/G TELEPHONE	T
H	U/G HYDRO	H
G	NATURAL GAS	G
	PERMEABLE PAVING	

EXISTING	LEGEND	DESIGN
S	SANITARY SEWER	S
D	STORM DRAIN	D
W	WATER MAIN	W
P	PAVEMENT	P
C	CURB & GUTTER	C
	SIDEWALK	
	INFILTRATION SWALE	

EXISTING	LEGEND	DESIGN
O.D.	OPEN DITCH	O.D.
SMH	SANITARY MANHOLE	SMH
DMH	STORM MANHOLE	DMH
SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
HYD.	FIRE HYDRANT	HYD.
W.V.	WATER VALVE	W.V.
U.P.	UTILITY POLE	U.P.

DESIGNED: RKS	SCALE: AS SHOWN
DRAWN: HT	DATE: MAY 2017
CHECKED: –	DATE: –
APPROVED: –	DATE: –

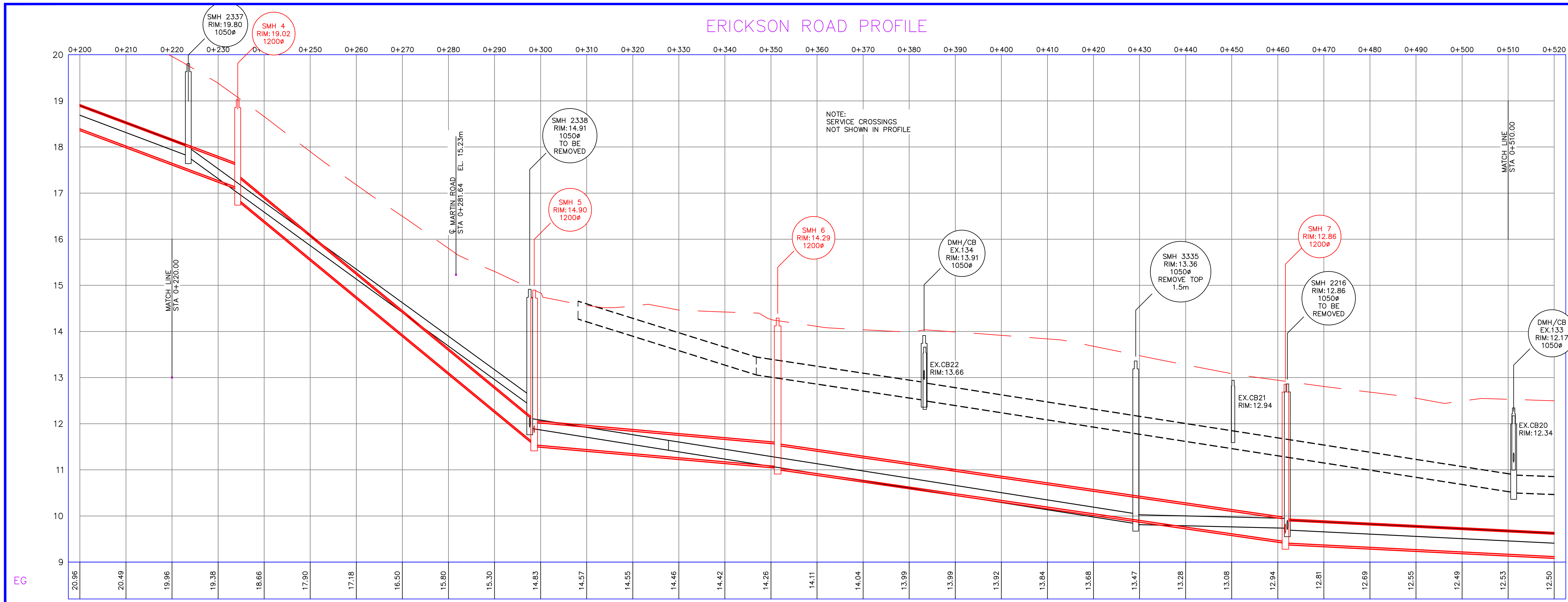
HIGHLAND Engineering Services Ltd.
#104-950 Alder Street, Campbell River, B.C. V9W 2P8
(250) 287-2825
highland@highland-eng.ca
www.highland-eng.ca

TITLE:
CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
ERICKSON ROAD – 0+000 TO 0+220

CITY DWG # 17–516
PROJECT: 4067
SHEET 1 OF 7
ISSUE 4

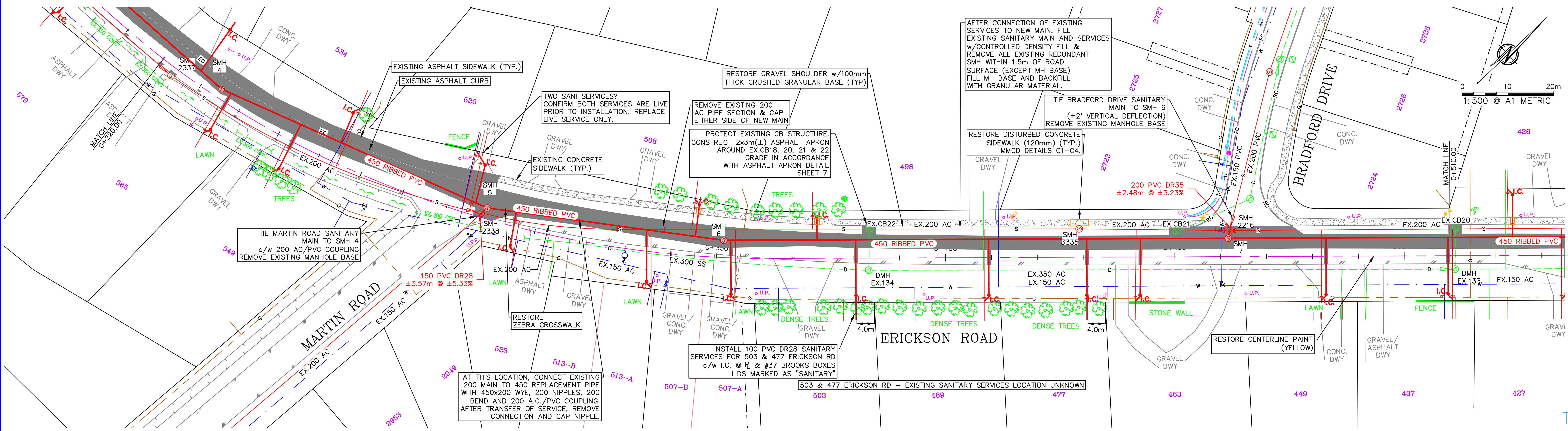
DESTROY PRINTS OF PREVIOUS REVISION

ERICKSON ROAD PROFILE



Station	0+200	0+210	0+220	0+230	0+240	0+250	0+260	0+270	0+280	0+290	0+300	0+310	0+320	0+330	0+340	0+350	0+360	0+370	0+380	0+390	0+400	0+410	0+420	0+430	0+440	0+450	0+460	0+470	0+480	0+490	0+500	0+510	0+520
EG	20.96	20.49	19.96	19.38	18.66	17.90	17.18	16.50	15.80	15.30	14.83	14.57	14.55	14.46	14.42	14.26	14.11	14.04	13.99	13.99	13.92	13.84	13.68	13.47	13.28	13.08	12.94	12.81	12.69	12.55	12.49	12.53	12.50

