



REQUEST FOR TENDER No. 21-025

Sludge Storage Cell 3 Replacement


**Addendum 3
(49 pages)**

Issued: April 19, 2021


Closing Date & Time: on or before 3:00 PM Pacific Time on April 23, 2021

Please find enclosed Addendum No. 3 (48 pages) from Project Engineer Scot Merriam, P.Eng. of SRM Projects.

End of Addendum 3

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1. **Note** – The expected tank delivery date to FCPCC site has changed from Thursday June 3, 2021 to **Tuesday June 15, 2021**. The accuracy of this estimate is plus two weeks or minus one week, as indicated in the RFT Instructions to Bidders ARTICLE 2. Scope of Work. This estimate will be tightened up at award and further firmed up within two weeks from delivery.
2. **Note** – The empty, bare weight of the new tank is actually estimated to be **4,200 kg** (9,260 lbs) and not 2,500 kg as previously reported by the tank fabricator.
3. **Note** – The Contractor is responsible for receiving the tank at Lee Road and guiding the tank fabricator's low-bed delivery truck into unloading position as required by the Contractor's crane. Please refer to the attached photos, which depict access and potential interference points.
4. **Note** – The in-plant construction laydown areas available for use during the Work are slightly different from those indicated during the tender site visit. Please refer to for information only site layout C-1001 markup Rev 1 and photos attached for a description of three construction laydown areas available for use. The Contractor may have to coordinate access to laydown areas B and C while planned grubbing activities for the expansion project occur in later June.
5. **Note** – FCPCC operations will suspend forklift and other traffic through the sludge storage cell 3 construction area throughout the Work period. Consequently, temporary crossing plates for the piping trench are entirely at the discretion of the Contractor.
6. **Note** – The successful bidder will be required to sign off on RDN's Contractor-Supplier Package (attached), which outlines the Contractor's responsibilities with regard to environmental protection.
7. **Note** – RDN "*Process Piping General*" specification SP-P-0001 has been revised. Please refer to attached highlighted revision 1.
8. **Note** – RDN "*Austenitic Stainless Steel Piping*" specification SP-P-0002 has been revised. Please refer to attached highlighted revision 1.
9. **Question:** How do the guard rails and ladder attach to the tank?
Answer: *The guard rails and ladder are bolted to stainless steel or FRP tabs on the FRP tank.*
10. **Question:** What will be the extent of temporary tank internal bracing that will need to be removed and disposed of on site?
Answer: *The tank will come without temporary internal bracing.*
11. **Question:** Will the tank come with the fabricator supplied pipe supports attached? If not, would these be a bolted connection?
Answer: *The pipe supports will be provided loose, for Contractor attachment. The connections are bolted.*
12. **Question:** What will be the required anchor bolt projection?
Answer: *This dimension will be provided on the Issued for Construction version of RDN/Allnorth drawing FC-S-312.*

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13. **Question:** Is there anything between the base of the tank and the top of the concrete foundation?


Answer: *In general, no. However, the tank fabricator has specified that the perimeter of the tank base must be grouted before the anchor bolts may be tightened. More details on this will be indicated on the final approved tank fabricator shop drawings and/or the Issued for Construction version of RDN/Allnorth drawing FC-S-312.*

14. **Question:** Will the manway cover, gasket and bolt-ups come installed or would this be by the contractor?

Answer: *The manway cover, gasket and bolt-ups will come installed from the tank fabricator.*

15. **Question:** Will RDN consider using CCDC 2 - 2020 'Stipulated Price Contract' instead of the RDN's standard form contract included in RFT 21-025?

Answer: *No. The standard for contract included in RFT 21-025 will apply to the Work awarded for Sludge Storage Cell 3 Replacement.*

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APPENDIX 1 – TANK UNLOADING ACCESS PHOTOS

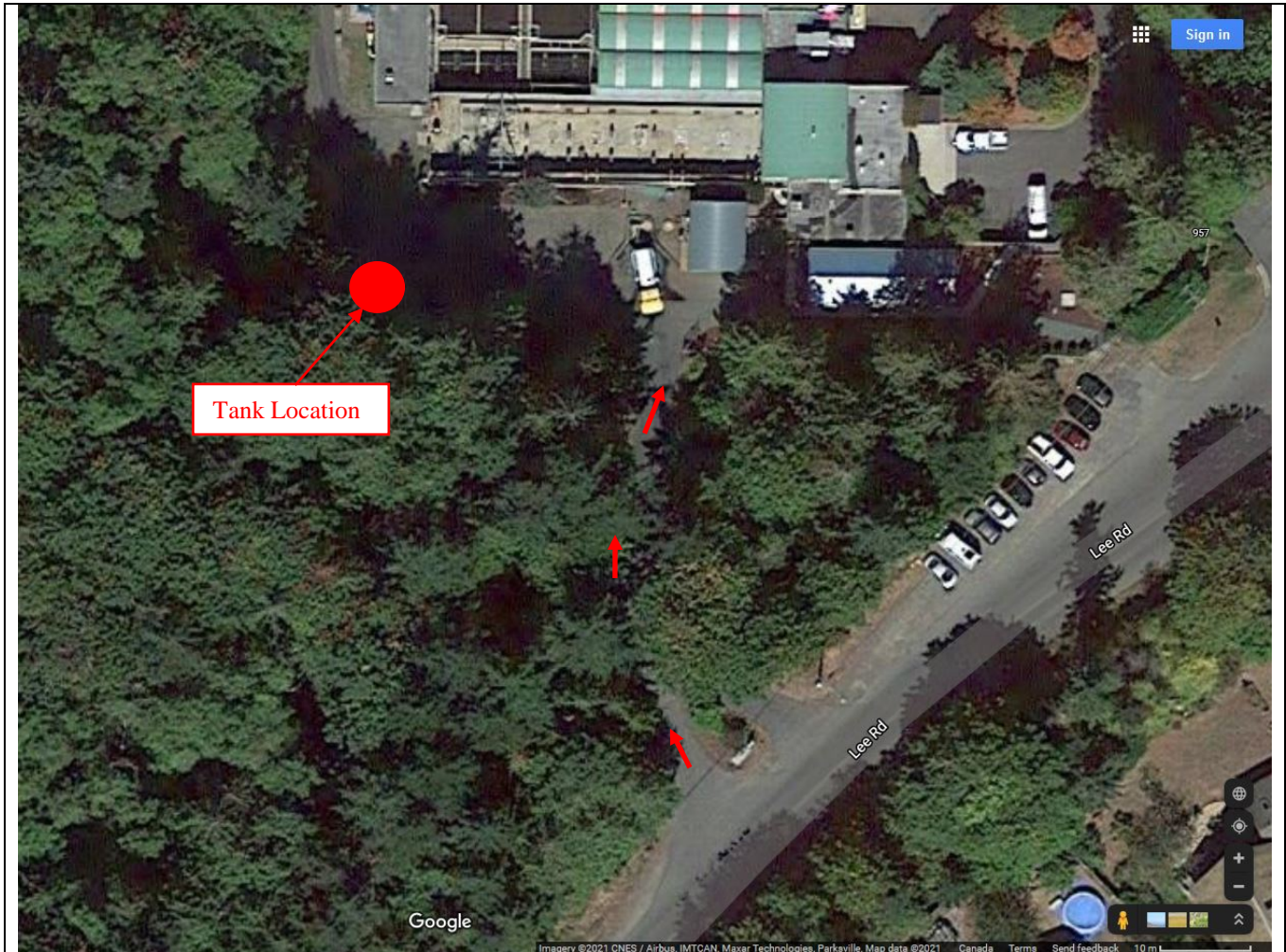


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Sludge Storage Cell 3 Unloading Reference Photos

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1. Sludge tank unloading route – 957 Lee Road, Parksville, BC



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Sludge Storage Cell 3 Unloading Reference Photos

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2. View into FCPCC Lee Road back entrance – note cable height.



