ADDENDUM NO. 1

TO THE
CONTRACT DOCUMENTS
FOR THE

REGIONAL DISTRICT OF NANAIMO
TENDER No. 23-040
NANOOSE BAY PUMP STATION No. 6 UPGRADE AND SANITARY FORCEMAIN REPLACEMENT

TO ALL TENDERERS: August 22nd, 2023

The following changes, additions, and/or deletions are hereby made a part of the Contract Documents for the Regional District of Nanaimo, "Tender No. 23-040 Nanoose Bay Pump Station No. 6 Upgrade and Sanitary Forcemain Replacement", as fully and completely as if the same were fully set forth therein:

1. QUESTION AND ANSWER SHEET No. 1

Add the enclosed Question and Answer Sheet No. 1
(Enclosure: 7 pages)

2. TABLE OF CONTENTS

On the second page, under Section 26 32 13.1 – Power Generation Diesel, replace the following:
"15" with "14"

On the second page, add the following under Section 26 32 13.01 – Power Generation Diesel:
"Section 26 36 23 – Automatic Transfer Switches 7"

3. INSTRUCTIONS TO TENDERERS

ARTICLE 42 – SEQUENCING PROCEDURES

Add the following Article:

"Attached in *Appendix C – Temporary Bypass Pumping Plan*, and in *Section 01 57 20 – Sequencing and Tie-in Requirements*, are detailed outlines of how work may be proceeded with. It is necessary for the Engineer to produce such outlines, in order to ensure the station upgrades may be installed with minimum disruption to existing pumping operations. The governing criteria used in the preparation of these procedures were:

a) In general, the maximum shutdown period for pumping should not exceed the typical duration between existing station pumping cycles.
b) In general, the proposed forcemain should be tested prior to being put into service.
c) There is limited fluid storage available, and the sanitary sewer shall not back-up into adjacent residences.
d) The existing pumps are a re-use item, and require inspection, and re-conditioning (if necessary) prior to being re-installed in the new station.

These are suggested procedures only. Should the Tenderer wish to use alternate procedures, these must be presented in writing, for approval by the Engineer, and prior to the start of construction."

ADDENDUM NO. 1

REGIONAL DISTRICT OF NANAIMO
TENDER No. 23-040
NANOOSE BAY PUMP STATION No. 6 UPGRADE AND SANITARY FORCEMAIN REPLACEMENT

3. SPECIFICATIONS

SECTION 01 57 00 – TEMPORARY PUMPING

1.1 Scope of Work
Add the following clause:
1.1.3 "The Contractor will be responsible for execution of the Owner Supplied Temporary Bypass Pumping Plan."

1.2 Related Work Specified Elsewhere
Add the following clauses:
1.2.3 "Refer to Section 26 05 00 – Common Work Results, for additional information regarding electrical requirements for temporary bypass pumping."
1.2.4 "Refer to Appendix C – Temporary Bypass Pumping Plan, for additional information regarding requirements for temporary bypass pumping."

SECTION 01 57 20 – SEQUENCING AND TIE-IN REQUIREMENTS

1.1 Scope of Work
1.1.6 Delete the following wording after "pump control system, and":
"if necessary,"

SECTION 26 05 00 – COMMON WORK RESULTS
Refer to the enclosed Addendum No. 1 from PBX Engineering
(Enclosure: 25 pages)

SECTION 26 32 13.01 – POWER GENERATION DIESEL
Replace this section with the enclosed Section 26 32 13.01 – Power Generation Diesel
Refer to the enclosed Addendum No. 1 from PBX Engineering
(Enclosure: 25 pages)

SECTION 26 36 23 – AUTOMATIC TRANSFER SWITCHES
Add the enclosed Section 26 36 23 – Automatic Transfer Switches
Refer to the enclosed Addendum No. 1 from PBX Engineering
(Enclosure: 25 pages)

4. APPENDICES

APPENDIX C – TEMPORARY BYPASS PUMPING PLAN
Add the enclosed Appendix C – Temporary Bypass Pumping Plan
(Enclosure: 28 pages)

ADDENDUM NO. 1

REGIONAL DISTRICT OF NANAIMO
TENDER No. 23-040
NANOOSE BAY PUMP STATION No. 6 UPGRADE AND SANITARY FORCEMAIN REPLACEMENT

Tenderers shall acknowledge receipt and acceptance of this Addendum No. 1 by signing in the space provided, emailing a copy of the signed Addendum a minimum of 24-hours prior to the specified opening date, to the Regional District of Nanaimo at cmathie@rdn.bc.ca, and submitting the signed Addendum, initialled on every page with the Tender. Tenders submitted without this Addendum may be considered incomplete.

KOERS & ASSOCIATES ENGINEERING LTD.



Cody Morris, P.Eng.
Project Engineer
Permit to Practice No. 1001658

Receipt acknowledged and conditions agreed to this ____day of_____, 2023.

_____ _____
TENDERER SIGNATURE

ADDENDUM No. 1

to the

CONTRACT DOCUMENTS

for the

NANOOSE BAY SANITARY LIFT STATION NO. 6

TO ALL TENDERERS: August 21, 2023

The following changes, additions, and/or deletions are hereby made a part of the Contract Documents for the Regional District of Nanaimo (RDN), "Nanoose Bay Sanitary Lift Station No. 6", and are to be read, interpreted, and coordinated with all other parts as fully and completely as if the same were fully set forth therein. The specifications and drawings are complementary. Items listed under the specification in this addendum and having influence on the drawings are so deemed to alter the drawings. Items listed under the drawings in this addendum and having influence on the specification are so deemed to alter the specification.

1. **Summary of Change**

   a. This addendum covers the following changes:

      i. Removal of new standby generator from contract. The existing generator shall be reconnected as the permanent standby generator.

      ii. Addition of a temporary bypass pumping system for the projects. Relevant upgrades to specifications are presented within.

2. **Revisions to Specifications**

   a. 26 05 00 – Common Work Results

      i. **Modify** Section title *1.5 Scope*
      to
      1.5.1 Scope – Sanitary Lift Station Upgrade

      ii. **Modify** Section 1.5.2.4 *Supply and installation of concrete pads for generator and electrical kiosk including gaskets between pad and enclosures*
      to
      Supply and installation of concrete pads for electrical kiosk including gaskets between pad and enclosures. Reconnection of existing standby generator.

      iii. **Modify** Section 1.5.2.2: *Supply and installation of underground and above ground electrical cabling including termination within the electrical kiosk and generator*
      to
      Supply and installation of underground and above ground electrical cabling including termination within the electrical kiosk and existing generator.

      iv. **Modify** Section 1.5.3 *Supply and installation of a 25kW diesel-powered standby generator complete with sub-base fuel tank, critical grade muffler, and sound attenuated enclosure*
      to
      Maintain existing generator connection through construction.

      v. **Remove** Section 1.5.3.1 *Maintain existing generator connection through construction until new generator has been delivered and installed on site.*

      vi. **Modify** Section 1.5.8
      replace
      stand-by generator
      with
      existing stand-by generator

      vii. **Add** Section *1.5.3 Scope - Temporary Bypass Solution*

1. This project involves the construction of a temporary bypass pumping system for the sanitary pumping station located at 3270 Schooner Cove Dr, Nanoose Bay.
2. The electrical scope of the bypass pumping system station includes, but is not limited to, the following items of work:
    1. Electrical Construction Services, including:
        i. Supply and installation of a temporary 100A, 120/208V, 3PH BC Hydro Service
        ii. Temporary cabling for pump and float control systems.
        iii. Trenching and backfilling for underground electrical duct work, as required.
        iv. Temporary ducting, as required.
        v. Temporary electrical grounding systems, as required.
    2. Supply and installation of underground and above ground electrical cabling including termination within the electrical controls compartment and standby generator.
    3. Supply and installation of a 25kW, 120/208V 3PH diesel-powered standby generator complete with sub-base fuel tank, critical grade muffler, and sound attenuated enclosure. A portable trailer mounted generator is an acceptable alternate.
    4. Installation of a lockable NEMA 3R electrical enclosure equipped with the following electrical and controls items:
        i. Distribution equipment.
        ii. Two (2) Motor control cabinets populated with motor control equipment.
            1. System Description:
                a. Two (2) single pump controllers with Hand-Off-Auto (HOA) selector switch and running indicator. Each pump is supplied with on/off switch to be modified so on contact is wired to float controlled starter box.
            2. Basis of Design: Tsurumi Pump Controller 5204
            3. External Control Devices:
                a. HOA Selector Switch
                b. Four (4) – float system (two (2) per pump):
                    i. Pump 1 Start
                    ii. Pump 1 Stop
                    iii. Pump 2 Start
                    iv. Pump 2 Stop
            4. Indicator:
                a. Pump Running Light (green)
            5. Enclosure

a. Environmental Rating: NEMA 4X

b. Material: Fiberglass

iii. Automatic transfer switch.

5. Supply and installation of temporary wet well, and electrical and controls components including, but not limited to, the following:

    i. Float switches

        1. Four (4) float configuration, two (2) per pump

            a. Pump 1 Start

            b. Pump 1 Stop

            c. Pump 2 Start

            d. Pump 2 Stop

    ii. Two (2) Pumps:

        1. Basis of Design: Flygt 3127, Motor # C3127.182 21-12-4AL-W 10HP
        2. Starting Method: Direct online
        3. Horsepower: 10hp
        4. Rated Voltage: 230V
        5. Phases: 3
        6. Rated Power: 7.5kW
        7. Rated Current: 25A
        8. Starting Current: 134A

6. Provide detailed shop drawings and installation details prior to construction.

7. Providing electrical commissioning of external control and power facilities for the standby generator power systems, including:

    i. Commissioning of transfer switch with stand-by generator

    ii. Coordinate commissioning schedule

8. Providing testing and commissioning services for the motor starting equipment

9. Providing electrical assistance during the commissioning of the temporary bypass solution.

10. Providing testing and commissioning of the electrical services and systems provided under this Contract. Coordinate commissioning services with generator supplier and pump system supplier.

11. Provide all permits, licenses and fees required by applicable Governmental Authorities having jurisdiction.

12. All work described herein shall be performed by qualified personnel.

13. Provide seismic engineering and associated materials and equipment as described herein.

14. Provide vibration isolation equipment and materials including seismic restraints and anchoring.

15. Preparation of operations and maintenance manuals.

16. Provision of training for the operation and maintenance teams on items specific to the site works.

b. 26 32 13.01 – Power Generation Diesel

i. Replace existing specification with Addendum 1 provided specification.

c. 26 36 23 – Automatic Transfer Switches

i. Add specification.

Tenderers shall acknowledge receipt and acceptance of this Addendum No. 1 by submitting with the Tender a full copy of this signed Addendum initialled on every page. Tenders submitted without this Addendum may be considered incomplete.

Regards,

PBX ENGINEERING LTD.

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Receipt acknowledged and conditions agreed to this _____day of_____, 2023.

_____ _____

TENDERER SIGNATURE

Revision History

Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
-	August 21, 2023	Issued for Tender (Addendum 1)	MS	AT

1. GENERAL

1.1 DOCUMENTS

.1 This Section of the Specification forms a part of the Contract Documents and is to be read, coordinated and implemented in conjunction with all other parts.

1.2 SCOPE – TEMPORARY BYPASS SOLUTION

.1 Supply one outdoor standby diesel generator set and all associated equipment as described in this Technical Specification.

.1 Contractor is permissible for supplying trailer mounted generator OR slab mounted generator. This specification covers both options and some sections are only permissible for one or the other.

1.3 RELATED TECHNICAL SPECIFICATIONS

.1 Section 26 05 00 – Common Work Results - Electrical

1.4 REGULATORY REQUIREMENTS

.1 UL-142, Standard for aboveground Tanks and Flammable and Combustible Liquids

.2 CAN/ULC S601, Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids

.3 Canadian General Standards Board (CGSB)

.4 CAN/CGSB 3.6 2010, Regular Sulfur Diesel Fuel.

.5 Canadian Environmental Protection Act (CEPA)

.6 CCME PN 1326, Environmental Code of Practice for Above ground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.

.7 CSA International

.8 CSA B139-Series 19 (R2014), Installation Code for Oil Burning Equipment.

.9 CSA 282-15, Emergency Electrical Power Supply for Buildings.

.10 C22.2 NO. 94.1-15 - Enclosures for electrical equipment, non-environmental considerations

.11 C22.2 NO. 94.2-15 - Enclosures for electrical equipment, environmental considerations.

.12 International Organization for Standardization (ISO)

.13 ISO 3046 1 2002, Reciprocating Internal Combustion Engines Performance Part 1: Declarations of Power, Fuel and Lubricating Oil Consumptions, and Test Methods - Additional requirements for engines for general use.

.14 National Electrical Manufacturers Association (NEMA)

.15 NEMA MG 1-2014, Motors and Generators.

.16 Underwriters' Laboratories of Canada (ULC)

.17 CAN/ULC S601 14, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids 5th Edition.

.18 CAN/ULC S603 14, Standard for Steel Underground Tanks for Flammable and Combustible Liquids.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 26 05 00 - Common Work Results – Electrical.

1.6 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and data sheets for power generators and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submittals:

.1 Submit Shop Drawings for generator, and include:

.1 Engine: make and model, with performance curves.

.2 Alternator: make and model.

.3 Voltage regulator: make, model and type.

.4 Battery: make, type and capacity.

.5 Battery charger: make, type and model.

.6 Main circuit breaker and trip unit: make, type and model.

.7 Load bank circuit breaker and trip unit: make, type and model.

.8 Alternator control panel: make and type of meters and controls.

.9 Governor type and model.

.10 Generator enclosure, model and type.

.11 Exhaust system and muffler model and type.

.12 Fuel tank.

.13 Schematic and wiring diagrams of engine, generator, and control panel, complete with interconnecting wiring diagram for automatic transfer switch.

.14 Single line diagram showing all breakers, switches, metering and protective relays.

.15 Complete bill of materials, including manufacturer's name, catalogue numbers and capacity.

.2 Submit dimensioned Shop Drawing showing complete generating system and fuel tank mounted on steel base, including vibration isolators, exhaust system, cooling system, drip trays, and enclosure. Indicate on Shop Drawings:

.1 Horizontal and vertical dimensions.

.2 Minimum door opening required for moving unit.

.3 Clearance requirements from equipment.

.4 Weight of entire assembly with full tank and fluids.

.5 Exact locations and details where necessary of interconnecting services including house load electrical connections, communications connections, general electrical connections, etc.

.3 Include slab anchoring locations and dimensioned foundation template.

.4 Provide conduit stub-up template for use by the Subcontractor responsible for installation of the diesel generator set and all associated equipment.

.5 Provide proof of seismic certification.

.4 Manuals:

.1 Two (2) sets operations and maintenance manuals - to be submitted on delivery

.2 Two (2) sets Engine Shop Manuals & two (2) sets Complete Parts Manual – to be submitted on delivery

.5 One (1) USB flash drive containing searchable PDF files of all final manuals, including maintenance manuals, engine shop manual, parts manual, and shop drawings.

1.7 WARRANTY

.1 Not applicable to rental generator:

.1 Warranty shall be Five (5) year or Three Thousand (3000)-Hour Comprehensive Limited Warranty which covers parts for 5yrs and labour for 5 years.

.2 Provide terms of warranty.

2. PRODUCTS

2.1 GENERAL

.1 All equipment shall be of current production by a firm who manufacturers the generator and control panel and who assembles the standby generator set as a matched unit. All equipment shall be new, factory tested, and delivered ready for installation.

.2 The supplier shall be the manufacturer's authorized distributor, who shall provide initial start-up services, conduct field commissioning services, and provide warranty service. The supplier shall have 24-hour service availability and factory-trained service technicians authorized to do warranty service on all warrantable products. The supplier shall be able to provide onsite parts and service within 24 hours of initial call.

2.2 SYSTEM DESCRIPTION

.1 Generating system shall consist of a fully automatic diesel engine driven electrical generation plant completely equipped with the following:

- .1 Diesel engine.
- .2 Alternator.
- .3 Alternator control panel.
- .4 Generator control panel and annunciator.
- .5 Main electronic trip circuit breaker.
- .6 Load bank electronic trip circuit breaker.
- .7 Battery charger and battery.
- .8 Fuel supply system, including sub-base fuel tank.
- .9 Exhaust system.
- .10 Factory sound attenuated enclosure.
- .11 Steel mounting base.