EXISTING DRAIN	NE:14.28 · 38.88m @ 3.11% EX.300 SS · 36.57m @ 1.50% EX.300 CMP · SW:12.52 NW:12.96 NE:12.51 · 127.95m @ 1.56% EX.350 AC · SW:10.52 NW:11.17 NE:10.51 · [illegible]m @ 0.39% EX.350 AC	
EXISTING SANITARY	96.12m @ 3.76% EX.200 AC · W:17.81 E:17.79 · 74.47m @ 7.22% EX.200 AC · S:11.93 SW:12.41 NE:11.91 · 29.99m @ 1.60% EX.200 AC · 100.68m @ 1.58% EX.200 AC · SW:9.84 NE:9.82 · 32.91m @ 0.24% EX.200 AC · SW:9.74 NW:9.71 NE:9.70 · 104.17m @ 0.49% EX.200 AC	
SANITARY	106.31m @ 3.75% 450 RIBBED PVC · W:17.13 E:16.89 · 63.44m @ 8.35% 450 RIBBED PVC · W:11.59 S:11.81 NE:11.56 · 52.03m @ 0.90% 450 RIBBED PVC · SW:11.09 NE:11.06 · 110.01m @ 1.45% 450 RIBBED PVC · SW:9.46 NW:9.63 NE:9.43 · 126.61m @ 0.50% 450 RIBBED PVC	



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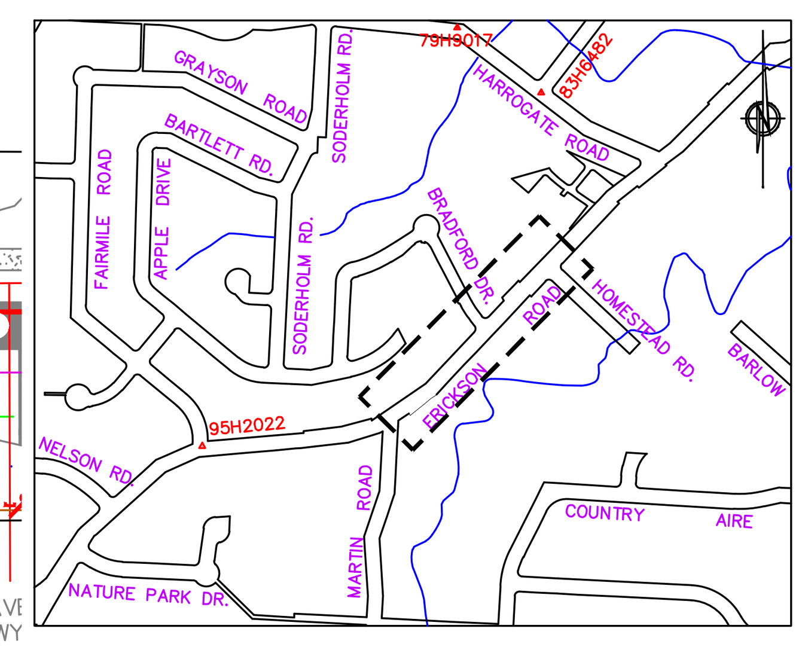

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TENDER

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–	–	–	–
–	–	–	–
–	–	–	–
4	TENDER	HT	18/04/26
3	90% SUBMISSION (2)	HT	18/02/26
2	90% SUBMISSION	HT	17/11/17
1	50% SUBMISSION	HT	17/06/26

EXISTING	LEGEND	DESIGN
T	U/G TELEPHONE	T
H	U/G HYDRO	H
G	NATURAL GAS	G
	PERMEABLE PAVING	
S	SANITARY SEWER	S
D	STORM DRAIN	D
W	WATER MAIN	W
P	PAVEMENT	P
C	CURB & GUTTER	C
	SIDEWALK	
	INFILTRATION SWALE	
O.D.	OPEN DITCH	O.D.
SMH	SANITARY MANHOLE	SMH
DMH	STORM MANHOLE	DMH
SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
HYD.	FIRE HYDRANT	HYD.
W.V.	WATER VALVE	W.V.
U.P.	UTILITY POLE	U.P.

DESIGNED: RKS	SCALE: AS SHOWN	DRAWN: HT	DATE: MAY 2017
CHECKED: –	DATE: –	APPROVED: –	DATE: –

HIGHLAND Engineering Services Ltd.
#104-950 Alder Street, Campbell River, B.C. V9W 2P8
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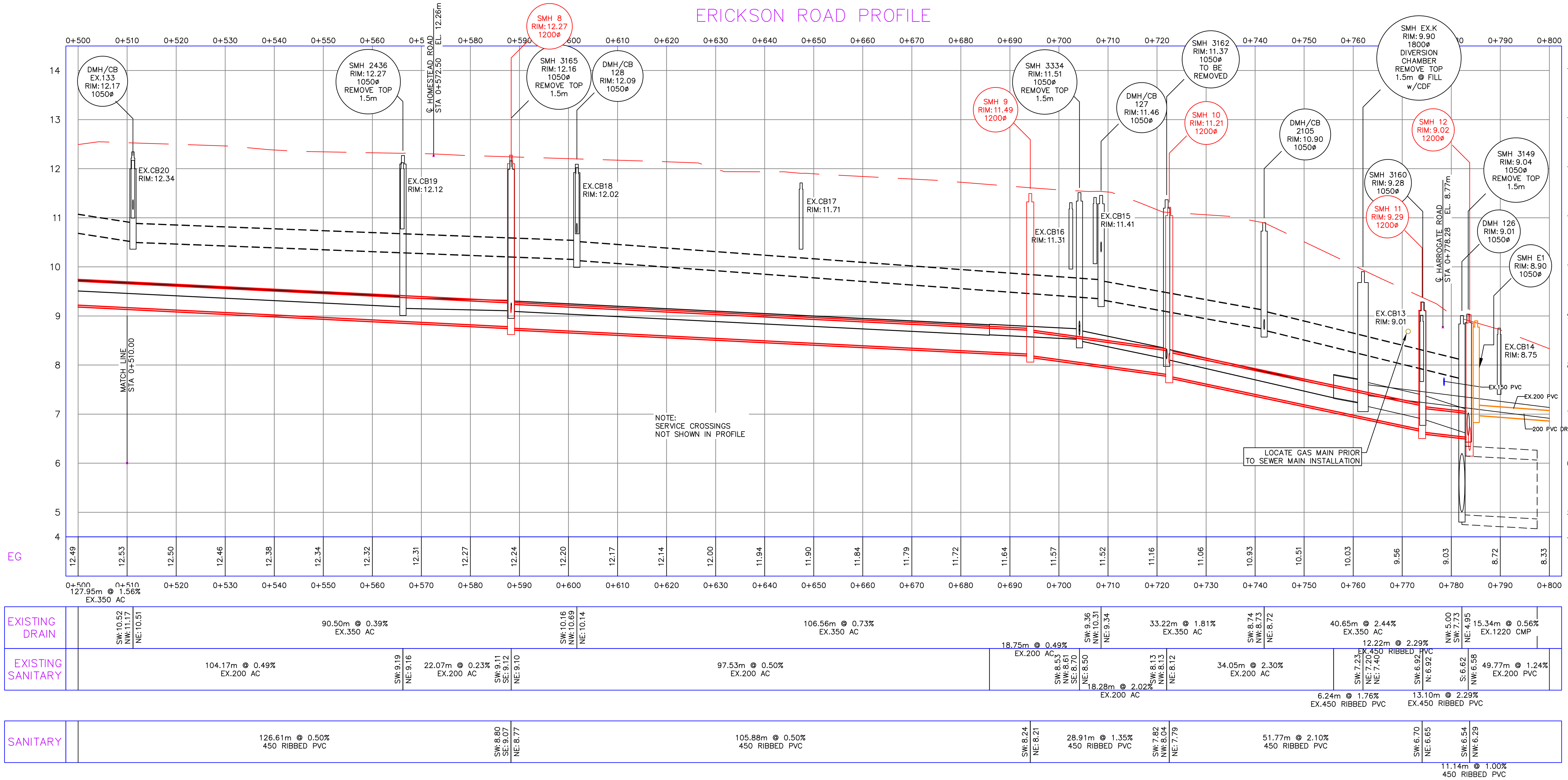
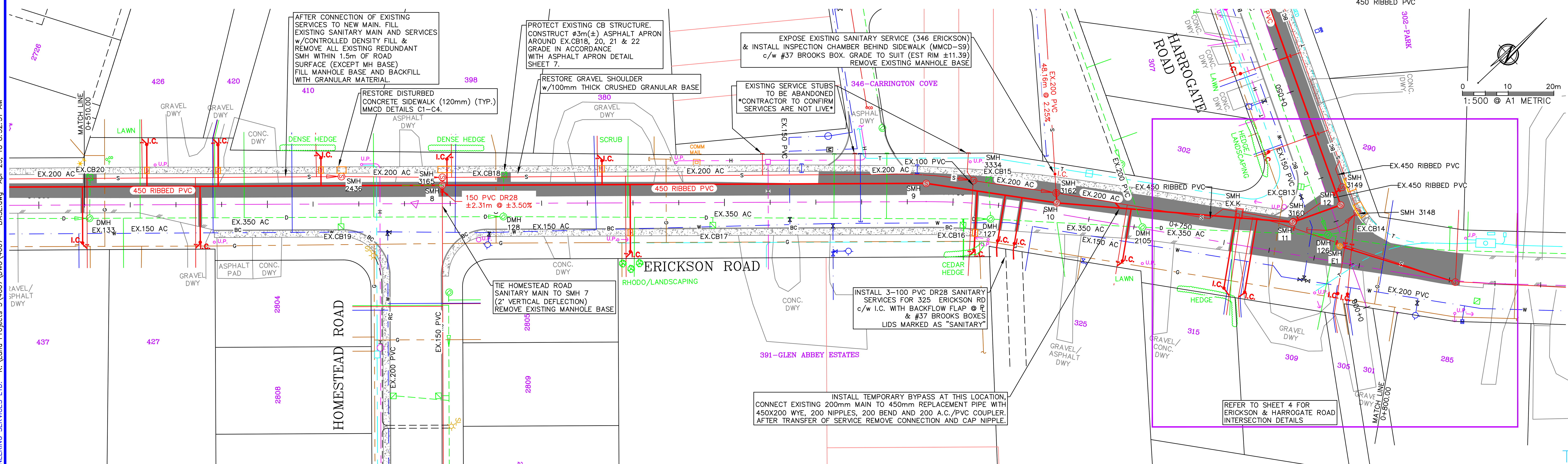
TITLE: CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
ERICKSON ROAD – 0+220 TO 0+510