3. View into FCPCC Lee Road back entrance showing power pole location (ID tag at red arrow)



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Sludge Storage Cell 3 Unloading Reference Photos

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4. ID tag on power pole in photo 3.



5. Part way down Lee Road back entrance driveway into FCPCC



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Sludge Storage Cell 3 Unloading Reference Photos


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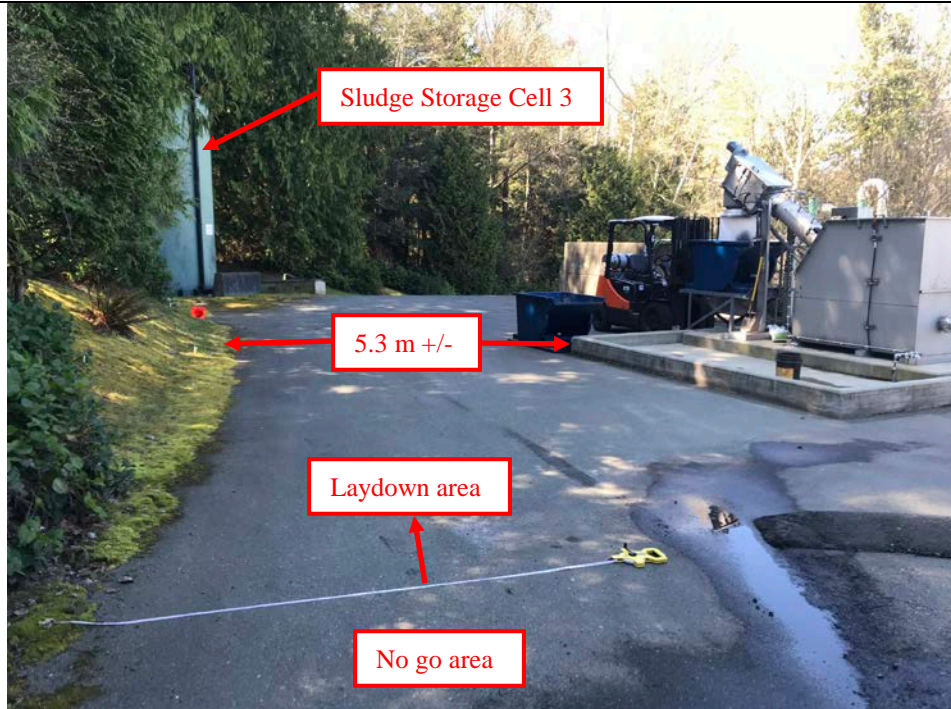
6. View to back entrance gate off Lee Road



7. Back entrance gate off Lee Road; sludge tank is left of gate.

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APPENDIX 2 – CONSTRUCTION LAYDOWN AREAS AVAILABLE



1. Construction laydown area A near sludge storage cell 3 – looking west (area west of white tape line will be free).



2. Construction laydown area A near sludge storage cell 3 – looking east (forklift and blue bins to be removed by FCPCC).



3. Construction laydown area A near sludge storage cell 3 – looking east (other dimension).



4. Construction laydown area A near sludge storage cell 3 (no FCPCC traffic on this section of road during construction).

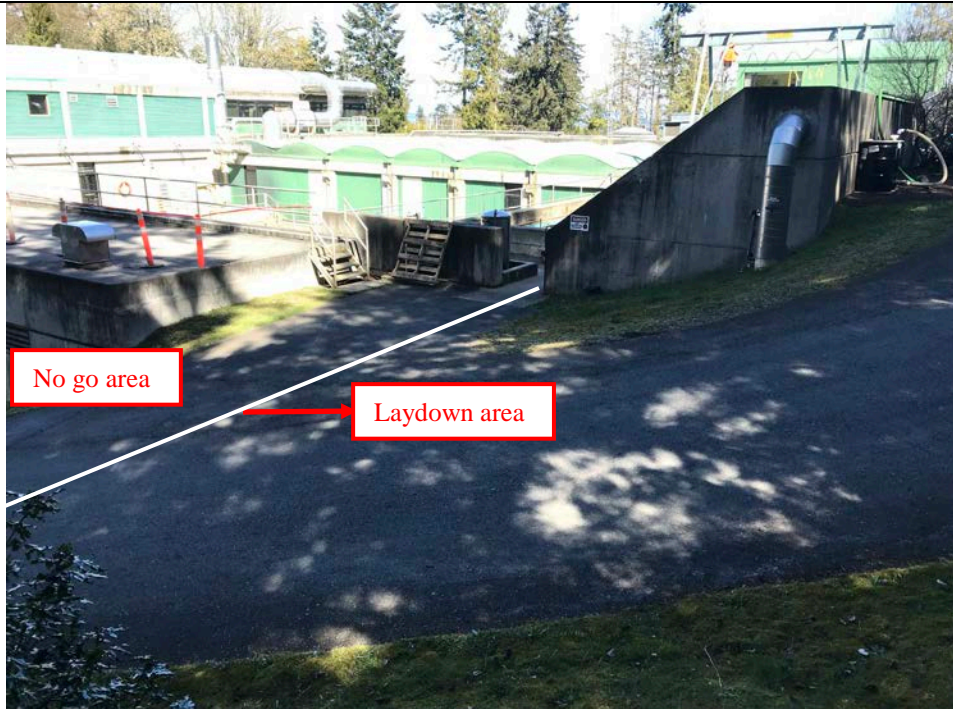


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Sludge Storage Cell 3 Construction Laydown Reference Photos

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5. Construction laydown area A near sludge storage cell 3 (end of laydown area near tank).



6. Septage trucks will be coming and going during the construction period.



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Sludge Storage Cell 3 Construction Laydown Reference Photos

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7. Construction laydown area B at parking area accessed from main FCPCC entrance (last 3 parking spots).



8. Route to construction laydown area C, accessed from FCPCC main parking area or back road from tank location.



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Sludge Storage Cell 3 Construction Laydown Reference Photos


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9. Grassy construction laydown area C across bridge



10. Grassy construction laydown area C across bridge – approximately 5.5 m x 7.5 m available

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APPENDIX 3 – RDN EMS CONTRACTOR-SUPPLIER PACKAGE

Document #:	WWS-COM-10.1
Revision #:	17
Effective Date:	31 January 2020
Reviewed by:	L. Mueller, EMS Coordinator
Approved by:	I. Lundman, Operations Sup't

WWS-COM-10.1 Contractor-Supplier Package

The purpose of this package is to convey the requirements of Regional District of Nanaimo Wastewater Services' (WWS) Environmental Management System (EMS) to contractors and suppliers. This package is applicable to all wastewater treatment facilities and pump stations.

As a contractor or supplier to WWS, you have a responsibility to comply with all provisions identified in the Contract Documents regarding Environmental Protection. Where Contract Documents do not exist, the service provider will comply with Sections Two, Three and Four.

Please retain a copy for your records.

