Sunshine Coast Regional District

Request for Proposal

Number: 2437008

for

Geotechnical Assessment
Slope Stability Chapman Water Transmission Intake Line

Issue Date:
March 19, 2024

Closing Date of

April 25, 2024 at 3:00 PM local time

OPTIONAL SITE MEETING: A optional site meeting will be held on April 11, 2024 at 1:00 pm local time at 5642 Reservoir Road, Sechelt BC we will meet at the gate. Proponents need to RSVP to purchasing@scrd.ca by noon on April 10, 2024 if no RSVPs are received the site meeting may be cancelled.

CONTACT: All enquiries related to this Request for Proposal, including any requests for information and clarification, are to be submitted by April 12, 2024 and directed, in writing, to purchasing@scrd.ca, who will respond if time permits with a Q&A on BC Bid by April 17, 2024. Information obtained from any other source is not official and should not be relied upon. Enquiries and any responses providing new information will be recorded and posted to BC Bid or otherwise distributed to prospective Proponents.

DELIVERY OF PROPOSALS: Proposals must be in English and must be submitted using one of the submission methods below, and must either **(1)** include a copy of this cover page that is signed by an authorized representative of the Proponent or **(2)** be submitted by using the e-bidding key on BC Bid (if applicable), in accordance with the requirements set out in the RFP.

BC Bid Electronic Submission: Proponents may submit an electronic proposal using BC Bid. Proposals must be submitted in accordance with the BC Bid requirements and e-bidding key requirements (found at https://www.bcbid.gov.bc.ca/). Only pre-authorized electronic bidders registered on the BC Bid system can submit an electronic proposal using the BC Bid system. Use of an e-bidding key is effective as a signature.

OR

Hard Copy Submission*:* Proponents must submit **ONE (1)** hard-copies and **ONE (1)** electronic copy on a USB Drive of the proposal. Proposals submitted by hard copy must be submitted by hand or courier to:

Sunshine Coast Regional District
1975 Field Road
Sechelt, BC V7Z 0A8

Regardless of submission method, proposals must be received before Closing Time to be considered.

CONFIRMATION OF PROPONENT'S INTENT TO BE BOUND:

The enclosed proposal is submitted in response to the referenced Request for Proposal, including any Addenda. By submitting a proposal the Proponent agrees to all of the terms and conditions of the RFP including the following:

a) The Proponent has carefully read and examined the entire Request for Proposal;
b) The Proponent has conducted such other investigations as were prudent and reasonable in preparing the proposal; and
c) The Proponent agrees to be bound by the statements and representations made in its proposal.

PROPONENT NAME (please print): _____

NAME OF AUTHORIZED REPRESENTATIVE (please print):_____

SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____

DATE: _____

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1. GENERAL TERMS & CONDITIONS

1.1 DEFINITIONS

Throughout this Request for Proposal, the following definitions apply:

"**Addenda**" means all additional information regarding this RFP, including amendments to the RFP;
"**BC Bid**" means the BC Bid website located at https://www.bcbid.gov.bc.ca/ ;
"**Closing Location**" includes the location or email address for submissions indicated on the cover page of this RFP, or BC Bid, as applicable;
"**Closing Time**" means the closing time and date for this RFP as set out on the cover page of this RFP;
"**Contract**" means the written agreement resulting from the RFP executed by the Regional District and the successful Proponent;
"**Contractor**" means the successful Proponent to the RFP who enters into a Contract with the Regional District;
"**Must**", or "**mandatory**" means a requirement that must be met in order for a proposal to receive consideration;
"**Proponent**" means a person or entity (excluding its parent, subsidiaries or other affiliates) with the legal capacity to contract, that submits a proposal in response to the RFP;
"**Proposal**" means a written response to the RFP that is submitted by a Proponent;
"**Request for Proposals**" or "**RFP**" means the solicitation described in this document, including any attached or referenced appendices, schedules or exhibits and as may be modified in writing from time to time by the Regional District by Addenda; and
"**Should**", "**may**" or "**weighted**" means a requirement having a significant degree of importance to the objectives of the Request for Proposals.
"SCRD", "Regional District", "Organization", "we", "us", and**"our"** mean Sunshine Coast Regional District.

1.2 FORM OF PROPOSAL

This Proposal must be completed in its entirety. Failure to properly complete this Proposal form may cause your Proposal to be rejected. The signing officer must initial all corrections. The Sunshine Coast Regional District (Regional District) reserves the right to permit a correction, clarification or amendment to the Proposal or to correct minor errors and irregularities.

1.3 SUBMISSION OF PROPOSAL

a) Proposals must be submitted before Closing Time to the Closing Location using one of the submission methods set out on the cover page of this RFP. Proposals must not be sent by fax. The Proponent is solely responsible for ensuring that, regardless of submission method selected, the Regional District receives a complete Proposal, including all attachments or enclosures, before the Closing Time.
b) For electronic submissions (BC Bid or email), the following applies:
(i) The Proponent is solely responsible for ensuring that the complete electronic Proposal, including all attachments, is received before Closing Time;
(ii) The Regional District limits the maximum size of any single email message to 20MB or less.
(iii) Proponents should endeavour to submit emailed proposal submissions in a single message and avoid sending multiple email submissions for the same opportunity. If an electronic submission exceeds the applicable maximum single message size, the Proponent may make multiple submissions (BC Bid upload or multiple emails for the same opportunity). Proponents should identify the order and number of emails making up the email proposal submission (e.g. "email 1 of 3, email 2 of 3…");
(iv) For email proposal submissions sent through multiple emails, the Regional District reserves the right to seek clarification or reject the proposal if the Regional District is unable to determine what documents constitute the complete proposal;
(v) Attachments must not be compressed or encrypted, must not contain viruses or malware, must not be corrupted, and must be able to be opened using commonly available software (e.g. Adobe Acrobat). Proponents submitting by electronic submission are solely responsible for ensuring that any emails or attachments are not corrupted. The Regional District has no obligation to attempt to remedy any message or attachment that is received corrupted or cannot be viewed. The Regional District may reject proposals that are compressed encrypted, cannot be opened or that contain viruses or malware or corrupted attachments.
c) For BC Bid e-submissions only pre-authorized e-bidders registered on BC Bid can submit electronic bids on BC Bid. BC Bid is a subscription service ($150 per year) and the registration process may take two business days to complete. If using this submission method, Proponents should refer to the BC Bid website or contact BC Bid Helpdesk at 250-387-7301 for more information. An electronic proposal submitted on BC Bid must be submitted using the e-bidding key of an authorized representative of the Proponent. Using the e-bidding key of a subcontractor is not acceptable.
d) For email proposal submissions, including any notices of amendment or withdrawal referred to in Section 1.6, the subject line of the email and any attachment should be clearly marked with the name of the Proponent, the RFP number and the project or program title.
e) The Regional District strongly encourages Proponents using electronic submissions to submit proposals with sufficient time to complete the upload and transmission of the complete proposal and any attachments before Closing Time.

f) The Proponent bears all risk associated with delivering its Proposal by electronic submission, including but not limited to delays in transmission between the Proponent's computer and the Regional District Electronic Mail System or BC Bid.

g) While the Regional District may allow for email proposal submissions, the Proponent acknowledges that email transmissions are inherently unreliable. The Proponent is solely responsible for ensuring that its complete email proposal submission and all attachments have been received before Closing Time. If the Regional District Electronic Mail System rejects an email proposal submission for any reason, and the Proponent does not successfully resubmit its proposal by the same or other permitted submission method before Closing Time, the Proponent will not be permitted to resubmit its proposal after Closing Time. The Proponent is strongly advised to contact the Regional District Contact immediately to arrange for an alternative submission method if:

(i) the Proponent's email proposal submission is rejected by the Regional District Electronic Mail System; or

(ii) the Proponent does not receive an automated response email from the Regional District confirming receipt of each and every message transmitted, within a half hour of transmission by the Proponent.

An alternate submission method may be made available, at the Regional District's discretion, immediately to arrange for an alternative submission method, and it is the Proponent's sole responsibility for ensuring that a complete proposal (and all attachments) submitted using an approved alternate submission method is received by the Regional District before the Closing Time. The Regional District makes no guarantee that an alternative submission method will be available or that the method available will ensure that a Proponent's proposal is received before Closing Time.

1.4 SIGNATURE REQUIRED

Proposals must be properly signed by an officer, employee or agent having authority to bind the Proponent by that signature.

1.5 CLARIFICATIONS, ADDENDA & MINOR IRREGULARITIES

If any Proponent finds any inconsistencies, errors or omissions in the proposal documents or requires information, clarification of any provision contained therein, they shall submit their query in writing or email, addressed as follows:

Purchasing Division
Sunshine Coast Regional District
1975 Field Road, Sechelt, BC V7Z 0A8

purchasing@scrd.ca

Any interpretation of, addition to, deletions from or any corrections to the proposal documents will be issued as written addendum by the Regional District.

All Addenda will be posted on BC Bid. It is the sole responsibility of the Proponent to check for Addenda on BC Bid. Proponents are strongly encouraged to subscribe to BC Bid's email notification service to receive notices of Addenda.

1.6 WITHDRAWAL OR REVISIONS

Proposals or revisions may be withdrawn by written notice provided such a notice of withdrawal is received prior to the closing date and time. Proposals withdrawn will be returned to the Proponent unopened. Revisions to the proposals already received shall be submitted only by electronic mail, or signed letter. The revision must state only the amount by which a figure is to be increased or decreased, or specific directions as to the exclusions or inclusion of particular words.

1.7 CONDUCT OF THE CONTRACT

Unless otherwise specified within this document, any queries regarding this Request for Proposal are to be directed to purchasing@scrd.ca. No other verbal or written instruction or information shall be relied upon by the Bidder, nor will they be binding upon the Regional District.

1.8 CONFLICT OF INTEREST/NO LOBBYING

(a) A Proponent may be disqualified if the Proponent's current or past corporate or other interests, or those of a proposed subcontractor, may, in the Regional District's opinion, give rise to an actual or potential conflict of interest in connection with the services described in the RFP. This includes, but is not limited to, involvement by a Proponent in the preparation of the RFP or a relationship with any employee, contractor or representative of the Regional District involved in preparation of the RFP, participating on the evaluation committee or in the administration of the Contract. If a Proponent is in doubt as to whether there might be a conflict of interest, the Proponent should consult with the Regional District Contact prior to submitting a proposal. By submitting a proposal, the Proponent represents that it is not aware of any circumstances that would give rise to a conflict of interest that is actual or potential, in respect of the RFP.

(b) A Proponent must not attempt to influence the outcome of the RFP process by engaging in lobbying activities. Any attempt by the Proponent to communicate, for this purpose directly or indirectly with any employee, contractor or representative of the Regional District, including members of the evaluation committee and any elected officials of the Regional District, or with the media, may result in disqualification of the Proponent.

1.9 CONTRACT

By submitting a proposal, the Proponent agrees that should its proposal be successful the Proponent will enter into a Contract with the Regional District on substantially the same terms and Conditions set out in www.scrd.ca/bid and such other terms and conditions to be finalized to the satisfaction of the Regional District, if applicable.

1.10 SUSTAINABLE PROCUREMENT

The Regional District adheres to its sustainable consideration factors. Proposals will be considered not only on the total cost of services, but Proposals that addresses the environment and social factors.

1.11 INVOICING AND PAYMENT

Unless otherwise agreed, the Regional District payment terms are Net 30 days following receipt of services or approved invoices, whichever is later. Original invoices are to be forwarded to the accounts payable department of the Regional District. The purchase order number assigned by the Regional District must be stated on the invoice otherwise payment may be delayed.

1.12 PRICING, CURRENCY AND TAXES

Offered prices are to be attached as a price schedule in Canadian dollars with taxes stated separately when applicable.

1.13 IRREVOCABLE OFFER

This Proposal must be irrevocable for 90 days from the Proposal closing date and time.

1.14 TIME IS OF THE ESSENCE

Time shall be of the essence in this contract.

1.15 ASSIGNMENT

The Proponent will not, without written consent of the Regional District, assign or transfer this contract or any part thereof.

1.16 OWNERSHIP OF DOCUMENTS & FREEDOM OF INFORMATION

All documents submitted in response to this Request for Proposal shall become the property of the Regional District and as such will be subject to the disclosure provisions of the *Freedom of Information and Protection of Privacy Act* and any requirement for disclosure of all or a part of a Proposal under that Act.

The requirement for confidentiality shall not apply to any Proposal that is incorporated into a Contract for the Work. Further, the Regional District may disclose the top scoring proponent's aggregate pricing to the Regional District Board at a public meeting, when making a recommendation for the award of the Contract.

For more information on the application of the Act, go to http://www.cio.gov.bc.ca/cio/priv_leg/index.page.

1.17 AWARD OF CONTRACT

The Purchasing Policy at the Regional District offers contracts to businesses through an open, fair and consistent competitive bidding process. This ensures that the Regional District will receive the best overall value for the goods and services it requires. The Regional District reserves the right to cancel, award all or part of the scope of work described in this document to a single Proponent or may split the award with multiple Proponents.

All awards are subject to Board approval that meets the needs as determined by the Board. The Regional District, in receipt of a submission from a Proponent, may in its sole discretion consider the Proponent to have accepted the terms and conditions herein, except those expressly excluded or changed by the Proponent in writing.

The RFP shall not be construed as an agreement to purchase goods or services. The lowest priced or any proposal will not necessarily be accepted. The RFP does not commit the Regional District in any way to award a contract and that no legal relationship or obligation regarding the procurement of any good or service will be created between Regional District and the proponent unless and until Regional District and the proponent execute a written agreement for the Deliverables

1.18 COST OF PROPOSAL

The Proponent acknowledges and agrees that the Regional District will not be responsible for any costs, expenses, losses, damage or liability incurred by the Proponent as a result of or arising out submitting a Proposal for the proposed contract or the Regional District's acceptance or non-acceptance of their proposal. Further, except as expressly and specifically permitted herein, no Proponent shall have any claim for any compensation of any kind whatsoever, as a result of participating in this RFP, and by submitting a proposal each Proponent shall be deemed to have agreed that it has no claim.

1.19 PROPONENT'S RESPONSIBILITY

It is the Proponent's responsibility to ensure that the terms of reference contained herein are fully understood and to obtain any further information required for this proposal call on its own initiative. The Regional District reserves the right to share, with all proponents, all questions and answers related to this bid call.

1.20 EVALUATIONS

Proposals will be evaluated in private, including proposals that were opened and read in public, if applicable. Proposals will be assessed in accordance with the evaluation criteria.

If only one Proposal is received, the Regional District reserves the right to open the Proposal in private or if the total bid price exceeds the estimated budget for the Contract, the Regional District may cancel and re-tender, accept, not accept and cancel or re-scope the Work seeking a better response, with or without any substantive changes being made to the solicitation documents. If more than one Proposal is received from the same Proponent, the last Proposal received, as determined by the Regional District, will be the only Proposal considered.

1.21 ACCEPTANCE OF TERMS

The submission of the Proposal constitutes the agreement of the Proponent that all of the terms and conditions of the RFP are accepted by the Proponent and incorporated in its Proposal, except those conditions and provisions which are expressly excluded and clearly stated as excluded by the Proponent's proposal.

1.22 MANDATORY REQUIREMENTS

Proposals not clearly demonstrating that they meet the mandatory requirements will receive no further consideration during the evaluation process.

1.23 INSURANCE & WCB

The Proponent shall obtain and continuously hold for the term of the contract, insurance coverage with the Regional District Listed as "Additional Insured" the minimum limits of not less than those stated below:

(a) Commercial General Liability – not less than $2,000,000 per occurrence
(b) Motor Vehicle Insurance, including Bodily Injury and Property Damage in an amount no less than $2,000,000 per accident from the Insurance Corporation of British Columbia on any licensed motor vehicles of any kind used to carry out the Work.
(c) Error & Omissions Insurance – not less than $5,000,000 per occurrence.
(d) A provision requiring the Insurer to give the Owners a minimum of 30 days' notice of cancellation or lapsing or any material change in the insurance policy;

The Proponent must comply with all applicable laws and bylaws within the jurisdiction of the work. The Proponent must further comply with all conditions and safety regulations of the Workers' Compensation Act of British Columbia and must be in good standing during the tern of any contract entered into from this process.

1.24 COLLUSION

Except otherwise specified or as arising by reason of the provisions of these documents, no person, or corporation, other than the Proponent has or will have any interest or share in this proposal or in the proposal contract which may be completed in respect thereof. There is no collusion or arrangement between the Proponent and any other actual or prospective Proponent in connection with proposals submitted for this project and the Proponent has no knowledge of the context of other proposals and has no comparison of figures or agreement or arrangement, express or implied, with any other party in connection with the making of the proposal.

1.25 CONFLICT OF INTEREST

Proponents shall disclose in its Proposal any actual or potential conflict of interest and existing business relationship it may have with the Regional District, its elected or appointed officials or employees.

1.26 LIABILITY FOR ERRORS

While the Regional District has used considerable efforts to ensure an acute representation of information in these bid documents, the information contained is supplied solely as a guideline for Proponents. The information is not guaranteed or warranted to be accurate by the Regional District nor is it necessarily comprehensive or exhaustive.

1.27 TRADE AGREEMENTS

This RFP is covered by trade agreements between the Regional District and other jurisdictions, including the following:

a) Canadian Free Trade Agreement; and
b) New West Partnership Trade Agreement.

1.28 LAW

This contract and any resultant award shall be governed by and construed in accordance with the laws of the Province of British Columbia, which shall be deemed the proper law thereof.

1.29 REPRISAL CLAUSE

Tenders will not be accepted by the Regional District from any person, corporation, or other legal entity (the "Party") if the Party, or any officer or director of a corporate Party, is, or has been within a period of two years prior to the tender closing date, engaged either directly or indirectly through another corporation or legal entity in a legal proceeding initiated

in any court against the Regional District in relation to any contract with, or works or services provided to, the Regional District; and any such Party is not eligible to submit a tender.

1.30 FORCE MAJEURE (ACT OF GOD)

Neither party shall be liable for any failure of or delay in the performance of this Agreement for the period that such failure or delay is due to causes beyond its reasonable control including but not limited to acts of God, war, strikes or labour disputes, embargoes, government orders or any other force majeure event. The Regional District may terminate the Contract by notice if the event lasts for longer than 30 days.

1.31 CONFIDENTIAL INFORMATION OF PROPONENT

A proponent should identify any information in its proposal or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by Regional District. The confidentiality of such information will be maintained by Regional District, except the total proposed value, which must be publicly released for all proposals, or otherwise required by the Freedom of Information and Protection of Privacy Act ("FOIPPA"), law or by order of a court or tribunal. Proponents are advised that their proposals will, as necessary, be disclosed, on a confidential basis, to advisers retained by Regional District to advise or assist with the RFP process, including the evaluation of proposals. If a proponent has any questions about the collection and use of personal information pursuant to this RFP, questions are to be submitted to the RFP Contact.

1.32 DISPUTE RESOLUTION

All unresolved disputes arising out of or in connection with this Proposal or in respect of any contractual relationship associated therewith or derived therewith shall be referred to and finally resolved by arbitration as prescribed by Mediate BC services pursuant to its rules, unless otherwise mutually agreed between the parties.

1.33 DEBRIEFING

At the conclusion of the RFP process, all Proponents will be notified. Proponents may request a debriefing meeting with the Regional District.

2. INTRODUCTION

2.1 Purpose

The Regional District is requesting proposals from qualified professional engineers to conduct a slope stability geotechnical assessment of the embankment supporting the Chapman water intake transmission line.

The geotechnical assessment will consist of a desktop review and physical assessment of the area identified along the Chapman water intake transmission line, and a final report submitted to the Regional District that includes a slope risk assessment, remediation recommendations, a rotational slope diagram and a slope monitoring plan.

3. SITUATION/OVERVIEW

3.1 Background

In December 2020, a landslide occurred near the Chapman water intake transmission line. Emergency remediation of two (2) existing water lines occurred from January 2021 to February 2021. In Spring 2022, an assessment of the primary Chapman water intake transmission line and supporting trestle infrastructure was completed and a geotechnical investigation to assess the stability of the slope along sections of the transmission line was recommended.

Further assessment is required to determine slope stability and possible impact to the water intake transmission line situated in the area. The Chapman water intake trestles are steel structures that were originally installed in the 1970s to support watermains. The trestle column supports rest on large concrete block piers and are located adjacent to Chapman Creek.

3.2 Scope

The scope of work includes a geotechnical assessment completed by a Professional Engineer, registered in the Province of BC, of the supporting embankment slope for the water transmission line. The area identified for assessment begins at the Chapman Creek Raw Water Pump Station and ends at the Chapman Creek Crossing #1 (see Appendix 1 – Location Map).

The Contractor will conduct a desktop study that includes the review of related documents as set out in this tender and may include, but is not limited to, topographic surveys and standard practice geotechnical testing and analysis techniques. Also, a physical inspection of the slope area should be conducted which may include, but is not limited to, visual inspection of slopes, soil conditions, drainage, vegetation including danger trees, visible movement, and any other recommended inspections. Physical measurements could include, but is not limited to, ground cracking and groundwater levels.

The Contractor will identify locations of slope instability, noting any urgent issues, and will provide a report that includes a slope risk assessment including a weighted matrix identifying level of risk as high, medium, or low and an estimated term for remediation identified as long, medium, or short for identified locations. Priority should be based on severity and risk to infrastructure. Recommendations to remediate each section identified for slope instability to be provided with a Class C cost estimate. Rotational slope analysis with slope diagrams to be included. The report to also include a slope monitoring plan, identifying areas to be monitored, frequency, and type of monitoring. Where specific monitoring instruments or equipment are required, a cost estimate should be included.

3.3 Deliverables

The deliverables include a draft report for the Regional District's review and comment, and a final geotechnical assessment report.
The completed report will:

(i) Identify areas of slope instability in relation to the watermain, trestle bridges and supporting structures;
(ii) Provide a risk analysis with recommendations in the form of an action plan with timelines to remediate any instability for slope(s) identified as unstable;
(iii) Recommend and provide a schedule for monitoring methods including the frequency and type of monitoring;
(iv) Include a rotational slope stability analysis, with rotational slope slide diagrams; and
(v) Specify the assumptions used in the slope stability analysis.

4. CONTRACT

4.1 General Contract Terms and Conditions

Proponents should review carefully the terms and conditions set out in the General Service Contract, including the Schedules. The General Contract terms can be found at: Information about our General Service Terms and Conditions can be found at www.scrd.ca/bid.

4.2 Service Requirements

The Contractor's responsibilities will include the following:

a) Reviewing all related documents as provided in the RFP.
b) Conforming to all applicable codes, guidelines regulations and all laws as required by the authorities having jurisdiction.
c) Maintaining a good standing with Engineers and Geoscientists of BC (EGBC) throughout the term of the contract.
d) Ensuring that all engineering work complies with applicable Permit to Practice requirements as articulated by EGBC.
e) Providing a geotechnical assessment report(s) in Word and PDF format.
f) Obtaining all permits, licenses, approvals, and certificates which, as are generally required for the performance of the work. The Contractor shall pay all permit fees.
g) Maintain the site in a clean and orderly condition.

4.3 Site Access

The Contractor will provide the Regional District a minimum of 24 hours notice to arrange for access to the site. The site is accessible via a forest service road, and the Contractor will be responsible for providing appropriate vehicle transportation.

4.4 Project Schedule

The Contractor shall provide a final report to the Regional District by May 31, 2024.

4.5 Related Documents

The following reports are available for information:

- Appendix 1 Location Map Geotechnical Assessment Chapman Water Lines
- Appendix 2 Landslide Hazard Condition Assessment (2020)
- Appendix 3 Landslide Field Memos 1 to 9 (2021)
- Appendix 4 Landslide Waterline Stabilization Works Completed (2021)
- Appendix 5 Temporary Water Supply Main Support Construction Reservoir Road Extension Record Drawings (2021)
- Appendix 6 Plan and Elevation of existing trestles (1988)
- Appendix 7 Chapman Intake Supply Main (1979)

5. REQUIREMENTS

In order for a proposal to be considered, a Proponent must clearly demonstrate that they meet the mandatory requirements set out in Section 7.1 (Mandatory Criteria) of the RFP.