CITY DWG # 17–516
PROJECT: 4067
SHEET 2 OF 7
ISSUE 4





EXISTING UTILITIES

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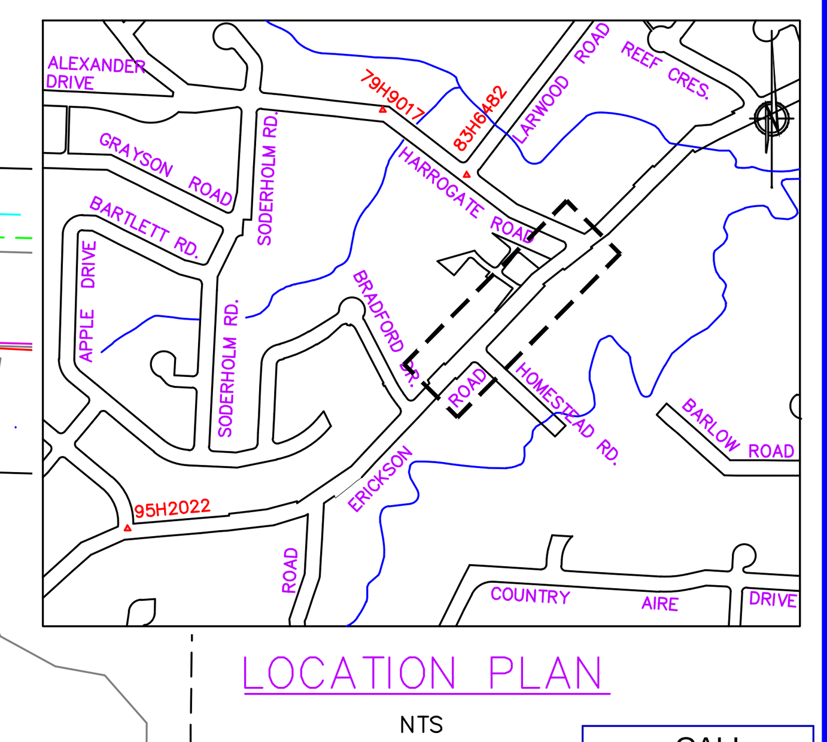

LOCATION PLAN

NTS

TENDER

BC 1 CALL BEFORE YOU DIG! 1-800-474-6886 or by CELLULAR *6886
CALL AT LEAST 3 FULL WORKING DAYS BEFORE YOU PLAN TO DIG

NO.	ISSUE	BY	DATE
–	–	–	–
–	–	–	–
–	–	–	–
4	TENDER	HT	18/04/26
3	90% SUBMISSION (2)	HT	18/02/26
2	90% SUBMISSION	HT	17/11/17
1	50% SUBMISSION	HT	17/06/26

EXISTING	LEGEND	DESIGN	EXISTING	LEGEND	DESIGN	EXISTING	LEGEND	DESIGN
T	U/G TELEPHONE	T	S	SANITARY SEWER	S	O.D.	OPEN DITCH	O.D.
H	U/G HYDRO	H	D	STORM DRAIN	D	SMH	SANITARY MANHOLE	SMH
G	NATURAL GAS	G	W	WATER MAIN	W	DMH	STORM MANHOLE	DMH
	PERMEABLE PAVING		P	PAVEMENT	P	SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
			C	CURB & GUTTER	C	HYD.	FIRE HYDRANT	HYD.
				SIDEWALK		W.V.	WATER VALVE	W.V.
				INFILTRATION SWALE		U.P.	UTILITY POLE	U.P.