PACKAGE CONTENTS:

1.0 General Overview: ISO 14001

- 1.1 Environmental Management System (EMS)
- 1.2 Environmental Policy and ISO Clause
- 1.3 Environmental Aspects and Impacts
- 1.4 Environmental Objectives and Targets

2.0 Operating Procedures

3.0 Emergency Preparedness and Response Procedures

4.0 Environmental Specifications

- 4.1 Air Emissions
- 4.2 Cleaning Equipment
- 4.3 Dust Control
- 4.4 Energy Consumption
- 4.5 Hazardous Materials
- 4.6 Noise
- 4.7 Sensitive Areas
- 4.8 Spills
- 4.9 Surface Water Control
- 4.10 Waste Management - Solid Non-Hazardous Waste

5.0 Attachments

- Environmental Policy
- ISO Clause

I, _____ of _____
(please print name) (please print company name)

acknowledge that I have received a Contractor-Supplier Package (ISO 14001 Contractor Supplier Environmental Performance Requirements) containing the materials listed above.

(Date)

(Supplier/Contractor Employee's Signature)

(Date)

(WWS Project Manager's Signature)

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1.0 GENERAL OVERVIEW: ISO 14001

1.1 Environmental Management System (EMS)

- An EMS is the part of an organization's management system, used to develop and implement its environmental policy and manage its environmental aspects.
- It includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources.

1.2 Environmental Policy and ISO Clause

- An Environmental Policy is a statement by the organization of its overall intentions and direction related to its environmental performance. It provides a framework for action and for the setting of environmental objectives and environmental targets.
- It is a driver for implementing and maintaining our EMS and reflects commitment to continual improvement, legal compliance and prevention of pollution
- The Environmental Policy is posted at each of the WWS wastewater treatment facilities and pump stations, and is available on the RDN website: www.rdn.bc.ca
- Uncontrolled copy of the Environmental Policy attached (Section 5.0 of this package)
- Uncontrolled copy of WWS' ISO Clause (Section 5.0 of this package)

1.3 Environmental Aspects and Impacts

- Environmental Aspect: element of an organization's activities, products or services that can interact with the environment.
- Environmental Impacts: any changes to the environment whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
- Environmental impacts include:
 - Air Pollution and Odour
 - Depletion of Natural Resources (Energy Use)
 - Landfill (Garbage)
 - Noise
 - General Repairs-Construction (Sensitive Areas)
 - Sewage Bypass (Leak/Spill)
 - Treatment Disposal (Hazardous Waste)

1.4 Environmental Objectives and Actions

- Environmental Objective: overall environmental goal consistent with the environmental policy, that an organization sets itself to achieve.
- Environmental Target: a detailed performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
- Objective and Targets are set to minimize environmental impacts.
- Any legal requirements that must be met by the organization (i.e. permit requirements) help create the objectives and targets.

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2.0 OPERATING PROCEDURES

- All WWS wastewater treatment facilities have Operating Procedure Manuals.
- Procedures applicable to contractors and suppliers will be supplied by the WWS Project Manager at pre-construction meetings or prior to the work commencing.
- Contractors and Suppliers will be required to sign a Procedure Checklist acknowledging that they have received copies of applicable procedures at a pre-construction meeting or prior to commencing work on site.
- The WWS Project Manager will ensure that a site induction is completed prior to work commencing as per the ISO Clause attached. (Section 5.0 of this package)

3.0 EMERGENCY PREPAREDNESS AND RESPONSE PROCEDURES

- All WWS wastewater treatment facilities have Emergency Preparedness and Response Procedure Manuals.
- Procedures applicable to contractors and suppliers will be supplied by the WWS Project Manager at pre-construction meetings or prior to the work commencing.
- Contractors and Suppliers will be required to sign a Procedure Checklist acknowledging that they have received copies of applicable procedures at a pre-construction meeting or prior to commencing work on site.
- The WWS Project Manager will ensure that a site induction is completed prior to work commencing as per the ISO Clause (Section 5.0 of this package).

4.0 ENVIRONMENTAL SPECIFICATIONS

Contractors and suppliers must abide by the following environmental specifications while working on site, as applicable.

4.1 Air Emissions

- Contractors and Suppliers will ensure that excess vehicle idling is minimized.
- Contractors will ensure that their staff are trained in the proper use and handling of all materials and chemicals to ensure air emissions/odours are minimized.
- No open burning of waste materials is permitted.

4.2 Cleaning Equipment

- Do not clean equipment in streams/rivers or lakes.
- Clean construction equipment prior to entering roadways.
- Do not clean equipment in locations where debris can gain access to sewers, watercourses or aquifers.

4.3 Dust Control

- Transport dusty materials in covered haulage vehicles.
- Public roadways shall be kept clean and free of mud.

4.4 Energy Consumption

- Contractors and Suppliers will use energy efficient equipment when undertaking any work on a job site, where practical.
- Contractors and Suppliers staff will turn off lights and equipment when not in use and where practical when on a job site.

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4.5 Hazardous Materials

- Hazardous materials brought on site and removed shall be managed in accordance with current MOE Regulations current at the time of work.
- Governing Ministry of Labour Regulations respecting protection of works, remedial handling and disposition of Designated Substances encountered shall be followed.
- Do not empty fuel, lubricants, herbicides, pesticides, fungicides, paint materials, solvents or other chemicals into sewers or watercourses (only legally acceptable disposal methods are acceptable).

4.6 Noise

- Use vehicles and equipment with efficient muffling devices.
- Provide and use devices that will minimize noise levels in construction areas.
- Minimize noise resulting from activities while on-site whenever practical.

4.7 Sensitive Areas

- Inform WWS staff in writing of the particular schedule for each river crossing, channelizing or other work in the designated sensitive areas.
- Avoid encroachment on unique natural areas and establish boundary protection and signage to avoid encroachment.
- Do not disturb habitats of rare or endangered species. Agree and implement mitigative measures with WWS staff.
- Protect wetland sites used as feeding or breeding areas by migratory fowls or as habitats for other animals and establish boundary protection and signage to avoid such encroachment.
- Schedule construction in sensitive areas so that there will be minimal interference with water uses including fish migration or spawning, or disruption of incubation periods for eggs.
- Keep removal of vegetation to a minimum.
- Contain and deposit on land all aquatic plants uprooted or cut prior to or during construction.

4.8 Spills

- If requested, the contractor will provide to the WWS Project Manager for approval an Environmental Plan which addresses spill prevention, and spill response and communication.
- The contractor will be provided with a WWS Spill Response procedure in the event an Environmental Plan is not requested by WWS. If the contractor is provided with a WWS Spill Response procedure, the contractor will be required to follow instructions assigned to 'operator' in the procedure.
- Spill containment must be provided for any equipment containing fuel.
- Be prepared at all times to intercept, clean up and dispose of any spillage that may occur whether on land or water.
- Keep all materials required for clean-up of spills readily accessible on-site (e.g. spill kit)
- The contractor must dispose of all spillage and contaminated material the contractor generates. Contaminated material may not be stored on site.
- Report spills to EMBC at 1-800-663-3456 as per the *BC Spill Reporting Regulation*, which applies for the purposes of the *BC Environmental Management Act*.
- Notify WWS staff immediately if there are any spills and provide the EMBC confirmation number, where one has been provided.
- Results of all spill investigations must be forwarded to the WWS Project Manager and Chief Operator of the facility at which the spill occurred.