This section includes "Response Guidelines" which are intended to assist Proponents in the development of their proposals in respect of the weighted criteria set out in Section 7.2 of the RFP. The Response Guidelines are not intended to be comprehensive. Proponents should use their own judgement in determining what information to provide to demonstrate that the Proponent meets or exceeds the Regional District's expectations.

Please address each of the following items in your proposal in the order presented. Proponents may find it helpful to use the individual Response Guidelines as headings for proposal responses.

5.1 Capabilities

5.1.1 Qualifications

Proponent must include a Professional Engineer with a registered license to practice within British Columbia. Proponents will need to provide their license to practice number. The Proponents Professional Engineer will need a minimum of 5 years' experience in the last 10 years conducting and specializing in geotechnical assessments.

The Proponent shall clearly demonstrate:

a) That they have the ability to conduct geotechnical assessments.
b) That they have expertise in Surface Water Hydrology.

The Proponent should provide the curriculum vitae for the key members of the project team.

5.1.2 Relevant Experience

The Proponent shall provide details regarding the performance of the Proponent, project team and any proposed subcontractors on similar projects including without limitation, the Proponent's history with the respect to the quality of work, schedule, changes in the work, and force account work.

5.1.3 References

Proponents shall provide a minimum of 3 references (i.e. names and contact information) of individuals who can verify the quality of work provided specific to the relevant experience of the Proponent and of any subcontractors named in the proposal. References from the Proponent's own organization or from named subcontractors are not acceptable.

The Regional District reserves the right to seek additional references independent of those supplied by the Proponent, including internal references in relation to the Proponent's and any subcontractor's performance under any past or current contracts with the Regional District or other verifications as are deemed necessary by it to verify the information contained in the proposal and to confirm the suitability of the Proponent.

5.1.4 Environmental Requirements

The Proponent to provide details on how they will meet environmental regulations, including, but not limited to:

- Fisheries Act.
- Vancouver Coastal Health (VCH) Regulations.

5.2 Sustainable Social Procurement

A factor in the Regional District evaluation process is sustainable social procurement and the evaluation of proposals will take this into consideration.

As part of any submission the Proponent is encouraged to identify how they may contribute to the following key social, employment and economical goals, but not limited to the following:

a) Contribute to a stronger local economy by:
   - promoting a Living Wage
   - Using fair employment practices;
   - Increase training and apprenticeship opportunities;
b) Local expertise knowledge by:
   - Being locally owned;
   - Utilization of local subcontractors;
c) Environmental Cost of Ownership;
d) Energy efficient products;
e) Minimal or environmentally friendly use of packing materials; and
f) Reducing hazardous materials (toxics and ozone depleting substances).

5.3 Approach

The approach identified within the Proponent's proposal for the geotechnical slope stability needs to have a detailed description of the methodologies to be utilized to satisfy the requirements stated under scope for a definitive assessment useful for either immediate or future corrective measures; at minimum, the type of supporting ground (whether bedrock or earth) underneath the blocks shall be identified. If the proposed scope includes any form of ground disturbance, including but not limited to, test pits, trenches or boring, Archaeology approvals are required prior to commencing the ground disturbance work. Regional District staff will assist the Proponent in applying for these approvals.

5.4 Schedule

Proponent shall provide preliminary schedule identifying all the milestones and time periods for each task.

5.5 Price

Proponents need to submit a fee proposal that sets out the separate costs of each milestone as well as an all-inclusive cost for all the projects; the proposal should include a breakdown of the fixed prices including time, travel, hourly billable rates and material costs.

Prices quoted will be deemed to be:

- in Canadian dollars;

- inclusive of duty, FOB destination, and delivery charges where applicable; and
- exclusive of any applicable taxes.

6. PROPOSAL FORMAT

Proponents should ensure that they fully respond to all requirements in the RFP in order to receive full consideration during evaluation.

The following format, sequence, and instructions should be followed in order to provide consistency in Proponent response and ensure each proposal receives full consideration. All pages should be consecutively numbered.

a) Signed cover page (see section 7.1 Mandatory Criteria).
b) Table of contents including page numbers.
c) A short (one or two page) summary of the key features of the proposal.
d) The body of the proposal, including pricing, i.e. the “Proponent Response”.
e) Appendices, appropriately tabbed and referenced.
f) Identification of Proponent (legal name)
g) Identification of Proponent contact (if different from the authorized representative) and contact information.

7. EVALUATION

Evaluation of proposals will be by a committee formed by the Regional District and may include other employees and contractors.

The Regional District’s intent is to enter into a Contract with the Proponent who has met all mandatory criteria and minimum scores (if any) and who has the highest overall ranking.

Proposals will be assessed in accordance with the entire requirement of the RFP, including mandatory and weighted criteria.

The Regional District reserves the right to be the sole judge of a qualified proponent.

The Evaluation Committee may, at its discretion, request clarifications or additional information from a Proponent with respect to any Proposal, and the Evaluation Committee may make such requests to only selected Proponents. The Evaluation Committee may consider such clarification or additional information in evaluating a Proposal.

7.1 Mandatory Criteria

Proposals not clearly demonstrating that they meet the following mandatory criteria will be excluded from further consideration during the evaluation process.

Mandatory Criteria
The proposal must be received at the Closing Location before the Closing Time.
The proposal must be in English.
The proposal must be submitted using one of the submission methods set out on the cover page of the RFP

Mandatory Criteria
The proposal must either (1) include a copy of the Confirmation of Proponent's Intent to be Bound that is signed by an authorized representative of the Proponent, this is also required for email submissions or (2) be submitted by using the e-bidding key on BC Bid (if applicable), in accordance with the requirements set out in the RFP
Professional Engineer with a Permit to Practice

7.2 Weighted Criteria

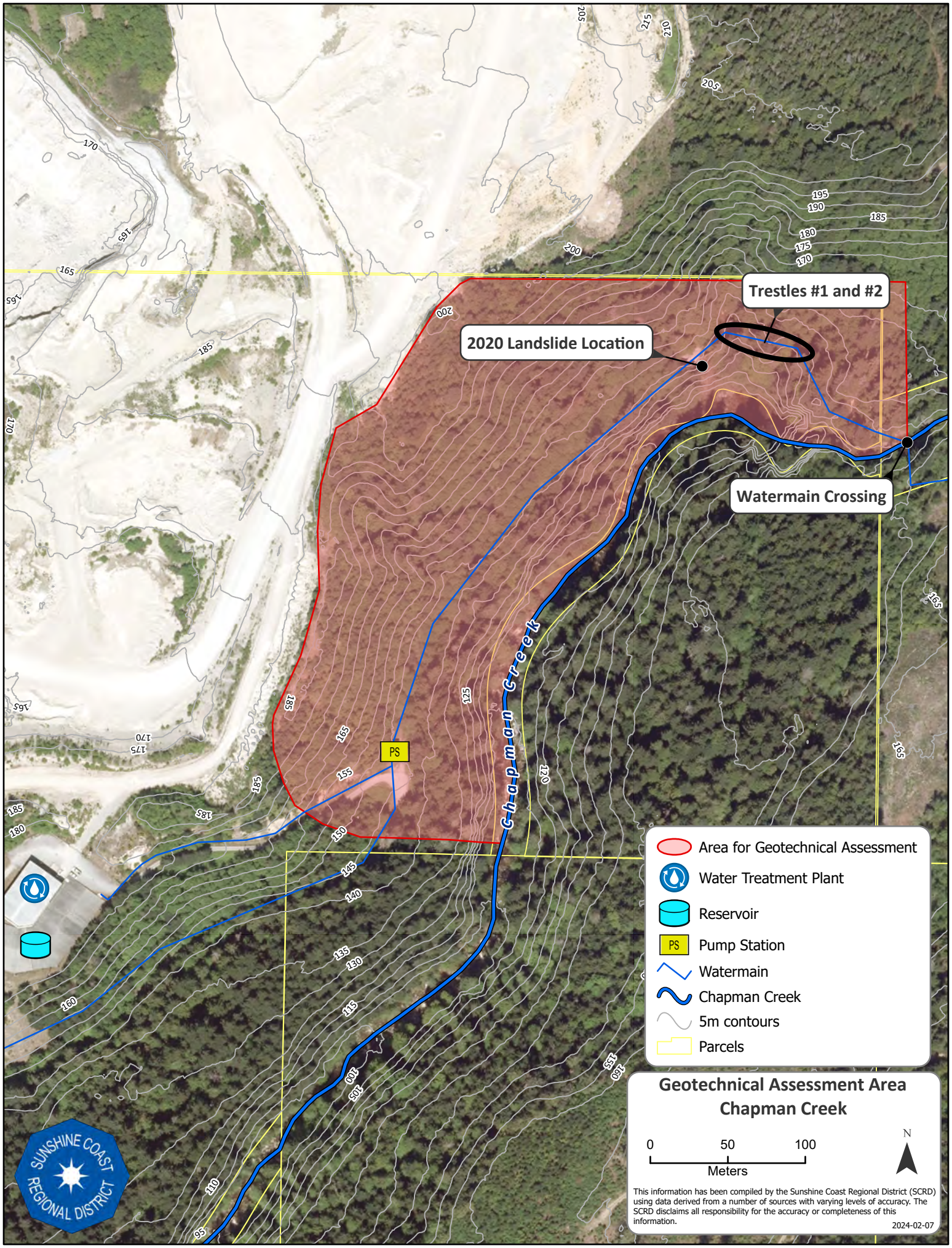
Proposals meeting all of the mandatory criteria will be further assessed against the following weighted criteria.

Weighted Criteria	**Weight (%)**
Approach	30
Experience and Capabilities	30
Schedule	10
Sustainable Social Procurement	5
Price	25
TOTAL	**100**

7.3 Price Evaluation

The lowest priced Proposal will receive full points for pricing. All other prices will be scored using the following formula: lowest priced proposal/price of this proposal* total points available for price.

Appendix 1 Location Map Geotechnical Assessment Chapman Water Lines


Trestles #1 and #2
2020 Landslide Location
Watermain Crossing
PS
Chapman Creek
Area for Geotechnical Assessment
Water Treatment Plant
Reservoir
Pump Station
Watermain
Chapman Creek
5m contours
Parcels
Geotechnical Assessment Area
Chapman Creek
0
50
100
Meters
N
SUNSHINE COAST REGIONAL DISTRICT
This information has been compiled by the Sunshine Coast Regional District (SCRD) using data derived from a number of sources with varying levels of accuracy. The SCRD disclaims all responsibility for the accuracy or completeness of this information.
2024-02-07

Appendix 2 Landslide Hazard Condition Assessment (2020)

ARYA ENGINEERING INC.

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Memorandum

File No.:	20-369-SC	Date:	December 22, 2020
To:	Sunshine Coast Regional District (SCRD), Attention: Stephen Misiurak		
Email:	Stephen.misiurak@scrd.ca	Phone:	604.885.6800
From:	Benjamin Tomasz, P.Eng. Masoud Mohajeri, P.Eng.	CC:	
Subject:	**Memorandum 1 – Field Review – Landslide Hazard Condition Assessment Reservoir Road Extension, Sechelt, British Columbia**		

1.0 INTRODUCTION

Arya Engineering Inc. (Arya) presents this memorandum detailing observations taken during a recent field review conducted to evaluate a landslide that has recently occurred along the northwestern bank of Chapman Creek, at a location approximately 500 m northeast of the Chapman Creek Water Treatment Facility in Sechelt, BC. An Arya representative visited the site on December 20, 2020, after receiving notification of landslide occurrence from a representative of the SCRD. The commentary contained herein is based on Arya's field observations, conversations with SCRD personnel, and a review of published geologic and topographic information available for the area. The intent of this memorandum is to provide a description of the ground instabilities observed and preliminary recommendations for remedial actions and landslide mitigation measures to be considered in the slide area.

2.0 CONDIITON ASSESSMENT

During the field review, ground movement was observed along the downhill (southeast) side of an access corridor (pathway) that we understand accommodates a 600 mm diameter underground water supply main. It is our understanding that the supply main conveys water from an intake location further northeast, beyond Chapman Falls to the aforesaid water treatment facility.

As evaluated from the pathway located immediately northwest of the landslide, the slide was observed to consist of a slumped mass of material predominantly consisting of sand and gravel with trace to some fines. The slide mass appeared to have dropped in elevation by at least 1 m at the time of the field review (headscarp height), and to have resulted in approximately 2 m of slope regression, as estimated from undisturbed areas adjacent to the lateral margins of the landslide headscarp. Loose surface soils as part of the slumped mass were observed to have runout further downhill from the main body of the slump mass through sloughing and raveling. The disturbed soils were observed to be light grey, brownish-grey and strong-brown in color. An open tension crack had formed approximately 300 mm upslope from the headscarp location. The crown of the slide was measured at 7 m in width. Numerous minor tension cracks were observed adjacent to the headscarp in the form of ground depressions located parallel to the crown.

Manual probing in the vicinity of the tension crack location revealed loose soils in excess of 900 mm in depth.

Based on discussions with an SCRD site representative and measurements taken on-site at the time of the review, the 600 mm dia. supply main was estimated to be located at a setback of approximately 1.5 m to 1.8 m from the observed tension crack, at its closest point. Due to the topographic conditions in the slide area and indications of unstable terrain, visual observations of the landslide were limited to beyond the headscarp and crown area. The toe, flanks and main body of the slump mass could not be assessed. There were no indications observed on-site that either overland flow or windthrow contributed to the slope failure.

Topographic details of the study area were established based on tilt clinometer readings taken on site during the time of the field review, as well as topography provided on the SCRD's property viewer application. As discussed, the slide initiated on the downhill side of an existing access corridor that accommodates the supply main. The pathway has been benched into the side of a steep slope that maintains a prominence of approximately 80 m. As taken from the pathway location where the slide has occurred, the slope descends to the southeast to Chapman Creek below, averaging a slope gradient of 50° to 55° over a prominence of approximately 30 m. Also taken from the location of the pathway in the vicinity to the slide, the slope ascends to the northwest at an average slope of 35° over a prominence of approximately 50 m.

Visual assessment of exposed surface soils located on the uphill side of the access corridor suggests an undisturbed soil profile consisting of a thin veneer of podzol (50 mm to 100 mm), underlain by a loose, strong-brown sand and gravel deposit with some fines (150 mm to 600 mm), further underlain by Vashon Stade lodgement till. The till was described as a matrix of sand and gravel and trace silt and trace coarse soils consisting of cobbles and boulders. This deposit was observed at multiple locations across the pathway and was typically described as very moist, brownish-grey in color, highly weathered and friable. This material was observed to readily disintegrate upon disturbance with a soil probe.

Outcropping bedrock was observed below the slide location along the channel of Chapman Creek. No groundwater conditions including seepage were observed in the vicinity of the landslide. The soil stratigraphy observed is consistent with published surficial geologic information for the area which locates the slide area at the contact of bedrock, granular fluvial deltaic, fan and channel deposits and ground moraine deposits.

2.0 FAILURE MODE AND MECHANISM

The conditions observed suggest localized debris slide failure, which is a characteristic landslide mode across the Sunshine Coast in similar ground conditions (veneer of loose, unconsolidated surface soils over granular till on steep open slopes). These slides are either translational or rotational in nature or consist of a combination of translational and rotational movement. Given the spatial characteristics of the slide and observations of the exposed soils across the headscarp location, and across observable areas of the

slump mass, it is anticipated that the landslide failure plane propagates through the glacial till matrix to some depth.

It is expected that the primary condition initiating localized debris slides is continual weathering of the glacial till near surface. Locally, this material is predominately comprised of weakly to moderately cemented sand and gravel which contains relatively high shear strength when unweathered. However, continual precipitation and infiltration of surface waters results in wetting of the glacial till contact which gradually decreases the cementation related cohesion ("apparent cohesion") and reduces the shear strength of the soil mass comprising the slopes. While the driving forces in a given slope section essentially remain static with time, the resistance forces ("apparent cohesion") decrease to a point where the slope geometry can no longer support its own weight, and landsliding ensues.

A seasonal phenomenon on the Sunshine Coast generally consists of several discrete days over the winter months where intense rainfall occurs, and numerous localized debris slides are triggered in similar terrain and ground conditions, and which realize identical failure geometries to the slide observed during the field review. It is anticipated that during these precipitation events, elevated transient groundwater conditions at the glacial till contact, partial infiltration of surface water into the till matrix, and/or the continual weathering of the till during these events reduces the shear strength parameters of the soils sufficiently to trigger landsliding.

2.0 RECOMMENDATIONS

The landslide observed on site has resulted in the oversteepening of the downhill side of the pathway (near vertical headscarp) and the removal of vegetation from this section of the slope, further increasing susceptibility to ground movement. Regression of the oversteepened headscarp through erosion and/or subsequent retrogressive slope failures is likely. Forthcoming precipitation may further trigger landsliding either through mobilization of the current landslide mass, and/or mobilization of a regressive landslide toward the supply main. Given the current setback of the supply main (1.5 m to 1.8 m uphill of existing tension cracking) and the apparent height of the headscarp (at least 1 m), urgent remedial action in the form of a permanent, or semi-permanent slope stabilization or supply main stabilization strategy is strongly recommended.

Provided mitigation of only shallow slope instability is required, securing the slope sections immediately adjacent to and downhill of the supply main with micro-piles and/or soil anchors may be a feasible design and construction strategy for this failure, given the site conditions and access constraints of the slide location. A supply main underpinning strategy through micropile/soil anchor installation may also be a feasible design alternative.

During the time of the field review and through subsequent correspondence, Arya has provided instructions to SCRD personnel to immediately close access to the pathway and to weather protect the landslide area with plastic sheeting. These interim measures should be maintained until a more permanent remedial action plan is undertaken. All reasonable efforts should be undertaken to direct surface water runoff originating from the hillside away from the slide area. If practical, redirected surface

waters should be concentrated in closed pipes and directed to Chapman Creek below; however, given the prominence and steepness of the hillside, this may not be a practical. As in interim strategy, concentrated surface water could otherwise be directed to locally constructed energy dissipators (PVC outflow connected to a T-fitting surrounded in blast rock or coarse granular material) constructed across the pathway. Collected and concentrated surface water should not be discharged immediately on the slope below the pathway.

A main line bypass without terminating service of the main may also be feasible as a means of temporarily rerouting the supply main located closest to the landslide headscarp. This strategy would reduce the likelihood of imminent retrogressive slope failure that could otherwise interfere with the performance of the supply main. This strategy would also facilitate access to the headscarp location for further geotechnical review, as needed to gather the requisite site information needed to establish an appropriate long-term remediation plan.

3.0 CLOSURE AND LIMITATIONS

Arya has provided several remediation designs for similar type failures in limited access locations across the Sunshine Coast through the utilization of micro-piles and soil anchors, and through other means. We are available to provide additional design consultation and project support upon request.

In consideration of the subsurface conditions and topographic conditions observed, the potential for deep-seated slope failure would need to be assessed as part of establishing a suitable long-term solution. It's also important to note that the commentary and recommendations contained herein are based on our general project experience with the local geomaterials and topographic conditions observed on-site. Detailed geotechnical field investigation would be required to confirm the failure mode and triggering mechanisms presented herein in support of providing an appropriate remediation plan.

This report has been prepared for the exclusive use of the Sunshine Coast Regional District for the development of the proposed structure and auxiliary building on the subject site. The recommendations provided in this document reflect Arya's best judgment based on the information available to Arya at the time of preparation of this document. If conditions other than those are noted during subsequent phases of development, Arya should be notified immediately and given the opportunity to review and revise the current recommendations, if necessary.

This report remains the property of Arya Engineering Inc., and Arya does not accept damages caused by the unauthorized third-party use of the information contained herein. The assessment was conducted in accordance with current geotechnical engineering practice and principles.

We trust this document provides the information required at this time for project continuation. If you have any questions regarding the document, please do not hesitate to contact us.

Sincerely,
Arya Engineering Inc.

Prepared By:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Reviewed By:

Masoud Mohajeri, Ph.D., P.Eng., PMP
Principal | Specialist Geotechnical Engineer

Attachment: Terms and Conditions

TERMS AND CONDITIONS OF ENGAGEMENT

1. **GENERAL:** Arya Engineering Inc. *(*ARYA*)* shall render the Services, as specified in the attached Scope of Services, to the Client for the Project in accordance with the following terms and conditions of engagement and related articles. ARYA may, at its discretion and at any stage, engage sub-consultants to perform any part or all of the Services.
2. **DEFINITIONS:**
    a. Agreement – is this Prime Agreement for professional Services.
    b. Consultant – shall mean professionals and other specialists other than ARYA or its officers, employees and agents engaged by the Client directly.
    c. Contractor – is the party contracting with the Client for the provision of labour, materials and equipment for the execution and quality control of the Work.
    d. Contract – is the agreement between the Client and the Contractor for the provision of labour, materials and equipment for the execution of the Work by the Contractor.
    e. Contract Documents – shall comprise all documents relating to the Project issued by or through ARYA, including the plans, drawing, specifications and schedules, and all variations and modifications thereto approved by ARYA.
    f. Field Services – shall mean applying such selective sampling and inspection procedures at the project site during construction as ARYA, and at ARYA's professional discretion, considers necessary to enable ARYA to ascertain whether the Contractor is carrying out the Work in general conformity with the design concept for the Project.
    g. Project– shall refer to the project described in the recital clauses to this Agreement.
    h. Services – shall mean ARYA's duties and responsibilities to the Client as set forth in the attached Scope of Services and Authorization to Proceed.
    i. Sub-Consultant – shall mean any registered professional engineers or other specialists engaged by ARYA in connection with the Project.
    j. Work – is the totality of all labour, materials and equipment used or incorporated into the Project by the Contractor pursuant to the Contract Documents.
3. **REPRESENTATIVES:** Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.
4. **AUTHORIZATION TO PROCEED:** Verbal authorization by the Client, either in person or over the telephone, or by written instructions will serve as authorization for ARYA to proceed with the services called for in this services agreement and those delineated in related correspondence between ARYA the Client. This Agreement, including attachments incorporated herein by reference, represents the entire agreement between ARYA and Client. This Agreement may be altered only by written instrument signed by authorized representatives of both Client and ARYA.
5. **EXTENT OF AGREEMENT:** Work beyond the Scope of Services or redoing any part of the Project through no fault of ARYA, shall constitute extra Work and shall be paid for on a time-and-materials basis in addition to any other payment provided for in this Agreement. If, during the course of performance of this Agreement, conditions or circumstances are discovered which were not contemplated by ARYA at the commencement of this Agreement, ARYA shall notify the Client either verbally or in writing of the newly discovered conditions or circumstances, and the Client and ARYA shall renegotiate, in good faith, the terms and conditions of this Agreement.
6. **COMPENSATION:** Charges for the Services rendered will be made in accordance with ARYA's Schedule of Fees and Disbursements in effect from time the services are rendered. ARYA's Schedule of Fees and Disbursements are included in ARYA's budget estimate. All charges will be payable in Canadian Dollars. ARYA shall invoice the Client for the services performed under this Agreement and shall provide a summary of costs upon request. The Client shall pay such invoice upon receipt. Invoices not paid within thirty (30) days of the invoice date shall be subject to a late payment charge of 1.5 percent per month (18% per annum) from the date of billing until paid. The invoice amounts shall be presumed to be correct unless the Client notifies ARYA in writing within fourteen (14) days of receipt. Overdue accounts over ninety (90) days will be forwarded to a collections agency. The Client and ARYA expressly agree that ARYA's fee shall be payable by the Client even in the event that the Client does not, for any reason, proceed with the Project as described in the Contract Documents. The Client and ARYA further expressly agree that payment of the ARYA's fee by the Client pursuant to this Agreement shall be a condition precedent to the Client's use of the Contract Documents and models for the execution of the Work.
7. **PROBABLE COSTS:** ARYA does not guarantee the accuracy of probable costs for providing Engineering Services. Such probable costs represent only ARYA as a professional and are supplied only for the general guidance of the Client. The parties expressly acknowledge and agree that the cost of the Services and contract time estimates provided by ARYA to the Client under this Agreement are subject to change and are contingent upon factors over which ARYA has no control. ARYA does not guarantee the accuracy of such estimates.

