Resort Municipality of Whistler
SOUTH WHISTLER WATER SUPPLY UPGRADES PHASE 1 – CIVIL WORKS

Construction Documents Project Manual

February 15, 2023
RMOW Project No. E203027

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Owner: Resort Municipality of Whistler
(NAME OF OWNER)

Contract: South Whistler Water Supply Improvements Phase 1
(TITLE OF CONTRACT)

Reference No. E20307
(OWNER'S CONTRACT REFERENCE NO.)

To *Owner*:

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)

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

ACCORDINGLY WE HEREBY OFFER:

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

2.2 to achieve Substantial Performance of the Work on or before **October 31, 2023**

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 unit prices 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 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*.

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.

WE CONFIRM:

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

- the appendices as required by paragraph 5.3 of the Instructions to Tenderers – Part II; and
- the Bid Security as required by paragraph 5.2 of the Instructions to Tenderers – Part II.

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:

- within 15 *Days* of receipt of the written *Notice of Award* deliver to the *Owner*:
  a. a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract Price, covering the performance of the Work including the Contractor's obligations during the Maintenance Period, 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;
  b. a Baseline Construction Schedule, as provided by GC 4.6.1;
  c. a "clearance letter" indicating that the tenderer is in Worksafe BC compliance; and
  d. a copy of the insurance policies as specified in GC 24 indicating that all such insurance coverage is in place and;
- 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*; and

5.1.3 sign the Contract Documents as required by GC 2.1.2.

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:

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

- 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 us to enter into the *Contract* and the *Owner* may, on written notice to us, award the *Contract* to another party. 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:

- the face value of the *Bid Security*; and
- the amount by which our *Tender Price* is less than the amount for which the *Owner* contracts with another party to perform the *Work*.

OUR ADDRESS IS AS FOLLOWS:

Resort Municipality of Whistler

4325 Blackcomb Way, Whistler, BC, V8E 0X5

Phone: 604-932-5535

Fax: 604-935-8109

Attention: _____

This Tender is executed this _____ day of _____, 20____.

Contractor:

_____

(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

_____

(AUTHORIZED SIGNATORY)

_____

(AUTHORIZED SIGNATORY)

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1.0 Introduction IT - 6

2.0 Tender Documents IT - 7

3.0 Submission of Tenders IT - 8

4.0 Additional Instructions to Tenderers IT - 8

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(FOR USE WHEN UNIT PRICES FORM THE BASIS OF PAYMENT TO BE USED ONLY WITH THE GENERAL CONDITIONS AND OTHER STANDARD DOCUMENTS OF THE UNIT PRICE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.)

**(TO BE READ WITH "INSTRUCTIONS TO TENDERERS - PART II"
CONTAINED IN THE EDITION OF THE PUBLICATION
"MASTER MUNICIPAL CONSTRUCTION DOCUMENTS" SPECIFIED IN ARTICLE 2.2 BELOW)**

Owner: Resort Municipality of Whistler
(NAME OF OWNER)

Contract: South Whistler Water Supply Improvements Phase 1
(TITLE OF CONTRACT)

Reference No. E20307
(OWNER'S CONTRACT REFERENCE NO.)

Introduction

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

50 mm Watermain Service
1. Installation of 50 mm domestic service line

Altitude to Check Valve Replacement
2. Removal of existing altitude valve in an existing vault at the Cheakamus Reservoir.
3. Installation of 200 mm check valve in an existing vault at the Cheakamus Reservoir.
4. Installation of two (2) 200 mm DI Spools.

250 mm Watermain
1. Removal of existing 250 mm watermain and fittings and appurtenances.
2. Installation of 250 mm DI watermain
3. Installation of Air valve chamber(s) complete with air valve(s).
4. Installation of 250 mm gate valves with risers to surface.

300 mm Watermain
1. Removal of existing 300 mm watermain and fittings and appurtenances.
2. Installation of 10 m of 300 mm DI Watermain

400 mm Watermain
1. Removal of existing 400 mm watermain and fittings and appurtenances.
2. Installation of 400 mm DI Watermain

75 mm Fibre-Optic Conduit
1. Installation of 75 mm conduit.
2. Installation of pull boxes.

Direct all inquiries regarding the *Contract*, to:

Michael Day, P.Eng.
Project Manager
HDR Corporation
(778) 372-4819
michael.day@hdrinc.com

Direct all general inquiries regarding the *Contract,* to:

Chelsey Roberts, AScT.
Capital Projects Manager, Infrastructure Services
Resort Municipality of Whistler
4325 Blackcomb Way
Whistler, BC, V8E 0X5
(604) 935-8305
croberts@whistler.ca

Tender Documents

2.0 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 *Contract Drawings*".

2.1 A portion of the *Contract Documents* are 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. They are those contained in the publication entitled "Master Municipal Construction Documents - General Conditions, Specifications and Standard Detail Drawings". Refer to Schedule 1 to the Agreement or, if not specified in Schedule 1, then the applicable edition shall be the most recent edition as of the date of the *Tender Closing Date.* All sections of this publication are by reference included in the *Contract Documents*.

2.2 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 judgment about its reliability, accuracy, completeness and relevance to the *Contract*, and neither the *Owner* nor any representative of the *Owner* gives any guarantee or representation that the additional information is reliable, accurate, complete or relevant.

2.3 **The *Contract Documents* are available for viewing at:**
Resort Municipality of Whistler
Municipal Hall
4325 Blackcomb Way
Whistler, BC, V0N 1B4

The *Contract Documents* are available *online* at:
This tender is being issued electronically through the RMOW website (www.whistler.ca) where any interested party may download the Tender documents directly from the aforementioned website. No registration, tracking or other recording of Tender document holders will be performed by the Resort Municipality of Whistler. All addenda, amendments or further information will be published on the RMOW website and BC Bid website. It is the sole responsibility of the Tenderer to monitor the website regularly to check for updates.

Submission of Tenders

3.0 Tenders must be submitted in a sealed envelope, marked on the outside with the above *Contract* Title and Reference No., and must be received by the office of:

engineerbids@whistler.ca

on or before:

Tender Closing Time: 2:00 pm local time

Tender Closing Date: March 8, 2023

The email should indicate the Tender title and contract number in the subject line and the full legal name of the Tenderer in the body of the email.

Tenderers should note that the maximum acceptable email size is 8MB. If greater than 8MB, Tenderers should email bids in multiple emails. If sending in multiple emails, each email should indicate the total number of emails that are being sent. All emails must be received prior to the Submission Deadline. Responses are to be prominently marked with the Tender title and contract number, and the full legal name and return address of the respondent.

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

Additional Instructions to Tenderers

4.1 Copies of the Master Municipal Construction Documents Volume II, Instructions to Tenderers - Part II, General Conditions, Specifications and Standard Detail Drawings are available separately from:

Master Municipal Construction Documents Association
Suite 102
211 Columbia St.
Vancouver, BC V6A 2R5
www.mmcd.net

604.601.5103

Evaluation Criteria 4.2 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 Municipality reserves the right to conduct pre-selection meetings with Tenderers. The Municipality further reserves the right to conduct post-selection meetings in order to correct, change or adapt the selected Tender to the wishes of the Municipality. **Acceptance of any tender may be subject to budgetary considerations and/or Municipality approval, and/or the approval of other jurisdictions having authority.**

Site Meeting 4.3 It is recommended that Tenderers review the site and satisfy themselves of the existing conditions. A site briefing can be provided by request.

Deletion / Addition of Work 4.4 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 4.5 Should a tenderer find omissions from or discrepancies in the Contract Documents, or be in doubt as to their meaning, the tenderer should notify the Owner 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. Failure to do so may result in the forfeiture of the Bid Security. 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 1.

Measurement and Payment 4.6 Delete all 'Measurement and Payment' Clauses from the MMCD Volume II, Master Municipal Specifications. Refer to Supplemental Specification 01 22 00 MEASUREMENT AND PAYMENT.

Tender Requirements 5.0 **IT – Part II 5 is amended by the following, as applicable.**

5.2.3. **A Consent of Surety**

The Contractor shall provide a Consent of Surety for the issue of a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract Price, covering the performance of the Work, including the Contractor's obligations during the Maintenance Period, 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.

8 **IT – Part II 8 is amended by the following, as applicable.**

8 **IT – Part II 8 is amended by the following, as applicable.**

8.1 **Examination and Site Inspection**

The Tenderer must examine the Place of Work before submitting their tender, either personally or through a representative, and satisfy themselves as to the nature and location of the work, local conditions, soil structure, topography, the nature and quality of the materials to be used, the equipment and facilities needed preliminarily to and during the prosecution of the work, the means of access to the site, all necessary information as to risks, contingencies and circumstances as may affect their tender, and all other matters which can in any way affect the work under this Contract. The Tenderer is fully responsible for conducting sufficient field investigation (test pits/bore holes) and obtaining all information required for the preparation of their tender and for the execution of the work. By submitting a tender, the Tenderer represents that the Tenderer has examined the Place of the Work, or specifically elected not to. No additional payments or time extensions shall be claimable or due because of difficulties relating to conditions at the Place of the Work which were reasonably foreseeable by a contractor qualified to undertake the Work.

12 **IT – Part II 12 is amended by the following, as applicable.**

12.S Amendments to Tenders

Change “hand, mail, or fax” to “hand or mail” and add “An amendment by email or fax will not be accepted.”

15 **IT – Part II 15 is amended by the following, as applicable**

15.1S **Award**

Replace 15.1 with:

“The Owner reserves the full right, in its sole discretion and according to its own judgement of its best interest to

1. reject any or all tenders;
2. waive any defect or deficiency in a tender which does not materially affect the tender or the Tender Price relative to other tenders and accept that tender;
3. accept any tender, including an Alternative Tender which , in accordance with paragraph 6.3 of these Instructions to Tenderers - Part II, the Owner may accept.

In exercising its discretion the Owner will have regard to the information provided in the Form of Tender, Form of Tender

Appendices, and any information obtained by the Owner from any other person, firm or corporation relating to their previous experience with the tenderer, as well as the Owner's previous relevant experience, if any, with the tenderer, including but not limited to, the following criteria:

a) the proven experience of the tenderer, and any listed subcontractors to do the Work;
b) the tenderer's ability to complete the Work within the Preliminary Construction Schedule including timeliness in completing deficiency works;
c) the tenderer's ability to work effectively with the Owner, its consultants and representatives, and the public;
d) the tenderer's ability to manage and do the work effectively using the named superintendent and submitted contractors and subcontractors;
e) the tenderer's history on other projects including with respect to quality of the Work, changes in the Work, force account Work, cooperation with the Owner, and the contract administration costs of the Owner;
f) the nature of any legal proceedings undertaken by the tenderer, or any officer or director of the tenderer directly (or indirectly through another corporation) against the Owner within the last five years of the Invitation to Tender

In no event shall the Owner be liable for a tenderer's costs of preparing a tender.

The award of this Contract is subject to approval by Council."

15.4S **Award**

Insert the following clauses:

"Without limiting the generality of the foregoing, any tender which is incomplete, obscure or irregular may be rejected; any tender having erasures or corrections in the Form of Tender: Appendix 1, Schedule of Quantities & Prices may be rejected; any tender in which unit prices are omitted or in which unit prices are obviously unbalanced may be rejected; any tender accompanied by an insufficient bond may be rejected; any tender that has any deletions, alterations, or changes in the Contract Documents as listed in Schedule 1 and 2 of the Agreement may be rejected."

Hours of Work

The hours of work must not extend beyond 0700 h and 1800h, inclusive, daily. The Contractor shall schedule his work within these hours and will not be permitted to commence work earlier than 0700 h and/or work later than 1800h, except as authorized by the Contract Administrator. No work on Saturdays, Sundays, or Statutory Holidays will be permitted except in case of emergency and then only with written permission of the Contract Administrator and to such extent as he deems necessary.
The Owner reserves the right not to not to allow any work to be

undertaken on Weekends or Statutory Holidays.

Watermain Testing Procedure

The Contractor is to be aware that a testing written procedure is required as part of the watermain testing process. Refer to Supplementary Specifications Section 33 11 01 - 3.17.7 for detailed requirements.

Traffic Management

Tenderers are to be made aware that the *Owner* requires all traffic control plans to be submitted to the *Owner* prior to any lane or road closures being put into effect. The tenderer is advised to refer to Supplemental Specification 01 55 01S.

Materials Testing

The Contractor is advised that they are responsible for Quality Assurance testing.

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E20307 South Whistler Water Supply Improvements Phase 1

(TITLE OF CONTRACT)

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

ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1	**General Requirements**				
	a) Mobilization/Demobilization	Lump Sum	1		
	b) Traffic Control	Lump Sum	1		
	c) Restoration	Lump Sum	1		
	Sub-Total Item 1 – General Requirements:				
2	**Watermain Modification and Installation**				
2.2	Installation of 250mm dia. Watermains c/w all air-vacuum valves w/ chamber, gate valves, fittings and blow-offs	Lump Sum	1		
2.3	Removal of existing 250mm dia. watermain, fittings, and appurtenances	Lump Sum	1		
2.4	Modifications to existing 300mm Watermain	Lump Sum	1		
2.8	Installation of 400mm watermain, c/w all air-vacuum valves w/ chamber, gate valves, fittings and blow-offs	Lump Sum	1		
2.9	Disinfection and testing of new watermains	Lump Sum	1		
	Subtotal Item 2 – Watermain Modification and Installation:				
3	**Conduit Installation**				
3.1	Installation of 75mm Fiber Optic Conduit, Pull Boxes, and Pull String	Lump Sum	1		
4	**Completion**				
4.1	Restoration	Lump Sum	1		
	TENDER PRICE				

TENDER SUMMARY	
TENDER PRICE	

GST (5%)	
TOTAL TENDER PRICE	

South Whistler Water Supply Improvements Phase 1

(TITLE OF CONTRACT)

See paragraph 5.3.2 of the Instructions to Tenderers – Part II.

Indicate Schedule with bar chart with major item descriptions and time.

MILESTONE DATES: Substantial performance by October 31, 2023

ACTIVITY	CONSTRUCTION SCHEDULE									
	1	2	3	4	5	6	7	8	9	10
Mobilization to Site										
Modifications to existing 200mm watermain										
Installation of 250mm watermain										
Modifications to existing 300mm watermain										
Installation of 300mm watermain										
Modifications to existing 400mm watermain										
Installation of 400mm watermain										
Pressure Testing										
Disinfection										
Installation of 75mm Fibre-Optic Conduit										
Traffic Control										
Restoration										
Demobilization										

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South Whistler Water Supply Improvements Phase 1

(TITLE OF CONTRACT)

See paragraph 5.3.3 of the Instructions to Tenderers – Part II.

Superintendent Name:

Project Name:	
Dates:	
Responsibility:	
References:	
Project Name:	
Dates:	
Responsibility:	
References:	
Project Name:	
Dates:	
Responsibility:	
References:	

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South Whistler Water Supply Improvements Phase 1

(TITLE OF CONTRACT)

See paragraph 5.3.4 of the Instructions to Tenderers – Part II.

PROJECT	OWNER / CONTACT NAME PHONE and FAX	WORK DESCRIPTION	VALUE ($)
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		
	Owner / Contract _____ Phone ( ) _____ Fax ( ) _____		

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South Whistler Water Supply Improvements Phase 1

(TITLE OF CONTRACT)

See paragraph 5.3.5 of the Instructions to Tenderers – Part II.

TENDER ITEM	TRADE	SUBCONTRACTOR NAME	PHONE NUMBER

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SUPPLEMENTARY GENERAL CONDITIONS

GC #	Parag #	Title	Action
(a) MMCD STANDARD			
1.0	1.21	Definitions	**Replace with:** "Contract Administrator" means the person appointed by the Owner and identified by the Owner in writing to the Contractor. The Contract Administrator may be an officer of the Owner, a direct employee of the Owner, an officer or employee of the consultant who designed the Work for the Owner, or an independent consultant.
1.0	1.30	Definitions	**Delete** GC 1.30.1 "Deleted Items"
1.0	1.45	Definitions	**"Milestone Date"** means any date specified in the Contract Documents for completion of the Work, or portion of the Work, including the dates of Substantial Performance and Total Performance.
2.0	2.2	Interpretation	**Replace** GC 2.2.4 (1) (i) **with:** "Standard Detail Drawings"
3.0	3.4	Inspection and Site Inspector	**Replace** GC 3.4.5 **with:** If at any time and for any reason the Contract Administrator determines that inspection or testing of the Work, or portion of the Work, is required that was not called for in the Contract Documents, then the Contract Administrator may direct the Contractor to perform, or have performed, that inspection or testing, as provided in GC 4.12.6.
	4.6	Construction Schedule	**Replace** GC 4.6.2 **with:** The Contractor shall update the Baseline Construction Schedule monthly to produce an adjusted Baseline Schedule (the "Adjusted Baseline Schedule") that reflects any adjustments to the Milestone Date(s) or the Contract Time as provided by the Contract Documents, including without limitation if the Contract Administrator issues a Change Order or other Contract Document(s) which adjusts any Milestone Date(s). Each Adjusted Baseline Schedule will replace the previous Baseline Construction Schedule.
	4.6	Construction Schedule	**Replace** GC 4.6.6 **with**: The time for the performance of the Work shall commence on the date specified in the Notice to Proceed, or if not so specified, on the date the Notice to Proceed is issued. Subject to a contrary provision in the Contract Documents, the Owner shall issue the Notice to Proceed within 10 Days of receipt of the documentation required from the Contractor under paragraph 5.1.1 of the Form of Tender. Failure by the Owner to issue the Notice to Proceed within the 10 Days shall entitle the Contractor to a claim for delay under GC 13.1.1.
	4.7	Superintendent	**Replace** GC 4.7.1 **with**: The Contractor shall employ a competent senior representative at the Place of the Work (the "Superintendent") who shall have the responsibility to ensure that the Work is performed in compliance with the Contract Documents. Unless otherwise permitted in writing by the Owner, the Superintendent shall be the person whose experience was submitted in Appendix 3 of the Tender. The Contractor shall also employ necessary assistants for the Superintendent and the Superintendent and assistants shall be in attendance at the Place of the Work while Work is being performed.
	4.11	Subcontractors	**Replace** GC 4.11.2 **with**:

			The Contractor shall employ only the Subcontractors listed in Appendix 5 of the Form of Tender, or others as approved in writing by the Owner, and shall not change or employ additional Subcontractors without the approval of the Owner, which approval shall not be unreasonably withheld
7.0	7.1	Changes	**Replace** GC 7.1.3 **with**: Additional work that the Owner may wish performed that does not satisfy the requirements of subparagraphs (a) and (b) of GC 7.1.1(1) is Extra Work and not a Change. Pursuant to GC 8, Extra Work may be declined by the Contractor or may, upon agreement between the parties, be undertaken as Extra Work.
9.0	9.4	Quantity Variations	**Replace** GC 9.4.1 **with**: If for any reason, including an addition or deletion under GC 7.1.1.(1) or GC 7.1.1.(2) respectively, the actual quantity of a unit price item varies by more than plus or minus the Variance Threshold Percentage from the estimated quantity for that unit price item as listed in the Schedule of Quantities and Prices (the "Tender Quantity") or as otherwise agreed to pursuant to these Contract Documents, then either the Owner or the Contractor may by written notice request the other party to agree to a revised unit price, considering the change in quantities. A party shall make a request for a revised unit price as soon as reasonably possible after the party concerned becomes aware of the quantity variation.
	9.4	Quantity Variations	**Replace** GC 9.4.2(2) **with**: If there is an overrun in the estimated quantity, GC 9.4.3 (2) shall apply to the overrun.
10	10.1	Force Account Costs	**Replace** GC 10.1.1(4) **with**: 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.
12	12.2	Discovery of Hazardous Materials	**Replace** GC 12.2.2 **with**: If the Contract Administrator observes any materials at the Place of the Work that the Contract Administrator knows or suspects may be Hazardous Materials then the Contract Administrator shall immediately give written notice to the Contractor and the Contractor shall immediately stop the Work or portion of the Work as required by GC 12.2.1 (1).
13	13.9	Liquidated Damaged for Late Completion	**Replace** 13.9.1(1) **with**: 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 $1000.00 per day or pro rata portion for each Day that actual Substantial Performance is achieved after the Substantial Performance Milestone Date; plus
17	17.5	Disputes	**Replace** GC 17.5.2(2) **with**: If the parties have not agreed upon a Referee within 3 Days of a submission of names by one party to the other as provided by GC 17.5.2 (1), then either party may request in writing the Master Municipal Construction Documents Association to appoint the Referee. The Association will have the authority to appoint a Referee without further consultation with the parties and the parties shall accept the Association's appointment. If for any reason the Association fails to appoint a Referee within 5 Days of the written request then such failure shall be deemed to be an agreement between the parties to omit a review of that Dispute by a Referee and a party may at the end of the 5 Days request a Settlement

			Meeting and proceed with the remaining steps in the Dispute resolution process as described in this GC.
18	18.2	Supporting Documents	**Replace** GC 18.2.2 **with**: If requested in writing by the Contract Administrator the Contractor shall as a precondition to the issuance of the Payment Certificate provide a sworn declaration in a form acceptable to the Contract Administrator, that as of the date set out in the sworn declaration all amounts which have been incurred directly by the Contractor relating to the Work that are due and owing to third parties have been paid.
	18.6	Substantial Performance	**Replace** GC 18.6.3(1) **with**: a sworn declaration in a form in accordance with SGC 18.2.2; and
24	24.1	Required Insurance	**Replace** GC 24.1.1(2) **with**: Commercial General Bodily Injury and Property Damage Liability Insurance Limits: Bodily Injury and Property damage – inclusive $5,000,000 The insurance shall include Contractor's Contingent Liability and Contractual Liability of sufficient scope to include the liability assumed by the Contractor under the terms of this Contract, and Completed Operations Liability. The policy shall include the Owner and the Contract Administrator as additional insured's with a cross liability clause. Any property damage shall be for the account of the Contractor and shall not exceed $10,000.00 for any one occurrence.
	24.1	Required Insurance	**Replace** SGC 24.1.5 **with**: All policies referred to in this GC shall provide that thirty (30) days notice of cancellation will be given in writing to each insured, including the Owner, otherwise the policies to remain in full force and effect until the Work has been completed. Notwithstanding the foregoing, the Commercial General Bodily Injury and Property Damage Liability insurance referred to in GC 24.1.1 (2) shall remain in full force and effect from the commencement of the performance of the Work for a period of not less than twelve (12) months following Total Performance, and with respect to completed operations coverage for a period of not less than 24 months following Total Performance.
(b) PROJECT SPECIFIC			
4.2	4.2.1	Safety	**Add Clause** SGC 4.2.2 The Contractor shall be the Prime Contractor under WorkSafeBC.
4.3	4.3.4	Protection of Work, Property and the Public	**Delete and Replace Clause** 4.3.4(1) with the following Expose using hand or hydro vacuum excavation and determine conclusively the location in the field of all underground utilities and structures indicated on the Contract Documents as being at the Place of the Work.
4.3	4.3.4	Protection of Work, Property and the Public	**Delete and Replace Clause** 4.3.4(3) with the following Similarly expose using hand or hydro vacuum excavation and conclusively determine the location in the field of all underground utilities or underground structures that are reasonably apparent in an inspection of the Place of Work.
4.3	4.3.4		**Add Clause** SGC 4.3.4(4) The Contractor shall contact BC One Call prior to construction.