.2 Generator set to be: 31kVA/25kW, 120/208V, 60Hz, 3 PH., 4W.

.3 Basis of design: Cummins C25 D6

.4 System designed to operate as standby.

.5 All components necessary for the satisfactory operation of the standby power system shall be included and installed.

.6 Complete unit shall be CSA approved and meet NFPA current regulations.

.7 A trailer mounted standby genset is a suitable alternate to a permanent pad mounted solution.

2.3 Generator Load

.1 Generator size has been calculated based on the following load requirements:
- .1 Pumps 1 and 2 to run concurrently.
- .2 Pumps 1 and 2 to start sequentially and not simultaneously.
- .3 Pump 1
  - .1 Starting Method: Direct online
  - .2 Horsepower: 10hp
  - .3 Rated Voltage: 230V
  - .4 Phases: 3
  - .5 Rated Power: 7.5kW
  - .6 Rated Current: 25A
  - .7 Starting Current: 134A
- .4 Pump 2
  - .1 Starting Method: Direct online
  - .2 Horsepower: 10hp
  - .3 Rated Voltage: 230V
  - .4 Phases: 3
  - .5 Rated Power: 7.5kW
  - .6 Rated Current: 25A
  - .7 Starting Current: 134A

2.4 DIESEL ENGINE

.1 Diesel engine: to ISO 3046 1.

.2 Diesel engine-generator set is to be a 4-cycle, 1800 rpm, diesel engine generator set with low reactance brushless generator, single phase RMS sensing automatic voltage regulator, set-mounted control panel, and high ambient cooling system 50 degrees C.

.3 Engine shall be designed to operate on #2 diesel fuel. Diesel engine requiring premium fuels will not be accepted.

.4 Capacity:
- .1 Rated continuous power in kW at rated speed, after adjustment for system losses in auxiliary equipment necessary for engine operation; to be calculated as follows: Rated continuous output = Generator kW divided by Generator efficiency at full load.
  - .1 Under following site conditions:
    - .1 Altitude: refer to project location.
    - .2 Installed outdoors.

.5 Performance:

.1 The voltage regulation in a steady state shall be within +/-1.5% for any constant load between no load and rated load at 0.8 P.F.

.2 The adjustment range of the voltage regulator shall be tested and shall be at least +/-10% of the nominal voltage.

.3 Maximum transient voltage dip shall not exceed 25% below rated voltage on application of the single largest surge load step at a 0.8 power factor. Refer to Contract Drawings.

.4 Maximum transient voltage rise shall not exceed 12% above rated voltage on removal of full load at 0.8 power factor.

.5 Transient recovery time within +/- 1.5% shall be less than 2 seconds.

.6 Governor:

.1 Stability plus or minus 0.5%.

.2 Speed regulation no load to full load 2.5% maximum.

.3 Automatic frequency regulation shall be isochronous from steady state no load to steady state rated load.

.4 Frequency regulation shall be adjustable from isochronous to 5% droop.

.6 Cooling System:

.1 Engine shall be cooled by a mounted closed loop radiator system rated for full load operation in 50 degrees C ambient as measured at the generator air inlet.

.2 Block heater: thermostatically controlled lube oil or liquid coolant heater to allow engine to start in lowest ambient temperature experienced at installation location.

.1 Switch and fuse in heater circuit, mounted in engine alternator control cubicle.

.3 All coolant hoses, including block heater hoses, silicon type.

.4 Cooling system shall be filled with 50/50 ethylene glycol/water mixture by the equipment supplier.

.5 Factory installed coolant drain extension to exterior.

.7 Fuel system:

.1 Solid injection, mechanical fuel transfer pump, fuel filters and air cleaner, fuel rack solenoid energized when engine running.

.8 Lubrication system:

.1 Lube oil filter: replaceable, full flow type, removable without disconnecting piping.

.2 Lube oil cooler.

.3 Engine sump drain valve.

.4 Oil level dip stick.

.5 Engine oil drain to exterior of sound attenuated enclosure, complete with manual shut-off valve located inside enclosure.

.9 Starting system:

.1 12 or 24V dc electric starting motor.

.2 Heavy duty, 12 or 24V lead-acid battery with a cold cranking amp rating high than the cold cranking amp requirement of the starter motor.

.3 Battery must have sufficient capacity to crank engine at 10°C for 1 min with a battery end voltage of at least 80% of the rated voltage.

.4 Batteries must be accessible and include battery mounting rack and interconnecting cables of generous length.

.5 Battery charger: fully automatic, three stage, trickle type. Charge at standby to boost charge after use.

.1 Equipped with dc voltmeter, dc ammeter and on off switch.

.2 Minimum charger capacity: capable of recharging a battery discharged by two cranking cycles to 80% of capacity within 4 hours and to full capacity within 12 hours.

.3 Charger shall be mounted at the generator enclosure.

Guards to protect personnel from hot and moving parts.

.1 Locate guards so that normal daily maintenance inspections can be undertaken without their removal.

2.5 ALTERNATOR

.1 The Contractor shall confirm the generator rating and physical size with the manufacturer.

.2 The AC generator shall be: synchronous, four pole, revolving field, brushless type, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc(s).

.3 All insulation system components shall meet NEMA MG1 temperature limits for Class H, 130^{o}C insulation system.

.4 A permanent magnet generator (PMG) shall provide excitation power for immunity from voltage distortion caused by non-linear loads. The PMG shall sustain excitation power for optimum motor starting and to sustain short circuit current at approximately 300% of rated current for not less than 10 seconds.

.5 Output at 50 degrees C ambient:

.1 100% full load continuously.

.6 The automatic voltage regulator shall be temperature compensated, solid-state design. The voltage regulator shall be equipped with single phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot.

2.6 MAIN BREAKER AND LOAD BANK BREAKER

.1 Two (2) generator mounted circuit breakers – 100% rated, LSI, 3 pole.
- .1 Breaker #1 (Main Breaker) – 100A
- .2 Breaker #2 (Load Bank)

.2 Minimum 10kA symmetrical rms interrupting capacity rating.

.3 Operate by means of solid state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long/short time/instantaneous tripping for short circuit protection.

.4 Include Form-C contacts to indicate open/closed position. Breaker auxiliary contact to be wired to “Breaker open alarm” on generator controller.

.5 Circuit breaker shall be so located that the feeder conduits rise straight out of the floor into the bottom of the breaker enclosure.

.6 Load Bank Circuit Breaker to come with shunt trip, wired to transfer switch to trip load bank breaker if power fails during load testing.

2.7 CONTROL PANEL

.1 The NEMA 12 weatherproof enclosed control panel shall be mounted on the generator set with vibration isolators, and contain a digital solid-state based generator controller.

.2 Operating indication:
- .1 "Normal power"
- .2 "Emergency power"
- .3 “Auto”
- .4 “Off”

.3 Run/Off/Auto Selection

.4 Fault Annunciation Indication

2.8 SAFETY SHUTDOWNS, ALARMS AND CONTROL

.1 Digital engine controller to be mounted on unit.

.2 Each of the items below shall have configurable shutdown feature and separate fault annunciation:
- .1 Low oil pressure
- .2 Low coolant level
- .3 High engine temperature
- .4 Over temperature on alternator

.5 Over/under speed
.6 Overcrank
.7 Over/under voltage
.8 Fuel leakage
.9 Low fuel level.
.10 Low battery voltage.
.11 Short circuit.

.3 Engine start delay (0-240 sec.)

.4 Overcrank delay (0-240 sec.)

.5 All wiring and contacts shall terminate in the generator control panel and shall land on clearly identified and easily accessible terminal blocks intended for customer use.

2.9 STEEL MOUNTING BASE

.1 Complete generating set and fuel tank mounted on steel base of sufficient strength and rigidity to protect assembly from stress or strain during transportation, installation and under operating conditions on suitable level surface.

.2 Mobile mounting base (trailer) acceptable.

2.10 FUEL SYSTEM

.1 Fuel tank to be sized for 24 hours of continuous operation at full load.

.2 Above-ground fuel tank to be belly-style, included in the generator sub-base and shall be double-contained/double-walled, and be supplied complete with a leakage sensor.

.3 Include fill and vent lines with weatherhoods, fuel level gauge and vent alarm, drain and end plug, feed and return lines, with flexible terminations at engine, shut off cock, renewable cartridge filter, fire valve.

.4 Primary and secondary fuel filters to be spin-on type of easy access.

.5 Sub-base fuel tank must include all accessories to meet current CSA B139-Series 19 code, including, but not limited to, extension of fuel tank, vents and fill to exterior of enclosure, overfill prevention valve, high fuel alarm and fuel fill alarm.

2.11 EXHAUST SYSTEM

.1 Exhaust silencer with condensate drain, plug and flanged couplings, shall be mounted within the genset enclosure.

.2 Cap on muffler exhaust with additional lockable screen over top to prevent vandals from dropping debris inside.

.3 Fittings and accessories, as required.

.4 Expansion joints: stainless steel, corrugated, of suitable length, to absorb both vertical and horizontal expansion.

2.12 ENCLOSURE

.1 Factory manufactured and installed enclosure shall be weatherproof, sound attenuated, rigid, free-standing, vandal resistant, highly corrosion resistant enclosure complete with heating and lighting.

.2 Enclosure shall be rated UL-2200 and certified to CAN/CSA C22.2 No. 94.1-15 and CAN/CSA C22.2 No. 94.2-15.

.3 All enclosure assemblies shall be from the same manufacturer, shall bear the CSA seal of approval, or other certification mark acceptable in the Province of British Columbia, and be manufactured by an enclosure manufacturer regularly engaged in this type of work

.4 Enclosure dimensions on Contract Drawings are approximate only. Contractor to determine final dimensions to layout of all proposed equipment on Site.

.5 Sound Attenuation:

.1 Sound attenuated on inside surface to obtain 75dBA when measured at a distance of 6 meters from any side of the enclosure and 1 meter above ground.

.2 Compliance with this requirement shall be provided and demonstrated during factory testing.

.3 Compliance with this requirement shall be verified on site.

.4 Sound level verification shall be performed with genset at full load.

.6 Pad mounted generator enclosure shall include the following equipment:

.1 Motorized air intake dampers.

.2 Gravity air discharge dampers.

.7 Connecting Hardware:

.1 Miscellaneous hardware other than screws, nuts, bolts and washers shall be stainless steel.

.2 Connecting hardware (i.e. screws, nuts, bolts and washers) 3/8” diameter or smaller and shall conform to the following:

.1 All hardware shall have unified national thread form (ANSI) and shall be stainless steel.

.8 Engine coolant and oil drains to exterior of sound attenuated enclosure complete with manual shut off valve located inside enclosure.

3. EXECUTION

3.1 SOURCE QUALITY CONTROL

.1 Notify Contract Administrator 10 Business Days in advance of date of factory test. Contract Administrator may be present for testing outlined in this Technical Specification.

.2 Test procedure:

.1 Prepare blank forms and check sheet with spaces to record data and at top of first sheet record:

.1 Date.

.2 Generator set serial no.

.3 Engine, make, model, serial no.

.4 Alternator, make, model, serial no.

.5 Voltage regulator, make and model.

.6 Rating of generator set, kW, kV.A, V, A, r/min, Hz.

.2 Mark check sheet and record data on forms in duplicate as test proceeds.

.3 The engine generator set and the testing results shall meet current CSA standard C282 including the following tests:

.1 Generator to be tested at generator manufacturers facility for four (4) hours at full load and 0.8 power factor, taking readings at 15 minute intervals, and record the following:

.1 Time of reading.

.2 Running time.

.3 Ambient temp in degrees C.

.4 Lube oil pressure in kPa.

.5 Lube oil temp in degrees C.

.6 Alternator voltage: phase 1-2, 2-3, 1-3.

.7 Alternator current: phase 1, 2, 3.

.8 Power in kW.

.9 Frequency in Hz.

.10 Power Factor.

.11 Battery charger current in A.

.12 Battery voltage.

After completion of 4 hours run, demonstrate following shut down devices and alarms:

.13 Overcranking.

.14 Overspeed.

.15 High engine temp.

.16 Low lube oil pressure.

.17 Short circuit.

.18 Alternator over voltage.

.19 Low battery voltage, or no battery charge.

.20 Manual remote emergency stop.

.21 High alternator temperature.

.22 Tank leakage.

.4 Provide sound measurement results.

3.2 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

.2 After the genset is installed, temporary power shall be connected to the unit to energize the space heating.

3.3 INSTALLATION

.1 General

.1 The Contractor shall provide all necessary hoists, skids, temporary supports and beams to assist with installing the genset, as required.

.2 If not trailer mounted generator - the generating set shall be positioned on the seismic restraints neoprene pad type vibration isolators, supplied with the set, and carefully aligned and positioned as detailed on the Shop Drawings.

.3 If not trailer mounted generator - the vibration isolator seismic restraints and anchor bolts shall be installed as per the manufacturer's instructions. The installation must be inspected and certified by the manufacturer's representative.

.4 If not trailer mounted generator - ensure that there are no rigid connections or incidental physical contacts between isolated equipment and the building structure or nearby systems.

.5 If not trailer mounted generator - select and locate vibration isolation equipment to give uniform loading and deflection, according to weight distribution of equipment.

.6 Complete wiring and interconnections as indicated.

.2 Fuel System

.1 If not trailer mounted generator - install sub-base tank and secure to the concrete slab with anchors as specified by the manufacturer.

.2 All unused surplus bungs in the fuel tank shall be plugged.

.3 Exhaust System

.1 Ship loose exhaust components to be installed on-site by contractor. Generator supplier to provide instructions/assistance via phone or email as required.

3.4 FIELD COMMISSIONING

.1 Notify the Contract Administrator 10 Business Days in advance of test date.

.2 Provide fuel for testing and leave full tanks on acceptance.

.3 Demonstrate:

.1 Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.

.2 Unit start and shut down on "Manual" control

.3 Unit start and transfer on "Test" control.

.4 Unit start on "Engine start" control.

.5 Operation of manual bypass switch.

.6 Operation of automatic alarms and shut down devices.

.7 Install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:

.1 No load to full load to no load.

.2 No load to 70% load to no load.

.3 No load to 20% load to no load.

.4 20% load to 40% load to no load.

.5 40% load to 60% load to no load.

.6 60% load to 80% load to no load.

.4 Run unit on 100% load for minimum period of 4h to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling. No adjusting of speed or voltage shall be made after the load tests have commenced.

.1 Generator supplier to be responsible for supplying all fuel and fluids for commissioning generator.

.5 At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.

.6 After completion of 4 hours run, demonstrate following shut down devices and alarms:

.1 Overcranking.

.2 High engine temp.

.3 Low lube oil pressure.

.4 Low battery voltage, or no battery charge.

.5 Manual remote emergency stop.

.6 Tank leakage.

.7 Provide test reports from shop/factory that sensors were tested, in accordance with the Division 26 Technical Specifications and trip points documented. Provide certified documents.

END OF SECTION

Revision History

Rev. No.	Date	Description of Revisions	Prep. By	Rev. By
-	August 21, 2023	Issued for Tender (Addendum 1)	MS	AT

1.0 GENERAL

1.1 DOCUMENTS

.1 This Technical Specification forms a part of the Contract Documents and is to be read, coordinated, and implemented in conjunction with all other parts.

1.2 SCOPE

.1 Materials and installation for automatic transfer switch as required for temporary bypass solution to the Nanoose Bay Pump Station No. 6.

1.3 RELATED TECHNICAL SPECIFICATIONS

.1 Technical Specification 26 05 00 Common Work Results - Electrical.

.2 Technical Specification 26 05 10 Testing and Commissioning.

1.4 REGULATORY REQUIREMENTS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.178.1-14, Transfer Switch Equipment.

.2 The Automatic Transfer Switch shall be designed, manufactured, tested and listed to the following safety standards:

.1 UL 1008 Edition 8 - Automatic Transfer Switches For Use in Emergency Systems

.2 UL 869A - Reference Standard Service Equipment

.3 CSA - C22.2 No 178.1-12 - Automatic Transfer Switches

1.5 SHOP DRAWINGS AND SUBMITTALS

.1 Submit in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Technical Specification 26 05 00 Common Work Results – Electrical.

