SECTION 005

GENERAL REQUIREMENTS

Fisheries and Oceans Canada

Pinkut Creek Spawning Channel – Fuel System Upgrade

June 16, 2014

SECTION 005: GENERAL REQUIREMENTS

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1.0 LOCATION OF THE WORK

The Pinkut Creek Spawning Channel is located on the south shore of Babine Lake, approximately 46 km northeast of Burns Lake, B.C. The Site is accessed by unpaved logging roads. (See Appendix A for location map).

The Facility is comprised of an assortment of buildings and rearing channels. Buildings include an office, shop, residences, pump house, office generator building and several keeper channel buildings for the rearing channels.

The electrical power supply for the site is provided through a combination of solar panel systems and diesel generators. Generator power supply is provided by three separate sources dispersed throughout the site:

- an emergency generator for the office building,
- an emergency generator for the shop building, (along with a diesel and gasoline fuel dispensing system for vehicles),
- diesel driven backup pumps drawing from Babine Lake for the spawning channels.

All of the work under this Construction Contract is located at the Babine Lake Pump Station.

Accommodation is available at Burns Lake, B.C. For security reasons, Bidders shall not assume that onsite accommodation is permissable.

2.0 EXTENT OF THE WORK

This specification covers the removal and disposal of existing fuel tanks and installation of Owner Supplied fuel tanks, including construction of a new piping and appurtenances. Except as otherwise expressly provided herein, the Contractor shall supply all labour, supervision, installed and consumable materials, equipment, tools, testing devices, tests for new construction, services and each and every item of expense necessary for the civil, mechanical, electrical and works including all removals and disposals, all as detailed in the following specifications and attached drawings except as specifically designated as supplied by others. Portions of the work require a Certified Petroleum Equipment Installer, as required by the CEPA/STR regulation.

The Work is all located at the Babine Lake Water Pump Station, and generally consists of the following:

- Transfer fuel, remove and dispose of the following diesel storage tanks, in accordance with the project specifications;
    - One existing 59,750L outdoor aboveground single walled steel diesel storage tank, and
    - One existing 970L indoor aboveground single walled steel (residential type) diesel storage tank (currently supplying fuel to two engine driven pumps).
- Provide temporary fuel setup for existing diesel driven pumps during construction;
- Provide documentation report of tank disposal to the Specification requirements, signed and certified by an ITA Certified Petroleum Equipment Installer;
- Filter existing transferred fuel, remove any water contamination, and properly dispose of contaminants to the Specification requirements;
- Remove and dispose of existing indoor and outdoor mechanical fuel piping, and accessories as indicated on the drawings;
- Remove portions of an existing wood and concrete structure covering the above noted 59,750L tank;
- Receive and transport two new Owner Supplied aboveground double walled steel storage tanks from Regal Tanks Ltd. (44313 Progress Way, Chilliwack B.C. – phone 604-793-9734) to the Hatchery and unload and install;
- Installation of new fuel tanks:
    - One new 22,700L outdoor aboveground double walled vacuum monitored steel diesel storage tank, and
    - One new 970L indoor aboveground double walled steel diesel storage day tank.
- Supply and install tank appurtenances, drop tubes, piping, fittings, valves, supports, etc. for the new and existing tanks as indicated on the drawings;
- Supply and install heat tracing, insulation, and jacketing for exterior fuel pipes as indicated on the drawings;
- Remove and dispose of existing electrical control panel and sensors for fuel

transfer system;

- Supply and install electrical controls, panel, wiring and conduit/cable for the fuel tank systems, etc. as indicated on the drawings;
- Receive on site and Install new Owner Supplied day tank level switches and PLC controller;
- Transfer and filter stored fuel into the new storage tanks, test and commission new systems;
- Supply and locate/install fire extinguishers, spill kits and signage;
- Supply and install piping identification labels to all diesel and gasoline piping.
- Re-grade around work area, and restore site;
- Provide contract close out documents, including equipment O&M manuals, As-built drawing mark-ups, tank, fuel and water disposal manifests, and warranties.

3.0 DRAWINGS

All work shall be performed in strict accordance with the drawings listed in these Specifications.

4.0 COORDINATION OF ACTIVITIES

The Contractor shall coordinate activities to ensure work proceeds with the minimum of interruption.

5.0 LAYOUT OF WORK

The Contractor shall be responsible for the layout of the work and shall assume full responsibility for the alignment, dimensions and elevations of each and every part of the Work and their mutual relationship

6.0 QUALITY CONTROL

All quality control and testing services connected with new construction work shall be carried out as required by the specifications. The cost of testing will be borne by the Contractor unless specifically stipulated otherwise. Retesting of rejected work or tests which fail to meet specification requirements shall be borne by the Contractor. The minimum requirements for testing are as stipulated in the TECHNICAL SPECIFICATIONS of this document.

7.0 RIGHT-OF-WAY AND RIGHT-OF-ACCESS

The Contractor shall ensure that no equipment damages any landscaped or planted areas. It shall be the Contractor's responsibility to repair any damages to landscaped or planted areas caused by his construction equipment and/or operation as deemed by the Owner's Representative.
The Owner will, with the notice to proceed, give to the Contractor possession of as much of the site as may be required to enable the Contractor to commence and proceed with the Work.
The Contractor shall bear all expenses and charges for special or temporary operating or staging areas required in connection with access to the site and will be responsible for all costs so incurred.
Delivery of supplies, equipment and/or materials to the Place of the Work shall be received in an area designated by the Owner's Representative.

Contractor’s access to the site will be limited to 08:00-16:00hrs on regular business days, unless approval for weekend or after hours work has been granted formally by the Hatchery Manager.

8.0 PREVENTION OF ENVIRONMENTAL IMPACTS

The Contractor shall comply with applicable federal, provincial, municipal orders and regulations concerning the control and abatement of water pollution. The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of contaminants, debris and other objectionable pollutants and wastes into the environment. The Contractor shall also be responsible for obtaining all required permits, making notifications as required by the applicable regulations and for providing copies of any such information to the Owner's Representative.
Any dewatering pumping that must be used, and any water used in tank or line testing, shall be discharged to a proper location. The Contractor shall dispose of water in a manner not detrimental to public health, environment, public and private property or, any portion of the work completed or under construction. Water containing suspended materials or other harmful substances shall not be discharged into waterways, sewer or drainage systems. Disposal or runoff of water containing suspended materials or other harmful substances shall be controlled and monitored in accordance with local authority requirements.

9.0 WEATHER

In adverse weather, the Contractor shall take proper precautions to ensure that the work can be performed satisfactorily. If, in the opinion of the Owner's Representative, the shelter or precautions are not satisfactory, no work shall be undertaken.

Such precautions or work stoppage shall not provide any allowance for the work not being completed by the scheduled date.

10.0 PERFORMANCE SCHEDULE

The Contractor shall commence performance of the Work after receiving instructions to proceed from the Owner's Representative. The Owner's Representative will promptly thereafter confirm the date of commencement in writing. The Contractor shall schedule his sequence of all field construction activities according to the schedules accepted with the Owner's Representative at the time of Contract Award. The Contractor shall provide a minimum of one week notice to the Owner's Site representative prior to arriving on site and commencing construction.

11.0 REPORTING REQUIREMENTS

The Contractor shall promptly submit the schedules and reports set forth below and any others required by the Contract Documents:

- Bar chart schedules as specified herein. The schedules shall be updated weekly showing actual progress versus schedule progress and percent completion to date.
- The Contractor's daily activity and workforce report. This may be verified by the Owner's Representative, if requested.
- Field Report on purchased material specifications and delivery.
- Safety meeting minutes and attendance records.
- Names and registration numbers for Certified Petroleum Equipment Installers undertaking portions of the work under the CEPA/STR regulation.
- Documentation Report of fuel tank and equipment disposal to the Specification CEPA requirements, signed and certified by an ITA Certified Petroleum Equipment Installer.

12.0 MATERIAL AND EQUIPMENT SUPPLIED BY THE OWNER

The Owner will supply the following equipment, to be delivered to the facility by the Owner. The Contractor shall inspect, receive, and move the equipment to the work site:

- Two new level switches for the 970L fuel tank; and,
- One new PLC controller for the fuel transfer system.

The Owner will supply the following equipment, to be loaded, transported, and offloaded at the facility by the Contractor. The Contractor shall inspect, receive, and move the equipment to the work site from Regal Tanks Ltd. (44313 Progress Way, Chilliwack B.C. – phone 604-793-9734):

- One new 22,700L outdoor aboveground double walled steel diesel storage tank;
- One new custom 970L indoor double walled rectangular steel storage tank; and,
- One new high pressure Overfill prevention tank fill valve.

13.0 MATERIAL AND EQUIPMENT RECEIVED BY THE CONTRACTOR

The Contractor is responsible for the receipt, offloading and storage of all equipment, materials and supplies required for the performance and progress of the work.

14.0 MATERIAL TO BE HANDED OVER TO THE PROJECT MANAGER

As soon as part or all of the Work covered by this contract is complete and has been accepted, Contractor shall hand over three copies of the following items, as applicable, to the Owner's Representative.

- All letters of acceptance, inspection reports and other documents which Contractor will have obtained in accordance with the requirements of this Contract.
- Three copies of vendor supplied equipment and material data (technical, operating and maintenance), packing slips, purchase orders and invoices including information received with deliveries.
- One complete set of marked up Record Information contract drawings (as-built).
- One tank disposal report for each decommissioned fuel tank.
- One contaminants disposal report for any fuel/water/sludge disposed of from existing tanks.

15.0 REMOVAL OF ALL SCRAP AND SURPLUS MATERIALS

All scrap and surplus material shall be removed from site at the contractor's expense. During the progress of the work, the Contractor shall take special care to observe all good housekeeping practices. Ongoing cleanup is required. If the Owner requests any Contractor’s material, a negotiated value must be arranged before transfer to the Owner's property.

WASTE MANAGEMENT AND DISPOSAL:

For the removal and disposal of Environment Canada registered tanks and equipment, the contractor is to provide permanent withdrawal and removal reports and tank disposal certificates signed and stamped by an Industry Training Authority (ITA) Certified Petroleum Equipment Installer.

Contractor is responsible for all transportation related to the removal, demolition, and disposal of the tanks and equipment. Ensure all liquids and sludge are safely removed and disposed of and the tanks are cleaned and free of harmful vapours prior to transport and or destruction.

Contractor is responsible for the safe removal and disposal of any residual and or remaining fuel/oil in the tanks. Dispose of waste fuel/oil in sealed leak proof drums. Label containers with appropriate warning labels.

Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

Provide supervision by an ITA Certified Petroleum Equipment Installer and record for each tank system's removal and permanent withdrawal from service.

Provide certificates of destruction for each tank with the required tank and system identification information. The certificates to be submitted with a brief report signed and stamped by the ITA Certified Petroleum Equipment Installer, stating the removal and permanent withdrawal were completed as required in this Section. The report shall include photos of the equipment destruction, and transport and disposal documents for any waste liquids and sludges.

REMOVAL OF STORAGE TANK SYSTEMS:

System is to be removed by a person approved to do so. In British Columbia, the fuel storage tank removal must be supervised by an ITA Certified Petroleum Equipment Installer.

