REQUEST FOR PROPOSALS No. 23-058

French Creek Pollution Control Centre
ATAD Mixing Upgrade – Engineering Services

ISSUED: August 21, 2023

CLOSING DATE AND TIME:
Submissions must be received on or before:
3:00 PM (15:00 hrs) Local Time on September 12, 2023

Submissions and Questions are to be directed to:

Rob Wood, Project Engineer
Regional District of Nanaimo
957 Lee Road
Parksville, BC V9P 1Z4
250-713-6356
rwood@rdn.bc.ca

Questions are requested at least five (5) business days before the closing date

Non-Mandatory Onsite Information Session
11:00 AM (13:00 hrs) Local Time on August 31, 2023
French Creek Pollution Control Centre
957 Lee Road
Parksville, BC

Proposals will not be opened in public

Instructions to Proponents

The Regional District of Nanaimo (RDN) invites qualified and experienced engineering firms to submit a proposal package to provide structural, process mechanical, electrical, instrumentation and controls engineering services for upgrading the existing Turborator mixer / aerators to INVENT HyperClassic mixer / aerators in four (4) of the Autothermal Thermophilic Aerobic Digestion (ATAD) tanks at the French Creek Pollution Control Centre (FCPCC) as set forth in this Request for Proposal (RFP).

Closing Date / Time / Submission Method

Submissions must be received on or before **3:00 PM (15:00 hrs), Local Time, on September 12, 2023**.

Submission Method:

By Email: In PDF format with "**23-058 FCPCC ATAD Mixing Upgrade – Engineering Services**" as the subject line at this electronic address: rwood@rdn.bc.ca

Please note: Maximum email file size limit is 20MB, or less. The Regional District of Nanaimo (RDN) will not be liable for any technological delays of submissions.

Submissions received in any other manner will not be accepted.

Onsite Information Session (Non-Mandatory)

A non-mandatory onsite information session will be held to provide Proponents an opportunity to review the site conditions and ask questions. Proponents are required to bring their own PPE; CSA hard-toe boots and safety vest. The meeting will be held at FCPCC at the date and time indicated on the cover-page. **Please RSVP** by email to the listed RDN contact for this RFP.

Amendment to Proposals

Proposals may be amended in writing and sent via email to the RDN contact person identified on the cover page on or before the closing. Such amendments should be signed by the authorized signatory of the Proponent.

Addenda

If the RDN determines that an amendment is required to this RFP, the RDN will post the Addendum on the RDN (www.rdn.bc.ca/current-bid-opportunities) and BC Bid (www.bcbid.gov.bc.ca) websites. Each addendum will be incorporated into and become part of the RFP. No amendment of any kind to the RFP is effective unless it is contained in a written addendum issued by the RDN. It is the sole responsibility of the Proponent to check and ensure all amendments are included prior to submitting their final Proposal submission.

Withdrawal of Proposals

The Proponent may withdraw their Proposal at any time by submitting a written withdrawal email to the RDN contact person identified on the cover page on or before the closing.

Unsuccessful Vendors

The RDN will offer debriefings to unsuccessful Proponents, on request, at a mutually agreeable time.

1. INTRODUCTION

The purpose of this Request for Proposal (RFP) is to solicit submissions from qualified firms to submit a proposal package to provide structural, process mechanical, electrical, instrumentation and controls engineering services for upgrading the existing Turborator mixer / aerators to INVENT HyperClassic mixer / aerators in four (4) of the Autothermal Thermophilic Aerobic Digestion (ATAD) tanks at the French Creek Pollution Control Centre (FCPCC). The FCPCC is located at 957 Lee Road, Parksville, BC. Details of the requirements are described in the following sections.

2. BACKGROUND

French Creek Pollution Control Centre Background

Wastewater from approximately 28,000 people and businesses in Qualicum Beach, Parksville and the service areas of French Creek, Pacific Shores, Surfside and Barclay Crescent flows to the French Creek Pollution Control Centre (FCPCC), constructed in 1977. FCPCC also treats septage from septic systems and wastewater from properties with holding tanks.

FCPCC currently provides primary and secondary treatment to remove more than 90% of the biochemical oxygen demand (BOD) and total suspended solids (TSS). Solids removed during the treatment process are treated further to become biosolids. FCPCC treated 3.6 billion litres of wastewater in 2020. Treated wastewater is discharged into the Strait of Georgia 2,440 m offshore at a depth of 61 m.

Project Asset Description

The ATAD system at FCPCC is comprised of eight (8) concrete tanks, connected in series through piping in the walls between the tanks, and a separate fibre-reinforced plastic (FRP) sludge storage cell. The active digestion takes place in ATAD tanks 3 to 6 – the first two (2) tanks are currently inactive – where the mixer / aerators are located. Sludge flows between the tanks by gravity. The sludge then flows, by gravity, into the final two (2) concrete sludge storage tanks where it is then pumped to be dewatered and disposed. An additional FRP sludge storage cell was recently constructed adjacent to the ATAD system for additional sludge storage capacity. Record drawings of the ATAD system are included in **Appendix C**.

Project Background

The existing mixing system is comprised of two Turborator mixer / aerators per tank with additional submersible propeller mixers in ATAD tanks 3 and 6. The mixing system is inefficient, resulting in non-uniform digestion and deposition of solids in the tanks, requiring periodic cleanout. The upgrade will replace the existing mixing and aeration system with hyperboloid type mixer / aerators. The concept is an air sparger ring underneath each hyperboloid mixer, one per tank, that will provide air to the tank. The mixer then disperses the air throughout the tank, making fine bubbles and thoroughly mixing the sludge. One blower per tank is currently envisaged, however, the air supply philosophy (blower type, configuration and control) must be determined and is one of the primary tasks to complete in order to enable procurement of the long-lead blowers. Four (4) 2.5m diameter INVENT HyperClassic mixer / aerators have been selected and will be procured by the RDN. Reference **Appendix A** for a concept layout sketch of the proposed upgrade and **Appendix B** for a technical memo describing the existing system and recommendations for the mixer / aerator upgrade.

3. SCOPE OF SERVICES

The Proponent is required to provide the following services:

1. Review all available record documents.
2. Use a recent 3D scan of the ATAD tanks roof area and internals of ATAD tanks 3 to 5 as base information for design and layout of the equipment, piping and EIC components.
3. Drawings, specifications, data sheets, and other documents required for a complete detailed design, as per the Engineering Document Requirements List (EDRL) in **Appendix D** and more specifically including:

Structural Engineering:

a. Structural assessment of the existing concrete to determine the suitability of the existing concrete roof to incorporate a cutout sufficient for the installation and support of the proposed mixer.

   i. Design of rehabilitation or modifications to the structure to accommodate the mixers, if required, would be considered additional scope.

b. Design to permanently close the existing cutouts for the Turborators as well as several other unused openings in the concrete roof of the ATAD tanks.

c. Location and design of concrete housekeeping curbs (mixers) and pads (blowers) for the proposed equipment.

Process Mechanical Engineering:

d. Recommendations for the air supply philosophy. Specifically, the blower type, number, size, location and controls (e.g. valves and instruments).

e. Detailed procurement specifications for the blowers and other related equipment for the air supply.

f. Design and/or specification of a sound and weatherproof enclosure for the blowers.

g. Design and specification of the mechanical piping required to connect the blowers to the air sparger rings in each tank, including routing, sizing, material selection and supports.

h. Demolition plan for the existing Turborators and submersible propeller mixers.

Electrical, Instrumentation and Controls

i. Review and confirmation of available power and space for power supply equipment in the motor control centre (MCC) for the existing Turborators.

   i. Include review of existing variable frequency drives (VFD's) for reuse.

j. Design of MCC modifications to permit installation of the necessary electrical equipment.

k. Design and specification of all electrical, instrumentation and controls equipment.

l. Detailed process control narrative (PCN) for the mixer / aerator system.

m. Demolition plan for unused electrical and instrumentation equipment.

4. Construction sequencing description to minimize disruption to continued operation of the ATAD's during installation and commissioning.

5. Design reviews, submittals, and Class 'A' construction cost estimate.

6. Participate in process safety, operability, and maintainability reviews.

7. Procurement support for blower package equipment including specifications and datasheets, Q&A support, and quote evaluation and recommendation. RDN to prepare and administer the Request for Quote (RFQ).

8. Procurement support for the installation contractor including tender Q&A support, and bid evaluation and recommendation. RDN to prepare and administer the tender.

9. Project lists, plans, and reports to allow for fully documented design, construction, commissioning, and ongoing operational reference.

10. All significant design calculations are to be submitted to the RDN for record.

11. Coordination with the programming and integration services consultant.

12. Construction services including, but not limited to, the following items. The RDN will administer the construction contract:

    a. Attendance at construction kick-off meeting.

    b. Shop drawing reviews.

    c. Review and approval of the Installation Contractor's construction sequencing and process fluid bypass plan.

    d. Responding to RFI's / attending site to review and answers questions.

    e. Inspection of Work at milestones to ensure conformance with the drawings.

    f. Attendance at Substantial Completion walkthrough and follow-up inspections to review completion of deficiencies.

    g. Preparation of record drawings incorporating information gathered from field reviews and the Installation Contractor's as-built redlines.

    h. Preparation of an as-built PCN incorporating changes from construction and commissioning.

13. Commissioning services including, but not limited to, the following items. The Installation Contractor shall be responsible for preparing commissioning plans and conducting the commissioning.

    a. Review and approval of commissioning plans.

b. Confirmation of system readiness for startup and commissioning.

c. Review and documentation (e.g. system checklists) of commissioning activities and testing to confirm the system operates per the PCN, including, but not limited to the following checks:

   i. System operates properly throughout the full limits of design parameters.

   ii. All safety features and interlocks function as intended.

The RDN will provide or engage others to provide:

1. Plant Control System (PCS) programming and integration services.
2. Procurement of the mixers, blowers and installation contractor.
3. Contract administration of the construction contract.

4. DELIVERABLES

1. Provide all documents identified in the Engineering Document Requirements List (EDRL) in **Appendix D**.

5. SCHEDULE

- **September 29, 2023** – Proponent selected.
- **November 24, 2023** – Blower procurement package completed.
- **February 16, 2024** – Installation contractor procurement package completed.
- **Summer / Fall 2024** – Installation work, dependent on blower delivery.

6. REFERENCE / BACKGROUND INFORMATION

The following reference documents are included in the appendices for additional facility and project background.

- **Appendix A** – Concept Layout Sketch
- **Appendix B** – Technical Memo for ATAD Mixing System Upgrade, April 2023
- **Appendix C** – Record Drawings
- **Appendix D** – Engineering Document Requirements List
- **Appendix E** – Sample Form of Contract

7. PROPOSAL SUBMISSION AND EVALUATION

Submission

The RDN invites qualified and experienced engineering firms to submit a proposal package to provide structural, process mechanical, electrical, instrumentation and controls engineering services for upgrading the existing Turborator mixer / aerators to INVENT HyperClassic mixer / aerators in four (4) of the ATAD tanks at the FCPCC. To assist in receiving similar and relevant information, and to ensure your Proposal receives fair evaluation, the RDN asks Proponents to provide the following information.

1. Firm and Project Team Qualifications and Experience

a) Qualifications and areas of expertise of the Firm and nominated Project Team. Please include CV/Resume of the key personnel of the Project Team and explain their role in the project, and an organizational chart demonstrating roles and lines of responsibility for the Project Team.

b) Experience of the Firm and nominated Project Team in at least three previous relevant projects. Provide short descriptions of similar projects and assignments completed by both the Firm and nominated Project Team members. Provide brownfield project examples in congested areas and projects that include nominated team members.

c) Provide client references for two of the referenced projects. If the Firm has performed work with the RDN in the past, internal RDN references may be contacted at the RDN's discretion.

2. Project Management and Firm Resources

a) A description of your Firm's:
   a. Project management processes to assure quality and project control.
   b. Relevant supporting resources that could be drawn on should additional expertise be required to address anticipated or potential challenges to this specific project.
   c. List of relevant and plant-specific engineering and design software intended to be used for this assignment including Autodesk Plant 3D.

3. Sample Deliverables

a) Provide within the appendices sample documents that contain typical examples of the following documents. Provide examples that demonstrate proficiency and familiarity with the deliverables, identification and clear communication of items of importance to an engaged and hands-on client, and strong degree of detail to assist with asset management and process safety initiatives.
   a. Installed Cost Estimate template.
   b. P&ID drawing from similar scope project (limit to 1 page).
   c. Process Control Narrative.
   d. Engineering Work Package (EWP) Table of Contents.

4. Confirmation Statements

a) A statement of your Firm's ability to complete the work within the timeframe described substantiated with information demonstrating a well thought out commitment (e.g. schedule, discussion, notes, concerns, etc.) to the project.

b) A statement confirming that your Firm has a Permit to Practice professional engineering in BC issued by EGBC.

5. Sustainability Practices

a) Description of any corporate sustainability initiatives / practices in place. For example:
   a. Describe the systems, policies and/or practices you use to understand and manage your energy consumption and to reduce GHG emissions resulting from your own operational activities.
   b. Describe the systems, policies and/or practices you use to reduce waste, associated with by-products of production and other operational activities, and to work towards a circular economy through the repurposing of materials/waste.
   c. Describe the systems, policies and/or practices you use to manage and reduce harmful gaseous emissions (e.g. VOCs, Sox, Nox, other air pollutants, toxic fumes); harmful solid emissions (e.g. scarce metals, use of hazardous pesticides, particulate matter); and harmful liquid emissions (e.g. spills, liquid toxic waste, chemical fluids).

d. Describe any employment training, skills training, career mentoring, and/or apprenticeship opportunities you provide within your company.
e. Describe the systems, policies and/or practices you use to support local economic development in the communities and regions where you operate and do business such as sub-contracting and purchasing from local suppliers, partnerships with local organizations, and/or providing employment and skills training opportunities for the local workforce.
f. Describe the systems, policies and/or practices you use to promote wellness, active living, and/or work-life balance programs for all employees including strategies to manage physical safety and mental/emotional wellness.

6. Rates and Fee Estimate

Provide a fee estimate table that includes personnel, rates, activities and the estimated hours each team member is expected to expend on each activity. E.g.

Activities	**Personnel Name and Hourly Rate**	**Totals**
Activity #1	Hours	Row Subtotal
Totals	Column Subtotal	**Grand Total**

Include disbursements as a separate item in the total price.

Evaluation

Proposals will be evaluated on a 30% financial, 70% technical basis. The evaluation will review:

- Firm and Project Team Qualifications and Experience – 20 points
- Project Management and Firm Resources – 15 points
- Sample Deliverables – 15 points
- Confirmation Statements – 5 points
- Sustainability Practices – 15 points
- Financials – 30 points

The lowest price proposal will receive full marks. Other proposals will receive reduced scores based on the proportion higher than the lowest price. i.e. Score = Min Cost/Cost x Fee Points.

Proposals submitted should be in enough detail to allow the RDN to determine the Proponent's qualifications and capabilities from the documents received. The selection committee, formed at the RDN's sole discretion, will score the Proposals in accordance with the criteria provided.

The RDN may evaluate proposals on a comparative basis by comparing one Proponent's proposal to another Proponent's proposal. The RDN reserves the right to not complete a detailed evaluation if the RDN concludes the proposal is materially incomplete, irregular or if it contains any financial or commercial terms that are unacceptable to the RDN.

The selection committee may proceed with an award recommendation or the RDN may proceed to negotiate with the highest evaluated Proponent with the intent of developing an agreement. If the parties after having bargained in good faith are unable to conclude a formal agreement, the RDN and the Proponent will be released without penalty or further obligations other than any surviving obligations regarding confidentiality and the RDN may, at its discretion, contact the Proponent of the next best rated

Proposal and attempt to conclude a formal agreement with it, and so on until a contract is concluded or the proposal process is cancelled.

The RDN reserves the right to award the assignment in whole or in part or to add or delete any portion of the work. Throughout the evaluation process, the evaluation committee may seek additional clarification on any aspect of the Proposal to verify or clarify the information provided and conduct any background investigation and/or seek any additional information it considers necessary.

8. *COMPENSATION*

The successful proponent will be compensated for their actual costs, based on the rates provided in the proposal, up to the total amount of the fee estimate.

9. *PROPOSED PURCHASE CONTRACT*

The RDN's preferred form of Contract is attached herein in **Appendix E**. Proponents should carefully review this form of Contract. Proponents may (but are not required to) request that the RDN consider revisions to the form of Contract and include any clauses of concern in their proposal along with suggested language changes. Failure to do so means acceptance of the agreement as presented.

10. GENERAL CONDITIONS

10.1 No Contract

By submitting a Request for Proposal and participating in the process as outlined in this RFP, Proponents expressly agree that no contract of any kind is formed until a fully executed contract is in place.

10.2 Privilege Clause

The lowest or any proposal may not necessarily be accepted.

10.3 Acceptance and Rejection of Submissions

This RFP does not commit the RDN, in any way to select a preferred Proponent, or to proceed to negotiate a contract, or to award any contract. The RDN reserves the right in its sole discretion cancel this RFP, up until award, for any reason whatsoever

The RDN may accept or waive a minor and inconsequential irregularity, or where applicable to do so, the RDN may, as a condition of acceptance of the Submission, request a Proponent to correct a minor or inconsequential irregularity with no change in the Submission.

10.4 Conflict of Interest

Proponents shall disclose in their Proposals any actual or potential Conflict of Interest and existing business relationships it may have with the RDN, its elected officials, appointed officials or employees.

10.5 Solicitation of Board Members and RDN Staff

Proponents and their agents will not contact any member of the RDN Board or RDN Staff with respect to this RFP, other than the RDN Contact named in this document.

10.6 Litigation Clause

The RDN may, in its absolute discretion, reject a Proposal submitted by Proponent, if the Proponent, or any officer or director of the Proponent is or has been engaged either directly or indirectly through

another corporation in legal action against the RDN, its elected or appointed officers and employees in relation to:

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

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

10.7 Exclusion of Liability

Proponents are solely responsible for their own expenses in preparing and submitting a Proposal and for any meetings, negotiations, or discussions with the RDN. The RDN will not be liable to any Proponent for any claims, whether for costs, expense, losses or damages, or loss of anticipated profits, or for any other matter whatsoever, incurred by the Proponent in preparing and submitting a Proposal, or participating in negotiations for a Contract, or other activity related to or arising out of this RFP. Except as expressly and specifically permitted in these Instructions to Proponents, no Proponent shall have any claim for 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.