			The Contractor shall co-ordinate activities with utility owners and is responsible for protecting and supporting all utilities, including poles, during construction in a manner acceptable to the utility owner. The Contractor shall inform any utility/service provider of any planned disruption/adjustment to usual service in writing and receive written agreement of such disruption or adjustment prior to these disruptions or adjustments.
	4.3.7		**Add Clause** SGC 4.3.7. The Contractor shall maintain the uninterrupted flow of all watercourses, sewers, drains and any other utilities encountered during the work. The cost of utility relocation shall be paid by the Contractor if the relocation is for the convenience or safety of construction, and by the Owner if the relocation is necessary by a direct conflict between the work and the utility which in the opinion of the Contract Administrator cannot be otherwise avoided except as noted herein or on the drawings as being the Contractor's responsibility.
	4.3.8		**Add Clause** SGC 4.3.8. If instructed by the Contract Administrator, the Contractor will be responsible for arranging the relocation of utilities. The Owner will be responsible for the cost of the relocation of the utilities.
	4.3.9		**Add Clause** 4.3.9. Nothing shown or anything not shown on the drawings will relieve the Contractor of the responsibility for damage to persons or property, or delay in construction, caused by damage to or interference with existing or utilities along the route of the work to be completed under this Contract. No payment will be made for any loss or cost to the Contractor occasioned by damage to or interference with utilities.
	4.3.10		**Add Clause** SGC 4.3.10. All trees not located immediately within the excavation zone are to be protected from damage during construction, except those trees which would endanger persons or property shall be removed by the Contractor upon approval by the Owner. No trees on private property shall be damaged.
	4.3.11		**Add Clause** SGC 4.3.11 The *Contractor* shall conduct operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business and residences adjacent to the *Place of Work*. No greater quantity of work shall be undertaken at any one time than can be properly conducted with due regard to the rights and interests of the public as may be determined by the *Contract Administrator.* The *Contractor* is to provide safe, satisfactory and convenient means of approach and entrance to adjoining lanes, driveways, buildings, and pedestrians wherever necessary in the opinion of the *Contract Administrator*. For this purpose the *Contractor* shall construct and maintain suitable and safe platforms, approaches, structures, bridges, diversions or other works. During all phases of the operation the *Contractor* shall take precautions to abate nuisance caused by mud or dust by clean- up, sweeping, sprinkling with water, or other means as necessary to accomplish results satisfactory to the *Contract Administrator*.

			The *Contractor* shall take care to prevent spillage on streets over which hauling is done and the *Contractor* shall immediately clean up any spillage or debris deposited on streets due to his operations.
4.6	4.6.8	Construction Schedule	**Add SGC** 4.6.8 The Construction Schedule will make adequate provision for adverse weather which may be expected from records for the area, including seasonal weather patterns.
4.6	4.6.9	Construction Schedule	**Add Clause** SGC 4.6.9 The hours of work must not extend beyond 0700 h and 1700 h, inclusive, daily. The Contractor shall schedule their work within these hours and will not be permitted to commence work earlier than 0700 h and/or work later than 1700 h, except as authorized by the *Contract Administrator*. In case the Contractor desires to work on a day which is a statutory holiday, they shall notify the Contract Administrator in writing at least four (4) days in advance of such holiday, stating those places where said work will be conducted. In case the Contractor fails to give such notice in advance of any statutory holiday, no work within the terms of the Contract shall be done on such holiday. The Owner reserves the right not to allow any work to be undertaken on Statutory Holidays The Contractor shall not schedule construction work requiring inspection in excess of a 54 hour working week. With approval of the *Contract Administrator*, extended working hours on working days will be permitted for operations, which must reasonably be completed on that date.
4.6	4.6.10	Construction Schedule	**Add Clause** SGC 4.6.10 The Contractor shall coordinate their work with the Owner's Operations Staff. Construction work to be done with minimal disturbance to the municipal utilities.
4.9	4.9.3	Materials	**Add Clause** SGC 4.9.3 1. Be responsible for storing all of the materials supplied for the *Work* either by the *Contractor* or the *Owner*, until it has been incorporated into the completed *Work*; 2. Store all materials in a matter which will prevent damage from the weather, dirt, foreign matter, vandalism and theft; 3. Arrange for and/or verify the time of delivery of all materials to be supplied by the *Contractor* or the *Owner* to ensure that delivery will coincide with the *Contractor's* work schedule. 4. Examine with the *Contract Administrator* the quantities and details of all materials supplied by the *Owner* at the time and place of delivery or those materials already at the *Place of Work*, and prepare and sign a Statement of Materials Acceptance, specifically noting and rejecting any defective material;

			5. Assume responsibility, upon signing of the *Contract*, for all materials supplied by the *Owner* and already at the *Place of Work* ; 6. Replace all materials supplied by the *Contractor* or the *Owner* which are found to be stolen, missing or damaged while under his care; 7. Replace all materials found to be defective in manufacture which have been supplied by the *Contractor*
4.12	4.12.4	Test and Inspections	**Replace** "perform, or cause to be performed" with "engage a firm of testing engineers selected by the Contractor and approved by the corporation to carry out".
4.0	4.17	Licences	**Add to Clause** GC 4.17 The Contractor shall have or otherwise obtain a current business license in the Resort Municipality of Whistler prior to commencement of the Works
6.0	6.2.1	Coordination & Connection	**Add to Clause** GC 6.2.1 The Owner will not be liable for claims for delay caused by Utilities, BC Transit or Municipal forces for work required to be undertaken on this contract.
24	24.1	24.1.1	**Replace Clause with**: Contractor will at the Contractor's expense, carry with an insurance company or companies and under policies of insurance acceptable to and approved by Owner the following insurance with limits not less than shown in the respective items: (1) Automotive Liability Insurance (Owned and Non-Owned Units) Limits: Bodily Injury and Property Damage - inclusive each accident $3,000,000 The Contractor shall, at the Contractor's expense, throughout the term of the Contract, maintain such insurance as required under the Insurance (Motor Vehicle) Act of British Columbia. The Contractor shall provide the Owner with a Certificate of Insurance, I.C.B.C. form No. APV 47, for owned or leased vehicles as evidence of third-party motor vehicle insurance coverage. (2) Commercial General Bodily Injury and Property Damage Liability Insurance Limits: Bodily Injury and Property Damage – inclusive $5,000,000 The insurance shall include Contractor's Contingent Liability, and Contractual Liability of sufficient scope to include the liability assumed by the Contractor under the terms of this Contract, and Completed Operations Liability. The policy shall include the Owner and the Contract Administrator as additional insured with a cross liability clause. Any property damage deductible shall be for the account of the Contractor and shall not exceed $10,000.00 for any one occurrence. (3) Course of Construction Builders' Risk Insurance Coverage on an "All Risks" basis in the amount of not less than the amount of the Contract Price; subject to a deductible provision for the Contractor's account not exceeding $10,000.00 each loss. Coverage to include the Owner as an additional insured. (4) Insurance on Contractor supplied Equipment Equipment rented or owned by the Contractor to its full insurable value.

			(5) Boiler and Machinery Insurance - If Applicable. Boiler and machinery Insurance in the joint names of the Contractor and the Owner. The policy shall include as insureds all Subcontractors. The coverage shall be maintained continuously from the commencement of use or operation of the boiler and machinery objects insured by the policy and until ten calendar days after Substantial Performance.
		24.1.5	**Replace Clause with**: All policies referred to in this GC shall provide that thirty (30)days notice of cancellation will be given in writing to the Named Insured and the Owner, otherwise the policies to remain in full force and effect until the Work has been completed. Notwithstanding the foregoing, the Commercial General Bodily Injury and Property Damage Liability Insurance referred to in GC 24.1.1(2) shall remain in full force and effect from the commencement of the performance of the Work for a period of not less than twelve (12) months following Total Performance, and with respect to completed operations coverage for a period of not less than 24 months following Total Performance.
24	24.1	Insurance	**Add Clause** SGC 24.1.7: The Contractor shall ensure the following are additional named insured under this contract: HDR Corporation Resort Municipality of Whistler

END OF SUPPLEMENTARY GENERAL CONDITIONS

(FOR USE WHEN UNIT PRICES FORM THE BASIS OF PAYMENT TO BE USED ONLY WITH THE GENERAL CONDITIONS AND OTHER STANDARD DOCUMENTS OF THE UNIT PRICE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.)

BETWEEN *OWNER* AND *CONTRACTOR*

This agreement made in duplicate this

_____ day of _____, 20_____.

Contract:

(TITLE OF CONTRACT)

Reference No.

(OWNER'S CONTRACT REFERENCE NO.)

BETWEEN:

The Resort Municipality of Whistler

(NAME OF OWNER)

(the "*Owner*")

AND:

_____

_____

_____

(NAME AND OFFICE ADDRESS OF CONTRACTOR)

(the "*Contractor*")

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

The Work Start / Completion Dates

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

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* on or before _____October 31, 2023_____ subject to
(INSERT DATE OF SUBSTANTIAL PERFORMANCE)
the provisions of the *Contract Documents* for adjustments to the *Contract Time*.

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

Contract Documents

The "*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*.

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*.

Contract Price

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

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 unit prices listed in the *Schedule of Quantities and Prices*; plus
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. 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*.

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*.

Payment

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

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.

Rights and Remedies

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

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*.

Notices

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

The *Owner*:

Resort Municipality of Whistler

4325 Blackcomb Way, Whistler, BC, V8E 0X5

Fax: 604-935-8109

Attention: _____

The *Contractor*:

_____

_____

_____

Fax: _____

Attention: _____

The *Contract Administrator*:

_____

_____

_____

Fax: _____

Attention: _____

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

1. immediately upon delivery, if delivered by hand; or
2. immediately upon transmission if sent by fax and received in hard copy; or
3. after 5 *Days* from date of posting if sent by registered mail.

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.*

The sender of a notice by fax assumes all risk that the fax is received in hard copy.

General

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

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

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*.

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

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:

(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

(AUTHORIZED SIGNATORY)

(AUTHORIZED SIGNATORY)

Owner:

Resort Municipality of South Whistler

(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

(AUTHORIZED SIGNATORY)

(AUTHORIZED SIGNATORY)

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", edition dated 2009. All sections of this publication are included in the *Contract Documents*.

Agreement, including all Schedules;

Supplementary General Conditions;

General Conditions*;

Supplementary Specifications;

Specifications*;

Supplementary Standard Detail Drawings (if any, insert title and edition date);

Standard Detail Drawings*;

Executed Form of Tender, including all Appendices;

Contract Documents listed in Schedule 2 to the Agreement –"List of *Contract Documents*";

Instructions To Tenderers - Part I;

Instructions to Tenderers - Part II*;

The following Addenda:

_____

_____

_____

_____

_____

_____

_____

_____

(ADDENDA, IF ANY)

LIST OF CONTRACT DOCUMENTS

TITLE	DRAWING NO.	DATE	REVISION NO.	REVISION DATE
COVER SHEET		14/02/2023	1	14/02/2023

LOCATION & AREA PLANS & DRAWING INDEX	10299470-G01-101-G001	14/02/2023	1	14/02/2023
SHEET LAYOUT PLAN	10299470-G01-101-G002	14/02/2023	1	14/02/2023
LYNHAM ROAD PLAN AND PROFILE	10299470-C01-101-C001	14/02/2023	1	14/02/2023
HWY 99 CROSSING PLAN AND PROFILE	10299470-C01-101-C002	14/02/2023	1	14/02/2023
VALLEY TRAIL PARKING LOT PLAN AND PROFILE	10299470-C01-101-C003	14/02/2023	1	14/02/2023
CHEAKAMUS LAKE ROAD PLAN AND PROFILE	10299470-C01-101-C004	14/02/2023	1	14/02/2023
WWTP ACCESS ROAD PLAN AND PROFILE	10299470-C01-101-C005	14/02/2023	1	14/02/2023
P291 PUMP STATION PLAN AND PROFILE	10299470-C01-101-C006	14/02/2023	1	14/02/2023
R226 CHEAKAMUS RESERVOIR PLAN AND PROFILE	10299470-C01-101-C007	14/02/2023	1	14/02/2023
DETAIL SECTIONS	10299470-C01-101-C008	14/02/2023	1	14/02/2023
STANDARD DETAILS	10299470-C01-101-C009	14/02/2023	1	14/02/2023

[add geotechnical reports, client standard drawings to this list]

REFERENCE DOCUMENT	DOCUMENT #	DATE	REVISION NO.	REVISION DATE
Preliminary Geotechnical Report, Proposed South Whistler Booster Pump, Water Treatment Facility and Water Supply Project, Resort Municipality of Whistler, BC	1956	10/02/2023	1	10/02/2023

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SUPPLEMENTAL SPECIFICATIONS

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SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Supplemental Specification supercedes all MMCD Measurement and Payments terms.

B. Section Includes:
   1. General requirements applicable to all bid/pay items.
   2. General provisions on lump sums.
   3. Listing of the various bid/pay items in the Project, together with criteria for measuring Unit Price Work for payment.

1.2 REQUIREMENTS APPLICABLE TO ALL BID/PAY ITEMS

A. In this Section and elsewhere in the Contract Documents, the terms “bid item”, “pay item”, “bid/pay item”, “Item” followed by a number designation, “this item”, and the like all have the same meaning, and refer to one or more specific elements of the Contract, established for pricing and payment, as indicated in the Tender Form, which becomes part of the Contract signed by the parties.

B. This Article applies to all bid/pay items in the Contract.

C. Prices – General:
   1. The bid/pay items listed starting with Article 1.5 of this Section refer to and are the same bid items listed in the Tender Form and included in the Contract, and constitute all bid/pay items for the Work at the time the Contract was signed by the parties.
   2. All Lump Sum items shall be all inclusive of all labour, equipment, and materials required to complete the Work in accordance with the Contract Documents. Include costs for work, materials, supplies, permits and equipment not expressly stated in the Contract Documents, but implied or required in order to complete the Work
   3. Price Escalation:
      a. Unless expressly indicated otherwise in the Contract Documents, Owner is not obligated to change the stipulated prices (including lump sums, unit prices, and allowances) that are all or part of the Contract Price because of escalation of costs when there is no corresponding change in the Contract Schedule.
      b. Changes in the Contract Schedule do not necessarily entitle Contractor to a change in Contract Price due to escalation.
   4. Each lump sum in the Contract shall include an amount considered by Contractor as sufficient for all overhead and profit for each separately identified bid/pay item.

D. Contract Price, Payment Procedures, and Related Matters:
   1. Contract Price: The Contract Price, as apportioned among bid/pay items in the Contract may be modified by Change Order.
   2. Payments to Contractor: Refer to the General Conditions (as may be modified by the Supplementary Conditions), the Agreement (including provisions on retainage, if any), among other applicable Contract Documents.
   3. Procedures for Changes in Contract Price: Refer to the General Conditions (as may be modified by the Supplementary Conditions).
   4. Alternates: The scope and limits of alternates, when contemplated for or included in the Contract, may be addressed, in whole or in part, in Section 01 25 00 – Substitution Procedures.
   5. Provisional Items: Provisional Work is included in the Schedule of Quantities and Prices and will be undertaken and included in the Contract at the election of the Owner. No claim by the Contractor will be entertained if the Owner elects not to proceed with one more of the

provisional items or variations to the pricing indicated in the Tender Form should the Owner elect to proceed with the one or more of the Provisional Items.

6. Defective Work is not eligible for payment.

1.3 GENERAL PROVISIONS ON UNIT PRICES AND QUANTITIES

A. NOT USED

1.4 GENERAL PROVISIONS ON LUMP SUM ITEMS

A. Progress payments for Work paid on a lump sum basis will based on Engineer's estimate of the Work (in accordance with the Contract Documents) performed through the end of the associated pay period, based on the Schedule of Quantities and Prices.

B. At its sole discretion, Engineer may correct amounts of lump sum Work included in prior payment requests based on improved data or information available to Engineer, or Engineer's knowledge or reasonable belief that Work is incomplete or defective.

1.5 BID/PAY ITEMS – GENERAL CONTRACT

A. Item 1.1 – General Requirements:
   1. This includes all costs for the provision of bonds/security, insurance, mobilization/demobilization, temporary facilities, administration, miscellaneous items, survey, final clean-up, testing, commissioning and all other general requirements.
   2. Payment for this item will be made on the following basis:
      a. Twenty five (25%) of the lump sum price upon mobilization and active construction;
      b. Twenty five (25%) of the lump sum price upon clean-up, restoration, demobilization, and receipt of final as-constructed drawings, O&M manuals, and completed commissioning forms;
      c. Fifty (50%) of the lump sum price paid in equal installments over the duration of the Contract based on the approved construction schedule.

B. Item 2.1 – Removal of existing altitude valve:
   1. This item includes all work necessary to cut into existing and remove the altitude valve as shown on the Drawings. Included shall be all temporary systems to remove the equipment and disposed at legally registered recycling depots or disposal places.
   2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

C. Item 2.2 – Installation of 200mm dia. check valve, disinfection and tie-in:
   1. This item includes all work necessary to cut into existing, install check valve and install two spools as shown on the Construction Drawings.
   2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

D. Item 2.3 – Installation of 250mm dia. watermains, air valve w/ chamber, gate valves and tie-ins:
   1. This item includes all work necessary to cut into existing, install ductile iron pipe, air valve in chamber, and gate valves as shown on the Construction Drawings. Included shall be all mechanical connections and pipe bedding and fill as shown on the Drawings.
   2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

E. Item 2.4 – Removal of existing 250mm dia. Watermain and fittings
   1. This item includes all work necessary to cut into existing, remove the piping and fittings as shown on the Construction Drawings. Included shall be replacement of soil, all temporary systems to remove the equipment and disposed at legally registered recycling depots or disposal places.
   2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

F. Item 2.5 – Installation of 300mm watermains, fittings and tie-ins

1. This item includes all work necessary to cut into existing, install ductile iron pipe, fittings as shown on the Construction Drawings. Included shall be all mechanical connections and pipe bedding and fill as shown on the Drawings.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

G. Item 2.6 – Removal of existing 300mm dia. watermain and fittings
1. This item includes all work necessary to cut into existing, remove the piping and fittings as shown on the Construction Drawings. Included shall be replacement of soil, all temporary systems to remove the equipment and disposed at legally registered recycling depots or disposal places.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

H. Item 2.7 – Modifications and relocation to 350mm watermain hydrant
1. This item includes all work necessary to cut into existing and relocate fire hydrant, fire hydrant branch and gate valve as shown on Construction Drawings. Included shall be replacement of soil, placement of pipe bedding and fill and all temporary systems to remove the equipment as shown on Drawings.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

I. Item 2.8 – Installation of 400mm watermain, fittings and tie-ins
1. This item includes all work necessary to cut into existing, install ductile iron pipe, fittings as shown on the Construction Drawings. Included shall be all mechanical connections and pipe bedding and fill as shown on the Drawings.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

J. Item 2.9 – Removal of existing 400mm dia. watermain and fittings
1. This item includes all work necessary to remove the piping and fittings as shown on the Construction Drawings. Included shall be replacement of soil, all temporary systems to remove the equipment and disposed at legally registered recycling depots or disposal places.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

K. Item 3.0 – Pressure testing of new watermain
1. This item includes all work necessary to pressure test the new watermains as per AWWA C600.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

L. Item 3.1 – Disinfection and testing of new watermains
1. This item includes all work necessary to disinfect and test the new watermains per AWWA B300.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

M. Item 3.2 – Installation of 75mm Fibre Optic Conduit and Pull Boxes
1. This item includes all work necessary to cut into existing, install conduit, fittings and pull boxes as shown on the Construction Drawings. Included shall be pipe bedding and fill as shown on the Drawings.
2. Payment: Payment will be made at the lump sum price based on the Engineer's estimate of percentage of work item completed.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 33 01

PROJECT RECORD DRAWINGS

1.7 Recording Actual Site Conditions

.5S The Contractor will complete sufficient field measurements in the project coordinate system of the final locations and elevations of the surface and underground works and deliver to the Contract Administrator in AutoCAD format.

The Contractor will keep one set of drawings on-site that will be marked up in red ink identifying any changes made during the construction. This copy will be turned over to the Contract Administrator following completion of all works.

The Contractor shall be responsible for the detailed setting out of the work and recording all data required to compile record drawings, including digital survey for record drawings.

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SECTION 01 52 01

TEMPORARY STRUCTURES

1.3 SITE OFFICE Replace clause 1.3.1 with the following 1.3.1s:

1. Contractor to provide necessary site offices or working areas as necessary for the support and execution of the work, including sufficient areas for filing and layout of contract documents and contractor’s normal site staff.

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SECTION 01 58 01

PROJECT IDENTIFICATION

1.2 Temporary Project Signage	**Replace Clause 1.2.1.1 with the following 1.2.1.1S** .1 Provide and erect, within 3 weeks of signing Contract, two project signs in a location designated by the Contract Administrator. **Replace Clause 1.2.2 with the following 1.2.2S:** 1.2.2 Public Notice .1 The Contractor shall be responsible for preparing and hand delivering a project information sheet to each property within 100m of the work zones, under the Contractor's letterhead at a minimum before each of the following construction stages. a. Prior to start of Work b. Prior to any planned interruptions to Utilities .2 At a minimum, the information sheet shall contain the following information: a. Project name b. Brief statement of overall project purpose (e.g. why are these construction works necessary) and system benefits. The Resort Municipality of Whistler may assist with this verbiage. c. Brief statement of overall construction procedure (e.g. any planned service interruptions or methods of temporary supply, system construction and commissioning, transfer of services to new watermain etc.) a. Scheduled date of initial service disruption d. Diagram of current project segment highlighting all users who's service will be affected by those Works Contractor's primary contact for inquiries from public pertaining to construction schedule and detailed construction related issues e. Construction Inspector's contact information to field individual concerns and questions that could affect the progress and/or scope of the construction f. Resort Municipality of Whistlers Project Manager's contact information. g. Other sources of project information available to the public to be listed (e.g. RMOW's website) .3 The Contractor shall provide a draft of the information sheet to the Resort Municipality of Whistler for review and comment not less than one week (5 days) before the scheduled delivery date of the notices, and the Contractor shall receive approval of the final information sheet from the Resort Municipality of

	Whistler before distribution. The Contractor shall notify users directly affected by the Work 72 hours in advance of the actual scheduled service disruption. This second notice shall be a re-distribution of the information sheet discussed above with dates and times updated accordingly

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SECTION 31 23 01
EXCATING TRENCHING AND BACKFILLING

3.6 Surface Restoration

.6S **Replace Clause 3.6.6.2**

.2S At a minimum, patch all other roads on the Friday of each week to provide asphalt surface for weekend traffic. At all other times, the Contractor is to maintain a smooth granular running surface free of rutting, potholes or other irregularities. All asphalt patches shall be to finished surface.