The contractor must keep and provide to the Departmental Representative a record that includes the date on which the storage tank system or any associated components were removed. The record must state that the removal was done by an ITA Certified Petroleum Equipment Installer.

Contact the Departmental Representative immediately if there is evidence of contamination within the construction site.

DRAINING:

Drain and flush piping into tank, and pump out liquid from tanks using an explosion proof, air driven or hand pump. Remove sludge from tank bottom Dispose of product and sludge in accordance with Federal, Provincial/Territorial, and local regulations. Waste disposal carrier to be licensed by Provincial Environmental Agency having jurisdiction.

VAPOUR REMOVAL:

Purge flammable and toxic vapours from the tank or make the tank inert in accordance with one of the following methods:

- Purging: Purge vapours to less than 10% of lower flammability limit or lower explosive limit. Verify with combustible gas meter.

- Inerting: Displace oxygen to levels below necessary to sustain combustion. Verify with combustible gas meter.

- Dry Ice Method: Add 1.85kg of solid carbon dioxide (dry ice) for each 500 liter capacity (3lbs per 100 gallons) of tank volume. Crush and distribute ice evenly over greatest area to secure rapid evaporation. Avoid skin contact. Verify dry ice has vaporized.

- Air Method: Ventilate tank with air using small gas exhauster operated with compressed air. Air shall enter the opening at one end and to exit opening at the other end to quickly remove vapour. Test interior of tank to determine when tank is free of vapour.

TANK REMOVAL FROM SITE:

Tanks shall be removed from premises as promptly as possible after vapour removal. If tank remains at site overnight or longer, recheck vapour levels prior to transport, and remove vapour if required.

Ensure the tank is secured for transport with adequate venting at the top of the tank. 30mm minimum diameter is required for safe venting, however, larger vents are recommended.

The Contractor may recover any scrap metal value from the material disposal, provided that all disposal requirements and environmental items have been addressed and documented.

REFERENCES:

Department of Justice Canada (Jus)

- Canadian Environmental Protection Act, 1999 (CEPA)
- Canada Gazette Part II, Vol 142, No 13 – "Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations" (June 12, 2008) annexed out of the Canadian Environmental Protection Act.

Canada Labour Code

- Part II (September 2000) – Occupational Safety and Health Regulations

Transport Canada (TC)

- Transportation of Dangerous Goods Act, 1992 (TDGA).

National Fire Code of Canada (NFC) 2005

Canadian Council of Ministers of the Environment (CCME)

- PN 1326 "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products".

SUBMITTALS:

Submit to Departmental Representative a proposed Work Plan and schedule prior to commencing work.

DFO will submit the required notification of the tank removal to the Dominion Fire Commissioner's Office.

Submit to the Departmental Representative a summary report certified by an ITA Certified Petroleum Equipment Installer, detailing the permanent withdrawal from service, removal and disposal of each tank. The report will include the dates when each tank was permanently withdrawn and removed and the destruction certificates bearing each tank's BC ID number and EC system number. The report must also include a statement saying:

> "*The removal and permanent withdrawal were done in accordance with Sections 44 and 45 of the Canada Gazette Part II, Vol 142, No 13 "Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations" (June 12, 2008) annexed out of the Canadian Environmental Protection Act".*

Submit to Departmental Representative any necessary permits for transportation and disposal of the used oil tanks and any associated waste materials. Any vapour level test readings should be included as well. Also included shall be photos of the tank destruction, and volumes and disposal location(s) of any waste liquids or sludges.

QUALITY ASSURANCE:

Perform work in accordance with all Federal, Provincial/Territorial, and local requirements pertaining to fuel storage tank removals. Regulations will include but are not limited to the following:

- National Fire Code (2005), Section 4.3.15
- Canada Gazette Part II, Vol 142, No 13 – "Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations" (June 12, 2008)
    - Section 44. Permanent Withdrawal from Service
    - Section 45. Removal of Storage Tank Systems

HEALTH AND SAFETY:

Perform construction occupational health and safety in accordance with the Health and Safety Requirements

The Site Safety and Health Plan/Statement shall demonstrate that the contractor is aware of, and shall perform all work in accordance in full compliance with the requirements of Occupational Health and Safety, Canada Labour Code Part 2, and the Worker's Compensation Act. In addition, the following safety precautions shall be enforced:

.1 Disconnect or remove source of ignition from vicinity of tank. Provide temporary protection for safe movement of personnel and vehicle traffic.
.2 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
.3 When necessary, ground and bond metal equipment, including tanks and transfer pipes, before operating equipment or transferring flammable materials.
.4 Use non-sparking tools and intrinsically safe electrical equipment.
.5 Smoking shall not be permitted in the worksite.

Protective equipment and clothing to be worn by workers while in the tank removal Work Area.

WORK PLAN:

Prior to commencement of work, contractor shall prepare or present to the Departmental Representative their proposed Work Plan. The Work Plan is not limited to but should as a minimum include the following:

.1 Describe the methods, means, sequence, and schedule to be employed in the pumping, cleaning, de-vaporizing, testing, inspecting, cutting, and disposal for the fuel storage tanks and related piping, equipment and appurtenances.

.2 Include methods to be employed for any product storage; sludge and liquid removal; purging and inerting.

16.0 HIERARCHY

In the event of conflicts between Contract Documents the following shall apply:

- Figured dimensions shown on a drawing shall govern even though they may differ from dimensions scaled on the same drawing,
- Drawings of larger scale shall govern over those of smaller scale of the same date,
- Specifications shall govern over drawings,
- The General Conditions shall govern over specifications, and
- The executed Agreement between the Owner and Contractor shall govern over all documents.

Not withstanding the foregoing, documents of later date shall always govern.

17.0 TERMINOLOGY

All references to the Consultant refer to Morrow Engineering Ltd.(MEL)

All references to the Engineer refer to the Engineer assigned by the Consultant.

All references to the Owner's Representative refer to the Individual assigned by the Owner.

All references to the location of work are to the individual sites listed in these specifications.

SECTION 006

TECHNICAL SPECIFICATIONS

Fisheries and Oceans Canada

Pinkut Creek Spawning Channel – Fuel System Upgrade

1.0 GENERAL SPECIFICATIONS

1.1 SCOPE

This specification covers the materials, labour, equipment and services necessary to carry out upgrades for the Fisheries and Oceans Canada (FOC) Pinkut Creek Spawning Channel Fuel Systems.

The Work of this specification includes the civil, mechanical, electrical, and testing including all the associated demolition, disposal, upgrade and restoration for the above Work.

Except as otherwise expressly provided herein, the Contractor shall supply all labour, supervision, installed and consumable materials, equipment, tools, testing devices, services, and each and every item of expense necessary for the supply, construction and installation of all the works as described in these specifications herein called the Work. The Owner will supply fuel storage tanks and accessories as indicated in Section 005 of these specifications.

The Contractor shall follow the schedule of work agreed to by FOC.

The Work to be done and the material to be supplied and built into the Work shall be that referred to in the Specifications, and as shown on the drawings listed in SECTION 007 of these Specifications.

The Work generally consists of the following:

Pumphouse Site

- Transfer fuel, remove and dispose of the following diesel storage tanks, in accordance with the project specifications:
    - One existing 59,750L outdoor aboveground single walled steel diesel storage tank,
    - One existing 970L indoor aboveground single walled steel (residential type) diesel storage tank (currently supplying fuel to two engine driven pumps), and

- Provide temporary fuel setup for existing diesel driven pumps during construction;
- Provide documentation of tank disposal to the Specification requirements;
- Filter existing transferred fuel, remove any water contamination, and properly dispose of contaminants to the Specification requirements;
- Remove and dispose of existing indoor and outdoor mechanical fuel piping, and accessories as indicated on the drawings;
- Remove and dispose of portions of an existing wood and concrete structure covering the above noted 59,750L tank;
- Receive, transport (from the Lower Mainland to the site), and install two new Owner Supplied aboveground double walled steel diesel storage tanks:
- Installation of new fuel tanks:
    - One new 22,700L outdoor aboveground double walled vacuum monitored steel diesel storage tank (complete with overfill prevention valve), and
    - One new 970L indoor aboveground double walled steel diesel storage day tank,
- Supply and install tank appurtenances, drop tubes, piping, fittings, valves, supports, etc. for the new tanks as indicated on the drawings;
- Supply and install new fuel transfer and return piping, and appurtenances between the new fuel tanks as indicated on the drawings;
- Supply and install new fuel supply and return piping for the two existing diesel driven pumps as indicated on the drawings;
- Supply and install heat tracing, insulation, jacketing, and snow covers for exterior fuel pipes as indicated on the drawings;
- Install two new Owner Supplied day tank level switches;
- Supply and install a new electrical control panel and PLC (Owner Supplied) for the fuel transfer system;
- Transfer stored fuel into the new storage tanks, test and commission new systems;
- Supply and locate/install fire extinguishers, spill kits and signage;

- Supply and install piping identification labels to all fuel piping.

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- Provide contract close out documents, including equipment O&M manuals, As-built drawing mark-ups, and warranties.

1.2 LOCATION OF WORK

Refer to Section 005.

2.0 DETAILED SPECIFICATIONS

2.1 CIVIL

2.1.1 General

The work of this section shall include the supply of all labour, material, equipment and supervision for the civil work as shown on the drawings and specified herein.

2.1.2 Scope of Work (Civil)

Major items of work consist of the following:

Pumphouse Site

- N/A (misc.)

2.1.3 Material Specifications

Sieve sizes and permissible particle distributions for item 2.1.3.1 shall be as per MMCD (Master Municipal Construction Documents) Section 02226.

2.1.3.1 20mm minus Crushed Gravel

Consisting of 20 mm minus material of uniform quality, crushed to size and of sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, or

other deleterious substances. Flat and elongated particles are those whose greatest dimension exceeds five times their least dimension.

2.1.3.2 Concrete

All concrete shall be suitable for C1 exposure class (35 MPa and W/C ratio 0.40) with max aggregate size 20 mm and 5-7% entrained air. The use of fly ash or admixtures to reduce shrinkage is recommended.

Concrete shall be in accordance with CAN / CSA-A23.1 - Concrete Materials and Methods of Concrete Construction.

Reinforcing steel shall be in accordance with CSA-G30.18 - Billet Steel Bars for Concrete Reinforcement.

Tie wire shall be 16 gauge, cold-drawn, annealed wire and shall be in accordance with CSA-G30.3.

2.1.3.3 Anchor Bolts

Stainless Steel threaded rods and epoxy adhesive, complete with matching stainless steel bolts and washers as indicated on the drawings. Hilti HVA SS or approved equal. Install to manufacturer's recommendations.

2.1.3.4 Grout

Non-shrink grout to ASTM 1107, Grade C: premixed compound consisting of non-metallic aggregate, Portland type 10 cement, water reducing and plasticizing agents.

a. Compressive strength: 50 – 60 Mpa at 28 days
b. Constituency: Plastic: to ASTM C827 Flow Table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.

2.1.4 Procedures

2.1.4.1 Excavation, Backfill and Compaction

2.1.4.1.1 The Contractor shall repair and make good all buildings, graded surfaces, walkways and grassed areas affected by the work, to the satisfaction of the Owner's Representative.

2.1.4.1.2 Maintain the work in a well-drained condition, provide all necessary pumps, equipment and materials, including temporary drains and ditches if required, to keep excavations free from water during the performance of the work. The Contractor must comply with all prevailing Federal, Provincial and Local regulations when draining water from the work site.