10.8 Ownership of Proposals

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

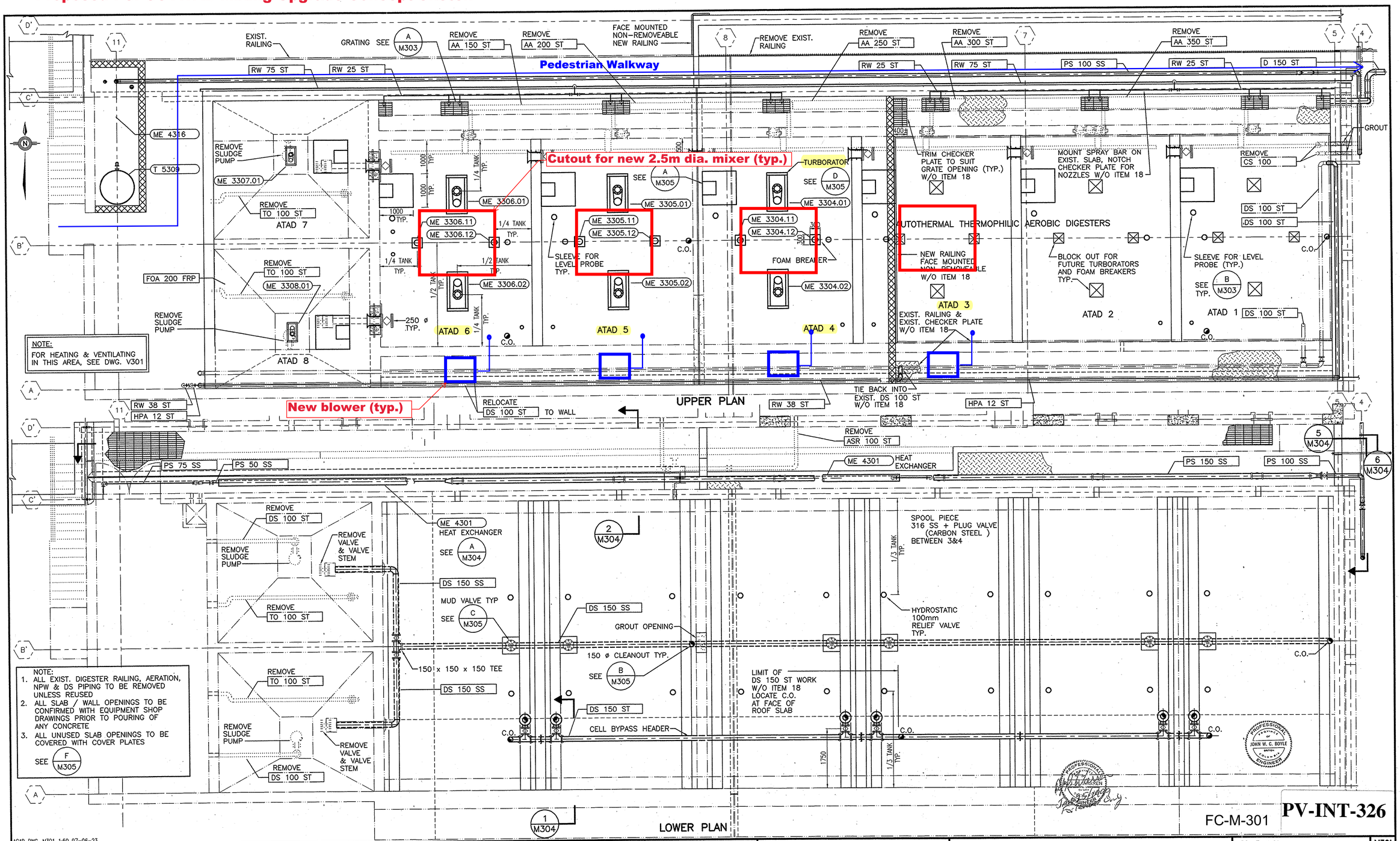
10.9 Freedom of Information

All submissions will be held in confidence by the RDN. The RDN is bound by the Freedom of Information and Protection of Privacy Act (British Columbia) and all documents submitted to the RDN will be subject to provisions of this legislation. The successful vendor and value of the award is routinely released.

REGIONAL DISTRICT OF NANAIMO

Appendix A
Concept Layout Sketch

Proposed FCPCC ATAD Mixing Upgrade Concept Sketch



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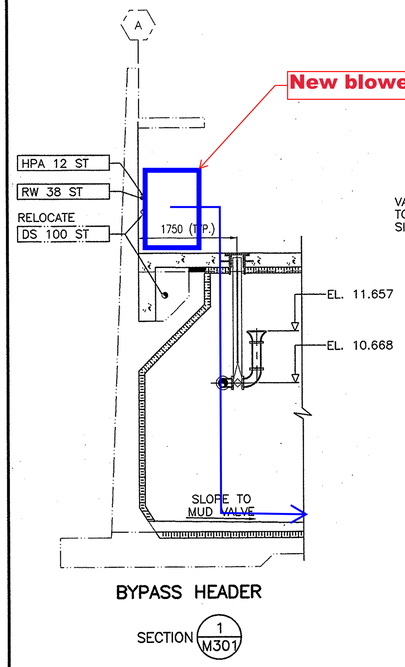
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Consulting Engineers
JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS – PLANS

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SHEET 107 OF 180 ISSUE B

FC-M-301

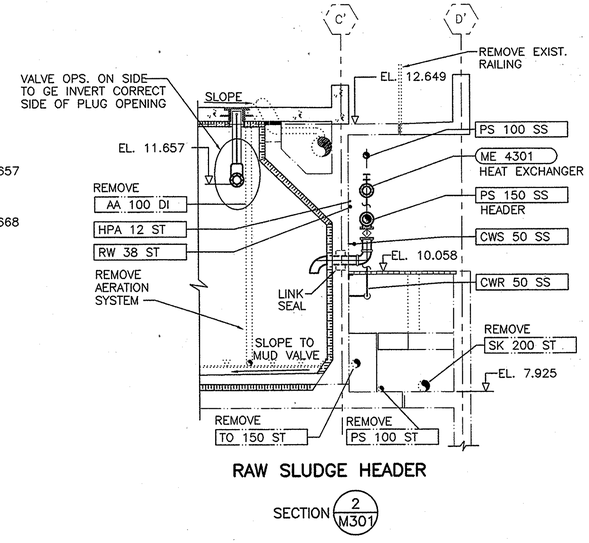
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BYPASS HEADER

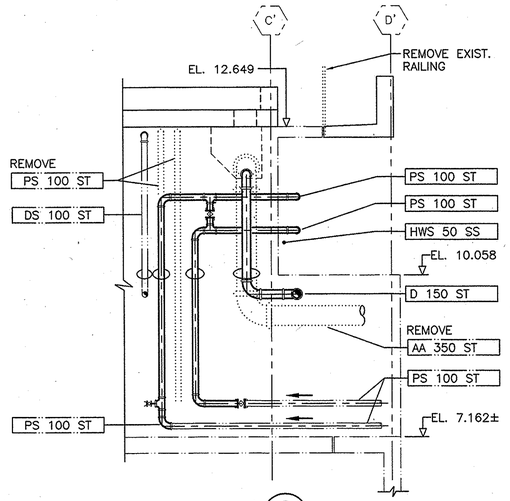
SECTION 1 / M301

ADDITIONAL STEEL SLUDGE LINE EASTS
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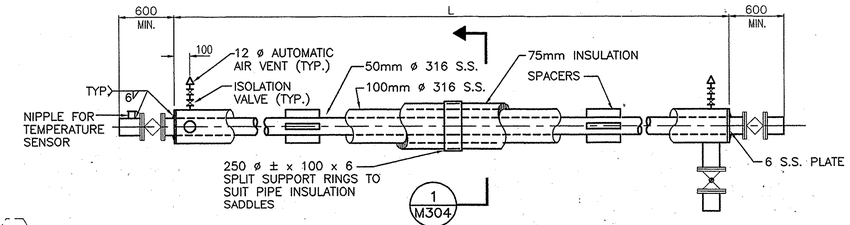


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SECTION 2 / M301



SECTION 5 / M301

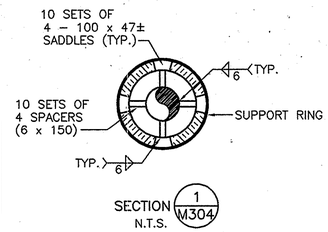


SLUDGE / COOLANT HEAT EXCHANGER

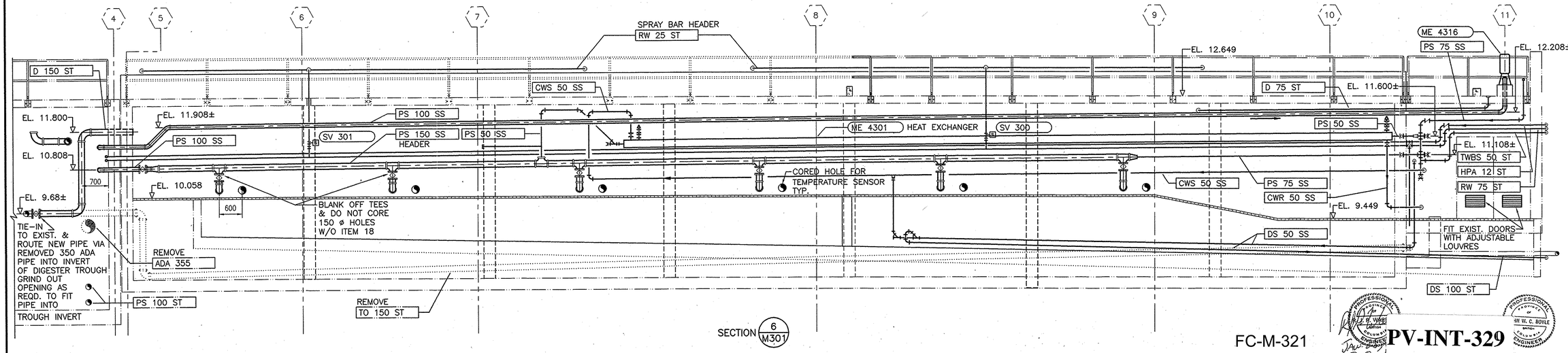
DETAIL A / M304
N.T.S.

HEAT EXCHANGER LENGTHS		
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ME 4301	20000	1

NOTES:
1. ORIENTATION OF HOT WATER INLET & OUTLET NOZZLES TO SUIT PIPE LAYOUT DWGS.
2. ALL METAL PARTS TO BE 316 S.S.



SECTION 1 / M304
N.T.S.



SECTION 6 / M301

FC-M-321

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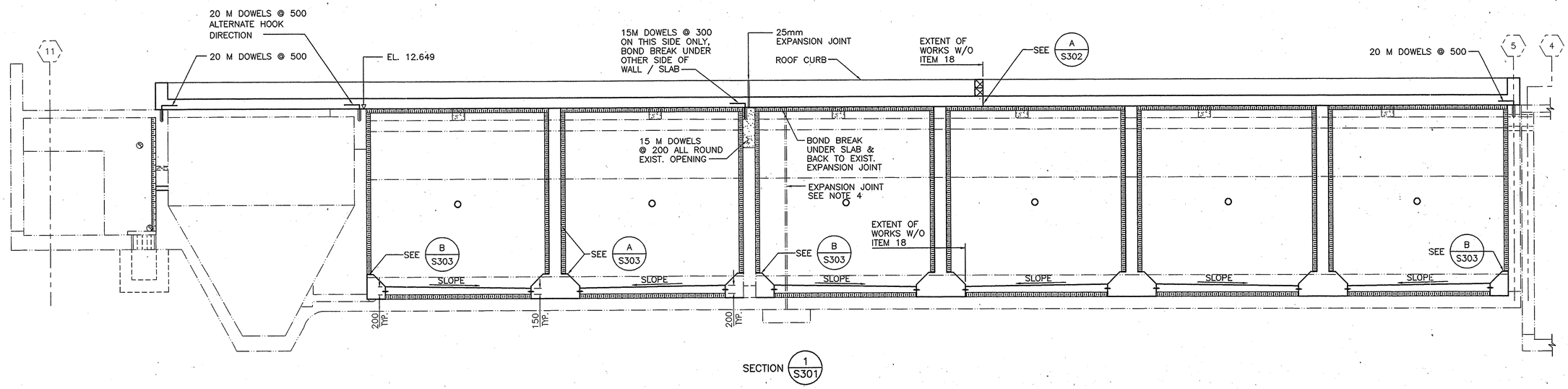
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Consulting Engineers
JAN 22 1999

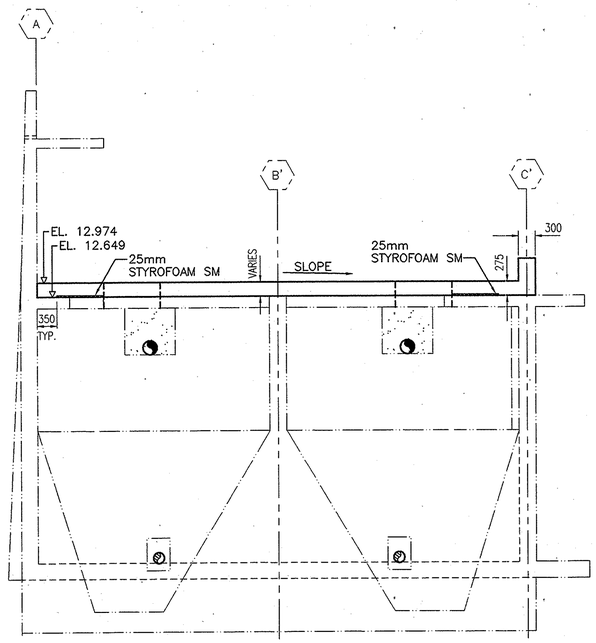
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FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS – SECTIONS

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SHEET 110 OF 180 ISSUE B

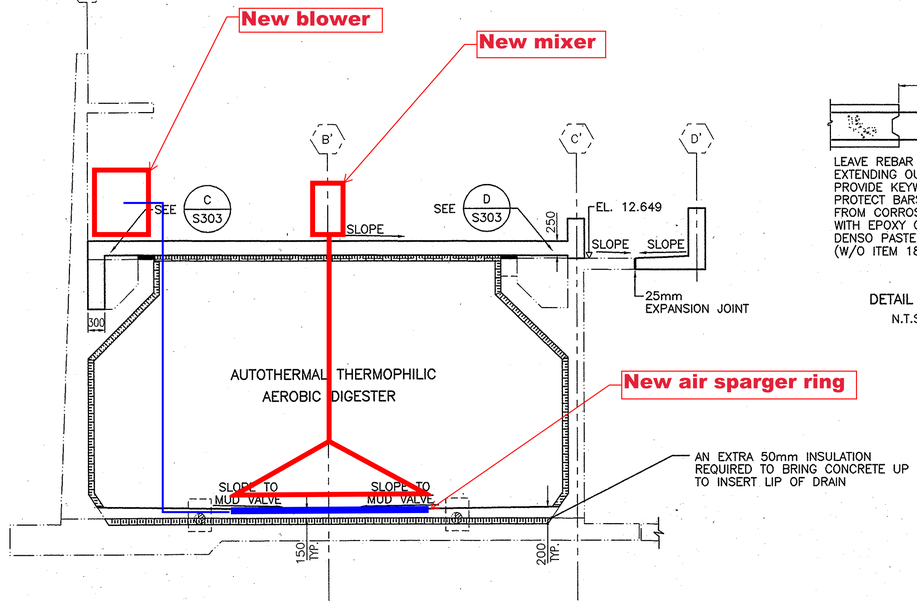
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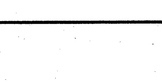
SECTION 1 / S301



SECTION 2 / S301



SECTION 3 / S301 (TYP.)



DETAIL A / S302
N.T.S.

NOTES:

1. ALL REBAR DOWELS TO USE HILTI INJECTION TECHNIQUE HIT C-100 ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
2. ALL EXIST. INTERIOR DIGESTER TANK SURFACES TO BE CLEANED, PRESSURE WASHED, AND SAND BLASTED PRIOR TO POURING ANY NEW CONCRETE OR INSTALLING INSULATION
3. CONTRACTOR SHALL LOCATE REBAR IN WALLS AND SLABS TO AVOID CUTTING OF SAME WITH DOWELLING OPERATIONS
4. CONTRACTOR SHALL CLEAN OUT EXIST. EXPANSION JOINT AND RESEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. W. WARREN

FC-S-323

PV-INT-282

ACAD DWG. S302 1:50 97-05-27

AutoCAD DRAWING

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DAYTON & KNIGHT LTD.
Consulting Engineers
JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTER – SECTIONS

SCALE: 1:50 OR AS SHOWN
S302
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SHEET 63 OF 180 ISSUE B

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Appendix B
Technical Memo for ATAD Mixing System Upgrade
April 2023

WATER^3 INNOVATION INC.
EDMONTON, ALBERTA, CANADA
INFO@WATER3INNOVATION.COM

Technical Memo for ATAD Mixing System Upgrade

Prepared for

The Regional District of Nanaimo

Prepared by

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List of Acronyms and Abbreviations

°C	degrees Celsius
%	percent
ATAD	autothermal thermophilic aerobic digestion
CFD	Computational Fluid Dynamic
CFM	cubic feet per minute
COD	chemical oxygen demand
dB(A)	A-weighted decibels
FCPCC	French Creek Pollution Control Centre
ft	feet
g/L	grams per liter
H_2S	hydrogen sulfide
hp	horsepower
HRT	hydraulic retention time
kJ	kilojoules
kw	kilowatts
m	metres
m^3/day	cubic metres per day
m^3/hr	cubic metres per hour
mbar	millibars
mg/L	milligrams per litre
mm	milimetres
mV	millivolts
NH_4-N	ammonium nitrogen
NO_2-N	nitrite nitrogen
NO_3-N	nitrate nitrogen
ORP	oxidation reduction potential
OU	oxygen uptake
OUR	oxygen uptake rate

PD	positive displacement
ppm	parts per million
psi	pound-force per square inch
rpm	revolutions per minute
SCFM	standard cubic feet per minute
SOTE	standard oxygen transfer efficiency
SRT	solids retention time
SWD	side water depth
TWAS	thickened waste activated sludge
VFD	variable frequency drive
VS	volatile solids
VSD	volatile solids reduction
VSS	volatile suspended solids

1. Introduction

1.1 What is Autothermal Thermophilic Aerobic Digestion (ATAD)

Autothermal thermophilic aerobic digestion (ATAD) is a sludge digestion process that is capable of achieving a high degree of stabilization and pathogen reduction. The process is characterized by high reaction rates achieved at a thermophilic temperature of 50-70°C. The temperatures are attained by using the heat released by the exothermic microbial oxidation process. Approximately 15,000 kJ of heat is generated per kilogram of volatile solids destroyed. In a completely mixed and aerated environment, the thermophilic temperatures attained are sustained without the addition of supplemental heat, other than the heat introduced by aeration. With the sufficient insulation, hydraulic retention time (HRT), and adequate solids concentrations and mixing, the process can achieve between 40% and 50% volatile solids destruction and sufficient pathogen reduction to produce class A biosolids. The feed must contain a minimum volatile solids content of between 25 and 40 g/LCOD (chemical oxygen demand). Fine screening or grinding and good grit removal are required to remove or grind the plastic and stringy materials and to minimize abrasion on aerators and mixers.

1.2 ATAD Operation

The key to effective ATAD performance is aeration and mixing. The aeration system is designed to:

1. Transfer sufficient oxygen to meet the high demand of the digestion process,
2. Supply the oxygen required while minimizing the latent heat loss in the exhaust air, and
3. Provide adequate mixing of the sludge to ensure complete stabilization. Aeration and mixing systems include aspirating aerators, Venturi aeration equipment, jet aeration, and immersible mechanical aerators.

Substantial amounts of foam are generated in ATAD reactors because of cellular proteins, lipids, and oil and grease materials breaking down and releasing into solution. A freeboard of 0.5 to 1.0 m (1.65 to 3.3 ft) should be provided in the reactors to use as volume for foam development and control. Mechanical foam cutters suspended in the reactors at fixed elevations, vertical mixers and spray systems can also be used for foam control.

The ATAD process produces significant amount ammonia, as nitrifying bacteria do not function at thermophilic temperatures. The ammonia concentrations returning to the plant in the recycled centrate are significant and can impact the plant's secondary treatment process. A side stream treatment for this high strength centrate with the nitrification and denitrification processes can eliminate the impact on main stream treatment process at the same time also help main stream treatment process with additional nitrifiers.

The off-gas ammonia concentration could be as much as 800 ppm. Reduced sulfur compounds, such as hydrogen sulfide, carbonyl sulfide, methyl mercaptan, ethyl mercaptan, dimethyl sulfide, and dimethyl disulfide may also be produced in the ATAD process when the localized anaerobic conditions occur due to insufficient mixing and oxygen transfer. Odors can be controlled if proper operating temperatures are achieved and the reactors are adequately mixed and aerated. Odor control systems may include wet scrubbers and biofilters.

1.3 Advantages and Disadvantages of ATAD Compared to Conventional Aerobic-Anaerobic Sludge Digestion

In summary, the major advantages of ATAD are:

- Significantly reduced solids retention time (SRT) of 5 to 8 days to achieve a volatile solids reduction of 40 to 50%.
- Reducing pathogenic viruses, bacteria, viable helminth ova, and other parasites to below detectable levels, thus meeting the pathogen reduction requirements of class A biosolids.
- Approximately 25% lower oxygen requirement because few, if any, nitrifying bacteria exist in temperatures above 40°C.
- Heat exchangers are used for cooling the biosolids discharged from the reactors. Heat recoverable for heating buildings.
- Smaller wastewater treatment plant do not need to deal with biogas.