2.0 PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 It is intended for the Automatic Transfer Switch (ATS) to operate in the following modes:

.1 The ATS shall continually monitor the condition of the utility supply voltage/frequency and shall automatically respond to a utility power failure condition by issuing an engine start signal to the standby generators(s) in the system.

.2 The ATS shall automatically transfer the load to the generator supply in the event of a utility supply failure and return the load to the utility supply upon restoration.

.3 The ATS shall perform an open transition power transfer with a neutral delay period between operating generator and the utility supply once the utility power source has been restored.

.4 When an On Load test mode is activated, the ATS shall automatically transfer the load to the generator supply and return the load to the utility supply upon test completion.

.2 All work defined within this specification shall be the responsibility of the Automatic Transfer Switch manufacturer, unless specifically defined as provided and/or installed by others.

2.2 TRANSFER SWITCH

.1 Rating: 100A, 120/208V, 3PH.

.2 Environmental Rating:

.1 Outdoor application: NEMA 4X

.2 Indoor (mounted in cabinet): NEMA 3R

.3 Operation: Open Transition

.4 Transfer switch to be mechanically held type.

.5 The complete ATS assembly shall be mounted as to secure location capable of supporting the ATS weight.

.6 Exercise Timer with load on, 7 day, with battery backup.

.7 Time Delays:

.1 Engine Start - A time delay on engine start shall be provided to delay the engine start signal after failure of the utility source. The time delay shall be user adjustable 0 - 60 seconds, factory set at three (3) seconds.

.2 Engine Warmup - A time delay for engine warm up shall be provided which permits transfer to the generator supply after generator voltage and frequency have reached acceptable limits. The time delay shall be user adjustable 0 - 60 minutes, factory set at two (2) seconds.

.3 Utility Return - A time delay for return to utility shall be provided which permits a re-transfer back to the utility supply only after stable voltage and frequency condition exists

for the specified time period. The time delay shall be user adjustable 0 - 60 minutes, factory set at five (5) minutes.

.4 Engine Cooldown - A time delay for engine cooldown shall be provided which delays the engine stop signal after load has re-transferred back to the utility source. The time delay shall be user adjustable 0 - 60 minutes, factory set at five (5) minutes.

.5 Neutral Delay - A time delay for neutral position shall be provided in the open transition mode to minimize the effect of out-of-phase transfer due to connected motor load. The time delay shall be user adjustable 0 - 120 seconds, factory set at three (3) seconds.

.6 Gen Commit to Transfer Delay - A time delay for Gen Commit to Transfer position shall be provided. Should the generator fail to transfer on load with the "commit to transfer" feature enabled, the ATS shall automatically re-transfer back to the utility supply if within nominal limits following expiry of the "Gen Commit to Transfer" timer. The time delay shall be user adjustable 0 - 600 seconds, factory set at three hundred (300) seconds.

.7 Transfer Fail Delay - A time delay for Transfer Fail delay shall be provided. The timer shall activate a fail alarm condition if the transfer switch fails to successfully transfer within the transfer fail time delay setting. The time delay shall be user adjustable 0 - 600 seconds, factory set at thirty (30) seconds.

.8 The transfer controller shall provide a timer bypass function to automatically bypass unwanted delays during testing or maintenance procedures. The timers shall automatically reset on the next operation sequence to their original setting. The following time delays shall have a user initiated bypass feature:

.1 Engine Warmup Delay

.2 Utility Return Timer

.3 Engine Cooldown Timer

.4 Neutral Delay Timer

.9 Integrated surge suppression.

.10 Auxiliary contacts:

.1 2 sets NO/NC contacts for transfer switch in "On Utility"

.2 2 sets NO/NC contacts for transfer switch in "On Generator"

.3 2 sets NO/NC contacts for utility power available

.4 2 sets NO/NC contacts for transfer switch "Not in Auto"

.5 2 sets NO/NC contacts for transfer switch internal fault

.11 Shunt trip generator switch. A Shunt trip device shall be provided in the Generator transfer power switching device to provide remote tripping capability for load shedding or load dumping purposes. Shunt trip device shall be rated for 24Vdc 10A control power, which shall be to be supplied by an external source with required logic and over current protection.

.12 Shunt trip utility switch. A Shunt trip device shall be provided in the Utility transfer power-switching device to provide remote tripping capability for immediate load dumping purposes. Shunt trip device shall be rated for 24Vdc 10A control power, which shall be to be supplied by an external source with required logic and over current protection

.13 Relay Control for load bank circuit breaker shunt trip. Contact must sustain 30A inrush current draw from shunt trip solenoid. Coordinate with Generator Supplier.

.14 Front panel HMI shall display, at minimum:

.1 Utility power available

.2 Generator power available

.3 Transfer switch in utility position

.4 Transfer switch in emergency position

.5 Transfer switch fault condition

.6 Utility voltage

.7 Generator voltage

.8 Phase rotation

.15 Controller input for “Transfer Inhibit” functionality via relay dry contact.

.16 Voltage/Frequency sensing: The ATS controller shall provide the following voltage and frequency sensing control features for the utility and generator supplies:

.1 The Transfer Switch controller shall have fully integrated 120-600V, 3 phase true RMS AC voltage sensing on the Utility Supply, generator supply and ATS Load bus for operation and monitoring. Programmable set points shall be provided for utility/generator source under voltage, overvoltage and phase unbalance.

.2 AC voltage sensing shall utilize advanced symmetrical component algorithms to determine positive, negative and zero sequence voltages. This shall provide the capability to detect true phase loss/unbalance (i.e. single phasing) protection on 3 phase systems where re-generative phase voltages maybe present due to failed 3 phase transformers or motor loads.

.3 AC Voltage sensing shall be fully configurable to allow operation on 3 phase 3 wire or 3 phase 4 wire systems without use of additional potential transformers on systems 600VAC or below.

.4 Phase Sequence & Phase Reversal Protection: Phase Sequence/Phase reversal protection shall be provided to inhibit transfer between alternate sources should an incorrect phase sequence condition exist between connected sources. The Transfer Switch controller shall provide capability to program either A-B-C or C-B-A phase rotation.

.5 Under Voltage Sensing: Three phase under voltage sensing shall be provided for both utility and generator supplies. Activation of an abnormal under voltage condition on any phase shall initiate a load transfer to the alternate source or shall inhibit a transfer to a source

until its voltage levels are within normal limits. The under voltage sensor shall be user adjustable from 70-100% of nominal and shall be based on a falling (i.e. drop-out) voltage. The under voltage sensor shall be factory set for drop-out at 85% nominal voltage. The under voltage sensor shall reset (i.e. pick-up) 5% above the dropout setting and shall be adjustable. The under voltage sensor shall include an adjustable transient time delay feature.

.6 Over Voltage Sensing: Three phase over voltage sensing shall be provided for both utility and generator supplies. Activation of an abnormal over voltage condition on any phase shall initiate a load transfer to the alternate source or shall inhibit a transfer to a source until its voltage levels are within normal limits. The over voltage sensor shall be user adjustable from 100-130% of nominal and shall be based on a rising (i.e. pick-up) voltage. The over voltage sensor shall be factory set for pick-up at 115% nominal voltage. The over voltage sensor shall reset (i.e. drop-out) 5% below the pick-up setting and shall be adjustable. The over voltage sensor shall include an adjustable transient time delay feature.

.7 Phase Unbalance/Phase Loss Sensing: Voltage phase unbalance/phase loss sensing shall be provided for the generator and utility supplies. Activation of an abnormal utility phase unbalance condition shall initiate the generator to start and to transfer on load. The voltage phase unbalance sensor shall be user adjustable from 3-30% of nominal and shall be factory set for pick-up at 5% nominal voltage. The voltage phase unbalance sensor shall include an adjustable transient time delay feature.

.8 Under Frequency Sensing: Under frequency sensing shall be provided for both utility and generator supplies. Activation of an abnormal under frequency condition shall initiate a load transfer to the alternate source or shall inhibit a transfer to a source until its frequency levels are within normal limits. The under frequency sensor shall be user adjustable from 70-100% of nominal and shall be based on a falling (i.e. drop-out) frequency. The under frequency sensor shall be factory set for drop out at 80% nominal frequency. The under frequency sensor shall reset (i.e. pick-up) 10% above the dropout setting and shall be adjustable. The under frequency sensor shall include an adjustable transient time delay feature.

.9 Over Frequency Sensing: Over frequency sensing shall be provided for both utility and generator supplies. Activation of an abnormal over frequency condition shall initiate a load transfer to the alternate source or shall inhibit a transfer to a source until its frequency levels are within normal limits. The over frequency sensor shall be user adjustable from 100-130% of nominal and shall be based on a rising (i.e. pick-up) frequency. The over frequency sensor shall be factory set at 115% nominal voltage. The over frequency sensor shall reset (i.e. drop-out) 5% below the pick-up setting and shall be adjustable. The over frequency sensor shall include an adjustable transient time delay feature.

.17 ATS Control Mode: The transfer switch controller shall provide 7 selectable operating modes available from the main operating screen. The following operating modes shall be provided:

.1 Auto: ATS shall operate automatically during a utility power failure

.2 Off: ATS shall not start engine or transfer load during a utility power failure

.3 Manual: ATS can be operated manually to the desired source.

.4 On Load Test: ATS shall be selected to operate in On-Load test mode and permit load transfer

.5 Off Load Test: ATS shall be selected to operate in Off-Load test mode and shall not permit load transfer

.6 Timed Test: ATS shall be selected to operate in a Timed test mode

.7 Closed Transition: ATS shall be selected to operate in a Closed Transition Transfer mode

.18 Utility Retransfer Operation Selection: The operator interface display shall provide a selection for Utility Re-transfer operation. The utility re-transfer operation shall be user selectable for Automatic, or Manual re-transfer operation. When Manual re-transfer mode is selected, the user can initiate when the re-transfer to utility power shall occur.

.19 Test Modes: The transfer switch controller shall provide the following user selectable test modes and features:

.1 On Load/Off Load: The operator interface shall provide selection of “OFF-LOAD” testing (i.e. load does not transfer to generator) or “ON-LOAD” testing (i.e. load transfers to generator) modes.

.2 Automatic Timed Test Modes: Automatic timed test mode shall be provided to allow for tests to be manually initiated and automatically terminated. Timed test modes shall be user adjustable (0-999 minutes). The load shall automatically re-transfer back to the utility supply should the generator fail on load.

.3 Automatic Gen Exerciser: A calendar based automatic exercise time function shall be provided for generator testing. The Exercise scheduler shall be fully programmable for; start/stop date & time, duration of the test and type of test mode (i.e. On-Load or Off-Load). The exercise timer shall utilize the transfer controller’s internal time clock for referencing all timing functions. The transfer switch shall automatically re-transfer back to the utility supply if the generator set fails during an exercise period.

.20 Controller to include Ethernet Modbus TCP remote communication port.

.21 The Transfer Switch Controller shall be capable of operating in conjunction with other ATS controllers on a common Ethernet Modbus TCP communication network.

.22 All programming/configuring of the transfer switch controller set points including voltage, frequency and time delays shall be software programmable from the front door mounted graphical display screen.

.23 Front panel selector switch with positions for:

.1 Test

.2 Auto

.3 Off

.24 Standard of Acceptance:

.1 Thomson Technology Model TS 870 c/w TSC 900 controller and all options and accessories to suit this Technical Specification.

3.0 EXCECUTION

3.1 INSTALLATION

.1 Installation Location: The transfer switch shall be installed in an environment where the temperature range is within +5° to +122° Fahrenheit (-15° to +50° Celsius) and humidity range not exceeding 5%-95% non-condensing. The transfer switch shall not be installed in a location where it is subjected to direct sunlight on the front of the transfer switch door.

.2 Power Cabling: All power cabling entering/exiting the transfer switch enclosure shall be installed per Technical Specification 26 05 21 Wiring Devices (0-1000V). To ensure satisfactory installation of this equipment, all power cabling connections shall utilize approved lugs and shall be adequately torqued as specified by the ATS manufacturer. All mechanical and electrical connections shall be checked for tightness prior to placing this equipment in service to ensure proper operation and to validate applicable warranty coverage.

.3 Control Wiring: All control wiring for engine start, load shed, alarm and remote test shall be installed per Technical Specification 26 05 21 Wiring Devices (0-1000V).

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Technical Specification 26 05 10 – Testing and Commissioning.

.2 The automatic transfer switch shall be tested once installed at the project site to confirm proper operation of the system. Schedule and witness testing activities shall be coordinated with the Contract Administrator, site contractor, and owner as required in advance of the testing.

END OF SECTION

Temporary Bypass Pumping Plan

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PUMP AND PIPING ANALYSIS FOR:

Nanoose Bay

Bypass Analysis

Regional District of Nanaimo, BC

Submitted to: Josh Oakes, Stormtec Filtration

August 2, 2023

Rev.0
All previous revisions are considered obsolete.

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Memorandum

CPP Ref. No 230724(2)NB

August 2, 2023

Stormtec – Innovative Water Management Solutions
876 Derwent Way
Delta, BC
V3M 5R1

Attention: **Josh Oakes**
Business Development

Via email: josho@stormtec.ca

Re: **Nanoose Bay**

1. Introduction

This memorandum provides a hydraulic analysis and suitability assessment of a Flygt 3127 pump that is to be used in a temporary bypass pumping application installed at Nanoose Bay in the Regional District of Nanaimo, BC. It will consist one pump system moving 23.1 L/s of wastewater from the suction manhole to the discharge manhole. Figure 1 below shows the suction and discharge locations for bypass 1.

2. Scope of Work

Canada Pump and Power (CPP) has developed this memorandum based on the information provided to CPP by Stormtec in Appendix A. This memorandum is not valid if any of the information provided is incorrect; it is Stormtec's responsibility to verify that the information provided to CPP is correct.

This document has been prepared for the exclusive use of Stormtec for the specific application described. CPP has prepared this document in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. CPP makes no warranty, express or implied.

If an item is not specifically noted in the following scope description, it is not considered to be within the scope of this report.

The scope of this analysis includes:

- Hydraulic performance of the bypass system from the inlet of the suction line to the outlet of the discharge line, including the pump(s);
- Sizing the pump(s) to meet the flow requirements, based on the hydraulic analysis of the system;
- Selecting the size of lines, including the size and type of fittings, based on flow requirements and design best practice; and
- 100% redundancy on the pump(s).

Assumptions:

- The fluid is municipal wastewater, and the properties of water are based on a temperature of 20°C;
- Hose has full flow; and
- Any solids in the water have negligible impact on the properties of the water.

3. Exclusions

Some items that are highlighted as outside the scope are listed below and throughout this memorandum. These exclusions are not intended to be an exhaustive list, and instead is only meant to illustrate points CPP wants to specifically note that Stormtec should consider in its planning and risk management:

- Stormtec is responsible for providing a setup, execution, emergency spill response plan, control management plan and any other requirements outlined by applicable laws or the owner of the project. The overall bypass plan developed by Stormtec must consider a means to mitigate the risks associated with any spills.
- CPP has not assisted with or been involved in the development of any other documents or planning activities outside the scope of this memorandum. As such, this memorandum is only intended to confirm the feasibility of the pump system based on the hydraulic analysis.
- Stormtec is responsible for considering all setup and operating requirements, such as the space required to setup operating equipment and materials.

4. Reference Documents

This memorandum has been prepared using the following reference document(s):

Regional District of Nanaimo Community Sewer System Standards

5. Spill Protection and Prevention Response

All system lines must be tested prior to start up to identify any potential system leaks (and to any client specific test standard(s), if applicable). If a leak is identified, it must be corrected prior to putting the bypass system into operation. The client will be notified system is ready for testing once system has been installed; up to 12 hrs notice will be given if possible. After the system is in operation for 2 hours, all components shall be re-tightened and checked prior to continued operation. Pumping systems requiring spill containment should have these in place prior to any testing and operation. In the event of any system leaks, the system is to be turned off immediately. A vacuum truck (or alternate equipment as specified in the contractor emergency response plan) shall be brought on site to initiate the clean up process under the direction of the General Contractor & Contract Owner. The emergency spill response plan and periodic disposal of accumulated rainwater in spill containments is the responsibility of Stormtec and it is outside the scope of this memorandum.

6. Application Information and Operating Conditions

The bypass is located at Nanoose Bay in the Regional District of Nanaimo, BC. The bypass area is shown in Figure 1. The elevation of the site is 38 m. Distances used for calculations are based on the data provided in Appendix A.