2.1.4.1.3 Foundation pad areas shall be excavated to firm subsoil or rock (as directed by the Engineer).

2.1.4.1.4 Shoring of excavations shall be installed in accordance with the regulations of the Workers' Compensation Act of British Columbia.

2.1.4.1.5 Compact by rolling or mechanically tamping with a suitable compaction unit, for the subgrade material encountered and to achieve the required compaction.

2.1.4.1.6 Compact sub-foundation pads to 95% modified proctor density in maximum 300 mm lifts.

2.1.4.1.7 Remove and dispose of all waste materials at a disposal site approved by the Environmental Consultant.

2.1.4.2 Concrete Work

2.1.4.2.1 The Contractor shall check and verify all dimensions, elevations and site conditions before starting fabrication or construction. Immediately report any discrepancies between drawings and site conditions to the Engineer.

2.1.4.2.2 The Contractor shall notify the Engineer for inspections a minimum of 48 hours prior to all concrete pours.

2.1.4.2.3 All concrete work shall be in accordance with CSA-A23.1-M94.

2.1.4.2.4 Concrete shall be compacted into place using internal vibration for footings and pedestals.

2.1.4.2.5 The Contractor shall commence curing procedure immediately following concrete placing. Acceptable curing procedures are:

- clear plastic covers
- approved liquid curing membrane
- continuous wetting of damp surfaces
- maintenance of form work in place

2.1.4.2.6 The Contractor shall repair honey-combing as directed by the Engineer.

2.1.4.2.7 Form work shall be metal or wood materials constructed to produce grout tight forms.

2.1.4.2.8 Reinforcement detailing and placing shall be in accordance with ACI Detailing Manual SP66 (84) and CSA A23.3-M84.

2.1.4.2.9 Reinforcement splicing shall be as shown on the drawings except that where not shown, splice length to be equivalent to 40 bar diameters.

2.1.4.2.10 Concrete protection – clear cover to reinforcement shall be as shown on the drawing except that where not shown, cover shall be:

- bottom 75mm
- top and sides 50 mm

2.2 MECHANICAL/PIPING

2.2.1 General

The work of this section shall include the supply of all labour, material, equipment and supervision for the mechanical/piping work as shown on the drawings and specified herein.

2.2.2 Scope of Work (Mechanical)

Major mechanical items of work consist of the following:

Pumphouse Site

- Transfer fuel, remove and dispose of the following diesel storage tanks, in accordance with the project specifications:
    - One existing 59,750L outdoor aboveground single walled steel diesel storage tank,
    - One existing 970L indoor aboveground single walled steel (residential type) diesel storage tank (currently supplying fuel to two engine driven pumps), and
- Provide temporary fuel setup for existing diesel driven pumps during construction;
- Provide documentation of tank disposal to the Specification requirements;
- Filter existing transferred fuel, remove any water contamination, and properly dispose of contaminants to the Specification requirements;
- Remove and dispose of existing indoor and outdoor mechanical fuel piping, and accessories as indicated on the drawings;
- Remove and dispose of portions of an existing wood and concrete structure covering the above noted 59,750L tank;
- Receive, transport (from the Lower Mainland to the site), and install two new Owner Supplied aboveground double walled steel diesel storage tanks:
- Installation of new fuel tanks:
    - One new 22,700L outdoor aboveground double walled vacuum monitored steel diesel storage tank, and

- One new 970L indoor aboveground double walled steel diesel storage day tank,

- Supply and install tank appurtenances, drop tubes, piping, fittings, valves, supports, etc. for the new tanks as indicated on the drawings;
- Supply and install new fuel transfer and return piping, and appurtenances between the new fuel tanks as indicated on the drawings;
- Supply and install new fuel supply and return piping for the two existing diesel driven pumps as indicated on the drawings;
- Supply and install heat tracing, insulation, and jacketing for exterior fuel pipes as indicated on the drawings;
- Transfer stored fuel into the new storage tanks, test and commission new systems;
- Supply and locate/install fire extinguishers, spill kits and signage;
- Supply and install piping identification labels to all fuel piping.

2.2.3 Material Specifications

2.2.3.1 Petroleum Piping/Fittings – Steel - 2" ∅ and less

Pipe:	Carbon steel, seamless, ASTM A106 Gr. B, Sch. 40
Fittings:	Malleable iron, 300#, NPT.
Connections:	All threaded unless shown otherwise on drawings

2.2.3.2 Petroleum Tubing/Fittings – Stainless Steel

Tubing:	Type 316 stainless steel, ASTM A-269, seamless, full annealed, max. RB80, - ½" O.D. x 0.049" wall thickness, or - ¾" O.D. x 0.065" wall thickness Swagelok or approved equal.

	Tube Fittings:	316 SS compression type, Swagelok or approved equal

2.2.3.3 Flexible Hoses

Stainless Steel	316SS tube with SS overbraid, ½" Hoses: 13mm (1/2") nominal hose I.D., length to suit (min 12" – confirm with Engineer), Swagelok FM Series (Convoluted 316L SS Core), c/w 316L SS braid reinforcement, and Male or Female NPT end connections.

2.2.3.4 Filters — Racor Fuel Filter/ Water Separator Turbine Series 900FH 3/4"- NPT 30 micron or approved equal. (bush or adapt to mate with piping)

2.2.3.5 Pipe Insulation and Jacketing

Insulation:	25mm (1") thick polyethylene insulation sized for pipe.
Jacketing:	16gauge Aluminum jacket c/w aluminum straps.

2.2.3.6 Petroleum Valves

Ball Valves:	Full port, 316 stainless steel body and trim, NPT connections, Lockable, Grinnell No. GB 3933-T-FP or approved equal
Thermal Relief Valves:	13 ∅ (½") stainless steel check valves, Female NPT ends, Swagelok SS-8CP4-10, with fixed 10 psig nominal cracking pressure or approved equal.
Mechanical	EBW Model 605-300-01, 20∅ (¾") NPT, set

Anti-Siphon Valves: to differential based on tank height above lowest piping to prevent siphoning.

Fusible Link: Firomatic fusible link valves:

- Model B-200-F, 13∅ (½") NPT
- Model B-300-F, 20∅ (¾") NPT

2.2.3.7 Fuel Tanks

Owner Supplied (See drawings.)

2.2.3.8 Tank Accessories

Vapour Vent: Morrison Updraft Vent – Sized to match vent pipe. Morrison Figure # 354 – Aluminum body and cap with 40 mesh brass screen, or approved equal.

Tank Level Gauge: Where indicated on the drawings, provide Mechanical Clock Gauge with Metric Face and 50mm (2") MPT connection. Morrison Bros. Co. FIG. 818MET01 00 AG, calibrated to the tank, or approved equal.

For Day Tank, provide Scully Golden Gauge to match tank depth, measuring in Liters or centimeters.

2.2.3.9 Piping Identification

Brady, high performance, wrap-around, Size 1 pipe labels, marker or approved equal for corresponding pipe diameter, ¾" black letters on yellow background with arrows in one direction. Piping to be identified as Diesel.

2.2.3.10 Miscellaneous Metals

Bolts and Nuts:	ASTM A193, Grade 8M stainless steel hex head machine bolts with heavy hex nuts, alloy to match flanges
Rolled Steel Sections and Plates:	To CAN/CSA-G40.21, Grade 300W. Where specified metric angles or plate thicknesses are not available, equivalent imperial angles or plate thicknesses will be acceptable.
Coating:	Hardware to be hot dip galvanized to CSA G164, 21 oz/3.2 s.f.

2.2.4 Procedures

2.2.4.1 Steel Pipe - Threaded Connections

Threaded joints shall have clean cut threads and be reamed clean. Joints shall be made using an approved pipe compound.

2.2.4.2 Cleaning of Pipe

Each length of pipe must be internally swabbed before being tied into the line. Contractor shall take all precautions to ensure that each pipe length is kept as free of dirt and other foreign materials as is practicable. Open ends of installed pipe shall be securely closed on completion of each day's work and shall not be opened until work is resumed. Any obstructions which may occur in the line shall be removed by the Contractor and the line must be delivered to the Owner entirely free from water, dirt and other foreign substances. If for any reason, water, dirt, or foreign substances enter the line, it shall be taken apart, examined, cleared and replaced at the Contractor's expense.

2.2.4.3 Testing – Pipe

All piping shall be hydrostatically tested at 50 psig. Minimum test time shall be one hour. Maximum pressure loss shall be 2 psi.

Air pressure testing is not permitted.

Testing shall be performed before any coatings are applied. Contractor shall lay out and perform all pressure testing activities, including installation and removal of test blinds and test gaskets to isolate equipment, and shall furnish and install all hoses, tools, gauges, recorders and equipment required to make the tests.

Cleaning of the lines shall be performed before testing. All tests shall be carried out in the presence of the Owner's Representative. Corrections including, but not limited to, tightening or remaking of threaded connections, cleaning of plugged lines and removal of debris, shall be done by the Contractor, at his expense, to the satisfaction of the Owner's Representative.

Hydrotest water is available and the nearest location points will be indicated by the Owner's Representative. The disposal of the water after use shall be done by the Contractor.

The Contractor shall isolate pumps, tanks, filters, dispensers and all other sensitive items rated lower than the test pressure. Records shall be made of each system tested and shall include date of test, identification of piping tested, test medium, test pressure, test temperature, signature of person responsible and the Owner's Representative.

All piping shall be thoroughly flushed with product after the hydrostatic testing is complete to ensure no water remains in

the piping.

2.2.4.4 Pipe Identification

Provide pipe identification labels to clearly identify all piping with contents and direction of flow labels on all visible sections of piping.

Apply pressure sensitive markers in accordance with manufacturer's recommendations with complete wrap around.

Any markings showing dog ears, bubbles or other failings shall be replaced.

Apply pipe legend and arrow indication for each pipe run. Apply pipe legend and arrow indication within 80 mm of each valve to show proper identification of pipe contents and direction of flow.

The legend shall be applied to the pipe so that the lettering is in the most legible orientation. For overhead piping, apply so that the legend may be read from floor or ground level.

2.3 ELECTRICAL

2.3.1 General

The work of this section shall include the supply of all labour, material, equipment (including test equipment) and supervision for the electrical work as shown on the drawings and specified herein.

2.3.2 Scope of Work (Electrical)

Major items of work consist of the following:

General

- Disconnect and remove electrical services connected to equipment to be removed;
- Remove existing alarm and fuel transfer control systems as indicated on the drawings;
- Supply and install electrical controls (incl Owner Supplied PLC control panel), wiring and conduit/cable for the fuel tank systems, and diesel supply tank solenoid valves, dispensing power supply and emergency stop circuits, etc. as indicated on the drawings;
- Test and commission new systems;

Pumphouse Site

- Supply and install heat tracing, including power supply, junction boxes, thermostat, and wiring for exterior fuel pipes as indicated on the drawings;
- Install two new Owner Supplied day tank level switches;
- Supply and install a new electrical control panel and PLC for the fuel transfer system;

2.3.3 Material Specifications

2.3.3.1 Conduit

3/4"ø rigid, galvanized steel conduit unless shown otherwise on drawings

2.3.3.2 Wire and Cable

a. TECK 90, 600 V cable with explosion proof or watertight connectors as required by area classification.
b. Unless otherwise noted or specified, all wiring shall be copper, with RW90 X-link polyethylene insulation.
c. Minimum conductor size for power circuits shall be #12AWG and for control circuits shall be #14AWG.
d. All conductors shall be stranded.