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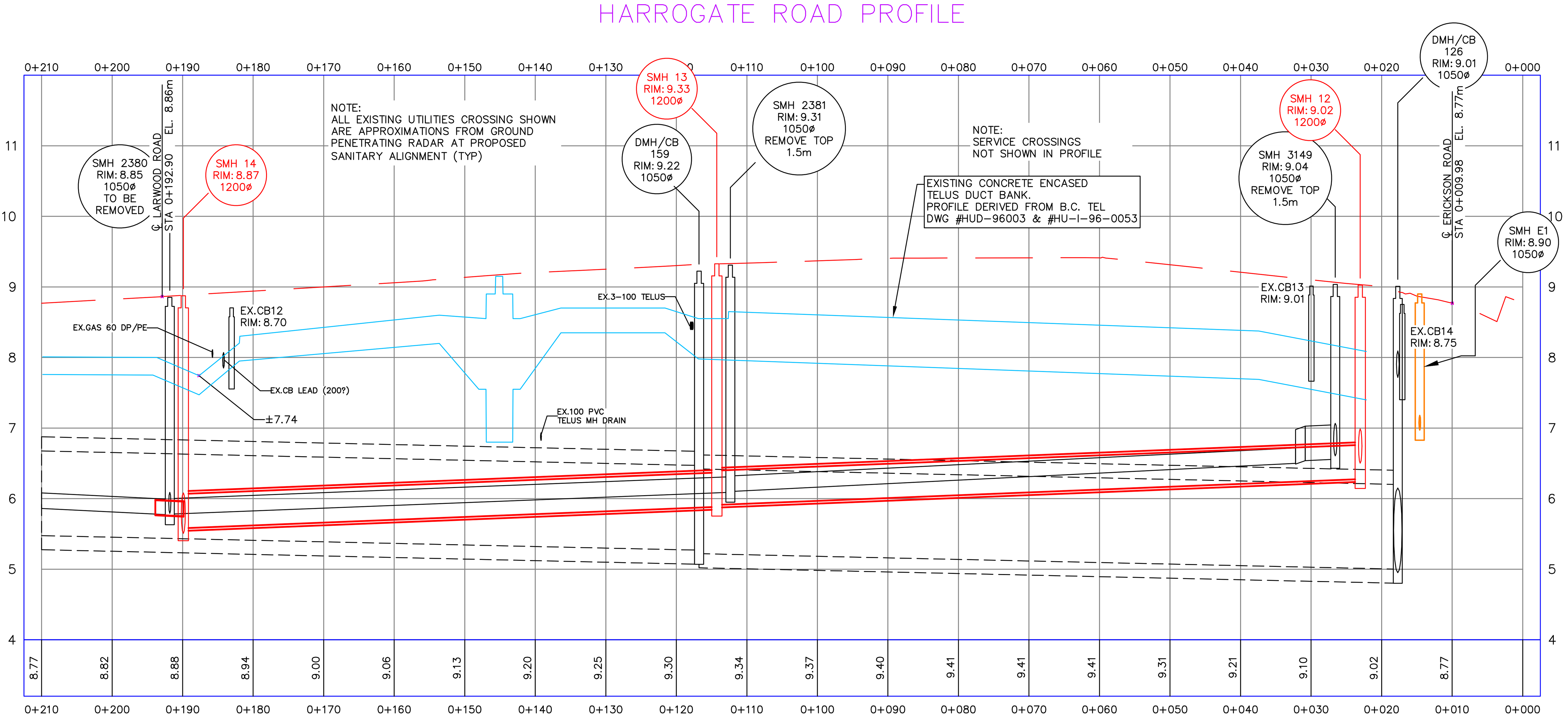
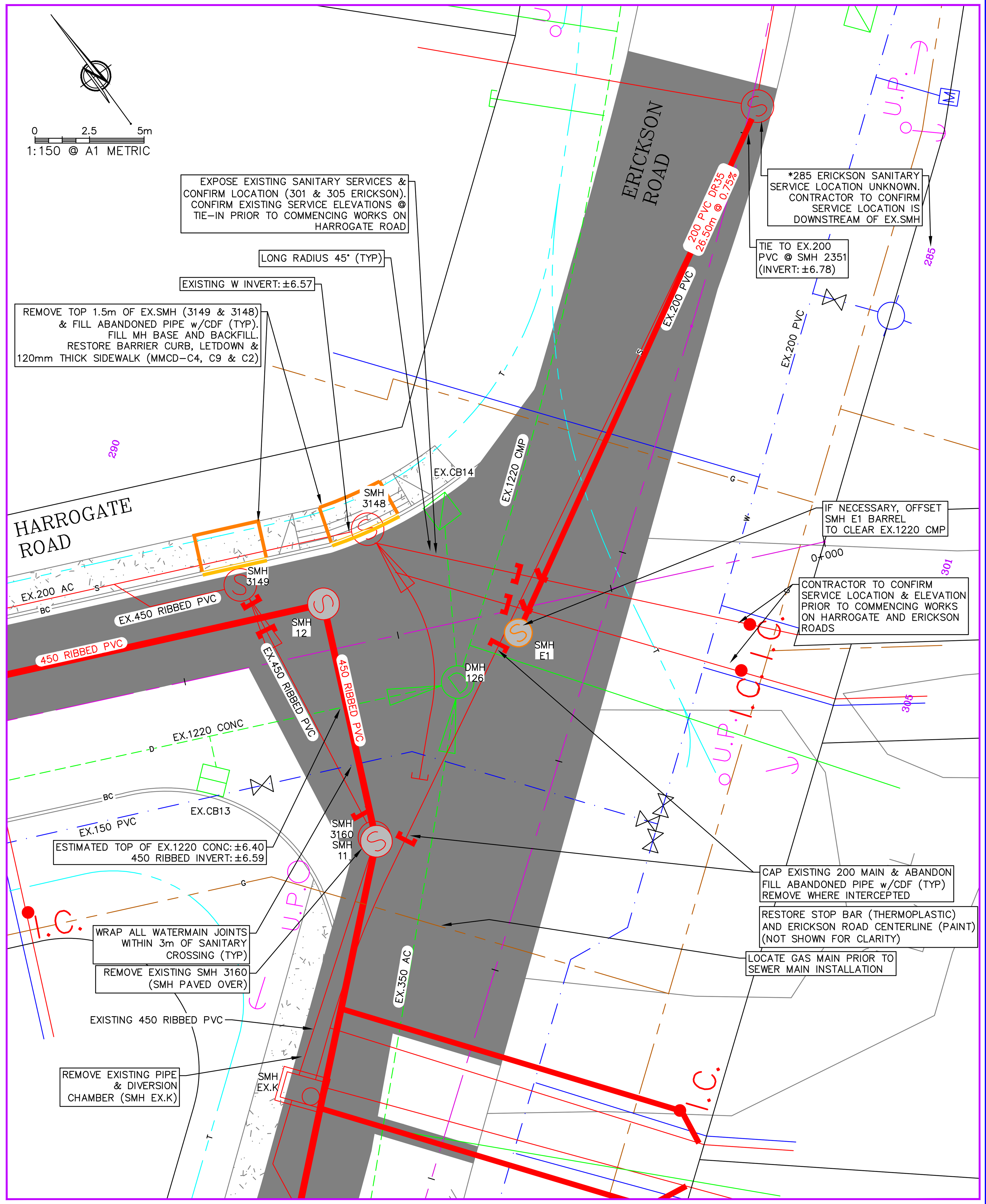
CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
ERICKSON ROAD – 0+510 TO 0+800