.8S **Add New Clause 3.6.8**

Disturbed Grassed Areas to be Hydro-Seeded

All native and grass areas within the rural and urban areas disturbed by the construction shall be reinstated with 150mm compacted depth topsoil and hydro-seeded. No additional payment will be made to the contractor for this work.

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3.17 General Procedure Flushing, Testing, and Disinfection	**Replace Clause 3.17.2 with the following:** .2S Perform all tests in the presence of Contract Administrator and Municipal representative. Notify Contract Administrator 72 h in advance of proposed test. **Add Clause 3.17.7:** .7S The Contractor is required to submit a written testing and flushing procedure for approval from the Municipality and Contract Administrator. The procedure must be submitted a minimum of two weeks prior to performing pressure and chlorination testing. At a minimum the testing procedure is to include the following: a. Water source locations b. Water discharge points a. Expected test dates for pressure testing, initial chlorination, chlorine residual testing, flushing and collection of water samples for laboratory testing b. Segments of watermain to be tested c. Chlorination methods d. Chlorine level determination method e. Bacterial testing laboratory used
3.23 Connections to Existing Mains	**Replace Clause 3.23.1 with the following:** .1S Watermain tie-ins will only be completed after hydrostatic testing, disinfection, flushing, testing and acceptance by the Owner. Tie-ins to be completed by the Contractor and witnessed by the Owner. Tie-ins to be disinfected per AWWA C651 by the Contractor.

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SECTION 40 05 00
PIPE AND PIPE FITTINGS-BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Utility piping systems.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of Contract.
   2. Division 01 - General Requirements.
   3. Section 40 05 51 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      a. B16.3, Malleable Iron Threaded Fittings.
      b. B16.5, Pipe Flanges and Flanged Fittings.
      c. B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
      d. B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings.
      e. B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
      f. B31.1, Power Piping.
      g. B31.3, Process Piping.
      h. B36.19, Stainless Steel Pipe.
      i. B40.100, Pressure Gauges and Gauge Attachments.
   2. American Iron and Steel Institute (AISI).
   3. ASTM International (ASTM):
      a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
      b. A74, Standard Specification for Cast Iron Soil Pipe and Fittings.
      c. A106, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
      d. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
      e. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
      f. A197, Standard Specification for Cupola Malleable Iron.
      g. A234, Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
      h. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
      i. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
      j. A518, Standard Specification for Corrosion-Resistant High-Silicon Iron Castings.
      k. A536, Standard Specification for Ductile Iron Castings.
      l. A587, Standard Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry.
      m. A760, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
      n. A774, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
      o. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.

p. B88, Standard Specification for Seamless Copper Water Tube.
q. C14, Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
r. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
s. C425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
t. C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
u. C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
v. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
w. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
x. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
y. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
z. D4101, Standard Specification for Polypropylene Plastic Injection and Extrusion Materials.
aa. F439, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
bb. F441, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.

1. American Water Works Association (AWWA):
   a. B300, Standard for Hypochlorites.
   b. C200, Standard for Steel Water Pipe - 6 IN and Larger.
   c. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
   d. C208, Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
   e. C220, Standard for Stainless-Steel Pipe, ½ In. (13 mm) and Larger.
   f. C226, Standard for Stainless-Steel Fittings for Waterworks Service, Sizes ½ in. Through 72 in. (13 mm Through 1,800 mm).
   g. C228, Standard for Stainless-Steel Pipe Flange Joints for Water Service – Sized 2 in. Through 72 in. (50 mm Through 1,800 mm).
   h. C504, Standard for Rubber Seated Butterfly Valves
   i. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service
   j. C515, Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
   k. C606, Standard for Grooved and Shouldered Joints.
   l. C651, Standard for Disinfecting Water Mains.
   m. C800, Standard for Underground Service Line Valves and Fittings.
2. American Water Works Association/American National Standards Institute (AWWA/ANSI):
   a. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
   b. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   c. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
   d. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
   e. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
3. Chlorine Institute, Inc. (CI):
   a. Pamphlet 6, Piping Systems for Dry Chlorine.
4. Cast Iron Soil Pipe Institute (CISPI):
   a. 301, Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
5. International Plumbing Code (IPC).

6. National Fire Protection Association (NFPA):
    a. 54, National Fuel Gas Code.
    b. 69, Standard on Explosion Prevention Systems.
7. Underwriters Laboratories, Inc. (UL).
8. Canadian Standards Association (CSA)
    a. B137.1, Standard for Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
    b. B137.2, Standard for Polyvinylchloride (PVC) Injection-Moulded Gasketed Fittings for Pressure Applications.
    c. B137.3, Standard for Rigid Polyvinylchloride (PVC) Pipe and Fittings for Pressure Applications.
    d. B137.5, Standard for Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
    e. B137.6, Standard for Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot and Cold-Water Distribution Systems.
    f. B139, Installation Code for Oil-Burning Equipment.
9. NSF International (NSF).
10. Building Codes:
    a. National Building Code.
    b. BC Building Code.
11. Safety Regulations:
    a. WorkSafeBC.
    b. Alberta Occupational Health and Safety (OHS).

B. Coordinate flange dimensions and drillings between piping, valves, and equipment.

1.3 SYSTEM DESCRIPTION

A. Piping Systems Organization and Definition:
1. Piping services are grouped into designated systems according to the chemical and physical properties of the fluid conveyed, system pressure, piping size and system materials of construction.
2. See PIPING SPECIFICATION SCHEDULES in PART 3.

1.4 SUBMITTALS

A. Shop Drawings:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
    c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
        1) Attach technical product data on gaskets, pipe, fittings, and other components.
3. Schedule Fabrication and/or Layout Drawings:
        1) Dimensions of piping lengths.
        2) Invert or centerline elevations of piping crossings.
        3) Acknowledgement of bury depth requirements.
        4) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.
        5) Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.
        6) Line slopes and vents.
    a. Schedule of interconnections to existing piping and method of connection.

B. Contract Closeout Information:
1. Operation and Maintenance Data:

a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

C. Informational Submittals:
1. Qualifications of lab performing disinfection analysis on water systems.
2. Test reports:
a. Copies of pressure test results on all piping systems.
b. Reports defining results of dielectric testing and corrective action taken.
c. Disinfection test report.
d. Notification of time and date of piping pressure tests.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe during handling using methods recommended by manufacturer.
1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with pipe is not permitted.

B. Prevent damage to pipe during transit.
1. Repair abrasions, scars, and blemishes.
2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Insulating unions:
a. "Dielectric" by Epco.
2. Dielectric flange kit:
a. PSI.
b. Maloney.
c. Central Plastics.
3. Harness Restraint
a. Romac AWWA M-11.
4. Mechanical grooved type coupling:
a. Victaulic

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 PIPING SPECIFICATION SCHEDULES

A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping specification schedules located at the end of PART 3 of this Specification Section.

2.3 COMPONENTS AND ACCESSORIES

A. Insulating Components:
1. Dielectric flange kits:
a. Flat faced.
b. 3mm (1/8 IN) thick dielectric gasket, phenolic, non-asbestos.
c. Suitable for 1207 kPa, 100 DEGC.
d. 1.5mm (1/32 IN) wall thickness bolt sleeves.
e. 3mm (1/8 IN) thick phenolic insulating washers.
2. Dielectric unions:
a. Screwed end connections.
b. Rated at 1207 kPa , 100 DEGC.
c. Provide dielectric gaskets suitable for continuous operation at union rated temperature and pressure.

B. Reducers:

1. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections.
2. Connection size requirements may change from those shown on Drawings depending on equipment furnished.

C. Protective Coating and Lining:
   1. Include pipe, fittings, and appurtenances where coatings, linings, coating, tests and other items are specified.

D. Pressure Gauges:
   1. See Specification Section 40 73 00.

E. Mechanical grooved type coupling:
   a. Rigid couplings:
      1) Victaulic Style 07 and Style W07, ductile iron coupling with a fusion bonded epoxy coating (safety blue) direct from manufacturer, for steel piping systems.
      2) Victaulic Style 89 and Style W89, ductile iron coupling with hot dipped galvanized coating, for stainless steel piping systems.
      3) Victaulic Style 489, 316 stainless steel couplings for submerged or for corrosive conditions, for stainless steel piping systems.
      4) Victaulic Style 31, ductile iron coupling with a coal tar epoxy coating, for ductile iron piping systems.
      5) Victaulic Style 307, ductile iron coupling with a coal tar epoxy coating, for transitions from ductile iron piping to IPS steel/stainless steel piping systems.
   b. Flexible couplings:
      1) Victaulic Style 77 and Style W77, ductile iron coupling with a fusion bonded epoxy coating (safety blue) direct from manufacturer, for steel piping systems.
      2) Victaulic Style 77S, 316 stainless steel coupling for submerged or for corrosive conditions, for stainless steel piping systems.
      3) Victaulic Style 475, 316 stainless steel coupling for submerged or for corrosive conditions, for stainless steel piping systems.
   c. Coupling gaskets:
      1) Grade E “EDPM” Standard type for water from -34°C to +110°C
      2) Grade E “EDPM” FlushSeal type, suitable for vacuum service
   d. Bolts and nuts – Stainless steel Type 304
   e. Victaulic Fittings
      1) Steel to ASTM A106 Grade B – segmentally welded
      2) Ductile Iron to ASTM A536
      3) ASTM A403 Type 304 or 316 stainless steel
   f. Victaulic Flanges
      1) Style 741 and Style W741, ductile iron flange adapter, for steel piping systems
      2) Flange adapters shall not be used on stainless steel piping systems.
   g. Victaulic Grooves
      1) Steel Pipe: roll grooved using standard grooving rolls to Victaulic specifications, or cut grooved where piping thicknesses allow to Victaulic specifications.
      2) Light Wall Stainless Steel Pipe, schedule 5S and 10S: roll grooved to Victaulic specifications using “RX” roles.
      3) Standard Wall Stainless Steel Pipe, greater than schedule 10S: roll grooved using standard grooving rolls to Victaulic specifications, or cut grooved where piping thicknesses allow to Victaulic specifications.
      4) Standard grooving rolls or cut grooving tools shall be dedicated for the use on stainless steel pipe or be thoroughly cleaned to prevent groove contamination and corrosion.

F. Valves:
   1. See schematics and details for definition of manual valves used in each system under 100mm (4 IN) in size.

2. See Drawings schedule for valve types 100mm (4 IN) and above and for automatic valves used in each system.
3. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 EXTERIOR BURIED PIPING INSTALLATION

A. Unless otherwise shown on the Drawings, provide a minimum of 1.8 m earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.

B. Enter and exit through structure walls, floors, and ceilings by using penetrations and seals with Linkseal, Grouting or cast-in-pace and as shown on Drawings.

C. Install insulating components where dissimilar metals are joined together.

3.2 FIELD QUALITY CONTROL

A. Pipe Testing - General:
1. Test piping systems as follows:
   a. Test exposed, piping systems upon completion of system.
   b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
   c. Test buried piping prior to backfilling and, if insulated, prior to application of insulation.
2. Utilize pressures, media and pressure test durations as specified in the PIPING SPECIFICATION SCHEDULES.
3. Isolate equipment which may be damaged by the specified pressure test conditions.
4. Perform pressure test using calibrated pressure gauges and calibrated volumetric measuring equipment to determine leakage rates.
   a. Select each gauge so that the specified test pressure falls within the upper half of the gauge's range.
   b. Notify the Engineer 24 HRS prior to each test.
5. Completely assemble and test new piping systems prior to connection to existing pipe systems.
6. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.
7. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Pressure Testing:
Testing medium: Potable Water; pressure provided in PIPING SPECIFICATION SCHEDULES

Pipe Type	Test Pressure	Medium
All	1724 kPa (250 psi)	Water

1. Allowable leakage rates:
   a. Exposed piping systems, all pressure piping systems and all buried which are hydrostatically pressure tested shall have zero leakage goal at the specified test pressure throughout the duration of the test. Allowable leakage per AWWA C600.
2. Hydrostatic pressure testing methodology:
   a. General:
      1) All joints, including welds, are to be left exposed for examination during the test.
      2) Provide temporary restraints for expansion joints for additional pressure load under test.
      3) Isolate equipment in piping system with rated pressure lower than pipe test pressure.

C. Dielectric Testing Methods and Criteria:
    1. Provide electrical check between metallic non-ferrous pipe or appurtenances and ferrous elements of construction to assure discontinuity has been maintained.
    2. Wherever electrical contact is demonstrated by such test, locate the point or points of continuity and correct the condition.

3.3 CLEANING, DISINFECTION AND PURGING

A. Cleaning:
    1. Clean interior of piping systems thoroughly before installing.
    2. Maintain pipe in clean condition during installation.
    3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
    4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
    5. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
        a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, or other foreign material which may have accumulated by operation of system, from testing, or from other causes.
        b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.

B. Disinfection of Potable Water Systems:
    1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
    2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
    3. Perform disinfection using sodium hypochlorite complying with AWWA B300.
    4. Flush each segment of system to provide flushing velocity of not less than 1 m per second.
    5. Drain flushing water to sanitary sewer.
        a. Do not drain flushing water to receiving stream.
    6. Use continuous feed method of application.
        a. Tag system during disinfection procedure to prevent use.
    7. After required contact period, flush system to remove traces of heavily chlorinated water.
    8. After final flushing and before placing water in service, obtain an independent laboratory approved by the Owner to collect samples and test for bacteriological quality.
        a. Repeat entire disinfection procedures until satisfactory results are obtained.
    9. Secure and deliver to Owner, satisfactory bacteriological reports on samples taken from system.
        a. Ensure sampling and testing procedures are in full compliance to AWWA C651, local water purveyor and applicable requirements of British Columbia.
    10. All piping with the following designation shall be disinfected:
        a. PW – Potable Water

3.4 LOCATION OF BURIED OBSTACLES

A. Furnish exact location and description of buried utilities encountered and thrust block placement.

B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.

C. Include such information as location, elevation, coverage, supports and additional pertinent information.

D. Incorporate information on "As-Recorded" Drawings.

3.5 PIPING SYSTEM SCHEDULES

Abbreviation	Service	Size and Material[1]	System Number
PW	Potable Water	15mm to 300mm	10

3.6 PIPING SYSTEM SCHEDULES

A. SPECIFICATION SCHEDULE – SYSTEM 10

1. General:
   a. Piping symbol and service:
      1) PW - Potable Water.
   b. Test requirements:
      1) Test medium: Water.
      2) Pressure: 1724 kPa.
      3) Duration: 6 HRS.
   c. Gaskets and O-rings:
      1) O-rings: Neoprene or rubber.
      2) Flanged, push-on and mechanical joints (ductile iron): Rubber, AWWA/ANSI C111/A21.11.
      3) Flanged joints (steel): Rubber, AWWA C207.
      4) Grooved coupling joints (ductile and steel): Rubber, AWWA C606.
      5) NSF/ANSI 61 listed.
2. System components:
   a. Pipe size 25mm through 600mm:
      1) Buried service:
         a) Materials: Ductile Iron, .
         b) Reference: AWWA C151
         c) Lining: Cement.
         d) Coating: Factory seal.
         e) Fittings: conforming to AWWA C104, AWWA C110, AWWA C111, AWWA C150, AWWA C151, and AWWA C153 as applicable.
         f) Joints: welded at fitting and restrained as shown on drawings.
3. Install all threaded piping with clean-cut tapered threads and with ends thoroughly reamed after cutting to remove burrs.
   a. Pipe joint cement permitted only on external threads.
   b. Anti-galling compound required on all threaded fittings
4. For screwed nipples for connections to flush valves, lavatory supplies, and other equipment with threaded connections use 304L, stainless steel pipe.

END OF SECTION

SECTION 40 05 51
VALVES - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Valving, actuators, and valving appurtenances.

B. Related Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
   4. Section 40 05 52 - Miscellaneous Valves.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      a. B1.20.1, Pipe Threads, General Purpose.
      b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
      c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASTM International (ASTM):
      a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
      b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
      c. D638, Standard Test Method for Tensile Properties of Plastics.
      d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
      e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
      f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
   3. American Water Works Association (AWWA):
      a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
      b. C210, Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
      c. C213, Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
      d. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
      e. C504, Standard for Rubber-Seated Butterfly Valves.
      f. C507, Standard for Ball Valves, 6 IN through 48 IN (150 MM through 1200 MM).
      g. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.
      h. C515, Reduced Wall, Resilient Seated Gate Valves.
      i. C550, Standard for Protective Coatings for Valves and Hydrants.
      j. C606, Standard for Grooved and Shouldered Joints.
   4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
      a. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

1.3 DEFINITIONS

A. The following are definitions of abbreviations used in this Specification Section or one of the individual valve sections:
   1. CWP: Cold water working pressure.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Valve pressure and temperature rating.
      d. Valve material of construction.
      e. Special linings.
      f. Valve dimensions and weight.
      g. Valve flow coefficient.

B. Contract Closeout Information:
   1. Operation and Maintenance Data:
      a. See Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

A. Refer to individual valve Specification Sections.

2.3 FABRICATION

A. End Connections:
   1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 40 05 00 or as shown on the Drawings.
   2. Comply with the following standards:
      a. Threaded: ASME B1.20.1.
      b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.

B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.

C. Nuts, Bolts, and Washers:
   1. Wetted or internal to be bronze or stainless steel.
   2. Exposed to be stainless steel.
   3. Washers to be used on both sides of bolted connections.

D. Epoxy Interior Coating: Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions. Operate valve, open and close at system pressures.

B. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.

C. For grooved coupling valves, install rigid type couplings or provide separate support to prevent rotation of valve from installed position.

D. For threaded valves, provide union on one side within 0.5m of valve to allow valve removal.

E. Install valves accessible for operation, inspection, and maintenance.

END OF SECTION

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SECTION 40 05 52
MISCELLANEOUS VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Air release and combination air valves.
   2. Automatic control valves:
      a. Pressure reducing valves.

B. Pressure-reducing valves. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 01 61 03 - Equipment - Basic Requirements.
   4. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
   2. American Water Works Association (AWWA):
      a. C512, Standard for Air-Release, Air-Vacuum, and Combination Air Valves for Waterworks Service.
      b. C550, Standard for Protective Interior Coatings for Valves and Hydrants.
   3. Canadian Standards Association (CSA).

1.3 SUBMITTALS

A. Shop Drawings:
   1. See General Conditions for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 40 05 51.

B. Contract Closeout Information:
   1. Operation and Maintenance Data:
      a. See Specification Section 01 33 04 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

B. Submit request for substitution in accordance with General Conditions.

2.2 AIR RELEASE AND VACUUM RELIEF VALVES

A. General: Conform to AWWA C512.

B. NSF/ANSI 61 certified.

C. Air Release Valve:
   1. Acceptable manufacturers:
      a. Valmatic 22.9DISV

b. Pratt WAR Series
c. APCO Model 50

2. Materials:
   a. Body and cover: Ductile Iron.
   b. Float, linkage, trim and fasteners: Stainless steel.
   c. Seat: Buna-N.
3. Design requirements:
   a. Size: 25mm.
   b. Pressure rating: 2068 kPa (300 psi).
   c. Working Pressure: 1172 kPa (170 psi)
   d. Working maximum water flow: 170 L/s.
   e. NPT inlets and outlets equal to the nominal valve size.
   f. Provide stainless steel isolation ball valve, type as shown.
   g. Coating: NSF/ANSI 61 approved fusion bonded epoxy coated and lined to AWWA C550.

D. Combination Air Release and Vacuum Valve:
1. Acceptable manufacturers:
   a. Valmatic 202C.2DISV
   b. Pratt WCV Series
   c. APCO Series S-140
2. Materials:
   a. Body and cover: Ductile Iron.
   b. Float, linkage, trim and fasteners: Stainless steel.
   c. Seat: Buna-N.
3. Design requirements:
   a. Single body type.
   b. Size: 50mm.
   c. Pressure rating: 2068 kPa (300 psi).
   d. Working Pressure: 1172 kPa (170 psi)
   e. Working maximum water flow: 170 L/s.
   f. NPT inlets and outlets equal to the nominal valve size.
   g. Provide stainless steel isolation ball valve, type as shown.
   h. Coating: NSF/ANSI 61 approved fusion bonded epoxy coated and lined to AWWA C550.

2.3 SOURCE QUALITY CONTROL

A. Shop hydrostatic test.

2.4 MAINTENANCE MATERIALS

A. Provide one set of any special tools or wrenches required for operation or maintenance for each type valve.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: See Specification Section 01 61 03 and Specification Section 40 05 51.

B. Air Release and Combination Air Valves:
1. Exhaust port to be piped and terminated 150mm minimum above floor.

3.2 FIELD QUALITY CONTROL

A. Clean, inspect, and operate valve to ensure all parts are operable and valve seats properly.

B. Check and adjust valves and accessories in accordance with manufacturer's instructions and place into operation.

3.3 TESTING & COMMISSIONING

A. The Contractor shall arrange for a certified representative from the automatic control valve supplier to be on site during commissioning and provide field training for operating personnel.

END OF SECTION

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SECTION 40 05 66
CHECK VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Rubber flapper swing check valves, two-inch to 24-inch diameter.

B. Related Requirements: Include but are not necessarily limited to:
   1. Section 40 05 51 - Valves - Basic Requirements.

1.2 REFERENCES

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
   2. American Water Works Association (AWWA):
      a. C508, Standard for Swing-Check Valves for Waterworks Service, 2 IN through 24 IN NPS.
   3. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
      a. SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
      b. SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Valve Manufacturers:
      a. Manufacturer shall be a business regularly engaged in manufacturing and furnishing check valves of the type required and similar equipment.
      b. Manufacturer shall be able to document having furnished not less than 50 check valves, of the type required, of size equal to or larger than those required for the Work, during the past five years.
      c. When requested by Engineer, submit qualifications statement indicating manufacturer's record of manufacturing and furnishing check valves of the types and sizes required and furnish documentation of compliance with qualifications requirements of this Article.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:
   1. In accordance with Section 40 05 51 - Valves Basic Requirements.

B. Informational Submittals: Submit the following:
   1. In accordance with Section 40 05 51 - Valves Basic Requirements.
   2. Manufacturer's Instructions:
      a. Manufacturer's written instructions for delivery, handling, storage, installation, and startup.

C. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data:
      a. Submit in accordance with Section 01 78 23 - Operations and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 RUBBER FLAPPER SWING CHECK VALVES: 2 IN TO 24 IN

A. ASME B16.1, Class 125 (175 PSI).

B. Acceptable Manufacturer:

1. Valmatic.
2. APCO Series 100.
3. Approved Equal.

C. Materials:
1. Body and cover: Cast iron.
2. Flapper: Buna-N, steel reinforced.

2.2 SOURCE QUALITY CONTROL

A. Factory Tests and Inspections:
1. Perform manufacturer's standard factory tests and inspections on materials and equipment furnished. Correct defects prior to shipment to the Site.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation – General:
1. Provide check valves at locations shown and indicated in the Contract Documents.
2. Install in accordance with the Contract Documents and manufacturer's written instructions. In event of conflict between the Contract Documents and manufacturer's written instructions, obtain written interpretation or clarification from Engineer.
3. Comply with:
   a. Section 01 61 03 - Equipment - Basic Requirements.
   b. Section 40 05 51 - Valves - Basic Requirements.
   c. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
4. Before installing, ensure each check valve is clean and free of dirt and debris.