2.3.3.3 Conduit Fittings

a. Boxes and fittings for use with galvanized steel conduit systems shall be Feraloy or equivalent.
b. Outlet boxes shall have threaded hubs for conduit connections.

2.3.3.4 Panel Enclosures

a. Aluminum enclosures housing switches, control relays, push buttons, indicator lights, terminals and wiring, generally as per the drawings. Size to suit
b. Lamicoid Labels as indicated on the drawings.

2.3.3.5 Relays

a. Allen Bradley 120 VAC AB 700-HA32A1, 10A – 2 pole relay with AB 700-HN100 plug-in base or approved equal.

2.3.3.6 Push Buttons, Switches and Panel Lights

a. AllenBradley AB 800T Series (or approved equal).

2.3.3.7 Level Switches

a. Owner Supplied (See drawings)

2.3.3.8 Heat Trace Wire

a. Heat tracing for exterior fuel piping: rated for minimum 5W/m heat input, thermostatically controlled to prevent freezing. Raychem Model 5BTV-1-CT or approved equal.

2.3.3.9 Thermostat for Heat Trace Wire

a. Tyco Model E507S-LS

2.3.3.10 Programmable Logic Controller (PLC)

Refer to Drawings. Owner supplied. Owner to program prior to shipping.

2.3.4 Procedures

2.3.4.1 Installation of new equipment

Best locations for new electrical equipment and routing of conduits/wiring to be determined by Contractor in the field. Proposed locations and routing to be approved by the Engineer prior to installation.

2.3.4.2 Code Compliance

The installation shall comply in all respects with the Canadian Electrical Code CSA 22-1 (latest edition) and in particular sections 20, 18 and 10 and with all other applicable provincial and local building and electrical codes. Where there is a conflict with the drawings, the above code, rules and bylaws shall govern, but in no case shall the standards established on these drawings and specifications be reduced by any of these codes, rules or bylaws.

2.3.4.3 Equipment Installation

The installation of the electrical equipment shall be in accordance with the manufacturer's instructions. Seals are to be installed at both ends of all conduits running to the fuel storage/dispensing areas. The Contractor is responsible for obtaining certified drawings, operating/maintenance manuals and installation instructions prior to proceeding with the work and shall submit certified data to the Engineer.

2.3.4.4 Equipment Identification

All equipment shall be clearly identified with lamicoid labels having minimum 3mm white letters on black background. Dymo tape labels are not acceptable.

2.3.4.5 Permits and Inspections

The Contractor shall obtain all permits and licenses as required and arrange for the final inspection of the works with the local Provincial Electrical inspector. All costs related to the permitting, licensing and inspection(s) shall be borne by the Contractor. Certificate(s) of inspection shall submitted to the Engineer.

2.3.4.6 Testing

The Contractor shall test all wiring point to point for continuity and insulation to ground. The installation shall also be tested for proper operation prior to handover.

2.3.4.7 Finishes

a.) Clean and touch up surfaces of shop painted equipment which is marred or scratched during shipment or installation, to match original paint.

b.) Clean, prime and paint exposed hangers, racks, fastening to prevent rusting.

2.3.4.8 Manufacturers and CSA Labels

Manufacturers' nameplates and CSA labels to be visible and legible after equipment is installed.

2.3.4.9 Manufacturer's Instructions

Follow manufacturer's instructions unless they contradict or reduce the stipulations of these specifications, applicable codes or regulations of an authority having jurisdiction. In such cases of conflict consult the Engineer for a ruling, which shall be binding.

2.3.4.10 Delivery and Storage

All electrical equipment must be stored indoors.

2.3.4.11 Project Record Documents

Keep a set of updated construction drawings on site.

2.3.4.12 Qualifications

Contractor shall have qualified personnel to continuously direct and monitor all electrical work.

2.3.4.13 Protection

Protect exposed live equipment during construction for personnel safety.

2.3.4.14 Deficiency Lists

Lists of work deficiencies will be issued at any time. Rectify work to satisfaction of Engineer immediately.

2.3.4.15 Drawings and Specifications

a.) Specifications and related plans establish scope, material and installation quality but do not necessarily show offsets, fittings or installation difficulty that may be encountered during the execution of the work and therefore cannot be used as a claim for any such deficiency of omission.

b.) Where work that is obviously necessary for the operation of the system is not shown on the drawings or described in the Specifications, such work shall be carried out in a manner acceptable to the Engineer at no additional cost.

c.) It shall be the responsibility of the Contractor to study all drawings and specifications, and understand the work thoroughly, taking into consideration requirements for each trade involved.

d.) In case of ambiguity, due to conditions at the site, information omitted or insufficient, conflict of requirements of different trades affecting the same portion of work, and so on, the Contractor shall notify the Engineer in writing and obtain necessary clarification. Failure to do this prior to tendering will not relieve or provide grounds for additional costs. The Engineer's decision on all matters shall be final and binding upon the Contractor.

e.) Drawings

i. Not intended to show structural details or architectural features unless specifically noted.
ii. Do not scale.
iii. Except where dimensioned, drawings indicate general electrical only. Furthermore, proper precautions shall be exercised to verity figures shown on the drawings.
iv. The drawings are diagrammatic and indicate the general arrangements of the systems and work included in this Contract. Exact locations of fixtures and equipment, where same are not definitely located, must be checked with the Engineer prior to the installation of same.

2.4 MISCELLANEOUS

2.4.1 General

The work of this section shall include the supply of all labour, material, equipment and supervision for the provision of the following miscellaneous items required at the fuel storage and dispensing areas:

2.4.2 Scope of Work / Material Specifications

Major items of work shall consist of supply and installation of the following:

- Spill Kits

  Rocky Mountain Environmental Model SRK Spill Response Kit or approved equal;

  Number Required: 1 (Pumphouse Location)

- Fire Extinguishers – (To be located near Fuel Transfer Pumps)

  Portable extinguishers rated not less than 80-B:C shall be provided at indoor locations as follows:

  Number Required: 1 (Pumphouse Location)

- Signage

Adhesive Signs

Suitable adhesive warning signs shall be installed at the fuel storage and dispensing area as follows:

LETTERING	*LOCATION*	*QUANTITY*
	**Pumphouse** On Diesel Fuel Tanks, and door of pumphouse building. (Minimum 200x200mm, Letters 25mm minimum, adhesive)	3
CAUTION **HANDLE FUEL CAREFULLY** **AVOID SPILLAGE** **ATTENTION** **MANIPULEZ LE COMBUSTIBLE** **SOIGNEUSEMENT** **ÉVITEZ LE RENVERSEMENT**	**All Fuel System Locations** At fill connections to each outdoor fuel tank. (Minimum 200x200mm, Letters 25mm minimum, adhesive)	1
DANGER **FUEL STORAGE** **DANGER** **STOCKAGE DU CARBURANT**	**Pumphouse** On Door of Engine Room (Minimum 200x200mm, Letters 25mm minimum, adhesive)	1

Tank Fill Procedure Signs (1 required)

Tank fill procedures signs (16" x 24" aluminium backed) shall be installed near the fill connection of each outdoor fuel tank, as directed by the Engineer on site (***Note: the wording for these signs will be supplied by the Engineer***). The Contractor shall supply and fasten signs as directed in the field.

Emergency Response Signs (2 required)

Emergency response signs (16" x 24" aluminium backed) shall be installed at each fuel tank location as directed by the Engineer on site. (**Note: the wording for these signs will be supplied by the Engineer**). The Contractor shall supply and fasten signs as directed in the field.