CITY DWG # 17-516
PROJECT: 4067
SHEET 3 OF 7
ISSUE 4

HARROGATE ROAD PROFILE

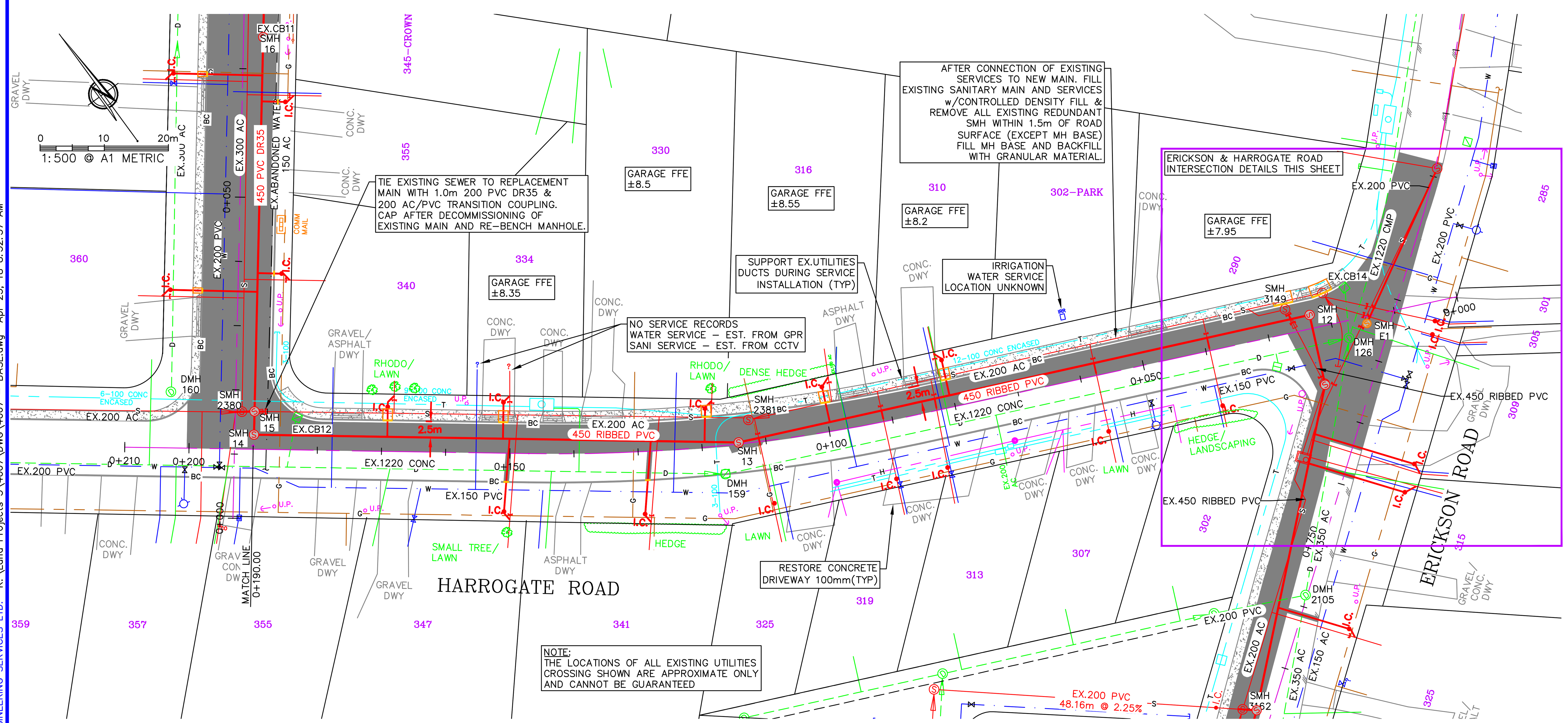


EXISTING DRAIN	199.02m @ 0.22% EX.1220 CONC	NW: 5.27 SE: 5.22	99.52m @ 0.22% EX.1220 CONC — NW: 5.00 SW: 7.73 NE: 4.95
EXISTING SANITARY	134.29m @ 0.50% EX.200 AC — NE: 5.79 SE: 5.79 NW: 5.78	78.91m @ 0.39% EX.200 AC — NW: 6.10 SE: 6.11	79.73m @ 0.50% EX.200 AC — NW: 6.58 S: 6.62 — 4.26m @ 0.50% EX.450 RIBBED PVC
	4.00m @ 0.50% 200 PVC DR35		1.94m @ 2.58% EX.450 RIBBED PVC
SANITARY	NE: 5.55 SE: 5.60	75.53m @ 0.40% 450 RIBBED PVC — NW: 5.90 SE: 5.93	91.15m @ 0.40% 450 RIBBED PVC — NW: 6.29 SW: 6.54



ERICKSON & HARROGATE INTERSECTION DETAILS

1:150



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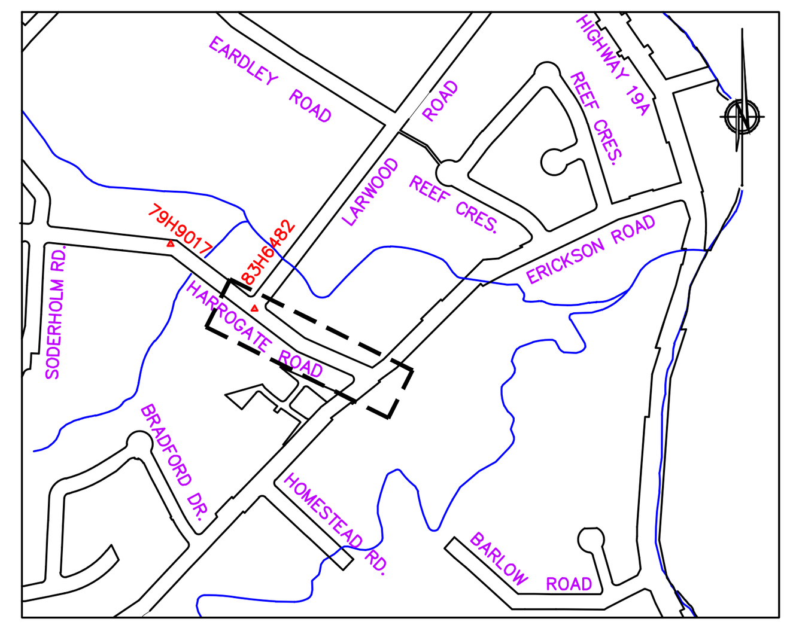

LOCATION PLAN

NTS

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TENDER

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EXISTING	LEGEND	DESIGN	EXISTING	LEGEND	DESIGN
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H	U/G HYDRO	H	SMH	SANITARY MANHOLE	SMH
G	NATURAL GAS	G	DMH	STORM MANHOLE	DMH
	PERMEABLE PAVING		SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
			HYD.	FIRE HYDRANT	HYD.
			W.V.	WATER VALVE	W.V.
			U.P.	UTILITY POLE	U.P.

EXISTING	LEGEND	DESIGN
S	SANITARY SEWER	S
D	STORM DRAIN	D
W	WATER MAIN	W
P	PAVEMENT	P
C	CURB & GUTTER	C
	SIDEWALK	
	INFILTRATION SWALE	

DESIGNED: RKS | SCALE: AS SHOWN
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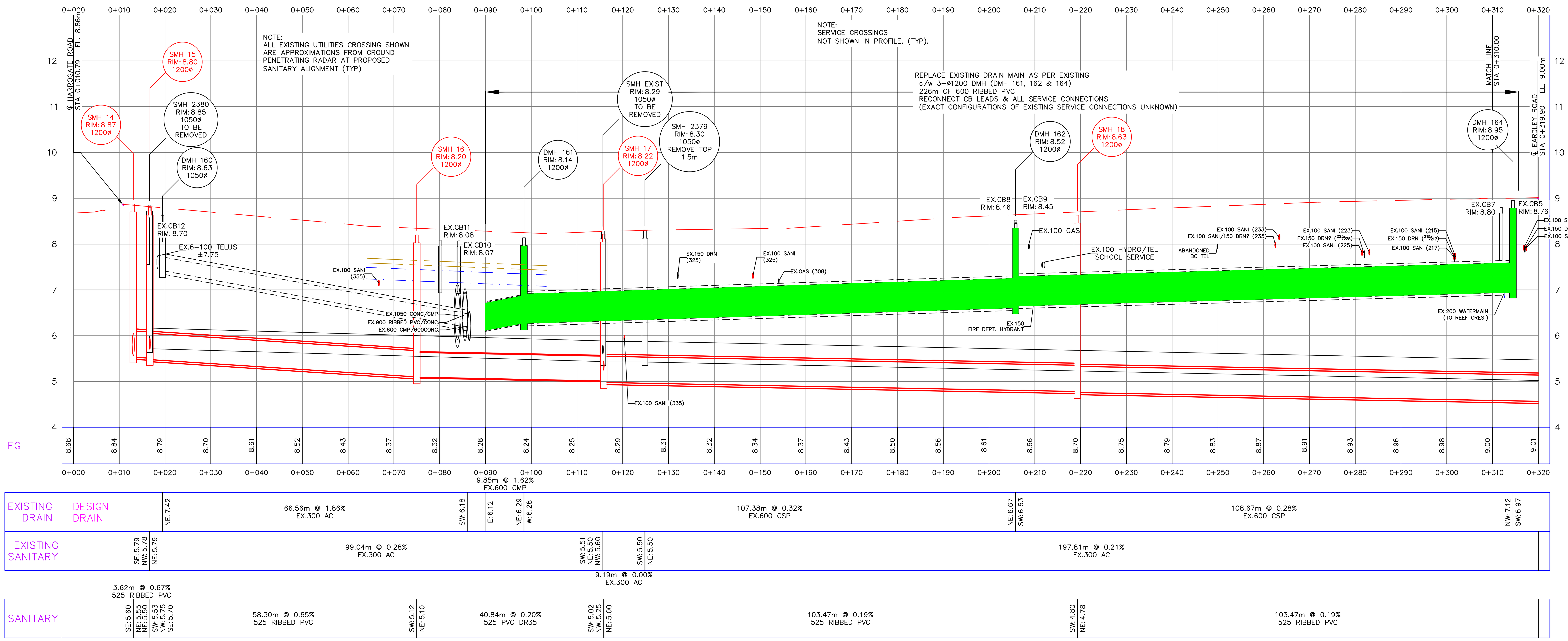
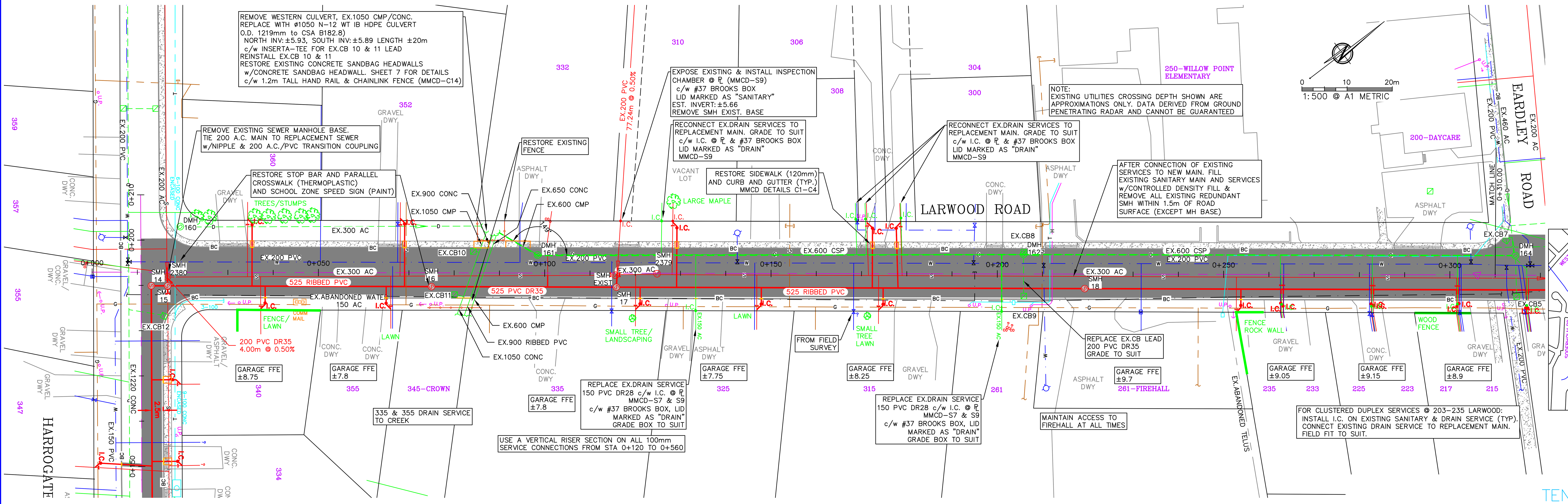
TITLE: CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
HARROGATE ROAD – ERICKSON TO LARWOOD