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- Reporting of releases is also a requirement of federal and other provincial legislation, including the Canadian Environmental Protection Act, and the Transportation of Dangerous Goods Act.

4.9 Sediment and Erosion Control

- The contractor, where ground work is required, will follow the project's sediment and erosion control plans.
- If no sediment and erosion control plan is in place the following procedures should be used :
 - Control all surface water and groundwater including rainfall and run-off. Ensure that erosion is controlled and that flooding of excavations or damage to structures does not occur.
 - Intercept surface drainage as far back from excavations as practical by means of ditches, berms or other interception methods as may be required for effective control.
 - Direct pumped water or run-off to settling ponds or sediment basins prior to discharge to adjacent storm sewers or watercourses as per provincial and federal regulations
 - The contractor is to discharge only to RDN approved discharge point(s).
 - Intercept and divert concentrated run-off from unstable areas under sheet flow conditions, as directed by the Engineer.
 - Do not direct any flow of water across or over pavements, except through approved pipes or properly constructed troughs.
 - Keep gutters and drainage ditches open at all times to provide adequate surface drainage.
 - Maintain all existing storm sewers clean and free of deleterious materials and blockages.
 - Provide splash pads where water is discharged to the watercourse.
 - Dispose of water so as not to be injurious to public health or safety, to property or to any part of work completed or under construction.
- The contractor must follow any other requirements identified in the contract document with WWS.

4.10 Waste Management – Solid Non-Hazardous Waste

- No open burning is permitted.
- All wastes generated by contractors will be cleaned-up and disposed of as per BC Ministry of Environment Regulations.
- Whenever possible Contractors and Suppliers should utilize recycling opportunities for the disposal of waste.

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5.0 ATTACHMENTS



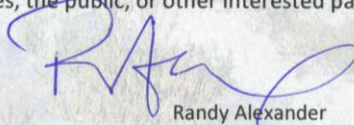
RDN Wastewater Services Environmental Policy

The Regional District of Nanaimo's (RDN) Wastewater Services (WWS) Environmental Policy reflects the values and priorities of the RDN's Board Strategic Plan 2019 - 2022, Regional Growth Strategy and Liquid Waste Management Plan.

The RDN's WWS is committed to providing reliable, high quality, and cost-effective wastewater services to the people and communities we serve. We strive to optimize our treatment and re-use processes and employ proven pollution prevention strategies at our facilities to protect and enhance the natural environment for future generations. In fulfillment of this commitment, it is the WWS policy:

- To do our utmost to comply with the letter and spirit of relevant environmental laws and regulations. There shall be thorough and accurate measurement and reporting of our environmental compliance.
- To prevent pollution. This includes improving the quality of treated wastewater and avoiding or reducing environmental pollution produced directly from WWS operations, or indirectly by the consumption of power, fuel, chemicals, and other resources.
- To identify and monitor environmental impacts and set measurable objectives and targets to reduce those impacts on the environment.
- To foster openness and dialogue with employees, First Nations and the public, including community engagement and public outreach, and respond to their concerns about potential hazards and impacts of our operations.
- To continually improve our performance relevant to this environmental policy.

This policy will be communicated regularly to all WWS staff and will be made available to regulatory agencies, the public, or other interested parties upon request.



Randy Alexander

General Manager, Regional and Community Utilities

Date: 20 November 2019


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ISO CLAUSE

Whereas the Regional District of Nanaimo's Wastewater Services (WWS) is operating to the ISO 14001:2015 standard, it is a condition of this contract that the Contractor comply with the WWS' Environmental Management System (EMS).

As per PM-08.0 Element 7.2 Competence and Element 7.3 Awareness, paragraph 5.11 of the WWS' EMS Policy and Procedure Manual:

1. Any contracted personnel whose activities can create a significant impact (as defined by the WWS' EMS) on the environment are required to undergo training. Such training will require one session of approximately one half hour.
2. While the Regional District of Nanaimo (the RDN) will provide the initial training to a representative Contractor, it is the responsibility of the Contractor to train the Contractor's own personnel, as well as any personnel of the Contractor's Subcontractor who will be working on a site of WWS.
3. The Contractor hereby warrants that it will provide any ISO 14001 related training which the RDN deems necessary to the Contractor's own personnel and any personnel of the Contractor's Subcontractor and will forward records thereof to the RDN at no additional charge to the RDN.

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APPENDIX 4 – PROCESS PIPING GENERAL SPECIFICATION REV 1

 REGIONAL DISTRICT OF NANAIMO	Process Piping General	Date: April 5, 2021 Revision: 1 Ref. No: SP-P-0001
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1. General

1.1. Summary

- 1.1.1. This specification outlines general requirements for the supply and installation of process piping, valves, fittings and related appurtenances at the Regional District of Nanaimo (RDN) Facilities. More detailed requirements are contained in other specifications. This specification must be referenced to and interpreted simultaneously with all other specifications pertinent to the Work.
- 1.1.2. When details are not provided in the design package, the Contractor shall design, select, locate and provide expansion joints, pipe guides and anchors required for pipe lines included in the Work.
- 1.1.3. All materials not specifically listed or specified but required to complete the installation are the responsibility of the Contractor.

1.2. References

1.2.1. Definitions

- a) Maximum working pressure: The greatest continual pressure at which the piping system operates.
- b) Design Package: Issued For Construction Drawings; Specifications and Engineering Work Package (EWP), Scope of Work (SOW) or other written description of the Work to be done.
- c) Test pressure: The hydrostatic pressure used to determine system compliance.
- d) Interior: Within an environmentally controlled enclosure where the temperature is maintained above 5°C.
- e) Submerged: Regularly or occasionally immersed in liquid; or within 3.0 m above maximum water level within a structure or lagoon/pond.

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- f) Outdoor: Exposed, above ground, outside or within an enclosure that is not environmentally controlled.
- g) Buried: Placed directly in soil and/or granular fill.
- h) Engineer: The Engineer or Engineering Firm responsible for the design.
- i) Owner's Representative: The Engineer responsible for the general design of the Work and contractually acting as The Consultant on behalf of the RDN, or other named agent of the RDN responsible for managing or coordinating the Work.
- j) Contractor's Engineer: A professional engineer registered in the Province of British Columbia who is qualified and retained to perform detailed piping design for the Work, including but not limited to thermal expansion design, at the Contractor's cost.

1.2.2. Reference Standards

- a) Conform with the most recent version of all standards referenced in this Section.
- b) ANSI B1 .1: Unified Inch Screw Threads, UN and UNR Thread Form
- c) ANSI/AWWA C606: Grooved and Shouldered Joints
- d) ASME B31.3: Process Piping
- e) ASTM B16.21: Nonmetallic Flat Gaskets for Pipe Flanges
- f) ASTM A193: Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A194: Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
- g) ASTM A307: Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength

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- h) ASTM A354: Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners
- i) ASTM A563: Carbon and Alloy Steel Nuts
- j) ASTM B32: Solder Metal
- k) ASTM B633: Electrodeposited Coatings of Zinc on Iron and Steel (m) ASTM B766: Electrodeposited Coatings of Cadmium

1.3. Coordination

- 1.3.1. Prior to construction, the Contractor must coordinate with others, if required, to locate openings and place sleeves in cast in place concrete and/or masonry.