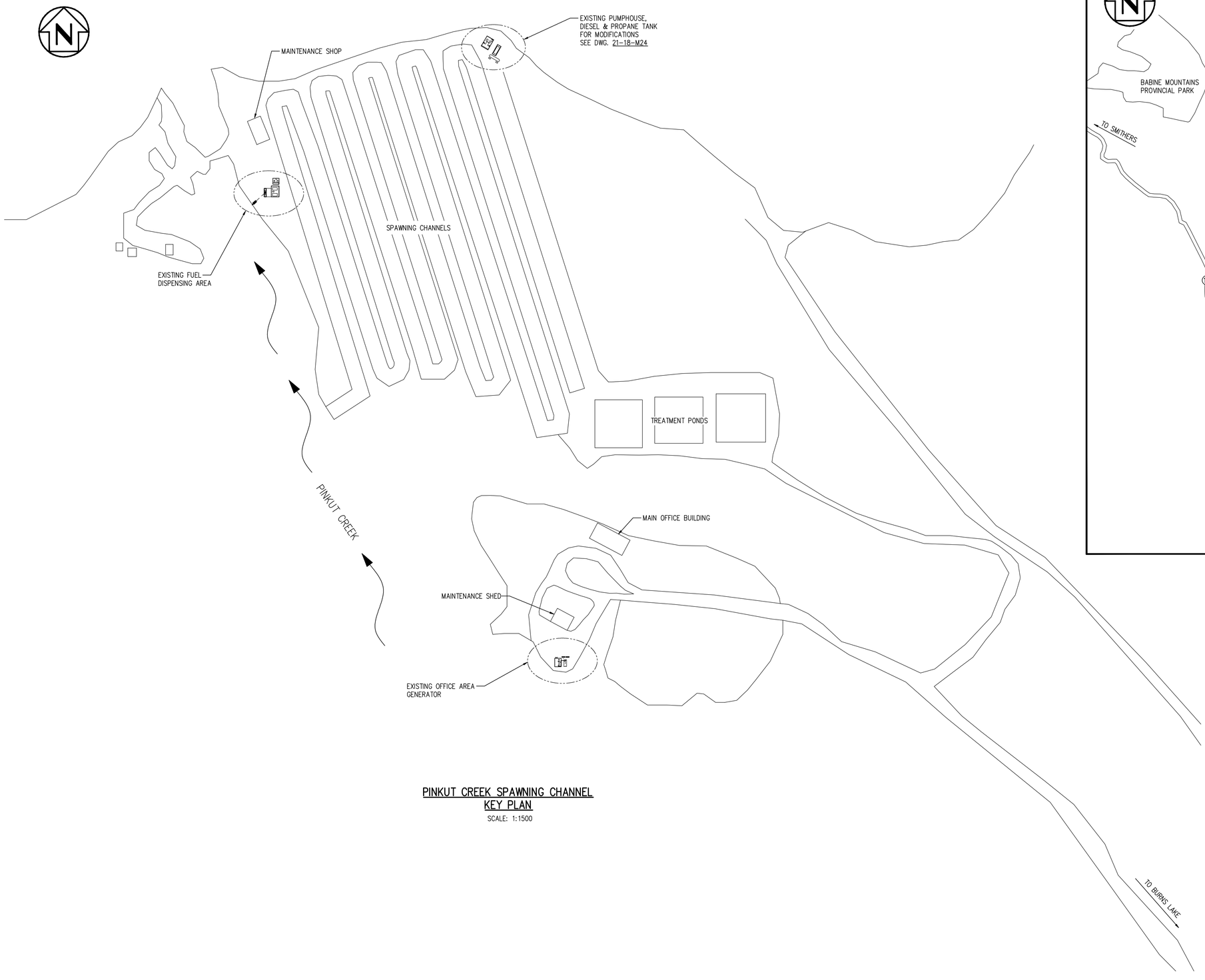
SECTION 007

DRAWING LIST

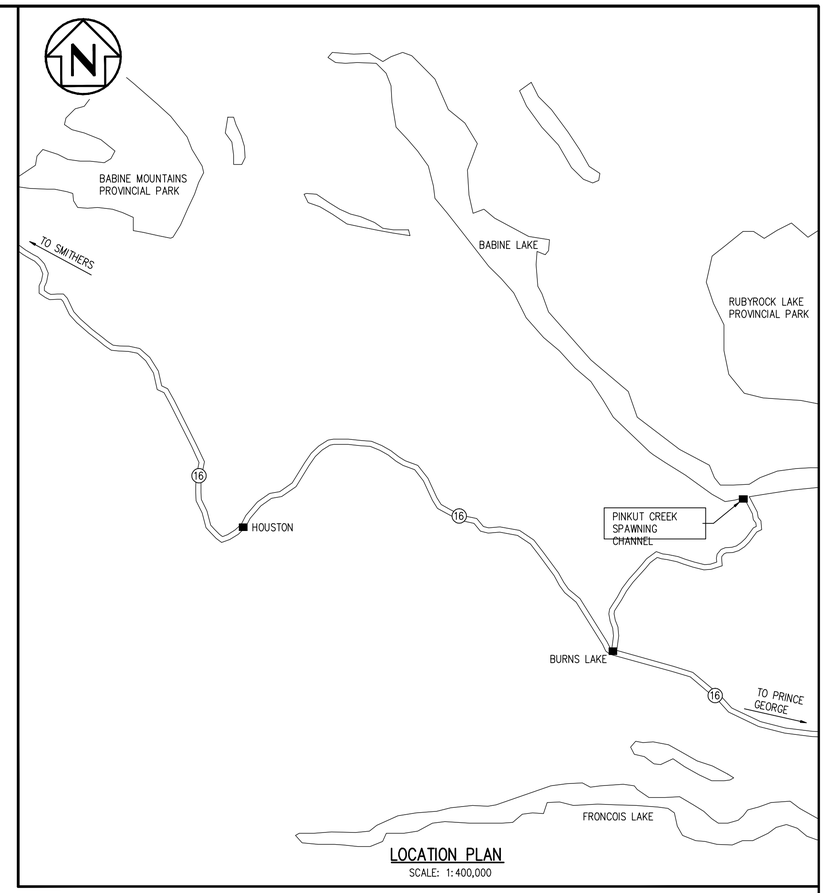
Fisheries and Oceans Canada
Pinkut Creek Spawning Channel – Fuel System Upgrade

SECTION 007: DRAWING LIST

DRAWING NUMBER	REV. #	TITLE
Dwg Set: 21-18-MXX		PINKUT CREEK SPAWNING CHANNEL FUEL SYSTEM UPGRADES
-M23	1	LOCATION PLAN AND KEY PLAN
-M24	1	PUMPHOUSE AREA PLANS & SECTIONS
-M25	1	PUMPHOUSE AREA MECHANICAL DETAILS
-M26	1	PUMPHOUSE AREA ELECTRICAL DETAILS
FOR REFERENCE – OWNER SUPPLIED TANKS		
-M27	0	PUMPHOUSE AREA MAIN TANK DETAILS
-M28	0	PUMPHOUSE AREA DAY TANK DETAILS



PINKUT CREEK SPAWNING CHANNEL
KEY PLAN
SCALE: 1:1500



LOCATION PLAN
SCALE: 1:400,000

NOTE: TANK REMOVAL/DESTRUCTION AND INSTALLATION REQUIRES REGISTRATION WITH ENVIRONMENT CANADA FOR THIS SITE. SEE SPECIFICATIONS.

MORROW PROJECT #41-145

Morrow Engineering Ltd.
CONSULTING ENGINEERS — NORTH VANCOUVER, B.C.

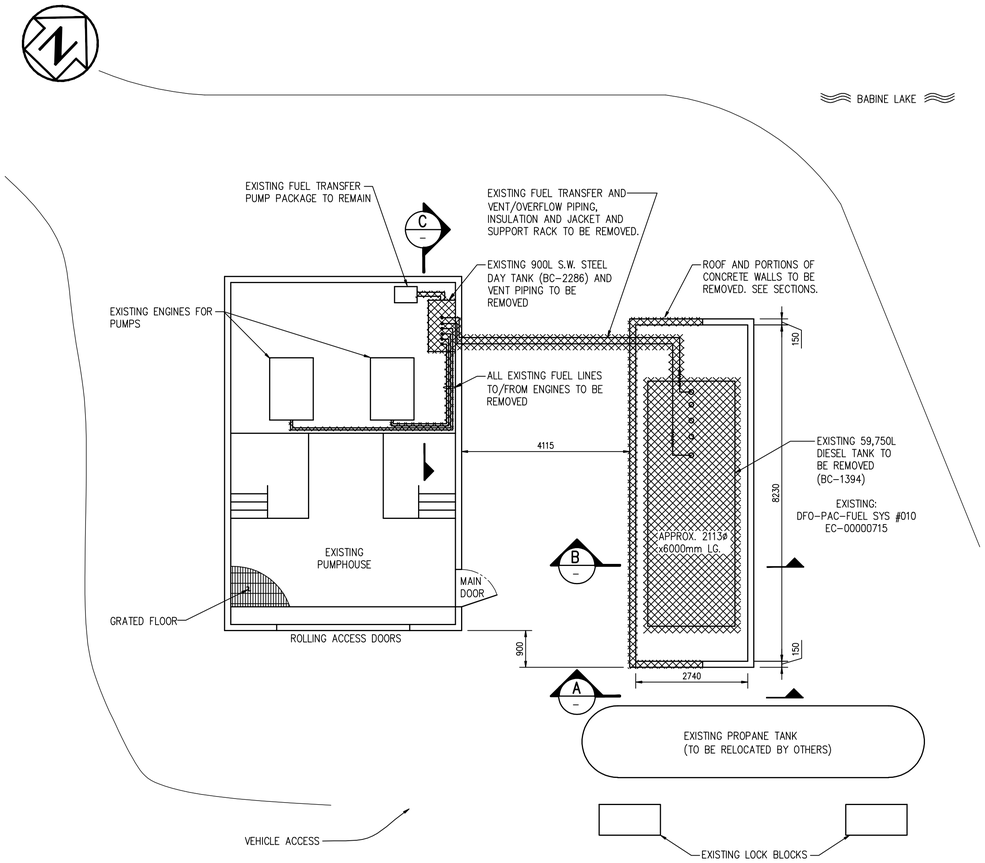
FISHERIES AND OCEANS CANADA
HABITAT AND ENHANCEMENT BRANCH

DWG. NO.	REFERENCE DRAWINGS	NOTES		NO.	DATE	REVISIONS
				1	13-08-07	RE-ISSUED FOR TENDERING
				0	12-11-26	ISSUED FOR TENDERING
				P1	12-10-03	ISSUED FOR CLIENT REVIEW