The disadvantages of ATAD are:

- High capital and operating costs

- Digested biosolids thickening is necessary to achieve solids consolidation to a minimum solid's concentration of 4% (preferably 5 to 6%)
- Requirement for extremely efficient aeration for systems using air instead of high-purity oxygen
- Objectionable odors
- Foam breakers required, due to the high degree of foaming in the reactors
- Poor dewatering characteristics of digested biosolids
- Larger carbon footprint of the facility

2. ATAD Process at the French Creek Pollution Control Centre (FCPCC)

2.1 Current Operation Conditions and Performance

The ATAD process at the French Creek Pollution Control Centre (FCPCC) facility has four active tanks (3-6) and two tanks (1-2) constructed for future expansion and have no aeration and mixing equipment installed (Table 1). Tanks 3 through 6 are operated in series from Tank 3 through to 6 by gravity and sludge storage Tanks 7 and 8 which follow Tank 6 and are used for digested sludge storage, cooling and thickening prior to dewatering. Digested sludge is conveyed by progressive cavity pumps for dewatering using centrifuge.

Table 1. FCPCC ATAD Tank Dimensions

Parameter	Value
Tanks 1 to 4	
Length (m)	4.4
Width (m)	8.53
SWD (m)	3.86
Tanks 5 to 6	
Length (m)	4.4
Width (m)	8.53
SWD (m)	3.92

ATADs 3, 4, 5 and 6 are currently mixed and aerated by Turborators. Tanks 3-5 have two Turborators, powered by 20 hp motors and Tank 6 has two Turborators powered by 25 hp motors. The Turborators are mounted on the roof of the ATAD tanks, each with a vertical shaft leading down to an impeller inside the ATAD tank. The self-aspirating design allows the impeller to introduce outside air into the sludge through the hollow shaft, producing fine bubbles due to the shearing action of the impellers. The temperatures inside the existing ATADs are monitored and controlled automatically by increasing or reducing the speed of the Turburator impellers through variable frequency drives (VFDs). The sludge temperatures are maintained between 38°C and 69°C (Table 2).

Table 2. FCPCC - ATAD Operational Data for Jan. 2022 to Feb. 2023

Parameter	Value
Feed solids (Primary 65%, TWAS 35%)	
Annual average Solids loading (m^3/day)	52.2
Maximum Month average (m^3/day)	59
Average Tank Operating Temperature (^oC)	
Tank 3	38-43
Tank 4	50-55
Tank 5	55-63
Tank 6	65-69
Average Volatile solids reduction (%)	45.1
Average VSS reduction range (%)	39-54

In the past, the volatile solids (VS) reduction rate has been reported to be between 26% and 52%. However, in 2022-2023, with better temperature and process control by Plant Operation the VS reduction rate has been more consistent in 39% to 54% range (Table 2). The ATAD process improvement is also evident from the centrate quality collected during 2022-2023 for the side stream treatment study at the University of Alberta. The COD has been reduced from 9000 mg/L to 3087 mg/L and ammonia from 950 mg/L to 750 mg/L (Table 3).

Table 3. Centrate Quality

Date	pH	NH_4-N (mg/L)	NO_2-N (mg/L)	NO_3-N (mg/L)	Alkalinity (mg/L)	COD (mg/L)
4/13/2022	7.3	950	12	9	2250	9000
1/19/2023	7.6	895	22	8.4	2100	5700
3/23/2023	7.4	750	30	8.4	2330	3087

2.2 ATAD Operational Challenges

When temperatures get higher than the set value, the impeller speed is reduced in order to reduce the amount of air being introduced, which in turn reduces the biological activity and heat production. However, mixing is also reduced when impeller speed is reduced, leading to the deposition of solids in the ATAD tanks and a reduction in the active volume of the tanks. In order to keep the settled solids in suspension, a submersible Flygt mixer has been installed in tank 3 and tank 6 whereas tank 4 and tank 5 rely upon high rate of mixing through Turborators. The current operation of the existing

ATAD Turborator is not ideal. As discussed above, solids settle out in the ATAD tanks when the Turborators are turned down to control aeration and sludge temperature. The inadequate mixing within the tanks does not distribute the oxygen efficiently throughout the ATAD tanks, leading to areas that do not receive sufficient oxygen leading to the formation of odorous reduced hydrogen compounds (such as hydrogen sulphide methyl mercaptans etc.) making the ATAD tanks the primary source of odor generation. High temperatures in the ATAD process is resulting in frequent failure of the Flygt submersible mixers. Free board to control the foaming in the tanks also reduces the effective operational volume of the tanks this further reducing the hydraulic retention time (HRT). This unwanted interdependence between aeration and mixing could be eliminated by providing alternate equipment, such as a mixer and aeration system.

In order to establish the current amount of air injected, airflow measurement was made for each Turborator in ATAD tanks 3-6 (Table 4).

Table 4. Air Flow to ATAD Process

ATAD	Turborator A	Turborator B	Total Air SCFM	Air Flow (m^3/hr)
Tank 3	328	334	662	1046
Tank 4	279	279	558	849
Tank 5	288	275	563	888
Tank 6	295	295	590	931
Total	**1190**	**1183**	**2373**	**3714**

2.3 Odor Management for ATAD Process

The odor control system at the FCPCC uses two bio-scrubbers followed by a chemical scrubber. The chemical scrubber is Met-Pro Duall Division model F-108 52MD with 4000 SCFM treatment capacity. The chemical scrubber currently operates at 3350 CFM. However, ~ 400 CFM comes in from Septage Receiving. Only foul air from the septage system and ATAD tanks are sent to the ATAD process odor control system. The FCPCC receives frequent odor complaints. Generally a significant amount of ammonia could also be present in the exhaust air from the ATAD tanks, for FCPCC mercaptans and H_2S gas been identified as source of odor. An air quality assessment before and after the odor scrubber should be considered.

3. ATAD Modelling and Suggested Upgrades

3.1 BIOWIN Model-1

The BIOWIN modeling was done for a range of airflow rates to the ATAD process. Two models were developed representing two scenarios. These models were run with the airflow range of 100 m^3/hr to 1000 m^3/hr to each ATAD tank. For the Model-1 as shown in Figure 1, independent ATAD process was run in which the model input was primary sludge and thickened waste activated sludge (TWAS) quality (Table 5). Tanks 3-6 were operated in series. The %VS reduction was calculated in each tank. Cumulative %VS reduction of the tanks was the overall %VS reduction for ATAD process.

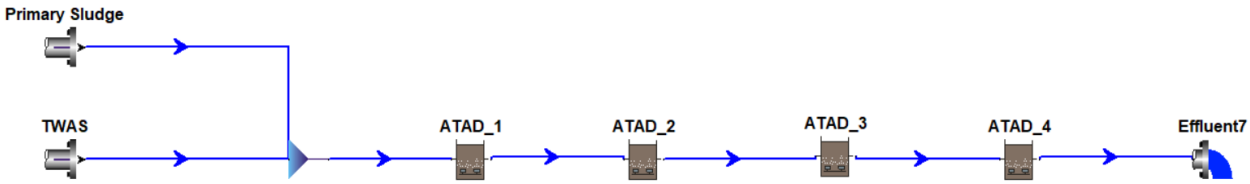


Figure 1. BIOWIN Model-1 for Standalone ATAD Process

Table 5. BIOWIN Modelling Input

Parameter	Value
Source	Municipal sludge
Feed solids	Primary 65%, TWAS 35%
Sludge feed rate (m^3/day)	52.2
Solids	6%
Volatile suspended solids	75%
Feed temperature °C	20
Tank Length (m)	4.4
Tank Length (m)	8.5
Tank Length (m)	3.8
Free board (m)	1
pH	7.3
Aeration (m^3/hr)	100 - 1000

The oxygen uptake rate (OUR) is shown in the Figure 2. The process performance and oxygen transfer efficiency steadily increased to an airflow of 500 m^3/hr (Figure 2). The most interesting

observation of oxygen uptake rate (OUR) for the ATAD tanks 3 & 4 is the steady OUR at even higher airflow due to the oxygen demand at the first two stages of digestion. For the tank 5, the OUR start dropping at 800 m^3/hr airflow. However, for the last ATAD tank 6, the drop in OUR starts at 500 m^3/hr airflow rate. This pattern of OU in the ATAD process helps in developing airflow control and supply philosophy. The airflow to each tank can be controlled through oxidation reduction potential (ORP) measurement based on the oxygen demand.

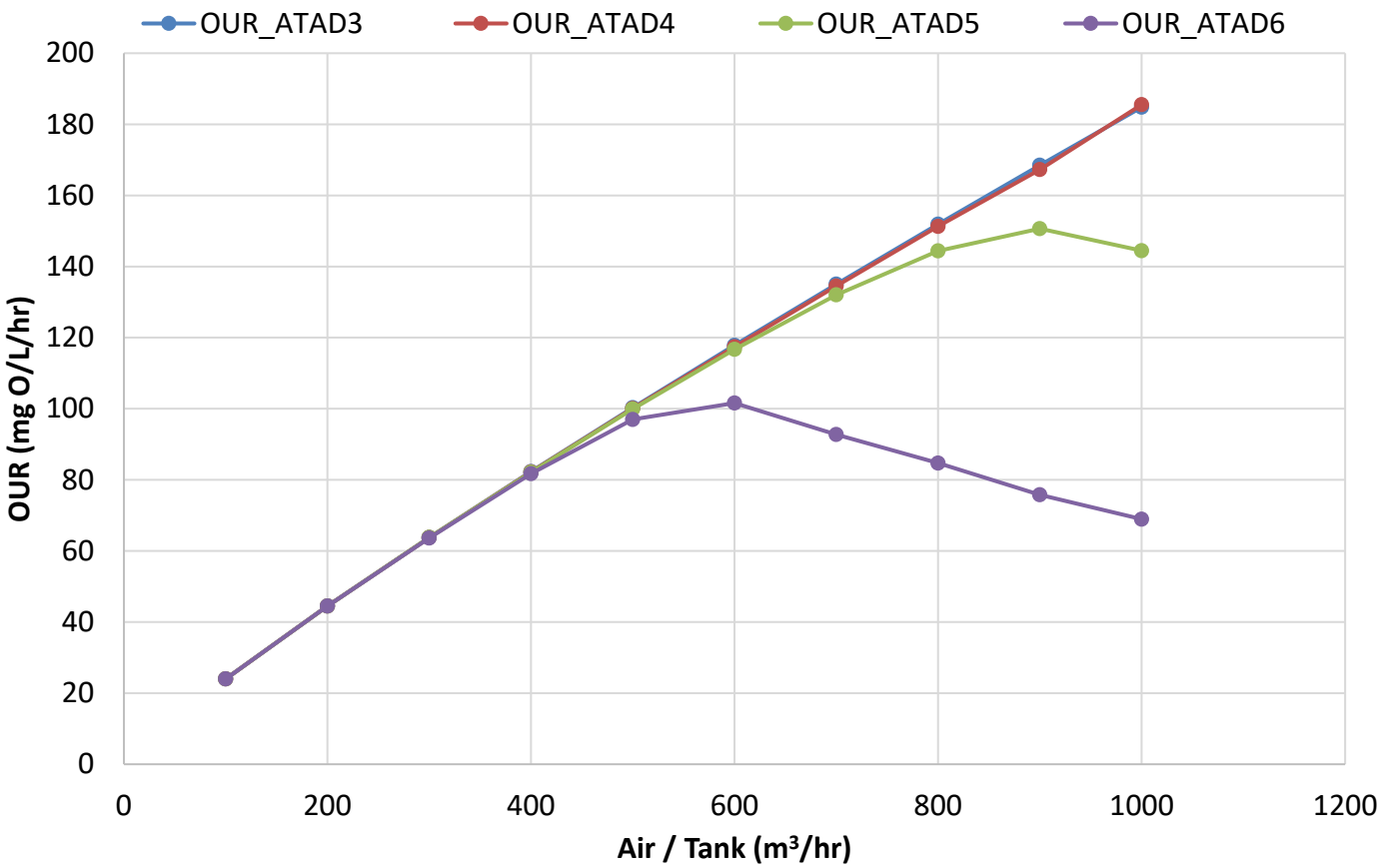


Figure 2. Oxygen Uptake Rate (OUR) for Model-1

The %VS reduction also increased with additional airflow proportionally up to 500 m^3/hr after that airflow rate it did not result in proportional increase in VS destruction rate (Figure-3). The BIOWIN modelling indicated that the optimal airflow for the process is around 500 m^3/hr compared to almost 1000 m^3/hr through both Turborators in each tank currently being supplied. These observations help in selecting the right size of mixer and air blower. At the same time will result in power saving as well

as more effective odor scrubbers operations due to reduced foul air being injected to these scrubbers.

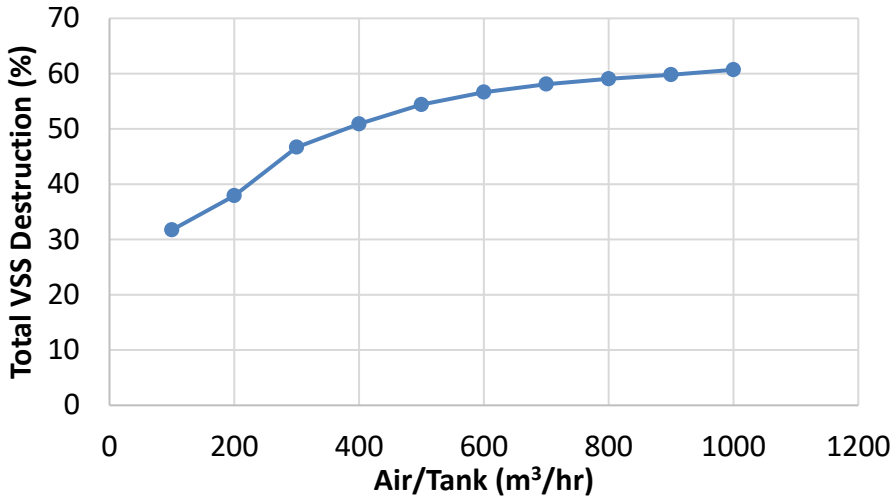


Figure 3. VSS Reduction (%) for Model-1

The individual % VS reduction for each ATAD tank as shown in Table 6 indicates that the VS reduction is uniformly increases to around 20% for the airflow up to 700 m^3/hr. However, after 700 m^3/hr, the VS reduction is not proportionate to airflow increase. This may be due to the oxygen transfer efficiency at higher airflow rates. It seems more logical to keep the airflow for each tank more uniform between 400-700 m^3/hr for each tank for more efficient oxygen transfer in the ATAD process.

Table 6. Air Flow to ATAD Process % VS Reduction

Air (m^3/hr)	%VS reduction Tank3	%VS reduction Tank 4	%VS reduction Tank 5	%VS reduction Tank 6	Total %VS reduction
100	13.76	10.33	6.95	5.11	31.72
200	12.38	9.40	11.19	11.93	37.91
300	12.64	14.12	15.56	15.86	46.69
400	14.94	17.13	17.96	15.08	50.89
500	16.93	19.19	17.58	17.65	54.40
600	18.57	20.24	19.15	17.42	56.64
700	19.86	20.46	21.36	16.41	58.10
800	20.84	20.73	22.91	15.38	59.07
900	21.68	22.40	22.65	14.49	59.80
1000	22.71	24.29	22.25	13.63	60.70

Similarly, standard oxygen transfer efficiency (SOTE) was higher at smaller airflow due to high oxygen demand. However, after 20 m^3/hr through each diffuser, the SOTE was steady (Figure 4). The airflow between 400-700 m^3/hr/tank will need 20 diffusers/tank.

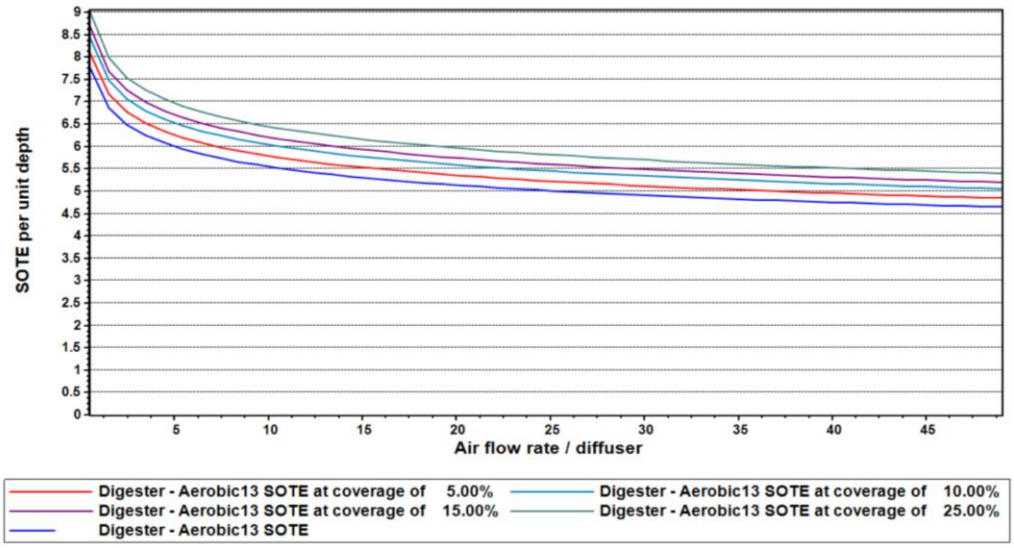


Figure 4. SOTE for Model-1

3.2 BIOWIN Model-2

The second BIOWIN Model-2 was developed for the scenario where the ATAD was considered as part of the overall main stream treatment process (Figure 5). The input for this model was the plant influent instead of primary sludge and TWAS properties provided in the BIOWIN Model-1.

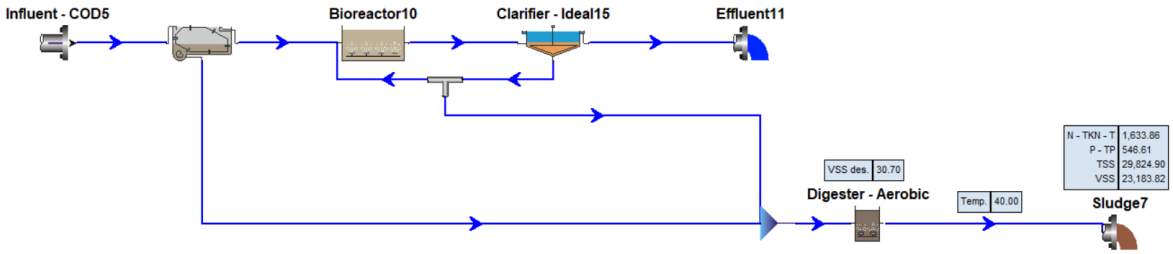


Figure 5. BIOWIN Model-2 for ATAD Process as part of the main stream treatment

This model was developed to compare and confirm the ATAD performance under both scenarios. Both Models produced fairly similar process performance in terms of OUR and %VS reduction under same airflow to the process respectively (Figures 6 and 7).