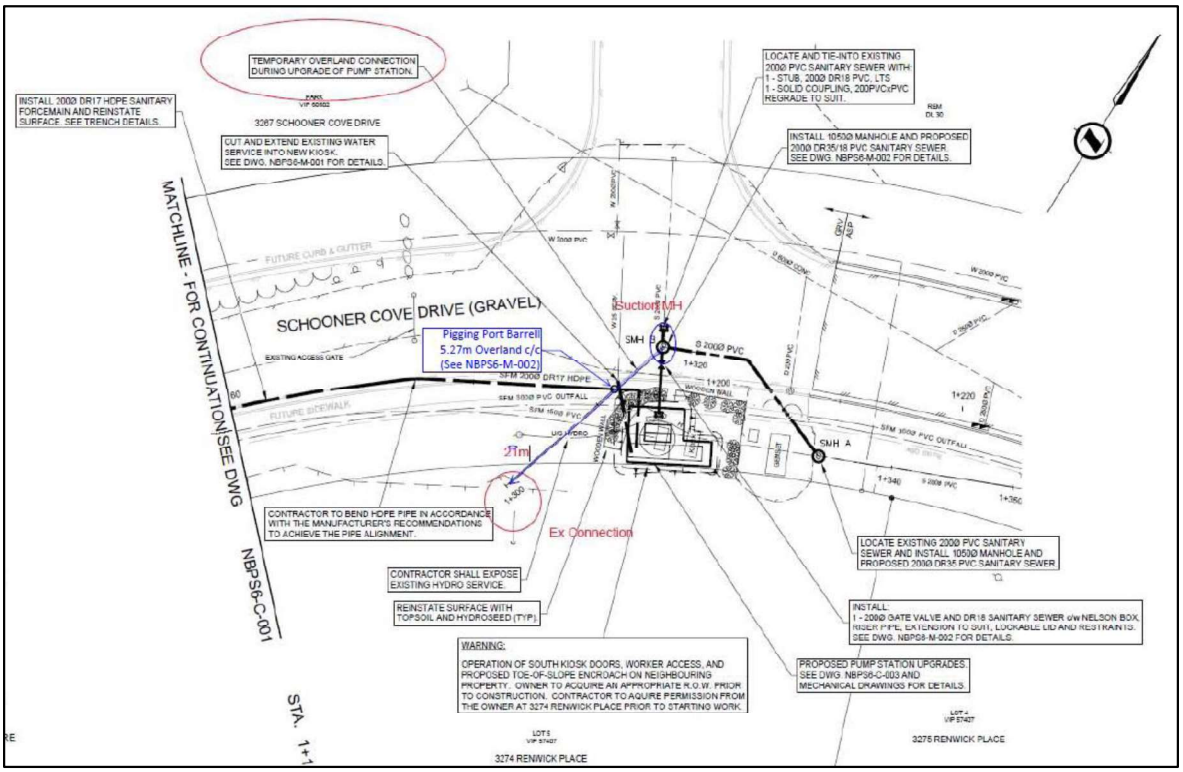


Figure 1: Provided Bypass 1 Area

Pumping Data:

- C-Factor: 135 (smooth hose, new/like-new HDPE)

Table 1: Pumping System Data

Bypass	1
Design Capacity Per Pump (L/s)	23.1
Elevation Change to Discharge from Top of Manhole (m)	3.8
Discharge Distance (m)	5.27 (8” Hose) 184.3 (200 DR17 HDPE Forcemain)
Suction Length (m)	0
Suction Manhole Depth (m)	2.4

7. System Layout

The system will be laid out in the region shown in Figure 1. One standby pump was considered for the bypass in this evaluation.

System Equipment:

Bypass 1:

Pump(s):

- (1) Flygt 3127 Submersible Pump
- (1) Flygt 3127 Submersible Pump (Standby)

Hose/Fittings:

- (4) 20 ft, 8” suction hose
- (2) 8” elbow
- (1) 8” tee
- (2) 8” gate valve
- (4) 8”x4” reducer

Note: All numbers in parentheses are quantities.

Important Notes:

1. System hoses and fittings must be adequately supported and anchored at each manhole location and along the length of the discharge line.
2. Stormtec is responsible for the development of appropriate measures to mitigate the risk of intake or discharge line plugging, and an appropriate response plan to ensure lines can be cleared in a sufficient time to prevent an overflow or backup event.
3. Stormtec is responsible for considerations of draining the lines for servicing or decommissioning the temporary bypass installation.
4. Provisions for operation during freezing weather have not been evaluated as part of this hydraulic assessment. Stormtec is responsible for all provisions during weather conditions which may result in freezing. This includes but it is not limited to hoarding structures and heat-tracing of system lines.
5. If a bypass plug is being used, CPP has not engineered the bypass plug or installation method. The manufacturer's procedures for pipe plug installation must be followed along with recommended safety precautions (such as blocking of the plug to hold it from slipping). Installation of the bypass system and plug is not considered a part of this scope of work and is the responsibility of Stormtec.
6. (For Electric Systems) Stormtec is responsible for supplying an adequate power supply, cabling, and controls/switchgear to operate and protect the pumping equipment. CPP has not evaluated any components outside of the pumping and hydraulic analysis outlined in this memorandum such as electrical system design.
7. As per the Regional District of Nanaimo Community Sewer System Standards, pumps shall be only non-clog pumping units capable of handling a 75mm solid. All pumping units to be grinder or vortex pumps capable of handling a 75mm solid.

8. Hydraulic Analysis

The hydraulic analysis for this system considers the system layout as shown in Appendix E.

Friction loss was calculated using:

Friction Loss Calculations

Hazen-Williams Equation:

$$H_L = 0.002083 \cdot L_{eq} \cdot (100/C)^{1.852} \cdot \left(\frac{Q^{1.852}}{D^{4.8655}}\right) \quad \text{[ft of head]}$$

L_{eq}	=	Equivalent Length [ft]
C	=	Hazen-Williams Roughness Coefficient
Q	=	Flow Rate [GPM]
D	=	Inside Pipe Diameter [in]

Figure 2: Hazen-Williams Equation

The pipe roughness coefficient used for these calculations is. *C* = 135 for hose.

8.1. Total Dynamic Head and NPSH

Pump Total Dynamic Head (TDH) is calculated using the Hazen-Williams equation.

Table 3 below summarizes the inputs for the pump system that were used in calculating the pump performance and TDH. Hydraulic calculations are based on water properties at 20˚C. Flow and head conditions are based on pure water, assuming solids and debris do not significantly impact normal pump performance.

Net Positive Suction Head is calculated using:

$$NPSHa = A - V - S - F$$

Where:

$$NPSHa = Net\ Positive\ Suction\ Head\ Available$$
$$A = absolute\ pressure$$
$$V = vapour\ pressure$$
$$S = static\ head$$
$$F = friction\ head$$

Additionally, absolute pressure is determined with the following:

Atmospheric Pressure:

$$p = p_0 \cdot exp\left(-\frac{gMh}{R_0 T_0}\right) \quad [kPa]$$

p_0	=	Atmospheric Pressure at Sea Level [Pa]
g	=	Earth Surface Gravitational Acceleration [m/s^2]
M	=	Molar Mass of Dry Air [kg/mol]
h	=	Height Above Sea Level [m]
R_0	=	Universal Gas Constant [J/(mol·K)]
T_0	=	Standard Temperature at Sea Level [K]

Figure 3: Atmospheric Pressure Equation

Using 125 ft (38 m) for the elevation, the absolute pressure is determined to be 14.6 psi.

The vapour pressure of water at 20°C is 0.339 psi (0.782 ft).

8.2. Hydraulic Analysis

Appendix E contains a layout sketch that provides a layout of the bypass system. The TDH of the pump is detailed in Table 2: Hydraulic Analysis Results.

Table 2: Hydraulic Analysis Results

Bypass	1
Pump	Flygt 3127
Flow per pump	366 USgpm (23.1 L/s)
TDH	50.4 ft (15.3 m)
NPSH*	N/A**
Backpressure Required	12.8 psi (88.3 kPa)
Surcharge Required	2.0 ft (0.6 m)

*NPSH is available minus required. See Appendix C for details.
**Flygt 3127 is submersible.

The bypass requires the minimum submergence based on the manufacturer's recommendations to help provide sufficient net positive suction head for the pump. The surcharge is based on the bottom of the manhole.

Table 3 below shows the inputs for the head loss calculations for the pump. Sample calculations can be found in Appendix C.

Table 3: System Input Data, Bypass 1

	C factor	Diameter (in.)	Length (ft.)	Velocity (ft./sec.)
Suction Pipe/Hose				
1	135.0	4.0	0.0	
2	135.0	0.0		
Fittings		4.0	0.0	
Discharge Pipe/Hose				
1	135.0	8.0	25.3	2.3
2	135.0	7.5	608	2.6
3	135.0	0.0		
4	135.0	0.0		
Fittings		8.0	56.6	
Suction Lift (ft.)			0	
Discharge Head (ft)			18.46	
Flow Rate (GPM)			366	
Residual Pressure (psi)			12.8	
Increment (optional)				

Fittings - SUCTION	Qty	Size (in)	Equivalent Pipe Length (ft)
90 Degree Bends	0.0	4.0	0.0
45 Degree Bends	0.0	4.0	0.0
Swing Check Valves	0.0	4.0	0.0
Gate Valves	0.0	4.0	0.0
Tees	0.0	4.0	0.0
Wyes	0.0	4.0	0.0
Step Bows	0.0	4.0	0.0
Reducer (each pump size)	0.0	4.0	0.0
TOTAL			0.0

Fittings - DISCHARGE	Qty	Size (in)	Equivalent Pipe Length (ft)
90 Degree Bends	1.0	8.0	20.0
45 Degree Bends	0.0	8.0	0.0
Swing Check Valves	0.0	8.0	0.0
Gate Valves	0.0	8.0	0.0
Tees	2.0	8.0	26.6
Wyes	0.0	8.0	0.0
Step Bows	0.0	8.0	0.0
Reducer (each pump size)	1.0	8.0	10.0
TOTAL			56.6

8.3. Pump Selection Summary

Based on the hydraulic analysis:

- The pump listed in Table 4 can provide the required flow rate; see Appendix B for the detailed pump curve and operating point. The pump curve and approximate operating point is based on the system layout as described in this memorandum.

Table 4: Pump Information Summary

Bypass	1
Pump	Flygt 3127
Flow	366 USgpm (23.1 L/s)
TDH	50.4 ft (15.3 m)
Surcharge Required	2.0 ft (0.6 m)
Backpressure Required	12.8 psi (88.3 kPa)
Solids Handling	3.38 in (86 mm)

- The pump listed in Table 4 meets the following aspect of the Regional District of Nanaimo Community Sewer System Standards:
  Only non-clog pumping units capable of handling a 75mm solid.
  All pumping units to be grinder or vortex pumps capable of handling a 75mm solid.
- The bypass requires a minimum submergence based on the manufacturer's recommendations of 2.0 ft (covering half the stator).
- Table 4: Pump Information Summary also details the backpressure requirements for the bypass system.

9. Closure

This memorandum confirms that the proposed setup, as seen in Appendix E, will produce the flow and head detailed in Table 4. Any revisions to the system layout or conditions will fall outside the scope of this work. If there are any changes to the information provided, CPP must be notified and a revised memorandum must be developed based on the new conditions.

If you have any questions or concerns, please contact me by email at dcarlson@mightypumps.com or by phone at 780-922-1178.

Sincerely,

Danny Carlson, P.Eng
Canada Pump and Power

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. E. CARLSON
58733
Aug 21, 2023
Permit # 1005058

10. Appendices List

A. Stormtec Data – Nanoose Bay
B. Pump Curves
C. Net TDH – Sample Calculations
D. Equipment Datasheets
E. Drawings and Sketches

11237 - 87ave
Fort Saskatchewan, AB
T8L 2B3
1-780-922-1178
sales@mightypumps.com
www.canadapumpandpower.com

Appendix A - Stormtec Data – Nanoose Bay

The following data was provided for the layout of the system.

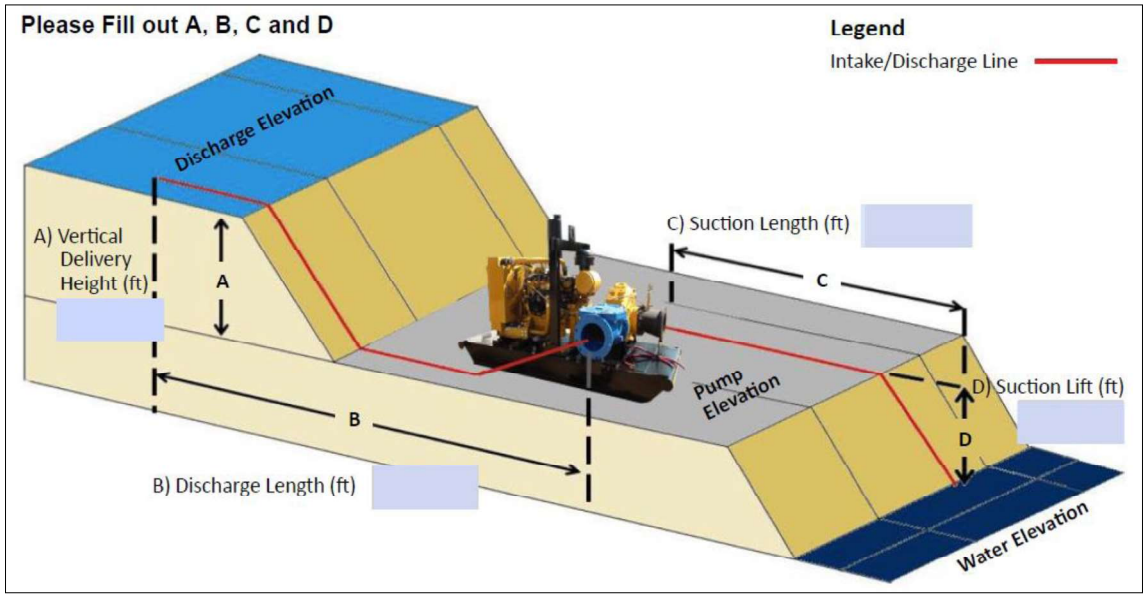


Figure 4: Example Layout Information

Elevation: 38 m

Bypass	1
Flow (L/s)	23.1
A (m)	3.8
B (m)	5.27 (8" Hose) 184.3 (200 DR17 HDPE Forcemain)
C (m)	0
D (m)	2.4

Appendix B - Pump Curves

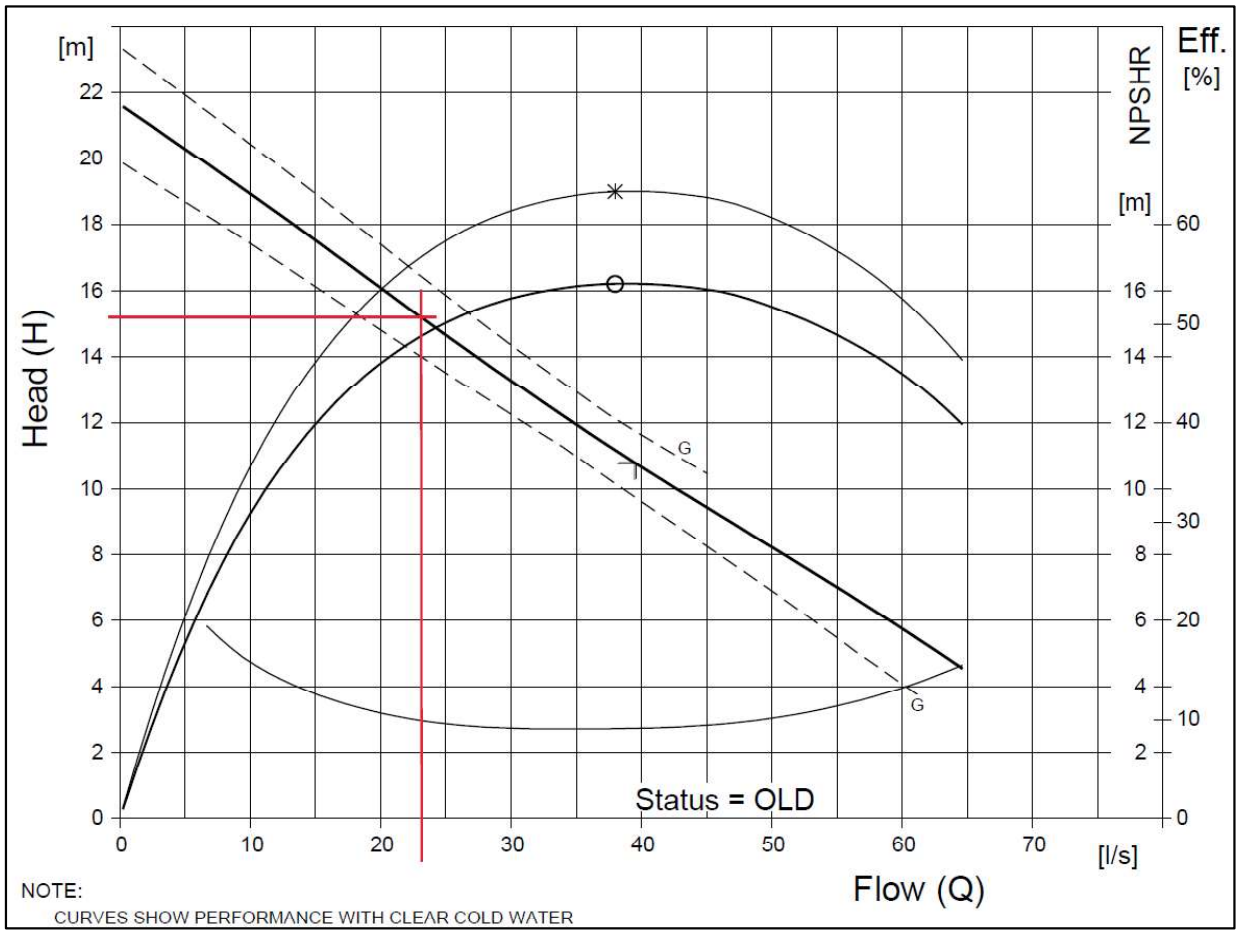


Figure 5: Flygt 3127 Pump Curve

Appendix C - Net TDH – Sample Calculations

Sample Calculation

A sample calculation of "Net TDH" is shown below calculated using Hazen-Williams approximation, method of equivalent lengths, manhole depth and discharge elevation measurements.