DESIGNED B.H.
DRAWN C.K.
CHECKED B.H.
RECOMMENDED
APPROVED
APPROVED

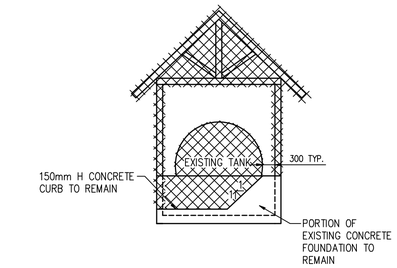
PINKUT CREEK SPAWNING CHANNEL FUEL SYSTEM UPGRADES LOCATION PLAN AND KEY PLAN

SCALE: AS NOTED
DATE: 10.08.04
DRAWING NUMBER: 21-18-M23
REVISION: 1



PUMPHOUSE REMOVAL/DEMO – PLAN

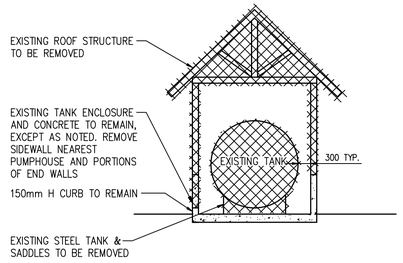
SCALE: 1:75



EXISTING DIESEL TANK REMOVAL/DEMO

SECTION A

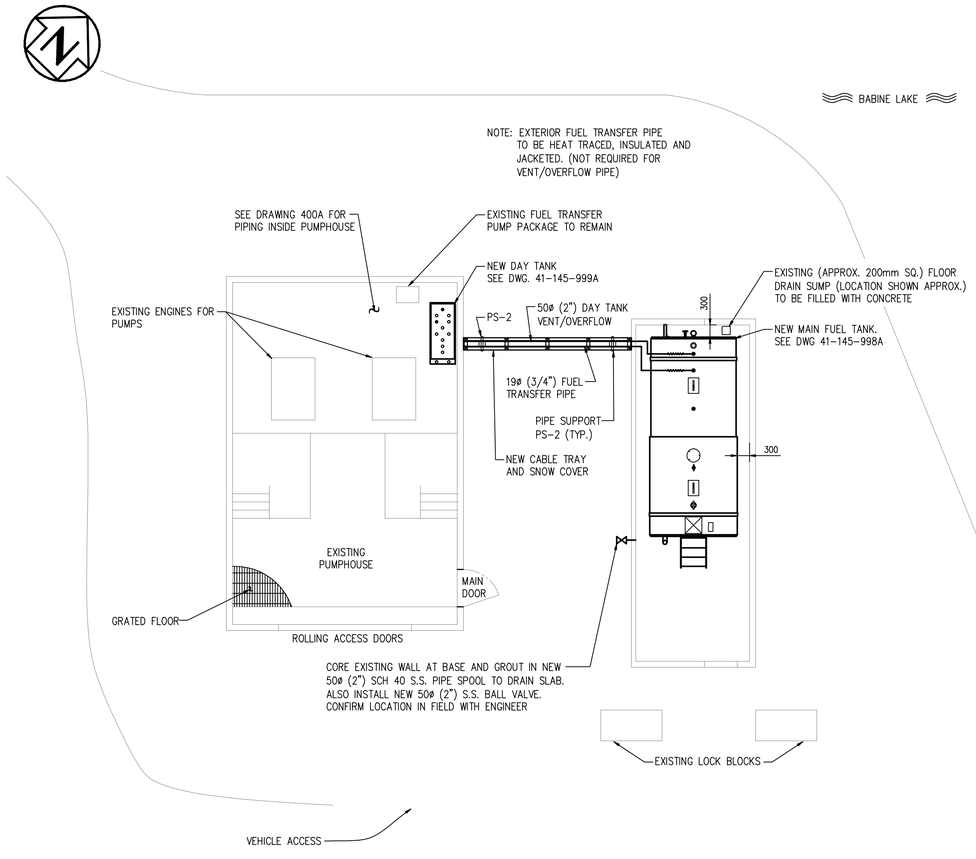
1:75



EXISTING DIESEL TANK REMOVAL/DEMO

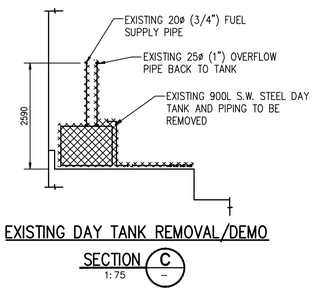
SECTION B

1:75



PUMPHOUSE MODIFIED – PLAN

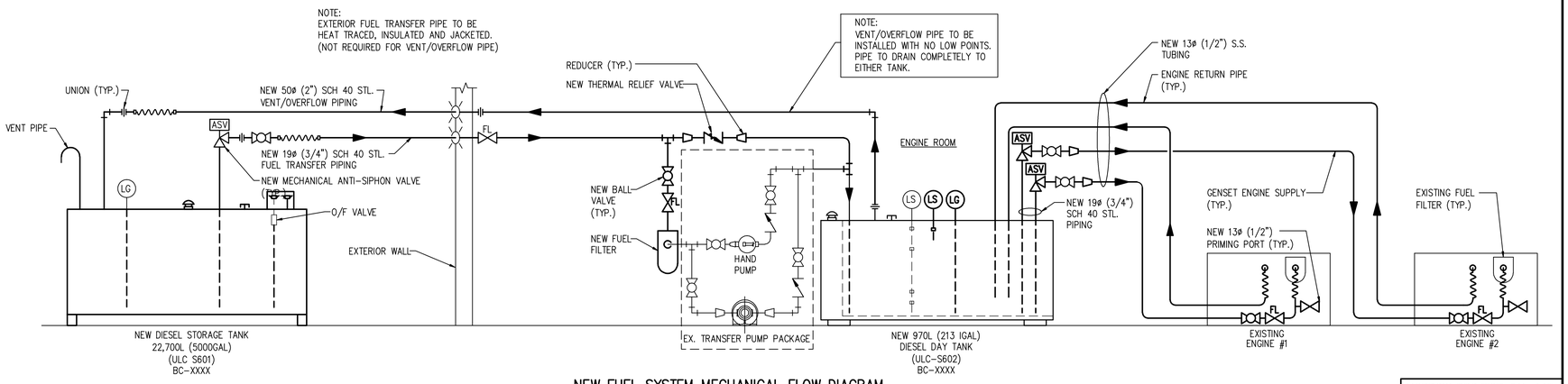
SCALE: 1:75



EXISTING DAY TANK REMOVAL/DEMO

SECTION C

1:75



NEW FUEL SYSTEM MECHANICAL FLOW DIAGRAM

N.T.S.

NEW DFO-PAC-FUEL SYS #XXX
EC-00000XXX

MORROW PROJECT #41-145

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FISHERIES AND OCEANS CANADA

HABITAT AND ENHANCEMENT BRANCH

DWG. NO.	REFERENCE DRAWINGS	NOTES		NO.	DATE	REVISIONS
				1	13-08-07	RE-ISSUED FOR TENDERING
				0	12-11-26	ISSUED FOR TENDERING
				P2	12-10-22	RE-ISSUED FOR CLIENT REVIEW
				P1	12-10-03	ISSUED FOR CLIENT REVIEW

DESIGNED B.H.
DRAWN D.C./C.K.
CHECKED B.H.
RECOMMENDED
APPROVED
APPROVED

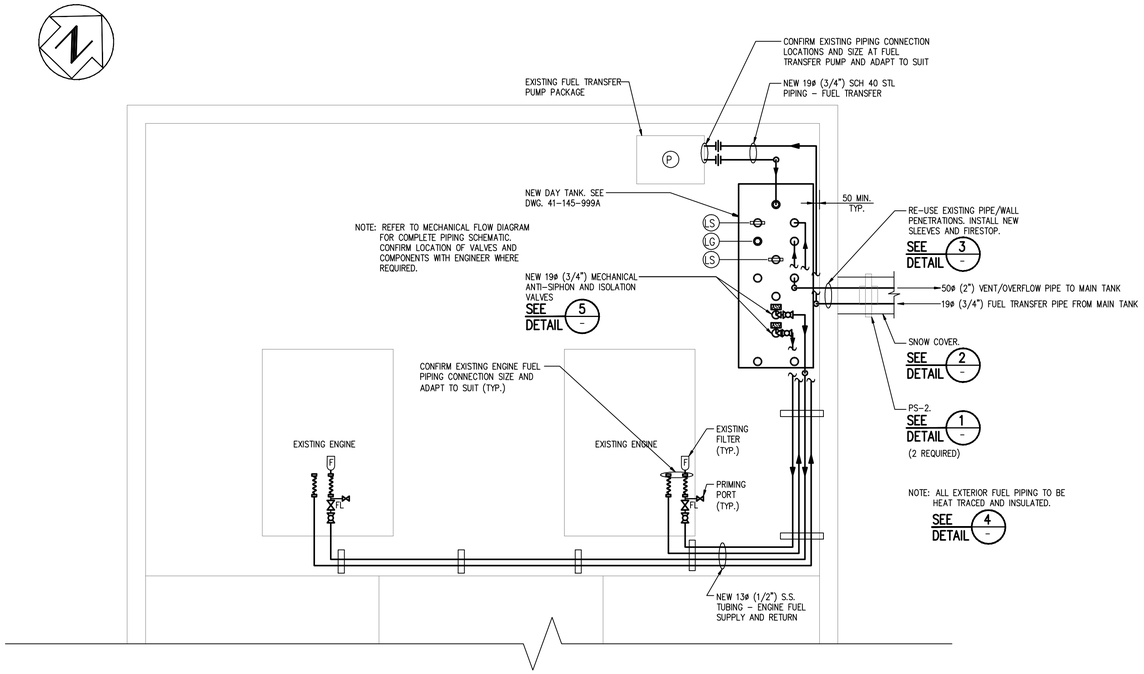
PINKUT CREEK SPAWNING CHANNEL FUEL SYSTEM UPGRADES PUMPHOUSE AREA PLANS & SECTIONS

SCALE: AS NOTED

DATE: 10.08.04

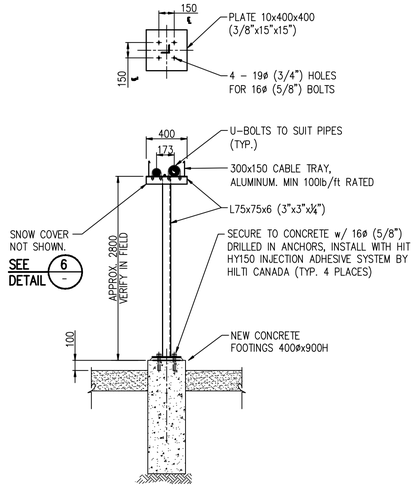
DRAWING NUMBER: 21-18-M24

REVISION: 1



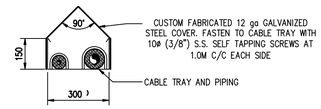
ENGINE ROOM PLAN

SCALE 1:25



PIPE SUPPORT - DETAIL 1
PS-2

SCALE 1:30



SNOW COVER - DETAIL 2

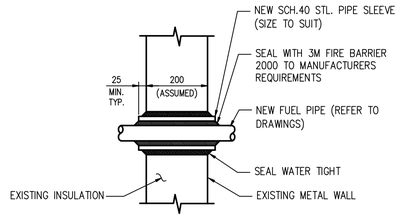
SCALE 1:15

PIPE/TUBING SUPPORT MAXIMUM SPACING (mm)		
NOMINAL PIPE SIZE (mm)	STL OR S.S. TUBING	STL OR S.S. SCH.40 OR SCH.80 PIPE
10ø (3/8")	1200	1800
13ø (1/2")	1200	1800
20ø (3/4")	1500	2100
25ø (1")	1800	2100
32 (1 1/4")	2100	2400
38ø (1 1/2")	2400	2700
50ø (2")	2400	3000

NOTE:
WHERE DIFFERENT SIZES OF PIPE/TUBING ARE RUN ALONG THE SAME ALIGNMENT, SUPPORT SPACING USED SHALL BE THAT FOR THE SMALLEST DIAMETER LINE.

LEGEND	
———	NEW
———	EXISTING

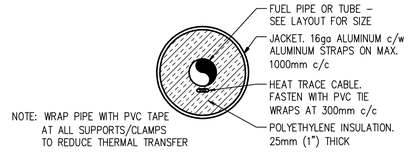
PIPING SYMBOLS	
	BALL VALVE
FL	FUSIBLE LINK VALVE
SN	SOLENOID VALVE
	FLEXIBLE CONNECTION
SLL	TANK LOW LOW LEVEL (ALARM)



TYPICAL PIPE SLEEVE

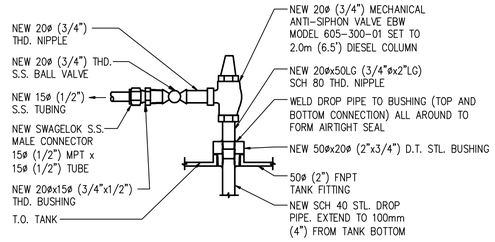
DETAIL 3

1:10



HEAT TRACE AND INSULATION - DETAIL 4

N.T.S.



GENERATOR FUEL SUPPLY TANK CONNECTION - DETAIL 5

N.T.S.

MECHANICAL NOTES:

1. ALL DIMENSIONS TO BE FIELD CHECKED PRIOR TO PIPING FABRICATION AND INSTALLATION
2. DIMENSIONS TO BE FIELD DETERMINED. MOUNT TUBING TO WALL WITH UNISTRUT AND P-CLAMPS.

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DWG. NO.	REFERENCE DRAWINGS	NOTES		NO.	DATE	REVISIONS
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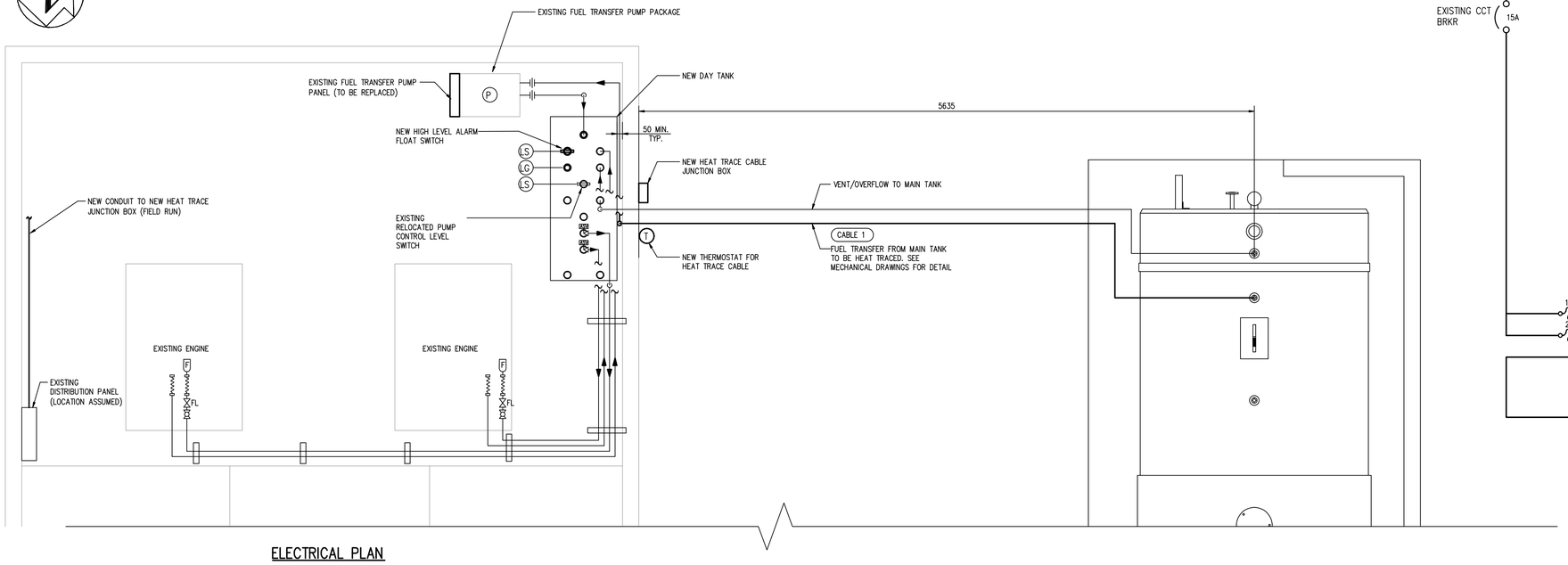
				0	12-11-26	ISSUED FOR TENDERING
				P2	12-10-22	RE-ISSUED FOR CLIENT REVIEW
				P1	12-10-03	ISSUED FOR CLIENT REVIEW