CITY DWG # 17–516
PROJECT: 4067
SHEET 4 OF 7
ISSUE 4

DESTROY PRINTS OF PREVIOUS REVISION

LARWOOD ROAD PROFILE





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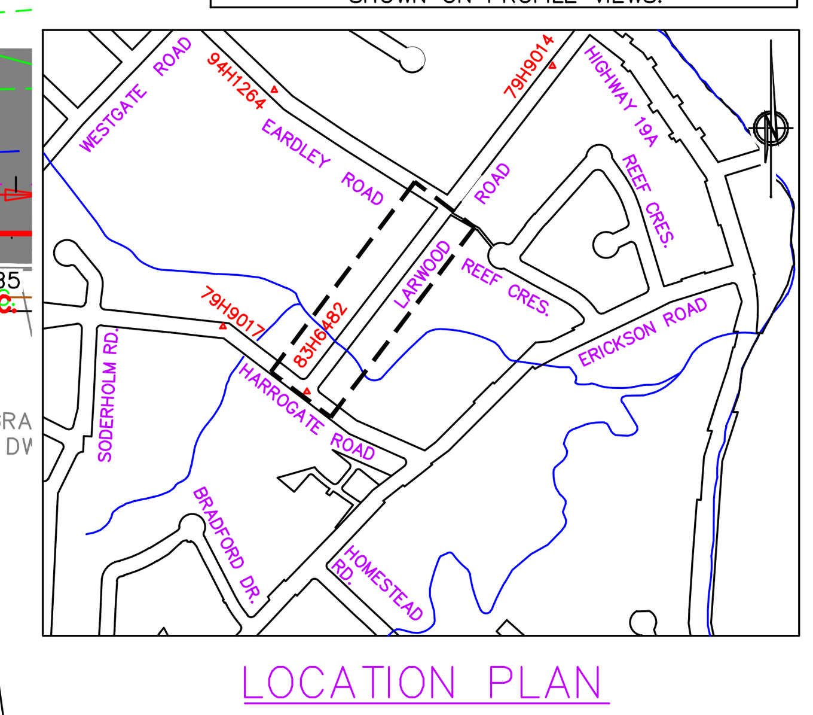

LOCATION PLAN

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EXISTING	LEGEND	DESIGN
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H	U/G HYDRO	H
G	NATURAL GAS	G
	PERMEABLE PAVING	

EXISTING	LEGEND	DESIGN
S	SANITARY SEWER	S
D	STORM DRAIN	D
W	WATER MAIN	W
P	PAVEMENT	P
C	CURB & GUTTER	C
	SIDEWALK	
	INFILTRATION SWALE	

EXISTING	LEGEND	DESIGN
O.D.	OPEN DITCH	O.D.
SMH	SANITARY MANHOLE	SMH
DMH	STORM MANHOLE	DMH
SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
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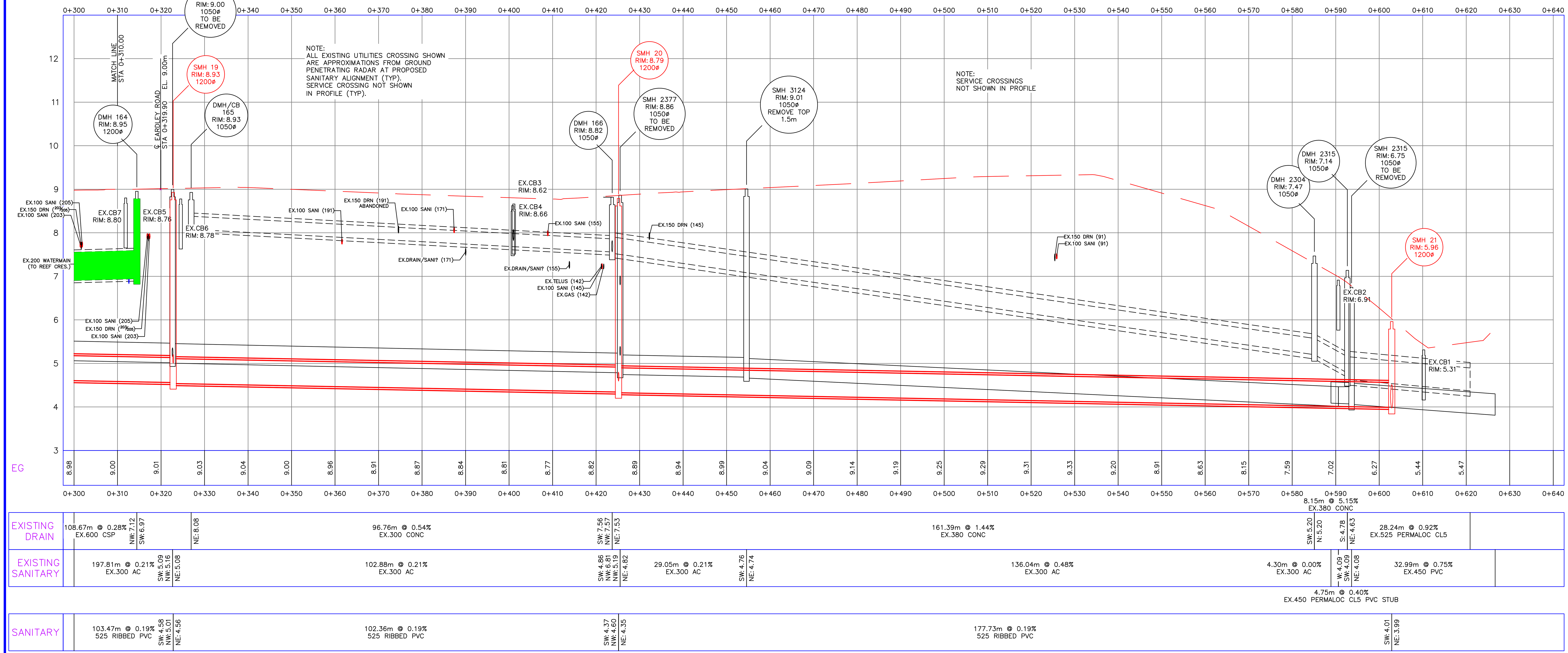
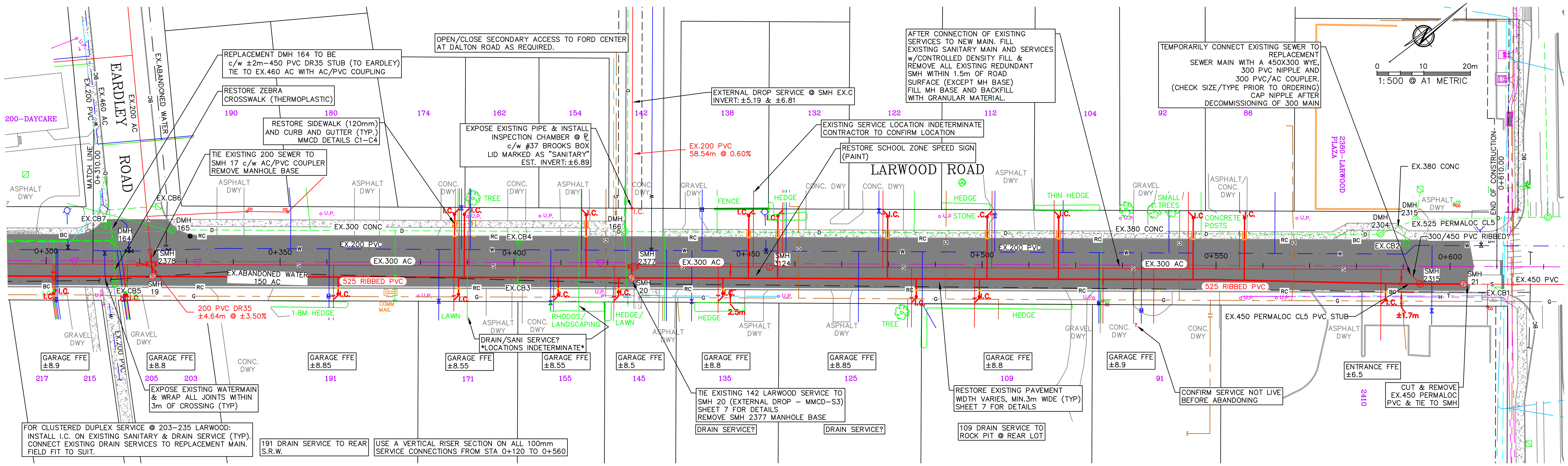
TITLE:
CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
LARWOOD ROAD – 0+000 TO 0+310