3.2 FIELD QUALITY CONTROL

A. Field Tests and Inspections:
1. Promptly after installing, before installing connecting pipe, verify proper and free operation of check valve.
2. Hydrostatically test check valves together with associated piping.
3. To extent practical, prior to Substantial Completion, verify proper operation of each installed check valve.

END OF SECTION

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CONTRACT DOCUMENTS

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Contract Drawings For

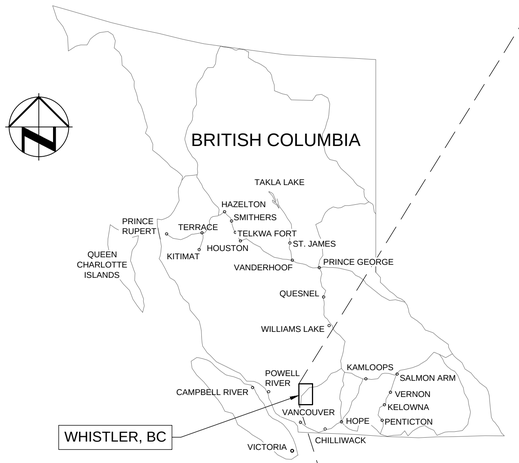
RESORT MUNICIPALITY OF WHISTLER
SOUTH WHISTLER WATER SUPPLY PHASE 1

WHISTLER, BC

ISSUED FOR TENDER

Project No. E20307

Date: FEBRUARY 14, 2023



LOCATION PLAN

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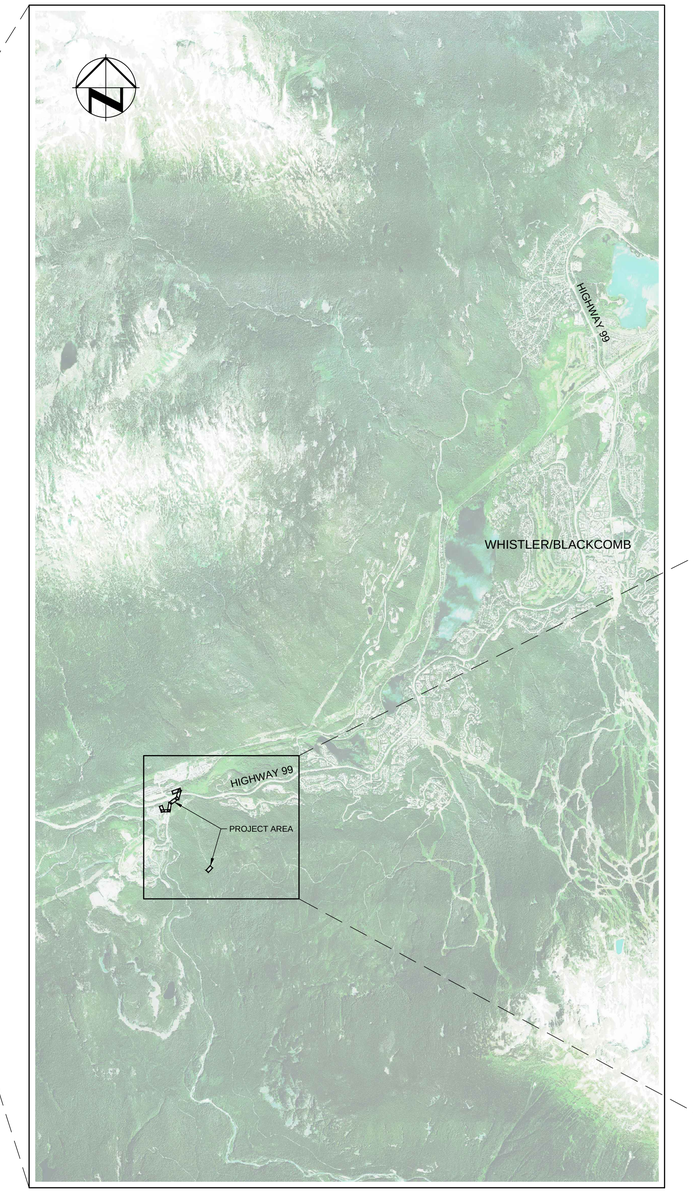

AREA PLAN

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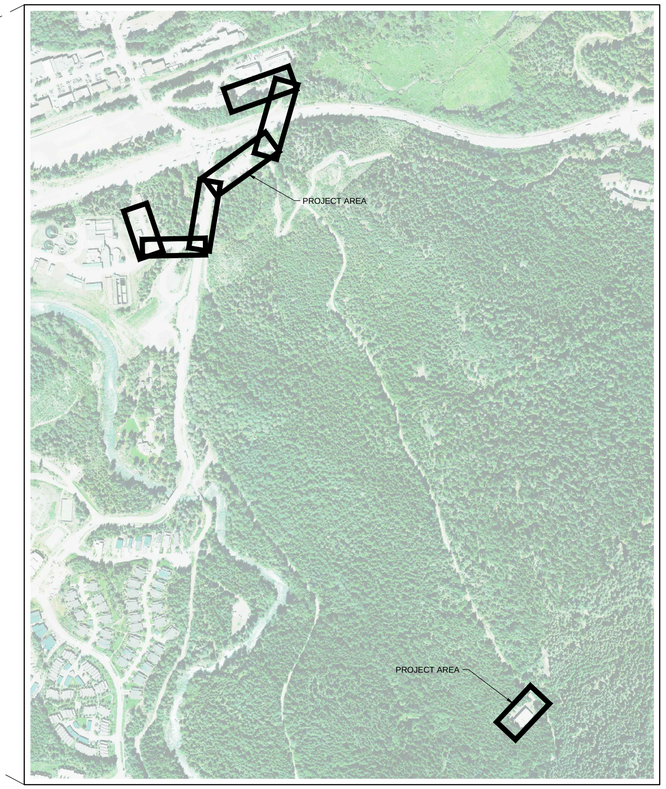
DRAWING INDEX

GENERAL

G000	COVER PAGE
G001	LOCATION & AREA PLANS & DRAWING INDEX
G002	SHEET LAYOUT PLAN

CIVIL

C001	LYNHAM ROAD | PLAN AND PROFILE
C002	HWY 99 CROSSING | PLAN AND PROFILE
C003	VALLEY TRAIL PARKING LOT | PLAN AND PROFILE
C004	CHEAKAMUS LAKE ROAD | PLAN AND PROFILE
C005	WWTP ACCESS ROAD | PLAN AND PROFILE
C006	P291 PUMP STATION | PLAN AND PROFILE
C007	R226 CHEAKAMUS RESERVOIR | PLAN AND PROFILE
C008	DETAIL SECTIONS
C009	STANDARD DETAILS



OVERALL PLAN

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ISSUE	DATE	DESCRIPTION
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CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER
WATER SUPPLY
PHASE 1

2023

LOCATION & AREA PLANS
& DRAWING INDEX

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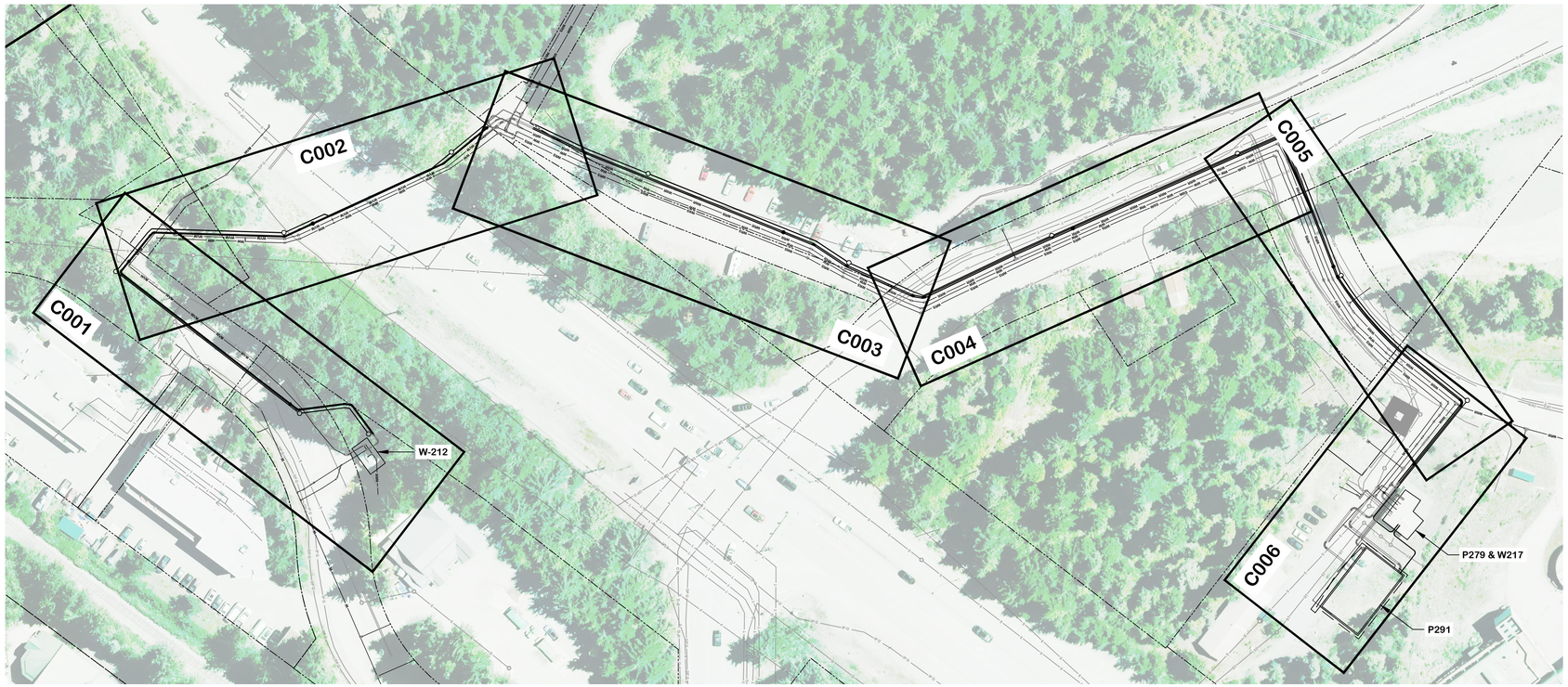

SHEET LAYOUT PLAN

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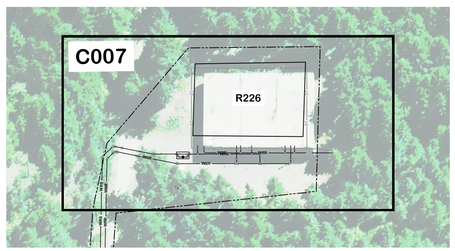

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CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER
WATER SUPPLY
PHASE 1

2023

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PLAN

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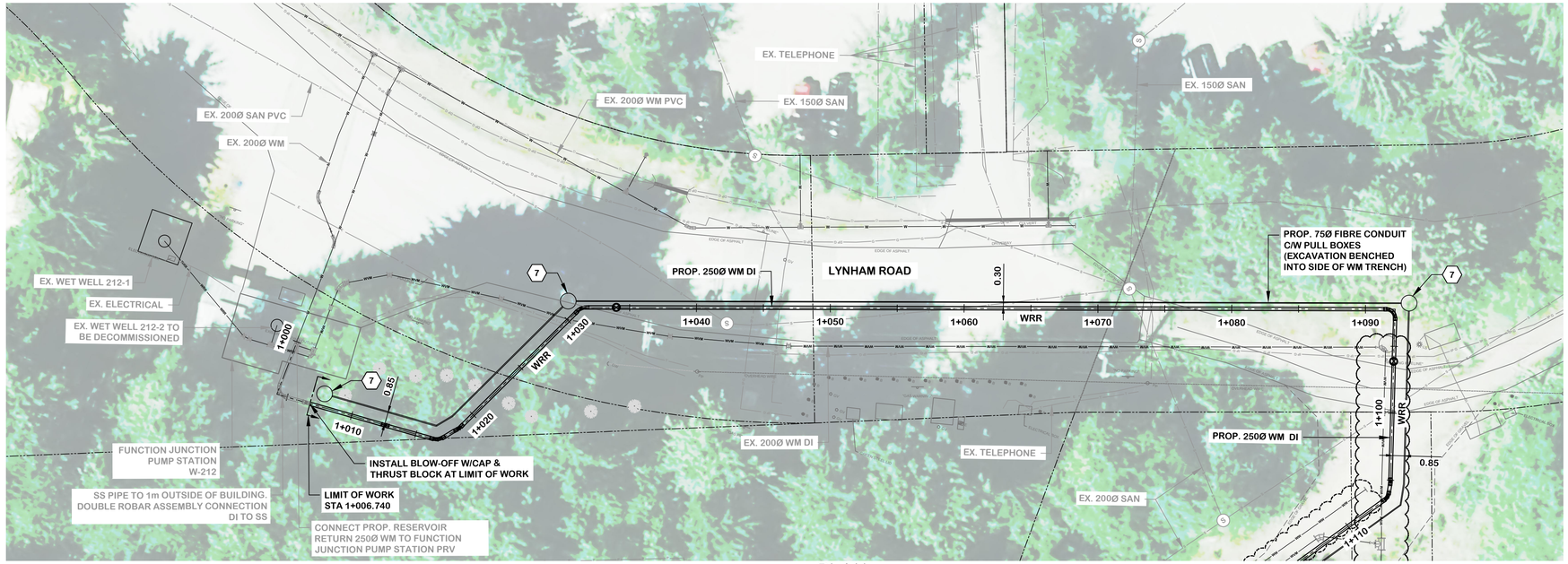

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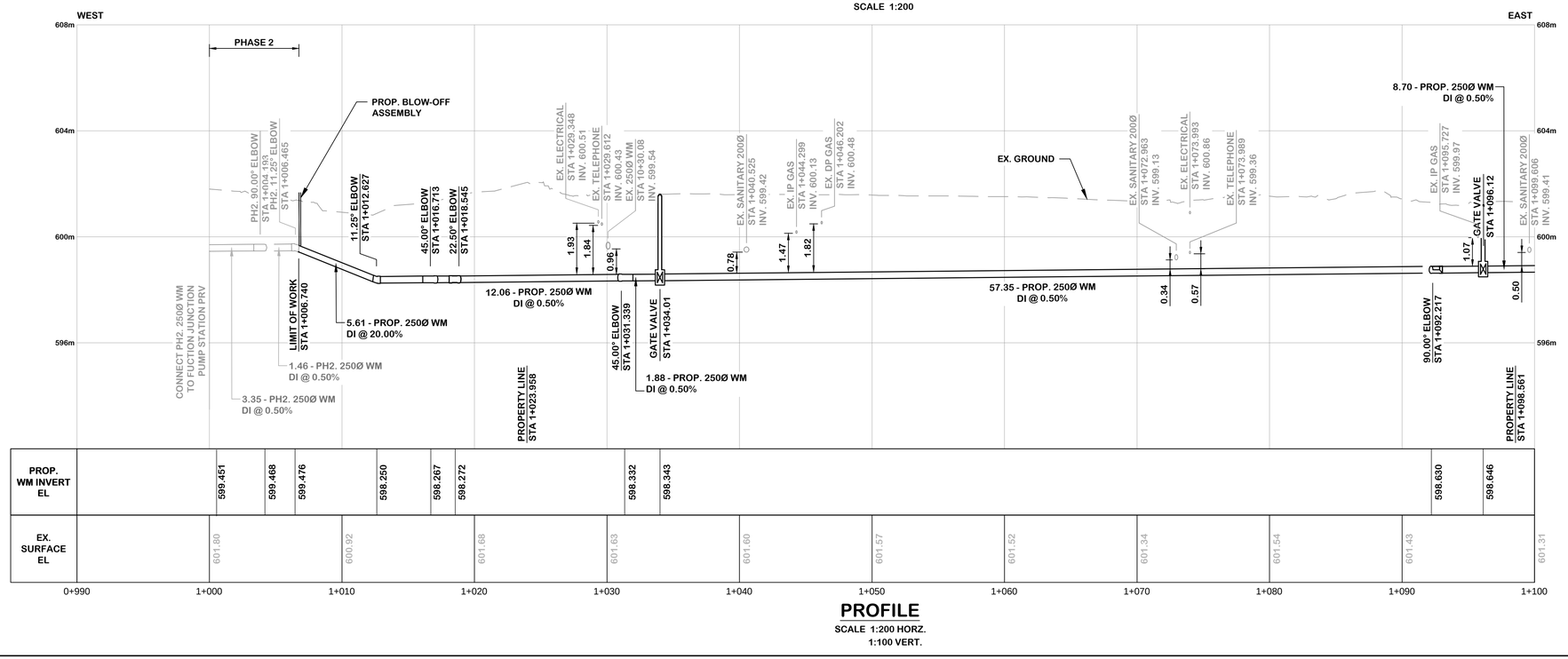

PROFILE

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1:100 VERT.

LEGEND

- PROP. WATERMAIN
- PHASE 2 WATERMAIN
- EX. CHEAKAMUS WATER RESERVOIR RETURN
- EX. CHEAKAMUS WATER RESERVOIR SUPPLY
- EX. VILLAGE MAIN
- EX. WATER WELL WATERMAIN
- EX. WATERMAIN
- EX. WATERMAIN ABANDONED
- EX.ELECTRICAL
- EX. DITCH
- EX. SANITARY SEWER
- EX. TELEPHONE
- EX. STREETLIGHT
- EX. DER ELECTRICAL
- EX. DES ELECTRICAL
- EX. DOM PRESSURE GAS
- EX. INT PRESSURE GAS
- EX. PROPERTY LINE
- LIMIT OF WORK
- EX. PIPE REMOVAL
- PROP. PULL BOX
- PROP. GATE VALVE
- PHASE 2 GATE VALVE
- PROP. AIR VALVE

CONSTRUCTION NOTES:

1. PIPES TO BE DUCTILE IRON WITH CEMENTATIOUS LINING, EXTERIOR GALVANIZED AND FACTORY SEAL COATED, FIELD INSTALLED IN POLYETHYLENE SHEATH PER AWWA C105.
2. 400Ø PIPES TO BE AWWA C900 DI WITH FLEXIBLE RESTRAINED JOINTS, US PIPE TR FLEX OR EQUIVALENT.
3. ALL WATER MAIN JOINTS TO BE WRAPPED WITH PETROLATUM TAPE.
4. EXPOSE PIPE JOINTS AND INSTALL MECHANICAL RESTRAINTS WHERE NOT PRESENT ON APPROX. 65m EXISTING WVM.
5. EXPOSE PIPE JOINTS AND INSTALL MECHANICAL RESTRAINTS WHERE NOT PRESENT ON APPROX. 25m EXISTING WW.
6. DB 2 FIBRE CONDUITS TO HAVE PULL BOXES AT MAX 90m THROUGH STRAIGHT SECTIONS AND MAX 60m THROUGH BENDS TOTALING UP TO 180°.
7. 1.2m FIBRE PULL BOX PER DETAIL E, DWG C010.
8. FIBRE CONDUITS TO HAVE PULL STRINGS INSTALLED.
9. ALL EXISTING UTILITY LOCATIONS TO BE VERIFIED IN FIELD BY CONTRACTOR PRIOR TO CONSTRUCTION.

GENERAL NOTES:

1. DRAWINGS ARE IN REFERENCE TO NAD83 UTM10N COORDINATE SYSTEM.
2. COMBINED SCALE FACTOR: 0.9997083.

ISSUE	DATE	DESCRIPTION
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PROJECT MANAGER	M. DAY
CIVIL	-
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

LYNHAM ROAD
PLAN AND PROFILE

2023

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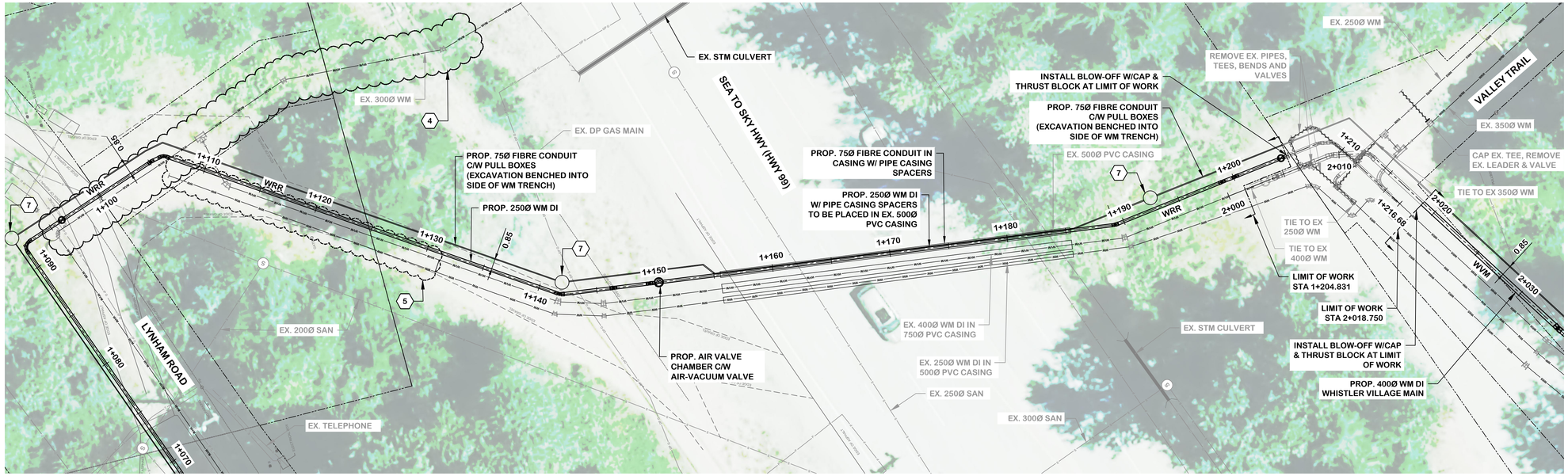

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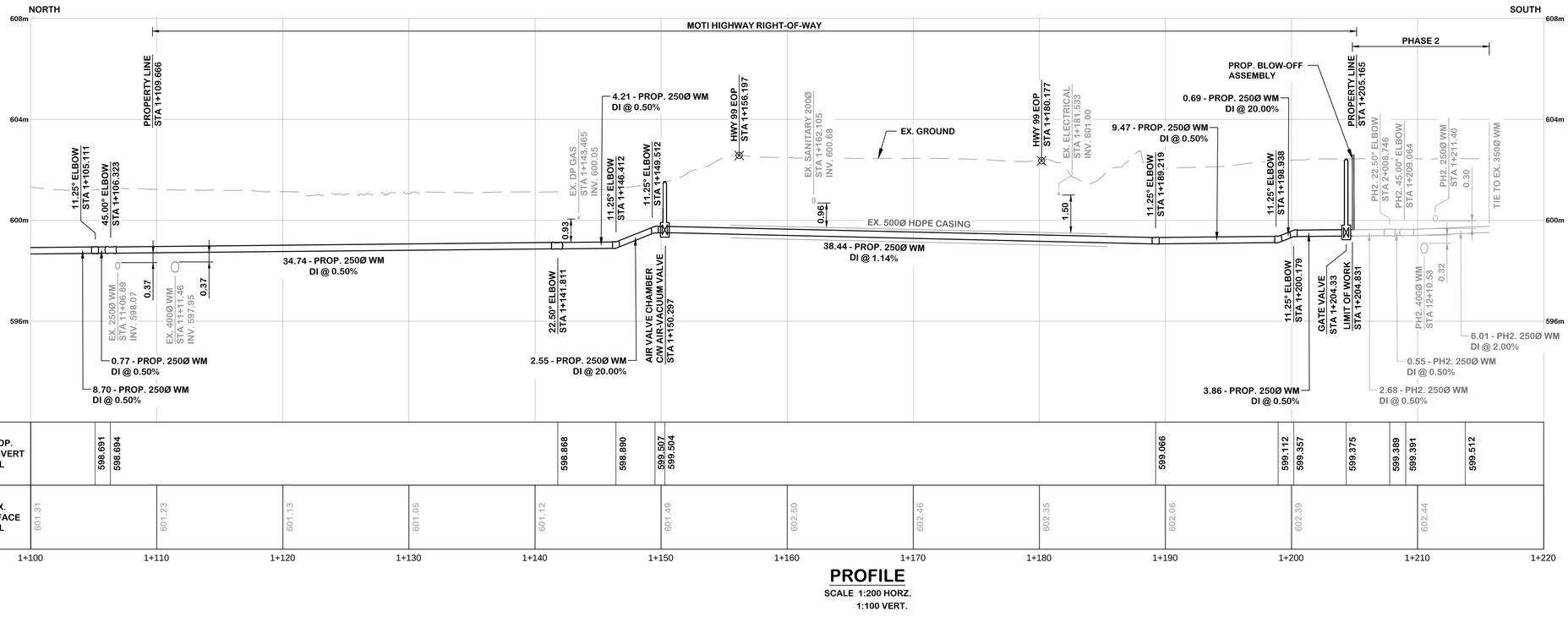

PROFILE
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LEGEND

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- PROP. AIR VALVE

CONSTRUCTION NOTES:

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3. ALL WATER MAIN JOINTS TO BE WRAPPED WITH PETROLATUM TAPE.
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GENERAL NOTES:

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2. COMBINED SCALE FACTOR: 0.9997083.