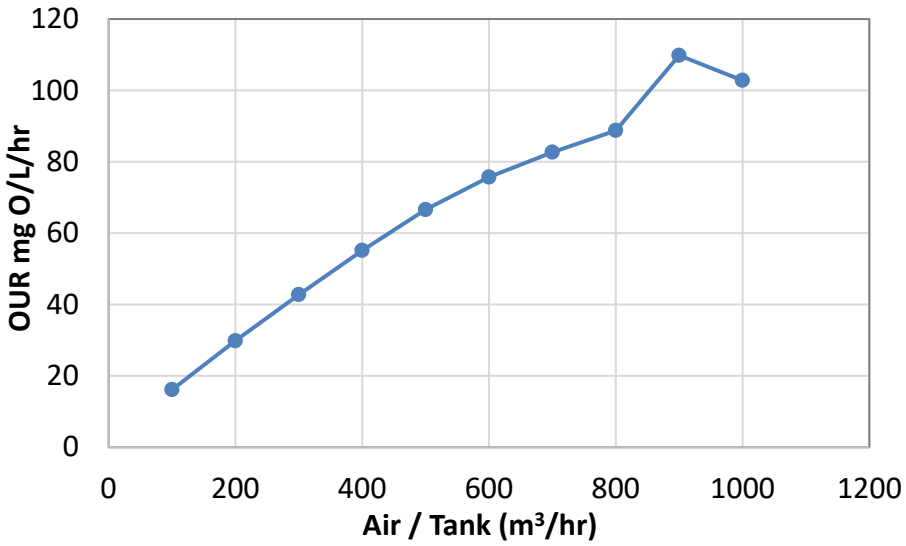


Figure 6. Oxygen Uptake Rate (OUR) for Model-2

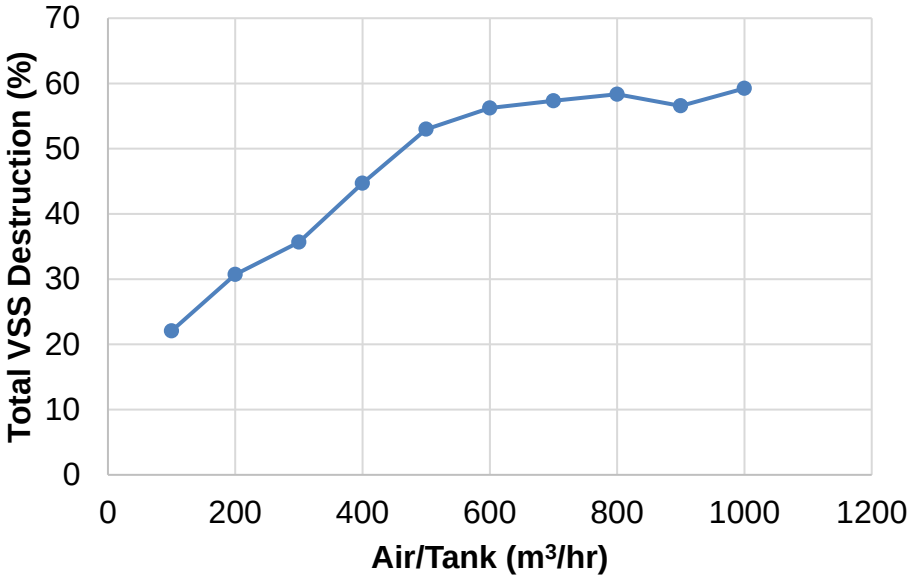


Figure 7. VSS Reduction (%) for Model-2

Both models confirmed that with the airflow rate range of 400-600 m^3/hr, the VS reduction was between 45-55%. The maximum VS reduction reaches to 60% at an air flow of 700 m^3/hr (Figure 3). Since currently there is no airflow measurement instruments for the turbolators, the plant staff measured the airflow as part of the BIOWIN Modelling process. The airflow for each Turborator is shown in Table 7. The BIOWIN modelling indicates that around 86% excess air is being injected into the ATAD tanks than needed. These findings are important for the Mixer/Aerator selection as well as gives the opportunity to optimize the airflow to each tank. The reduced airflow flow to the ATAD process will not only save power, it will also potentially reduce foaming in the ATAD tanks resulting in increased tank operating level, smaller free board. Coupled with improved and uniform mixing I n the tanks, it has the potential for increased ATAD treatment capacity at the FCPCC. Since the exhaust air from the ATAD tanks is treated in the bio-scrubbers and chemical scrubber, the reduced airflow to the scrubbers will save chemicals costs, improved treatment efficiency and provide excess treatment capacity for the future odor sources treatment. Currently a total of 3714 m^3/hr of air is supplied to the ATAD process achieving an efficiency of 45% VS reduction (Table 7). However, with improved mixing, the BIOWIN model indicated that 53% VS reduction can be achieved with 2000 m3/hr of air supplied.

Table 7. Air Flow to ATAD Process

ATAD	Turborator A	Turborator B	Total Air SCFM	Air (m^3/hr)	BIOWIN Air (m^3/hr)
Tank 3	328	334	662	1046	500
Tank 4	279	279	558	849	500
Tank 5	288	275	563	888	500
Tank 6	295	295	590	931	500
Total	**1190**	**1183**	**2373**	**3714**	**2000**
		Average VS Reduction (%)		45	53

3.3 Mixer Selection

Based on the BIOWIN modelling results, MEQUIPCO was contacted to get the INVENT Mixer/Aerator performance modelling done based on the design criteria given in Table 8 for ATAD process (Appendix B).

Table 8. INVENT Mixer Aerator Selection Criteria

Parameter	Value
Source	Municipal sludge
Sludge feed rate (m^3/day)	52.2
Solids	6%
Volatile suspended solids	75%
Temperature (°C)	25-65
Tank Length (m)	4.4
Tank Length (m)	8.5
Tank Length (m)	3.8
Free board (m)	1
ATAD HRT (Days)	10
Aeration (m^3/hr @ 7 psi)	400-700

Considering the mixing requirements, INVENT proposed a 2000 mm diameter mixer/ aerator for providing adequate mixing in the tank. The air supply for the aerator was 236 m^3/hr for a maximum of 435 m^3/hr. The recommended airflow rate was 351 m^3/hr (Appendix C). However, the maximum air flow for the aerator was not recommend as it will result in larger air bubbles and lower oxygen transfer efficiency.

The BIOWIN modelling indicated that the optimum air flow for the ATAD process is 500 m^3/hr to achieve 53% VS reduction (Table 7). However, upsizing to a 2500 mm diameter INVENT mixer/aerator that can accommodate a range of air flow between 400–700 m^3/hr is more appropriate (Appendix D). This will provide enough flexibility based on the operational conditions and temperature of the tank. For instance, Tank #3 being the first tank in series will have more oxygen demand whereas the tank #6 will have lesser oxygen demand and almost 70% of the VS destruction and digestion has happened at that stage of the ATAD process. The varied air supply can be achieved by controlling the blower output through a VFD.

Recognizing the operational problems at the FCPCC with the ATAD process due to operational inter-dependence of mixing and aeration through the current Turborator mixer/aerators, it is recommended that the mixing and aeration process need to be separated. The INVENT HyperClassic mixer / aerator system provides that flexibility. The key advantages are:

- More uniform mixing as demonstrated from INVENT's Computational Fluid Dynamic (CFD) modelling. INVENT mixer and aeration system operate independently since the mixing is provided by the impeller whereas the air is supplied into the aeration ring attached to the mixer through an independent positive displacement (PD) air blower. The air flow can be controlled through a variable frequency drive (VFD).
- The controlled air supply gives the opportunity of better process and temperature control without affecting the mixing. The solids are kept in suspension all the time.
- One more advantage of the slower speed mixing is the reduced wear on the parts. The mixer can be operated at a low 26 rpm when there is no air supply and only mixing is required in the process. Whereas the mixer operates at 40 rpm when air is supplied to the aerator. In both cases, the INVENT mixer moves at low rpm. The low rpm of the mixer gives an added advantage of gentle but effective mixing with reduce potential of foaming.

3.4 Air Blower Selection

Based on the airflow of 400-700 m^3/hr@ 7-10 psi (system head loss to be confirmed by others), AERZEN GM-15L-G5 is proposed. The performance data for this blower is:

- AERZEN GM-15L-G5
- Pressure Difference: 700 mbar (10 psi)
- Airflow volume: 1,030 m^3/hr
- Motor Power: 30 kw (40 hp)
- Noise level: 70 dB(A) with acoustic enclosure

One air blower with VFD for each tank is recommended for effective airflow control to the ATAD process based on the air demand. An ORP probe is also recommend for airflow control. One standby blower is also recommended for all four tanks. Even though the AERZEN blower has acoustic enclosure for noise control, these blowers should be housed on the ATAD tanks in an all-weather enclosure.

3.5 Existing & Future Electrical Requirement for INVENT Mixer / Aerator System

The turborators for ATAD 3, ATAD 4 and ATAD 5 have 20 hp motors and for ATAD 6 it is 25 hp. The VFDs are mixed, one of them is 30 hp, the others are 20 hp. The existing and future electrical infrastructure is listed in Table 9.

Table 9. Existing & Future Electrical Assets for ATAD Mixing and Aeration Upgrade

Equipment	Tank 3	Tank 4	Tank 5	Tank 6
Existing				
Turborator A	20 hp	20 hp	20 hp	25 hp
Turborator B	20 hp	20 hp	20 hp	25 hp
VFD A	20 hp	20 hp	20 hp	30 hp
VFD B	20 hp	20 hp	20 hp	30 hp
Flygt Mixer	15 hp			15 hp
Future				
INVENT Mixer	12.5 hp	12.5 hp	12.5 hp	12.5 hp
AERZEN Blower	40 hp	40 hp	40 hp	40 hp
VFD	40 hp	40 hp	40 hp	40 hp

Once the system head loss and the required pressure is confirmed, the blowers may require smaller motor and VFD.

3.6 Required Upgrades

Based on the review of existing and the assessment of INVENT mixer/aerator system requirements the following upgrades may be required:

- The existing electrical infrastructure may be adequate for meeting the power requirements.
- Since the ATAD process will be operated in series, minimum mechanical piping modifications for sludge transfer between the tanks may require in order to meet the operational and maintenance requirements for the new system. However, piping need to be installed for air transfer from the blower to the INVENT mixer/aerator.
- The structural assessment of the ATAD tanks and needed modification will be the most significant aspect of the new system.

4. Conclusions

- In the past, the VS reduction rate has been reported to be between 26% and 52%. However, in 2022-2023, with better temperature and process control by Plant Operation the VS reduction rate has been more consistent in 39% to 54% range. The minimum required volatile solids reduction (VSD) for being compliant with Class A biosolids is 38%.
- Insufficient mixing and oxygen supply to the ATAD process has caused operational and maintenance problems, such as foaming, reduced treatment capacity due to solids deposition and more free board, potential for localized anaerobic conditions generating odorous reduced sulphur compounds. Replacement of existing turborators with an alternate mixing aeration system which will independently provide mixing and air to the ATAD process is needed.
- The BIOWIN modelling has demonstrated that currently excess air is supplied to the ATAD process. Turborator currently supply 3714 m^3/hr air for 45% VS reduction. Whereas, an efficient mixing aeration system can achieve 53% VS reduction for an airflow rate of 2000 m^3/hr which is 85% less than currently supplied through turbolators.
- The excess air has a great potential to causing excessive foaming in the tanks. In order to control the foam, the operation increases the free board resulting in reduced process capacity. Operations also reduce the airflow for controlling foaming and temperature in the ATAD tanks, this results in solids deposition causing localized anaerobic conditions in the tanks thus reducing the treatment capacity as well as causing odors.
- The optimal air flow to the tanks will result in power saving as well as the reduced airflow to the odor scrubbers. This will also save chemicals costs as well as improved treatment efficiency particularly for the bio-scrubbers. This also gives an opportunity to the plant connecting additional odor sources to the wet scrubbers in the future.
- Currently there is no air measurements and automated airflow control in the ATAD process. In order to supply more air matching the oxygen demand oxidation-reduction potential (ORP) can be used to control the blower.
- The ATAD process produces significant amount ammonia, as nitrifying bacteria do not function at thermophilic temperatures. The off-gas ammonia concentration could be as high

as 800 ppm. Chemical scrubbers can remove up to 99.5% of hydrogen sulfide and mercaptans, even at high concentrations. The oxidation reactions are dependent on pH, with the optimum scrubber solution pH being in the 9.5 – 10.5 range by adding caustic. maintain the proper chlorine residual (ORP range of 400-600 mV) by adding hypochlorite.

5. Recommendations

- INVENT 2500 mm diameter mixer/aerator and AERZEN GM-15L-G5 is recommended for the ATAD mixing/aeration upgrades. The system head loss for aeration to be confirmed at the detail design stage.
- Based on the mixer selection criteria given in the earlier section, Mequipco may be approached for a quotation for INVENT mixer/aerator and AERZEN PD blower.
- One blower with VFD for each ATAD tanks should be provided with one standby blower.
- FCPCC should undertake an odor study to confirm the efficiency of both bio-scrubbers and chemical scrubbers before and after the completion of ATAD Mixing and Aeration system upgrade project.
- FCPCC may consider in future to add septage to ATAD tanks for odor control and providing direct treatment. Septage should be characterized for girt and organics. Plastics and other floatable should be removed before introducing septage to the ATAD process.

REGIONAL DISTRICT OF NANAIMO

Appendix C
Record Drawings

EXIST. RAILING
GRATING SEE A M303
REMOVE AA 150 ST
REMOVE AA 200 ST
FACE MOUNTED NON-REMOVEABLE NEW RAILING
REMOVE EXIST. RAILING
REMOVE AA 250 ST
REMOVE AA 300 ST
REMOVE AA 350 ST
RW 75 ST
RW 25 ST
RW 75 ST
PS 100 SS
RW 25 ST
D 150 ST
GROUT
ME 4316
T 5309
REMOVE SLUDGE PUMP
ME 3307.01
REMOVE TO 100 ST
ATAD 7
1000 TYP.
1/4 TANK TYP.
ME 3306.01
ME 3306.11
ME 3306.12
250 ø (TYP.)
HATCH SEE A M305
ME 3305.01
ME 3305.11
ME 3305.12
SLEEVE FOR LEVEL PROBE TYP.
C.O.
TURBORATOR SEE D M305
ME 3304.01
ME 3304.11
ME 3304.12
FOAM BREAKER
TRIM CHECKER PLATE TO SUIT GRATE OPENING (TYP.) W/O ITEM 18
MOUNT SPRAY BAR ON EXIST. SLAB, NOTCH CHECKER PLATE FOR NOZZLES W/O ITEM 18
REMOVE CS 100
DS 100 ST
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS
NEW RAILING FACE MOUNTED NON-REMOVEABLE W/O ITEM 18
BLOCK OUT FOR FUTURE TURBORATORS AND FOAM BREAKERS TYP.
SLEEVE FOR LEVEL PROBE (TYP.)
SEE B M303 TYP.
FOA 200 FRP
REMOVE TO 100 ST
ME 3308.01
REMOVE SLUDGE PUMP
ATAD 8
1/2 TANK TYP.
ME 3306.02
250 ø TYP.
ATAD 6
ATAD 5
ME 3305.02
ATAD 4
ATAD 3
ATAD 2
ATAD 1
EXIST. RAILING & EXIST. CHECKER PLATE W/O ITEM 18
NOTE:
FOR HEATING & VENTILATING IN THIS AREA, SEE DWG. V301
RELOCATE DS 100 ST TO WALL
UPPER PLAN
TIE BACK INTO EXIST. DS 100 ST W/O ITEM 18
RW 38 ST
HPA 12 ST
REMOVE ASR 100 ST
ME 4301 HEAT EXCHANGER
PS 75 SS
PS 50 SS
PS 150 SS
PS 100 SS
REMOVE DS 100 ST
REMOVE VALVE & VALVE STEM
SEE A M304
DS 150 SS
MUD VALVE TYP SEE C M305
150 x 150 x 150 TEE
GROUT OPENING
150 ø CLEANOUT TYP. SEE B M305
CELL BYPASS HEADER
SPOOL PIECE 316 SS + PLUG VALVE (CARBON STEEL) BETWEEN 3&4
1/3 TANK TYP.
HYDROSTATIC 100mm RELIEF VALVE TYP.
LIMIT OF DS 150 ST WORK W/O ITEM 18 LOCATE C.O. AT FACE OF ROOF SLAB
1750
NOTE:
1. ALL EXIST. DIGESTER RAILING, AERATION, NPW & DS PIPING TO BE REMOVED UNLESS REUSED
2. ALL SLAB / WALL OPENINGS TO BE CONFIRMED WITH EQUIPMENT SHOP DRAWINGS PRIOR TO POURING OF ANY CONCRETE
3. ALL UNUSED SLAB OPENINGS TO BE COVERED WITH COVER PLATES
SEE F M305
LOWER PLAN

FC-M-301

PV-INT-326

C:\ACAD13\DRAWINGS\122-78-1\m301 Mon Jun 23 13:17:05 1997

ACAD DWG. M301 1:50 97-06-23

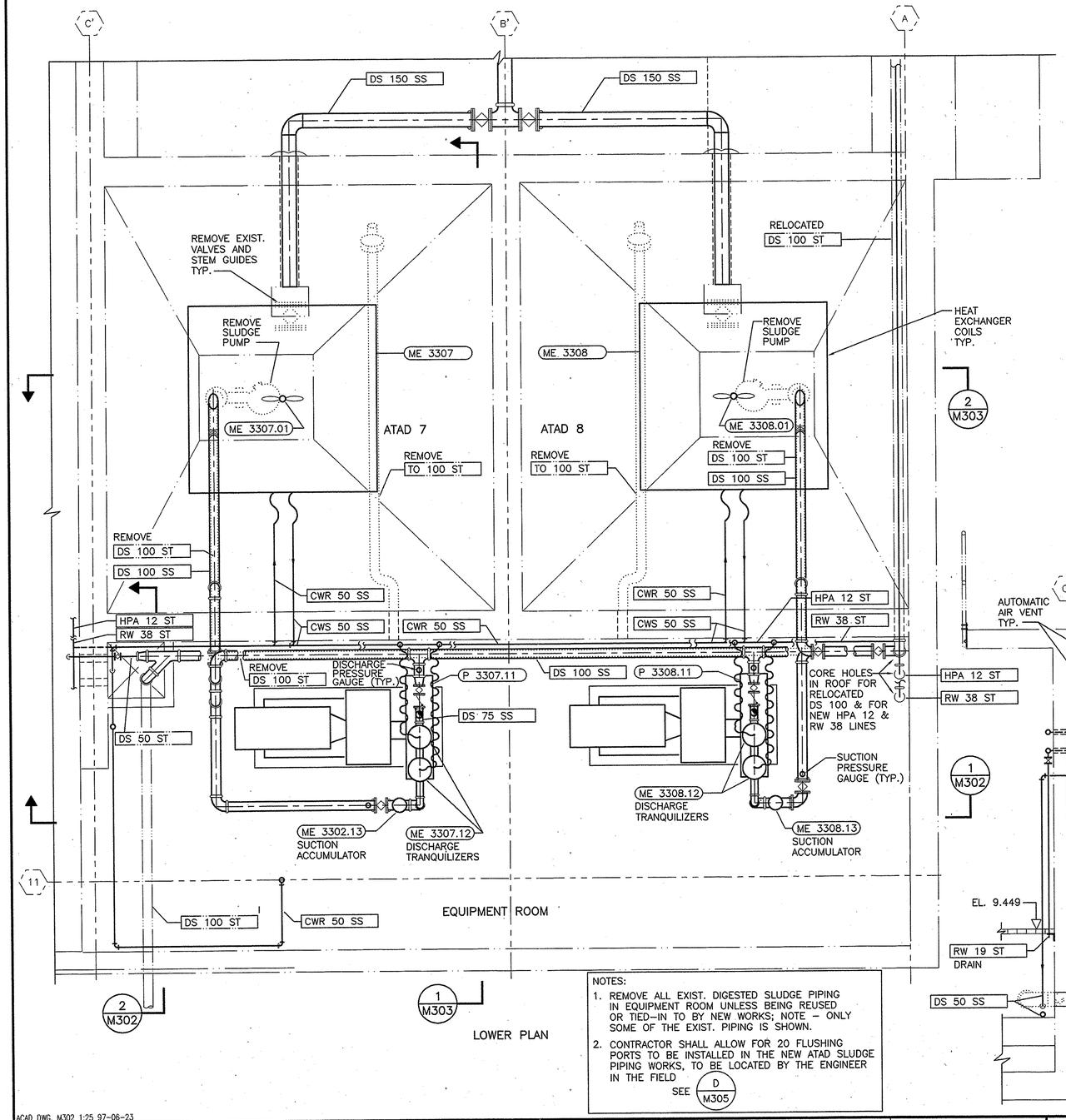
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REVISIONS	B	JUNE/97	BDL	JwB	JwB	RECORD DRAWING