8. **STANDARD OF CARE:** ARYA shall perform its services in a manner consistent with the standard of care and skill ordinarily exercised by members of the profession practicing under similar conditions in the geographic vicinity and at the time the Services are performed. This Agreement neither makes nor intends a warranty or guarantee, either expressed or implied.
9. **INDEMNITY:** Client waives any claim against ARYA, its officers, employees and agents and agrees to defend, indemnify, protect and hold harmless ARYA and its officers, employees and agents from any and all claims, liabilities, damages or expenses, including but not limited to, delay of the project, reduction of property value, fear of or actual exposure to or release of toxic or hazardous substances, and any consequential damages of whatever nature, which may arise directly or indirectly, to any party, as a result of the services provided by ARYA under this Agreement, unless such injury or loss is caused by the sole negligence of ARYA.
10. **INSURANCE, LIMITATION OF LIABILITY:** The Client agrees to limit ARYA and its officers, employees, and agents liability due to professional negligence and to any liability arising out of or relating to this Agreement to fifty thousand dollars ($50,000) or the amount of ARYA's fee, whichever is less. This limit applies to all services on the project, whether provided under this or subsequent agreements, unless modified in writing, agreed to, and signed by authorized representatives of the parties. No claims may be brought against ARYA in contract or tort more than two (2) years after Services were completed or terminated under this engagement. If for any reason such insurance shall not be available or shall not apply to any claim made by the Client against ARYA in respect of the Services, then the liability of ARYA to the Client under this Agreement shall be absolutely limited to the amount of any professional liability available at the time such claims are made. In this case, any liability arising out of or relating to this Agreement will also be limited to fifty thousand dollars ($50,000), or the amount of ARYA's fee, whichever is less. Note: ARYA will not be responsible for water ingress related problems as ARYA's insurance policy contains an Absolute Water Ingress Exclusion. For special projects, higher liability limits are available from our underwriter for an additional fee. ARYA warrants it is protected by WorkSafe BC Insurance, General Liability Insurance, Professional Errors and Omissions Insurance, and Automobile Liability Insurance. Certificates for such policies of insurance shall be provided to the Client upon request.
11. **RESPONSIBILITY:** ARYA is not responsible for the completion or quality of work that is dependent upon or performed by the Client or third parties not under the direct control of ARYA, nor is ARYA responsible for their acts or omissions or for any damages resulting there from. ARYA shall not be responsible for the following:
    a. The failure of a Contractor, retained by the Client, to perform the Work required for the Project in accordance with the applicable Contract Documents;
    b. The design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
    c. Any cross-contamination resulting from subsurface investigations;
    d. Any damage to subsurface structures and utilities which were identified and located by the Client;
    e. Any Project decisions made by the Client if the decisions were made without consultation of ARYA or contrary to or inconsistent with ARYA's recommendations;
    f. Any consequential loss, injury, or damages suffered by the Client, including but not limited to, loss of use, earnings, and business interruption; and,
    g. The unauthorized distribution of any document or report prepared by or on behalf of ARYA for the exclusive use of the Client.
12. **CLIENT'S RESPONSIBILITIES:**
    a. Make available to ARYA all relevant information or data pertinent to the project which is required by ARYA, and instruct ARYA fully in writing as to the Client's total requirements in connection with the Project. ARYA shall be entitled to rely upon the accuracy and completeness of such information and data furnished by or through the Client, including information and data originating with Consultants, whether such Consultants are engaged at the request of ARYA or otherwise. Where such information or data originates either with the Client or with Consultants, then ARYA shall not be responsible to the Client for the consequences of any error or omission contained therein or arising from ARYA's use of this data;
    b. When required by ARYA, to engage Consultants directly to perform services necessary to enable ARYA to carry out its duties and responsibilities. Such Consultants engaged by the Client shall be subject to the joint approval of the Client and ARYA;
    c. Authorize ARYA to act as the Client's for such purposes as are necessary to ARYA's rendering of its Services pursuant to this Agreement;
    d. Give prompt consideration to all sketches, drawing, specifications, tenders, proposals, contracts and other documents relating to the Project laid before the Client by ARYA, and whenever prompt action is necessary inform ARYA of the Client's decisions in such reasonable time so as not to delay the Services of ARYA, or to prevent ARYA from forwarding drawings or instructions to the Contractor or the Consultants or to Sub-Consultants in good time;
    e. Pay ARYA's fee and reimbursable expenses as provided for in this Agreement;

f. Provide necessary advertising incidental to obtaining tenders, and provide or reimburse ARYA for obtaining necessary legal, accounting and insurance counseling services;
g. Arrange and make provision for ARYA's entry and ready access to property (public and private) as well as to the Project site, as necessary to enable ARYA to perform its Services;
h. Give prompt written notice to ARYA whenever the Client or the Client's representative becomes aware of any defects or deficiencies in the Work or in the Contract Documents; and,
i. Obtain required approvals, licences and permits from municipal, governmental or other authorities having jurisdiction over the Project so as not to delay ARYA in the performance of Services. The Client expressly undertakes not to enter into contracts in connection with the Project which describe duties and responsibilities of ARYA which are inconsistent with the duties and responsibilities of ARYA provided for in this Agreement without obtaining ARYA's prior written agreement thereto.

13. **EXCLUSIVE USE:** Services provided under this Agreement, including all reports, drawings, plans, models, specifications and other documents, information or recommendations prepared or issued by ARYA, are instruments of service for the execution of the Project. ARYA retains the property and copyright in these documents, whether the Project is executed or not. No other use of these documents is authorized under this Agreement without the prior written agreement and remuneration of ARYA.
14. **SAMPLES:** All non-consumed samples shall remain the property of the Client, and Client shall be responsible for and promptly pay for the removal and lawful disposal of samples, cuttings and hazardous materials, unless otherwise agreed in writing. If appropriate, ARYA shall preserve samples obtained for the project for not longer than thirty (30) days after the issuance of any document that includes the data obtained from those samples.
15. **ENVIRONMENTAL:** ARYA's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of air, soil and/or groundwater, unless otherwise specifically listed in the attached Scope of Services. ARYA will co-operate with the Client's environmental consultant during field work phase of the investigation is requested.
16. **FIELD SERVICES**: Where applicable, Field Services recommended for the Project are the minimum necessary, at the sole discretion of ARYA, to review whether the Work of a Contractor retained by the client is being carried out in general compliance with the intent of the Services and in compliance to information and recommendations presented in all reports, drawings, plans, models, specifications and other documents provided in the deliverables prepared by ARYA in fulfillment of the Scope of Services. It is understood and agreed by the Client that the performance of the Contract is not ARYA's responsibility, nor are Field Services rendered for the Contractor's benefit. The Contractor alone is responsible for the quality control of the Work. Any reduction from the level of services recommended will result in ARYA not providing qualified certifications for the Work. ARYA shall issue certifications only where Field Services have been performed by ARYA.
17. **TERMINATION:** This Agreement may be terminated by either party upon ten (10) days written notice to the other. Upon the receipt of such written notice from the Client to ARYA, ARYA shall perform no further Services other than those reasonably necessary. In the event of a termination, the Client shall pay for all charges for services performed and demobilization by ARYA, in addition to reasonable termination expenses incurred to the date of notice of Termination. The limitation of liability and indemnity obligations of this Agreement shall be binding notwithstanding any Termination of this Agreement.
18. **DISPUTE RESOLUTION:** If requested in writing by either the Client or ARYA, the Client and ARYA shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured, non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed jointly by the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by arbitration under the rules of British Columbia or by an arbitrator appointed by agreement of the parties or by reference to a Judge of the Supreme Court of British Columbia. No one shall be nominated to act as an arbitrator who is in any way financially interested in the conduct of the Project or in the business affairs of either the Client or ARYA. The award of the arbitrator shall be final and binding upon the parties.
19. **GOVERNING LAW:** This Agreement is governed by the law British Columbia, and any litigation shall be brought and tried in, the judicial jurisdiction of the ARYA office that entered this Agreement, as stated herein.
20. **NON-SOLICITATION:** The Client agrees they shall not recruit for employment or hire any ARYA employees who provide services pursuant to this Agreement during the term of this Agreement and for a period of one (1) year following its termination.

Appendix 3 Landslide Field Memos 1 to 9 (2021)

ARYA
Engineering Inc.

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Memorandum 1			
File No.:	20-369-SC	Date:	January 20, 2021
Client:	Sunshine Coast Regional District (SCRD), Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	Southwest Contracting, NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Memorandum 1 - Temporary Water Supply Main Support Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this memorandum for the above-mentioned project summarizing the outcome of our site activities on January 20, 2021, between the hours of 9:45 am and 6:00 pm. Also provided is additional relevant project commentary as discussed with project stakeholders prior to, and during January 20, 2020.

Arya representatives (Masoud Mohajeri, Ben Tomasz, and Farid Emadi) attended a project startup meeting with project stakeholders including the SCRD, Southwest Contracting, NB Contracting, FSCI Biological Consultants and MFLNRORD. Upon the completion of the project startup meeting, Arya reviewed requirements for site safety including the protocols for COVID-19 compliance prior to commencement of site works. Upon the completion of the startup meeting and health and safety review, a subsequent preconstruction meeting was conducted with representatives of Southwest Contracting (Southwest) and NB Contracting to discuss scheduled construction objectives and the proposed construction sequence prior to project commencement.

The following summarizes relevant aspect of site activities conducted on January 20, 2020:

- Scheduled construction sequence was reviewed. Utility potholing, exposure of water mains through local excavation was completed, determination of water main alignment and establishment of proposed location of longitudinal beams, battered anchors and micropiles was completed.

- During the time of site supervision, after determining and marking water main alignment, longitudinal beams, battered anchors and micropiles, the contractor completed the installation of two battered anchors penetrating 3.0 m into bedrock with subsequent grouting completed. Material consistent with bedrock was noted after drilling about 2.1 m to 3 m through surficial soils, into the upslope area.
- Cubic grout samples were collected during the time of grouting for laboratory testing (compressive strength testing).
- Upon anchor completion, the landslide area was covered with plastic sheeting and the site was secured and locked by 6 pm.

Other relevant commentary regarding field works is provided as follows:

- The main site safety issues identified include the potential presence of unstable trees uphill of the working area, and hazard associated with excavating near steep, potentially unstable slope sections. A qualified professional has been retained for danger tree assessment, and steep hillside terrain is continually monitored by Arya's site representative during field works.
- Upon agreement with the SCRD, all design modifications required for the successful completion of the ongoing works will be detailed in plan set revisions to be provided by Arya to the SCRD.

Arya design drawings for the ongoing works were provided January 10, 2020, and subsequent review comments were received from the SCRD on January 12, 2020. Arya's response to the review comments provided are as follows:

- Truck washout to be completed with water supplied by the drilling contractor. If additional water access is needed during excavation proceedings and grade beam installation, local water source is available upon request from the SCRD.
- All installation of the proposed works shall be completed under a formally assigned professional engineer from Arya Engineering. Arya's site supervisor for the days of January 20 and January 21 has been assigned to Farid Emadi, P.Eng. Alternative site supervisors may be assigned by Arya during subsequent phases of this project.
- Operation of all water transmission mains and water supply valves shall be operated by authorized SCRD personnel only.

- Water shutdown is only to be considered in an extreme circumstance and in consultation with the SCRD beforehand.
- No removal of the slumped landslide mass is intended at this time.
- Supply main dimensions to be provided in subsequent field reviews/plan revisions after confirmation received during excavation proceedings.
- Grade beam elevation to be determined during subsequent phases of construction. Elevated grade beams may necessitate the incorporation of pedestrian handrails and non-slip platform surfaces. Grade beam corrosion protection to be considered prior to project completion.
- Water main supports to be confirmed upon further excavation proceedings, contingent upon quality of existing mains, excavation depth requirements, and pipe joint locations.
- Drainage details for groundwater control at or below supply main invert elevation to be determined during excavation proceedings.
- As provided herein, all design modifications to be formally reported to the SCRD in plan set revisions.

We trust that the observations and recommendations presented herein meet the current development requirements. Should any questions or concerns arise, please do not hesitate to contact our office.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Figure 1: Utility Potholing.

Figure 2: Watermain and Temporary Support Alignment Determination.

Figure 3: Drilling and Grouting of Anchor (East).

Figure 4: Completed Ancho (East).

Figure 5: Drilling and Grouting of Anchor (West).

Figure 6: Covering the Landslide Area with Plastic Sheeting

ARYA ENGINEERING INC.

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w aryaeng.ca

MEMORANDUM

File No.:	20-369-SC	Date:	January 22, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	Southwest Contracting, NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 2 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on January 21, 2021, between the hours of 7 am and 5 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), arrived at the site at 7:00 am to provide site access for the site crew. The tailgate meeting started at about 7:30 am with representatives from the Sunshine Coast Regional District (SCRD), Southwest Contracting (Southwest), and Arya Engineering Inc. (Arya). During the tailgate meeting the site safety issues were discussed and Arya provided a summary of the work progress and the intended activities for the day, and also responded to questions raised by the SCRD and Southwest representatives, taking note of those issues requiring further follow up.

The following summarizes relevant aspects of site activities conducted on January 21, 2021:

- Arya moved the muster point to a location near the working area based on the advice from the SCRD during the tailgate meeting.
- Southwest delayed the drilling until they received a required part for the drill rig at 9:30 am.
- Southwest used hollow T40N steel hollow bars in 3 m segments and completed eight (8) micropiles with subsequent grouting as per Arya specifications (See appended mill certificate for the hollow bars provided by Southwest). Six (6) grout samples were also collected at the time of grouting from each grout batch for further compliance tests by Arya.

- The drill rig was checked for verticality in two directions with a protractor at each drilling location prior to the start of the drilling.
- Table 1 summarizes the micropiles drilling information and the micropile numbering sequence are shown in Figure 1.

Table 1: Summary Table of Installed Micropiles

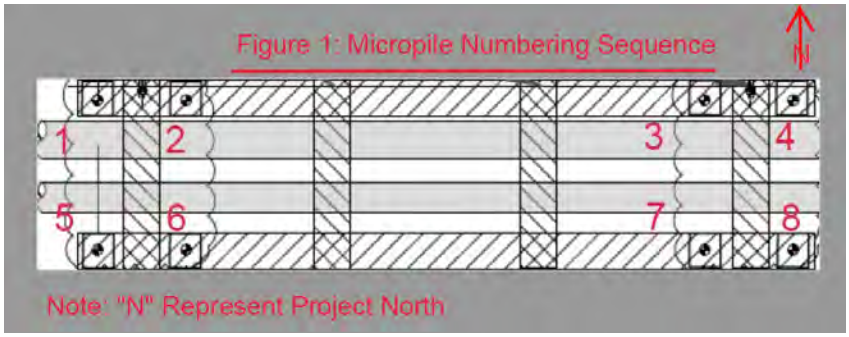
Micropile	#1	#2	#3	#4	#5	#6	#7	#8
Overburden Thickness (m)	0.9	0.9	2.3	2.3	2.7	2.1	3.7	2.7
Bedrock Thickness (m)	3.0	3.0	3.0	3.0	3.0	2.1**	3.9*	3.0
Total Depth (m)	3.9	3.9	5.3	5.3	5.7	4.2	7.6	5.7

Notes:

*Micropile depth adjusted such that the coupler will not be located between proposed grade beams.

**Arya approved the adjusted depth of penetration into bedrock for the micropile #5 due to reaching practical drilling refusal in a very hard bedrock material, that could cause excessive wear and tear of the drill bits.

-Stick out height of each bar not included in this table.



- Drilling was slower than usual at micropiles 1, 2, 5, and 6 due to competency of the subgrade materials.
- Drilling and grouting of the hole #5 was completed at 3 pm and Southwest left the site at 4 pm.
- Arya arranged for a Rescue GPS to be available on site to facilitate emergency calls if/when required.
- A Qualified Arborist visited the site to address the potential risks from falling trees. The site visit commenced at 4 pm and Farid Emadi, P.Eng. from Arya accompanied her during the time of the site visit and highlighted the work area as well as potential danger trees

that had been marked by MFLNRORD's site representative on January 20, 2021. The arborist made field notes and has provided a timeline of submission of the completed danger tree assessment report by Saturday, January 23, 2021.

- Testing of the installed battered anchors is planned for January 22, 2021, contingent upon the adequate grout compression testing results. Compression testing is also planned for January 22, 2021. Arya will arrange for the excavator contractor to provide the required assistance for anchor testing prior to commencement of testing.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments: Site Photographs and Mill Certificate for Hollow Bars

Photograph 1: Drill Bits and Couplings Attached to Anchors.

Photograph 2: Grout Samples Taken from the Grout Batch.

Photograph 3: Field Protractor Assessing the Verticality of the Rig Prior to Drilling

Photograph 4: Differences Between a Worn-Out Drill Bit (Left) and a New Drill Bit (Right).

Photograph 5: Worksite Conditions at the End of the Installation of Micropiles.

Mill Certificate for Hollow Bar

Producer: JiangSu CMP Anchorage System Co.Ltd.

Shipping Date: August 28, 2020

DSI PO No: PO251769/1

Our PO No: JSME20169S/1

Object: CMP Drill thread pipe T40N/L=3000 mm
(CMP Hollow bar T40N/L=3000 mm)

P/N: 40010320

DSI P/N: 40HT0318C

Certificate No: ZJZXH200608

Steel Brand: 40Cr

Heat No: 0A01525

Raw Materials Chemical Composition (%)

C	Si	Mn	S	P	Cr	Ni	Cu
0.400	0.200	0.620	0.002	0.012	0.880	0.010	0.010

●The above data are from steel mill

Test Results of Finished Bar

Test Results	Ultimate Load (KN)	Yield Load (KN)	Elongation A_5 (%)	Note
Required Min. Values	660.00	525.00		
Test 1	708.50	531.00	6.50	Passed
Test 2	750.00	557.00	7.00	Passed
Test 3	740.00	579.00	6.00	Passed

●Tested by China National Approval Lab No.50045791

●Bar cross section area A_S (average, Weight Method): 773.38 mm^2

●A_5: Test standard distance is $5.65\sqrt{A_S}$

●Test Standard: ISO 6892:1998 , ASTM A370-07A , GB/T228-2002

●Raw material made from ASTM A519-03 5140/EN 10083-1 41Cr4 Seamless Tubing, and comply to chemical composition and strength requirement of ASTM A519-03

●Conform to deformations requirements of ASTM A615/A615M-08

●Final product has deformations exceeding requirements of ASTM A 615.

Visual inspection and measurements: Satisfaction

Test/Inspection Date: 2020-06-30

This document is valid without signature

Jiangsu CMP Anchorage System Co.Ltd.
987 Qingshuiting East Road,
Moling Street,Jiangning District,
Nanjing
Tel: 025--52759677
Fax: 025--52759677

CMP International Inc.
200 Vanda Drive,
Maple,Ontario,L6A 4E5 ,
Canada
Tel: +1(416) 623 6671
Fax: +1(416) 850 8996

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w aryaeng.ca

MEMORANDUM

File No.:	20-369-SC	Date:	January 25, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	Southwest Contracting, NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 3 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on January 22, 2021, between the hours of 7 am and 1 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), attended the site early in morning to provide site access for the site crew. Arya had a tailgate meeting with the excavation contractor upon his arrival on site.

Southwest Contracting (Southwest) had their own internal tailgate meeting with their onsite staff and after their tailgate meeting, Southwest started to pack and load their equipment and site accessories for demobilization.

The proposed scope of work for Jan 22, 2021 was to complete the proposed performance tests for battered anchors by Arya after their installations.

Arya tested two cubic samples (50 mm length on each side) the morning of January 22, 2021 that had cured for two days prior to testing (see appended test results reported by Arya), and neither had reached the recommended compressive strength. Arya postponed the anchor testing as a result.

After the cancellation of anchor tests Arya asked Southwest to prepare the pads for the two anchor tests such that when the grout samples reach the required compressive strength, the site would be ready for the anchor tests. The maximum depth of excavation at each test pad area measured from the existing ground level at the trail was about 0.8 m.

Upon the completion of test pad preparation, Southwest demobilized from the site.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

The completed Tree Risk Assessment Report prepared by Heartwood Tree Consulting was received by Arya on January 22, 2020, outlining the outcome of a site visit conducted by a qualified arborist on January 21, 2021. The report discusses those trees at risk of potential instability in the vicinity of the work site and is appended to this memorandum.

Arya closed and locked the main gate at the end of the workday after all site staff left the site, as advised by the client (SCRD).

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs,
2. Compressive Strength Tests on Grout Samples,
3. Tree Risk Assessment Report,
4. Sign in Sheets for January 21 and January 22, 2021.

Figure 1: Excavation for Test Pad Preparation

Figure 2: Prepared Test Pad at the End of Preparation

Figure 3: Covering of the Landslide Area with Plastic Sheeting for Weather Protection.

Figure 4: Prepared Test Pad Area (North Facing).

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GROUT TEST REPORT

TO: SUNSHINE COAST REGIONAL DISTRICT (SCRD)
1975 FIELD ROAD
SECHELT, BC, V0N 3A1

PROJECT NO. 20-369-SC
CLIENT SCRD
C.C.

ATTN:

PROJECT: RESERVOIR ROAD EXTENSION

SET NO. 1 NO. OF SPECIMENS 12 DATE RECEIVED 21-Jan-2021 DATE CAST 20-Jan-2021

SPECM. NO	SPECIMEN TYPE	CURE CONDITION	DATE TESTED	AGE AT TEST (DAYS)	AVERAGE DIAMETER (mm) OR SIDE (mm x mm)	AVERAGE LENGTH OR SPAN (mm)	MAXIMUM LOAD (kN)	COMPRESSIVE OR FLEXURAL STRENGTH (MPa)	FAILURE TYPE
A	CUBE	LAB	Jan. 22	2	50 x 50	50	5	2.0	N/A
B	CUBE	LAB	Jan. 22	2	50 x 50	50	18.5	7.4	N/A
C	CUBE	LAB	Jan. 25	5	50 x 50	50	60.8	24.3	N/A
D	CUBE	LAB	Jan. 25	5	50 x 50	50	60.5	24.2	N/A

SPECIFIED STRENGTH 50 MPa @ 7 Days

CEMENT TYPE MICROSIL

BATCH TIME MORNING

SUPPLIER BASALITE

MIX RATIO WATER 19 L GROUT 60 KG

GROUT TEMP -
AIR TEMPERATURE 4°C

CAST TIME MORNING
CAST BY CONTRACTOR
INITIAL CURING FIELD

MOULD TYPE PLASTIC

INITIAL CURING TEMP MAX 21.1 °C MIN 18.5 °C

LOCATION
ANCHORS

COMMENTS REQ. 21 MPA FOR ANCHOR TESTING

PER:
Felix Motard
Junior Geotechnical Engineer

REVIEWED BY:
Benjamin Tomasz, P.Eng.
Senior Geotechnical Engineer

Heartwood Tree Consulting
Certified. Experienced. Professional.