ISSUE	DATE	DESCRIPTION
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PROJECT MANAGER	M. DAY
CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

2023

HWY 99 CROSSING
PLAN AND PROFILE

0 5m 10m

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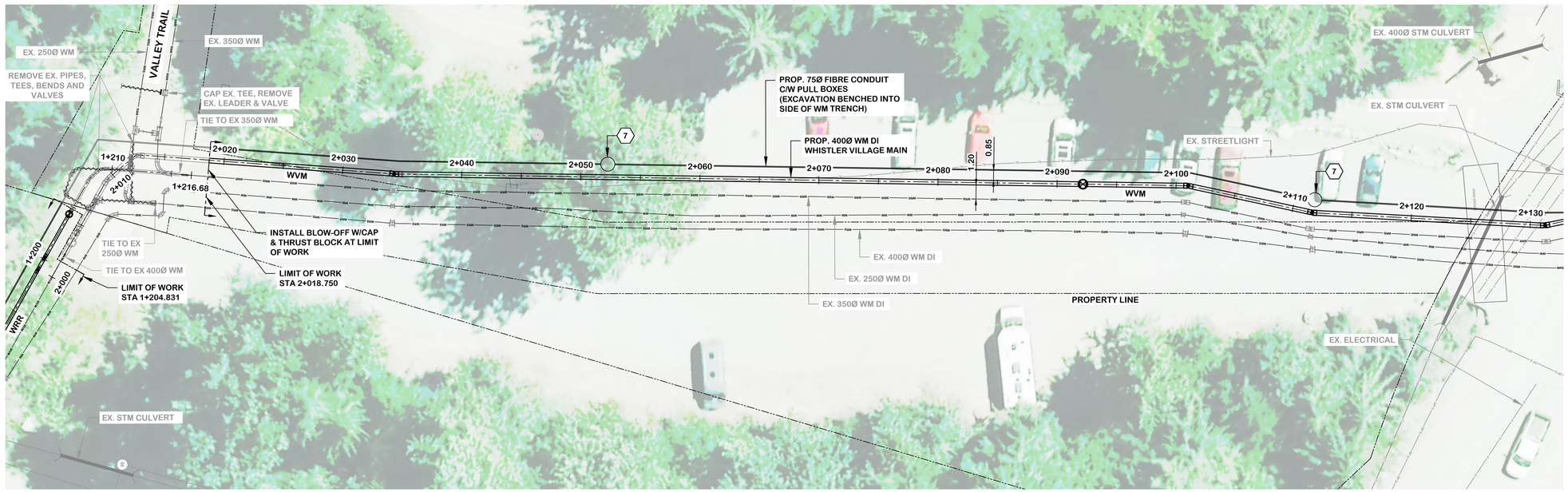

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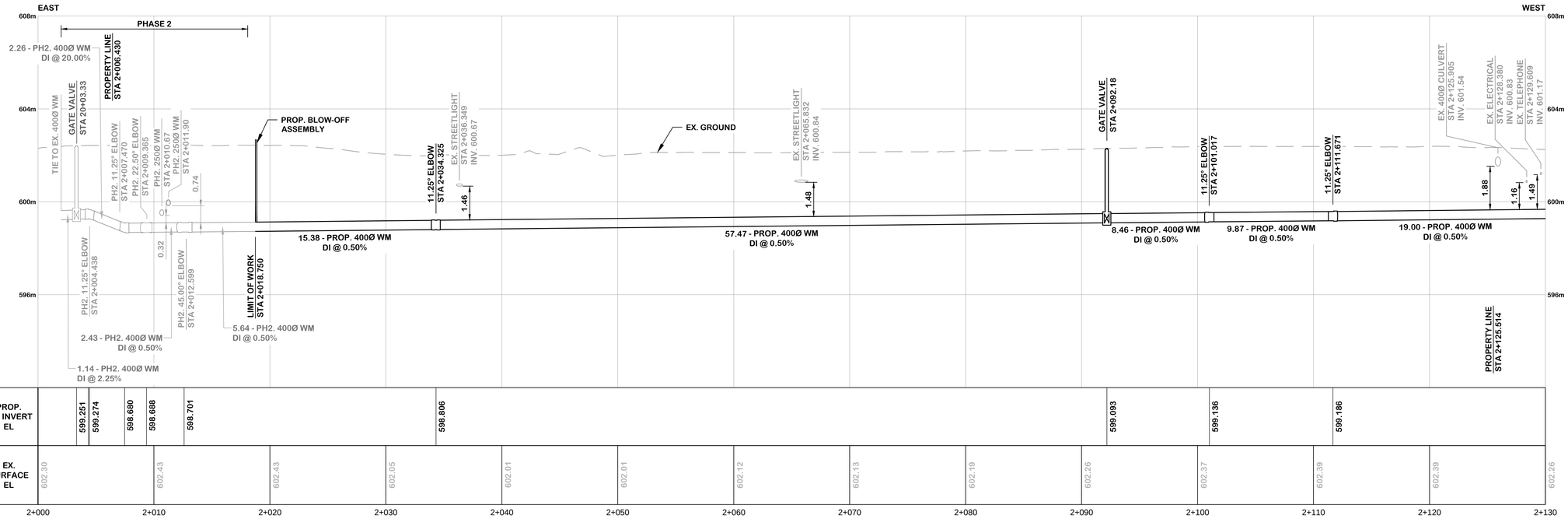

PROFILE

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- PROP. WATERMAIN
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- EX. DOM PRESSURE GAS
- EX. INT PRESSURE GAS
- EX. PROPERTY LINE
- LIMIT OF WORK
- EX. PIPE REMOVAL
- PROP. PULL BOX
- PROP. GATE VALVE
- PHASE 2 GATE VALVE
- PROP. AIR VALVE

CONSTRUCTION NOTES:

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GENERAL NOTES:

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ISSUE	DATE	DESCRIPTION
1	2022-02-14	ISSUED FOR TENDER

PROJECT MANAGER	M. DAY
CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

VALLEY TRAIL PARKING LOT

PLAN AND PROFILE

2023

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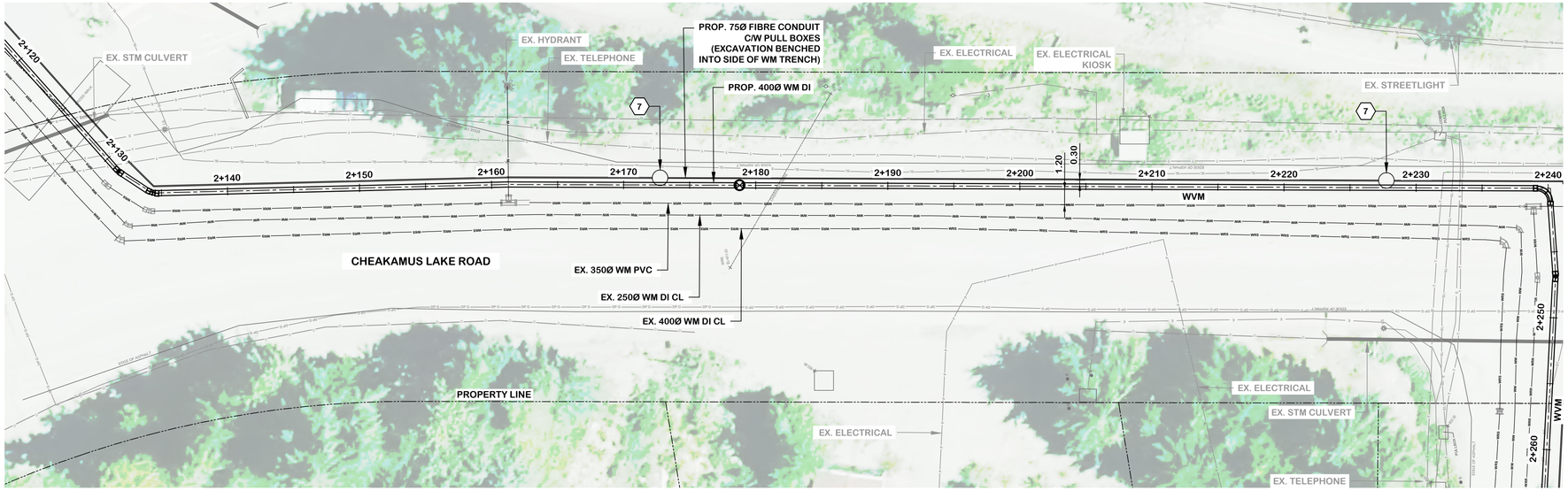

PLAN

SCALE 1:200

PROFILE

SCALE 1:200 HORZ.
1:100 VERT.

LEGEND

- PROP. WATERMAIN
- PHASE 2 WATERMAIN
- EX. CHEAKAMUS WATER RESERVOIR RETURN
- EX. CHEAKAMUS WATER RESERVOIR SUPPLY
- EX. VILLAGE MAIN
- EX. WATER WELL WATERMAIN
- EX. WATERMAIN
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- EX. DITCH
- EX. SANITARY SEWER
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- EX. STREETLIGHT
- EX. DER ELECTRICAL
- EX. DES ELECTRICAL
- EX. DOM PRESSURE GAS
- EX. INT PRESSURE GAS
- EX. PROPERTY LINE
- LIMIT OF WORK
- EX. PIPE REMOVAL
- PROP. PULL BOX
- PROP. GATE VALVE
- PHASE 2 GATE VALVE
- PROP. AIR VALVE

CONSTRUCTION NOTES:

1. PIPES TO BE DUCTILE IRON WITH CEMENTATIOUS LINING, EXTERIOR GALVANIZED AND FACTORY SEAL COATED, FIELD INSTALLED IN POLYETHYLENE SHEATH PER AWWA C105.
2. 400Ø PIPES TO BE AWWA C900 DI WITH FLEXIBLE RESTRAINED JOINTS, US PIPE TR FLEX OR EQUIVALENT.
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7. 1.2m FIBRE PULL BOX PER DETAIL E, DWG C010.
8. FIBRE CONDUITS TO HAVE PULL STRINGS INSTALLED.
9. ALL EXISTING UTILITY LOCATIONS TO BE VERIFIED IN FIELD BY CONTRACTOR PRIOR TO CONSTRUCTION.

GENERAL NOTES:

1. DRAWINGS ARE IN REFERENCE TO NAD83 UTM10N COORDINATE SYSTEM.
2. COMBINED SCALE FACTOR: 0.9997083.

ISSUE	DATE	DESCRIPTION
1	2022-02-14	ISSUED FOR TENDER

PROJECT MANAGER	M. DAY
CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
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ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER
WATER SUPPLY
PHASE 1

2023

CHEAKAMUS LAKE ROAD

PLAN AND PROFILE

0 5m 10m

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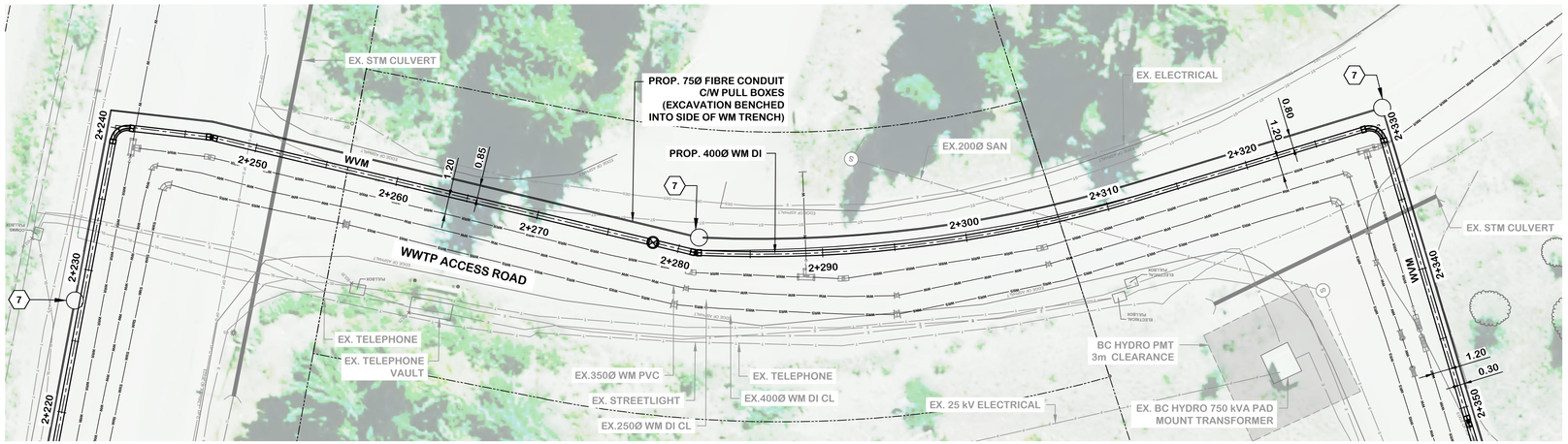
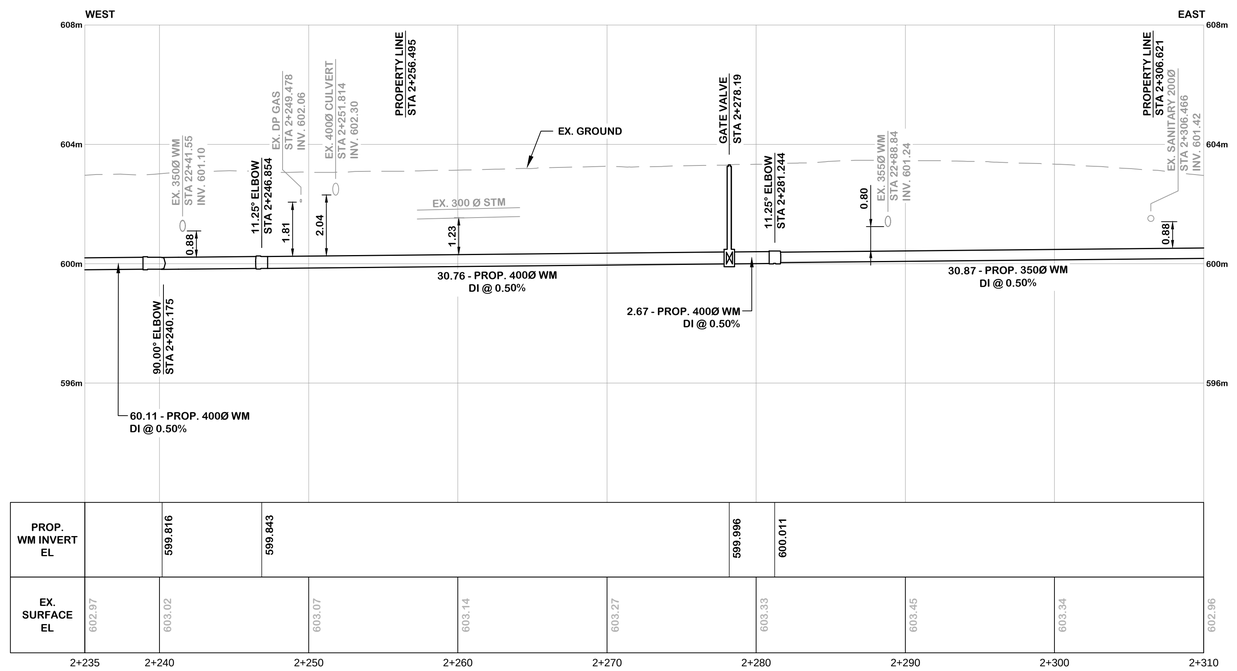


PLAN

SCALE 1:200



PROFILE

SCALE 1:200 HORZ.
1:100 VERT.

LEGEND

- PROP. WATERMAIN
- PHASE 2 WATERMAIN
- EX. CHEAKAMUS WATER RESERVOIR RETURN
- EX. CHEAKAMUS WATER RESERVOIR SUPPLY
- EX. VILLAGE MAIN
- EX. WATER WELL WATERMAIN
- EX. WATERMAIN
- EX. WATERMAIN ABANDONED
- EX.ELECTRICAL
- EX. DITCH
- EX. SANITARY SEWER
- EX. TELEPHONE
- EX. STREETLIGHT
- EX. DER ELECTRICAL
- EX. DES ELECTRICAL
- EX. DOM PRESSURE GAS
- EX. INT PRESSURE GAS
- EX. PROPERTY LINE
- LIMIT OF WORK
- EX. PIPE REMOVAL
- PROP. PULL BOX
- PROP. GATE VALVE
- PHASE 2 GATE VALVE
- PROP. AIR VALVE

CONSTRUCTION NOTES:

1. PIPES TO BE DUCTILE IRON WITH CEMENTATIOUS LINING, EXTERIOR GALVANIZED AND FACTORY SEAL COATED, FIELD INSTALLED IN POLYETHYLENE SHEATH PER AWWA C105.
2. 400Ø PIPES TO BE AWWA C900 DI WITH FLEXIBLE RESTRAINED JOINTS, US PIPE TR FLEX OR EQUIVALENT.
3. ALL WATER MAIN JOINTS TO BE WRAPPED WITH PETROLATUM TAPE.
4. EXPOSE PIPE JOINTS AND INSTALL MECHANICAL RESTRAINTS WHERE NOT PRESENT ON APPROX. 65m EXISTING WVM.
5. EXPOSE PIPE JOINTS AND INSTALL MECHANICAL RESTRAINTS WHERE NOT PRESENT ON APPROX. 25m EXISTING WW.
6. DB 2 FIBRE CONDUITS TO HAVE PULL BOXES AT MAX 90m THROUGH STRAIGHT SECTIONS AND MAX 60m THROUGH BENDS TOTALING UP TO 180°.
7. 1.2m FIBRE PULL BOX PER DETAIL E, DWG C010.
8. FIBRE CONDUITS TO HAVE PULL STRINGS INSTALLED.
9. ALL EXISTING UTILITY LOCATIONS TO BE VERIFIED IN FIELD BY CONTRACTOR PRIOR TO CONSTRUCTION.