1.4. Required Contractor Submittals to RDN - For Review in Advance of Fabrication/Construction

- 1.4.1. Before fabrication, provide materials certificates for each type of pipe material and for each fitting, valve, coupling, and all specified appurtenances used to complete the work covered in this section.
- 1.4.2. Isometric drawings must be prepared for all piping systems greater than 50 mm in diameter to indicate assembly details; pipe size, welds, flanges, couplings, valve placement, valve operating wheels, vents and drains, cathodic protection, seismic restraint system, expansion joints, guides, anchors, supports and provisions for thrust restraint, wall penetrations, as well as any other pertinent details. When piping isometrics are not provided in the design package, the development of piping isometrics will be the responsibility of the Contractor.
- 1.4.3. Provide details of any shop fabricated pipe and fittings.
- 1.4.4. Where directed by the Owner's Representative, provide mill test results or product samples.
- 1.4.5. For restrained, mechanical, and expansion joints provide manufacturer's catalogue data, shop drawings and assembly drawings confirming general arrangement, dimensions, tolerances,

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materials of construction, weights and installation details.

- 1.4.6. If requested, the piping fabricator shall submit a demonstrated fillet and butt weld on a test sample of pipe to be examined and approved by a certified inspection company. The test specimens will be submitted to the RDN's inspection company at the RDN's expense. Any retesting required by the RDN shall be completed at the Contractor's expense.
- 1.4.7. Catalogue cut sheets and/or shop drawings for each type of valve indicating the valve data and pressure rating, materials of construction, dimensions, head loss characteristics through the valve, operating torque and valve end configuration.
- 1.4.8. Where valves cannot be supplied as specified in the Design Package, in advance of construction, the Contractor is to provide a Detailed Valve Specification Sheet and indicate with check marks where the proposed valve meets the requirements specified and with written amendments where the product differs from the specification. This submission will be reviewed by the Engineer. This submission does not guarantee approval, and the Engineer could recommend an alternative valve.

1.5. Required Contractor Submittals to RDN – For Information

- 1.5.1. Submit radiographic weld test and other shop inspection and test results, indicating that the Work meets the specifications.
- 1.5.2. Provide current and complete documentation of welder's qualifications prior to the commencement of any welding. All welders involved in the Work must provide the correct documentation, including but not limited to Welding Certifications.
- 1.5.3. Prior to commencing any welding of stainless-steel pipe, submit a Welding Procedure Specification (WPS) including a written description of welding techniques including but not limited to materials, methods, and quality control. Certify that the technique is acceptable for the intended service condition. Written procedures must be signed and sealed at the Contractor's cost by a professional engineer registered in BC qualified for welding design.
- 1.5.4. When not provided in the Design Package, provide hanger, joint restraint, expansion joint, guide, anchor, support and seismic restraint system design details including locations, load information, design calculations and illustrative drawings, stamped and signed by a professional engineer registered in the Province of British Columbia

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1.5.5. Submit manufacturer's catalogue data and assembly drawings for mechanical, restraint and expansion joints confirming general arrangement, dimensions, tolerances, materials of construction, weights and installation details.

1.5.6. Submit Operating and Maintenance data for valves. Include complete description of operation together with detailed drawings, a complete list of replacement and repair parts, and parts manufacturer's identifying numbers.

1.6. Quality Assurance

1.6.1. Review the drawings prior to installation of piping, conduit services, and fixtures, identify any conflicts and cooperate with the Owner's Representative to determine the adjustments necessary to resolve these conflicts.

1.6.2. Provide complete, fully tested and operational process piping systems.

1.6.3. Comply with all laws, ordinances, rules, regulations, codes and orders of all authorities having jurisdiction relating to this work.

1.6.4. All welding of pipe and fittings shall be undertaken by welders certified for pipe welding for each applicable pipe welding procedure through the Industry Training Authority (ITA) and holding a Level A or Level B interprovincial Red Seal Ticket. For stainless steel welding, a Level A Red Seal Ticket is required.

1.6.5. Any fabricators supplying goods for the Work shall be fully approved by the Canadian Welding Bureau under the requirements of CSA W47.

1.6.6. All pipe fabrication and welding shall be in accordance with ASME B31.3 Process Piping for normal fluid service.

1.6.7. Perform visual examinations of all welding to reveal any surface or root defects, unacceptable weld fit-ups, arc strikes, weld spatter, or insufficient heat tint removal.

1.6.8. Perform visual examination of shop welding before shipping.

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- 1.6.9. Radiographic inspections of all piping included in the Work must be completed to meet the welding standards cited in this specification.
- 1.6.10. Spot-radiographic inspection of welds, or alternative method, may be conducted at the option and at the expense of the RDN. The Owners Representative will designate such company to carry out inspection of welds at the site of erection, and the Contractor shall fully co-operate with the Owner's Representative in supplying such labour and working space as may be required. Welding judged unacceptable shall be repaired using a method satisfactory to the Engineer at no additional cost to the Owner. The Contractor shall pay for the spot inspection of all welds which are judged unacceptable.
- 1.6.11. For each defective weld, two additional radiographic inspections at locations identified by the Owner's Representative will be required, plus a radiograph of the repair. Costs for such additional radiographic inspections including the radiograph of the repair shall be borne by the Contractor.
- 1.6.12. The RDN may use any method of inspection necessary to establish quality control and ensure adherence to welding procedures. Any weld test specimen coupons submitted shall clearly identify the welder(s).

1.7. Delivery, Storage and Handling

- 1.7.1. Store on site as recommended by materials manufacturer to prevent damage, undue stresses, or weathering. Store materials a minimum of 200 mm above ground with sufficient supports to prevent bending.
- 1.7.2. Protect non-UV light inhibited plastic materials from sunlight.
- 1.7.3. Provide shipping devices to maintain the face-to face dimension of each expansion joint during shipment, storage and installation.

2. Products

2.1. Bolts and Studs

- 2.1.1. Provide hex head bolts and studs, threads to ANSI B1.1, standard coarse thread series.

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2.1.2. Connecting stainless steel to stainless steel: Grade B8 ASTM A193, C1.1.

2.1.3. Connecting stainless steel to steel or cast/ductile iron: Provide carbon steel bolts and studs, Grade B to ASTM A307, heavy hex, zinc plated to ASTM B633. Bolt sizes to AWWA C110.

2.1.4. Connecting steel, or unless otherwise specified:

2.1.4.1. Provide carbon steel bolts and studs, Grade B to ASTM A307, heavy hex, zinc plated to ASTM B633

2.1.4.2. Bolt sizes to AWWA C110.

2.1.5. Axial stress in bolts shall not exceed 40% or material yield strength based on the unthreaded body area.

2.2. Nuts and Washers

2.2.1. Provide hex head nuts, threads to ANSI B1.1, standard coarse thread series. Greater than 25 mm, provide heavy hex.

2.2.2. Connecting stainless steel to stainless steel: Provide nuts to ASTM A194 Grade 8.

2.2.3. Connecting stainless steel to steel or cast/ductile iron: Provide carbon steel nuts, Grade A to ASTM A563. Provide flat hardened steel washers to ASTM F436. Nuts and washers to be zinc plated to ASTM B633. Always include washers.

2.2.4. Connecting steel, or unless otherwise specified: Provide carbon steel nuts, Grade A to ASTM A563. Provide flat hardened steel washers to ASTM F436. Nuts and washers to be zinc plated to ASTM B633

2.2.5. Tie-rods

2.2.5.1. Provide tie-rods continuously threaded to ASTM A354 and fabricated in accordance with 81.1 (screw threads, coarse thread series). Tie rods to be steel zinc plated to ASTM B633.