Tree Risk Assessment Report

Date: January 22, 2021

Report commissioned by: Ben Tomasz, Arya Engineering

Site Location: Chapman Creek access, off Reservoir Road

Inspection conducted by: Krista Braathen, ISA Certified Arborist PN -5458A, TRAQ Certified

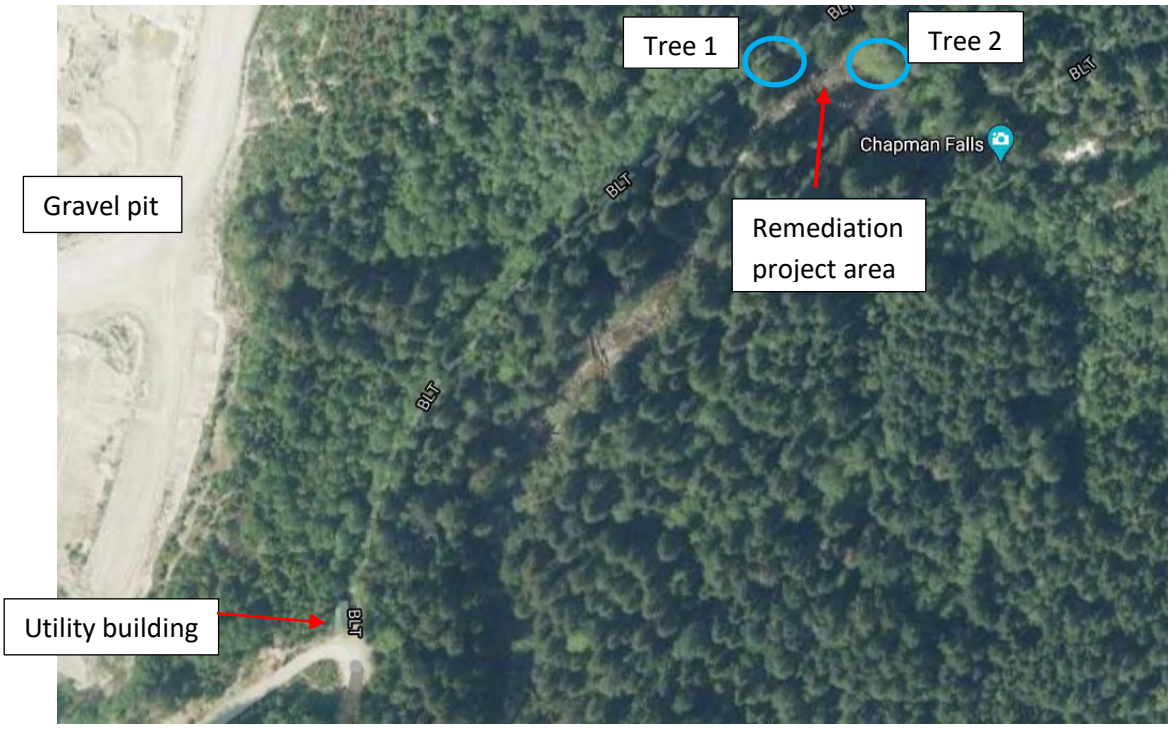
Site inspection: Thursday, January 21st. Weather was cold and sunny.

Purpose

Heartwood Tree Consulting was contracted by Mr. Tomasz to provide a Tree Risk Assessment and arborist report for a few trees located at the Chapman Creek remediation site. Only trees deemed to be in need of mitigation are included in this report.

The site inspection completed for this report was a Level 2: Basic Assessment. This level of assessment is a visual inspection from the ground to identify the tree, the health of the tree, general observations from the ground and around the root flare and generally inspect the main stem, structural branches, the canopy of the tree and assess any other site factors that may give more information regarding the tree and its health/growth habits. Further hazard assessments and higher levels of inspection may be recommended and outlined in this report.

Figure 1 – approximate location of trees (source: google maps)



A site visit was conducted on January 21, and an assessment carried out to determine the condition and safety of the trees.

tree	species	diameter	condition	recommendation
1	Western hemlock	84cm	poor	remove
2	Western red cedar	150cm*	good	prune to remove dead, broken and diseased branches

Photo 1 – tree 1 seen from remediation area leaning toward road

Tree 1

Observations

Tree 1 is an 84cm diameter Western hemlock located above (northwest) of the road and remediation area. It is in poor condition with compromised health and structure.

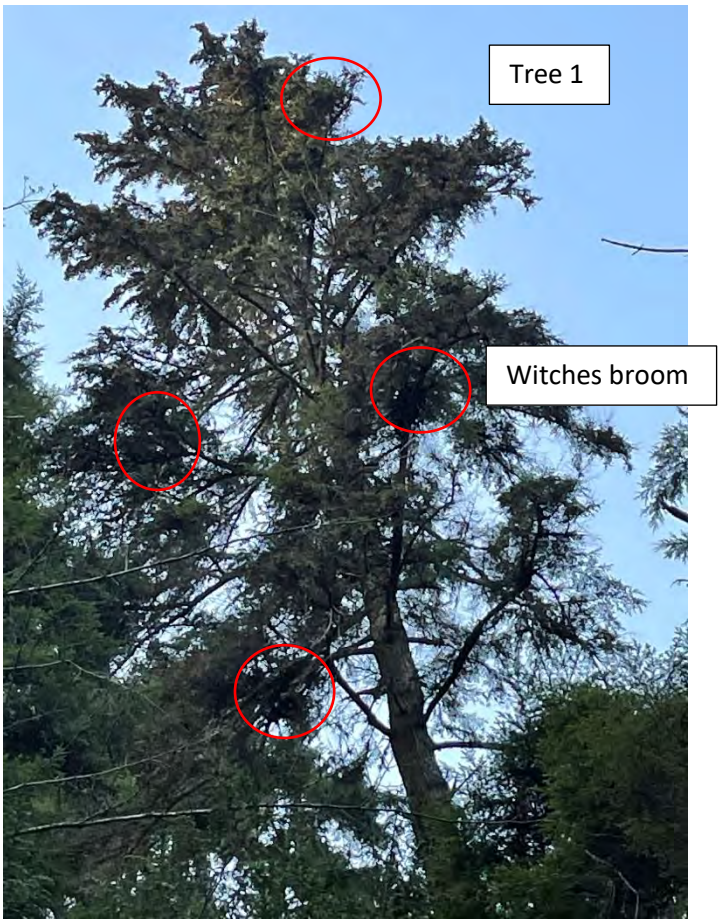
With moderate taper and vigor, this hemlock tree has 60% live crown ratio and about 9m crown spread. Moderate deadwood and dieback was noted throughout the crown with thinning foliage and heavy coning. A few suspect wounds were observed in the lower stem. Additionally, presence of 'witches' broom' is evident indicating progressive infection of Dwarf Mistletoe.

Mistletoe is a parasitic plant that competes with its host for nutrition and water, provides opportunity for other diseases and can ultimately kill the tree. Visible signs of mistletoe are not present until two or three years after initial infection so the tree can be negatively impacted before the problem is noticed. The presence of mistletoe in an infected tree can affect the structural quality of the wood and cause decay and deformed branches referred to as 'witches' broom'.

Tree 1 appears to have an unnatural lean towards the road in that its top has not corrected itself vertically. Some gaps between large roots and the soil on the uphill side of the tree was discovered indicating potential past or recent root lifting.

This tree is directly targeting the access road as well as the remediation area in question. The target area is considered high while workers are on site.

photo 2 – crown of tree 1 with witches' broom throughout and thinning crown



Conclusions

Tree 1 is considered a moderate hazard. The assessment matrix is based on the possibility of partial or complete stem failure as these are considered the most likely forms of failure at this time.

TRAQ assessment matrix:

Likelihood of failure	Likelihood of Impacting Target			
	Very low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Recommendations

Tree 1 is recommended to be removed before workers begin slope remediation work as planned. This tree should be left as a 6-9m wildlife snag if manageable for the tree service.

Photo 3 – tree 1 located on slope above road marked with pink X to identify; black wound at base and gap between large root and soil.

Tree 2

Observations

Tree 2 is an approximately 150cm diameter Western red cedar situated directly East of the remediation area where the slide occurred. It is in good condition at this time.

This is a vigorous tree with good taper. Its live crown ratio is 70% with about 10m of crown spread. Some exceptionally large dead and broken branches were noted especially in the lower crown. No sign of stress or disease was discovered.

Targets include the adjacent work area; the target area is considered high when workers are on site.

Conclusions

Tree 2 is considered a moderate hazard. The assessment matrix is based on the possibility of large branch loss.

TRAQ assessment matrix:

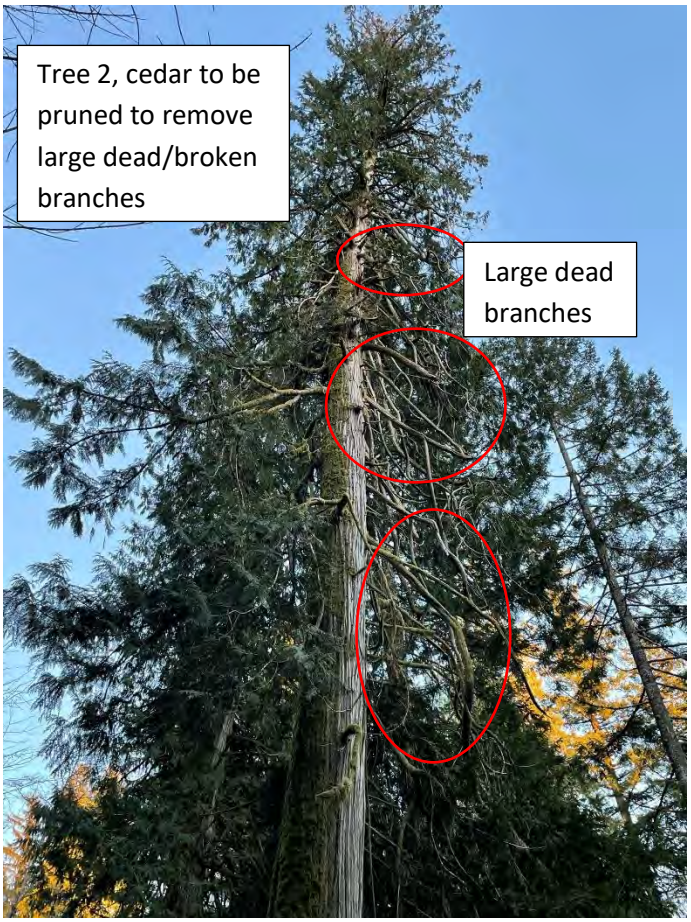
Likelihood of failure	Likelihood of Impacting Target			
	Very low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Recommendations

Pruning tree 2 to remove large branches that are broken, dead or diseased is suggested. Branch removal should be focussed on the road/work area side of the tree to reduce likelihood of failure into the remediation zone.

Photo 4 – tree 2 with large dead/broken branches especially in lower crown targeting work area.



Note

Leaving tree 1 as a 6-9m wildlife snag is strongly encouraged to retain weight on the slope and provide wildlife habitat.

Diameter of tree 2 was estimated as access to the adjacent slope was limited.

Krista Braathen
ISA Certified Arborist PN - 5458A
ISA Certified Tree Risk Assessor (TRAQ)
Wildlife Danger Tree Assessor - P2349
Heartwood Tree Consulting

Assumptions, Limiting Conditions and General Waiver

I confirm that the trees listed on the property identified in this report have been inspected.

I have no current or prospective financial interest in the vegetation or the property which is the subject of this report and have no personal interest or bias in favour of or against any of the involved parties or their respective position(s) if any.

The analysis, opinions and conclusions stated herein are the product of my independent professional judgement and based on current scientific procedures and facts, and the foregoing report was prepared according to commercially reasonable and generally accepted arboriculture standards and practices for British Columbia.

The information included in this report covers only those trees that were examined and reflects the condition of the trees as of the time and date of inspection. This report is 'valid' for the day of inspection only, as this is natural entity and weather conditions and site factors can change.

This report and the opinions expressed herein are not intended, nor should they be construed as any type of warranty or guarantee regarding the condition of the subject trees in the future.

To the best of my knowledge and belief, all statements and information in this report are true and correct and information provided by others is assumed to be true and correct.

I am not an attorney or engineer. This report does not cover those areas of expertise and represents advice only of arboricultural nature. Without limiting the generality of the preceding sentence, it is understood that nothing contained in this report is intended as legal advice or advice or opinions regarding soil stability or zoning laws, and this report should not be relied upon to take the place of such advice.

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Jan 21, 2021

Construction Site Sign-In Sheet

Print Name	Organization	Time In	Time Out
Codi Abbott	SCRD	7:20	7:50
STEPHEN MISIURAK	SCRD	7:30	11:05AM
Louis Rasseau	SWC	7 30	
[illegible]	SCRD	7:20	7:50
Farid Emak	Arya	7:00	5:00pm
Wes Campbell	SWC	7:00	
Donnk Tass	SWC	7:00	750
[illegible] Rosenboom.	SCRD	8.40	9.50
Felix Matard	Arya	1145am	12:30pm
Jim Wilson	FSC1	12:00 pm	12:30

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Jan 22, 2021 **Construction Site Sign-In Sheet**

Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	7:00 am	
Dan Hemstalk	SCRD	9:00am	9:15
Antonio Iaquinta	N/B	9:10 am	
Louis Rossouw	SWC	7:00	
Danny Ross	"	V	
Wes Campbell	SWC	"	

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MEMORANDUM

File No.:	20-369-SC	Date:	January 25, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	Southwest Contracting, NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 4 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on January 24, 2021, between the hours of 9 am and 12:45 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), attended the site in addition to two (2) site personnel from Sechelt Tree Services (STS). The entrance gate was open at the time of Arya's arrival.

Arya asked the contractor's crew to record their entrance on the sign-in sheet and had a tailgate meeting with them before the start of the workday.

Arya had issued the Tree Risk Assessment Report prepared by Heartwood Tree Consulting and dated January 22, 2020, to STS on January 22nd. Prior to commencing work, Arya reviewed the scope of work with STS site representatives, who acknowledged the contents of the report and confirmed understanding of the required scope the scope of tree work as recommended the arborist report was successfully completed, and an additional danger tree (hemlock) was also removed in the work area.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

Arya closed and locked the main gate at the end of the workday and after all site staff left the site, as advised by the client (SCRD).

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:	**Reviewed by:**
Farid Emadi, P.Eng. M.Sc.	Benjamin Tomasz, P.Eng.
Senior Geotechnical Engineer	Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs,
2. Sign in Sheets for January 24, 2021.

Figure 1: Hemlock Tree with an X-Sign for Cutting/

Figure 2: Hemlock Tree View from the Trail Before Cutting

Figure 3: Hemlock Tree after Cutting and Trimming.

Figure 4: Cedar Tree after Trimming.

Figure 5: Covering of the Landslide Area with Plastic Sheeting for Weather Protection.

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Jan 24, 2021 **Construction Site Sign-In Sheet**

Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	9:00	12:45
Will Waite	Sechelt tree	9:00	12:30
Trevor Julius	Sechelt tree	9:00	12:30

ARYA
Engineering Inc.

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w aryaeng.ca

MEMORANDUM

File No.:	20-369-SC	Date:	January 27, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	Southwest Contracting, NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 5 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on January 27, 2021, between the hours of 9:30 am and 12:30 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), and Felix Motard (Field EIT) attended the site in addition to two (2) site personnel from Southwest Contracting (Southwest). Stephen Misiurak, P.Eng. from SCRD was on site at the start of the workday and the entrance gate was open at the time of Arya's arrival.

Arya asked the contractor's crew to record their entrance on the sign-in sheet. Arya's site personnel had a tailgate meeting at their office in Gibsons, prior to heading to the site.

The following summarizes relevant aspects of site activities conducted on January 27, 2021:

- Site cleanup and removal of tree cuttings from the anchor test areas by Southwest was completed.
- Water was pumped from the excavated area next to the western most anchor (Anchor 2).
- Anchor tests on the battered anchors (Anchors 1 and 2) were completed.
- Excess water collected on the poly sheet covering the slipped area was removed.
- The access trail to project site was cleared of debris left over from tree removal.
- Anchors and micropiles were capped prior to mobilization from site.
- Barricade taped east of the project site prior to demobilization.

The water pump, generator and release pipe was provided by the SCRD's site representative and Arya delivered the accessories to the SCRD Maintenance Department in Sechelt after the end of the anchor tests.

The performance curves for Anchor 1 and 2 tests (East and West, respectively) along with the Jack Calibration sheet are appended to this memorandum.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Reviewed by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs,
2. Sign in Sheets for January 27, 2021.
3. Anchor Test 1 (East Anchor).
4. Anchor Test 2 (West Anchor).
5. Jack Calibration Sheet.

Figure 1: Testing Pad Preparation by Southwest

Figure 2: Installation of Pump at the West Testing Pad.

Figure 3: Placing a Cap Over Anchors and Micropiles

Figure 4: Site Conditions After Debris Clearing.

Figure 5: Barricade Tape to the East of the Site by SCRD.

ARYA Engineering Inc.

Lower Mainland Office
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Sunshine Coast Office
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t 604.886.1515

e info@aryaeng.ca
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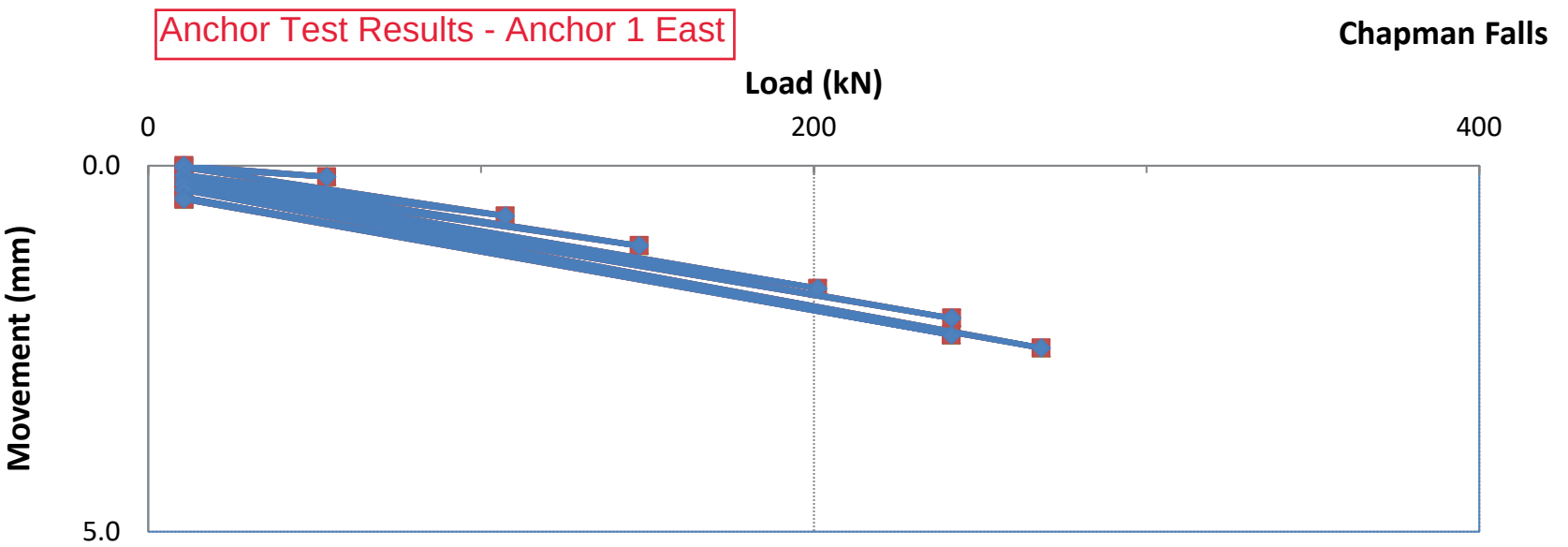
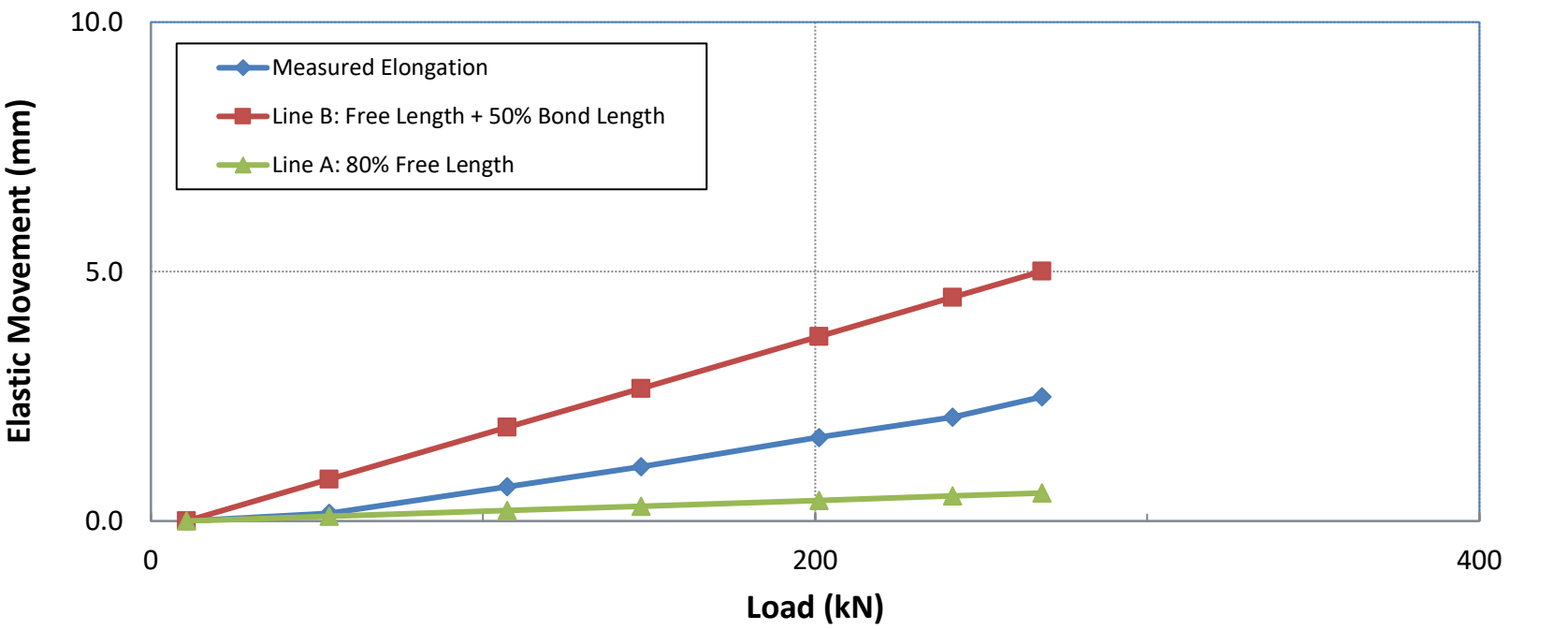
Jan 24, 2021 **Construction Site Sign-In Sheet**

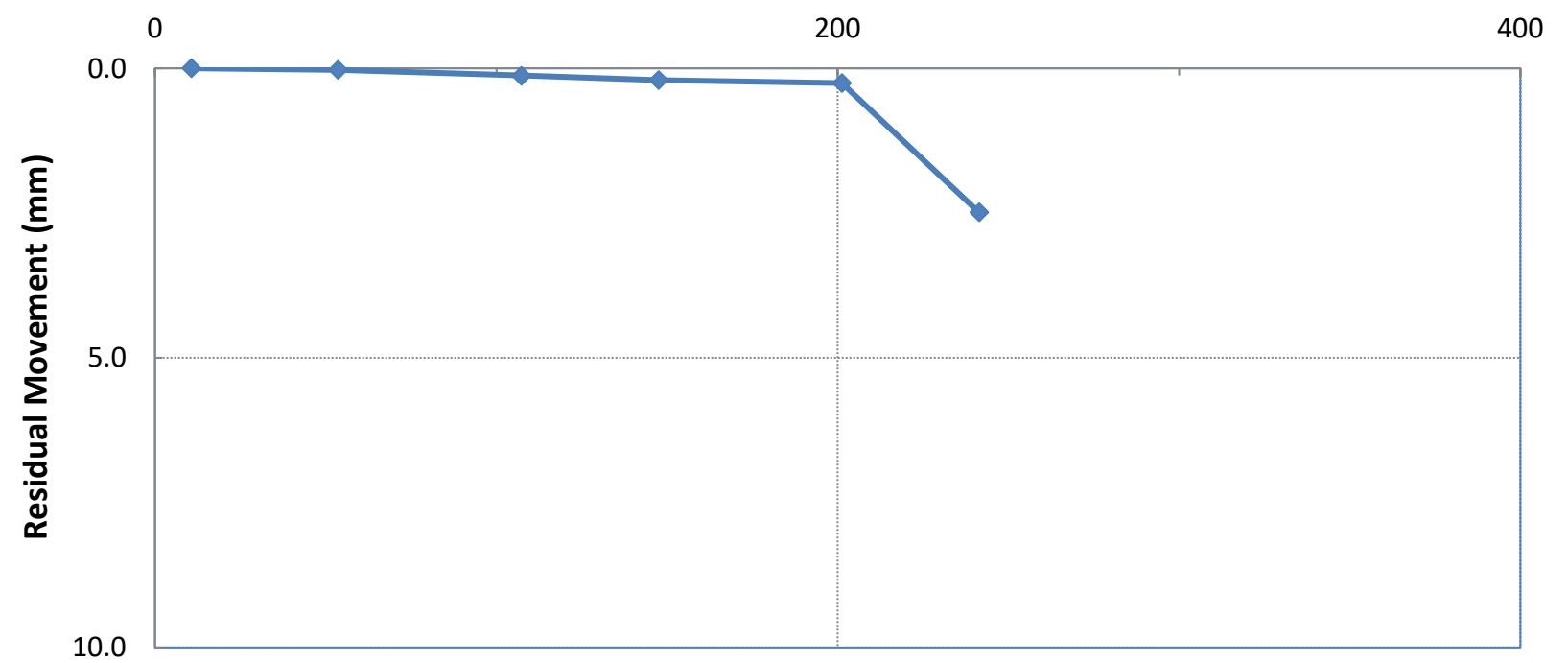
Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	9:00	12:14
Will Warte	Sechelt tree	4:00	12:30
Trevor Julius	Sechelt tree	9:00	12:30
Jan 27, 2021			
Farid Emadi	Arya	9:30	12:30pm
Felix Motard	Arya	9:30	12:30pm
STEPHEN MISURAK	SCRD	9:00AM	11:15 AM
[illegible]	SWC	9:30	12:30pm
[illegible]		9:30	12:30pm