Friction Loss Calculations

Hazen-Williams Equation:

$$H_L = 0.002083 \cdot L_{eq} \cdot (100/C)^{1.852} \cdot \left(\frac{Q^{1.852}}{D^{4.8655}}\right) \quad \text{[ft of head]}$$

L_{eq}	=	Equivalent Length [ft]
C	=	Hazen-Williams Roughness Coefficient
Q	=	Flow Rate [GPM]
D	=	Inside Pipe Diameter [in]

System Pumping Data (Bypass 1):

- Design Capacity: 366 USgpm (23.1 L/s)
- Suction Manhole Depth: 7.92 ft (2.4 m)
- Suction Length: 0 ft (0 m)
- Discharge Distance: 17.4 ft (5.27 m) [8" hose], 608 ft (184.3 m) [200 DR17 HDPE forcemain]
- Elevation Change to Discharge: 12.5 ft (3.8 m)
- C-Factor: 135 (smooth hose, new/like-new HDPE)

Suction Friction Loss Calculations:

Since the pump is submersible, suction losses are negligible.

Discharge Friction Loss Calculations:

For the discharge line, the friction loss calculations are below. It includes the losses from the total length of 8" discharge hose and the fittings required in that line.

$$L_{eq} = L_{hose} + L_{fittings} = 17.4\ ft + 7.92\ ft + \ 56.6\ ft = 81.9\ ft$$

$$C = 135$$

$$Q = 366\ USGPM$$

$$D = 8.00\ in$$

$$HL = 0.002083 \cdot \left(\frac{100}{135}\right)^{1.852} \cdot (366)^{1.852} \cdot \left(\frac{81.9\ ft}{8.00^{4.8655}}\right) = 0.221\ ft$$

These losses are for the forcemain of 8" DR17 HDPE.

$$L_{eq} = L_{hose} + L_{fittings} = 608\ ft + \ 0\ ft = 608\ ft$$

$$C = 135$$

$$Q = 366\ USGPM$$

$$D = 7.549\ in$$

$$HL = 0.002083 \cdot \left(\frac{100}{135}\right)^{1.852} \cdot (366)^{1.852} \cdot \left(\frac{608\ ft}{7.549^{4.8655}}\right) = 2.17\ ft$$

The Total Dynamic Head (TDH) is found by adding the suction manhole lift, the discharge elevation change, discharge friction losses, the required backpressure, and minus the pump minimum submergence:

$$TDH = 7.92\ ft + 12.5\ ft + 0.221\ ft + 2.17\ ft + 12.8\ psi * 2.31\frac{ft}{psi} - 2.0\ ft = 50.4\ ft$$

Appendix D - Equipment Datasheets

Performance Curve

Product	Type
CP3127.181	MT

Date	Project	Curve No	Issue
2020-05-19		63-432-00-3704	13

	1/1-Load	3/4-Load	1/2-Load
Power Factor	0.88	0.86	0.80
Efficiency	84.0 %	86.5 %	87.0 %
Motor Data	---	---	---

Comments

Inlet/Outlet: -/100 mm

Imp. Throughlet: 87 mm

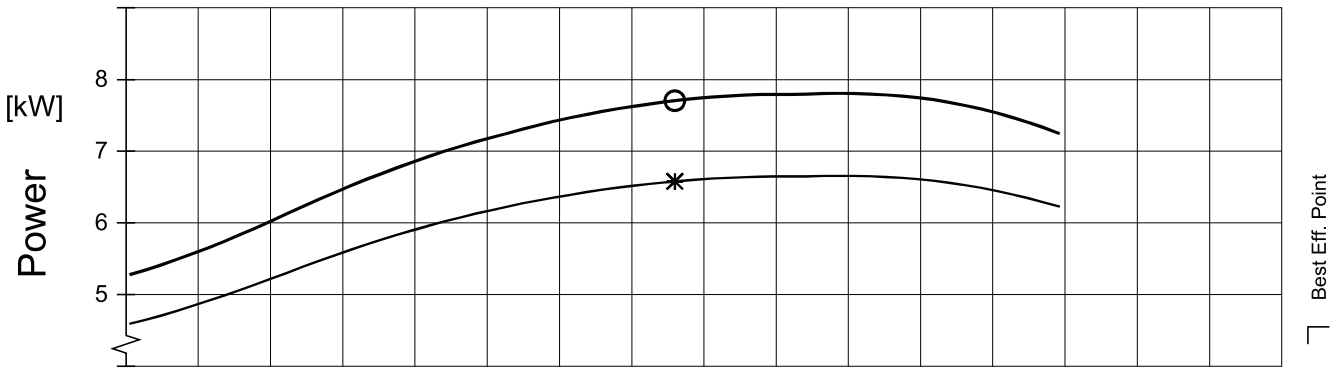
Rated Power ...	10 (7.46 kW)	hp
Starting Current ...	134	A
Rated Current ...	25	A
Rated Speed ...	1720	rpm
Tot. Mom. of Inertia ...	0.082	kgm2
No. of Blades	1	

Impeller Diameter: 225 mm

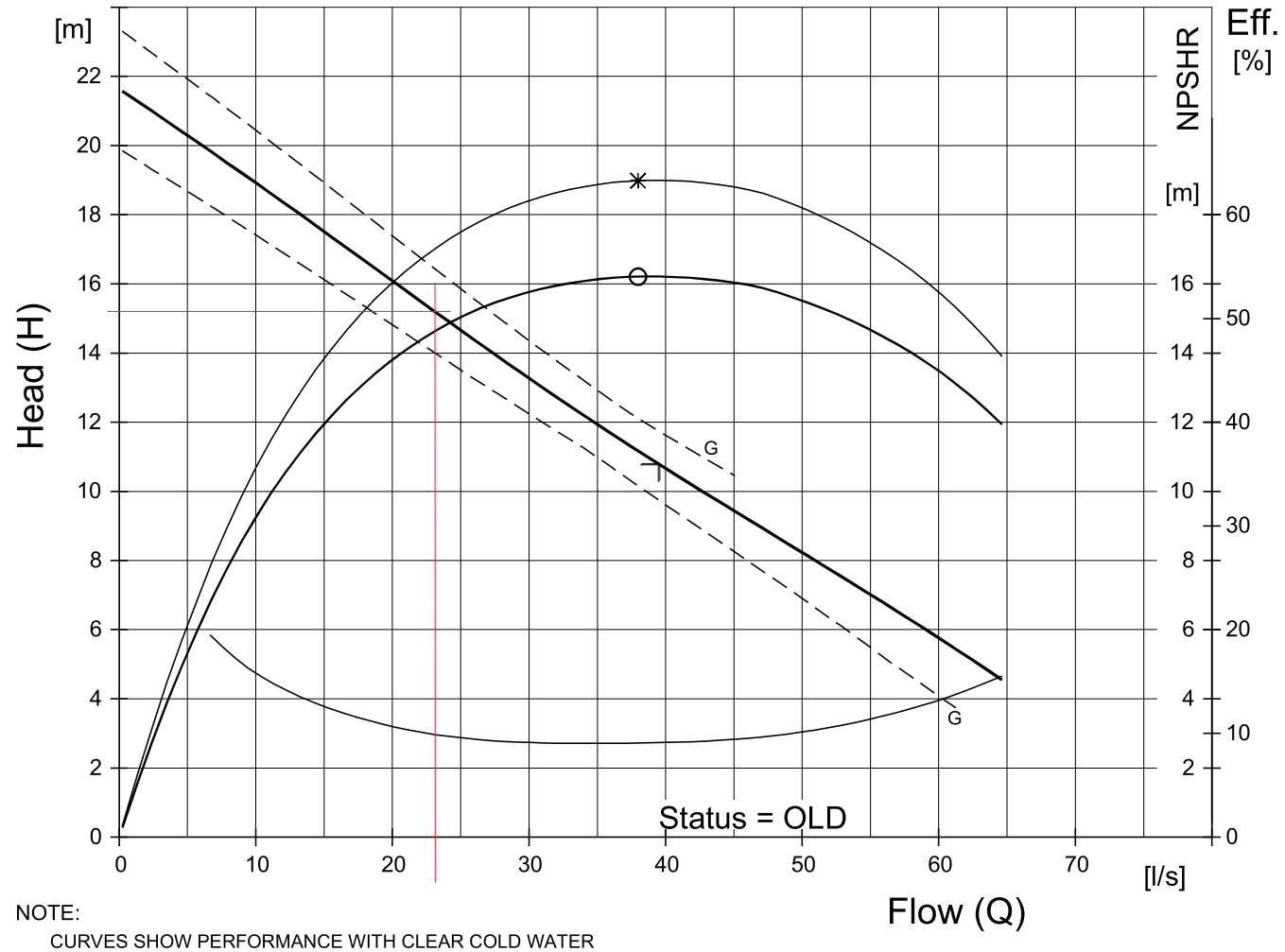
Motor #	Stator	Rev
21-12-4AL	12Y//	15

Freq.	Phases	Voltage	Poles
60 Hz	3	230 V	4

Geartype	Ratio
---	---



Duty-Point	Flow [l/s]	Head [m]	Power [kW]	Eff. [%]	NPSHR[m]
B.E.P.	38.0	11.2	7.71 (6.58) *	54.0 (63.3) *	2.8

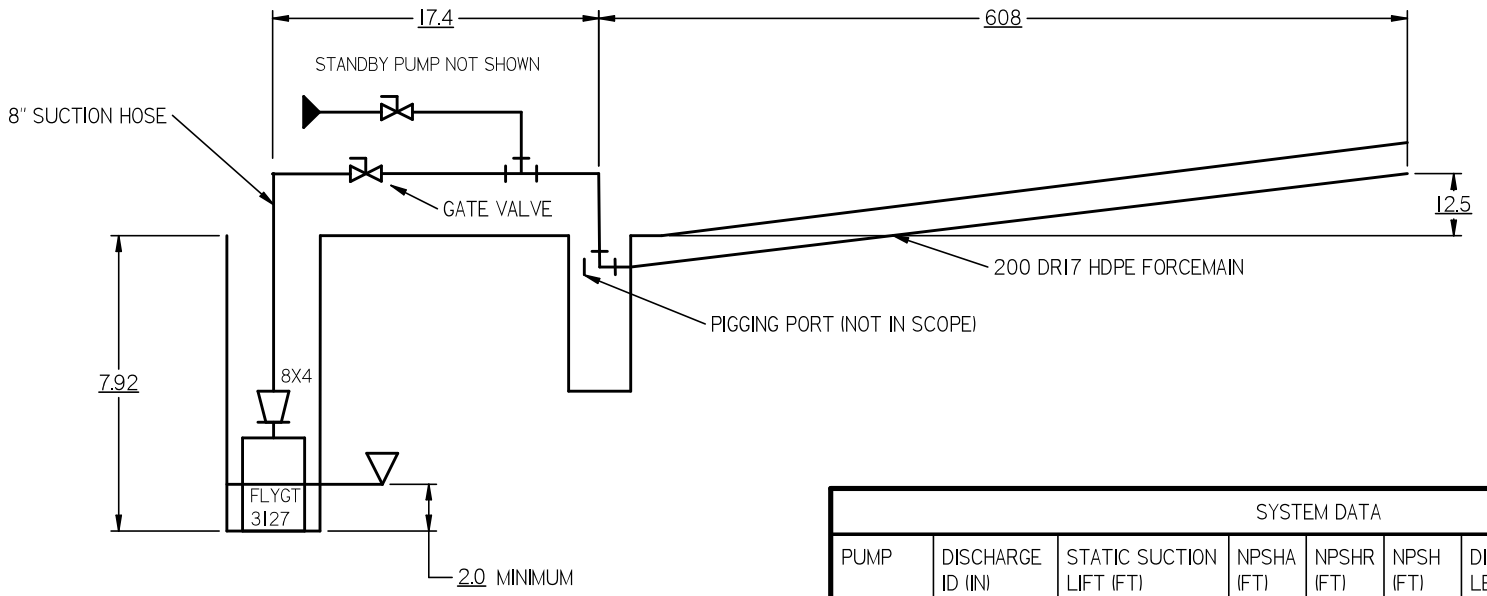


NOTE:
CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER
* : Pump EFFICIENCY/Shaft POWER
O : Overall EFFICIENCY/Input POWER
NPSHR = NPSH3 + min. operational margin

Guarantee between limits (G) acc. to
ISO 9906:2012 & ANSI/HI 11.6:2012 / <10kW

unix AUTHOR: SPHILLI SACU (rev:8.1)

Appendix E - Drawings and Sketches



1. ALL LENGTHS AND DIMENSIONS ARE APPROXIMATIONS.
2. VALVES AND CONNECTION LOCATIONS ARE REPRESENTATIVE ONLY - ACTUAL LOCATIONS MAY VARY.
3. STORMTEC IS RESPONSIBLE FOR ENSURING ALL HOSE IS ADEQUATELY SUPPORTED AND SECURED.
4. ELEVATIONS TO BE VERIFIED BY STORMTEC BEFORE WORK BEGINS.
5. STORMTEC MUST ENSURE THAT THE MINIMUM SUBMERGENCE IS MAINTAINED FOR SAFE PUMP OPERATION.
6. PUMP SUCTION INLET ASSUMED TO BE IN LINE WITH THE BOTTOM OF THE MANHOLE.