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2.3. Fittings

- 2.3.1. Provide fittings with wall thickness equal to or greater than the pipe, of the same material, coating, lining and pressure rating as pipe or better.
- 2.3.2. Provide eccentric reducers in horizontal lines with the flat side on top, unless shown otherwise.
- 2.3.3. Provide concentric reducers in vertical lines unless indicated otherwise.
- 2.3.4. Provide smooth flow standard radius elbows for process air service unless otherwise specified on the drawings.

2.4. Joints — Flanges

- 2.4.1. Flanges for mating to equipment or valves must be compatible with those items. In all situations similar faced flanges only shall be mated.
- 2.4.2. Class 150 (default, unless specified otherwise on the Drawings) — raised face weld neck with ring gaskets, unless mating to, lap joint flanges or equipment with flat faced flanges.
- 2.4.3. Class 300 — Not used.
- 2.4.4. Where dissimilar metals are to be connected, furnish dielectric fittings and/or isolating flanges, including major bolt sleeves and washers.
- 2.4.5. Gaskets
 - 2.4.5.1. Conform to ASTM B1621 and AWWA C228 Table 1.
 - 2.4.5.2. Minimum gasket thickness 3.175 mm.

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2.4.5.3. Provide full face gaskets for full/flat faced flanges

2.4.5.4. Provide ring type gaskets for raised face flanges.

2.4.5.5. Provide gasket materials suitable for the temperature, pressure and corrosivity of the fluid conveyed in the pipeline.

2.4.5.5.1. Provide liquid service gaskets of EPDM or neoprene.

2.4.5.5.2. Provide air service gaskets of compressed Kevlar with neoprene binder, suitable for service conditions.

2.5. Joints — Threaded Couplings

2.5.1. Provide screwed joints with American Standard threads.

2.5.2. Provide Teflon tape suitable for pipe material and service.

2.6. Joints — Grooved Joint Coupling

2.6.1. Provide pipe grooving, couplings and gaskets conforming to ANSI/AWWA C606. Victaulic or approved equal.

2.6.2. Provide for liquid service Victaulic Grade “E” EPDM flush seal gasket or approved equal.

2.6.3. Provide cut grooves on schedule 40, standard wall or thicker pipe, roll grooves for Sch 10 and Sch 5 stainless steel Grooved joint flange adapters shall be used only where specifically indicated.

2.7. Joints — Flexible and Restrained Joint Couplings

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2.7.1. Provide cylindrical center ring, two follower rings, two resilient gaskets, and connecting bolts. Robar, Dresser or equal.

2.7.2. If joint restrained add restraining rods and gussets welded to the pipe. Provide sufficient restraint to resist pressure equal to twice the system test pressure, as recommended by the manufacturer.

2.7.3. Provide gasket suitable for service conditions.

2.8. Joints - Welding

2.8.1. Use welding materials conforming to CSA W48.

2.8.2. Provide electrodes compatible with the material welded and which deposit metal with strength and corrosion resistance properties at least equivalent to the base metal.

2.9. Lining and Coating

2.9.1. Do not paint or line stainless steel pipe.

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3. Execution

3.1. Preparation

- 3.1.1. Prior to installation, inspect and field measure to ensure that conflicts or other irregularities do not impede the proper installation of piping.
- 3.1.2. Make all minor modifications required to suit equipment and structural element locations and elevations, at no expense to the RDN.
- 3.1.3. Advise the Owner's Representative of all modifications. Indicate all intended piping modifications on the shop drawings submitted prior to fabrication or installation. Do not commence work on related piping until the Owner's Representative's approval has been received.
- 3.1.4. Prior to valve and pipe appurtenance installation, field measure and check all equipment locations, pipe alignments, and structural installation. Ensure that valve location and orientation provides suitable access to all valve operators. Ensure that sufficient easily disassembled joints are provided to allow for removal and replacement of all valves and pipe appurtenances.

3.2. Pipe Handling

- 3.2.1. Inspect each pipe, fitting and piping appurtenance prior to installation. Do not install damaged material or materials with damaged linings or coatings.
- 3.2.2. Repair pipe with damaged protective coatings according to coating manufacturer's directions and to the Owner's Representative's satisfaction.
- 3.2.3. Remove all foreign matter from inside of piping and piping appurtenances prior to installation.
- 3.2.4. Use proper implements, slings, tools and facilities for the proper protection of the pipe and fittings. Exercise care in the installation so as to avoid damage to pipe or coatings.

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3.3. Conflicts

- 3.3.1. For any field run pipe, confirm the pipework routing with Owner's Representative prior to commencement of fabrication and installation. Advise Owner's Representative of any conflicts with existing services, structures, or services yet to be installed. Where necessary, amend the routing of pipework to avoid conflict, as instructed by Owner's Representative

3.4. Buried Pipe Installation

- 3.4.1. For buried stainless steel pipe apply tape to buried pipe and welded joints. Use Polyken, Tec-Tape or Denso tape consisting of primer and tape applied to minimum thickness of 0.90 mm in accordance with AWWA C209.
- 3.4.2. For flanged or coupled joints and for fittings use petrolatum primer, mastic and tape; Polyken, Tec-Tape or Denso, in accordance with AWWA C217.

3.5. Above Ground Pipe Installation

- 3.5.1. Make adequate provision in piping runs for expansion, contraction, slope and anchorage.
- 3.5.2. Install pipe support system to adequately secure the pipe and to prevent undue vibration, sag and stress.
- 3.5.3. Provide temporary supports as necessary during construction to prevent overstressing equipment, valves or pipe.
- 3.5.4. Accurately cut all piping for fabrication using field measurements.
- 3.5.5. Install pipes in straight alignment. Variance from the true alignment shall not exceed 10 mm in any direction or as required in ASME B31.3 whichever is less.
- 3.5.6. Fabricate and assemble pipe runs to ensure that pipework is not stressed to achieve

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the designed alignment and that no stresses are transferred to equipment or equipment flanges. "Springing" of pipework to ensure alignment is not permitted.

3.5.7. The Contractor shall undo and subsequently remake all pipework connections where so instructed by the Owner's Representative to ensure that springing does not occur.

3.5.8. Take care not to damage equipment, piping appurtenances, valves, flanges, or other joints.

3.6. Connections to Equipment and Existing Piping

3.6.1. Verify fit and materials at each connection prior to making the connection. Where joining piping to existing equipment, confirm flange type on the equipment and install matching pipe flanges to suit.

3.6.2. Modifications to either new or existing materials required to make connections shall be approved by the Owner's Representative in writing prior to the connections being made.

3.7. Pipe Joints

3.7.1. General

3.7.1.1. Provide joints that can be readily disassembled at the minimum within 1.0 m of any connection to equipment, on both sides of structural penetrations, and within 0.6 m of all threaded end valves.

3.7.1.2. Allow a minimum of 150 mm to face or 75 mm to edge of flanges or grooved joint couplings from wall, floor or ceiling unless otherwise shown.

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3.7.2. Threaded

3.7.2.1. Unless specifically noted on the Drawings, threaded couplings shall only be used on piping with nominal diameters less than 65 mm.