DESIGNED B.H.
DRAWN D.C.
CHECKED B.H.
RECOMMENDED
APPROVED
APPROVED

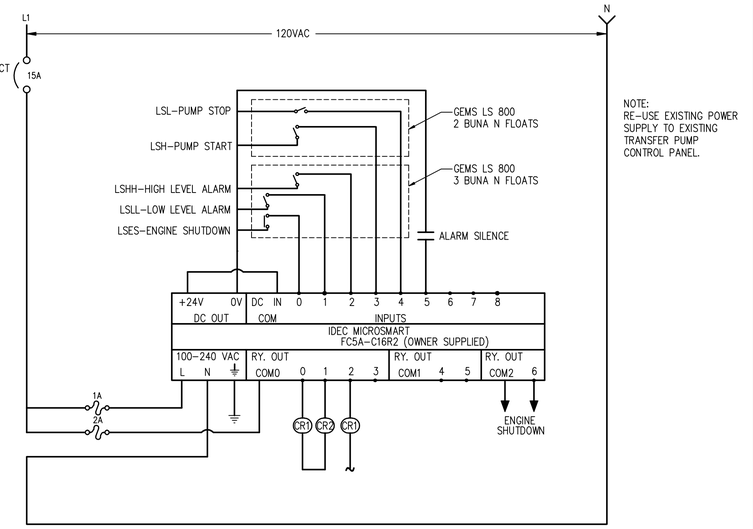
PINKUT CREEK SPAWNING CHANNEL
FUEL SYSTEM UPGRADES
PUMPHOUSE AREA
MECHANICAL DETAILS

SCALE AS NOTED
DATE 10.08.04
DRAWING NUMBER 21-18-M25
REVISION 1



ELECTRICAL PLAN

SCALE 1:25



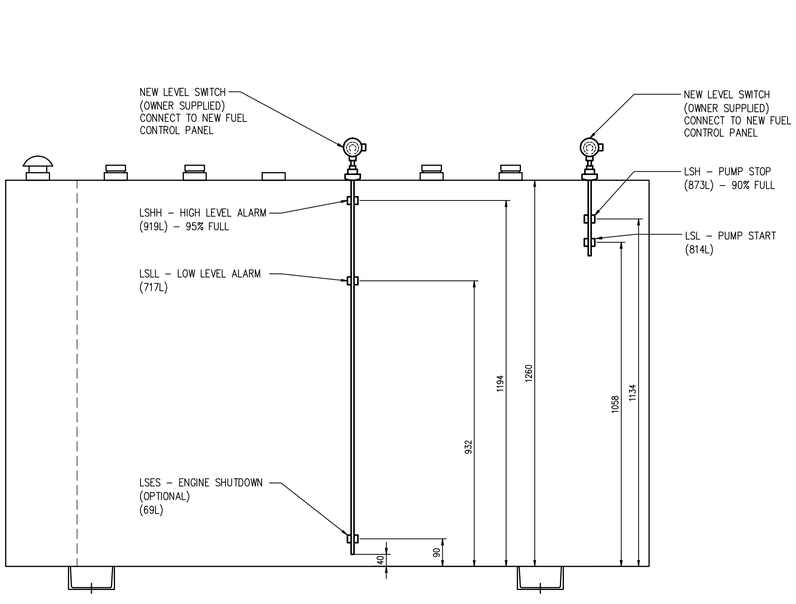
NOTE:
RE–USE EXISTING POWER SUPPLY TO EXISTING TRANSFER PUMP CONTROL PANEL.

DAY TANK FUEL PUMP CONTROL AND PLC DIAGRAM

N.T.S.

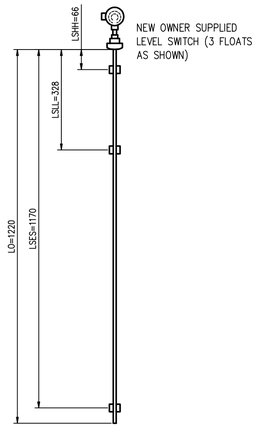
RELAYS
CR1 = PUMP MOTOR CONTACTOR
CR2 = ALARM (HORN)
CR3 = ALARM (STROBE)

NOTES
LSHH TO ALSO STOP PUMP
LSLL TO ALSO START PUMP



DAY TANK FUEL CONTROLS AND ALARM LEVELS

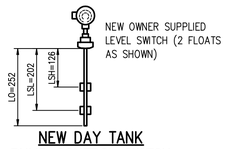
SCALE: 1:10



NEW OWNER SUPPLIED LEVEL SWITCH (3 FLOATS AS SHOWN)

NEW DAY TANK HIGH/LOW/ENGINE SHUTDOWN LEVEL ALARM SWITCH

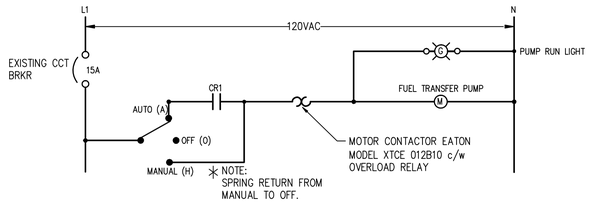
SCALE: 1:10



NEW OWNER SUPPLIED LEVEL SWITCH (2 FLOATS AS SHOWN)

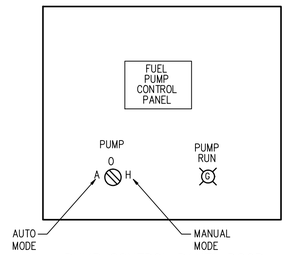
NEW DAY TANK PUMP CONTROL SWITCH

SCALE: 1:10



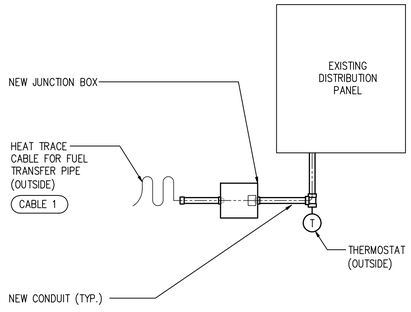
PUMP CIRCUIT

SCALE N.T.S.



PUMP CONTROL PANEL DOOR SCHEDULE

N.T.S.



HEAT TRACE CABLE SCHEMATIC

N.T.S.

NOTES:

1. ALL MATERIAL AND EQUIPMENT MUST BE CSA CERTIFIED.
2. INSTALLATION TO COMPLY FULLY WITH CANADIAN ELECTRICAL CODE C22.1 LATEST EDITION IN PARTICULAR SECTION 20, 18, 10, 12.
3. EQUIPMENT INSTALLATION AND WIRING TO COMPLY WITH MANUFACTURERS CERTIFIED INSTALLATION AND ERECTION INSTRUCTIONS.
4. MANUFACTURER'S PART No'S LISTED FOR CONVENIENCE. APPROVED EQUALS ARE ACCEPTABLE.

MORROW PROJECT #41–145

Morrow Engineering Ltd.
CONSULTING ENGINEERS — NORTH VANCOUVER, B.C.

FISHERIES AND OCEANS CANADA
HABITAT AND ENHANCEMENT BRANCH

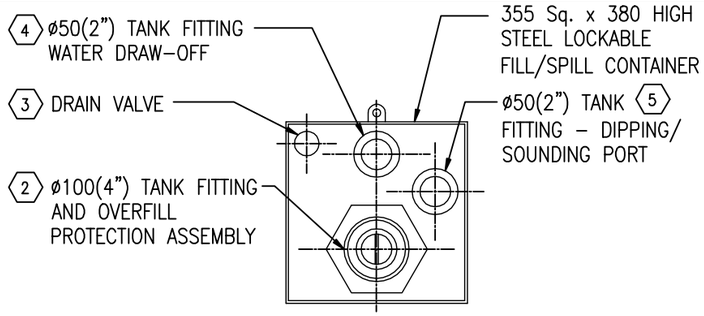
DWG. NO.	REFERENCE DRAWINGS	NOTES

NO.	DATE	REVISIONS
1	13–08–07	RE–ISSUED FOR TENDERING
0	12–11–26	ISSUED FOR TENDERING
P2	12–10–22	RE–ISSUED FOR CLIENT REVIEW
P1	12–10–03	ISSUED FOR CLIENT REVIEW

DESIGNED B.H.
DRAWN C.K./D.C.
CHECKED B.H.
RECOMMENDED
APPROVED
APPROVED

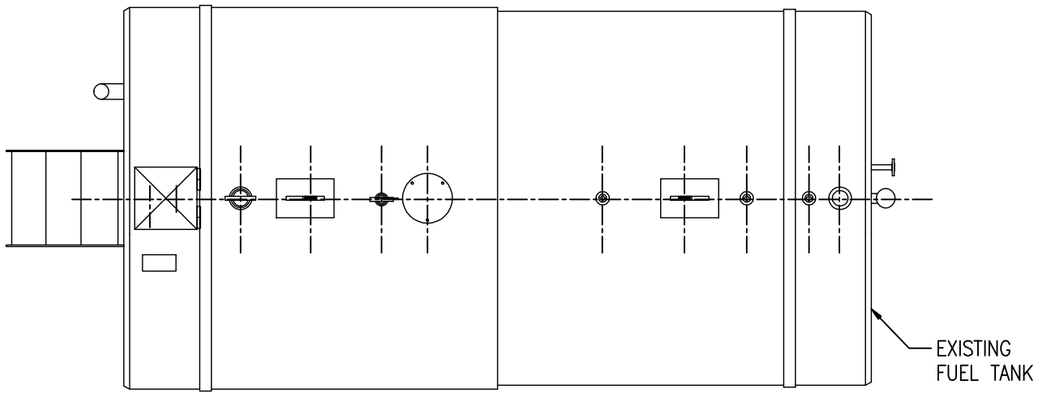
PINKUT CREEK SPAWNING CHANNEL FUEL SYSTEM UPGRADES PUMPHOUSE AREA ELECTRICAL DETAILS