Anchor Test Results - Anchor 1 East

Chapman Falls

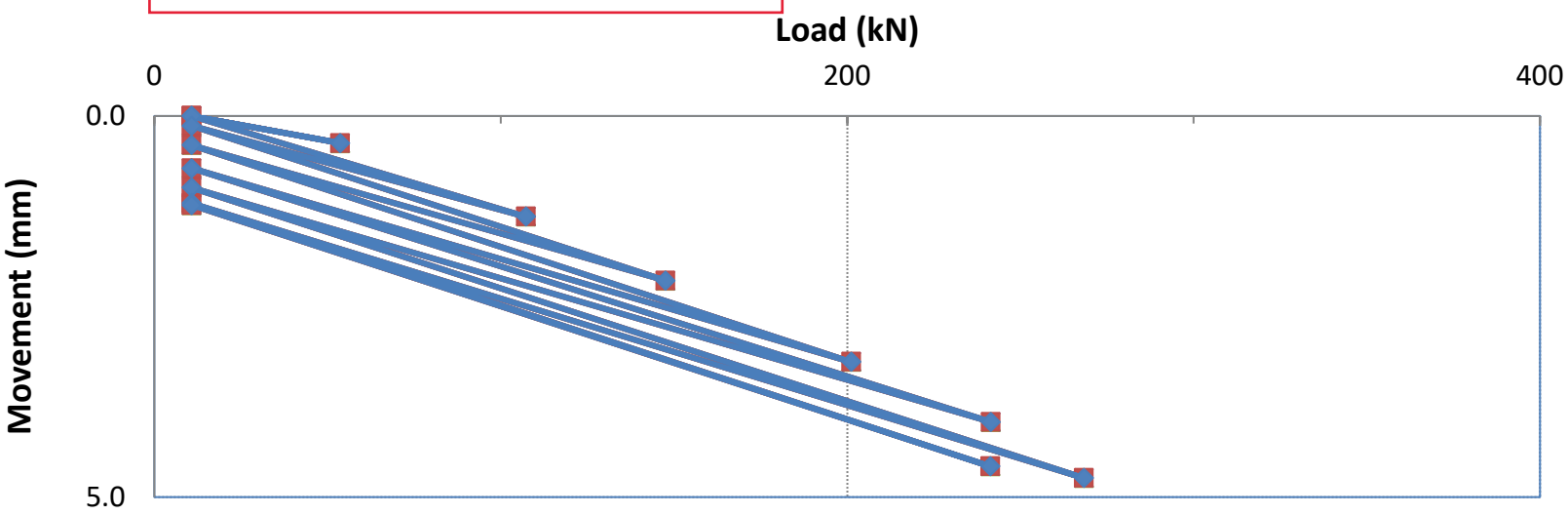


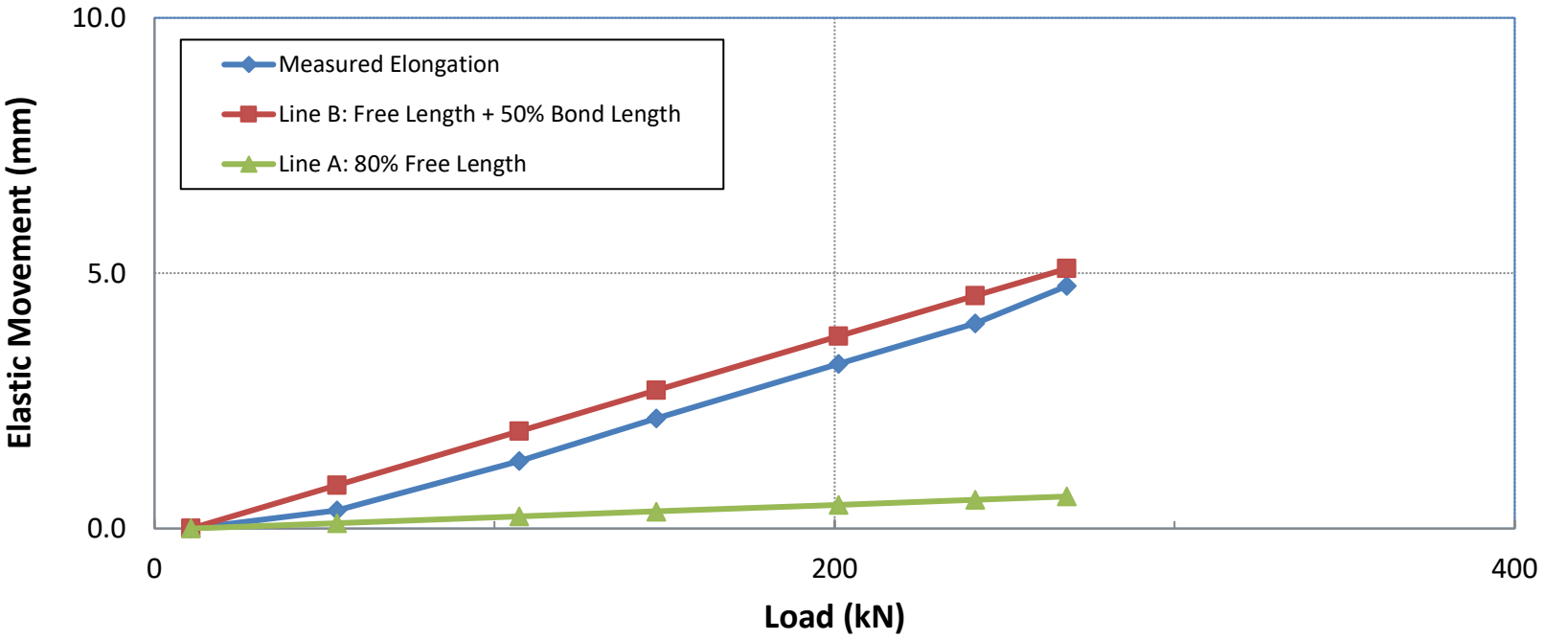


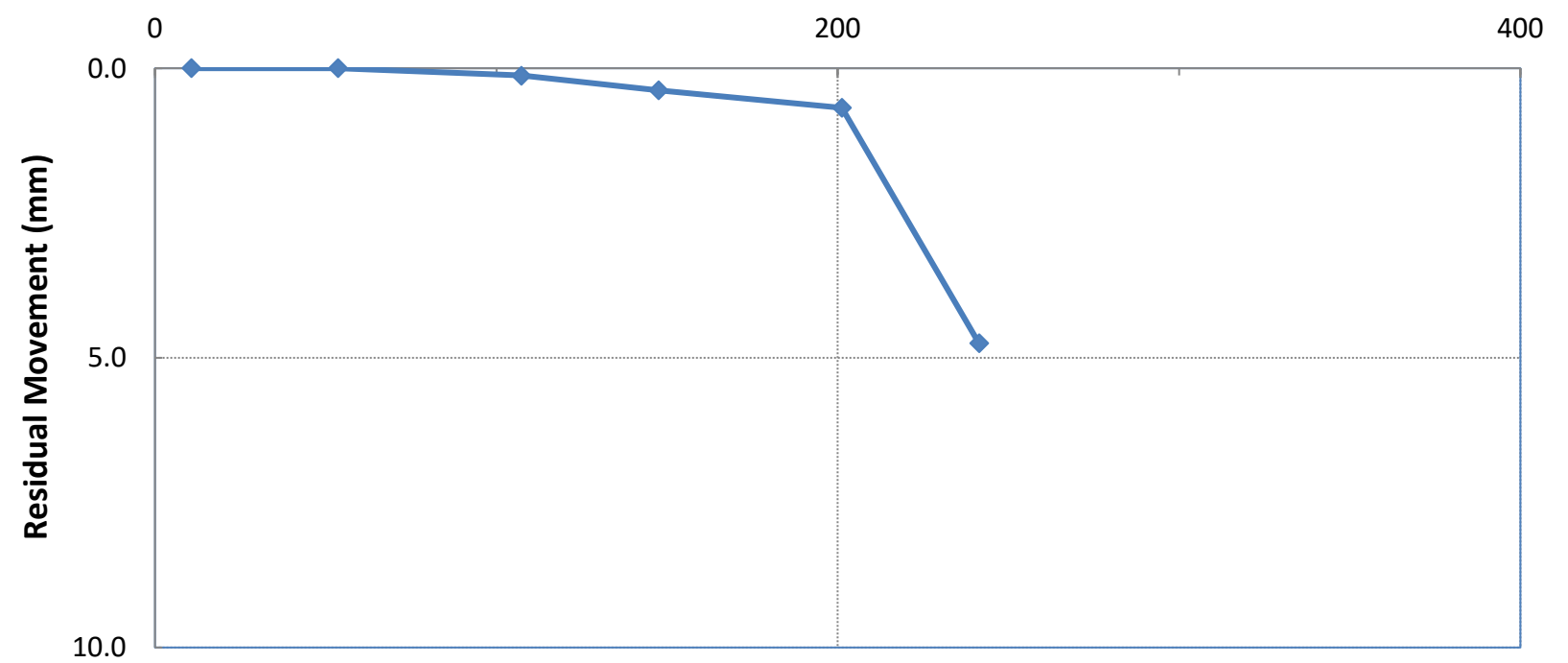


Anchor Test Results - Anchor 1 West

Chapman Falls





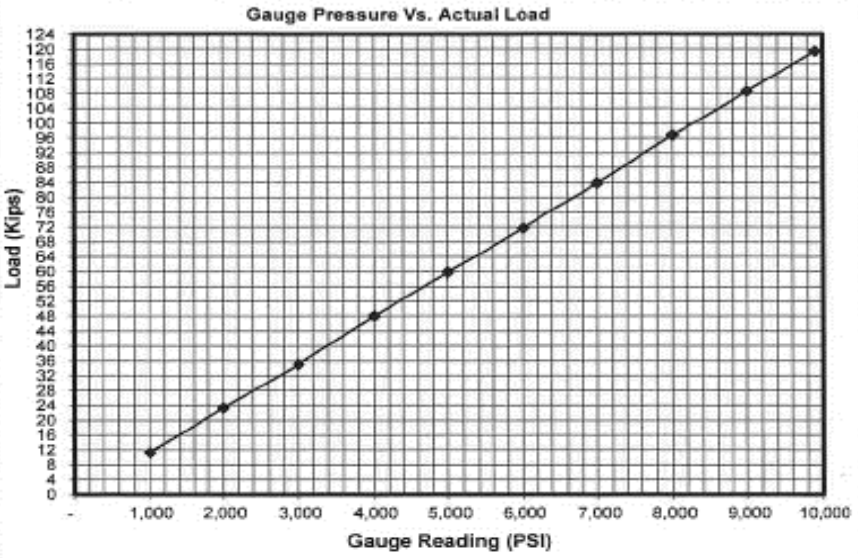


DYWIDAG SYSTEMS INTERNATIONAL CANADA LTD.
19433 96th Avenue #103
Surrey, B.C. V4B 4C4
Phone: (604) 888-8818 Fax: (604) 888-5008

JACK CALIBRATION FORM (SWC)

Stressing Jack:	Orbit 60ton (3")	**Theoretical Ram Area: (sq/n)**	12.300	**Date:**	15-Jan-21
ID Number:	SWC #5	**Calculated Ram Area: (sq/n)**	12.047	**Calibrated By:**	V. Stroleny
Field Gauge:	#5-1 (4" WIKA)				
Master Gauge:	Crystal M1 - 10K Psi	**Serial Number:**	11783		
Load Cell:	Road Runner 300 Kip	**Model Number:**	1-0228-08		
Serial Number:	103				
Calibrated Date:	17-Jne-20	**Calibrated By:**	RST Instruments		
Load Cell Read Out:	Model EW-3-0101-312 C	**Serial Number:**	1213		

FIELD GAUGE PSI	ACTUAL LOAD Kips	KN
1,000	11.3	50.4
2,000	23.3	103.7
3,000	35.0	155.9
4,000	48.0	213.5
5,000	59.9	266.4
6,000	71.7	319.1
7,000	83.9	373.0
8,000	96.7	430.2
9,000	108.6	483.2
9,900	119.4	531.1



Master Gauge	Field Gauge Reading (PSI) Field Guage: #5-1 (4" WIKA)				Load Cell Reading (LBS.)				Load Reading
(PSI)	Run 1	Run 2	Run 3	Avg.	Run 1	Run 2	Run 3	Avg.	(Kips)
1,000	1,000	1,100	1,000	**1,033**	11,600	11,900	11,600	**11,700**	**11.70**
2,000	2,000	2,000	2,100	**2,033**	23,700	23,600	23,800	**23,700**	**23.70**
3,000	3,000	3,100	3,050	**3,050**	35,500	35,800	35,600	**35,633**	**35.63**
4,000	4,000	4,000	4,000	**4,000**	47,800	47,800	48,000	**48,000**	**48.00**
5,000	5,000	5,000	5,000	**5,000**	59,900	60,000	59,800	**59,900**	**59.90**
6,000	6,000	6,000	6,000	**6,000**	71,600	71,700	71,900	**71,733**	**71.73**
7,000	7,000	7,000	7,000	**7,000**	84,000	83,900	83,700	**83,867**	**83.87**
8,000	7,900	7,900	7,900	**7,900**	95,300	95,500	95,700	**95,500**	**95.50**
9,000	8,900	8,900	8,900	**8,900**	107,400	107,300	107,600	**107,433**	**107.43**
9,900	9,800	9,800	9,800	**9,800**	118,000	118,300	118,300	**118,200**	**118.20**

Calibration Reviewed: _____ **Date:** Jan. 15, 21

ARYA ENGINEERING INC.

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MEMORANDUM

File No.:	20-369-SC	Date:	February 10, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 6 – Steel Beam Inspection Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing inspections conducted during the preparation and coating process of steel beams. Arya representative, Benjamin Tomasz, P.Eng., and Felix Motard, EIT, performed the inspections on the work conducted by Sunset Specialty Coatings Inc, on February 5, February 6, and February 8, 2021. Upon review with the coating supplier, and as agreed upon with the client, the beams were to be prepared to a near white blast and coated with “HI-BUILD TNEME-TAR SERIES 46H-413” polyamide epoxy-coal tar, at a minimum coat thickness of 200 microns (8.0 mils).

The contractor measured an average coating thickness of 250 microns using a coating thickness gage called “PosiTector 2000”. These values were confirmed by Arya using an outside micrometer in conjunction with specified web thicknesses for W8 x 28 and W16 x 67 steel members. The resulting coating thicknesses can be seen appended to this memorandum.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Felix Motard, EIT
Junior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs.
2. Measured Beam Coating Thickness.

Photograph 1: Overview of Work Area

Photograph 2: W8 x 28 Beams

Photograph 3: W16 x 67 Beam

Photograph 4: Contractor Measured Coating Thickness (Provided by Contractor)

Table 1: Arya Measured W8 x 28 Beam Dimensions

W8 x 28 Beams		
Specified Web Thickness (mm)	Measured Web Thickness (mm)	Calculated Coating Thickness (microns)
7.239	7.4803	241.3000
7.239	7.4828	243.8400
7.239	7.5159	276.8600
7.239	7.5387	299.7200
7.239	7.5463	307.3400
7.239	7.5235	284.4800
7.239	7.5006	261.6200
7.239	7.5336	294.6400

Table 2: Arya Measured W16 x 67 Beam Dimensions

W16 x 67 Beams		
Specified Web Thickness (mm)	Measured Web Thickness (mm)	Calculated Coating Thickness (microns)
10.033	10.9525	919.4800
10.033	10.4927	459.7400
10.033	10.4242	391.1600
10.033	10.3911	358.1400
10.033	10.9271	894.0800
10.033	10.4191	386.0800
10.033	10.7671	734.0600
10.033	10.6350	601.9800

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MEMORANDUM

File No.:	20-369-SC	Date:	February 10, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 7 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on February 10, 2021, between the hours of 9:30 am and 5:45 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), attended the site with other site personnel from the SCRD and the excavation and installation subcontractors.

Daily tailgate meeting started at 9:50 am to discuss site safety issues and other construction related activities intended for the day and following days.

The following summarizes relevant aspects of site activities conducted on February 10, 2021:

- Site cleanup and removal of tree cutting leftovers started after the tailgate meeting and the excavation started around 11 am.
- Arya provided a hardcopy of the WCB Notice Of Project (NOP) to the SCRD site representative prior to the start of the excavation.
- The subcontractor pumped out the collected water near the anchors and over the poly sheet laid upon the sloughed area through the existing drainage pipe crossing the trail path.
- The contractor marked up the locations for cross beams where the steel straps would be installed as per Arya's drawings.
- Steel straps comprised of 13 mm thick, galvanized steel wire ropes with plastic covering (where in contact with water supply pipes).

- The location for each steel strap was hand-excavated after reaching an excavation depth of about 0.75 m.
- Six (6) steel straps were installed and hand-excavated areas around the steel straps were backfilled with clean sand.
- The sub-contractor placed the barricade tapes around the excavated areas at the end of construction prior to leaving the site.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs 1 - 5,
2. Sign in Sheets for February 10, 2021,
3. WCB Notice Of Project.

Photograph 1: Delivery of I-Beams to Site

Photograph 2: Installation of Steel Galvanized Cable around Pipes.

Figure 3: Temporary Blockade of the Ditch Around the Excavated Area to Prevent Surface Water Flooding.

Figure 4: Sand Backfilling after the Installation of Steel Straps

Figure 5: Barricading the Excavated Area before leaving the Site.

ARYA Engineering Inc.

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Jan 24, 2021 **Construction Site Sign-In Sheet**

Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	9:00	12:45
Will Waite	Sechelt tree	9:00	12:30
Trevor Julius	Sechelt tree	9:00	12:30
Jan 27, 2021			
Farid Emadi	Arya	9:30	12:30pm
Felix Motard	Arya	9:30	12:30
STEPHEN MISURAK	SCRD	9:00AM	11:16 AM
[illegible]	[illegible]	9:30	12:30pm
[illegible]		9:30	12:30pm
Feb 10, 2021			
Cidi Abbott	SCRD	950	
Emily [illegible]-[illegible]	SCRD	950	[redacted] pm 3:30PM
STEPHEN MISURAK	SCRD	9:50	
Jim Wilson	FSCi	9:30	
Antonio [illegible]	N/B	9:30	5:30
Bryson Bentley	NB	9:30	3:30
Douglas Peterson	NB	9:30	5:30
[illegible]	Arya	9:30	2:00
BEN TOMASZ	ARYA	9:30	11:30
Farid Emadi	ARYA	9:30	5:45
M. Bergue	NB Cont. LTD	4:30	5:10

Notice of Project: 877458
Construction

Submitted: Tuesday, February 9, 2021 at 10:49 a.m. Pacific Time

Except as permitted by OHS regulation 20.2(4), WorkSafeBC must be provided at least 24 hour written notice prior to the start of the work activity. Work on this project, including set up activities, may begin on February 10, 2021, 10:49 a.m. Pacific Time, or on the start date indicated on the Notice of Project — whichever is later.

OHS regulation 20.2(3) requires that a copy of the Notice of Project is posted at the worksite for the duration of the project.

Worksite details

Worksite Location

	City	Location	Planned start date	Duration
1	Sechelt	Reservoir Rd, Sechelt BC On Sunshine Coast Hwy, turn into Salma Park Rd. Then turn left at Reservoir Rd. At the SCRD Pump Station Bldg. take the gravel road to the right and continue for about 500 m where the project site is located right before steel deck bridge that carries the Main Water Supply Pipe.	2/10/2021	3 Days

Owner or agent representative of this worksite:
WorkSafeBC Account Number: 125230
Arya Engineering Inc.
Suite 212 - 980 W. 1st Street
North Vancouver, British Columbia
Canada, V7P 3N4

Project information

Project:
Project cost greater than $100,000
Designed by a professional engineer
Work in an excavation over 1.2 m (4 ft) deep

Person responsible for co-ordinating health and safety activities:
Arya Engineering Inc.

Person in charge of the project:
Ben Tomasz
Project Manager
604-741-2118
ben@aryaeng.ca

Prime contractor:
WorkSafeBC Account Number: 125230
Arya Engineering Inc.
Suite 212 - 980 W. 1st Street
North Vancouver, British Columbia
Canada, V7P 3N4

Prime contractor designated in writing: Yes

Scope of work

Site preparation:
Ground preparation

Service construction:
Water line

New service or a repair to an existing service:
Repair

Other:
The scope of the project is to implement a temporary remedial measure proposed by Arya after a landslide took place near the water main supply at this area. It includes the installation of two 10 m long grade beams with cross over beams to support the steel strap that will be placed around the two water main supply pipes (16" and 20" in Dia.). This will require excavation below the pipes invert elevation, installation of steel straps backfilling up to the top of the support structure such that it will be buried under the ground. The grade beams will be fixed in place by connecting them to 10 mictropiles already in place.

Electrical declaration:
The project will use GFCI protection of installed receptacles in accordance with the requirements of the BC electrical code.

Attachments

Attachments

	Category	File name	Comment
1	Plans	20-369-SC_IFC_210110_SSD.pdf	IFC Dwgs

Other information

Submitted by:
Ben Tomasz
604-741-2118
ben@aryaeng.ca

Limitations
Neither the issuance of a Notice of Project number, nor the absence of follow-up action by WorkSafeBC indicates acceptance or approval of the information provided. If you have any safety concerns regarding this project, contact the person in charge of this project or WorkSafeBC prevention information line at 604.276.3100 or 1.888.621.7233.

Significant changes
If the information on the Notice of Project significantly changes, the new information must be submitted to WorkSafeBC as soon as possible and posted at the worksite.

To update the information, provide WorkSafeBC with the Notice of Project number, the worksite address, and a summary of the changes you want to make by either:

Email: prevnop@worksafebc.com
Fax: 604.276.3247

ARYA ENGINEERING INC.

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w aryaeng.ca

MEMORANDUM

File No.:	20-369-SC	Date:	February 26, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 8 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on February 11, 2021, between the hours of 7:45 am and 7:00 pm. Arya had approval of the SCRD for working late to compensate for the lost time due to welding generator problems.

Arya representative, Farid Emadi, P.Eng. (Field Engineer), attended the site with other site personnel from SCRD and the excavation and installation subcontractors.

The following summarizes relevant aspects of site activities conducted on February 11, 2021:

- Installation of the last two steel straps located to the west of the site clearing areas around the two pipes by hand excavation.
- Removal of the exposed grout from the micro piles to facilitate the connection between the micro piles and the grade beams.
- Installation of base plates at each micro pile location after levelling and welding the base plates to the nuts.
- Placement of grade beams over the base plates and welding the base plates and the grade beams together.
- Extension of the two anchors and passing them through the web of the grade beams.
- Placement of the three cross over beams on top of the grade beams and connecting each steel straps to the grade beams by three clamps.
- By the end of the day, six steel straps were completed.