3.7.2.2. Ream the ends of all pipes to remove all burrs and cuttings when fabricating threaded joints.

3.7.2.3. Clean out pipe prior to joining.

3.7.2.4. Apply Teflon tape to male threads and join pipe. Do not use extra tape to make up for slack in the joint.

3.7.2.5. Install threaded pipe with as few joints as possible. Short lengths of pipe coupled together shall not be used, except where a union is specifically shown on the drawings.

3.7.2.6. If it is necessary to back off a screwed joint after it is made, the thread shall be cleaned, and new Teflon tape applied.

3.7.2.7. Threads shall not be caulked.

3.7.2.8. Bushings shall not be used.

3.7.2.9. Nipples in threaded piping shall be shoulder nipples. Close nipples shall not be used unless specifically indicated.

3.7.3. Flanged

3.7.3.1. Clean flanges and gaskets prior to connection.

3.7.3.2. Lubricate gaskets with soapy water and apply anti-seize compound to bolts.

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3.7.3.3. Bring flanges into close parallel and lateral alignment.

3.7.3.4. Tighten bolts progressively, proceeding from side to side of the flange. Wrenches used for tightening bolts shall be in good condition and properly sized to prevent rounding of nut and bolt heads. Apply manufacturer's torque recommendations when connecting to valves and equipment. Do not over torque bolts.

3.7.3.5. Do not use washers to take up excess bolt length.

3.7.3.6. Bolt projection beyond nuts shall be approximately two full threads.

3.7.3.7. Align flanges which connect piping to mechanical equipment to close parallel and lateral alignment prior to tightening bolts. Do not place strain on equipment.

3.7.3.8. Install flange adapters in accordance with manufacturer's recommendations.

3.7.3.9. Install lap joint flanges in vibration free service only. Do not install in buried or submerged environments.

3.7.4. Grooved Joint Couplings

3.7.4.1. Install grooved joints and grooved joint flange adapters as recommended by manufacturer using manufacturer's recommended lubricants on gaskets.

3.7.4.2. All grooving tools and accessories to be manufactured by grooved product supplier.

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3.8. Welding – General

- 3.8.1. Metal surfaces in and adjacent to the welding groove shall be dry before welding commences and kept dry and free from dirt, loose scale, slag, grease or any other foreign contaminant.
- 3.8.2. All welds after welding is complete must be cleaned and surface prepared as required for the final coating, finish or passivation method to be applied.
- 3.8.3. The end of each pipe shall be carefully fitted to butt accurately with proper gap to the preceding pipe or fitting. Before placing the pipe in position, the ends of the pipe shall be made truly circular by an approved method and, if necessary, for large pipes “spiders” shall be placed in each to keep them truly circular.
- 3.8.4. All stainless steel pipe welding shall be completed using a full purge TIG (GTAW) process.

3.9. Field Welding

- 3.9.1. In general, field welding should be avoided except where necessary. Field welding may be performed with the prior written consent of the Owner’s representative, as indicated by the approval of the Contractor’s shop drawings.
- 3.9.2. Field welding shall conform to the general requirements of AWWA C206 “Field Welding of Steel Water Pipe Joints”, and the quality requirements under “Welding- General” in this specification.
- 3.9.3. Field welding shall not be done under conditions that will negatively affect the completed weld including but not limited to: moisture; blowing sands or dust; high winds; low temperatures. If in the Owner’s Representative’s opinion, protection from prevailing weather conditions is necessary, then all welding shall cease until this protection is provided at the Contractor’s cost, and welds done under poor conditions shall be re-made. The Contractor shall be prepared for such events and will not be compensated for downtime associated with delays of this nature
- 3.9.4. When the ambient temperature is below 0°C all welding operations shall cease unless an appropriate welding procedure has been submitted. Written procedures to be signed and sealed at the Contractor’s cost by a professional engineer registered in BC qualified for welding design.

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3.9.5. In general, field welds shall be butt type, suitably beveled to the satisfaction of the Owner's Representative.

3.9.6. Pipes cut in the field for closing pieces and other field joints shall be cut to a smooth uniform level. Edges shall be smooth and not serrated and shall be ground smooth if they are rough after cutting.

3.10. Pipe Structural Penetrations

3.10.1. Refer to Structural Drawings and Specifications.

3.10.2. Coordinate with other divisions to locate and place sleeves or cast-in-place pipe sections prior to the construction of concrete and masonry building elements.

3.11. Drains, Vents, Flushing Connections, Sample Points

3.11.1. Provide manual air vents at the high points of each reach of pipeline.

3.11.2. Provide manual drains at the low points of each reach of pipeline. Pipe drains shall be routed to a sump, gutter floor drain, or other approved collection point.

3.12. Testing

3.12.1. All piping shall be pressure tested as per ASME B31.3 and the test witnessed by the Owner's Representative.

3.12.2. Review pipe pressure testing procedures with Owner's Representative at least 1 week prior to commencement of pressure testing. Initial service leak testing for Category D fluid service is acceptable where approved by the Owner's Representative.

3.12.3. Give Owners Representative 24 hours' notice of testing.

3.12.4. Thoroughly clean all piping prior to pressure testing.

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- 3.12.5. Prior to pressure testing ensure piping is adequately restrained.
- 3.12.6. Do not insulate, bury, concrete surround or otherwise conceal work until piping systems are tested and accepted.
- 3.12.7. Supply all equipment, gauges and materials including fluids for pressure testing.
- 3.12.8. Install fittings for air relief, gauges and drainage as needed to complete testing. After testing remove and plug fittings.
- 3.12.9. Cap and plug all lines that are normally open ended. Remove on completion of testing.
- 3.12.10. Isolate all low pressure equipment or pipeline appurtenances during testing to protect the equipment or pipeline appurtenances from damage.
- 3.12.11. Repair and replace any defective work using new material.
- 3.12.12. General Testing Criteria:
 - 3.12.12.1. When information is not provided on a Piping Line List the test pressure shall be 1.5 times the maximum working pressure. Confirm system working pressure with Consultant prior to pipe testing.
 - 3.12.12.2. Test duration: 10 minutes or as defined by ASME B31.3.
 - 3.12.12.3. There shall be no loss of pressure during testing, and no visual evidence of leakage.

3.13. Cleaning and Flushing

- 3.13.1. After installation and prior to testing, perform initial cleaning of process and utility pipelines.


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- 3.13.2. Unless waived in writing by the Owner's Representative, clean piping greater than 150 mm and less than 600 mm by passing a tightly fitting cleaning ball or swab through the pipeline. Remove instrumentation or piping appurtenances that may be damaged by this procedure and replace after cleaning.

- 3.13.3. Give lines smaller or equal to 150 mm an initial flush with clean water for piping normally conveying liquid commodities, or purge with air or inert gas for piping normally conveying air or gas.

- 3.13.4. Flush with clean water and drain pipes conveying liquid commodities after testing. Dispose of testing and flushing water in a manner approved by the Owner's Representative that causes no damage to buildings or siteworks.

- 3.13.5. For piping conveying air or gas less than or equal to 150 mm diameter, purge with air and/or inert gas before testing. Upon completion of testing and cleaning, drain and dry the piping with a dry air stream.

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APPENDIX 5 – AUSTENITIC STAINLESS STEEL PIPING SPECIFICATION REV 1

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1. General

1.1. Summary

1.1.1. This Specification section applies to supply, fabrication, and installation of austenitic (304 or 316) stainless steel process piping for Regional District of Nanaimo (RDN) water and wastewater systems.