DESIGNED RW
DRAWN KS
CHECKED JwB

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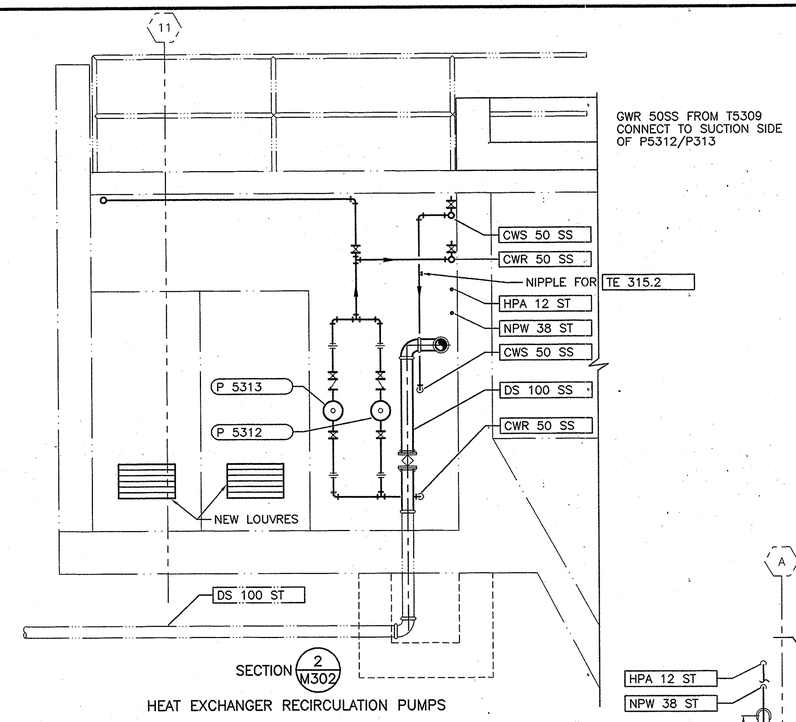
REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS – PLANS

SCALE: 1:50
M301
DRAWING No. 122.78.1
SHEET 107 OF 180 ISSUE B



NOTES:

1. REMOVE ALL EXIST. DIGESTED SLUDGE PIPING IN EQUIPMENT ROOM UNLESS BEING REUSED OR TIED–IN TO BY NEW WORKS; NOTE – ONLY SOME OF THE EXIST. PIPING IS SHOWN.
2. CONTRACTOR SHALL ALLOW FOR 20 FLUSHING PORTS TO BE INSTALLED IN THE NEW ATAD SLUDGE PIPING WORKS, TO BE LOCATED BY THE ENGINEER IN THE FIELD SEE D M305



FC-M-302

PV-INT-327

ACAD DWG. M302 1:25 97-06-23

REVISIONS	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
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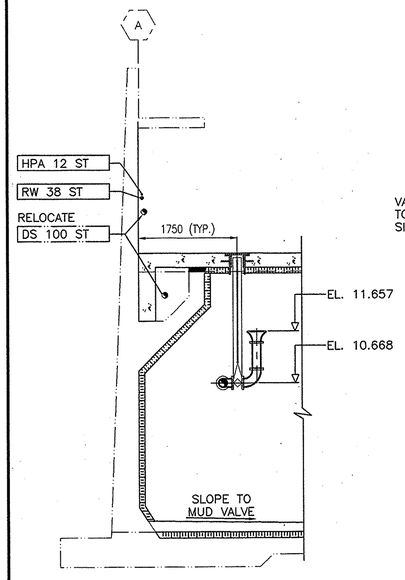
DESIGNED RW
DRAWN KS
CHECKED JWB

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Consulting Engineers
JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS–PLAN & SECTIONS

SCALE: 1:25 M302
DRAWING No. 122.78.1
SHEET 108 OF 180 ISSUE B

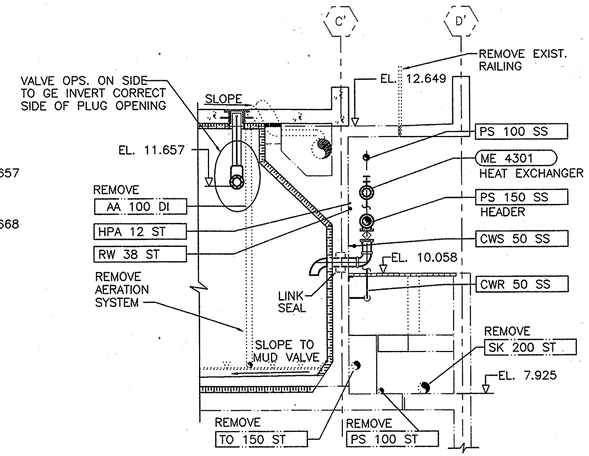
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BYPASS HEADER

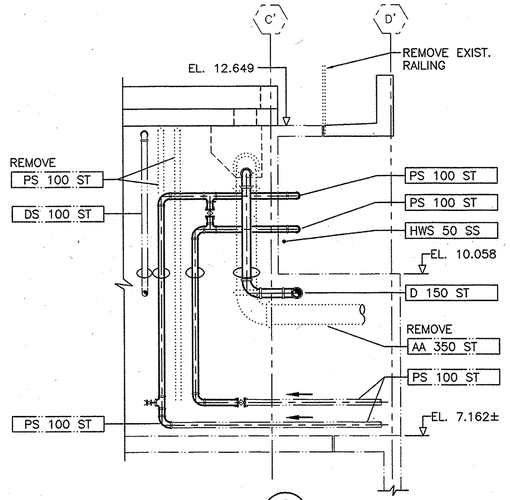
SECTION 1 / M301

ADDITIONAL STEEL SLUDGE LINE EASTS
CAN BE LIFT IN PLACE

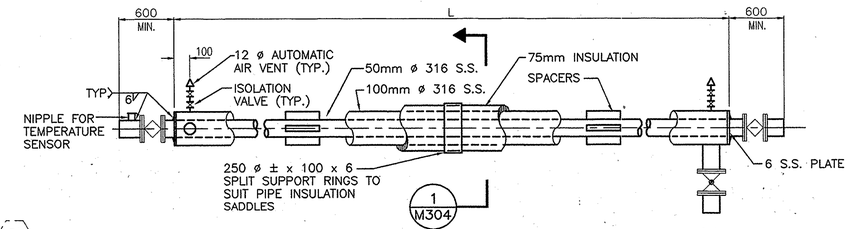


RAW SLUDGE HEADER

SECTION 2 / M301



SECTION 5 / M301

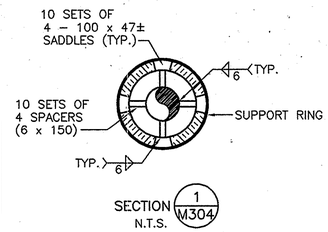


SLUDGE / COOLANT HEAT EXCHANGER

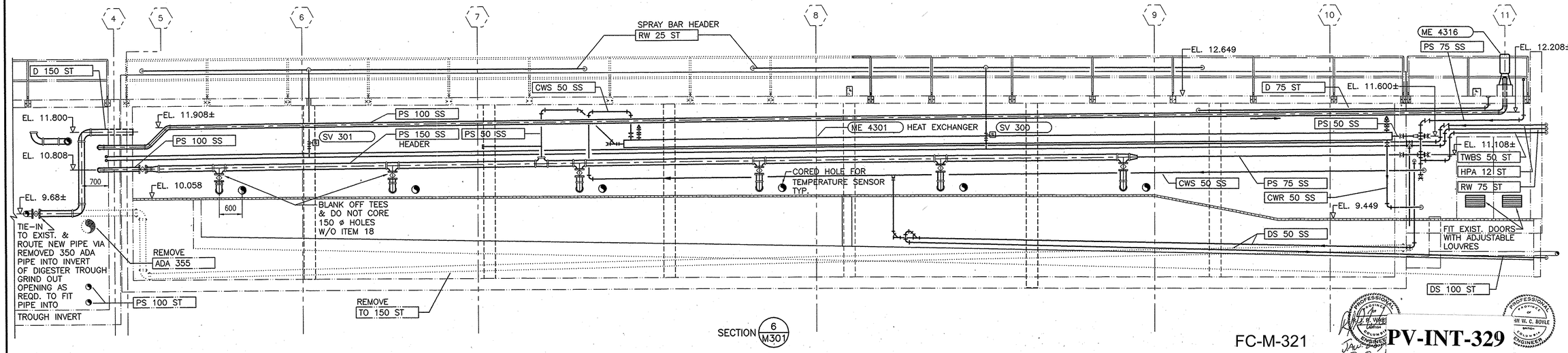
DETAIL A / M304
N.T.S.

HEAT EXCHANGER LENGTHS		
EQUIP. No.	LENGTH (L) mm	No. OF SECTIONS
ME 4301	20000	1

NOTES:
1. ORIENTATION OF HOT WATER INLET & OUTLET NOZZLES TO SUIT PIPE LAYOUT DWGS.
2. ALL METAL PARTS TO BE 316 S.S.



SECTION 1 / M304
N.T.S.



SECTION 6 / M301

FC-M-321

PV-INT-329

ACAD DWG. M304 1:50 97-06-23

AutoCAD DRAWING	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
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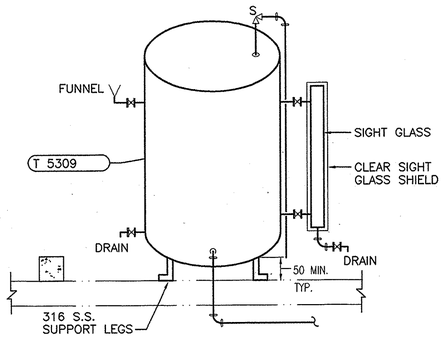
DESIGNED RW
DRAWN KS
CHECKED DWB

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JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS – SECTIONS

SCALE: 1:50
M304
DRAWING No. 122.78.1
SHEET 110 OF 180 ISSUE B

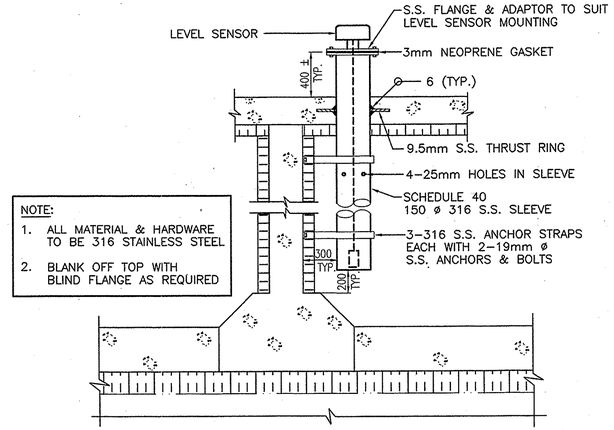
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FILLING / EXPANSION TANK T 5309

N.T.S.

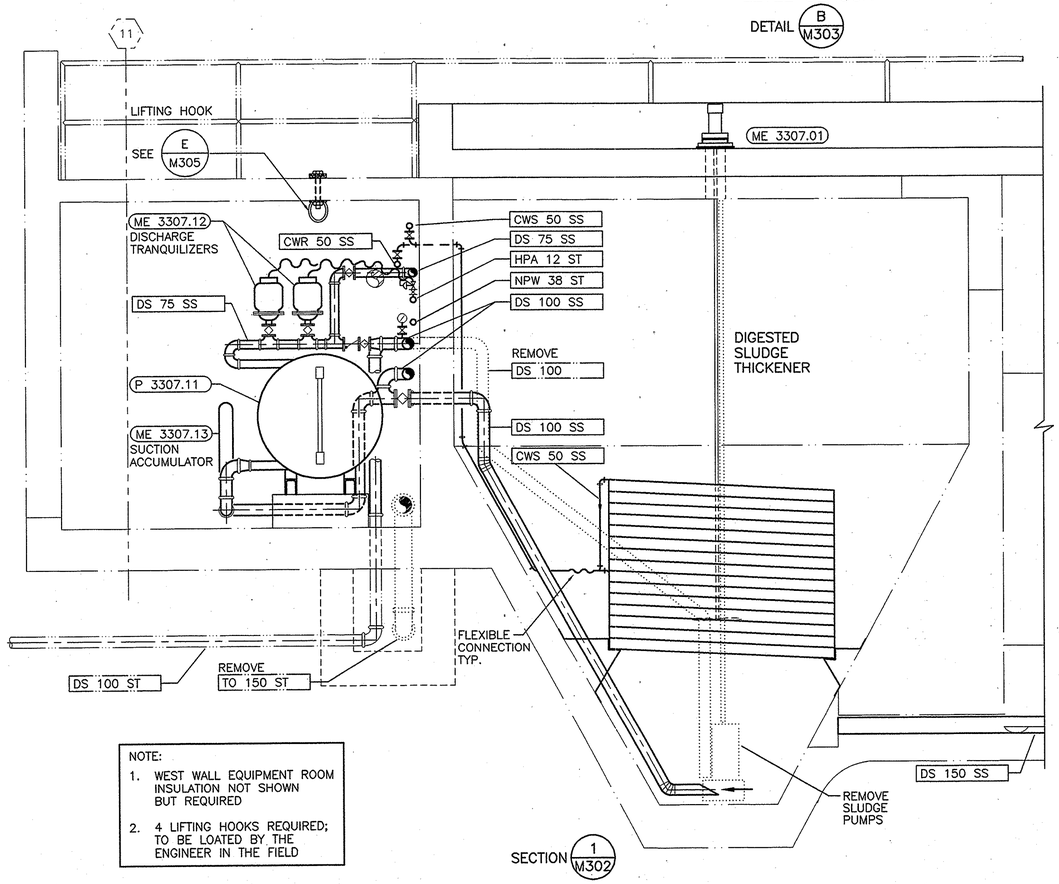
(ALL FITTINGS 50 mm UNLESS NOTED OTHERWISE – NOMINAL 273 LITRE VOLUME S.S. TANK)



NOTE:
1. ALL MATERIAL & HARDWARE TO BE 316 STAINLESS STEEL
2. BLANK OFF TOP WITH BLIND FLANGE AS REQUIRED

LEVEL SENSOR

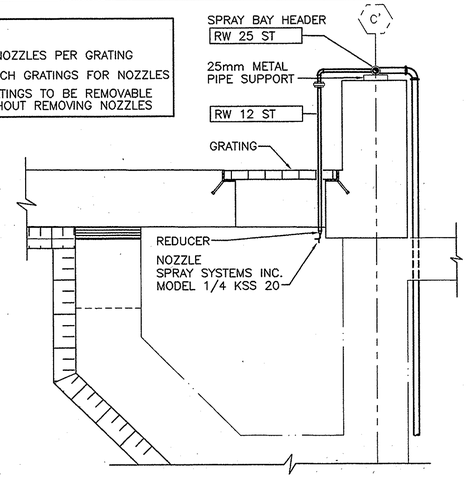
DETAIL B M303



NOTE:
1. WEST WALL EQUIPMENT ROOM INSULATION NOT SHOWN BUT REQUIRED
2. 4 LIFTING HOOKS REQUIRED; TO BE LOATED BY THE ENGINEER IN THE FIELD

SECTION 1 M302

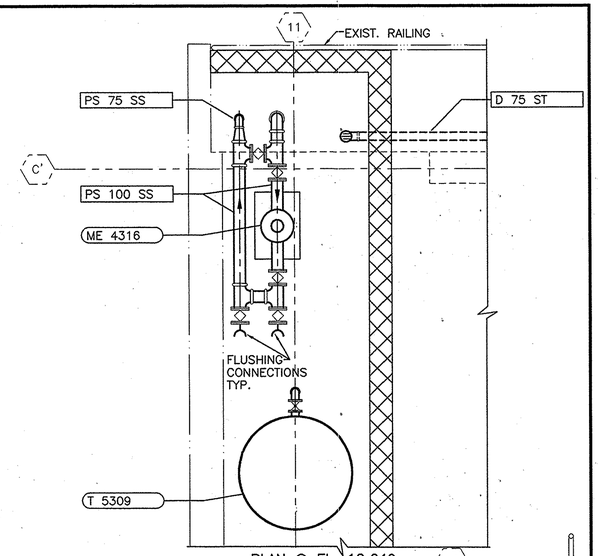
NOTE:
1. 2–NOZZLES PER GRATING
2. NOTCH GRATINGS FOR NOZZLES
3. GRATINGS TO BE REMOVABLE WITHOUT REMOVING NOZZLES



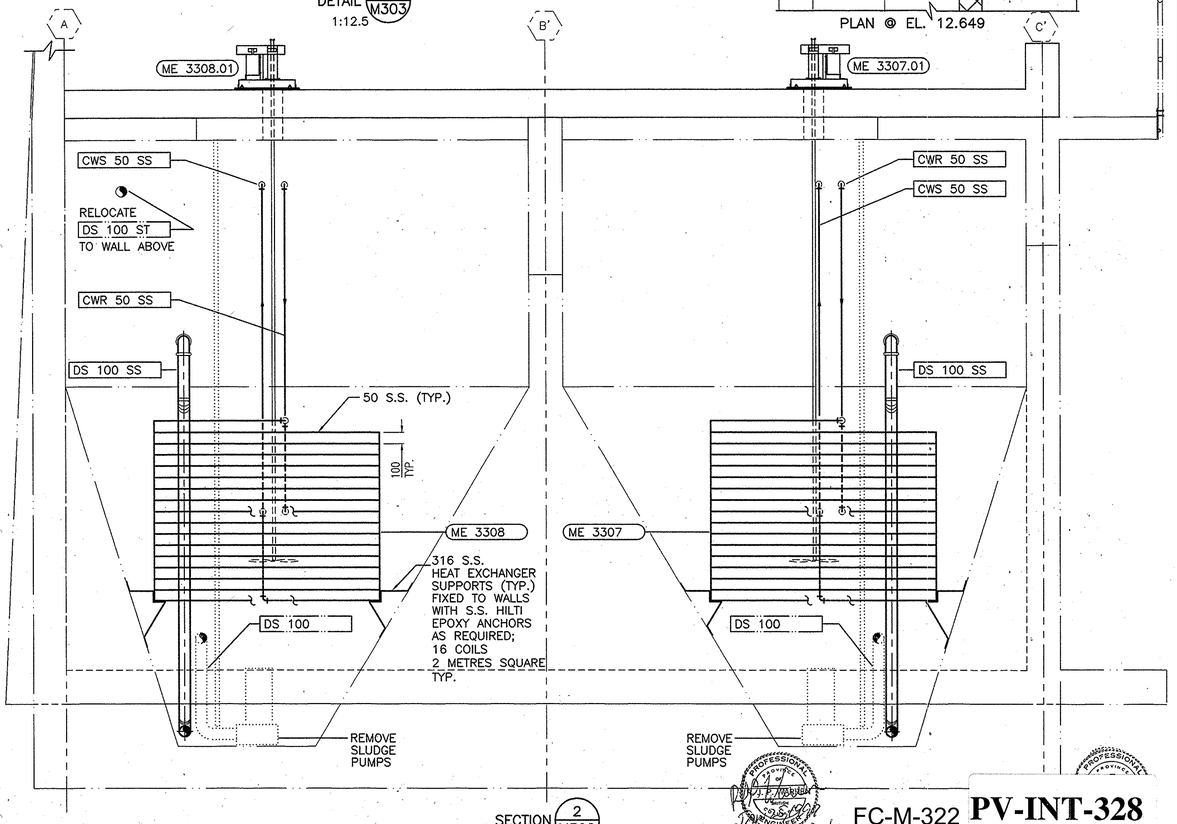
SPRAY BAR

DETAIL A M303

1:12.5



PLAN @ EL. 12.649



SECTION 2 M302

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA
D. P. Knight
25 Sept 1998
For Tender Only