CITY DWG # 17–516
PROJECT: 4067
SHEET 5 OF 7
ISSUE 4

DESTROY PRINTS OF PREVIOUS REVISION

LARWOOD ROAD PROFILE





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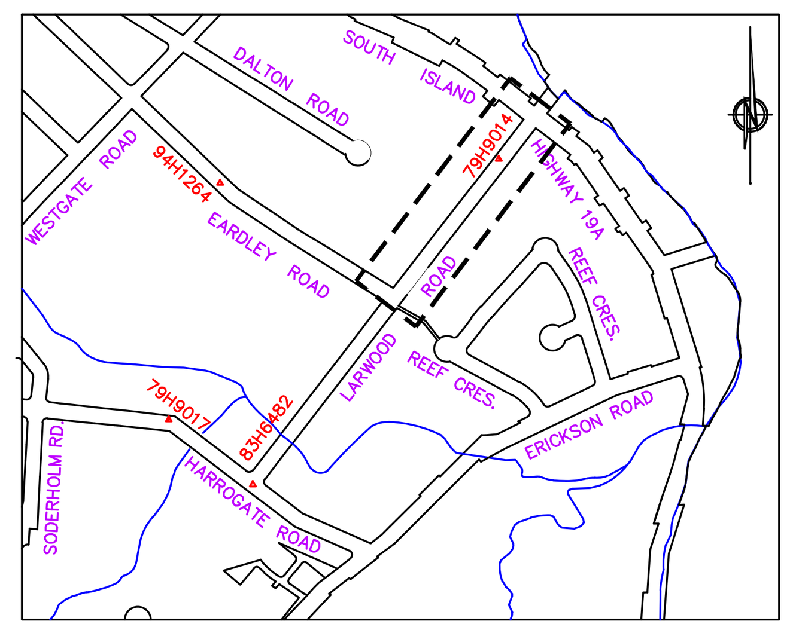

LOCATION PLAN

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1	50% SUBMISSION	HT	17/06/26

LEGEND	EXISTING	DESIGN
U/G TELEPHONE	T	T
U/G HYDRO	H	H
NATURAL GAS	G	G
PERMEABLE PAVING		
SANITARY SEWER	S	S
STORM DRAIN	D	D
WATER MAIN	W	W
PAVEMENT	P	P
CURB & GUTTER	C	C
SIDEWALK		
INFILTRATION SWALE		
OPEN DITCH	O.D.	O.D.
SANITARY MANHOLE	SMH	SMH
STORM MANHOLE	DMH	DMH
CATCH BASIN	SIDE INLET / TOP INLET	SIDE INLET / TOP INLET
FIRE HYDRANT	HYD.	HYD.
WATER VALVE	W.V.	W.V.
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TITLE: CITY OF CAMPBELL RIVER