GENERAL NOTES:

1. DRAWINGS ARE IN REFERENCE TO NAD83 UTM10N COORDINATE SYSTEM.
2. COMBINED SCALE FACTOR: 0.9997083.

ISSUE	DATE	DESCRIPTION
1	2022-02-14	ISSUED FOR TENDER

PROJECT MANAGER	M. DAY
CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

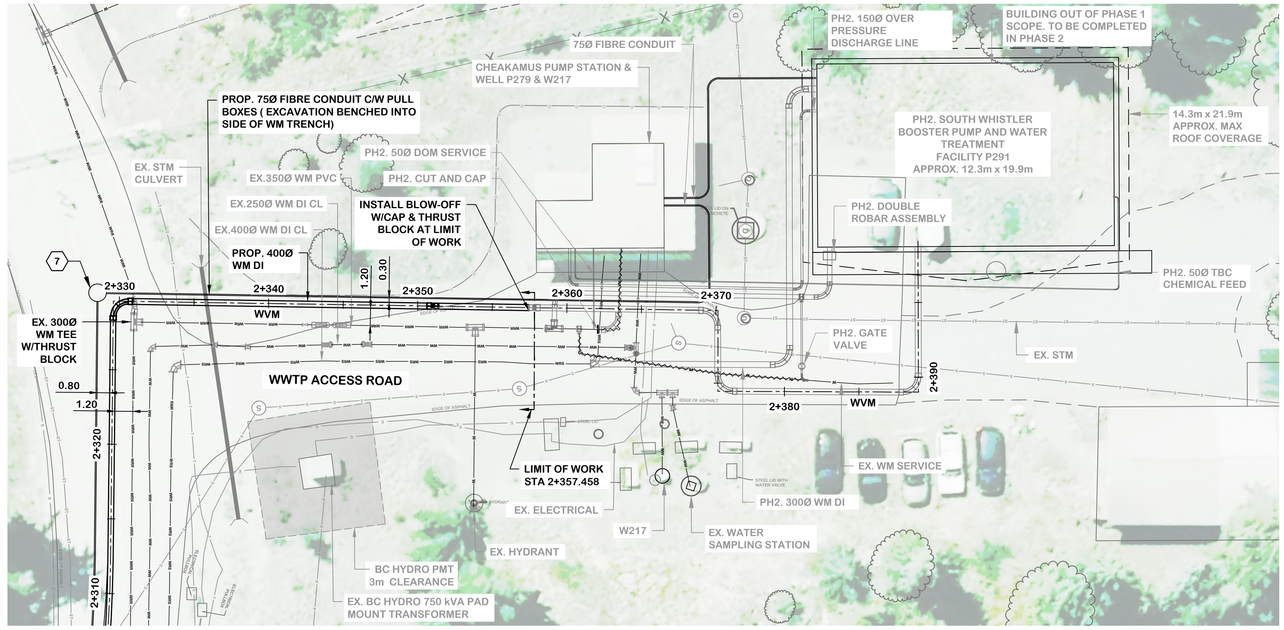
SOUTH WHISTLER WATER SUPPLY PHASE 1

2023

WWTP ACCESS ROAD
PLAN AND PROFILE

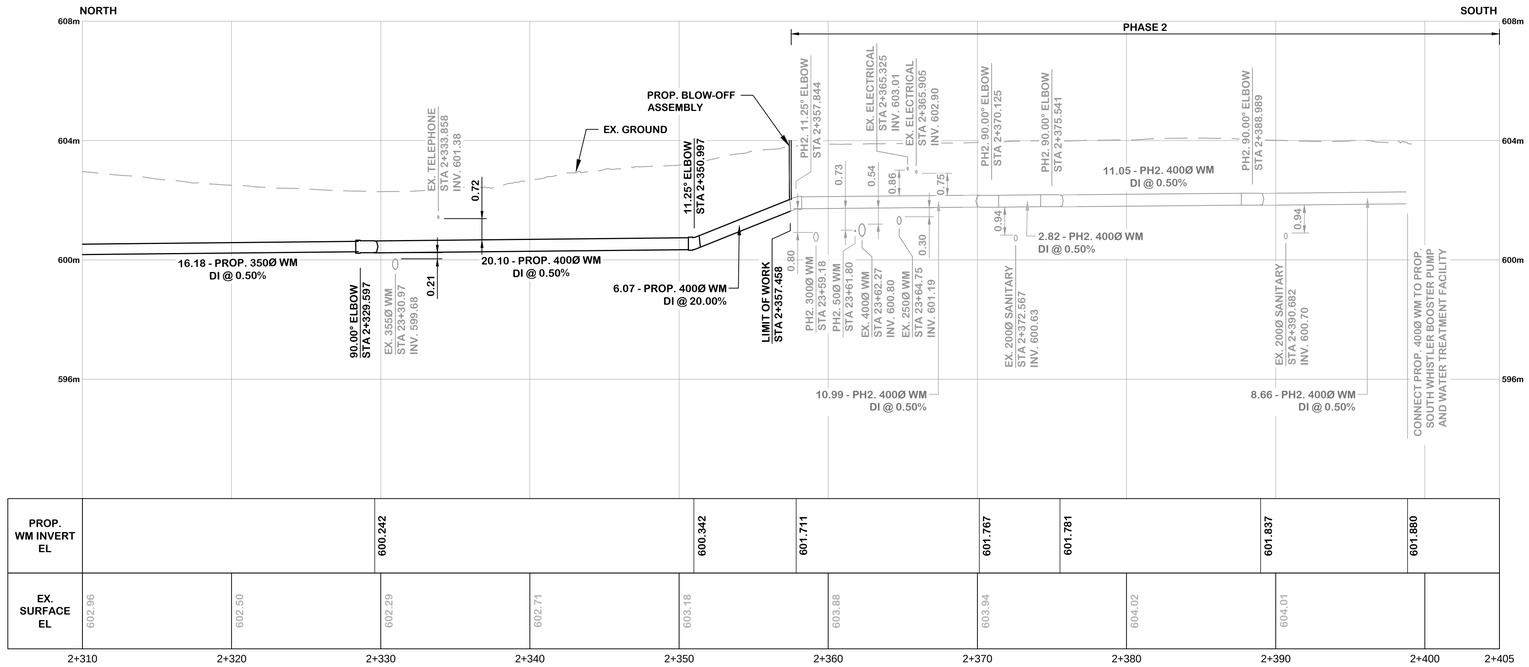
0 5m 10m

FILENAME 10299470-C01-101-C001.dwg
SCALE AS SHOWN
SHEET C005



PLAN

SCALE 1:200



PROFILE

SCALE 1:200 HORZ.
1:100 VERT.

LEGEND

- PROP. WATERMAIN
- PHASE 2 WATERMAIN
- EX. CHEAKAMUS WATER RESERVOIR RETURN
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STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

2023

P291 PUMP STATION

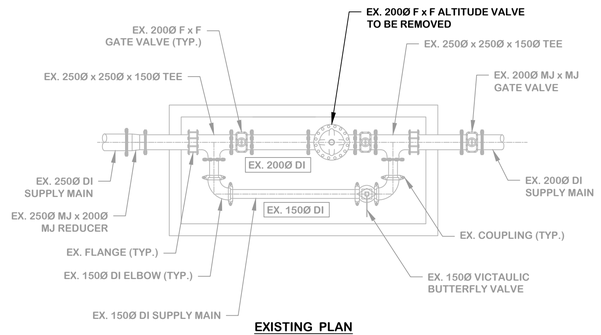
PLAN AND PROFILE

0 5m 10m

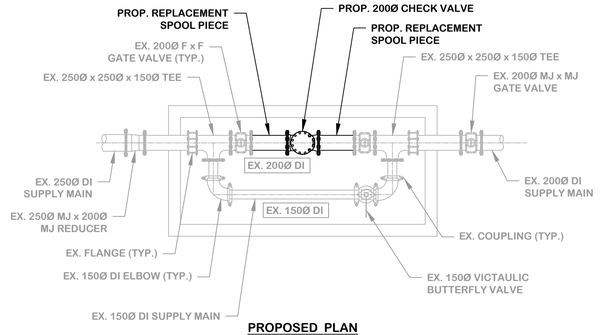
FILENAME 10299470-C01-101-C001.dwg
SCALE AS SHOWN

SHEET C006

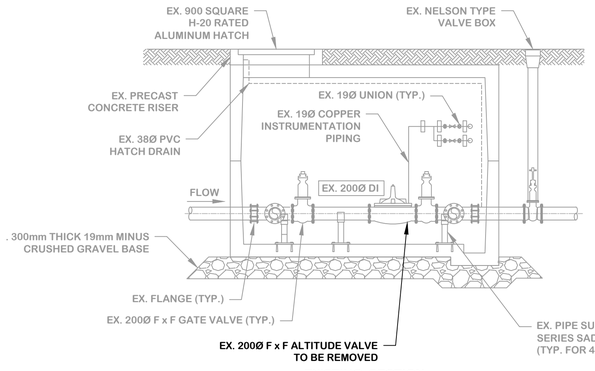
PLAN
SCALE 1:200



EXISTING PLAN

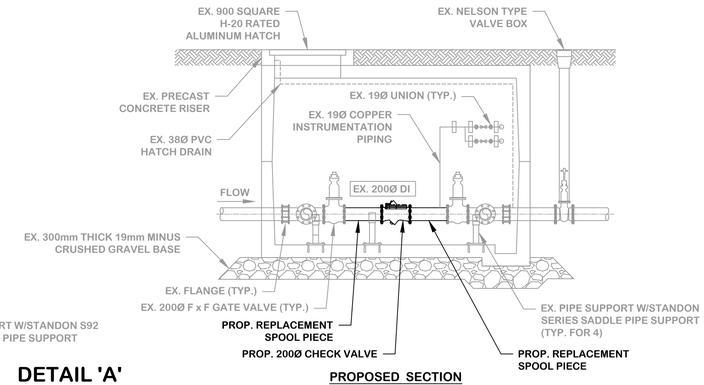


PROPOSED PLAN



EXISTING SECTION

DETAIL 'A'
SCALE NTS



PROPOSED SECTION

LEGEND

- PROP. WATERMAIN
- PHASE 2 WATERMAIN
- EX. CHEAKAMUS WATER RESERVOIR RETURN
- EX. CHEAKAMUS WATER RESERVOIR SUPPLY
- EX. VILLAGE MAIN
- EX. WATER WELL WATERMAIN
- EX. WATERMAIN
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- EX. PIPE REMOVAL
- PROP. PULL BOX
- PROP. GATE VALVE
- PHASE 2 GATE VALVE
- PROP. AIR VALVE

CONSTRUCTION NOTES:

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2. COMBINED SCALE FACTOR: 0.9997083.

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PROJECT MANAGER	M. DAY
CIVIL	MD
STRUCTURAL	
ARCHITECTURAL	
PROCESS	
MECHANICAL	
ELECTRICAL	
INSTRUMENTATION	
PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER
WATER SUPPLY
PHASE 1

2023

R226 CHEAKAMUS RESERVOIR
PLAN AND PROFILE

0 5m 10m

FILENAME 10299470-C01-101-C001.dwg
SCALE AS SHOWN

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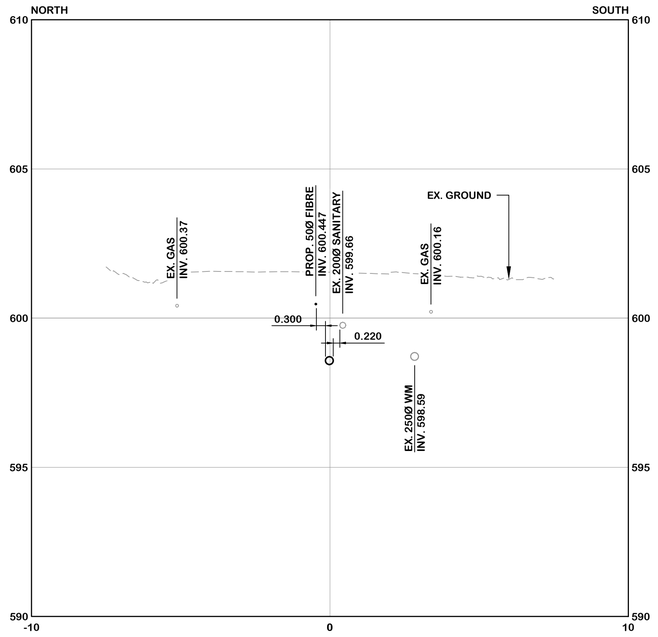
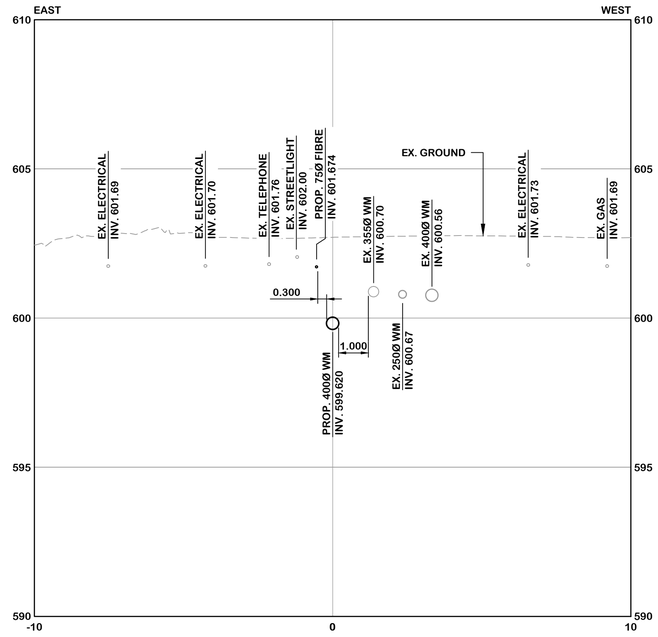
C007



STA 1+055



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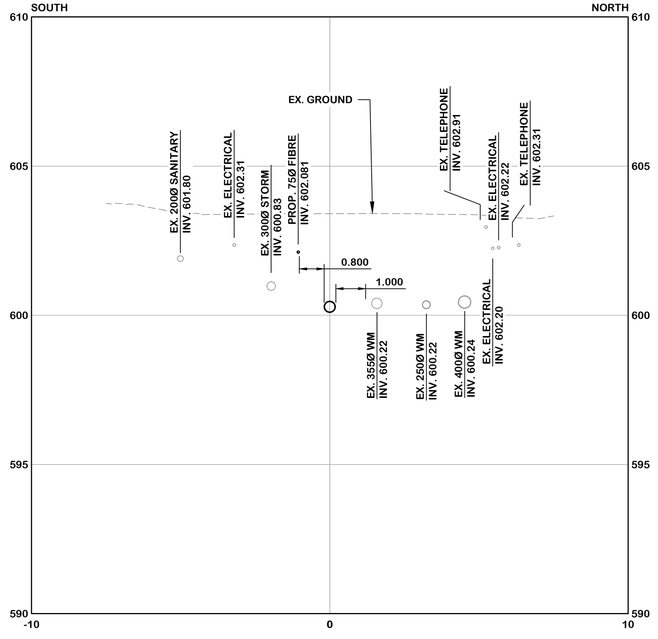

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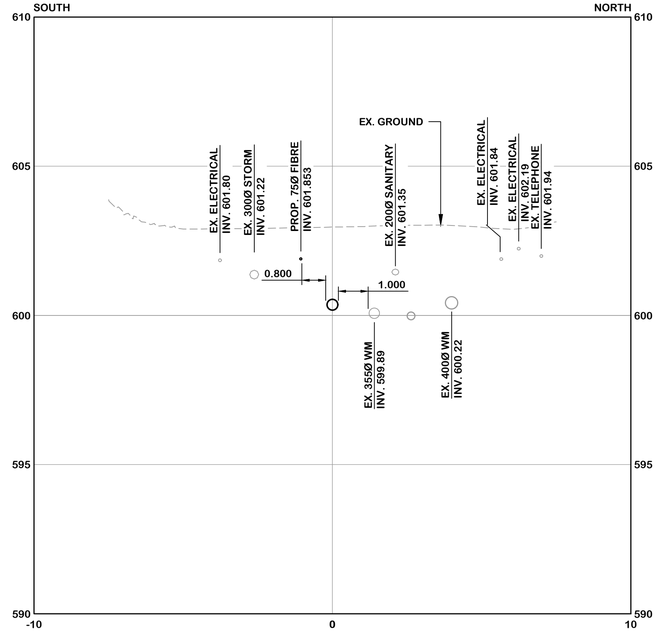

STA 2+310

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		STRUCTURAL	
		ARCHITECTURAL	
		PROCESS	
		MECHANICAL	
		ELECTRICAL	
1	2022-02-14	INSTRUMENTATION	
ISSUE	DATE	PROJECT NUMBER	E20307

DESCRIPTION

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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

2023

0 2m 4m

DETAIL SECTIONS

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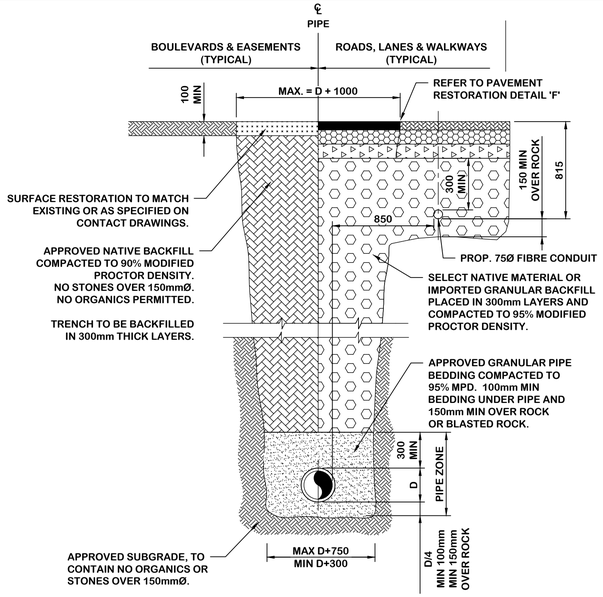
SCALE H 1:100

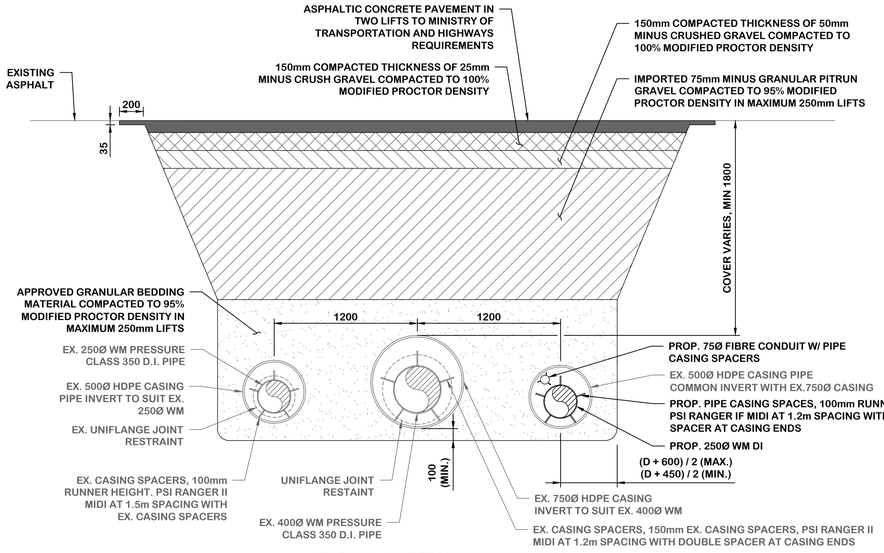
SHEET
C008



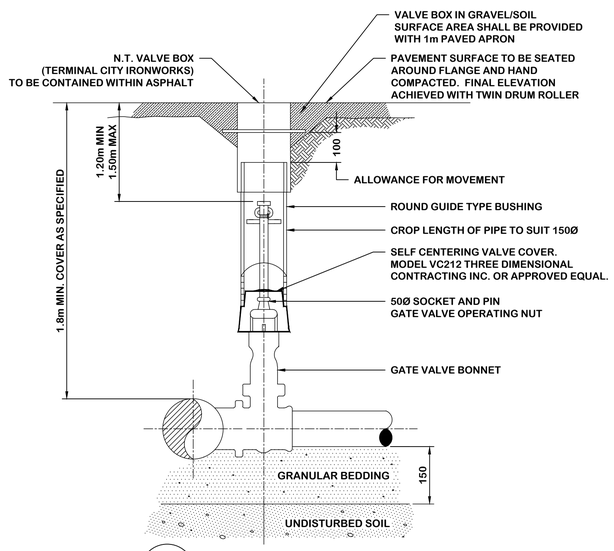
NOTES:
1. "D" = OUTSIDE DIAMETER OF THE PIPE AT ITS LARGEST SECTION.
2. TRENCHING TO COMPLY WITH ALL REQUIREMENTS OF THE WCB.

TRACER WIRE SHALL BE:
1. INSTALLED IN ALL CONDUIT
2. CONTINUOUS BETWEEN ANY TWO SUCCESSIVE COMM VAULT.
3. #13 AWG COPPER CLAD STEEL, HIGH STRENGTH WITH MINIMUM 450LB BREAK LOAD, WITH MINIMUM 30MIL HDPE INSULATION THICKNESS

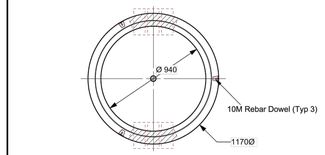
A - TYPICAL TRENCH SECTION
NTS



D - TYPICAL WATERMAIN HIGHWAY 99 CROSSING TRENCH DETAIL
NTS



B - VALVE BOX ASSEMBLY
NTS



Plan View

Elevation
Interlocking Riser Rings

General Notes:
- Product manufactured in accordance with CSA A23.4
- Lift Points Provided (See Shop Drawing for Quantity & Locations)
- Designed for Roadway Traffic Use - CL-625 Traffic Loading
- Site Installation, Backfilling & Suitability for Use is the responsibility of others

AE CONCRETE
19060 - 54th Avenue Surrey, B.C. V3S 8E5
Tel (604) 576-1808 info@aeconcrete.com

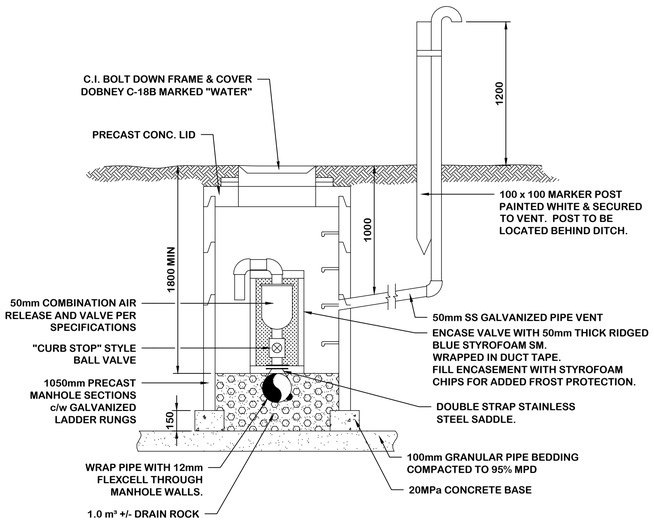
Circular Riser Ring Service Box

915Ø Riser Ring Base (Floor): 720 lbs
915Ø Riser Ring (150H): 300 lbs
C-23 Frame & Cover: 560 lbs

Scale: 1:20 mm | Rev:
Dwg#: SVTZ-N1-0915-SBOX-C

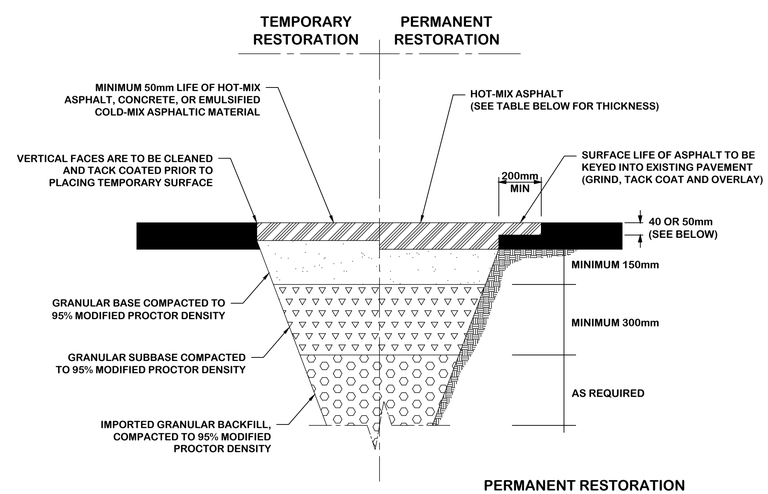
TRACER WIRE:
1. SHALL BE #12 AWG COPPER CLAD STEEL, HIGH STRENGTH WITH MINIMUM 450LB BREAK LOAD, WITH MINIMUM 30 MIL HDPE INSULATION THICKNESS.
2. SHALL BE PULLED INTO AND GROUNDED TO COMM VAULT.
3. ADDITIONAL 300mm OF TRACER WIRE SHALL BE COILED INSIDE COMM VAULT, CAPPED WITH MARETTE AND WRAPPED IN ELECTRICAL TAPE.