FC-M-322 **PV-INT-328**

ACAD DWG. M303 1:25 97-06-23

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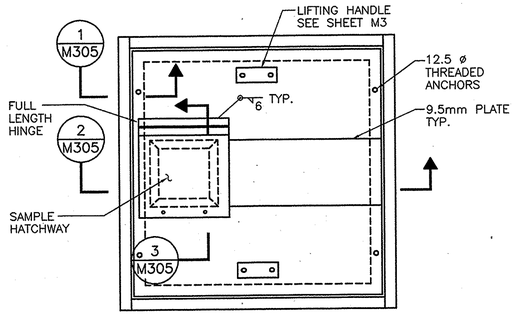
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DRAWN KS
CHECKED

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JAN 22 1999

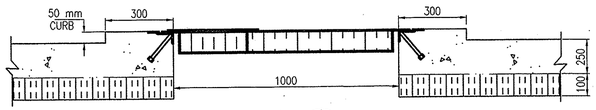
REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS–PLAN & SECTIONS

SCALE: 1:25 OR AS SHOWN M303
DRAWING No. 122.78.1
SHEET 109 OF 180 ISSUE B

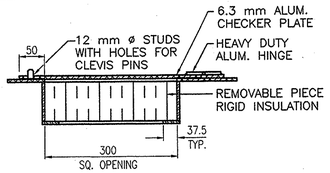
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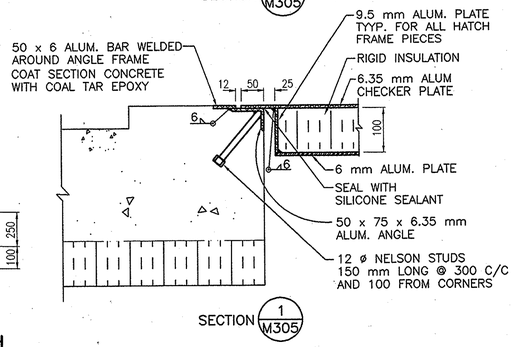
PLAN



SECTION 2 M305



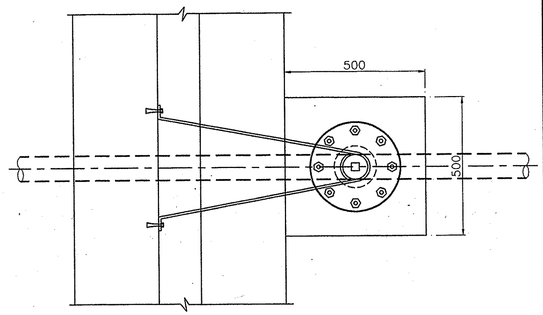
SECTION 3 M305



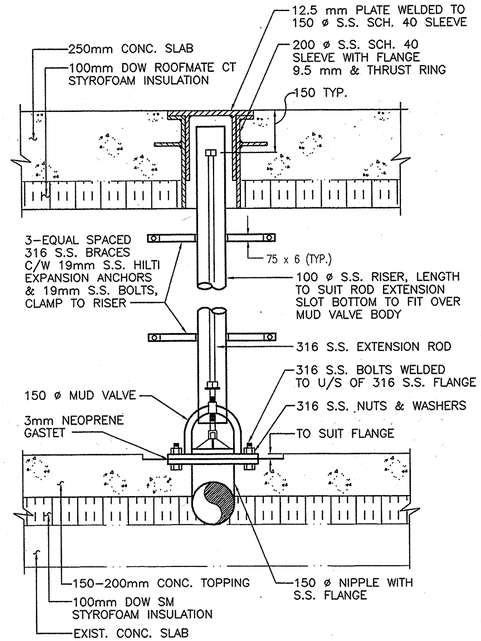
SECTION 1 M305

HATCH

DETAIL A M305



PLAN

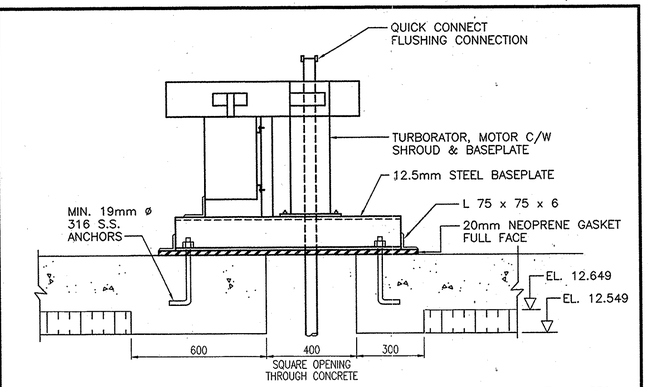


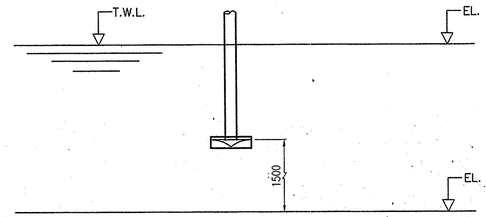
MUD VALVE / ATAD FLOOR

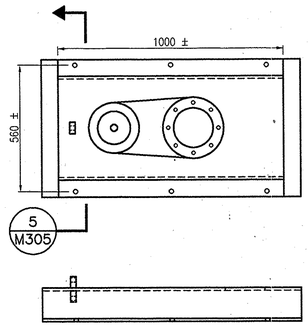
DETAIL C M305

NOTES:

1. LID DETAIL IS TYPICAL FOR ALL ATAD VALVE STEMS, CLEANOUTS
2. ALL S.S. TO BE TYPE 316



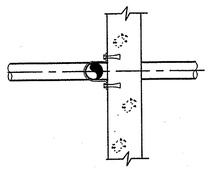




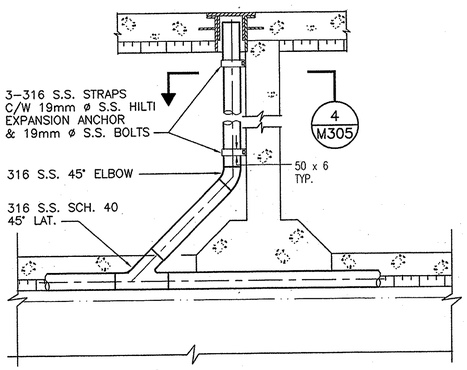
TURBORATOR

DETAIL D M305

SECTION 5 M305

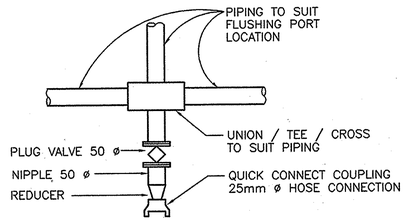


SECTION 4 M305



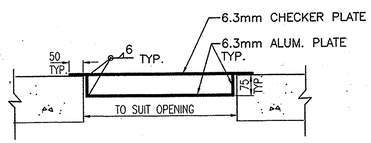
ATAD DRAIN CLEANOUT (TYPICAL)

DETAIL B M305



FLUSHING PORT (TYP.)

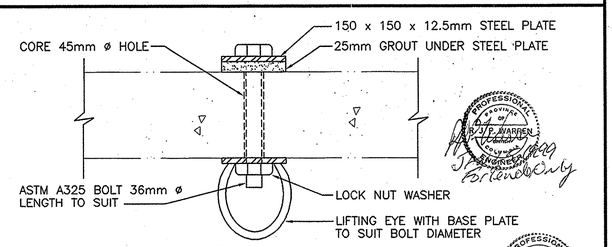
DETAIL D M305



ATAD COVER PLATE (TYP.)

DETAIL F M305

NOTE:
COVER PLATES REQUIRED FOR ALL UNUSED ATAD SLAB OPENINGS



LIFTING HOOK

DETAIL E M303

FC-M-342

PV-INT-330

ACAD DWG. M305 1:25 97-06-23

AutoCAD DRAWING	REVISIONS	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
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CHECKED JWB

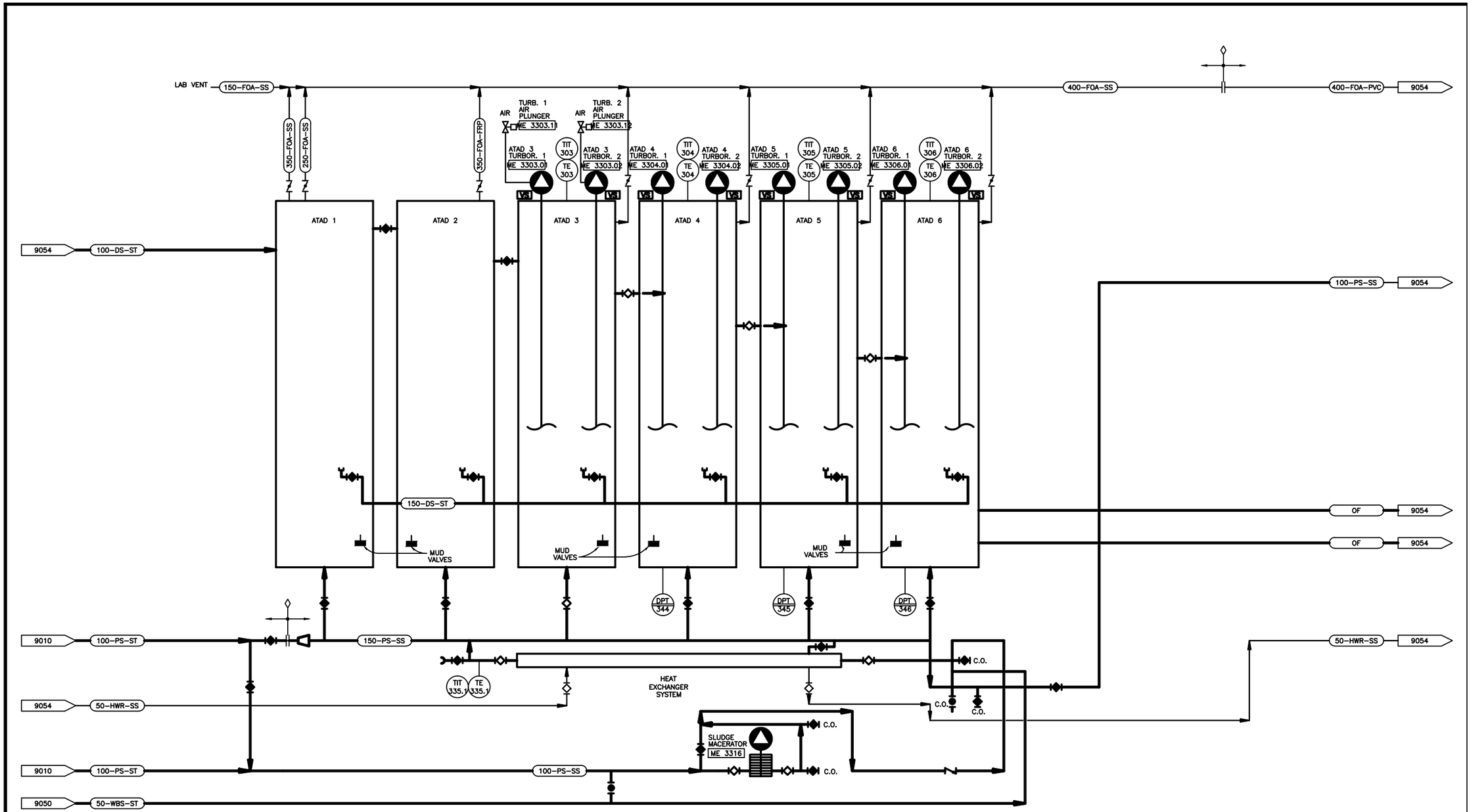
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JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
MISCELLANEOUS DETAILS

SCALE: N.T.S. M305
DRAWING No. 122.78.1
SHEET 111 OF 180 ISSUE B

C:\ACADR13\DRAWINGS\122-78-1\M305 Mon Jun 23 13:36:07 1997

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A	2005/01/04	A.R.M.	A.R.M.	ISSUED FOR CLIENT REVIEW

REVISIONS

VERIFY SCALES

BAR IS 20mm ON ORIGINAL DRAWING

0 20mm

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Associated Engineering

PROJECT No.	982819-000-362	
SCALE	NO SCALE	
DRAWN	A. R. MIRSALEHI	
DESIGNED	A. R. MIRSALEHI	
CHECKED	L. MARMOLEJO	
APPROVED	L. PICKARD	
DATE		INITIAL

REGIONAL DISTRICT OF NANAIMO

FRENCH CREEK P.C.C.
PLANT AUDIT
FC-P-301

PROCESS AND INSTRUMENT DIAGRAM
ATAD (SHEET 1 OF 1)

DRAWING NUMBER	REV. NO.	SHEET
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Time: 15:51

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9052 — 400-FOA-SS

400-FOA-SS — 9060

100-OF-ST

SLUDGE STORAGE CELL 3

LIT 307.1 / LE 307.1 / TIT 307.2 / TE 307.2

200-FOA-SS

SLUDGE STORAGE CELL 1

9052 — 100-PS-SS

HEAT EXCHANGER ME 3307

ME 3307.13

PI

TRANQUILIZER

VS

DIGESTED BIOSOLIDS TRANSFER PUMP 1 P 3307.11

100-DS-ST

100-DS-ST — 9010

100-DS-ST — 9052

LIT 308.1 / LE 308.1 / TIT 308.2 / TE 308.2

200-FOA-SS

SLUDGE STORAGE CELL 2

9052 — OF

9052 — OF

HEAT EXCHANGER ME 3308

ME 3308.13

PI

DIGESTED BIOSOLIDS TRANSFER PUMP 2 P 3308.11

VS

TRANQUILIZER

100-DS-ST

100-DS-ST — 9058

COOLING LINE IN EFFLUENT CHANNEL

C.O.

50-DS-SS

TIT 335.2 / TE 335.2

HEAT EXCHANGER RECIRCULATION PUMP 1 P 5312

9052 — 50-HWR-SS

HEAT EXCHANGER RECIRCULATION PUMP 2 P 5313

FILLING EXPANSION TANK T 5309

S.G.

TO FLOOR DRAIN

50-HWR-SS

50-HWR-SS — 9052

HPA — 25-HPA-ST

HPA — 25-HPA-ST

NO.	DATE	ENG.	BY	SUBJECT
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DESIGNED	A. R. MIRSALEHI	
CHECKED	L. MARMOLEJO	
APPROVED	L. PICKARD	
DATE		INITIAL

REGIONAL DISTRICT OF NANAIMO

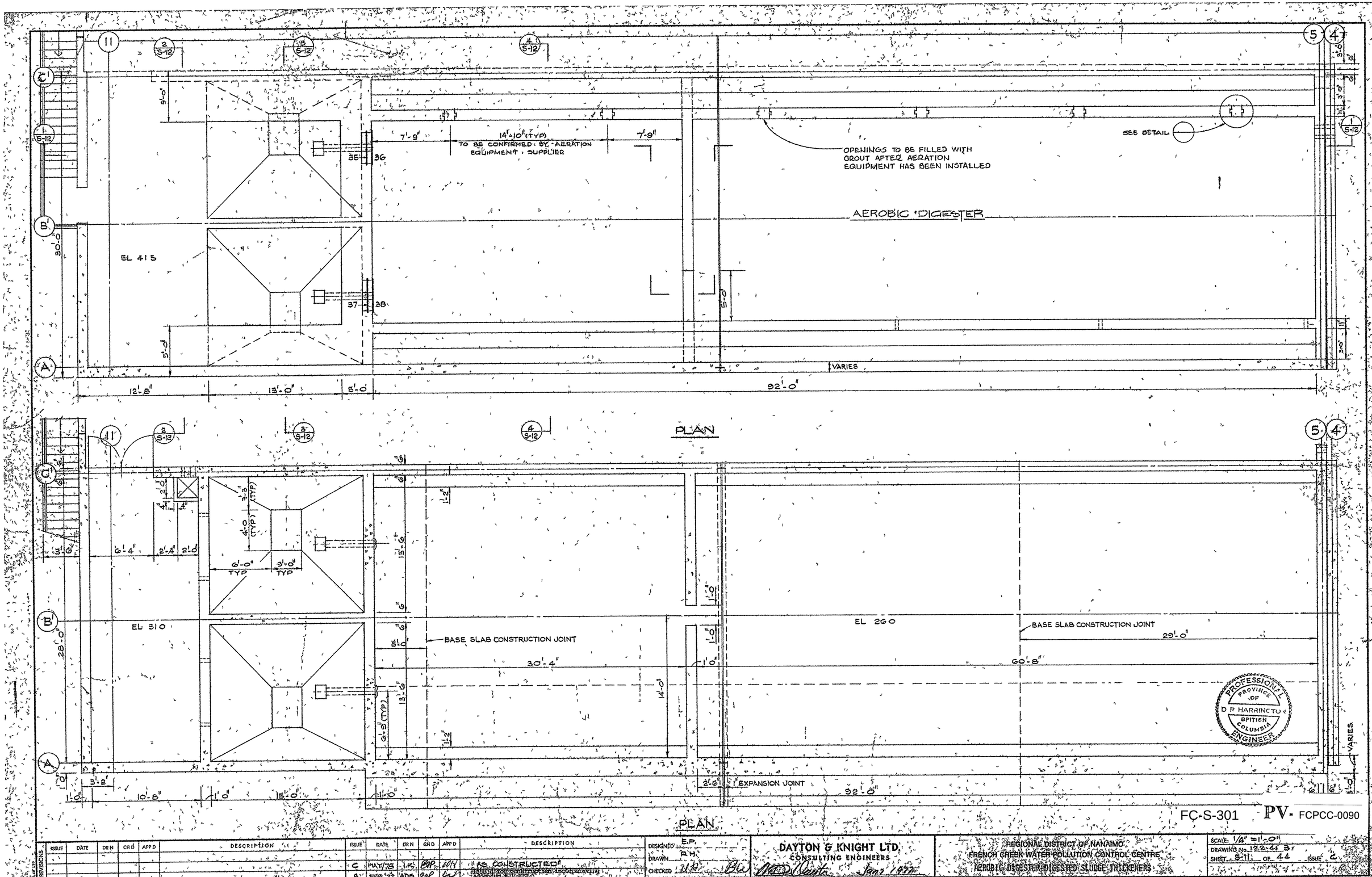
FRENCH CREEK P.C.C.
PLANT AUDIT
FC-P-302

PROCESS AND INSTRUMENT DIAGRAM
SLUDGE STORAGE (SHEET 1 OF 1)

DRAWING NUMBER	REV. NO.	SHEET
FC-05-9054	0	1 / 1

Time: 12:19 Date: 2006/01/03 Plot Scale: 1=1 (Paper Space) AutoCad File: K:\982819\EVC\Misc\FC05S054.dwg (A0)

PV-INT-158



PLAN

FC-S-301 PV- FCPCC-0090

REVISIONS	ISSUE	DATE	DRN	CHD	APP'D	DESCRIPTION
	C	MAY/78	I.K.	[illegible]	[illegible]	"AS CONSTRUCTED"
	B	FEB '77	ADS	[illegible]	[illegible]	Issued for construction tender purposes

DESIGNED E.P.
DRAWN R.H.
CHECKED [illegible]

DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS
[illegible] Jan/ 1977

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK WATER POLLUTION CONTROL CENTRE
AEROBIC DIGESTER DIGESTED SLUDGE THICKENERS

SCALE: 1/4" = 1'-0"
DRAWING No. 122-44 3r
SHEET 9-11 OF 44 ISSUE C

CORE HOLES

2 S303 2 S302 — 100 ø CORE THROUGH EXIST. WALL

OUTLINE OF EXIST. ROOF SLAB

OUTLINE OF NEW CURB

STYROFOAM SM (TYP.) UNDER NEW SLAB

EQUIPMENT BASE

1 S302

4525

1500 ±

BLOCK CURB SINGLE COURSE

400 400 800 400

GROUT OPENING

1000 TYP. 1000 TYP.

25mm EXPANSION JOINT

GROUT OPENINGS (TYP.)