- The generator for the welding machine was not working as of 11:15 am and after a few unsuccessful attempts to fix the generator on site, the subcontractor decided to bring a new welder to the site. The new welder was on site at 1:30 pm.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs,
2. Sign in Sheets for February 11, 2021.

Figure 1: Hand Digging and Placing the Steel Strap with Rubber Sleeve.

Figure 2: Backfilling with Clean Sand to Secure the Steel Straps.

Figure 3: Levelling each Base Plate Prior to Welding.

Figure 4: Levelling the Base Plates Prior to the Installation of Grade Beams.

Figure 5: Installation of Grade Beams over the Base Plates

Figure 6: Installation of Cross-Over Beams after Welding the Grade Beams to the Base Plates and Making Holes at the Opposite Sides of the Flange for the Connection of Steel Straps to the Cross-Over Beams

Figure 7: Installation of Additional Base Plates at the Top of the Grade Beams to Provide Proper Seating for the Nuts Connected to the Micropiles and Completing the Welding

ARYA ENGINEERING INC.

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Feb 11, 2021

Construction Site Sign-In Sheet

Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	7:45	7:00pm
Felix Mutard	Arya	10am	10:30am
Bryson Bentley	NB	8:00	7:00pm
Douglas Peterson	NB	8:00	7:00pm
Dan Hemstalk	SCRD	10:00am	10:30am
Coni Abbott	SCRD	10:00am	10:30am
Stephen Mikulak	SCRD	9 AM	2:30pm
Jim Wilson	FSC	10:55	11:15am
Rob Betts	Nic Fab	11:20	12:20
Jeremy Nickerson	Nic fab	11:20	12:20
Antonio Aguilera	NB	8:00	7:00pm
Wayne Kelly	FLNRO	12:37	1:07
Dan Neufeld	NIB	13:00	7:00pm

ARYA ENGINEERING INC.

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MEMORANDUM

File No.:	20-369-SC	Date:	February 26, 2021
Client:	Sunshine Coast Regional District, Attention: Stephen Misiurak, P.Eng.		
Email:	stephen.misiurak@scrd.ca	Phone:	604.885.6800, ext. 6494
From:	Arya Engineering Inc.	CC:	NB Contracting, FSCI Biological Consultants, MFLNRORD
Subject:	**Field Review Memo No. 9 - Temporary Water Supply Main Support Construction Reservoir Road Extension, Sechelt, British Columbia**		

Arya Engineering Inc. (Arya) presents this field review memo for the above-mentioned project summarizing the outcome of our site activities on February 12, 2021, between the hours of 6:45 am and 3:30 pm. Arya representative, Farid Emadi, P.Eng. (Field Engineer), attended the site with other site personnel from SCRD and the excavation and installation subcontractors.

The following summarizes relevant aspects of site activities conducted on February 12, 2021:

- Installation of last crossover beam and steel straps located to the west of the site.
- Installation of base plates on top of the grade beams for micro-piles and making a custom seating where anchors rests on the web of the grade beams.
- Completion of welding and application of touch up protective coatings over the beams and crossover beams.
- Placement of blue tape provided by SCRD along the two main water supply pipes prior to backfilling.
- Placement and spreading of road base backfill material from the west toward the east side of the site.
- Compaction of the final layer of backfill by tamping the excavator's bucket and by the track load of the excavator.
- The final layer of backfill had 150 mm thickness from the top of the grade beam and 75 mm where the steel straps were clamped on top of the grade beams. SCRD may wish additional backfilling depending on future maintenance schedules.

- The final layer was ramped up and down for proper connection to the existing trail elevations on both ends.
- The manholes located to the west of the site were inspected by the SCRD and all three manholes located to the west were accessible at the end of the backfilling to the satisfaction of the SCRD. Installation of additional cement rings to bring up the manhole access to the trail elevation may be required as an additional safety measure.
- Two wood logs were placed to the east of the property to prevent any future car traffic through the backfilled area.
- The down slope areas where sliding had occurred, were cleaned down to the reach of the excavator and covered with the available poly sheet to control surface erosion to the downslope areas. Based on our discussion with the SCRD site representative, the SCRD will complete the surface preparation of the downslope area, place new poly sheets to cover exposed areas and eventually consider a vegetation cover or other means of stabilizing the down slope areas. Arya is available to discuss options and provide additional services if requested.
- The contractor completed the surface preparation of the ditch (located to the north and at the toe of the upslope area) ending at the two drainpipes that cross the trail such that they can properly drain the collected water to the downslope areas.
- A solid flexible extension connected to the outlet of the drainpipe located to the west is recommended to carry the drained water to the lower elevations of the downslope area similar to the one on the eastern side.
- Arya recommends scheduled site visits to check the conditions of the drain ditch and drainpipe leading to the downslope area and provisions for a complete poly sheet cover over the downslope area until a permanent solution is provided.

Arya reviewed site conditions around the landslide area at the end of the workday, and no visible sign of retrogression or increased slippage was noted.

We trust that the observations and recommendations presented herein meet the current project requirements. Should any questions or concerns arise, please do not hesitate to contact the undersigned.

Sincerely,

Arya Engineering Inc.

Prepared by:

Farid Emadi, P.Eng. M.Sc.
Senior Geotechnical Engineer

Reviewed by:

Benjamin Tomasz, P.Eng.
Principal | Senior Geotechnical Engineer

Quality Assurance Reviewed by Masoud Mohajeri, P.Eng.

Attachments:

1. Site Photographs,
2. Sign in Sheets for February 12, 2021.

Figure 1: Installation of the Last Cross-Over Beam and Steel Straps.

Figure 2: Custom-Made Seating Where the Anchors Rest on the Web of the Grade Beams.

Figure 3: Welded Base Plate and Cross Over Beams to the Grade Beams.

Figure 4: Application of Protective Paint Patch over the Grade Beam

Figure 5: Taping Along the Two Main Water Supply Pipes and Dumping the Road Base.

Figure 6: Installation of Wood Logs and Surface Preparation of the Ditch and Connection to the Drainpipes

Figure 7: The Final Prepared Surface of the Backfilled Area and the Installation of the Poly Sheet over Downslope Area.

Figure 8: Another View of the Partially Covered Downslope Area with Poly Sheets.

Figure 9: Utility Manholes Located to the West at the End of Backfilling Area.

ARYA
ENGINEERING INC.

Lower Mainland Office
212-980 West 1st Street
North Vancouver, BC V7P 3N4
t 604.842.3734

Sunshine Coast Office
203-1001 Gibsons Way
Gibsons, BC V0N 1V8
t 604.886.1515

e info@aryaeng.ca
w aryaeng.ca

Feb 12, 2021

Construction Site Sign-In Sheet

Print Name	Organization	Time In	Time Out
Farid Emadi	Arya	7:00	15:30
Bryson Bentley	NB	7:00	1:47
Antonio [illegible]	NB	7:00	15:30
Dan Neufeld	Flathead Mech	7:30	15:30
Douglas Peterson	NB	7:00	15:30
Shane Walker	SCRD	9:40	10:40
Jim Wilson	FSC1	10:Am	11:Am
STEPHEN MISURAK	SCRD	10AM	15:30
Wayne Reddy	FLNRO	13:24	2:30
Sachmdra [illegible]	SCRD	14:56	15:30
NANDEEP SINGH	SCRD	14:50	15:30

Appendix 4 Landslide Waterline Stabilization Works Completed (2021)

Mark Sloan, RPF; RPBio, Resource Manager
Forests, Lands, Natural Resource Operations and Rural Development
Sunshine Coast Forest District
7077 Duncan Street
Powell River, British Columbia
V8A 1W1 Ph: 604-485-0768

FLNRO File: 0086708/2021-01
Conditional Water Licence: C069217
EOC Task #: 215245

Re: Chapman Creek Landslide - SCRD Waterline Stabilization Works Completed

Mark,

Please find included, the field review information - with photo's (16), of the Chapman Creek landslide repair works completed by the Sunshine Coast Regional District (SCRD) to stabilize the 2 existing waterline pipes.

Field Works commenced on January 20, 2021 and were substantually completed on Feb 12, 2021. Revegetation of the site remains outstanding, and should be undertaken when the weather conditions are more favorable for growth results. Post works, the initiation point of the landslide was backsloped and partially covered with a poly sheet to curb erosion.

Stephen Misiurak, P. Eng. (SCRD Manager Capital Projects), represented the SCRD during the field operations of the waterline stabilization works.
The SCRD hired ARYA Engineering Inc. (ARYA) to plan and deliver the SCRD waterline stabilization works (refer to plan/drawing 20-369-SC_IFC_210110_SSDa). ARYA supplied the following onsite contractors for the project:

- Southwest Contracting - Drill / grout and load test piles
- NB Contracting - Excavation and general works contractor
- Heartwood Tree Consulting - Arborist to address danger trees
- Sechelt Tree Services - Danger tree removal
- Trucking - Local tandem trucks to end haul/soil / debris and backfill aggregate hauling
- Flatline Mechanical - Onsite welding / fabrication for grade beam installation.

Periodic reporting of work progression can be located within the following memos and compression test submitted by ARYA:

- 20-369-SC_Memo1_20210120_FE(BT)(MM)_SSD
- 20-369-SC_Memo2_20210122_FE(BT)(MM)_SSD
- 20-369-SC_Memo3_20210125_FE_SSD
- 20-369-SC_Memo4_20210125_FE_SSD
- 20-369-SC_Memo5_20210129_FE(BT)_SSD
- 20-369-SC_Memo6_20210210_FM(BT)_FINAL
- 20-369-SC_Memo7_20210210_FE(BT)_SSD
- 20-369-SC_Memo8_20210210_FE(BT)_SSD
- 20-369-SC_Memo9_20210210_FE(BT)_SSD
- 20-369-SC_CompressionTesting_20210226_SSD.

Additionally, the SCRD hired an environmental monitor through FSCI Biological Consultants.

The project cost expenditures are currently being compiled by the SCRD.

I attended the site to monitor the waterline stabilization works on the following dates, with comments:

- Jan 20, 2021 - Prework meeting; 19 total persons in attendance (SCRD, ARYA, excavation / works contractor, drilling contractor, environmental monitor and myself). Items discussed included: COVID 19 protocols, representative / job function, review of plan and works schedule, safety, Worksafe BC compliance, danger tree assessment.
  Works included: locate and expose 2 waterlines then backfill, drilling / grouting of anchor piles
- Jan 21, 2021 - Drilling / grouting of vertical piles, SCRD / ARYA / crew advised of safety issue relating to danger trees, Arborist to visit site to review danger trees
- Jan 23, 2021 - No crew, photos of completed drilled / grouted piles, review danger tree removal completed on Jan 22, 2021 - SCRD advised to leave felled wood onsite
- Information only (no onsite inspection) Jan 24 to Feb 10, 2021 - ARYA load test grouted piles, source installation supplies and epoxy coat metal grade beam structure
- Feb 11, 2021 - Waterline has been lashed with steel cable straps, prepare grouted piles for grade beams
- Feb 12, 2021 - Grade beams installed / welded and exposed metal touch up recoated, aggregate backfill of grade beams with 25mm road base, dress fill downslope of grade beam and removal of oversteepened previously placed fill west of grade beam structure.
  Drainage has been reestablished by installing a ditch line at the toe of the cut slope. The 6" plastic pipe installed by the SCRD was left in the road; c/w with the attached flexible pipe leading ~20m downslope. The cut slope ditch line continues east from the 6" pipe passing the grade beam installation, which then leads into a gully. The exposed soils on the fill slope were partially covered with the poly sheet reused from the initial landslide protection of Dec 2020.

The work on the Chapman Creek SCRD waterline stabilization project was completed within the intent of the ARYA plan (refer to drawing 20-369-SC_IFC_210110_SSDa).
Site safety was addressed and practiced by all onsite. Machinery was inspected for condition and fluid leaks.
Over the project duration, the crew addressed environmental concerns including water flow, erosion control and contained soils from releasing downslope.
The site was left tidy upon completion of the works, and no deliterious substances were noted as remaining.
The road is blocked with logs to limit vehicle access at the site. Additionally, the SCRD has the road gated limiting access to the SCRD Water Treatment Plant and beyond to the project work site.

Revegetation of disturbed soils remains outstanding and should be addressed to curb mass wasting and / or sediment impacts upon Chapman Creek.

Sincerely.

Wayne Keddy, AScT, RFT
FLNRO Engineering Project Monitor
DBA: Wayne Keddy Contracting
7793 Fawn Road
Halfmoon Bay, B.C., V0N 1Y1
604-885-2294, email - wink@dccnet.com

REGISTERED FOREST TECHNOLOGIST PROVINCE OF WAYNE KEDDY BRITISH COLUMBIA NO. 1101
Mar 1. 2021

WAYNE KEDDY WKG CONTRACTING

Attachments:
- Photos 1 to 16

Jan 20, 2021; 10:43 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - expose and locate 2 waterlines

Jan 20, 2021; 15:25 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - drill horizontal anchor pile

Jan 21, 2021; 09:52 – Chapman Creek Landslide - SCRD Waterline Stabilization
View to west - drill vertical pile

Jan 23, 2021; 11:11 – Chapman Creek Landslide - SCRD Waterline Stabilization
View to west - piles installed and grouted

Feb 11, 2021; 12:48 – Chapman Creek Landslide - SCRD Waterline Stabilization
View upslope - danger tree topped with long stem remaining

Feb 11, 2021; 12:33 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam structure components delivered

Feb 11, 2021; 12:52 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - steel cable straps installed and steel plate preparation for grade beam installation

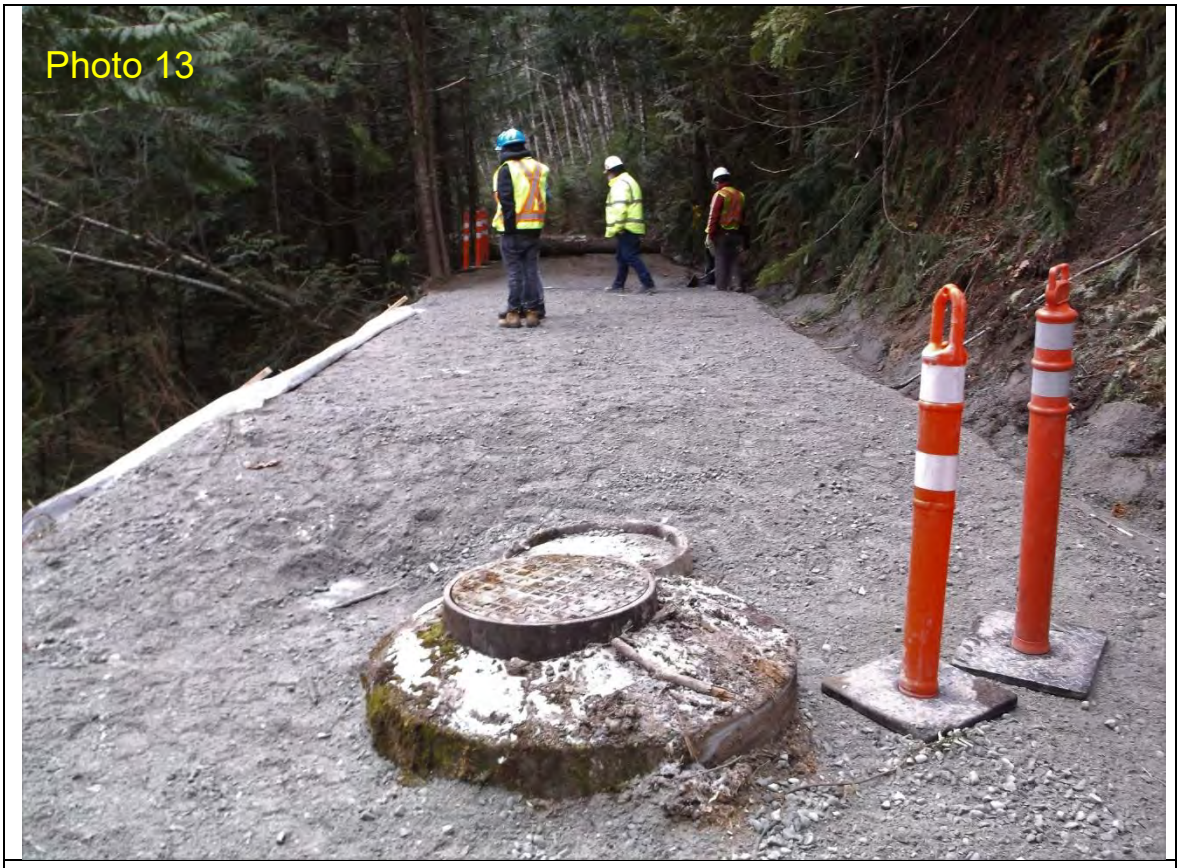
Feb 12, 2021; 13:23 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam installed with steel cable straps; backfilling structure

Feb 12, 2021; 13:24 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - grade beam installed with steel cable straps; backfilling structure

Feb 12, 2021; 13:44 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - grade beam installed with steel cable straps; backfilling structure

Feb 12, 2021; 14:24 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam installed, shaping fill slope

Feb 12, 2021; 14:25 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam installed, over steepened placed fill soils before removal



Feb 12, 2021; 15:08 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - grade beam installed, ditch line installed

Feb 12, 2021; 15:08 – Chapman Creek Landslide - SCRD Waterline Stabilization
View west - grade beam installed, poly sheet fill slope erosion protection

Feb 12, 2021; 15:21 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam installed, poly sheet fill slope erosion protection, ditch line installed

Feb 12, 2021; 15:28 – Chapman Creek Landslide - SCRD Waterline Stabilization
View east - grade beam installed, fill slope soil removal complete, road blocked

Appendix 5 Temporary Water Supply Main Support Construction Road Extension Record Drawings (2021)

Temporary Water Supply Main Support Construction
Reservoir Road Extension, Sechelt, British Columbia
Record Drawings

List of Drawings

REFERENCE DRAWINGS:

Dayton & Knight Ltd. Consulting Engineers, Sunshine Coast Regional District, Installation of Chapman Creek Supply Main Extension, Drawing No. 28.79.1

Arya IFC Drawings

Drawings and details as provided herein are a true testament to the works completed.

NO	DATE	REVISION
5	DATE5	
4	DATE4	
3	DATE3	
2	DATE2	
1	DATE1	

ARYA ENGINEERING INC.

203 - 1001 Gibsons Way
Gibsons, BC V0N 1V8
Phone 604-886-1515

TITLE: Cover Page

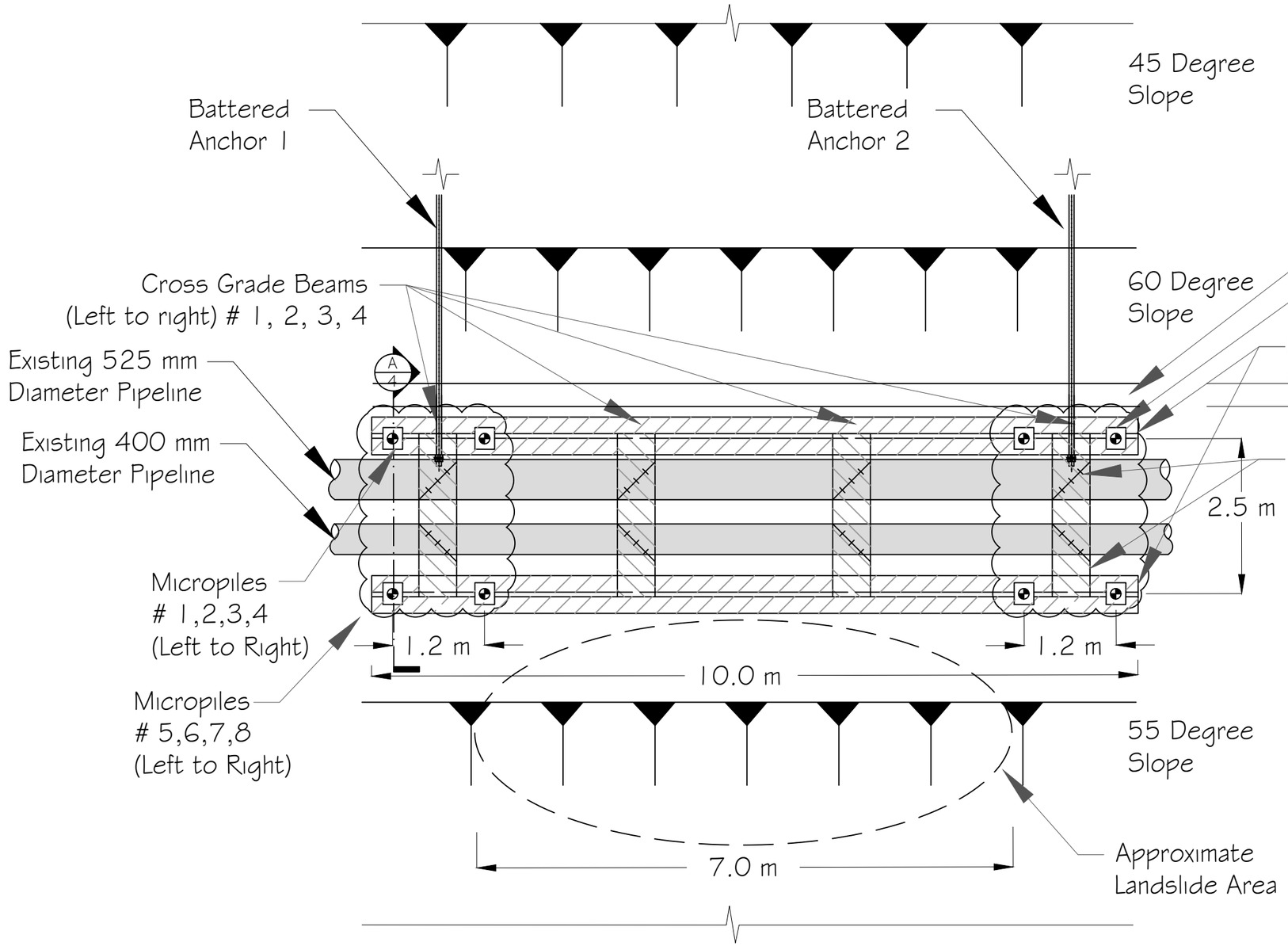
CLIENT: Sunshine Coast Regional District (SCRD)

CIVIC ADDRESS: Chapman Creek Primary 600 mm Waterline Landslide Remediation

SCALE	N.T.S.	DATE	FEB2021
DRAWN	SHN	CHECKED	BT/MM
DESIGN	FE	ISSUED	AS-BUILT

FIGURE

JOB NUMBER 20-369-SC



NOTE:
REFER TO THE APPENDIX FOR MICROPILE, ANCHOR, AND GRADE BEAM SPECIFICATIONS.

AS-BUILT CONDITION (PLAN VIEW)
SCALE: NTS

REFERENCE DRAWINGS:

Dayton & Knight Ltd. Consulting Engineers, Sunshine Coast Regional District, Installation of Chapman Creek Supply Main Extension, Drawing No. 28.79.1

ARYA IFC Drawings

Drawings and details as provided herein are a true testament to the works completed.

NO	DATE	REVISION
5	DATE5	
4	DATE4	
3	DATE3	
2	DATE2	
1	DATE1	

ARYA ENGINEERING INC.