1.1.2. This specification must be referenced to and interpreted simultaneously with all other specifications pertinent to the Work described herein.

1.1.3. Related Requirements

- a) Process Piping General SP-P-0001
- b) Process Valves General SP-P-0101

1.2. Reference Standards

1.2.1. Conform with the most recent version of all standards referenced in this Section.

- a) ASME B31.3 Process Piping
- b) ANSI/ASME B16.5: Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard
- c) ANSI/ASME B16.9: Factory Made Wrought Buttwelding Fittings
- d) ANSI/ASME B16.11: Forged Fittings, Socket-Welding and Threaded
- e) ANSI/ASME B16.21: Nonmetallic Flat Gaskets for Pipe Flanges
- f) ANSI/ASME B36.19: Stainless Steel Pipe
- g) ASTM A182: Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High Temperature Service

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- h) ASTM A240: Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
- i) ASTM A312: Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes
- j) ASTM A380: Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems
- k) ASTM A403: Wrought Austenitic Stainless Steel Piping Fittings
- l) ASTM A480: General Requirements for Flat-Rolled Stainless and Heat –Resisting Steel Plate, Sheet and Strip
- m) ASTM A778: Welded, Unannealed Austenitic Stainless Steel Tubular Products
- n) ASTM A967: Chemical Passivation Treatments for Stainless Steel Parts
- o) AWWA C220: Stainless Steel Pipe ½" (13 mm) and Larger
- p) AWWA C226: Stainless-Steel Fittings for Waterworks Service, Sizes ½". through 72" (13 mm through 1,800 mm)
- q) AWWA C227: Bolted, Split-Sleeve Restrained and Nonrestrained Couplings for Plain-End Pipe
- r) AWWA C606: Grooved and Shouldered Joints

1.3. Delivery, Storage and Handling

1.3.1. Protect materials from contamination from dirt or road salt by shrink wrap or other suitable packaging, and end caps, prior to shipment.

1.3.2. Store materials in such a way to prevent scratching and scoring of the surface and to avoid contact with dirt or carbon steel.

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1.4. Design Conditions

1.4.1. Use the following design conditions:

- a) Normal commodity temperature range: 2 to 25°C.
- b) Normal ambient temperature range: Indoor 0 to 40°C. Outdoor -20 to 40°C.
- c) Normal service operating pressure range: 0 to 400 kPa

2. Products

- 2.1. **When detailed piping bill of materials are not provided on the design drawings**, provide piping systems with components as detailed in the table below, suitable for the design and operating conditions:

Item	Size	Description
Pipe	50 mm & smaller	Schedule 40S: ASTM A312/A312M, Type 316 seamless, pickled and passivated.
	60 mm & larger	Schedule 10S: ASTM A778, "as-welded" grade, Type 316L.
Joints	50 mm & smaller	Socket weld, except where alternate joint type required to mate with equipment or piping appurtenances.
	60 mm & larger	Butt-welded or flanged.
Fittings	50 mm & smaller	Socket weld forged, except as noted in Joints above: 1,000 CWP, ASTM A182/A182M, Grade F316L.
	60 mm & larger	Butt-Welded: ASTM A774/A774M Grade 316L conforming to MSS SP 43, "as-welded" grade, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise.
Branch Connections	50 mm & smaller	Tee or reducing tee in conformance with Fittings above.
	60 mm & larger	Butt-welding tee or reducing tee in accordance with Fittings above.
Flanges	All	Forged Stainless Steel: ASTM A182/A182M, Grade F316L, ASME B16.5 or B16.47 Class 150, slip-on or weld neck. Raised face for Class 150. Flat face for flange connecting to ductile/cast iron Class 125 flanges or other equipment and appurtenances requiring such. 

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Item	Size	Description
Unions	50 mm & smaller	Socket weld forged: ASTM A182/A182M, Grade F316, 13800 or 20700 kPag WOG, integral ground seats, AAR design meeting the requirements of ANSI B16.11, bore to match pipe.
Bolting	All	Forged Flanges: Type 316 stainless steel, ASTM A320/A320M Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex head nuts.
Gaskets	All Flanges	Flanged 5 mm thick, unless otherwise specified, black rubber (EDPM), hardness 80 (Shore A), rated 93 degrees C minimum, conforming to ASME B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2. Blind flanges shall be gasketed covering entire inside face with gasket cemented to blind flange.
Thread Lubricant	50 mm & smaller	Teflon tape.

3. Execution

3.1. Stainless Steel Pipe Welding and Fabrication

- 3.1.1. Stainless steel fabrication shall be done in an approved fabrication shop set up to handle, fabricate and weld stainless steel using handling procedures designed to eliminate carbon contamination of the stainless steel including but not limited to: the use of stainless steel tools including wire brushes, chisels, files and hammers, welding gloves and grinding wheels. Only 300 series stainless steel brushes or wheels shall be used on austenitic stainless steel alloys.
- 3.1.2. Areas used for fabrication of austenitic and nickel alloys shall be separated from carbon steel areas by methods suitable to prevent contamination by dirt, carbon steel shavings, grinding dust and sparks, and zinc dust from painting operations. Welding gloves and tools used during the fabrication of stainless steel shall not have been used on previous carbon steel work.
- 3.1.3. Where tape is used for backing purge gas the tape shall use an adhesive backing such that when no longer required it can be completely removed with residual adhesive removed by a suitable solvent or abrasive.
- 3.1.4. Clean piping to a pre-weld zone extending 50 mm on either side of the weld with alcohol or acetone.
- 3.1.5. All welding of the root pass of austenitic stainless steel pipe shall be done using the Gas

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Tungsten Arc Weld (GTAW) process with shielding gas protection of the backside of the weld sufficient to reduce oxygen content to a level that can avoid granulation and ensure a high quality corrosion resistant weld. Large bore piping may be internally back welded to achieve the same result.

3.1.6. Clean welds after fabrication in accordance with ASTM A380.

3.1.7. Pickle and passivate welds after fabrication in accordance with AWWA C220, ASTM A380 and ASMT A967 by immersing in a liquid bath of pickling solution. Large bore piping shall be cleaned with a pickling paste.

3.1.8. Any noticeable discolouration on the piping after welding shall be removed by pickling.

3.1.9. Once sufficient pickling time has elapsed to re-passivate the stainless steel surface, clean the piping of all acids by thoroughly rinsing the pipe with water.

3.1.10. Thread stainless steel pipe in accordance with threading machine manufacturer's instructions.

3.2. Pipe Grooving

3.2.1. Groove stainless steel pipe in accordance with grooving machine manufacturer's instructions.

3.2.2. Contamination from iron particles by pressure contact with rollers or tooling should, if at all possible, be avoided. Where stainless steel rollers or tools are unavailable, adhesive plastic films or tape can be used to prevent direct contact. They shall be removed after fabrication. In all cases, if iron contamination is suspected, the piping must be pickled to remove the contamination and prevent rust staining.

3.3. Fabricated Fittings

3.3.1. Shop fabricated fittings made from rolled stock in accordance with ASTM A240 shall be in a solution annealed condition. Shop fabricated fittings made from pipe shall be in accordance with AWWA C220, ASTM A312, ASTM A778. Design standard shall be in accordance with AWWA C226 and thickness of all reinforcement collars and pads shall be determined by the appropriate formula in the latest edition of AWWA M11.

3.4. Pipe Coating: Do not paint stainless steel piping unless clearly indicated on the drawings.