250 ø OPENING

GROUT OPENING

3 S302

FOR ROOF DRAINS THIS AREA SEE SHEET M9

SLOPE TYP.

SLOPE TYP.

BLOCK CURB W/O ITEM 18 2 COURSES HIGH

EDGE OF ROOF SLAB W/O ITEM 18

EXIST. COL.

1 S302

EXIST. COL.

UPPER PLAN

150 ø CORE THROUGH EXIST. WALL TYP.

GROUT OPENING

4473 300 4473 4398 300 4398 300 4398 300 4398

ATAD 7

ATAD 8

ATAD 6

ATAD 5

ATAD 4

ATAD 3

ATAD 2

ATAD 1

GROUT OPENING

450 TYP.

500 TYP.

LOWER PLAN

FC-S-303

PV-INT-281

ACAD DWG. S301 1:50 97-05-27

P:\WEDOWS\VERN\122-78-1\struct\s301 Mon Jan 25 11:01:34 1999

AutoCAD DRAWING	REVISIONS	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
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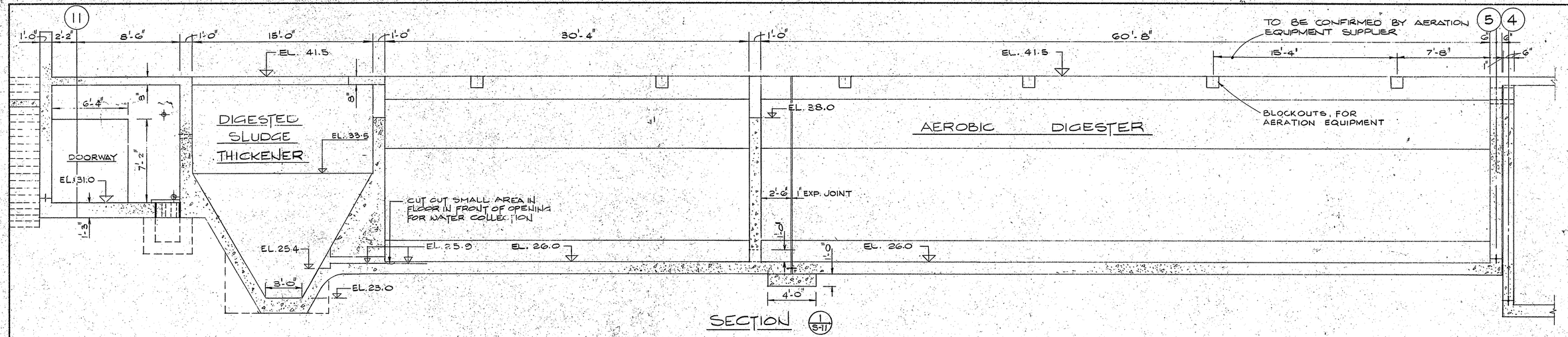
DESIGNED RW
DRAWN TL/KS
CHECKED

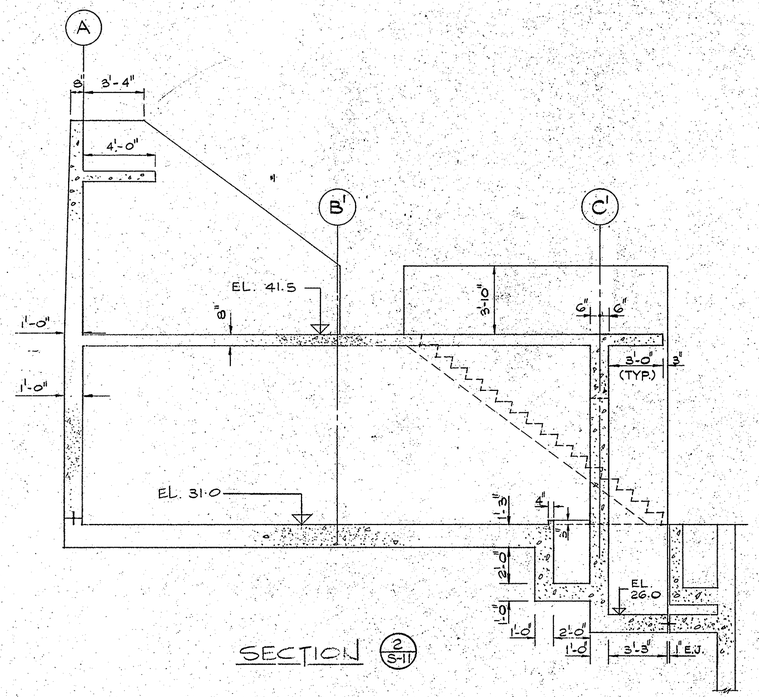
DAYTON & KNIGHT LTD.
Consulting Engineers

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTERS – PLANS

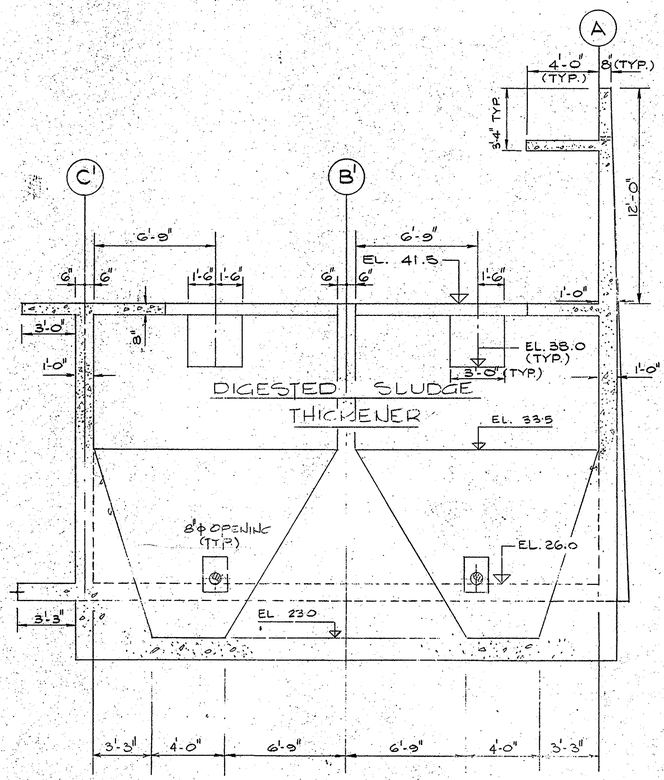
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DRAWING No. 122.78.1
SHEET 62 OF 180 ISSUE B

PV-INT-159

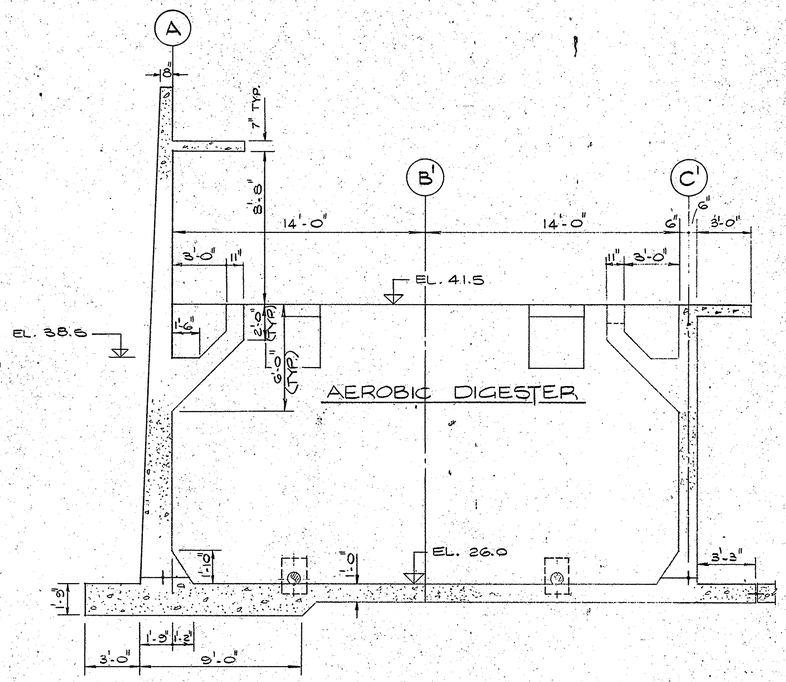




SECTION 2/S-11



SECTION 3/S-11



SECTION 4/S-11



FC-S-321 **PV-INT-159**

REVISIONS

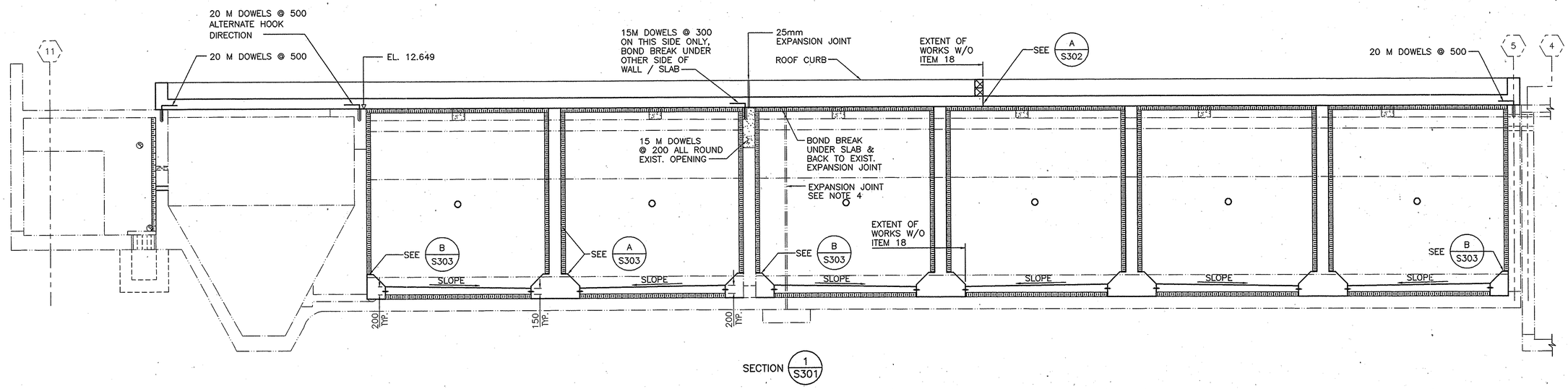
ISSUE	DATE	DR'N	CH'D	APP'D	DESCRIPTION
C	MAY/78	I.K.	EHP	WH	"AS CONSTRUCTED"
B	FEB'77	ADB	EHP	W	Issued for construction incorporating Addendum # 1 & 2.

DESIGNED E.P
DRAWN J.N
CHECKED WH BW

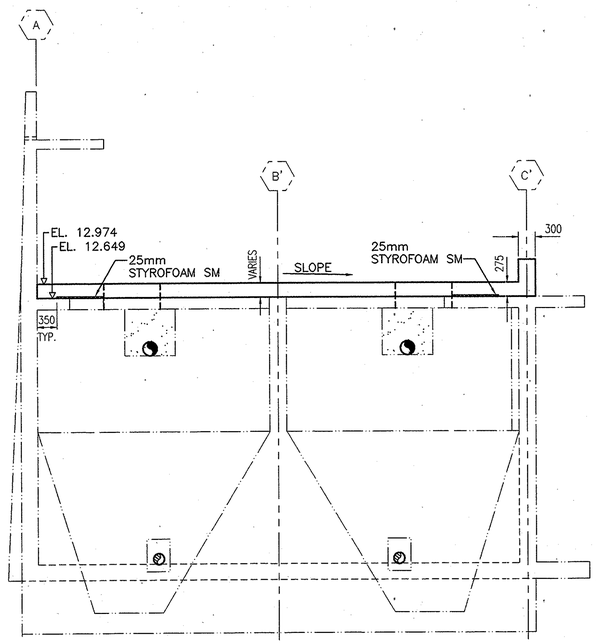
DAYTON & KNIGHT LTD.
CONSULTING ENGINEERS
Dayton & Knight 1977

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK WATER POLLUTION CONTROL CENTRE
AEROBIC DIGESTER-DIGESTED SLUDGE THICKENERS-SECTIONS

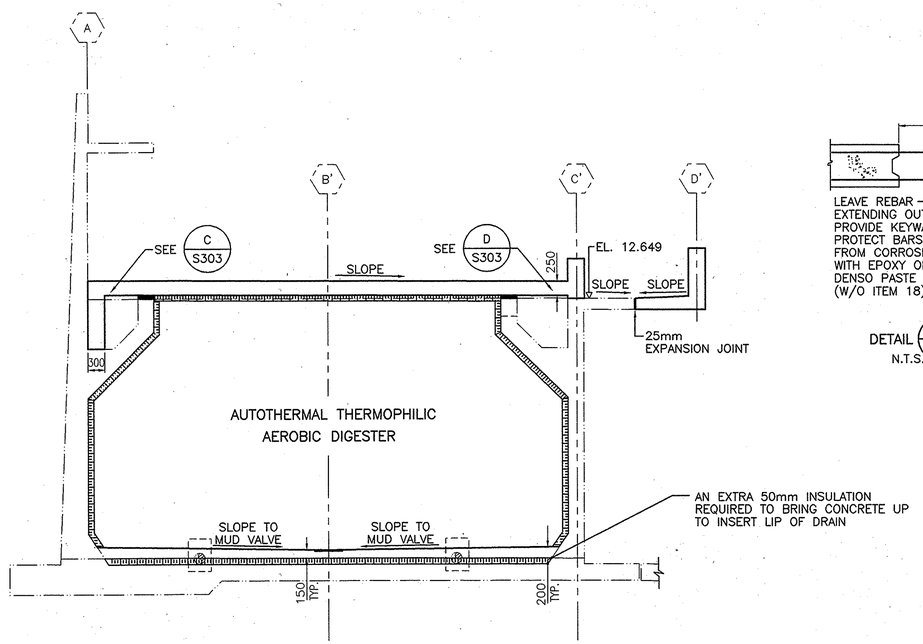
SCALE: 1/4" = 1'-0"
DRAWING No. 122.413
SHEET S-12 OF 44 ISSUE C



SECTION 1 / S301



SECTION 2 / S301



SECTION 3 / S301 (TYP.)

DETAIL A / S302
N.T.S.

NOTES:

1. ALL REBAR DOWELS TO USE HILTI INJECTION TECHNIQUE HIT C-100 ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
2. ALL EXIST. INTERIOR DIGESTER TANK SURFACES TO BE CLEANED, PRESSURE WASHED, AND SAND BLASTED PRIOR TO POURING ANY NEW CONCRETE OR INSTALLING INSULATION
3. CONTRACTOR SHALL LOCATE REBAR IN WALLS AND SLABS TO AVOID CUTTING OF SAME WITH DOWELLING OPERATIONS
4. CONTRACTOR SHALL CLEAN OUT EXIST. EXPANSION JOINT AND RESEAL

FC-S-323

PV-INT-282

ACAD DWG. S302 1:50 97-05-27

AutoCAD DRAWING

REVISIONS	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
	B	MAY/97	BDL	JWB	JWB	RECORD DRAWING

DESIGNED RW
DRAWN TL/KS
CHECKED

DAYTON & KNIGHT LTD.
Consulting Engineers
JAN 22 1999

REGIONAL DISTRICT OF NANAIMO
FRENCH CREEK W.P.C.C. STAGE 2 EXPANSION
AUTOTHERMAL THERMOPHILIC AEROBIC DIGESTER – SECTIONS

SCALE: 1:50 OR AS SHOWN
S302
DRAWING No. 122.78.1
SHEET 63 OF 180 ISSUE B

c:\acadr13\drawings\122-78-1\s302 Mon Jun 16 16:10:32 1997

REGIONAL DISTRICT OF NANAIMO

Appendix D
Engineering Document Requirements List

REGIONAL DISTRICT OF NANAIMO	Project Title	FCPCC - ATAD Mixing Upgrade	Rev.	Issued for	Date	By	Chk.	App.	Contractor Logo Here
	Project #		0	Engineering RFP	2023-08-17	RW	CLM		
	RDN #	WW-0049							
	Document #								

Engineering Document Requirements List

Discipline	EDRL Code	Document Description	Required Format	Required (Y = Yes)	For Record Document	Document Comments
Project Management	PM01	Project Execution Plan	Word, PDF			
	PM02	Project Schedule	MS Project, PDF	Y		
	PM03	Permit Management Plan	Word, PDF			
	PM04	Risk Management Plan	Word, PDF			
	PM05	Decision Log	Excel, PDF	Y		
	PM06	Cost Estimate	Excel, PDF	Y		Class 'A'
	PM07	Management of Change Plan	Word, PDF			
	PM08	Quality Plan	Word, PDF			
General	G01	Cover Sheet	Excel, PDF	Y		
	G02	Drawing List	Excel, PDF	Y		
	G03	Symbols and Abbreviations	PDF, DWG	Y		
	G04	Plant General Arangement	PDF, DWG			
	G05	Environmental Impact Study	Word, PDF			
	G06	Geotechnical Report	Word, PDF			
	G07	Flood Risk Assessment	Word, PDF			
	G08	Green/Sustainable Technology Memo	Word, PDF			
	G09	Staffing & Benchmarking Study	Word, PDF			
	G10	Plant3D Model	Viewer, Native	Y		Using 3D Scan data supplied by RDN
	G11	3D Scan of Existing Site	Viewer, Native			Completed by others
	G12	Table of Contents Handover O&M/QC/QA/Warranty/Commissioning	Word, PDF	Y		
Process	P01	Process Design Criteria	PDF	Y		
	P02	Process Flow Diagram	PDF, DWG			
	P03	Piping & Instrumentation Diagram	PDF, DWG	Y		Updates to existing
	P04	Process Mass Balance	PDF, Native			
	P05	Hydraulic Profiles	PDF, DWG			
	P06	Equipment Sizing Calculations	PDF	Y		For blowers
	P07	Design Report	Word, PDF	Y		Technical memo for air supply philosophy and blower selection
	P08	Area/Process Commissioning Plans	Word, PDF	Y		
	P09	Operations Manual	Word, PDF			By mixer and blower vendors
Civil	C01	Design Criteria	PDF, DWG			
	C02	General Notes and Site Location Plan	PDF, DWG	Y		
	C03	Standard Details	PDF, DWG			
	C04	Overall Site & Key Plan	PDF, DWG			
	C05	Site Topography Drawing	PDF, DWG			
	C06	Site Services Plan	PDF, DWG			
	C07	Clearing and Grubbing Plan	PDF, DWG			
	C08	Temporary Access and Laydown Plan	PDF, DWG			
	C09	Site Demolition	PDF, DWG			
	C10	Excavation Plan	PDF, DWG			
	C11	Excavation Sections	PDF, DWG			
	C12	Site Grading and Drainage Plan	PDF, DWG			
	C13	Site Grading and Drainage Sections	PDF, DWG			
	C14	Site Grading and Drainage Profiles	PDF, DWG			
	C15	Roadworks and Paving Plan	PDF, DWG			
	C16	Roadworks and Paving Sections	PDF, DWG			
	C17	Roadworks and Paving Profiles	PDF, DWG			
	C18	Roadworks Signage and Pavement Markings	PDF, DWG			
	C19	Pipeline Plan	PDF, DWG			
	C20	Pipeline Sections	PDF, DWG			
	C21	Pipeline Profiles	PDF, DWG			
	C22	Air Valve and Blow Down Chamber Details	PDF, DWG			
	C23	Yard Piping Plan	PDF, DWG			
	C24	Yard Piping Sections	PDF, DWG			
	C25	Yard Piping Profiles	PDF, DWG			
	C26	Miscellaneous Details	PDF, DWG			
	C27	Civil Calculations	PDF			
	C28	Environmental Protection Plan	Word, PDF			
	C29	Erosion & Sediment Control Plan	Word, PDF			
	C30	Land Owner List	Excel, PDF			
	C31	Pipe Crossings List	Excel, PDF			
	C32	Material Take Off List	PDF			
Structural	S01	Design Criteria	PDF, DWG	Y		
	S02	General Notes	PDF, DWG	Y		
	S03	Standard Details	PDF, DWG	Y		
	S04	Demolition and Restoration	PDF, DWG	Y		
	S05	Plan Drawing	PDF, DWG	Y		
	S06	Section Drawing	PDF, DWG	Y		
	S07	Elevation Drawing	PDF, DWG	Y		
	S08	Roof Plan	PDF, DWG	Y		
	S09	Structural and Miscellaneous Steel Drawings	PDF, DWG	Y		As required for new mixer cutout in roof.
	S10	Piling Plan	PDF, DWG			
	S11	Miscellaneous Details	PDF, DWG	Y		Closure of unused openings in concrete roof and pipe supports.
	S12	Steel, Building and Foundation Loading Diagrams	PDF, DWG			
	S13	Structural Calculations	PDF		Yes	
	S14	Detailed Specifications	Word, PDF	Y		Notes on drawings.
	S15	Material Take Off List	Excel, PDF			
Architectural	A01	Design Criteria	PDF			
	A02	General Notes	PDF, DWG			
	A03	Demolition and Restoration	PDF, DWG			
	A04	Standard Details	PDF, DWG			
	A05	Plan Drawings	PDF, DWG			
	A06	Elevation Drawings	PDF, DWG			
	A07	Section Drawings	PDF, DWG			
	A08	Detail Drawings	PDF, DWG			
	A09	Schedules	PDF, DWG			
	A10	Detailed Specifications	Word, PDF			
Process Mechanical	M01	Design Criteria	PDF	Y		
	M02	Standard Details	PDF, DWG			
	M03	General Arrangement	PDF, DWG	Y		
	M04	Sections and Elevations	PDF, DWG	Y		
	M05	Detail Drawings	PDF, DWG			
	M06	Access & Lifting Plan and Details	PDF, DWG			
	M07	Mechanical Equipment List	Excel, PDF	Y		
	M08	Tank Data Sheet	PDF, DWG			
	M09	Equipment Data Sheets	Excel, PDF	Y		For blowers
	M10	Mechanical Equipment Purchase Specification	PDF, DWG	Y		For blowers
	M11	Detailed Specifications	Word, PDF	Y		For blowers
	M12	Process Mechanical Calculations	PDF			
Piping	PP01	Design Criteria	PDF	Y		
	PP02	Standard Details	PDF, DWG	Y		
	PP03	Plan Drawing	PDF, DWG	Y		
	PP04	Section and Elevation Drawing	PDF, DWG	Y		
	PP05	Pipe Support Detail	PDF, DWG	Y		
	PP06	Piping Isometric	PDF, DWG	Y		Dependent on complexity of air supply philosophy
	PP07	Line Designation List	Excel, PDF	Y		Dependent on complexity of air supply philosophy
	PP08	Valve List	Excel, PDF	Y		Dependent on complexity of air supply philosophy
	PP09	Tie Point Schedule	Excel, PDF			
	PP10	Piping Calculations	PDF			
	PP11	Detailed Specifications	Word, PDF	Y		
	PP12	Material Take Off List	Excel, PDF	Y		
	E01	Design Criteria	PDF			
	E02	Standard Electrical Installation Detail	PDF, DWG			
	E03	Hazardous Area Classification Drawing	PDF, DWG			
	E04	Electrical Site/Room Layout	PDF, DWG	Y		If equipment is added external to existing MCCs
	E05	Lighting Layout	PDF, DWG			