203 - 1001 Gibsons Way
Gibsons, BC V0N 1V8
Phone 604-886-1515

TITLE:
General Site Plan
and Anchor/Micropile Alignment

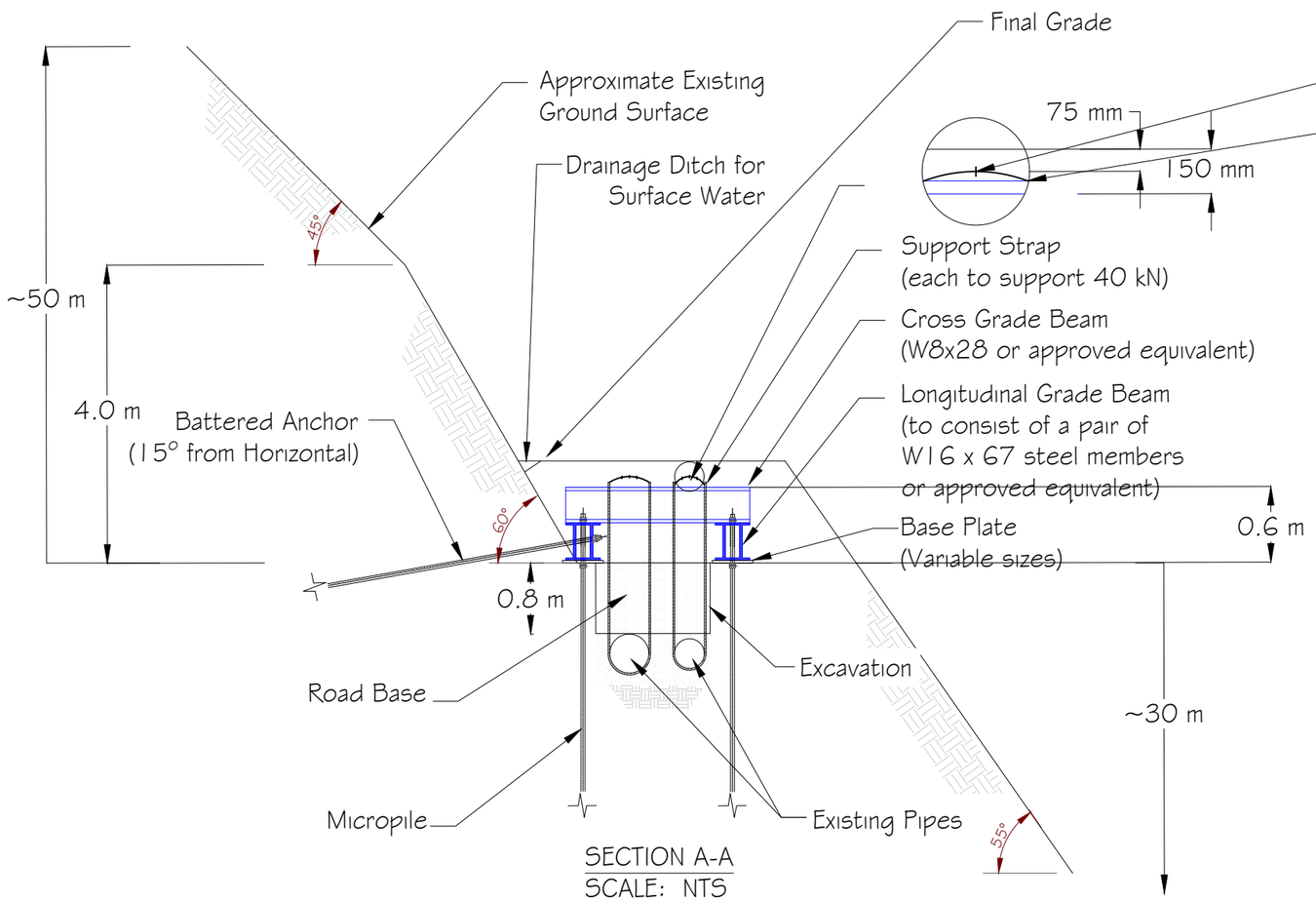
CLIENT:
Sunshine Coast Regional District
(SCRD)

CIVIC ADDRESS:
Chapman Creek Primary
Waterline Landslide Remediation

SCALE	N.T.S.	DATE	FEB2021
DRAWN	LS	CHECKED	BT/MM
DESIGN	FE	ISSUED	AS-BUILT

FIGURE
1
OF 2

JOB NUMBER
20-369-SC



SECTION A-A
SCALE: NTS

* Site survey during the construction was not part of Arya's scope of work and therefore all dimensions are approximate.
* Micropile depth adjusted such that the coupler will not be located between proposed grade beams.
* Arya approved the adjusted depth of penetration into bedrock for the micropile #5 due to reaching practical drilling refusal in a very hard bedrock material, that could cause excessive wear and tear of the drill bits.
- Stick out height of each bar not included in this table.

Summary Table of Installed Micropiles										
Micropile	#1 IBOTN40	#2 IBOTN40	#3 IBOTN40	#4 IBOTN40	#5 IBOTN40	#6 IBOTN40	#7 IBOTN40	#8 IBOTN40	Anchor 1 IBOTN40	Anchor 2 IBOTN40
Overburden Thickness (m)	0.9	0.9	2.3	2.3	2.7	2.1	3.7	2.7	2.1	2.1
Bedrock Thickness (m)	3.0	3.0	3.0	3.0	3.0	2.1**	3.9*	3.0	3.0	3.0
Total Depth (m)	3.9	3.9	5.3	5.3	5.7	4.2	7.6	5.7	5.1	5.1

Photograph 1: Start of Construction Phase

Photograph 2: Close-up of Two Pipes

Photograph 3: Close-up of Larger Diameter Pipe

Photograph 4: Anchor Installation

Photograph 5: Installation of Grade and Crossover beams and steel straps (Looking West)

Photograph 6: Placing and Spreading the Backfill material (Looking West)

Photograph 7: Site Conditions at the End of Construction Phase (Looking West)

REFERENCE DRAWINGS:

Dayton & Knight Ltd. Consulting Engineers, Sunshine Coast Regional District, Installation of Chapman Creek Supply Main Extension, Drawing No. 28.79.1

ARYA IFC Drawing

Drawings and details as provided herein are a true testament to the works completed.

NO	DATE	REVISION
5	DATE5	
4	DATE4	
3	DATE3	
2	DATE2	
1	DATE1	

ARYA ENGINEERING INC.
203 - 1001 Gibsons Way
Gibsons, BC V0N 1V8
Phone 604-886-1515

TITLE:
Typical Section and Site Photographs during Construction Phase

CLIENT:
Sunshine Coast Regional District (SCRD)

CIVIC ADDRESS:
Chapman Creek Primary Waterline Landslide Remediation

SCALE	N.T.S.	DATE	FEB2021
DRAWN	LS	CHECKED	BT/MM
DESIGN	FE	ISSUED	AS-BUILT

FIGURE
2
OF 2

JOB NUMBER
20-369-SC

APPENDIX A

Specification Sheet

Mill Certificate for Hollow Bar

Producer: JiangSu CMP Anchorage System Co.Ltd.

Shipping Date: August 28, 2020

DSI PO No: PO251769/1

Our PO No: JSME20169S/1

Object: CMP Drill thread pipe T40N/L=3000 mm
(CMP Hollow bar T40N/L=3000 mm)

P/N: 40010320

DSI P/N: 40HT0318C

Certificate No: ZJZXH200608

Steel Brand: 40Cr

Heat No: 0A01525

Raw Materials Chemical Composition (%)

C	Si	Mn	S	P	Cr	Ni	Cu
0.400	0.200	0.620	0.002	0.012	0.880	0.010	0.010

●The above data are from steel mill

Test Results of Finished Bar

Test Results	Ultimate Load (KN)	Yield Load (KN)	Elongation $_5$ (%)	Note
Required Min. Values	660.00	525.00		
Test 1	708.50	531.00	6.50	Passed
Test 2	750.00	557.00	7.00	Passed
Test 3	740.00	579.00	6.00	Passed

●Tested by China National Approval Lab No.50045791

●Bar cross section area A_S (average, Weight Method): 773.38 mm^2

●A_5: Test standard distance is $5.65\sqrt{A_S}$

●Test Standard: ISO 6892:1998 , ASTM A370-07A , GB/T228-2002

●Raw material made from ASTM A519-03 5140/EN 10083-1 41Cr4 Seamless Tubing, and comply to chemical composition and strength requirement of ASTM A519-03

●Conform to deformations requirements of ASTM A615/A615M-08

●Final product has deformations exceeding requirements of ASTM A 615.

Visual inspection and measurements: Satisfaction

Test/Inspection Date: 2020-06-30

This document is valid without signature

Jiangsu CMP Anchorage System Co.Ltd.
987 Qingshuiting East Road,
Moling Street,Jiangning District,
Nanjing
Tel: 025--52759677
Fax: 025--52759677

CMP International Inc.
200 Vanda Drive,
Maple,Ontario,L6A 4E5 ,
Canada
Tel: +1(416) 623 6671
Fax: +1(416) 850 8996

VANGUARD STEEL LTD.

TEST CERTIFICATE

THIS IS TO CERTIFY THAT THE FOLLOWING PRODUCTS HAVE BEEN DULY INSPECTED BY US AND FOUND CONFORMING TO THE SPECIFICATION.

RR-W-410E

Purchaser : VANGUARD STEEL LTD

L/C no. : T/T at sight

Commodity: H.D.GALV WIRE ROPE

Item no.: 26120032

Issuing no. : 16033394

P.O.Number.: T-52407

Contract no. : 16HTVSV03

Reel no. :1Reel

Surface : Galvanized

Length : 5000FT/Reel

Total net weight:1896LBS(860KGS)

Construction: 6 x 19 + FC

Diameter : 1/2"

Lay: RHRL

ID Marker: Red Thread

Physical Properties: Hot dipped Galv.

Standard: RR-W-410E,IPS

Tensile Strength: ≥1870MPA

Min. Breaking Load: ≥19260LBS

Zinc Weight: ≥0.2OZ/FT2

actual Tensile Strength: 1980~2010MPA

actual Breaking Load:20400LBS

actual Zinc Weight: >0.21OZ/FT2

Composition:

Chemical	C%	Si%	Mn%	S%	P%
70#	0.67-0.75	0.17-0.37	0.50-0.80	0.035	0.035

7880 Fraser Park Drive, Burnaby, B.C., CANADA V5J 5L8 Telephone: (604) 294-3191 **Telefax: (604) 294-8845**

MONTREAL • TORONTO • WINNIPEG • EDMONTON • VANCOUVER

Customer Name	Customer PO#	Shipper No	Heat Number
TRI CITY METAL INC	ARYA	1674852	1201003351

NUCOR

Mill Certification

04/19/2019

MTR#:167915-8
Lot #:120100335120
W CEMETERY ROAD
PLYMOUTH, UT 84330 US
800-453-2886
Fax: 435-458-2309

Sold To: CUSTOM PLATE & PROFILES
1250 APPLEBY LINE
A DIV OF SAMUEL SON & CO LTD
BURLINGTON, ON L7L 5G6 CA

Ship To: SAMUEL STRUCTURALS - RICHMOND
16160 RIVER RD
RICHMOND, BC V6V 1L6 CA

Customer PO	V90171	Sales Order #	12021740 - 1.1
Product Group	Hot Roll - Merchant Bar Quality	Product #	3017651
Grade	Nucor Multigrade	Lot #	120100335120
Size	0.625" x 10"	Heat #	1201003351
BOL #	BOL-259276	Load #	167915
Description	Hot Roll - Merchant Bar Quality UM Plate 5/8" x 10" Nucor Multigrade 20' 0" [240"] 2001-6000 lbs	Customer Part #	FL5/8X10 20 10W0
Production Date	05/28/2018	Qty Shipped LBS	4253
Product Country Of Origin	United States	Qty Shipped EA	10
Original Item Description		Original Item Number	

I hereby certify that the material described herein has been manufactured in accordance with the specifications and standards listed above and that it satisfies those requirements.

Melting Date: 05/27/2018

Melt Country of Origin : United States

C (%)	Mn (%)	P (%)	S (%)	Si (%)	Ni (%)	Cr (%)	Mo (%)	Cu (%)	Ti (%)	V (%)	Nb (%)	Sn (%)
0.16	0.85	0.007	0.044	0.21	0.10	0.11	0.03	0.29	0.001	0.016	0.000	0.011

ASTM A529 S78.2 CE (%) : 0.40

ASTM A992 5.4 CE (%) : 0.36

Other Test Results

Yield (PSI) : 53300
Tensile (PSI) : 73800
Yield (PSI) : 53300
Elongation in 8" (%) : 28.0
Tensile (PSI) : 73800
Elongation in 8" (%) : 30.0

Comments:

NUCOR MULTIGRADE MEETS THE REQUIREMENTS OF:
ASTM A36/A36M-14, A529/A529M-14 GR50,
A572/A572M-18 GR50, A709/A709M-17e1 GR36/50 NO CVN,
CSA G40.21-13 GR44W(300W)/GR50W(350W),
AASHTO M270/M270M-15 GR36/GR50, ASME SA36/SA36M-13
Nucor-Plymouth is an ISO-9001 and an ABS certified mill. CMTR complies with DIN EN 10204 – 3.1 All manufacturing processes of the steel materials in this product, including melting, casting, and hot rolling have occurred in the United States. All products produced are weld free. Mercury, in any form, has not been used in the production or testing of this material.

PO # N/A QD # CAN-0005U864
HEAT #: 1201003351
MILL TAG:

Bryden Morris, Chief Metallurgist

Customer Name	Customer PO#	Shipper No	Heat Number
TRI CITY METAL INC	ARYA	1674852	1201014640

NUCOR

Mill Certification

09/20/2019

MTR#:26513
Lot #:120101464(
W CEMETERY RO.
PLYMOUTH, UT 84330
800-453-28
Fax: 435-458-23

Sold To: CUSTOM PLATE & PROFILES
1250 APPLEBY LINE
A DIV OF SAMUEL SON & CO LTD
BURLINGTON, ON L7L 5G6 CA

Ship To: SAMUEL PROCESSING SURREY
8250 130 ST
Surrey, BC V3W 8J9 CA

R695575

Customer PO	V 90336	Sales Order #	12031872 - 3.1
Product Group	Hot Roll - Merchant Bar Quality	Product #	3017651
Grade	Nucor Multigrade	Lot #	120101464020
Size	0.625" x 10"	Heat #	1201014640
BOL #	BOL-351799	Load #	265131
Description	Hot Roll - Merchant Bar Quality UM Plate 5/8" x 10" Nucor Multigrade 20' 0" [240"] 2001-6000 lbs	Customer Part #	FL5/8X10 20 10W0
Production Date	07/18/2019	Qty Shipped LBS	4253
Product Country Of Origin	United States	Qty Shipped EA	10
Original Item Description		Original Item Number	

I hereby certify that the material described herein has been manufactured in accordance with the specifications and standards listed above and that it satisfies those requirements.

Melt Country of Origin : United States

Melting Date: 07/12/2019

C (%)	Mn (%)	P (%)	S (%)	Si (%)	Ni (%)	Cr (%)	Mo (%)	Cu (%)	Ti (%)	V (%)	Nb (%)	Sn (%)
0.15	0.87	0.011	0.038	0.20	0.10	0.15	0.02	0.25	0.001	0.017	0.001	0.010

ASTM A529 S76.2 CE (%) : 0.39

ASTM A992 5.4 CE (%) : 0.36

Other Test Results

Yield (PSI) : 57900
Tensile (PSI) : 78500

Yield (PSI) : 52500
Elongation in 8" (%) : 32.0

Tensile (PSI) : 76400
Elongation in 8" (%) : 31.0

Comments:

NUCOR MULTIGRADE MEETS THE REQUIREMENTS OF:
ASTM A36/A36M-14, A529/A529M-14 GR50,
A572/A572M-18 GR50, A709/A709M-17e1 GR36/50 NO CVN,
CSA G40.21-13 GR44W(300W)/GR50W(350W),
AASHTO M270/M270M-15 GR36/GR50, ASME SA36/SA36M-13
Nucor-Plymouth is an ISO-9001 and an ABS certified mill. CMTR complies with DIN EN 10204 – 3.1 All manufacturing processes of the steel materials in this product, including melting, casting, and hot rolling have occurred in the United States. All products produced are weld free. Mercury, in any form, has not been used in the production or testing of this material.

PO # N/A QO # CAN – 00050865
HEAT #: 1201014640
MILL TAG:

Bryden Morris, Chief Metallurgist

Customer Name TRI CITY METAL INC

Customer PO# ARYA

Shipper No 1674852

Heat Number D160447

Contract No.	
Customer	VARSTEEL
PO No.	DE-1049441
L/C No.	
Commodity	H-BEAM
Specification	ASTM A572 G50/A992/CSA G40.21-13 50WM(345WM)

INSPECTION CERTIFICATE

EN 10204(2004) TYPE 3.1

HYUNDAI STEEL

Factory	63, Jungbong-Daero, Dong-gu, Incheon, S. Korea
Certificate No.	IH20200405817-1
Class certificate No.	
Issue date	2020-04-29

Dimensions	Length	Heat No.	Quantity (PCS)	Weight (kg)	Chemical Composition														Tensile Test			Yield Ratio(1)	BEND TEST	Impact Test(L) V-Notch ℃				Remarks (Impact Specimen Size)
					C	Si	Mn	P	S	Cu	Ni	Mo	Cr	Al	V	Nb	Sn	CE(1)	Tensile Strength	Yield Strength	Elongation (2)			AVG	1	2	3	
					×100			×1000		×100				×1000				×100	N/mm2		%	-	-	-				
8X6-1/2X24	40.00 FT	D 160412	48	20,880	19	16	63	21	8	31	16	3	18	3	2	19	19	37	525 523	394 406	25.0 25.0	0.751 0.777						
8X6-1/2X24	40.00 FT	D 160443	16	6,960	18	22	61	24	10	28	10	2	19	3	2	14	19	35	563 569	425 429	24.5 24.0	0.755 0.754						
8X6-1/2X24	50.00 FT	D 160444	40	21,760	15	21	67	29	12	30	10	3	28	2	4	15	21	35	553 559	424 422	25.0 24.5	0.767 0.755						
8X6-1/2X24	60.00 FT	D 160412	32	20,896	19	16	63	21	8	31	16	3	18	3	2	19	19	37	525 523	394 406	25.0 25.0	0.751 0.777						
8X6-1/2X24	60.00 FT	D 160444	4	2,612	15	21	67	29	12	30	10	3	28	2	4	15	21	35	553 559	424 422	25.0 24.5	0.767 0.755						
8X6-1/2X28	45.00 FT	D 160447	12	6,852	16	23	61	26	10	28	13	2	19	2	2	14	16	33	555 544	402 394	25.0 25.5	0.725 0.725						
10X4X15	60.00 FT	D 160257	10	4,080	16	15	60	22	6	27	11	3	29	3	2	15	13	35	558 557	442 437	21.5 21.8	0.793 0.785						
10X8X33	60.00 FT	D 160016	4	3,592	17	14	63	22	6	27	9	2	18	2	2	18	11	34	533 523	403 390	26.5 26.5	0.757 0.746						
10X8X39	60.00 FT	D 159791	1	1,061	16	16	61	16	6	25	10	2	11	2	1	15	11	31	525 530	408 411	26.5 26.5	0.778 0.776						
12X8X50	40.00 FT	E 219115	2	1,814	18	17	63	23	7	26	9	2	19	4	13	1	12	35	524 546	384 411	28.0 27.5	0.733 0.753						
SUB TOTAL			169	90,507	====== NEXT ======																							

(1) Ceq: (CE=C+Mn/6+Cr/5+V/5+Mo/5+Ni/15+Cu/15)
(2) Gauge length : 200 mm
(3) Y.R = Y.S/T.S

Note

WE HEREBY CERTIFY THAT THE MATERIAL HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE ABOVE SPECIFICATION AND ALSO WITH THE REQUIREMENTS CALLED FOR THE ABOVE ORDER.

General Manager of Q.A Team

Customer Name TRI CITY METAL INC
Customer PO# ARYA
Shipper No 1674852
Heat Number E211288

IH20190305935-47 - E211288 - WFB601667 - 60

Contract No.	
Customer	WIRTH STEEL
PO No.	462019018111
L/C No.	
Commodity	H-BEAM
Specification	ASTM A572 GS0/A992/CSA G40.21-13 50WM(345WM)

INSPECTION CERTIFICATE

EN 10204(2004) TYPE 3.1

HYUNDAI STEEL

Factory	63, Jungbong-Daero, Dong-gu, Incheon, S. Korea
Certificate No.	IH20190305935-47
Class certificate No.	
Issue date	2019-03-28

Dimensions	Length	Heat No.	Quantity (PCS)	Weight (kg)	Chemical Composition														Tensile Test			Yield Ratio(%)	BEND TEST	Impact Test(L)				Remarks (Impact Specimen Size)
					C	Si	Mn	P	S	Cu	Ni	Mo	Cr	Al	V	Nb	Sn	CEq(1)	Tensile Strength	Yield Strength	Elongation (2)			V-Notch			℃	
					×100			×1000		×100				×1000				×100						AVG	1	2	3	
																			N/mm2		%	-	-	-				
16X10-1/4X67	45.00 FT	E 211286	9	12,312	18	15	97	23	6	25	8	2	16	2	13	2	11	40	549	391	28.0	0.713						
																			542	387	28.5	0.715						
16X10-1/4X67	45.00 FT	E 211288	3	4,104	18	16	95	24	7	24	9	2	16	3	14	1	12	40	556	411	24.5	0.740						
																			546	404	25.0	0.740						
16X10-1/4X67	50.00 FT	E 211285	2	3,038	19	16	96	23	6	24	8	2	14	3	13	2	9	41	548	401	25.5	0.732						
																			535	391	26.0	0.731						
16X10-1/4X67	50.00 FT	E 211286	20	30,380	18	15	97	23	6	25	8	2	16	2	13	2	11	40	549	391	28.0	0.713						
																			542	387	28.5	0.715						
16X10-1/4X67	50.00 FT	E 211288	5	7,595	18	16	95	24	7	24	9	2	16	3	14	1	12	40	556	411	24.5	0.740						
																			546	404	25.0	0.740						
16X10-1/4X67	50.00 FT	E 211289	1	1,519	18	15	93	22	7	21	8	2	16	2	14	1	12	39	553	399	26.0	0.722						
																			547	394	26.5	0.721						
16X10-1/4X67	60.00 FT	E 211286	2	3,646	18	15	97	23	6	25	8	2	16	2	13	2	11	40	549	391	28.0	0.713						
																			542	387	28.5	0.715						
16X10-1/4X67	60.00 FT	E 211287	40	72,920	18	14	98	24	7	27	8	2	14	2	14	2	11	40	552	410	28.5	0.743						
																			545	405	28.0	0.744						
16X10-1/4X67	60.00 FT	E 211288	27	49,221	18	16	95	24	7	24	9	2	16	3	14	1	12	40	556	411	24.5	0.740						
																			546	404	25.0	0.740						
16X10-1/4X67	60.00 FT	E 211289	2	3,646	18	15	93	22	7	21	8	2	16	2	14	1	12	39	553	399	26.0	0.722						
																			547	394	26.5	0.721						
SUB TOTAL			111	188,381	====== N E X T ======																							

(1) Ceq. (CE=C+Mn/6+Cr/5+V/5+Mo/5+Ni/15+Cu/15)
(2) Gauge length : 200 mm
(3) Y.R = Y.S/T.S

Note

WE HEREBY CERTIFY THAT THE MATERIAL HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE ABOVE SPECIFICATION AND ALSO WITH THE REQUIREMENTS CALLED FOR THE ABOVE ORDER.

General Manager of Q.A Team

This test report can be verified the authenticity to scan the top-right QR code via "Qreal" mobile app.