E - 1.2m FIBRE PULL BOX
NTS



NOTES:
- ALL "WATER CONTACT" FITTINGS TO BE BRASS OR OTHER APPROVED MATERIAL.
- NO BLACK IRON OR GALVANIZED PIPE OR FITTINGS.
- APPLY AN APPROVED CORROSION PROTECTION SYSTEM TO ALL BURIED FERROUS FITTINGS, FLANGES, FASTENERS, ETC.
  SUCH AS "DENSO" PETROLATUM TAPE SYSTEM; INCLUDING PASTE, PROFILING MASTIC AND TAPE AS PER MANUFACTURER'S INSTRUCTIONS, OTHER CORROSION PROTECTION SYSTEMS MAY BE USED UPON APPROVAL OF THE RMOW.

C - AIR VACUUM RELIEF STATION
NTS



NOTES:
1. GRANULAR MATERIALS TO BE PLACED AND COMPACTED IN MAXIMUM 300mm THICK LIFTS.
2. PERMANENT HOT-MIX ASPHALT PAVEMENT SHALL BE PLACED AND COMPACTED IN 2 LIFTS.
3. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE PROVISIONS OF THE WORKERS' COMPENSATION ACT OF BC.
4. REFER TO SECTIONS OF 02223 AND 02512 OF THE MATER MUNICIPAL CONSTRUCTION DOCUMENT FOR DETAILED SPECIFICATIONS.

PERMANENT RESTORATION ASPHALT THICKNESS

ROAD CLASSIFICATION	BASE LIFT THICKNESS	SURFACE LIFT THICKNESS
LOCAL ROAD	40mm	40mm
COLLECTOR ROAD	50mm	50mm

F - PAVEMENT RESTORATION
NTS

ISSUE	DATE	DESCRIPTION
1	2023-02-14	ISSUED FOR TENDER

PROJECT MANAGER	M. DAY
CIVIL	MD
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PROJECT NUMBER	E20307

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WHISTLER
Whistler, BC

SOUTH WHISTLER WATER SUPPLY PHASE 1

2023

STANDARD DETAILS

FILENAME 10299470-C01-101-C009.dwg
SCALE AS NOTED
SHEET C009

REFERENCE DOCUMENTS

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FRONTERA GEOTECHNICAL

1 – 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093

HDR
500 – 1500 West Georgia Street
Vancouver, BC
V6G 2Z6

February 10, 2023
File: 1956

Attention: Suzi Martin

RE: Preliminary Geotechnical Report, Proposed South Whistler Booster Pump, Water Treatment Facility and Water Supply Project, Resort Municipality of Whistler, BC

1.0 INTRODUCTION

We understand that as part of the South Water Supply Project, the Resort Municipality of Whistler (RMOW) has proposed to install a new watermain, booster pump and water treatment facility in Whistler. Frontera Geotechnical Inc. (Frontera) has been engaged to provide geotechnical recommendations to support the design and construction of the new watermain (Phase 1) as well as for the new booster pump and water treatment facility (Phase 2).

Frontera completed a geotechnical investigation along the proposed watermain alignment and in the location of the booster pump and water treatment facility. This report presents the findings of our investigation and provides general recommendations for the design and construction of the proposed improvements.

This report has been prepared exclusively for our client, for their use, the use of others on the design team and the RMOW for use in the development and permitting process, however, it remains the property of Frontera.

2.0 PROJECT DESCRIPTION

We have reviewed the civil engineering drawings prepared by HDR dated August 16, 2022, in preparing this report. We understand that Phase 1 of the project will include the following:

- The installation of approximately 725 m lineal meters of new watermain.
    - The watermain is to run from the existing Function Junction Pump Station on Lynham Road, underneath Highway 99, and along Cheakamus Lake Road to the location of the proposed new booster pump and water treatment facility east of the Whistler Wastewater Treatment Plant.
    - The watermain is to be 250 mm diameter and comprised of ductile iron where the main is located underneath, and to the north, of Highway 99, and will transition to a 400 mm diameter main south of Highway 99.
    - The watermain is to be generally 3 to 4 m below ground.

The grades along the watermain alignment are relatively flat and range from roughly 601 m to 604 m with a gentle slope up to the south. The majority of the proposed alignment is covered by either asphalt or

crushed rock gravel shoulder, with occasional areas of grassed embankment. The majority of the new alignment will be completed adjacent to the existing watermain and will cross over numerous existing utilities.

As part of Phase 2 of the project we understand that the following is proposed:

- The construction of a new booster pump station and water treatment facility.
- The new facility is to have a building footprint of approximately 12.3 m x 19.6 m.
- The new facility is to be constructed immediately north of the Cheakamus Pump Station, which is located to the east of the Whistler Wastewater Treatment Plant (WWTP).

The proposed new treatment facility is located on the WWTP access road, and is bound to the south by the Cheakamus Pump Station, to the east by undeveloped land and Cheakamus Lake Road, to the west by the Whistler WWTP, and to the north by Highway 99. The elevation at the location of the new facility is approximately 604 m geodetic and is currently grass and asphalt covered.

3.0 FIELD INVESTIGATION

Frontera completed a geotechnical investigation on January 13, 2023. The investigation comprised of four augered test holes along the watermain alignment (TH23-07 to TH23-10) advanced to 4.6 m depth. The test holes were supplemented with four dynamic cone penetration test (DCPT) soundings to help characterise the in-situ density of the underlying soils.

DCPT soundings are completed by driving steel rods with a blunt tip into the ground using a standardized mechanical drop hammer. The number of blows from the drop hammer required to advance the rods are recorded in 300 mm intervals. The number of blows required to drive the rods 300 mm can be used for inference of the in-situ density of granular soils and fills and consistency of fine-grained soils.

Six augered test holes were also completed within the footprint of the proposed booster pump facility (TH23-01 to TH23-06). Refusal was met at shallow depths in all six test holes at between 0.75 and 0.9 m. Additional test holes were completed at this location to help confirm bedrock was present and that drill refusal was not due to boulders.

The approximate locations of the test holes are shown on the attached site plan, our Drawing No. 1956-01.

4.0 SUBSURFACE CONDITIONS

4.1 Proposed Watermain Alignment

4.1.1 Soil Conditions

The Geological Survey of Canada Map Open File 5324 describes the area along the alignment as Floodplain Sediments typically comprised of sand and silt, commonly including organic materials and underlain in many places, by gravel; 1 to 3 m thick; occurring as flat surfaces close to river level. The southern edge of the alignment borders on Ice Contact Deposits; sands and gravels, stratified to massive and commonly faulted; generally > 3 m thick, forming hummocky surfaces.

The soil encountered within our investigation along the watermain alignment comprised of granular fill overlying sand to sand and gravel with exception to near the existing pump station on Lynham Road where the fill was underlain by organic topsoil over sand with some silt. A general description of the soils encountered is as follows:

FILL

Fill was encountered in all four test holes along the alignment (TH23-07 to TH23-10). The fill in TH23-07, 08, and 09 was generally comprised of sand / sand and gravel with varying amounts of cobbles and was between 1.0 m o 1.8 m thick. The fill is generally well graded and compact to dense.

At TH23-10 the fill is a fine to medium grained sand with some silt, organic roots and rootlets. The fill is loose to very loose and moist to wet. The moisture content from lab analysis of samples taken within the fill at this location are 22 %.

Organic TOPSOIL

At TH23-10 the fill was underlain by a 1.7 m thick layer of organic topsoil which was noted to be fine grained, loose and dry to moist. The topsoil has a high organic content with roots, rootlets, rotten wood and decomposing leaf matter present within. Moisture contents from lab analysis of samples taken within the sand range from 43 to 46 %.

SAND

Underlying the fill is variable sand was, encountered to depths between 3.0 to greater than 4.5 m. The sand grades from fine to coarse grained and is poorly graded with trace subrounded gravel at various depths and in TH23-08 and TH23-10 contains trace to some silt between 2.9 and 4.5 m. Based on the DCPT blow counts the sand ranged from compact to very dense.

SAND and GRAVEL

Sand and gravel was encountered in TH23-07 at a depth of 3.0 m. This deposit contained fine to coarse grained sand and gravel, some cobbles and was well graded. The material was noted to be dense to very dense, dry and grey.

4.1.2 Groundwater Conditions

The groundwater was encountered in test holes TH23-08, TH23-09 and TH23-10 and was estimated to be between 0.9 m to 3.1 m below existing grades at the time of our investigation. Groundwater was not encountered in TH23-07 which was advanced to 4.5 m below grade. This corresponds to an approximate geodetic elevation of 597.1 m to 600.8m. The water table is expected to vary seasonally, with generally higher groundwater levels following periods of sustained precipitation or snow melt.

4.2 Proposed Booster Pump & Water Treatment Facility

4.2.1 Soil Conditions

The Geological Survey of Canada Map Open File 5324 describes the area as Ice Contact Deposits; sands and gravels, stratified to massive and commonly faulted; generally > 3 m thick, forming hummocky surfaces.

Soils encountered at the proposed booster pump facility comprised of sand overlying shallow inferred bedrock. A general description of the soils encountered is as follows:

SAND

Sand with some gravel was encountered in all test holes completed within the proposed treatment facility area. The deposit was generally well graded, dense, dry and was orange/brown in colour.

BEDROCK (Inferred)

The auger met refusal at depths ranging between 0.76 to 0.9 m on inferred bedrock. Six test holes (TH23-01 to TH23-06) were completed to obtain a general bedrock profile.

For a more detailed description of the subsurface conditions refer to test hole logs in Appendix A.

4.2.2 Groundwater Conditions

The groundwater table was not encountered within any of the test holes and is expected to be below development grades. However, perched groundwater conditions could be encountered above the bedrock.

5.0 DISCUSSION

5.1 General

As part of the South Water Supply Project it is proposed to construct 725 linear meters of new watermain within Function Junction in Whistler during Phase 1 of the project. The depth of the proposed watermain ranges from 3 to 4 m below existing grade. Phase 2 of the project will include the construction of a new booster pump and water treatment facility.

Our drill investigation indicates that the new watermain alignment will likely be founded in native sand deposits. The groundwater table was found to range between 0.9 m to greater than 4.5 m along the alignment and the underlying sand deposits are highly permeable. Therefore, if excavations extend below the water table they will be prone to sloughing and collapse. It is expected that dewatering may be necessary to allow for construction of the watermain where it is below the water table and to help ensure that the sand provides a stable base for construction. Bedrock may be encountered in areas note drilled.

Shallow bedrock was encountered in the area of the proposed booster pump and water treatment facility. We expect that blasting may be required depending on the depth of excavation associated with utility installations beneath and near to the building. Perched water should be expected in excavations above the bedrock surface.

Provided the geotechnical considerations above are addressed as described below, we are of the opinion that the project is feasible from a geotechnical standpoint.

5.2 Seismic Considerations

The proposed development site is located within a seismically active zone. It is generally accepted that loose to compact sands prone to liquefaction or strain softening during cyclic loading caused by large earthquakes. Once liquefaction has been triggered, experience has shown that permanent vertical and horizontal ground movements may be experienced. Localized zones beneath the watermain where the sand was loose and below the water table may be prone to liquefaction.

We understand that in Whistler, typically services are not designed to resist the effects of seismicity or liquefaction which would include vertical settlement and horizontal movements. It should be appreciated that following a major earthquake event such as the 1 in 475 or 1 in 2,475 seismic hazard events that significant damage to services could occur.

The new treatment facility is expected to be underlain by bedrock and is therefore not susceptible to liquefaction.

6.0 DESIGN RECOMMENDATIONS

6.1 Phase 1: Watermain Installation

6.1.1 Dewatering

The water table was estimated at depths ranging from 0.9 to 3.1 m below existing site grades from station 1+000 to 2+010 at the time of our investigation. Therefore, the water table may be encountered during excavation along portions of the alignment. The groundwater table was not encountered in TH23-07 which was located at station 2+260.

If the water table is encountered, it should be expected that the highly permeable underlying soils will produce a high volume of water into excavations. Depending on the design elevations, it may be possible to install the watermain without the use of well point de-watering in the summer months when the groundwater level is generally lower. If a manageable amount of groundwater is encountered, we expect that conventional sumps and pumps would be sufficient to dewater the trenches.

If it is necessary to install the watermain below the water table, it is recommended to utilize well-point dewatering prior to excavating below the water. The water table should be lowered to at least 0.6 m below the underside of the pipe trench prior to excavating to minimize the potential for heaving, softening, or seepage at the excavation base. In addition, local sump pumps may be necessary.

The design of the dewatering system should be carried out by the contractor. The contractor should be asked to submit their dewatering plan sufficiently prior to construction for concept review.

Water from other sources such as adjacent or intersecting trench lines could be encountered. Local dewatering is not expected to significantly dewater the existing trench lines where perched water conditions could exist. We expect that intersecting trenches would be allowed drain into the excavation and the water would be removed using localized sump pumps.

Perched water table conditions are possible even if well point dewatering techniques are used. If encountered, seepage from these sources is expected to be light to moderate and it may be possible to control them using localized sump pumps.

6.1.2 Excavations

Excavations for the proposed watermain are expected to be between 3 to 4 m below grade. Prior to the watermain installation, any loose fill, topsoil, or organic materials should be removed from the trench to expose a subgrade of undisturbed granular soil or bedrock. Any soft, loose, disturbed or otherwise unsuitable soil should be removed from beneath the proposed pipe alignment prior to placing pipe bedding.

Open cut excavations above the water table are expected to be temporarily stable at slopes of 1H:4V or flatter to allow for installation of temporary shoring cages. Sloughing of trench walls should be expected. Temporary cut slopes could be covered in polyethylene sheeting to help reduce erosion and sloughing. Excavations advanced below the water table are expected to be unstable and will be prone to sloughing, soil migration, and could lead to undermining of the adjacent unsaturated soils. Therefore, as discussed above, dewatering is recommended.

We expect that pre-engineered steel trench shoring cages will be used to ensure worker safety during construction. All work must be carried out in accordance with WorkSafe BC regulations. The contractor must take care to ensure the excavation is maintained in a dry state, seepage is controlled, and disturbance to the subgrade soils is prevented. Any subgrade soils disturbed during the work for whatever reason must be removed and be replaced with approved bedding material.

The use of temporary shoring cages will not provide the required support for the trench walls to ensure that no movement occurs, therefore, some movements should be expected due to soil relaxation. Soils failure, which could impact the adjacent roadway or other nearby infrastructure, could occur. Due to this, adequate measures should be undertaken by the contractor to support and protect all existing improvements.

Construction techniques which could be considered by the contractor to mitigate the potential for impacts to existing infrastructure include, digging in the trench shields from the surface whilst backfilling the space between the shield and trench sidewall; using pneumatic shores to apply positive pressure to the trench sidewall; exposing and supporting any services independently from the soil, or other speciality techniques.

Shallow bedrock was encountered in the area of the proposed booster pump and water treatment facility. We understand that excavations for the new watermain in this area will be approximately 2.0 m below existing grade and therefore excavation within the bedrock may be necessary and blasting will likely be required.

All work must be carried out in accordance with WorkSafe BC regulations.

6.1.3 Backfill

We recommend that all work be carried out in general accordance with MMCD specifications.

Backfill materials will be required within the pipe trench to provide support for the pipe within the pipe zone and to ensure an adequate subgrade beneath all road pavement sections.

Base preparation beneath the pipes and manholes should be completed with 19 mm crushed rock lightly compacted in place.

Backfill within the pipe zone should be completed with 19 mm minus crushed rock compacted to a minimum of 95% Modified Proctor maximum dry density.

Bulk backfill materials should consist of well graded sand or sand and gravel fill compacted to a minimum of 95% Modified Proctor maximum dry density.

The contractor should be asked to provide density reports confirming that the specified level of compaction has been achieved. Frontera can provide quality assurance density testing upon request.

The existing excavated fill and native sand encountered within the test holes may be suitable for reuse as bulk backfill with exception to TH23-10 where the sand material contained high amounts of silt and where the organic topsoil horizon was encountered. Frontera can be asked to review the material at time of construction to confirm.

6.1.4 Pavement Restoration

We expect that the following pavement structure, which meets the requirements of the Resort Municipality of Whistler's "Temporary and Permanent Pavement Restoration", would be sufficient to support the anticipated traffic.

Table 2. Recommended **minimum** pavement structure:

Material	***Thickness (mm)***
Asphalt (50 mm base course, 40 mm surface course)	100
19 mm minus crush gravel base	150
100 mm minus, well graded, clean, sand and gravel subbase course	300

All base and sub-base materials should be compacted to a minimum of 95% of their Modified Proctor Maximum Dry Density (ASTM D1557) at a moisture content that is within 2% of optimum for compaction.

6.2 Phase 2: Booster Pump and Water Treatment Facility

6.2.1 Stripping

Prior to construction, all existing vegetation, asphalt, topsoil, disturbed or loose fill, and any other material which may compromise our design recommendations should be removed from the construction area to expose a subgrade consisting of bedrock.

6.2.2 Temporary Excavations

Design details for the proposed facility and associated services are not known. However, we understand that the watermain adjacent to the facility will be approximately 2.0 m below existing grade. Bedrock is expected at between 0.7 and 0.9 m below grade based on our test hole information.

Where excavation in bedrock is required, we expect that blasting may be necessary. We expect that the rock will be strong and self-supporting and therefore, excavation slopes of 1H:4V are expected to be stable, however, this must be confirmed at the time of excavation.

All excavations and trenching must conform to WorkSafeBC requirements or be designed by a professional engineer prior to worker entry.

6.2.3 Engineered Fill

Any grade reinstatement beneath foundations or grade supported slabs, should be completed with "engineered fill". In the context of this report any "engineered fill" is defined as clean sand to sand and gravel fill, containing less than 8% fines, compacted in 300 mm lifts to a minimum standard of 95% of its Modified Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

6.2.4 Foundation Recommendations

6.2.4.1 Foundation Design

The structures can be founded on conventional spread foundations placed on compacted fill, or bedrock.

Foundations supported directly on engineered fill can be designed for a serviceability limit state (SLS) bearing pressure of 150 kPa and ultimate limit state (ULS) of 300 kPa.

Foundations supported directly on competent bedrock can be designed for a serviceability limit state (SLS) of 500 kPa and a factored ultimate limit state (ULS) of 1 MPa.

We recommend that a level pad (i.e., less than 10 degrees from horizontal) is created in the bedrock subgrade through excavation and chipping. If a level pad is not achievable and the subgrade is sloped between 10 and 30 degrees, the foundations should be dowelled into the rock for additional support. Any rock subgrade exceeding 30 degrees should be benched so that it is less than 30 degrees.

The foundation subgrade must be reviewed by Frontera prior to pouring of foundations.

6.2.4.2 Subgrade Modulus

We recommend that the structural engineer consider a subgrade reaction modulus of 60 MPa/m for preliminary design if the foundations are to bear on the engineered fill or a subgrade reaction modulus of 500 MPa/m if the footings bear directly on bedrock. However, the actual modulus should be confirmed, through testing, at the time of initial site preparation.

6.2.4.3 Frost Protection

The underside of foundations should be located at least 0.6 m below finished site grades for frost protection.

6.2.4.4 Settlement of Foundations

Post construction settlements are estimated to be less than 25 mm with differential settlements of less than 1 in 300.

6.2.4.5 Seismic Design of Foundations

The soils at the site are not considered susceptible to liquefaction or strain softening when considering the 2018 BCBC seismic hazard. The seismic site response classification for this site is “Site Class A” in accordance with Table 4.1.8.4.A of the 2018 BCBC.

6.3 Concrete Slabs

Any grade supported concrete slabs should be underlain by a minimum of 150 mm of 19 mm clear crushed gravel, to prevent moisture from accumulating below the slab. The gravel should be tamped in place. We recommend that a poly moisture barrier be placed overlying the gravel beneath the grade supported slabs to help reduce moisture within the concrete slab.

6.4 Foundation Drainage

We recommend that a conventional perimeter drainage system be included in the mechanical design to help intercept and dispose of any migrating subsurface water at foundation level.

6.5 Backfill

Where backfill support hard landscaping we recommend that all backfill be clean sand to sand and gravel fill, containing less than 5% fines, compacted in 300 mm loose lifts to a minimum standard of 95% of its Modified Proctor Maximum Dry Density (ASTM D 1557) while at a moisture content that is within 2% of its optimum for compaction.

7.0 FIELD REVIEWS

Frontera Geotechnical Inc. should be asked to carry out sufficient field reviews during construction to ensure that the Geotechnical Design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way affect the contractor's obligations to perform under the terms of their contract.

It is the contractors' responsibility to advise Frontera Geotechnical Inc. (a minimum of 24 hours in advance) that a field review is required. Geotechnical field reviews are normally required at the time of the following:

1.	Excavation	Review of temporary cut slopes and ground conditions;
2.	Stripping	Review of stripped subgrade prior to any fill placement or pipe installation
3.	Subgrade Review	Review of subgrade prior to fill placement or footing construction;
4.	Filling	Review of engineered fill used to raise grades;
5.	Slab-on-grade	Review of engineered fill and drainage layer beneath slabs; and,
6.	Backfill	Review of backfill placement against foundations.
7.	Trench Backfill	Review of materials, placement, and compaction
8.	Road Structure	Review of materials, placement, and compaction

It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site view this document in advance of any work being carried out so that they become familiarized with the sensitive aspects of the works proposed. It is the responsibility of the developer to notify Frontera Geotechnical Inc. when conditions or situations not outlined within this document are encountered.

8.0 CLOSURE

This report is prepared solely for use by our client and their design team for this project as described to the general standards of similar work for similar projects in this area and no other warranty of any kind is expressed or implied. Frontera Geotechnical Inc. accepts no responsibility for any other use of this report.

We are pleased to assist you with this project, and we trust this information is helpful and sufficient for your purposes at this time. Please do not hesitate to call the undersigned if you require clarification or additional details.