SYSTEM DATA							
PUMP	DISCHARGE ID (IN)	STATIC SUCTION LIFT (FT)	NPSHA (FT)	NPSHR (FT)	NPSH (FT)	DISCHARGE LENGTH (FT)	MINIMUM SUBMERGENCE (FT)
FLYGT 3127	8	7.92	N/A	N/A	N/A	17.4 608	2.0

SKETCH FOR REFERENCE ONLY

	NAME	DATE
DRAWN	nbotham	08/02/23
CHECKED		
ENG APPR		
MGR APPR		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN FEET
ANGLES ±0.5°
2 PL ±0.25 3 PL ±0.065

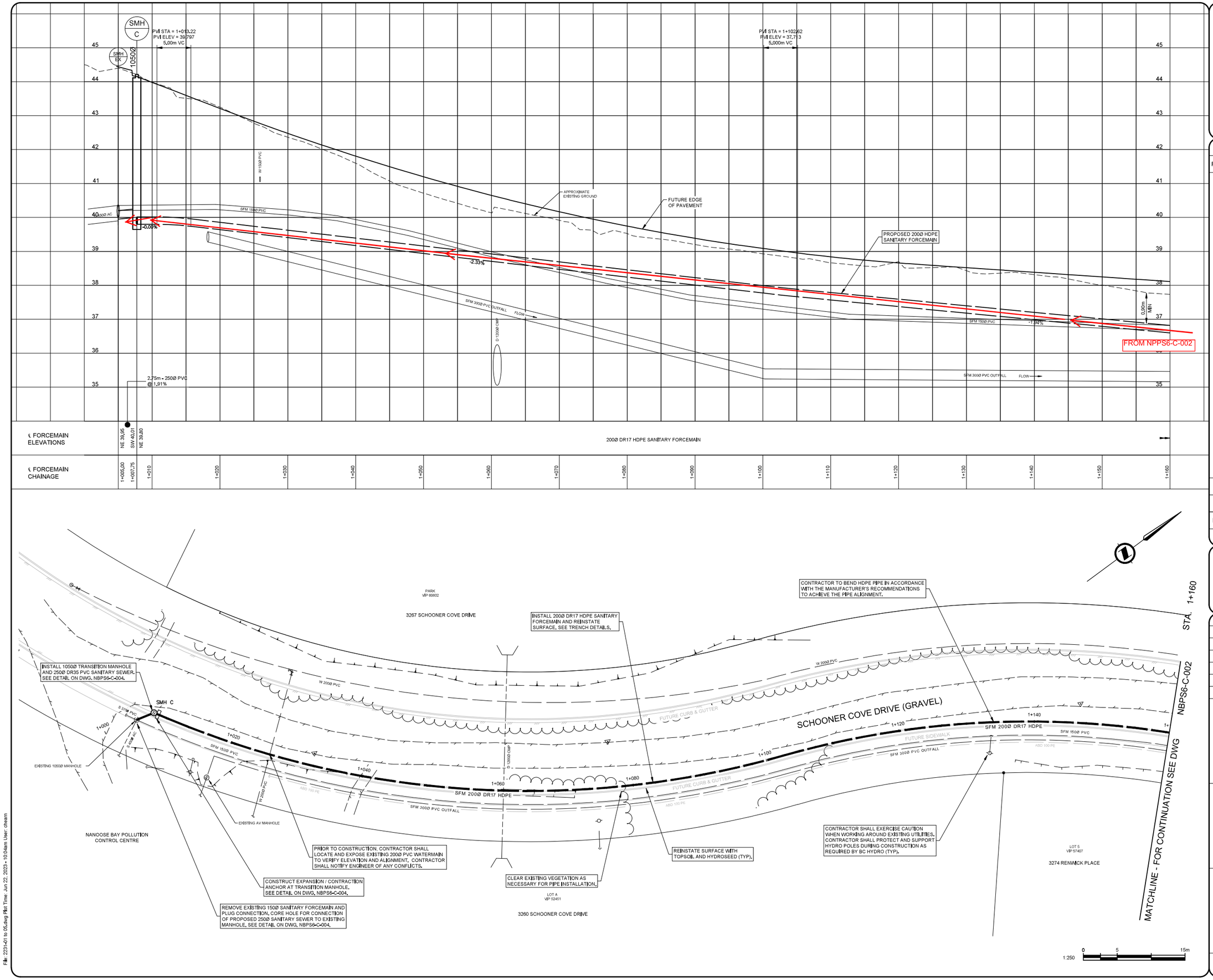
CANADA PUMP & POWER CORPORATION
DIVE ● PUMP ● BARGE ● DREDGE

TITLE: RAYMUR AND MALKIN
SECTION LAYOUT

SIZE: B | DWG NO: 230504(1)NB-3819-1 | REV: 0

FILE NAME: 230724(2)NB - 3886.dft

SCALE: NTS | SHEET 1 OF 1



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Consulting Engineers
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Parksville, BC V9P 2G8 www.koers-eng.com Fax: 250-248-5362

RECORD OF REVISIONS

REV	DATE	BY	ENG	DESCRIPTION

NOT FOR CONSTRUCTION

REV	DATE	BY	ENG	DESCRIPTION
B	23JUN23	CACH	CJM	TENDER
A	27MAR23	CACH	CJM	75% DESIGN REVIEW

RECORD OF ISSUE

SEAL

PERMIT TO PRACTICE No. 1001658

PROJECT NO.	2231
DRAWN	CACH
DESIGNED	CJM
CHECKED	CJM / MB
APPROVED	CD
DATE	DECEMBER 2022
SCALE	1:250 H / 1:50 V

CLIENT

REGIONAL DISTRICT OF NANAIMO

PROJECT

NANOOSE BAY
PUMP STATION No. 6
UPGRADE AND
SANITARY FORCEMAIN
REPLACEMENT

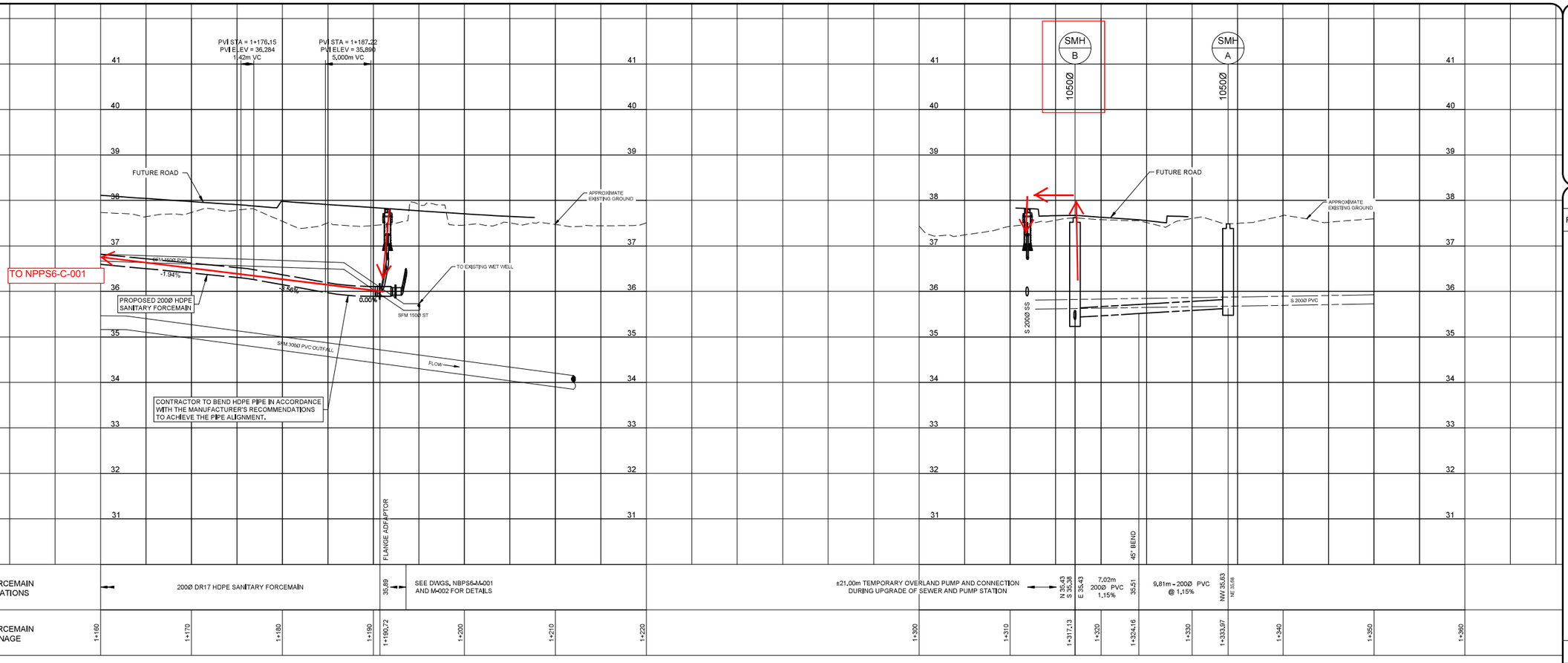
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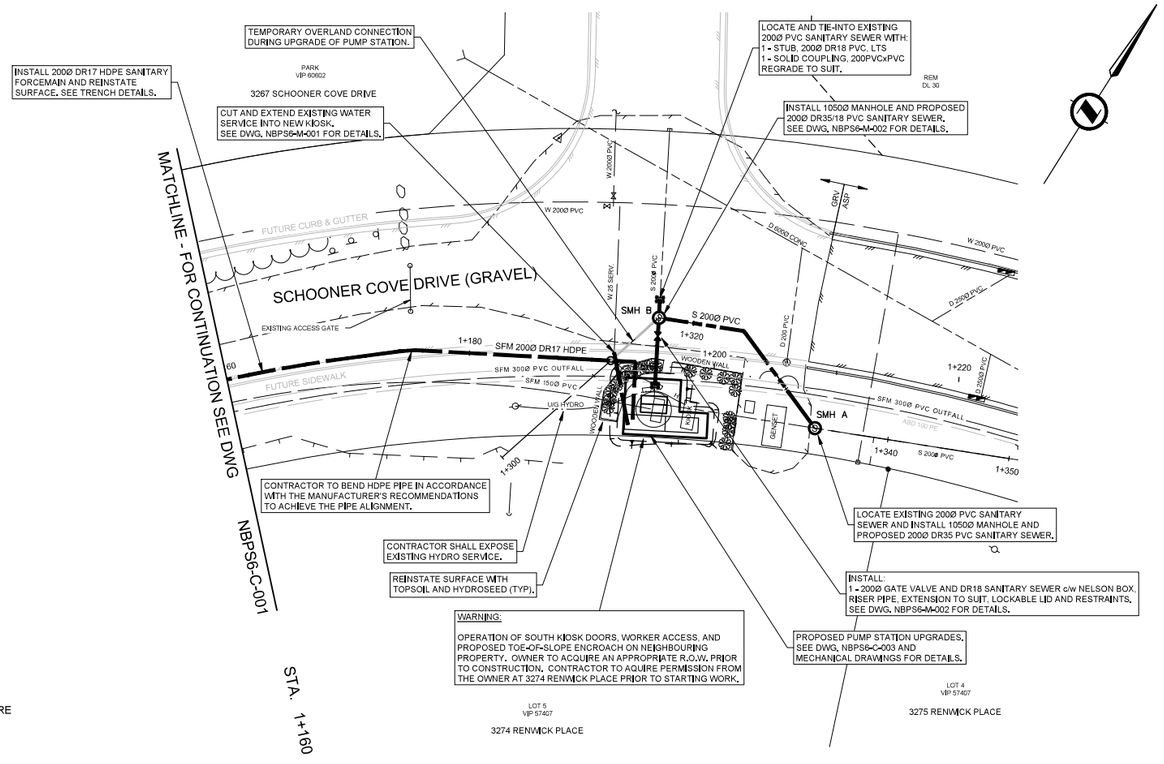
SANITARY FORCEMAIN
PLAN & PROFILE
STA. 1+000 TO 1+160

KOERS DWG. No. 2231-02

DRAWING No.	REV.	SHEET
NBPS6-C-001	B	2/28

File: 2231-01 to 05.dwg Plot Time: Jun 22, 2023 - 10:04am User: cheam





NOTES:

1. CONTRACTOR SHALL DEVELOP A BYPASS PUMPING AND SEQUENCING PLAN, AND SUBMIT TO THE ENGINEER FOR REVIEW. SEE SPECIFICATIONS FOR DETAILS.
2. CONTRACTOR SHALL DEVELOP AND IMPLEMENT PROPER WORK SEQUENCING TO MINIMIZE THE TIME PUMP STATION No. 6 IS OPERATING UNDER THE BYPASS PUMPING AND SEQUENCING PLAN.
3. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PUMP DOWN THE WET WELL, AND CO-ORDINATE WITH THE RDN TO VERIFY PUMP MOUNTING CONFIGURATIONS. THE CONTRACTOR SHALL WORK WITH THE PUMP SUPPLIER AND SUBMIT A PLAN SHOWING ANCHOR BOLTS. SEE SPECIFICATIONS FOR DETAILS.
4. ALL HDPE FITTINGS SHALL BE MANUFACTURED TO HAVE THE SAME MINIMUM PRESSURE RATING AS THE PIPE IT IS FUSED TO.
5. CONTRACTOR TO MAINTAIN ACCESS FOR RDN STAFF TO PUMP STATION FOR THE DURATION OF CONSTRUCTION.
6. ALL MANHOLES AND VALVE BOXES LOCATED OUTSIDE OF PAVED AREAS SHALL INCLUDE 1.5m WIDE ASPHALT SURROUND.

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Parksville, BC V9P 2G8 www.koers-eng.com Fax: 250-248-5362