2019.04.02.16:37:06

9300332

HMS [102(A)-3a A4(210x297)

Customer Name TRI CITY METAL INC
Customer PO# ARYA
Shipper No 1674852
Heat Number E221402

Contract No.	
Customer	HYUNDAI CORPORATION
PO No.	46202006B41V
L/C No.	
Commodity	H-BEAM
Specification	ASTM A572 G50/A992/CSA G40.21-13 50WM(345WM)

INSPECTION CERTIFICATE

EN 10204(2004) TYPE 3.1

HYUNDAI STEEL

Factory	63, Jungbong-Daero, Dong-gu, Incheon, S. Korea
Certificate No.	IH20200804278-6
Class certificate No.	
Issue date	2020-09-02

Dimensions	Length	Heat No.	Quantity (PCS)	Weight (kg)	Chemical Composition														Tensile Test			Yield Ration	BEND TEST	Impact Test(L)				Remarks (Impact Specimen Size)
					C	Si	Mn	P	S	Cu	Ni	Mo	Cr	Al	V	Nb	N	$CE_{(1)}$	Tensile Strength	Yield Strength	Elongation (2)			V-Notch			°C	
					×100			×1000		×100				×1000			×10000	×100	N/mm2		%	-	-	AVG	1	2	3	-
14X8X48	60.00 FT	E 220656	1	1,306	19	16	63	24	8	31	8	1	18	3	13	1	120	36	542	390	27.0	0.720						
																			543	382	28.0	0.704						
16X7X57	60.00 FT	E 221255	4	6,204	18	17	95	24	13	29	11	3	14	2	14	2	107	40	573	414	26.5	0.723						
																			565	402	25.5	0.712						
16X10-1/4X67	50.00 FT	E 221400	3	4,557	18	15	97	24	8	28	9	2	13	2	15	1	128	40	558	404	26.0	0.725						
																			557	385	27.0	0.692						
16X10-1/4X67	50.00 FT	E 221401	1	1,519	18	19	96	21	5	28	9	2	12	3	14	1	117	40	570	414	25.0	0.727						
																			567	393	26.5	0.694						
16X10-1/4X67	50.00 FT	E 221403	3	4,557	19	16	96	26	8	28	10	2	16	2	13	1	108	41	570	403	25.5	0.708						
																			572	393	26.0	0.688						
16X10-1/4X67	60.00 FT	E 221401	1	1,823	18	19	96	21	5	28	9	2	12	3	14	1	117	40	570	414	25.0	0.727						
																			567	393	26.5	0.694						
16X10-1/4X67	60.00 FT	E 221402	3	5,469	18	15	96	27	9	28	10	2	20	2	15	1	109	41	575	405	25.0	0.705						
																			570	389	27.0	0.683						
16X10-1/4X67	60.00 FT	E 221403	4	7,292	19	16	96	26	8	28	10	2	16	2	13	1	108	41	570	403	25.5	0.708						
																			572	393	26.0	0.688						
18X11X76	60.00 FT	N 054625	3	6,204	18	14	94	25	7	24	13	2	17	3	15	1	125	40	572	422	25.0	0.738						
																			570	410	25.5	0.720						
18X11X97	60.00 FT	N 054622	4	10,564	18	15	94	23	4	18	7	2	15	2	15	1	115	39	561	403	25.0	0.719						
																			563	393	25.5	0.699						
SUB TOTAL			27	49,495	====== NEXT ======																							

(1) Ceq: (CE=C+(Cr+V+Mo)/5+(Cu+Ni)/15+Mn/6)
(2) Gauge length : 200 mm
(3) Y.R = Y.S/T.S

Note

WE HEREBY CERTIFY THAT THE MATERIAL HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE ABOVE SPECIFICATION AND ALSO WITH THE REQUIREMENTS CALLED FOR THE ABOVE ORDER.

General Manager of Q.A Team

Hi-Build Tneme-Tar®

SERIES 46H-413

ABRASION

METHOD: ASTM D 4060, (CS-17 Wheel, 1,000 grams load).

SYSTEM: Series 46H-413 Hi-Build Tneme-Tar cured 30 days at 75°F (24°C).

REQUIREMENT: No more than 142 mg loss after 1,000 cycles. (TR1301)

METHOD: ASTM D 968, (Method A, Falling Sand).

SYSTEM: One coat 46H-413 Hi-Build Tneme-Tar cured seven days at 75°F (24°C).

REQUIREMENT: 22 liters per mil.

ADHESION

METHOD: ASTM D 4541.

SYSTEM: Series 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP6/NACE No. 3 Commercial Blast Cleaned steel and cured seven days at 75°F (24°C).

REQUIREMENT: No less than 1,150 psi (7.93 MPa) pull, average of three tests. (TR5674)

METHOD: ASTM D 4541.

SYSTEM: Series 46H-413 Hi-Build Tneme-Tar applied to concrete and cured seven days outdoors.

REQUIREMENT: Exceeds the cohesive strength of the concrete substrate (400 psi), average of three tests. (TR1170)

HARDNESS

METHOD: ASTM D 3363 (Pencil).

SYSTEM: One coat 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP10/NACE No. 2 Near-White Metal Blast Cleaned steel and cured 14 days at 75°F (24°C).

REQUIREMENT: Must pass F (gouge).

IMMERSION

METHOD: ASTM D 870.

SYSTEM: Series 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP6/NACE No. 3 Commercial Blast Cleaned steel and cured for seven days.

REQUIREMENT: No blistering, cracking, softening or delamination of film after one year continuous immersion in tap water. (TR4867)

METHOD: Continuous immersion in sea water at Kure Bend, N. Carolina.

SYSTEM: Two coats 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP10/NACE No. 2 Near-White Metal Blast Cleaned steel.

REQUIREMENT: No blistering, cracking or delamination after two years exposure.

IMPACT

METHOD: ASTM D 2794 (Intrusion).

SYSTEM: One coat 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP10/NACE No. 2 Near-White Metal Blast Cleaned steel and cured 14 days at 95°F to 100°F (35°C to 38°C).

REQUIREMENT: No visible cracking or delamination after 40 in/lbs (4.52 J) direct impact.

Hi-Build Tneme-Tar® | SERIES 46H-413

SALT SPRAY (FOG)

METHOD: ASTM B 117.

SYSTEM: One coat 46H-413 Hi-Build Tneme-Tar applied to SSPC-SP6/NACE No. 3 Commercial Blast Cleaned steel and cured seven days at 75°F (24°C).

REQUIREMENT: No blistering, cracking, checking, rusting or delamination of film. No rust creepage at scribe after 9,000 hours continuous exposure. (TR6246)

Tnemec Company Incorporated 6800 Corporate Drive Kansas City, Missouri 64120-1372 1-800-TNEMEC1 Fax: 1-816-483-3969 www.tnemec.com

PRODUCT DATA SHEET

HI-BUILD TNEME-TAR® SERIES 46H-413

PRODUCT PROFILE

GENERIC DESCRIPTION Polyamide Epoxy-Coal Tar

COMMON USAGE High-build corrosion resistant coating providing one coat protection for concrete and steel in a variety of chemical, immersion and underground conditions. Also, when a two-coat application is desired, a low film build option is possible.

COLORS Black

FINISH Semi-gloss

SPECIAL QUALIFICATIONS Conforms to the performance requirements of AWWA C 210 (not for potable water contact).

PERFORMANCE CRITERIA Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

PRIMERS
Steel: Self-priming or Series 1, 66, N69, N69F, 90-97, H90-97, 161
Galvanized Steel: Series 66, N69, N69F, 161
Concrete: Self-priming, 63-1500, 218

SURFACE PREPARATION

STEEL
Immersion Service: SSPC-SP10 Near-White Blast Cleaning
Non-Immersion Service: SSPC-SP6 Commercial Blast Cleaning

GALVANIZED STEEL Surface preparation recommendations will vary depending on substrate and exposure conditions. Contact your Tnemec representative or Tnemec Technical Services.

CAST/DUCTILE IRON Contact your Tnemec representative or Tnemec Technical Services.

CONCRETE Allow new concrete to cure for 28 days. Abrasive blast all surfaces referencing SSPC-SP13/NACE 6, ICRI CSP 2-4 Surface Preparation of Concrete and Tnemec's Surface Preparation and Application Guide.

PRIMED SURFACES **Immersion Service:** Scarify the surface with fine abrasive before topcoating if the Series 66, N69 or 161 prime coat has been exposed to sunlight for 60 days or longer.

ALL SURFACES Must be clean, dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS 75.0 ± 2.0% (mixed)

RECOMMENDED DFT 16.0 to 20.0 mils (405 to 510 microns)
8.0 to 10.0 mils (200 to 250 microns) for the two-coat option

CURING TIME

Temperature	To Touch	To Recoat (Min./Max)	Immersion
95°F (35°C)	2 hours	3-14 hours	5 days
85°F (29°C)	3 hours	4-18 hours	6 days
75°F (24°C)	4 hours	6-28 hours	7 days
65°F (18°C)	6 hours	10-50 hours	10 days
55°F (13°C)	9 hours	16 hrs-3 days	14-16 days
45°F (7°C)	18 hours	32 hrs-4 days	22-24 days
35°F (2°C)	26 hours	44 hrs-6 days	28-32 days

Curing time varies with surface temperature, air movement, humidity and film thickness.
Use the above times as guidelines only. Scarify the surface with fine abrasive before recoating if the maximum recoat time has been exceeded.

VOLATILE ORGANIC COMPOUNDS
Unthinned: 1.91 lbs/gallon (229 grams/litre)
Thinned 20% (No. 2 Thinner): 2.80 lbs/gallon (335 grams/litre)
Thinned 20% (No. 65 Thinner): 1.91 lbs/gallon (229 grams/litre)

THEORETICAL COVERAGE 1,203 mil sq ft/gal (29.5 m²/L at 25 microns). See APPLICATION for coverage rates.

NUMBER OF COMPONENTS Two: Part A and Part B

MIXING RATIO By volume: One (Part A) to one (Part B)

PACKAGING 5 gallon (18.9L) pails and 1 gallon (3.79L) cans — Order in multiples of 2.

NET WEIGHT PER GALLON 11.74 ± 0.25 lbs (5.32 ± .11 kg) (mixed)

STORAGE TEMPERATURE Minimum 20°F (-7°C) Maximum 110°F (43°C)

TEMPERATURE RESISTANCE (Dry) Continuous 200°F (93°C) Intermittent 250°F (121°C)

SHELF LIFE 12 months at recommended storage temperature.

FLASH POINT - SETA Parts A & B: 81°F (27°C)

HEALTH & SAFETY Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

HI-BUILD TNEME-TAR® | SERIES 46H-413

APPLICATION

COVERAGE RATES

Conventional Build

	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)
Suggested	18.0 (455)	24.0 (610)	69 (6.4)
Minimum	16 (405)	21.5 (545)	75 (7.0)
Maximum	20.0 (510)	27.0 (685)	59 (5.5)

Two-Coat System (DFT each coat)

	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)
Suggested	9.0 (225)	12.0 (300)	134 (12.5)
Minimum	8.0 (200)	11.0 (275)	150 (14.0)
Maximum	10.0 (250)	13.0 (325)	120 (11.2)

Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

MIXING

Power mix contents of each container, making sure no pigment remains on the bottom. Pour a measured amount of Part B into a clean container large enough to hold both components. Add an equal volume of Part A to Part B while under agitation. Continue agitation until the two components are thoroughly mixed. Do not use mixed material beyond pot life limits. **Note:** Both components should be above 50°F (10°C) prior to mixing. For application to surfaces between 35°F to 50°F (2°C to 10°C), allow mixed material to stand thirty (30) minutes and restir before using. For optimum application properties, the material temperature should be above 60°F (16°C).

THINNING

Use No. 2 Thinner. For air spray, thin up to 20% or 1 1/2 pints (760 mL) per gallon; for airless spray, thin up to 5% or 1/4 pint (190 mL) per gallon. A maximum of 20% of No. 65 Thinner may be used to comply with VOC regulations.

POT LIFE

16 hours at 35°F (2°C) 6 hours at 55°F (13°C) 2 hours at 75°F (24°C) 3/4 hour at 95°F (35°C)

APPLICATION EQUIPMENT

Air Spray

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure
DeVilbiss JGA	E .070"	704 or 765	5/16" or 3/8" (7.9 or 9.5 mm)	1/2" (12.7 mm)	75-100 psi (5.2-6.9 bar)	20-40 psi (1.4-2.8 bar)

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
0.017"-0.021" (430-530 microns)	3400-4000 psi (234-276 bar)	3/8" or 1/2" (9.5 or 12.7 mm)	60 mesh (250 microns)

Use appropriate tip/atomizing pressure for equipment, applicator technique and weather conditions.
Note: Application over inorganic zinc-rich primers: Apply a wet mist coat and allow tiny bubbles to form. When bubbles disappear in 1 to 2 minutes, apply a full wet coat at specified mil thickness.
Brush: Brushing is recommended on small areas only. Ladle material on and then use flat side of brush to spread. Do not brush out to thin film as with conventional coatings.

SURFACE TEMPERATURE

Minimum 35°F (2°C) Maximum 120°F (49°C)
The surface should be dry and at least 5°F (3°C) above the dew point. Coating won't cure below minimum surface temperature.

CLEANUP

Flush and clean all equipment immediately after use with the recommended thinner or xylol.

Appendix 6 Plan and Elevation of existing trestles (1988)

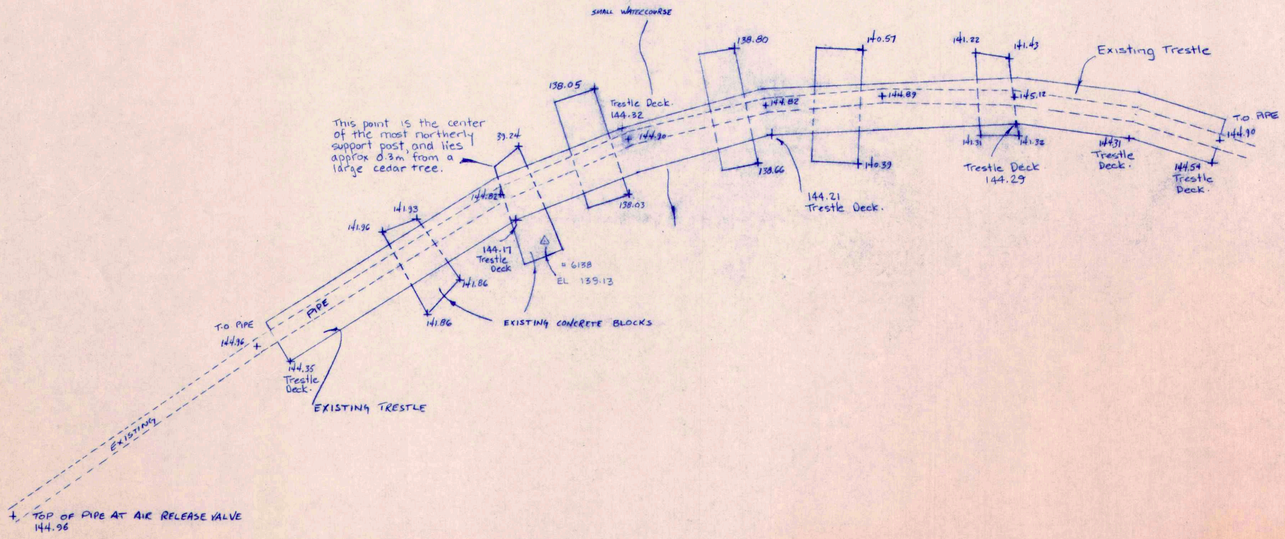
Plan and Elevations of existing Trestles and Water Pipe at the Sunshine Coast Regional District's Chapman Creek Water Intake.

Scale 1:100

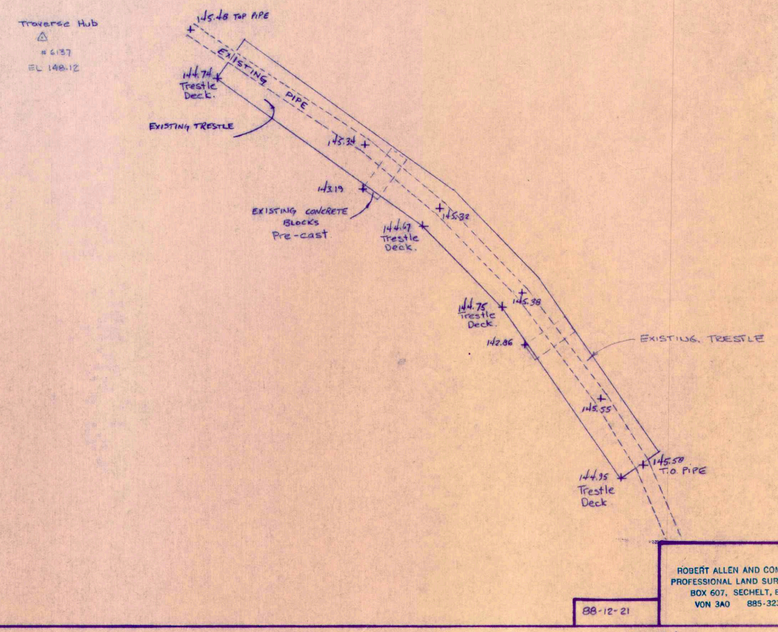
Notes

Elevations are derived from Station 'B' shown on the site Plan prepared by Dayton and knight, Professional Engineers, as 158.41m.

Elevations shown on the water pipe are to the top of the pipe. Approximate diameter of pipe 0.55m.



The water pipe is buried in this section lying between the Trestles.

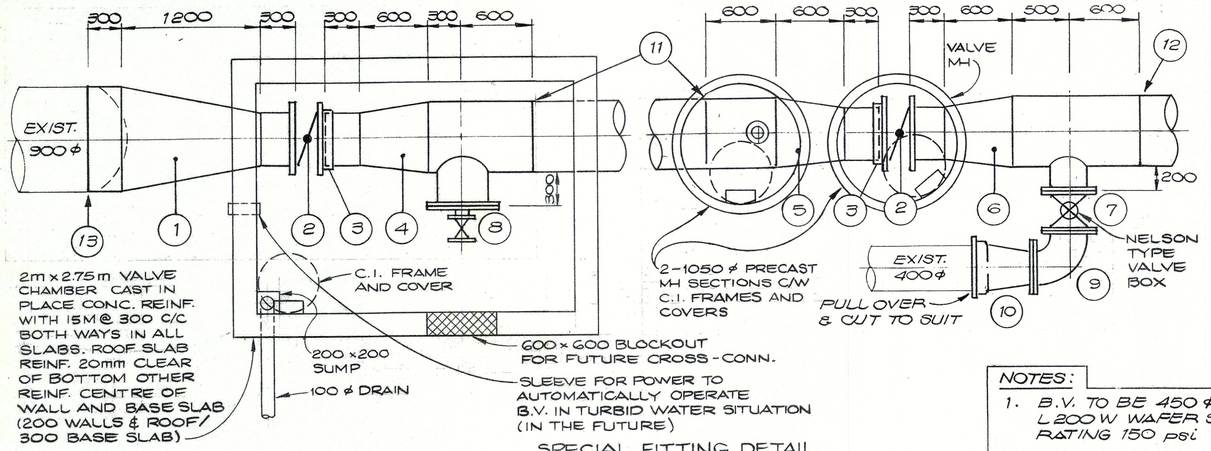


ROBERT ALLEN AND COMPANY
PROFESSIONAL LAND SURVEYORS
BOX 607, SECHELT, B.C.
V0N 3A0 885-3237

88-12-21

180-86/1106

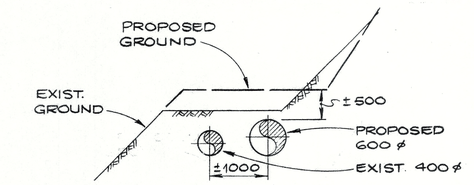
Appendix 7 Chapman Intake Supply Main (1979)



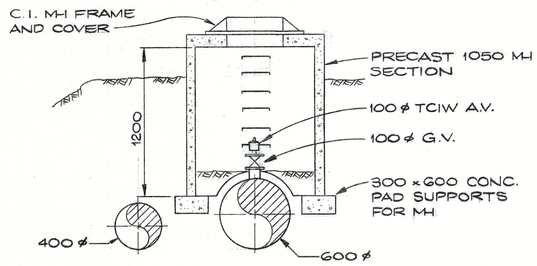
SPECIAL FITTING DETAIL
1:25

ITEM	DESCRIPTION	NO. REQ'D
1	900 x 450 STEEL SPECIAL	1
2	450 ϕ BUTTERFLY VALVE	2
3	450 ϕ FLANGE ADAPTER	2
4	450 x 600 x 450 STEEL SPECIAL	1
5	600 x 450 x 100 STEEL SPECIAL	1
6	450 x 600 x 300 STEEL SPECIAL	1
7	300 ϕ GATE VALVE	1
8	450 FLG. x 100 FLG. BLOWDOWN	1
9	300 ϕ FLG'D 90° ELBOW C.I.	1
10	300 FLG. x 400 HUB C.I.	1
11	600 ϕ STEEL x D.I. COUPLING	2
12	600 ϕ STEEL x STEEL COUPLING	1
13	900 ϕ STEEL x STEEL COUPLING	1

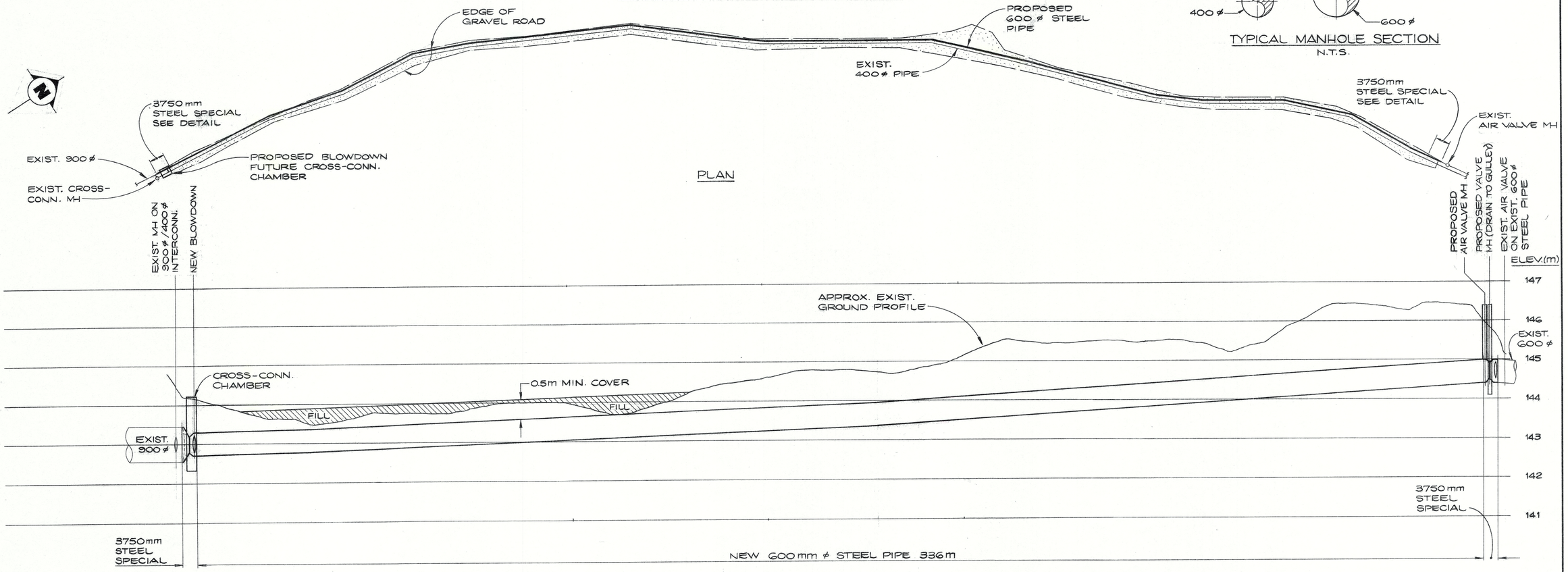
NOTES:
1. B.V. TO BE 450 ϕ (CENTERLINE) L 200 W WAFER STYLE - PRESSURE RATING 150 psi.
2. FLANGES ARE CLASS 125
3. NEED TWO 100 ϕ GATE VALVES



TYPICAL SECTION ASSUME LOOKING SOUTH
N.T.S.



TYPICAL MANHOLE SECTION
N.T.S.



PLAN

PROFILE

ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION	ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION

W.T.S. 198317 REVISIONS

DESIGNED A.B./J.F.
DRAWN KRC
CHECKED

DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS

SUNSHINE COAST REGIONAL DISTRICT
CHAPMAN CREEK INTAKE SUPPLY MAIN

SCALE: HORIZ. 1:500 VERT. 1:50
DRAWING No. 28.108.4
SHEET 1 OF 1 ISSUE A