LARWOOD – ERICKSON SEWER UPGRADE

CAMPBELL RIVER, BC

LARWOOD ROAD – 0+310 TO END

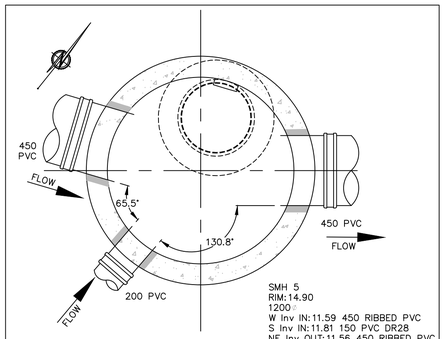
CITY DWG # 17–516

PROJECT: 4067

SHEET 6 OF 7

ISSUE 4

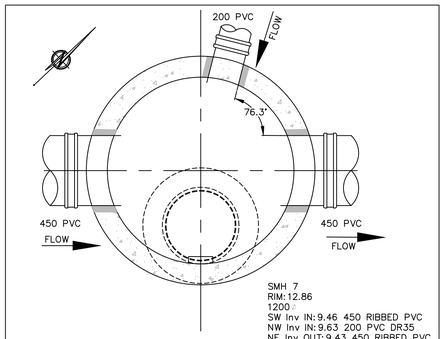
DESTROY PRINTS OF PREVIOUS REVISION



SMH 5 DETAIL

NOT TO SCALE

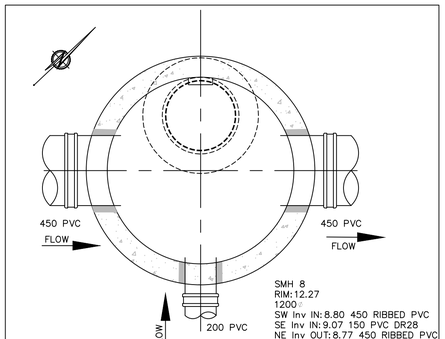
MANHOLES TO MMCD–S1 & S2



SMH 7 DETAIL

NOT TO SCALE

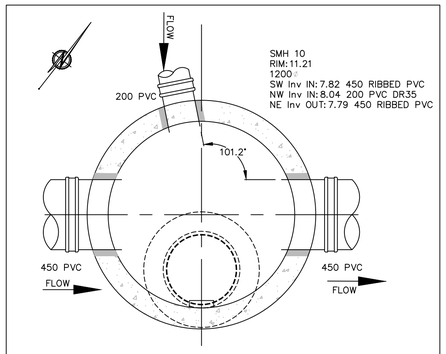
MANHOLES TO MMCD–S1 & S2



SMH 8 DETAIL

NOT TO SCALE

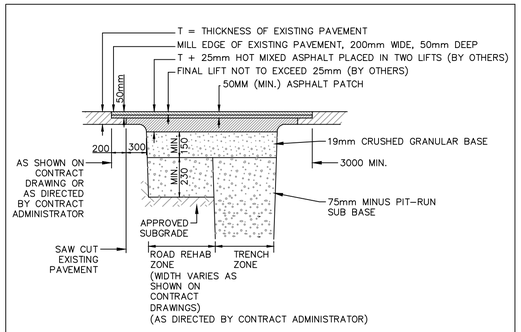
MANHOLES TO MMCD–S1 & S2



SMH 10 DETAIL

NOT TO SCALE

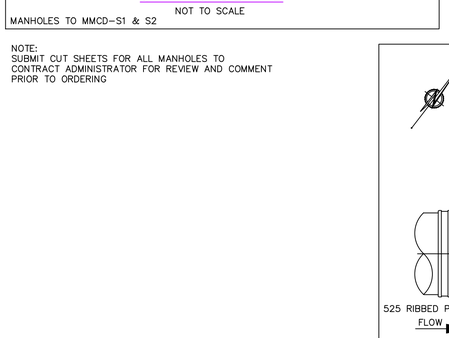
MANHOLES TO MMCD–S1 & S2



PAVEMENT RESTORATION

NOT TO SCALE

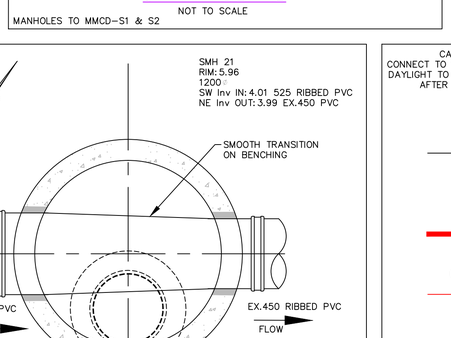
REFER TO SUPPLEMENTAL SPECIFICATION 32 01 01S.
ALL GRANULAR MATERIALS COMPACTED TO 95% M.P.D.
PAVEMENT CUT TO BE STRAIGHT LINE WITH VERTICAL FACE.
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.



SMH 15 DETAIL

NOT TO SCALE

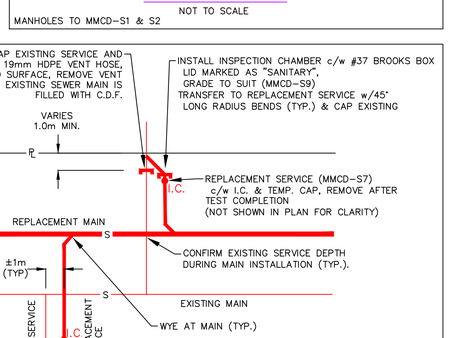
MANHOLES TO MMCD–S1 & S2



SMH 17 DETAIL

NOT TO SCALE

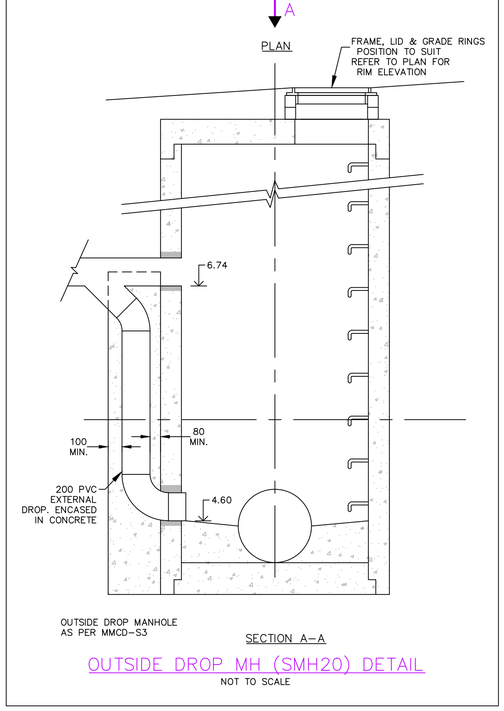
MANHOLES TO MMCD–S1 & S2



SMH 19 DETAIL

NOT TO SCALE

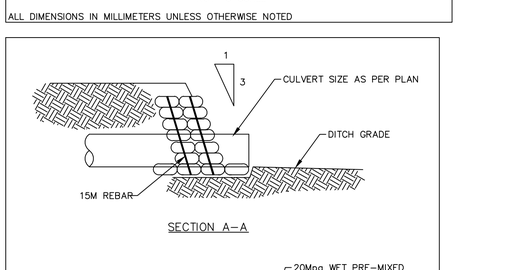
MANHOLES TO MMCD–S1 & S2



SECTION A–A

OUTSIDE DROP MH (SMH20) DETAIL

NOT TO SCALE



H	W
0–2500	1000
2500–3500	1500
3500–4500	1850
4500–5500	2400

UTILITY TRENCH

NOT TO SCALE

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

NOTE:
SUBMIT CUT SHEETS FOR ALL MANHOLES TO CONTRACT ADMINISTRATOR FOR REVIEW AND COMMENT PRIOR TO ORDERING

SMH 21 BENCHING DETAIL

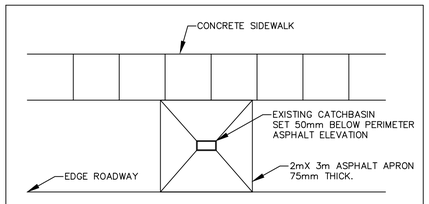
NOT TO SCALE

MANHOLES TO MMCD–S1 & S2

NOTE:
–CONFIRM I.C. UNIT ON EXISTING SERVICES DOES NOT EXIST PRIOR TO COMMENCING WORKS.
–INSTALL BACKFLOW VALVE ON ALL 100 SERVICE CONNECTIONS.
–INSTALL PLUG ON ALL SERVICE CONNECTIONS NOT CONNECTED TO EXISTING SERVICES.
–RESTORE ALL DISTURBED AREAS TO ITS ORIGINAL CONDITION OR BETTER (TYP.).
–FINAL I.C. LOCATIONS TO BE CONFIRMED IN FIELD BY CONTRACT ADMINISTRATOR

TYPICAL SANITARY SERVICE REPLACEMENT DETAIL

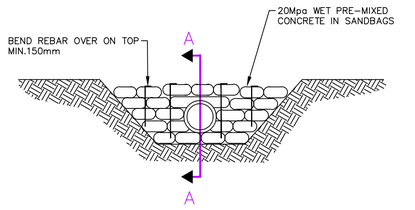
NOT TO SCALE



CATCH BASIN APRON DETAIL

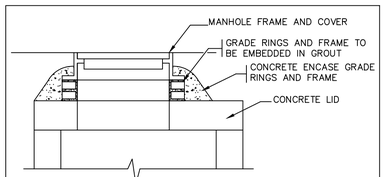
NOT TO SCALE

SECTION A–A



CULVERT HEADWALL DETAIL

NOT TO SCALE



MANHOLE LID GROUTING DETAIL

N.T.S.

TENDER

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G	NATURAL GAS	G	W	WATER MAIN	W	D	STORM MANHOLE	D
	PERMEABLE PAVING		P	PAVEMENT	P	SIDE INLET / TOP INLET	CATCH BASIN	SIDE INLET / TOP INLET
			C	CURB & GUTTER	C	HYD.	FIRE HYDRANT	HYD.
				SIDEWALK		W.V.	WATER VALVE	W.V.
				INFILTRATION SWALE		U.P.	UTILITY POLE	U.P.

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DATE:	–

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TITLE: CITY OF CAMPBELL RIVER
LARWOOD – ERICKSON SEWER UPGRADE
CAMPBELL RIVER, BC
DETAILS

CITY DWG #: 17–516
PROJECT: 4067
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