Yours truly,

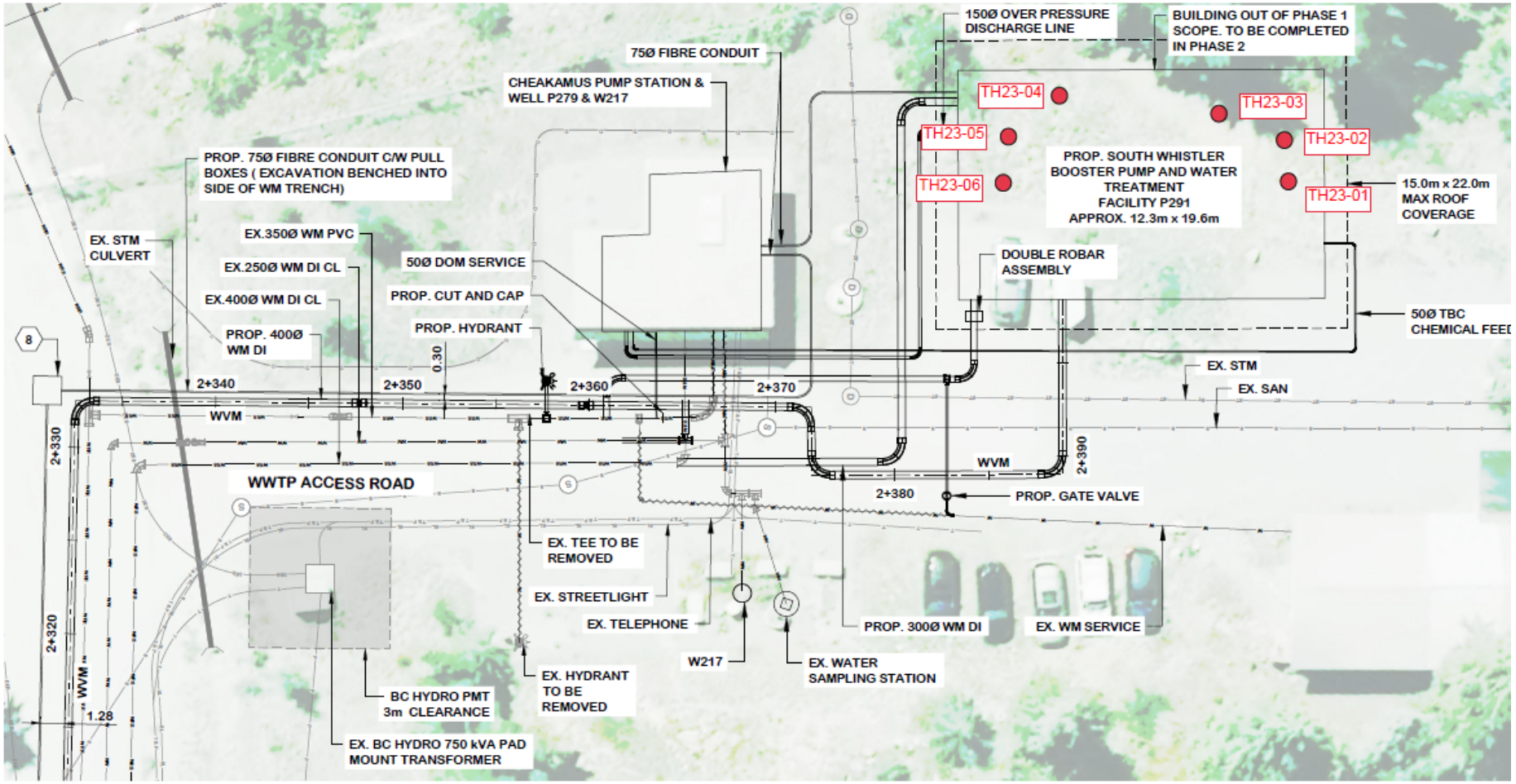
Frontera Geotechnical Inc.

Sam Gregory, B.Sc.
Project Manager

Jessica Gagne, P.Eng.
Geotechnical Engineer

Reviewed by:

Steven Fofonoff, M.Eng., P.Eng.
Principal



Geotechnical Investigation Plan
Proposed South Whister Booster Pump and Water Supply Project
Whistler. BC

FILE NO. 1956

DWG NO. 1956 - 01

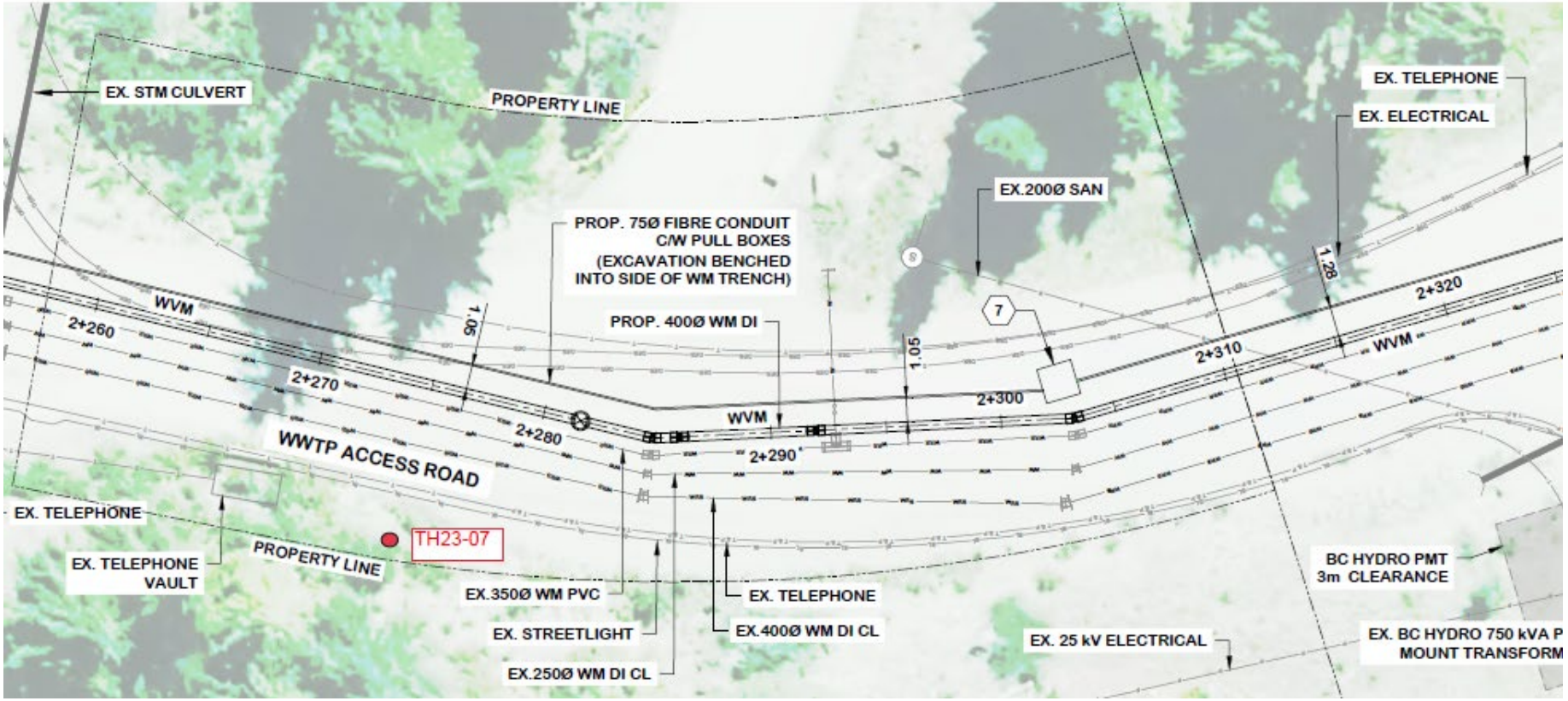
LEGEND
- Auger Test Hole

Date: 2023-18-01

Drawn By:	Approved By:	Reviewed By:
SG	SF	

Scale: NTS, Locations Approximate

FRONTERA GEOTECHNICAL



Geotechnical Investigation Plan
Proposed Home
1000 Laramee Road, Squamish, BC

FILE NO. 1950

DWG NO. 1950 - 01

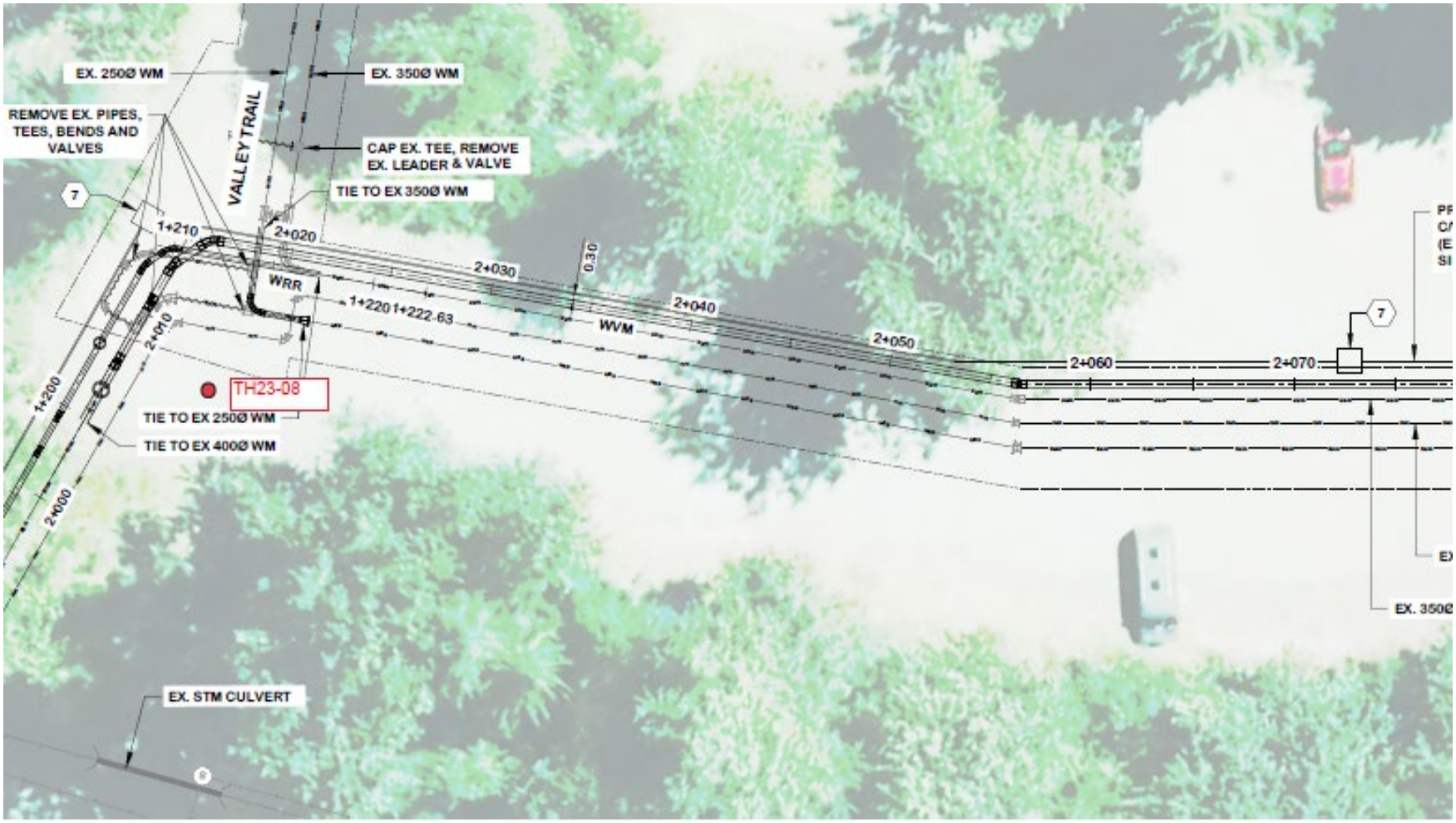
LEGEND
Auger Test Hole

Date: 2022-12-05

Drawn By:	Approved By:	Reviewed By:
SG	SF	

Scale: NTS, Locations Approximate

FRONTERA GEOTECHNICAL



Geotechnical Investigation Plan
Proposed Home
1000 Laramee Road, Squamish, BC

FILE NO.
1950

DWG NO.
1950 - 01

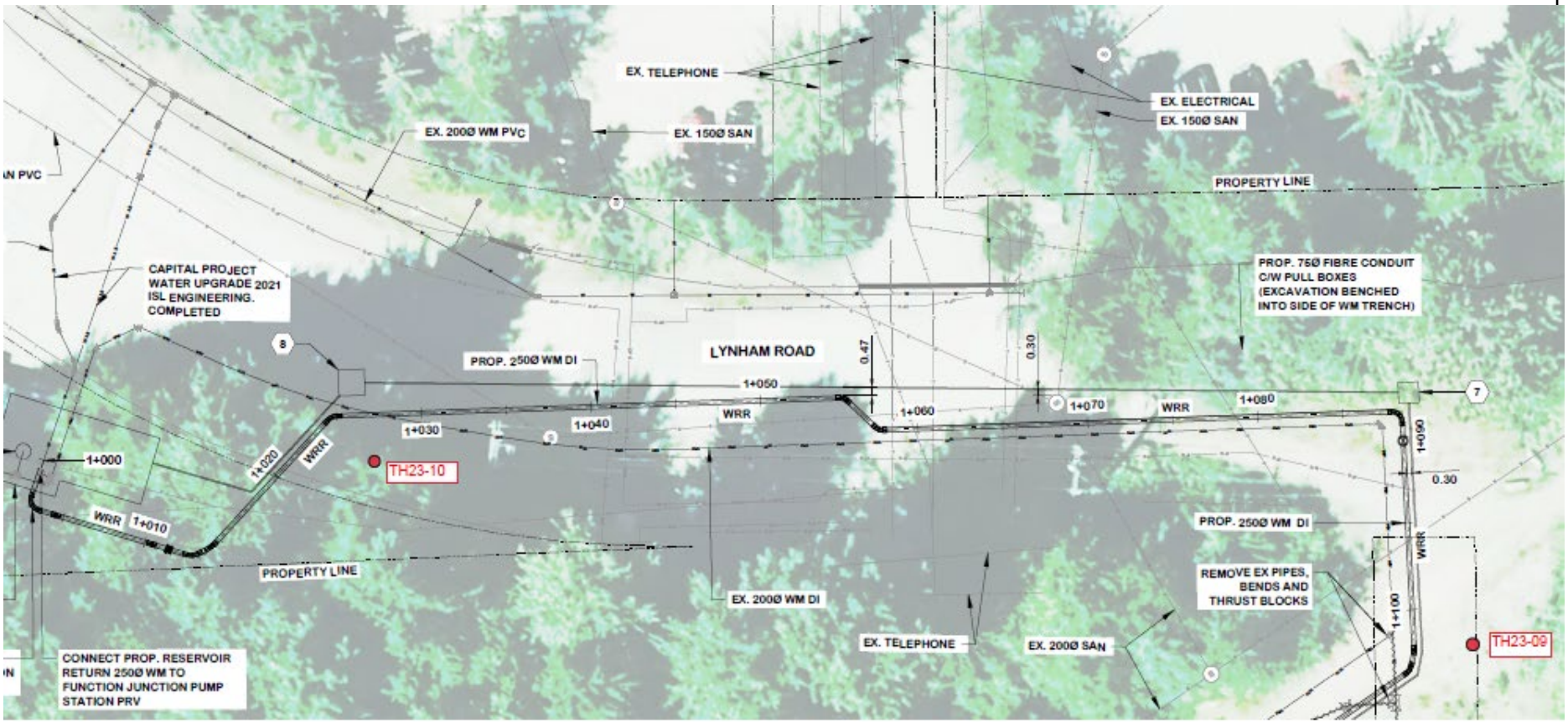
LEGEND
Auger Test Hole

Date: 2022-12-05

Drawn By:	Approved By:	Reviewed By:
SG	SF	

Scale: NTS, Locations Approximate

FRONTERA GEOTECHNICAL



Geotechnical Investigation Plan
Proposed Home
1000 Laramee Road, Squamish, BC

FILE NO.
1950

DWG NO.
1950 - 01

LEGEND
Auger Test Hole

Date: 2022-12-05

Drawn By:	Approved By:	Reviewed By:
SG	SF	

Scale: NTS, Locations Approximate

FRONTERA GEOTECHNICAL

APPENDIX A

TEST HOLE LOGS

Test Hole Log: TH23-01

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.0853, -123.03779

FRONTERA GEOTECHNICAL
#1 - 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093
www.fronterageo.ca

Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.81 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown. 0.76 m EL 603.05 m				No Data	0.76 m - Auger refusal, test hole terminated on possible bedrock.
1		End of Test Hole at 0.76 m					
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-02

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08524, -123.03799

FRONTERA GEOTECHNICAL
#1 - 38920 Queens Way
Squamish, BC V8B 0K8
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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.96 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown. 0.91 m EL 603.05 m				No Data	
1		End of Test Hole at 0.76 m					0.91 m - Auger refusal, test hole terminated on possible bedrock.
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-03

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08518, -123.03803

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#1 - 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093
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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.96 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown. 0.91 m EL 603.05 m				No Data	
1		End of Test Hole at 0.91 m					0.91 m - Auger refusal, test hole terminated on possible bedrock.
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-04

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08507, -123.03794

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Squamish, BC V8B 0K8
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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.81 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown. 0.76 m EL 603.05 m				No Data	0.76 m - Auger refusal, test hole terminated on possible bedrock.
1		End of Test Hole at 0.76 m					
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-05

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08509, -123.03799

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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.81 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown.				No Data	
		0.76 m EL 603.05 m					0.76 m - Auger refusal, test hole terminated on possible bedrock.
1		End of Test Hole at 0.76 m					
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-06

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08511, -123.03804

FRONTERA GEOTECHNICAL
#1 - 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093
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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.81 m					
0		**SAND with some gravel.** Fine to coarse grained sand, fine to coarse subangular gravel, well graded, dense, dry, orange/brown. 0.76 m EL 603.05 m				No Data	0.76 m - Auger refusal, test hole terminated on possible bedrock.
1		End of Test Hole at 0.76 m					
2							
3							
4							
5							
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-07

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08473, -123.03745

FRONTERA GEOTECHNICAL
#1 - 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093
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Depth (m)	Strata	Description	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 603.5 m				
0		**FILL** Trace roots and rootlets, medium grained sand, poorly graded, loose, dry, orange/brown.			No Data	
0.61 m EL 602.89 m		**FILL** Gravelly sand with cobbles, fine to coarse grained sand. fine to coarse angular gravel, subangular cobbles, well graded, compact to dense, moist, brown.	1			
1.83 m EL 601.68 m		**SAND with trace gravel** Fine to coarse grained sand, fine grained subangular gravel, well graded, compact, dry, brown.				
3.05 m EL 600.46 m		**SAND and GRAVEL with some cobbles.** Fine to coarse grained sand, fine to coarse grained angular to subangular gravel, subangular cobbles, well graded, dense to very dense, dry, grey.	2			3.0 m - 4.5 m - difficult drilling. 3.6 m - DCPT refusal on cobbles.
4.57 m EL 598.93 m		End of Test Hole at 4.57 m				No groundwater encountered.

Dynamic Cone Penetration Test (DCPT): 0, 12, 24, 36, 48, 60

DCPT values: 4, 5, 8, 25, 59, 25, 10, 22, 14, 25, 40, REF

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

RSLog / Frontera Geotechnical - 9.1 m / frontera-geotechnical-inc / admin / February 06, 2023 04:37 PM

Test Hole Log: TH23-08

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08656, -123.03594

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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) (0 12 24 36 48 60)	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 602.28 m					
0		**Sand and gravel FILL with some cobbles** Fine to coarse grained sand, fine to coarse grained angular gravel, angular cobbles, well graded, very dense, dry, brown.				No Data	Auger refusal at 0.6 m, moved 0.5 m to south and attempted second test hole. 0.6 m - DCPT refusal, drilled out to 1.5 m then conducted second DCPT.
1.52 m EL 600.76 m			45, 36, REF				Test hole open to 1.2 m.
2		**SAND** Medium grained sand, poorly graded, compact to dense, wet, yellow/brown.		1	20		2.1 m - Second DCPT refusal, loose cobbles from the fill fell down into base of hole.
3.05 m EL 599.24 m							
3		**SAND with trace silt** Fine grained sand, poorly graded, compact, wet, brown.					
4.27 m EL 598.02 m				2	32		
4		**SAND** Medium grained sand, poorly graded, compact, wet, brown.					
4.57 m EL 597.71 m							
5		End of Test Hole at 4.57 m					
6							
7							
8							
9							
10							

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

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Test Hole Log: TH23-09

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08774, -123.03477

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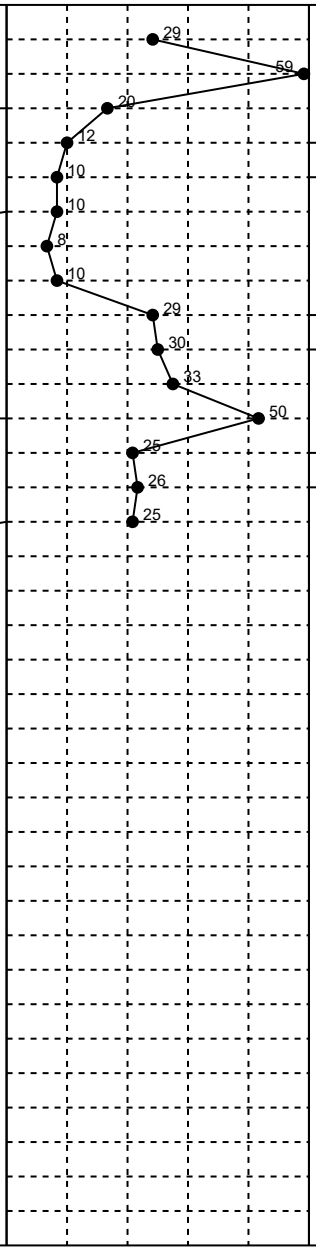
Depth (m)	Strata	Description	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 601.07 m				
0		**Gravelly Sand FILL** Fine to coarse grained sand, fine to coarse grained angular gravel, well graded, dense, moist, brown.			No Data	0.0 m to 0.9 m - poor recovery.
0.91 m (EL 600.15 m)						
1		**SAND with trace gravel** Medium grained sand, fine to coarse grained subrounded gravel, poorly graded, loose, wet, brown.	1	24		Test hole open to 0.9 m.
1.83 m (EL 599.24 m)						
2		**SAND with trace gravel** Fine to coarse sand, coarse grained subrounded gravel, well graded, compact to dense, wet, grey.	2	9		
3.66 m (EL 597.41 m)						
4		**SAND with trace gravel** Fine grained sand, coarse grained subrounded to rounded gravel. gap graded, compact, wet, brown.	3	24		
4.57 m (EL 596.49 m)						
5		End of Test Hole at 4.57 m				

Dynamic Cone Penetration Test (DCPT)



Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

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Test Hole Log: TH23-10

Project No.: 1956 **Client:** HDR

Project Title: South Whistler Water Supply Project

Address: Whistler, BC

Geographic Coordinates: 50.08756, -123.03586

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Depth (m)	Strata	Description	Dynamic Cone Penetration Test (DCPT) 0 12 24 36 48 60	Sample No.	Moisture Content (%)	Groundwater / Well	Remarks
		Ground Surface EL 600.76 m					
0		**FILL** Sand with trace silt, gravel and rootlets, Fine to medium grained sand, fine angular gravel, well graded, loose, moist, brown.	6, 6	1	22	No Data	Surfaced with 19mm crushed gravel.
0.61 m EL 600.15 m		**FILL** Silty SAND with trace gravel, Fine to medium grained sand, fine grained subrounded gravel, well graded, very loose, wet, grey.	1, 2, 0, 0, 0	2	22		Test hole open to 0.9 m
1.22 m EL 599.54 m		**Organic TOPSOIL** Fine grained orgainic sand with rotten wood, roots, rootlets and decomposing leaf matter, very loose, dry to moist, dark brown.	0, 1, 7	3	43		1.5 m - perched water observed in the silty sand.
2.9 m EL 597.87 m		**SAND with some silt** Trace rotten wood, Fine grained sand, poorly graded, compact, moist, grey.	21, 18, 17, 16, 18	4	46		
4.57 m EL 596.19 m		End of Test Hole at 4.57 m		5	35		

Date of Drilling: January 13, 2023

Drilling Method: Solid Stem Auger

Logged By: SG

Datum: BLS Ltd. (01-09-2023)

Hole Diameter (mm) : 165

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