RECORD OF REVISIONS

REV	DATE	BY	ENG	DESCRIPTION

NOT FOR CONSTRUCTION

ISS	DATE	BY	ENG	DESCRIPTION
B	23JUN23	CACH	CJM	TENDER
A	27MAR23	CACH	CJM	75% DESIGN REVIEW

RECORD OF ISSUE

SEAL

PERMIT TO PRACTICE No. 1001658

PROJECT NO.	2231
DRAWN	CACH
DESIGNED	CJM
CHECKED	CJM / MB
APPROVED	CD
DATE	DECEMBER 2022
SCALE	1:250 H / 1:50 V

CLIENT

REGIONAL DISTRICT OF NANAIMO

PROJECT

NANOOSE BAY PUMP STATION No. 6 UPGRADE AND SANITARY FORCEMAIN REPLACEMENT

TITLE

SANITARY SEWER AND FORCEMAIN PLAN & PROFILES STA. 1+160 TO 1+220 STA. 1+300 TO 1+360

KOERS DWG. No. 2231-03

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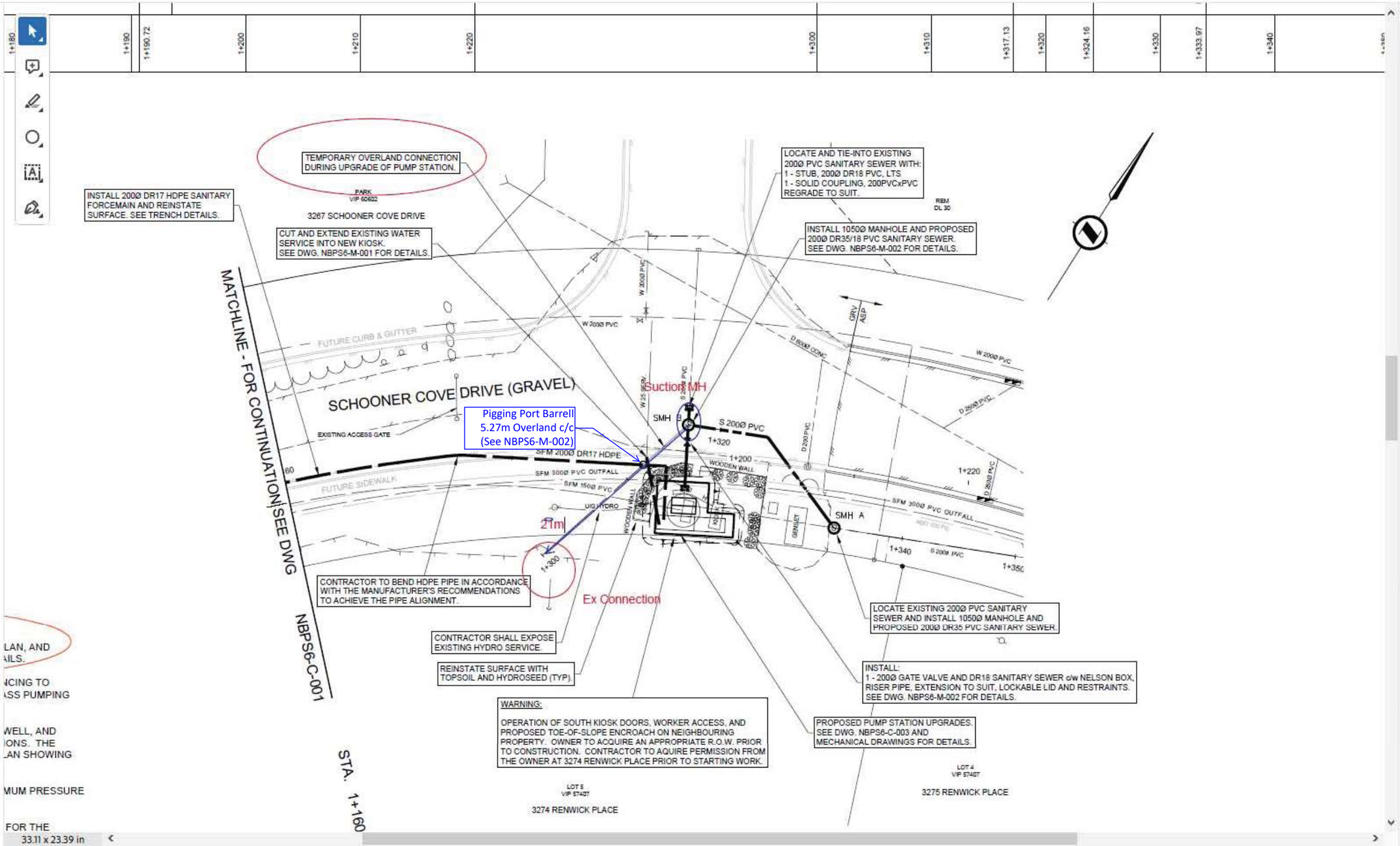
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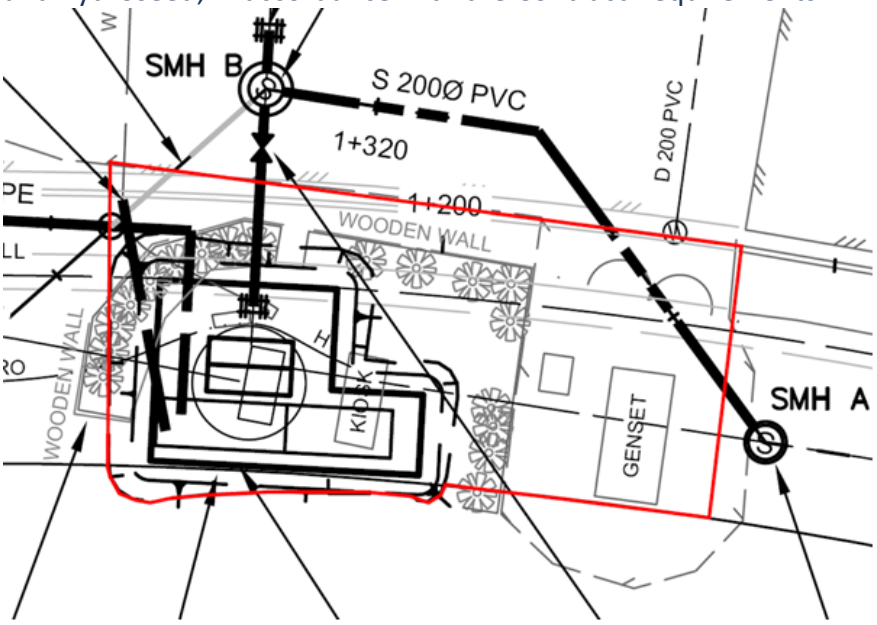


REGIONAL DISTRICT OF NANAIMO
TENDER No. 23-040
NANOOSE BAY PUMP STATION No. 6
UPGRADE AND SANITARY FORCEMAIN REPLACEMENT

Question and Answer Sheet #1

August 22nd, 2023

Question 1	Are there requirements to keep the gravel area next to the station open to public traffic or can it be blocked off given there is enough room kept open for the public to turn around?
Answer 1	The Contractor shall ensure the Nanoose Bay Pollution Control Centre remains accessible by vehicle to RDN Operators at all times. Additionally, ensure pedestrian access is maintained to the Dolphin Marsh Community Park at all times.
Question 2	SGC item 1.3 - Can you please confirm the RDN will be providing the benchmarks and base layout for the contractor to base their survey from?
Answer 2	The Owner will provide to the Contractor, existing control point information, and upon receipt of a signed electronic disclosure form, a copy of the digital drawing file. The Contractor is responsible for all layout necessary to carry out their Work.
Question 3	Could you please provide an unlocked copy of the drawings and specifications so we can mark them up when estimating?
Answer 3	Refer to the enclosed convenience copies of the Contract Documents and Drawings.
Question 4	Section 01 11 00 Item 1.5 requires the contractor to obtain written authorization from a land owner prior to any work occurring on their property. As working on their property is part of the design can this approval be obtained by the RDN?
Answer 4	The Owner will approach the affected Landowner, to obtain approval. The Contractor is responsible for reinstating the property to existing condition, or better upon completion of the Work.
Question 5	Section 01 33 00 Item 1.13.2.1 Are PVC non embossed binders acceptable?
Answer 5	PVC binders are not acceptable.
Question 6	Please provide asbuilt drawings for the existing station.
Answer 6	Refer to the enclosed record drawing scans.

Question 7	Please provide the head requirements for the temporary bypass pumps.
Answer 7	Refer to *Addendum No. 1* for the Temporary Bypass Pumping Plan (Owner Supplied).
Question 8	Please provide the current assumed winter flow rates coming into the station and pump cycle times.
Answer 8	Refer to *Addendum No. 1* for the Temporary Bypass Pumping Plan (Owner Supplied).
Question 9	Please provide the pump curves for the existing pumps
Answer 9	Refer to the enclosed pump performance curves. Additionally, please refer to *Section 01 57 20 – Sequencing and Tie-in Requirements*, *Clause 2.1.3* for information regarding use of RDN equipment. The Contractor shall provide everything necessary to successfully execute temporary bypass pumping.
Question 10	Please clarify the areas that will require topsoil and hydroseeding under tender item 1.2.0.2.
Answer 10	Refer to the sketch below for surface restoration limits around Pump Station No. 6. The area identified in red shall be restored using granular base. For all other disturbed areas along trenchlines, or otherwise, except within the existing gravel road limits, surfaces shall be restored using topsoil and hydroseed, in accordance with the Contract Requirements. 
Question 11	What size is the existing generator?
Answer 11	The existing standby generator is believed to be 36kW/45kVA, engine is an Onan 4B3.9-G. Additionally, please refer to *Section 01 57 20 – Sequencing and Tie-in Requirements*, *Clause 2.1.3* for information regarding use of RDN equipment. The Contractor shall provide everything necessary to

	successfully execute temporary bypass pumping.
Question 12	Will the RDN be paying for all BC Hydro charges related to the temporary service?
Answer 12	The Contractor will be responsible for coordination and payment with all third-party utilities. Costs associated with the temporary service are considered incidental, and should be included in the Contractor's price under the Item which is most closely related to.
Question 13	Does the owner require any additional items to be salvaged other than the items listed under section 31 01 30 item 3.11?
Answer 13	The Contractor shall provide a list of any pump station components not expressly identified in *Section 31 01 03 – Existing Structures & Utilities, Clause 3.11,* to the Owner for review, prior to disposal.
Question 14	Can you please confirm if compaction testing is by owner or by contractor?
Answer 14	Refer to *Instructions to Tenderers, Article 36 – Testing*. The Owner may employ a Material Testing Consultant during the Work. The Contractor is to coordinate their Work with this Consultant. Testing performed by the Owner does not relieve the Contractor of their responsibility to meet the contractual obligations, including, but not limited to, quality control.
Question 15	The generator is going to be a very long lead item to the project. Should we allow to delay the schedule until the new generator arrives or would you like the new station online and operating with the new generator to be added at a later date?
Answer 15	Refer to *Addendum No. 1*. The existing generator shall be re-connected to the proposed kiosk. Supply and installation of a new generator and the associated concrete pad has been eliminated from the Contractor's Scope of Work.

NOTE: Please acknowledge receipt of this Question & Answer Sheet #1 by returning a signed copy of this document to the Regional District of Nanaimo by email to cmathie@rdn.bc.ca.

_____ _____ _____

Signature Company Name Date

KOERS & ASSOCIATES ENGINEERING LTD.
Consulting Engineers.

FairWinds

REVISIONS

Nº	DATE	BY	ENG	DESCRIPTION
1	JUNE / 91	MB	[illegible]	RECORD DWG

SEAL

FW-090

PROJECT Nº	D8707
DRAWN	MB
DESIGNED	DS
CHECKED	DS
APPROVED	[illegible]
DATE	DEC. 3, 1990
SCALE	HOR. 1:500, VERT. 1:50

CLIENT

FAIRWINDS DEVELOPMENT CORPORATION

PROJECT

FAIRWINDS DEVELOPMENT
PHASE IV a
ROADS & UTILITIES

TITLE

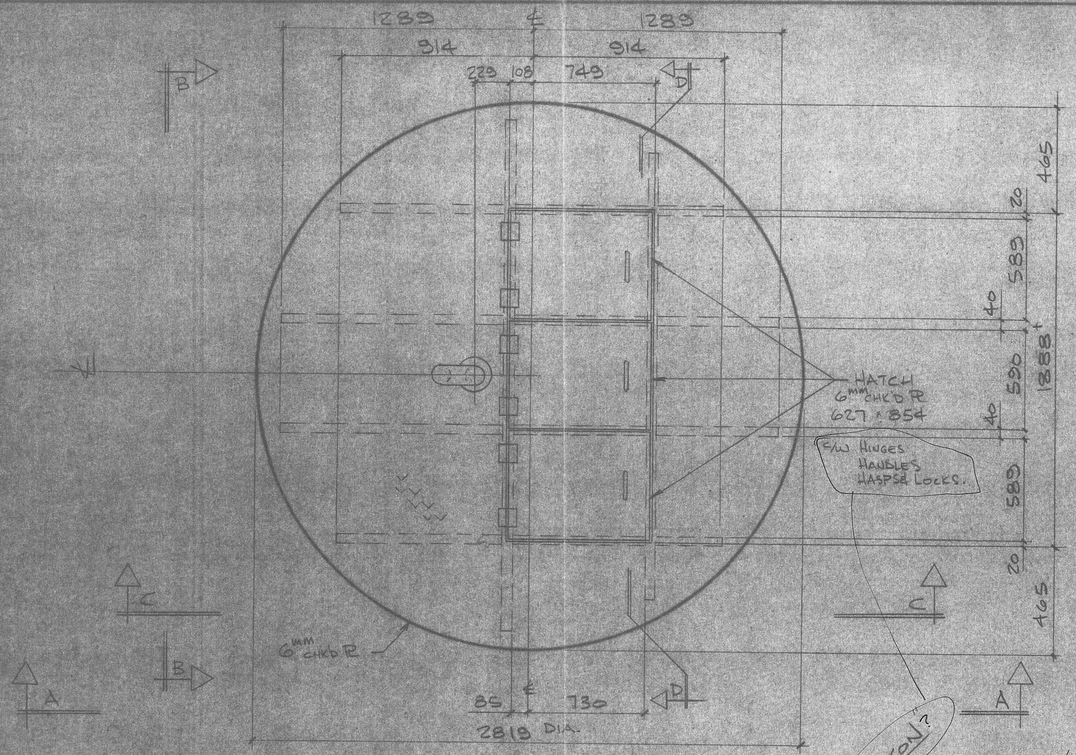
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PLAN & PROFILE
STA. 0+000 - STA. 0+325

FW-090

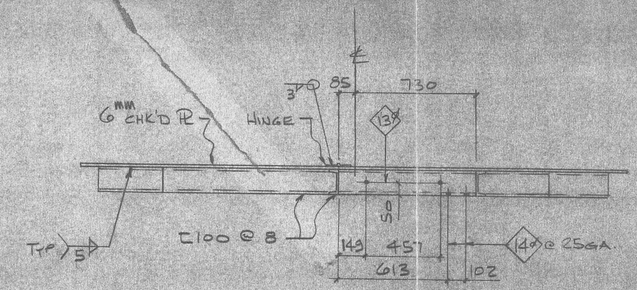
DRAWING Nº	REV.	SHEET
D8707-163	1	2/17

RIM 44.1
0+030 BVC EL. 43.400
0+080 PVI EL. 39.400, PVC EL. 40.236
0+130 EVC EL. 38.742
DOLPHIN LAKE SANITARY PUMP STATION
0+205.2 ℄ FUTURE RD
0+210 BVC EL. 37.690
0+220 BEGIN PAVEMENT
0+250 PVI EL. 37.164, PVC EL. 37.586
0+290 EVC EL. 38.367
℄ PAVED ROAD
-8.000 %
-1.315 %
+3.008 %
SF INV. 40.217
S.375 Ø W. INV 39.975
S. INV. 39.915
EXISTING 1280 CULV.
℄ FUTURE PAVED ROAD, CONSTRUCT GRAVEL ROAD TO SUBBASE EL. STA. 0+000 TO STA. 0+220
GROUND
S. INV. 36.309
S. INV. 36.289
D. INV. 36.313
D. INV. 36.343
D. INV. 35.111, OUTLET
S.F. INV. 35.583
S. INV. 35.313
S. INV. 34.870
CAP S. INV. 34.958
INV. EXISTING EFFLUENT SEWER
189.0 m - 150 mm Ø SAN. FORCEMAIN @ 1.2 m COVER. MIN.
22.0 m - 200 Ø SAN. @ 0.400 %
92.0 m - 600 mm Ø STORM @ 1.307 %
75.0 m - 525 mm Ø STORM @ 1.433 %
68.0 m - 200 mm Ø SAN @ 1.435%
73.0 m - 200 mm Ø SAN. @ 1.618 %
SMH132
S. CAP
D. OUTLET
SPS Nº6
DMH59
SMH131
0+000
0+100
0+200
0+300
0+325

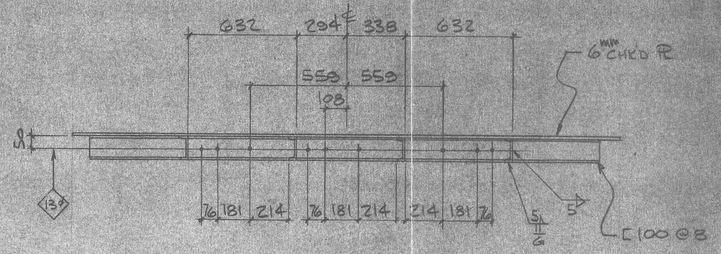
FUTURE RD.
FUTURE CURB LINE
FORM DITCH TO MARSH
1 - TEE 200F x 200H x 200F
2 - GATE VALVES 200F x H
INV. 34.958
P.I. 0+205.2
0+220 BEGIN PAVEMENT
FUTURE CURB LINE
R = 132.825
Δ = 047° 54' 31"
SANITARY PUMP STATION Nº 6
KIOSK
PS
300 Ø SF EXISTS
100 ABANDONED
TEMPORARY DITCH INLET TYPE CATCH BASIN, DIRECT. STORM WATER TO IT & TO DOLPHIN LAKE.
POLE BRACED
S. INV. 35.790
WYE 16-8 TO P.S.6
S. INV. 37.034
WYE 1-5 TO SMH131
S. INV. 37.087
WYE 5-1 TO SMH131
BARRIER CURB TYP.
SIDEWALK
STA. 0+000 TO STA. 0+220
CONSTRUCT GRAVEL ROAD TO SUBBASE 10.2 m WIDE
1 - TEE 200F x 200H x 150 F
1 - GATE VALVE 200H x F
1 - GATE VALVE 150 F x H
TOP 36.370
TOP 36.310
R = 137.208
Δ = 071° 04' 20"
W.P.C.C.
ABANDONED 100PE WATERMAIN
℄ R/W
SMH32
375 Ø STUB
SEE DWG. D8707-189
TIED INTO EXISTING 150PVC WATERMAIN WITH 2-22 1/2° BENDS 150 H x H C/W TIE-RODS & CONC. ENCASED.
SCHOONER COVE DR.
FUTURE PHASE
PHASE IV b
MATCH LINE - SEE DWG. D8707-164