Electrical	E06	Cable Tray / Conduit Layout	PDF, DWG			
	E07	Plant Single Line Diagram	PDF, DWG	Y		Update to existing
	E08	Single Line Diagram	PDF, DWG	Y		Update to existing
	E09	Switchgear Equipment/Wiring Drawings	PDF, DWG			
	E10	Motor Control Center Elevation/Wiring Drawings	PDF, DWG	Y		
	E11	Junction Box Layout/Wiring Drawings	PDF, DWG	Y		
	E12	Schematic Diagram	PDF, DWG	Y		
	E13	Protection and Control Diagrams	PDF, DWG			
	E14	Cable Block Diagrams	PDF, DWG	Y		
	E15	Heat Trace Isometrics / Wiring Diagrams	PDF, DWG			
	E16	Panel Schedules	Excel, PDF			
	E17	Load List	Excel, PDF	Y		
	E18	Cable Schedule	Excel, PDF	Y		Engineer Required to develop Full Cable Schedule for Contractor
	E19	Electrical Equipment Purchase Specification	PDF, Word	Y		
	E20	Engineering Calculations / Power Study	PDF, EasyPower	Y		
	E21	Material Take Off List	Excel, PDF	Y		
Instrumentation	I01	Design Criteria/Philosophy	PDF, Word			
	I02	Detailed Control Narrative	PDF, Word	Y		
	I03	Shutdown Key/Cause and Effect Matrix	Excel, PDF			
	I04	Logic Drawings	PDF			
	I05	DCS/PLC Cabinet Layout	PDF, DWG	Y		
	I06	DCS/PLC Cabinet Wiring Diagram	PDF, DWG	Y		
	I07	PLC/DCS Logic Source Code	Native Format			
	I08	Junction Box Diagram	PDF, DWG	Y		
	I09	Network Diagram	PDF, DWG	Y		
	I10	Loop Drawings	PDF, DWG			
	I11	Instrument Location Drawing	PDF, DWG	Y		
	I12	Standard Instrument Installation Detail	PDF	Y		Details likely will be project specific - non-standard.
	I13	Security System Diagram	PDF, DWG			
	I14	Fire Protection Diagram	PDF, DWG			
	I15	Cable Schedule	Excel, PDF	Y		
	I16	Instrument List	Excel, PDF	Y		
	I17	I/O List	Excel, PDF	Y		
	I18	Instrument Datasheets	Excel, PDF	Y		
	I19	Control Valve Datasheet (incl. Sizing Calculation)	Excel, PDF	Y		
	I20	Detailed Instrument Specifications	Word, PDF	Y		
	I21	Material Take Off List	Excel, PDF	Y		
Building Mechanical	H01	Design Criteria	PDF, DWG			
	H02	Standard Details	PDF, DWG			
	H03	HVAC Demolition Plan	PDF, DWG			
	H04	HVAC Ducting General Arrangement	PDF, DWG			
	H05	HVAC Ducting Sections	PDF, DWG			
	H06	HVAC Control Diagram	PDF, DWG			
	H07	HVAC Equipment Schedule	Excel, PDF			
	H08	HVAC Equipment Datasheets	Excel, PDF			
	H09	HVAC Calculations	PDF			
	H10	Fire Protection Demolition	PDF, DWG			
	H11	Fire Protection Plan	PDF, DWG			
	H12	Plumbing Demolition Plan	PDF, DWG			
	H13	Plumbing General Arrangement	PDF, DWG			
	H14	Plumbing Plans	PDF, DWG			
	H15	Plumbing Sections	PDF, DWG			
	H16	Plumbing Sanitary and Water Schematic	PDF, DWG			
	H17	Detailed Specifications	Word, PDF			
	H18	Material Take Off List	Excel, PDF			
Landscaping	L01	Planting Plan	PDF, DWG			
	L02	Irrigation Plan	PDF, DWG			
	L03	Landscape Specification	PDF, DWG			

REGIONAL DISTRICT OF NANAIMO

Appendix E
Sample Form of Contract

REGIONAL DISTRICT OF NANAIMO

CONSULTING SERVICES AGREEMENT

THIS AGREEMENT made the <Day> day of <Month>, 20<XX>.

BETWEEN:

REGIONAL DISTRICT OF NANAIMO
6300 Hammond Bay Road
Nanaimo, BC
V9T 6N2

(hereinafter called the "Regional District" or "Client")

AND:

<VENDOR NAME>
<Street Address>
<City, Province>
<Postal Code>

(hereinafter called the "Consultant")

NOW THIS AGREEMENT WITNESSETH:

THAT in consideration of the terms, conditions and covenants hereinafter set forth, the Regional District and the Consultant covenant and agree each with the other as follows:

1 Appointment

The Regional District retains the Consultant to provide the Services (herein called the "Services") described in Schedule 'B' which is attached hereto and forms part of this Agreement.

2 Term

The Consultant will provide the Services during the period (hereinafter called the "Term") commencing on <Enter Start Date> and ending on <Enter End Date>, unless sooner terminated as hereinafter provided.

3 Payment

The Regional District will pay to the Consultant, for the Services, the amount, in the manner and at the times set out in Schedule 'A' attached hereto. The Consultant agrees to accept the amount as full payment and reimbursement. No additional amounts may be charged by the Consultant unless pre-approved by the Regional District in writing.

SAMPLE

4 Independent Consultant

The Consultant will be an independent Consultant and not the servant, employee, or agent of the Regional District. The Consultant is not, and must not claim to be the Regional District's agent for any purpose unless the Regional District gives the Consultant authorization in writing to act as the Regional District's agent for specific purposes that are reasonably necessary to the Consultant's rendering of the Services pursuant to this Agreement.

5 Assignment and Sub-Consultants

The Consultant will not, without the prior written consent of the Regional District, assign or subcontract this Agreement or any portion thereof. The Consultant may retain subconsultants to assist in the performance of the Services provided that the terms of this Agreement shall apply to the subconsultants and provided that the Consultant shall be wholly responsible for the professional standards, performance and all actions of the subconsultants. The Consultant shall only employ subconsultants having the appropriate standards, qualifications, and experience in their respective areas of expertise. Notwithstanding the foregoing, Consultant may, where appropriate, subcontract any portion of the Services its affiliates without the Regional District's prior written consent and Consultant shall remain liable for the performance of such affiliates.

6 Intellectual Property

If any Intellectual Property is developed by the Consultant in the course of or in connection with the performance of the Services, the Consultant retains ownership of such Intellectual Property. Provided the Regional District has paid the Consultant for the Services, the Regional District will have a non-exclusive license to use any proprietary concept, product or process of the Consultant which relates to or results from the Services for the life of the Project and solely for purposes of its own internal use and for maintenance and repair including updating the original work, with respect to that part of the Project to which the Services relate.

7 Conflict

The Consultant shall not, during the term, perform a service for or provide advice to any person, firm or corporation where the performance of the service or the provision of the advice may or does, in the reasonable opinion of the Regional District, give rise to a conflict of interest between the obligations of the consultant to the Regional District under this Agreement, and the obligations of the Consultant to such other person, firm or corporation.

8 Limits of Liability

In consideration of the provision of the Services by the Consultant to the Client under this Agreement, the Client agrees that any and all claims which the Client may have against the Consultant, its employees, officers, agents, representatives and Sub-Consultants in respect of the Services, howsoever arising, whether in contract or in tort, save and except for claims arising out of or in connection with any malicious act or malicious omission under paragraph 9, shall be absolutely limited to the amount of the insurance available at the date such claim is brought, including any deductible portion therein, provided that neither

the Consultant nor any of its employees, officers, agents, representatives nor Sub-Consultants has done anything to prejudice or impair the availability of such insurance.

In no event shall the Consultant be liable for any loss or damage occasioned by delays or other causes or circumstances beyond the Consultant's reasonable control.

9 Indemnity

Notwithstanding the provision of any insurance coverage by the Client, and subject to paragraph 8, the Consultant shall indemnify and save harmless the Client, its officers, employees, agents, successors, assigns, representatives, Consultants and Other Consultants from and against any losses, claims, damages, actions and causes of action, costs, expenses, judgments and proceedings arising out of or in connection with any error, or negligent or malicious act or omission, by the Consultant or any of its officers, agents, representatives, employees or Sub-Consultants, except to the proportionate extent of any contributing negligent or wrongful act or omission of the Client, or any of its officers, agents, representatives, employees, Consultants or Other Consultants. The terms and conditions, of this indemnity provision shall survive the completion of all Services and the termination of this Agreement for any reason.

10 Insurance

At the Consultant's expense, provide and maintain any insurance that the Consultant is required to provide by law. The Consultant must provide satisfactory proof of insurance coverage to the Regional District upon request.

Comprehensive General Liability Insurance in an amount not less than two million dollars ($2,000,000.00) inclusive per occurrence against bodily injury and property damage. The Regional District is to be added as an additional insured under this policy, is to be endorsed to provide the Regional District with 30 days advance written notice of cancellation or material change and include a cross liability clause.

Professional liability (errors and omissions) insurance coverage shall be maintained to a limit of not less than $250,000 per claim, $1,000,000 aggregate.

Automobile third party liability insurance in an amount not less than $2,000,000 inclusive per occurrence for bodily injury, death, and damage to property, covering all vehicles owned or leased by the Consultant.

The Consultant will responsible for paying any insurance deductibles.

11 Termination

Notwithstanding any other provision of this Agreement:

a) If the Consultant fails to comply with any provision of this Agreement, then, and in addition to any other remedy or remedies available to the Regional District, the Regional District may, at its option, terminate this Agreement immediately by giving written notice of termination to the Consultant.

b) Either Party may terminate this Agreement at any time upon giving the other Party seven (7) days' notice of such termination.

If either such option is exercised by the Regional District, the Regional District will be under no further obligation to the Consultant except to pay the Consultant such amount as the Consultant may be entitled to receive, pursuant to Schedule 'A', for services provided and expenses incurred to the date the said notice is given or delivered to the Consultant. The Consultant will refund to the Regional District any payment already made to the Consultant not yet earned.

12 Prior Dealings

All prior negotiations and agreements between the parties relating to the subject matter of this Agreement are superseded by this Agreement. There are no representations, warranties, understandings, or agreements other than those expressly set forth in the Agreement or subsequently agreed to in writing, which writing shall be executed by a duly authorized officer of the party to be bound thereby prior to the commencement of the work.

13 Waiver

The failure of either party at any time to require the other party's performance of any obligation under this Agreement shall not affect the right to require performance of that obligation in the future. Any waiver by either party of any such breach or any such provision hereof shall not be construed as a waiver or modification of this provision itself, or a waiver or modification of any other right under this Agreement.

14 Counterparts

This Agreement may be executed in counterparts with the same effect as if both parties had signed the same document. Each counterpart shall be deemed to be an original. All counterparts shall be construed together and shall constitute one and the same Agreement.

15 Dispute Resolution

If the parties to this Agreement are unable to agree on the interpretation or application of any provision in the Agreement, or are unable to resolve any other issue relating to this Agreement, the parties agree to the following process in the order it is set out:

a) the party initiating the process will send written notice to the other party (the "Dispute Notice"); and;
b) the parties will promptly, diligently and in good faith, including the senior management of both parties, take all reasonable measures to negotiate an acceptable resolution to the disagreement or dispute.
c) if the dispute is not resolved through collaborative negotiation within 30 Business Days of the dispute arising, the parties should then attempt to resolve the dispute through mediation under the rules of the Mediate BC Society and will be held in Nanaimo, BC. unless otherwise agreed.

16 Governing Law

This Agreement is governed by and is to be interpreted and construed in accordance with, the laws applicable in British Columbia.

17 Worksafe BC Coverage

Prior to the commencement of the work, all employers with employees must be registered with WorkSafe BC and remittance up to date. Self-employed proprietors or partners in a partnership, must have Personal Optional Protection coverage.

18 Delay in Performance

Neither the RDN nor the Consultant shall be deemed to be in default of this Agreement for delays in performance caused by circumstances beyond the reasonable control of the non-performing party. For purposes of this Agreement, such circumstances include, but are not limited to abnormal weather conditions, flood, earthquake, fire, epidemic, pandemic, war, riot and other civil disturbance, strike, lockout, work slowdown and other labour disturbances, sabotage, judicial restraint and inability to procure permits, licenses or authorizations from any local, provincial or federal agency for any of the supplies, materials, accesses or services required to be provided by either the RDN or the Consultant under this Agreement. If any such circumstances occur, the non-performing party shall, as soon as possible after being prevented from performing, give written notice to the other party describing the circumstances preventing continued performance and the efforts being made to resume performance of this Agreement.

19 Confidentiality and Privacy

Confidentiality

The Consultant will keep strictly confidential any information supplied to, obtained by, or which comes to the knowledge of the Consultant as a result of, relating to or arising out of the performance of the Services and this Contract (the "Confidential Information") and will not disclose such Confidential Information.

Notwithstanding the preceding sentence, the Consultant may disclose the Confidential Information:

(a) with the prior written consent of RDN;

(b) in strict confidence to the Consultant's professional advisors;

(c) to Subconsultants who, in each case, need to know the applicable Confidential Information for the purposes of performing the Services; and

(d) as otherwise required by law or permitted by this Contract.

The Consultant will require all Personnel and SubConsultants to enter into an agreement with the Consultant containing provisions in the same form as those found herein.

Exceptions to Confidentiality Obligations

The obligations of confidentiality will not apply to:

(a) information that is, or subsequently becomes, publicly available other than through a breach of this Contract or through a breach of a confidentiality agreement which another person has entered into concerning the Confidential Information;

(b) information that the Consultant already possessed independently before commencing the Services;

(c) information that is rightfully received from a third party without breach of any obligation of confidentiality by such third party; or

(d) information which is independently developed without the use of the Confidential Information.

Collection or Use of Confidential Information

Except with the prior written consent of the RDN, the Consultant will not collect or use, and will ensure that its professional advisors and Subconsultants do not collect or use, the Confidential Information for any purpose other than complying with the terms of this Contract or performing the Services. Without limiting the generality of the foregoing, except with the prior written consent of RDN, the Consultant will not collect or use, and will ensure that its professional advisors and Subconsultants do not collect or use, the Confidential Information to advance the commercial or other interests of the Consultant or any Subconsultant or any entity affiliated with the Consultant or any Subconsultant.

Privacy

The Consultant acknowledges that the RDN is subject to the Freedom of Information and Protection of Privacy Act, R.S.B.C. 1996, c. 165, as amended ("FOIPPA"), and accordingly, any documents, information and data submitted to RDN by the Consultant under this Contract, as well as any resultant studies, documents, information, and date received by the RDN may be disclosed under FOIPPA. The Consultant will not do or omit to do anything that causes the RDN to be not in compliance with FOIPPA.

Publicity

The Consultant will not issue any press release or speak to the media about this Contract or the subject matter of this Contract without the prior written consent of the RDN, which consent may be unreasonably withheld. The Consultant will refer all media inquiries relating to the Services or the Contract to the RDN.

SIGNATORIES

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

For the Regional District of Nanaimo:

_____
Signature

_____
Printed Name, Title

For the Consultant, <Company Name or Consultant's Name>:

_____
Signature

_____
Printed Name, Title

REGIONAL DISTRICT OF NANAIMO

SCHEDULE 'A'
FEES & EXPENSES

Total compensation to be paid to the Consultant by the Regional District of Nanaimo shall not exceed a maximum of **$<Enter Amount>** in Canadian Dollars. This compensation includes all fees and expenses including GST. If the services are completed by the consultant at less cost than maximum amount, the Regional District shall be billed only for actual hours worked and actual expenses incurred. If the Consultant receives the Maximum Fee, but has yet to complete the Services, it shall continue to provide the Services until it has provided all the Services.

The Consultant shall submit invoices to the Regional District for Services performed monthly (the "billing period") during which the Services are performed under this Agreement; such invoices to be submitted as soon as practicable after each billing period. The invoice submitted for each billing period shall be clearly itemized to show the amount of work performed, the billing rates, the reimbursable expenses and the costs incurred to employ any subconsultants. Except for the amounts which the Regional District in good faith is disputing and except for invoices (or portions of invoices) in respect of which the Regional District has requested and not received supporting evidence, the Regional District shall pay invoices submitted to it for the Services within 30 days' receipt thereof.

SCHEDULE 'B'
SCOPE OF WORK

Enter/Attach RFP Response, Scope of Work, Deliverables and Timeframe