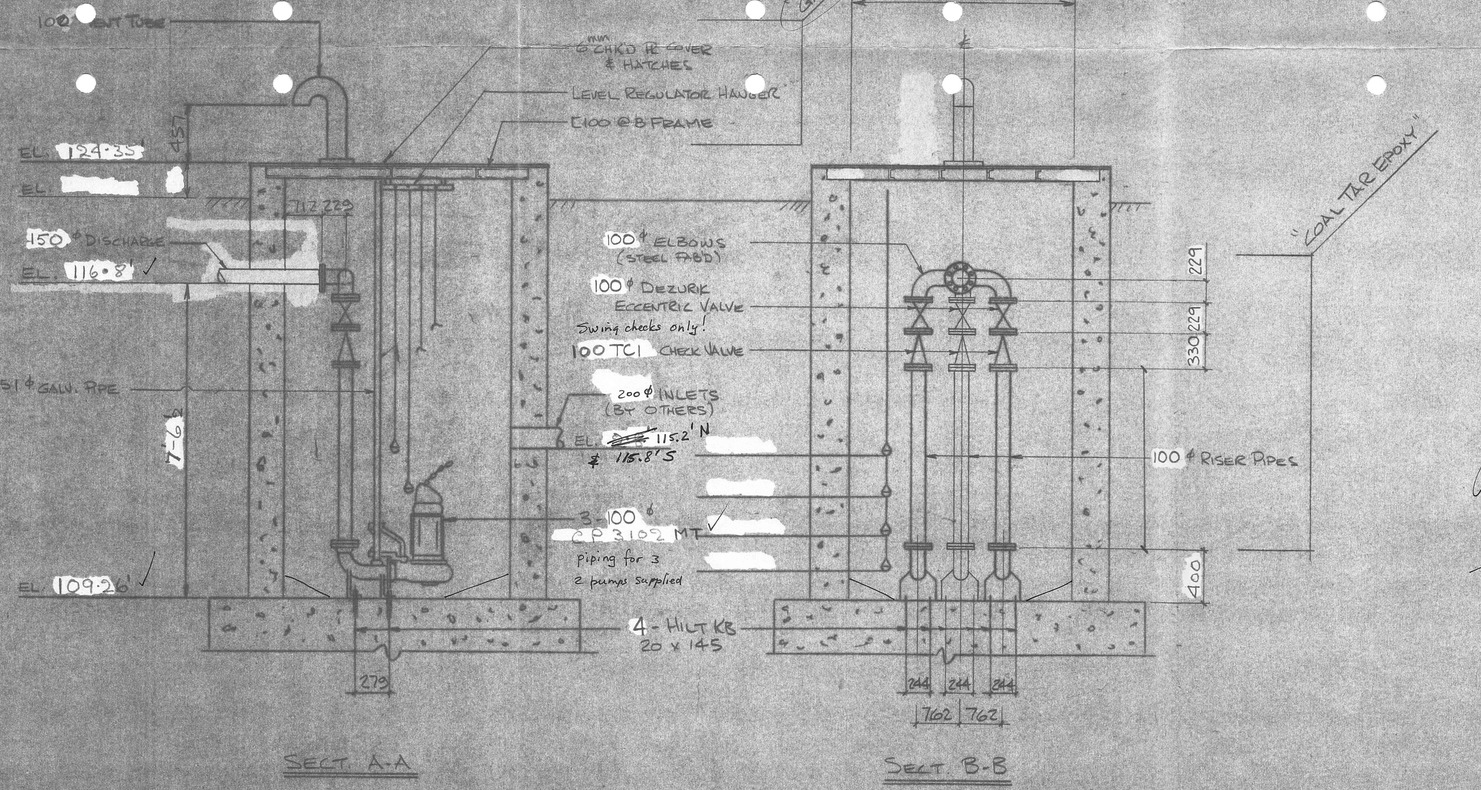
COVER PLAN



SECT. C-C



SECT. D-D



SECT. A-A

SECT B-B

Approved as noted
Feb 6/91

REV.	BY	DATE	DESCRIPTION

FABRICATE PER CSA STANDARD S16-

MATERIAL G40-21M 350 W (H.S.S.) G40-21M 300 W (STRK.)

WELDING PER CSA STANDARD W59 - 1982

WELD

HOLES AS NOTED

PAINT - UNLESS OTHERWISE NOTED AS NOTED

GEO. THIRD & SONS
STEEL FABRICATORS & ERECTORS
295-6555

WESTEC # 12

CUSTOMER: FLYGT CANADA

PROJECT: FAIR WINDS / DOLPHIN LAKE

DRAWING TITLE: S.A

DWN. DATE JOB NO.

CHK. SCALE NTS DWG NO. 2

CANCEL PRINTS BEARING PREVIOUS LETTER

Performance Curve

Product	Type
NP3102.160	MT

Date	Project	Curve No	Issue
2023-02-02		63-464-00-3703	10

	1/1-Load	3/4-Load	1/2-Load
Power Factor	0.82	0.76	0.65
Efficiency	85.0 %	85.5 %	84.0 %
Motor Data	---	---	---

Rated Power ...	5 (3.73 kW)	hp
Starting Current ...	31	A
Rated Current ...	5.1	A
Rated Speed ...	1745	rpm
Tot. Mom. of Inertia ...	0.027	kgm2
No. of Blades	2	

Impeller Diameter: 162 mm

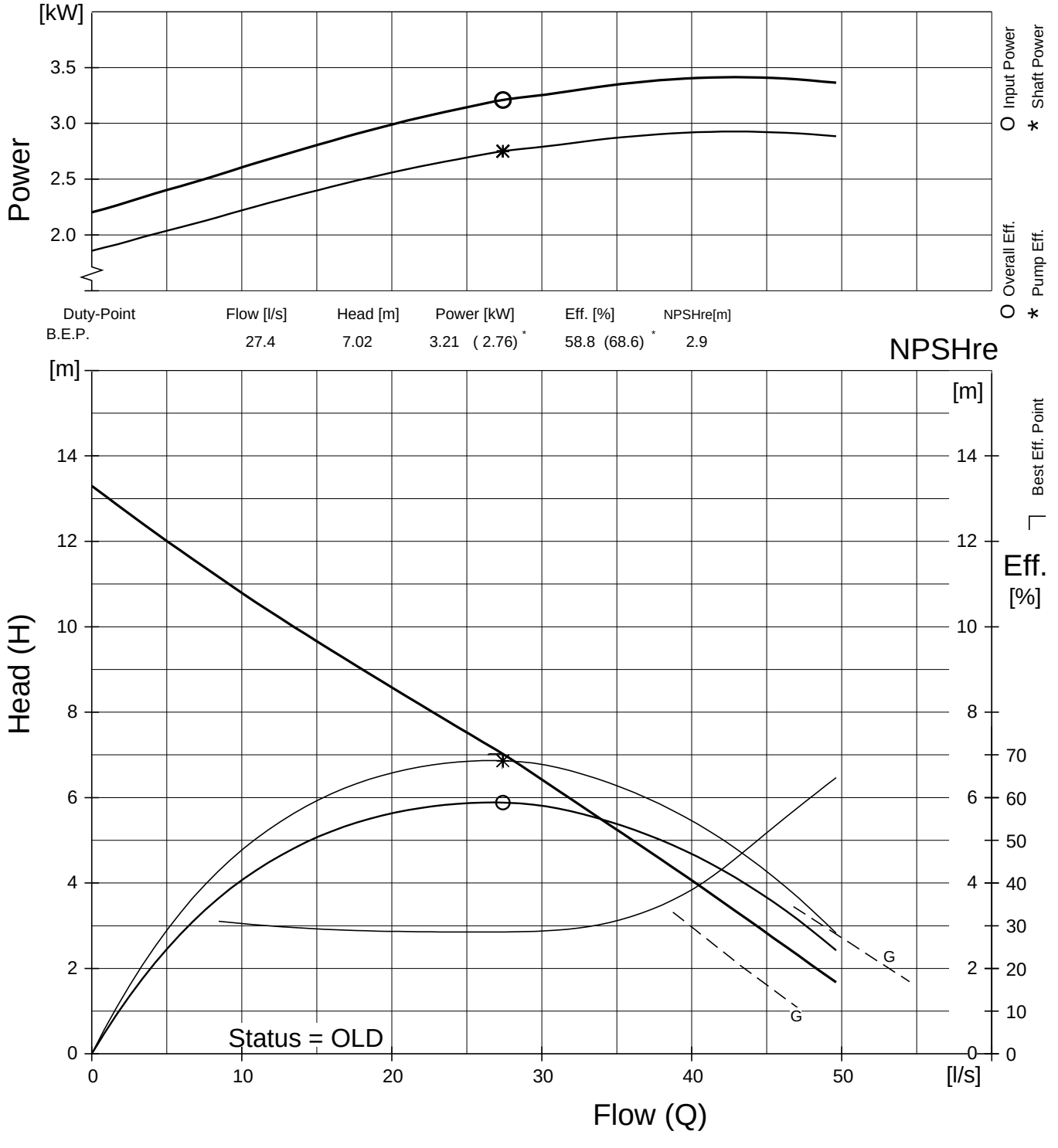
Motor #	Stator	Rev
18-11-4AL	63D	11

Freq.	Phases	Voltage	Poles
60 Hz	3	600 V	4

Geartype	Ratio
---	---

Comments

Inlet/Outlet	Imp. Throughlet
-/100 mm	---



Duty-Point	Flow [l/s]	Head [m]	Power [kW]	Eff. [%]	NPSHre[m]
B.E.P.	27.4	7.02	3.21 (2.76) *	58.8 (68.6) *	2.9

NPSHre = NPSH3% + min. operational margin

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

GUARANTEE BETWEEN LIMITS (G) ACC. TO TEST-CODE:	ISO/HI <10kW /e X

unix AUTHOR: XYZHOU SACU (rev:8.0)

Performance Curve

Product	Type
NP3102.181	MT

Date	Project	Curve No	Issue
2023-02-02		63-464-00-3703	17

	1/1-Load	3/4-Load	1/2-Load
Power Factor	0.82	0.76	0.65
Efficiency	85.0 %	85.5 %	84.0 %
Motor Data	---	---	---

Comments

Inlet/Outlet: -/100 mm

Imp. Throughlet: ---

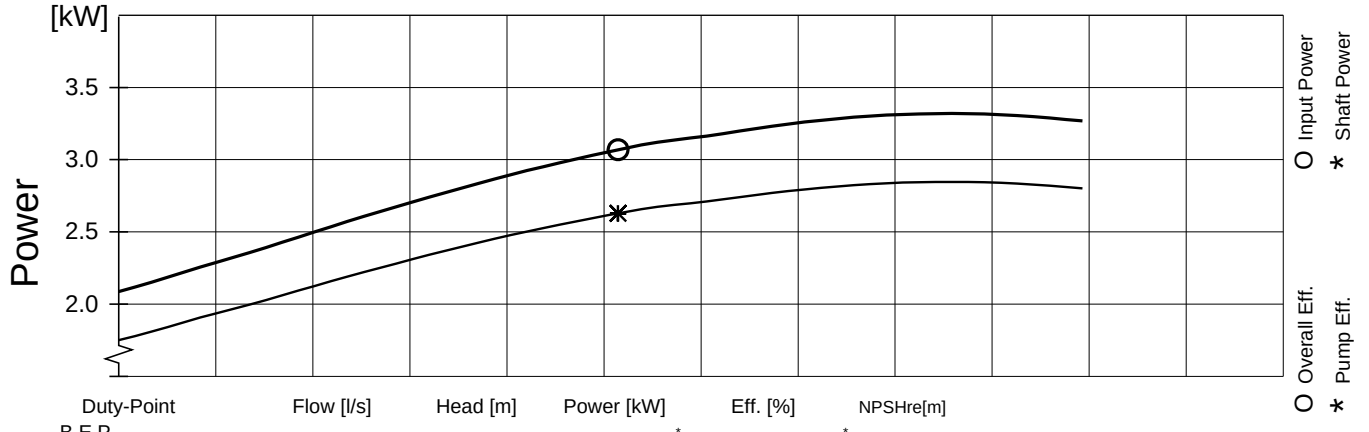
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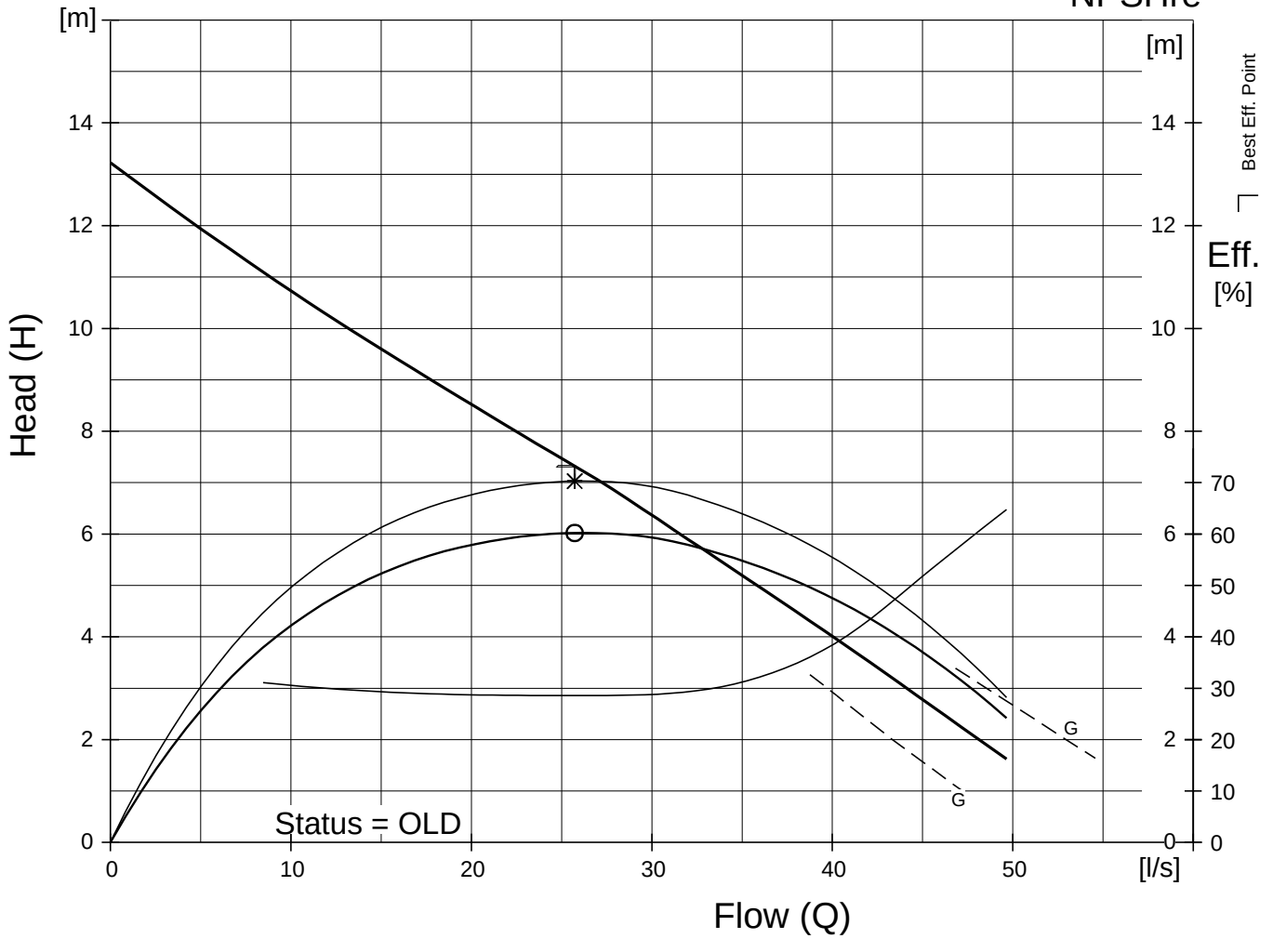
Motor #	Stator	Rev
18-11-4AL	63D	11

Freq.	Phases	Voltage	Poles
60 Hz	3	600 V	4

Geartype	Ratio
---	---



Duty-Point	Flow [l/s]	Head [m]	Power [kW]	Eff. [%]	NPSHre[m]
B.E.P.	25.7	7.32	3.07 (2.63) *	60.2 (70.3) *	2.9



NPSHre = NPSH3% + min. operational margin

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

GUARANTEE BETWEEN LIMITS (G) ACC. TO TEST-CODE:	ISO/HI <10kW /e X

unix AUTHOR: XYZHOU SACU (rev:8.0)