SCALE AS NOTED
DATE 10.08.04
DRAWING NUMBER 21–18–M26
REVISION 1

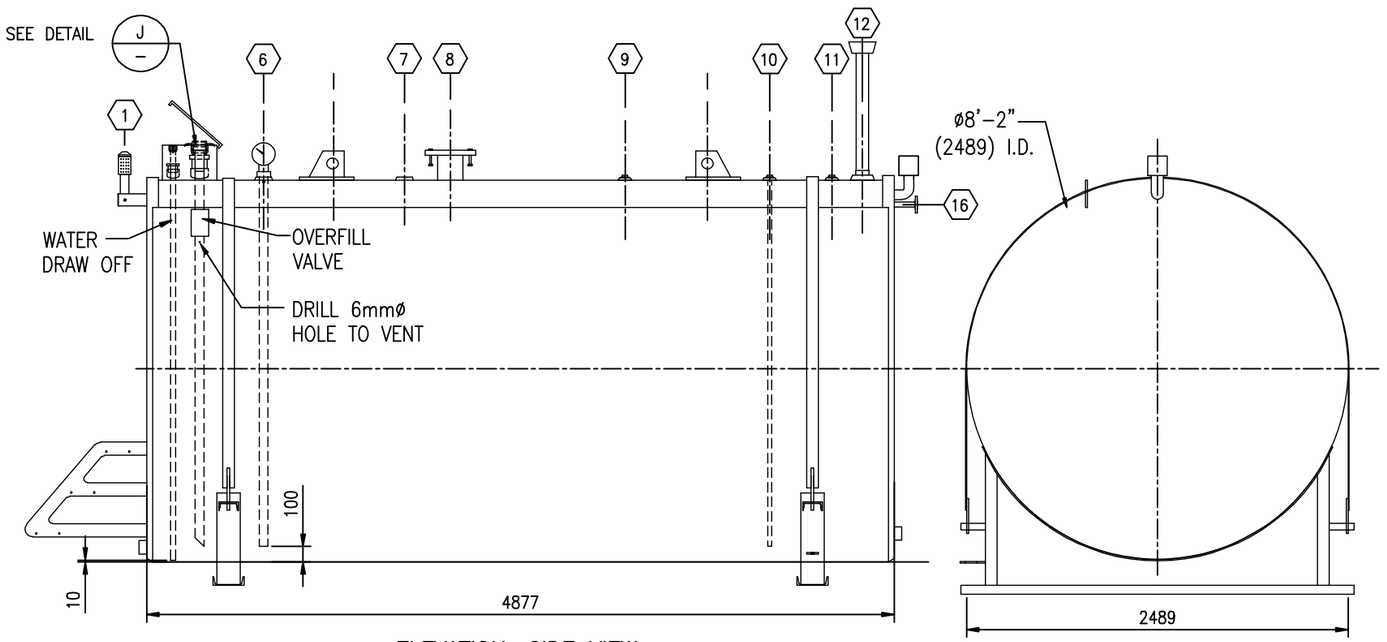


TYP. FILL/SPILL BOX DETAIL

DETAIL J – 1:30



TOP VIEW



ELEVATION: SIDE VIEW

ELEVATION: FRONT VIEW

22,500L (5000GAL.) – MAIN TANK

DOUBLE WALL STEEL, ULC-S601 STORAGE TANK

SCALE: 1:40

NEW DIESEL STORAGE TANK FITTING SCHEDULE

22,730L (5000 IGAL)
2489ø x 4877LG (75"øx16'LG)
ULC-S601 (DOUBLE-WALL VACUUM MONITORED)

1. INTERSTITIAL VACUUM GAUGE
2. 100ø (4") FNPT FITTING c/w 100øX50ø (4"X2") D.T. BUSHING, 50ø (2") DROP PIPE, CLOSE NIPPLE, 50ø (2") TIGHT FILL CONNECTION AND DUST CAP (KAMLOK OR EQUAL), MORRISON OVERFILL VALVE C/W 3mm(1/8") HOLE DRILLED IN TOP TO VENT INTO TANK – FILL
3. DRAIN VALVE – SPRING LOADED PLUNGER TYPE
4. 50ø (2") FNPT FITTING – C/W 50øx25ø(2"X1") D.T. BUSHING, 25ø(1") NIPPLE, MALE KAMLOK CONNECTION AND DUST CAP, AND 25ø(1") SCH. 40 STL DROP TUBE TO 10mm FROM TANK BOTTOM – WATER DRAW OFF
5. 50ø (2") FNPT FITTING C/W 50øx40ø(2"X1 1/2") S.T. BUSHING, 40ø(1 1/2") THD NIPPLE, 40ø(1 1/2") TIGHT FILL CONNECTION AND DUST CAP (KAMLOK OR EQUAL) – TANK DIPPING
6. 50ø (2") FNPT FITTING – c/w MORRISON CLOCK GAUGE MODEL 818MET0100AG AND STL DROP PIPE WITH 6mmø (1/4") HOLE DRILLED IN TOP TO VENT INTO TANK
7. 50ø (2") FNPT FITTING – SPARE
8. EMERGENCY VENT
9. 50ø (2") FNPT FITTING C/W THD PLUG – SPARE
10. 50ø (2") FNPT FITTING c/w 50øx19ø (2"x3/4") D.T. BUSHING AND 19ø (3/4") SCH. 40 STL. DROP TUBE – FUEL TRANSFER
11. 50ø (2") FNPT FITTING – DAY TANK VENT/OVERFLOW
12. 75ø (3") FNPT FITTING – VENT PIPE AND OPEN VAPOUR VENT WITH RAIN HOOD

NOTE:
1. TANK TO BE DESIGNED FOR SEISMIC RESTRAINT BY MANUFACTURER.

DWG. No.	REFERENCE DRAWINGS	REV	DATE	REVISION DESCRIPTION	DWN	APP'D
		0	12.11.26	ISSUED FOR TENDERING	D.C.	B.H.
		P2	12.10.22	RE-ISSUED FOR CLIENT REVIEW	D.C.	B.H.
		P1	12.10.03	ISSUED FOR CLIENT REVIEW	D.C.	B.H.

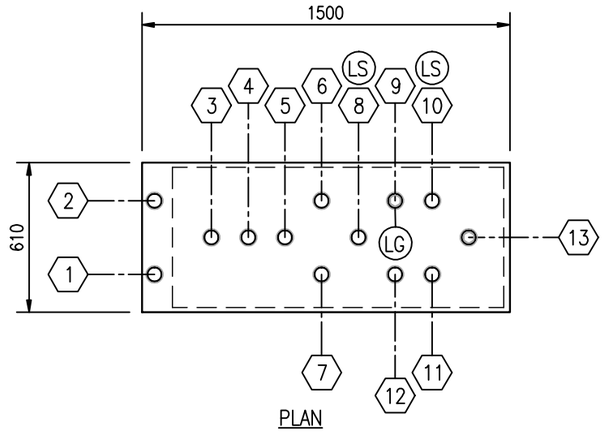
CAD FILE NAME: J:\DRAWINGS\2011\41-145 LAST UPDATE: –

Morrow Engineering Ltd.
CONSULTING ENGINEERS NORTH VANCOUVER, B.C.

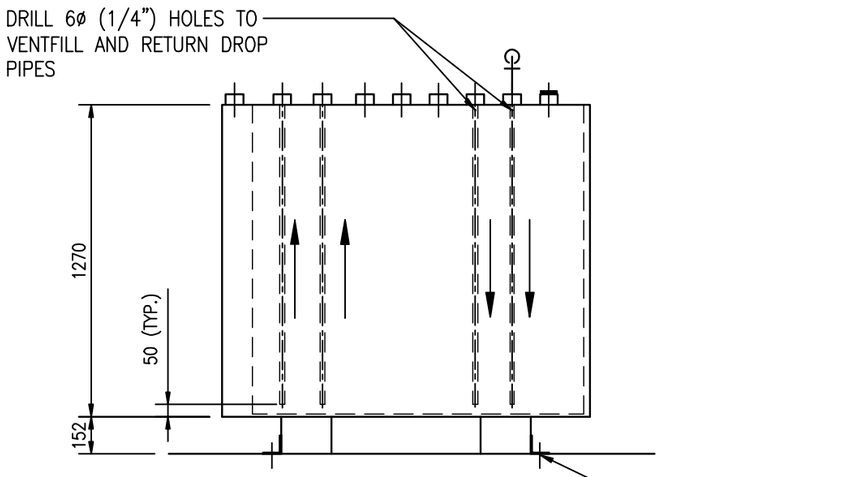
SCALE: AS SHOWN
DATE: 30/08/12
APPROVED BY: ENGINEER B.H. CLIENT
DRAWN BY: D.C.
CHECKED BY: B.H.

PINKUT CREEK SPAWNING CHANNEL
FUEL SYSTEM UPGRADES
PUMPHOUSE AREA MAIN TANK DETAILS

DRAWING NUMBER 21-18-M27 REV 0



PLAN



ELEVATION

GENERATOR DIESEL DAY TANK

DIESEL ENGINE DAY TANK FITTING SCHEDULE

970L (213 IGAL) NOMINAL
PRIMARY TANK: 1350LG.x572Wx1260H (53"LG.x22.5"Wx49.6"H)
CONTAINMENT TANK: 1500LG.x610Wx1270H (59"LG.x24"Wx50"H)
ULC-S602 (110% CONTAINMENT)

1. 50ø (2") NPT FITTING c/w 50ø (2") VENT PIPE AND RAIN PROOF HEAD – CONTAINMENT VENT
2. 50ø (2") CONTAINMENT DIP PORT
3. 4. 50ø (2") NPT FITTING c/w 50ø x 20ø (2"x3/4") DOUBLE TAPPED BUSHING, 20ø (3/4") SCH 40 STL. DROP PIPE – ENGINE SUCTION x2
5. 50ø (2") NPT FITTING c/w THD PLUG – SPARE
6. 50ø (2") NPT FITTING c/w THD PLUG – SPARE
7. 50ø (2") NPT FITTING – VENT/OVERFLOW
8. 50ø (2") NPT FITTING – TRANSFER PUMP START/STOP LEVEL SWITCH
9. 50ø (2") NPT FITTING – LEVEL GAUGE
10. 50ø (2") NPT FITTING – HIGH LEVEL ALARM
11. 12. 50ø (2") NPT FITTING c/w 50ø x 13ø (2"x1/2") DOUBLE TAPPED BUSHING AND 13ø (1/2") SCH 40 STL. DROP TUBE – ENGINE RETURN x2
13. 50ø (2") NPT FITTING c/w 50 x 20 (2"x3/4") DOUBLE TAPPED BUSHING AND 20ø (3/4") DROP TUBE – FUEL TRANSFER LINE (FILL)

NOTE: TANK TO BE DESIGNED FOR SEISMIC RESTRAINT BY MANUFACTURER.

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		P2	12.10.22	RE-ISSUED FOR CLIENT REVIEW	D.C.	B.H.
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CAD FILE NAME: J:\DRAWINGS\2011\41-145 LAST UPDATE: 30/08/12

Morrow Engineering Ltd.
CONSULTING ENGINEERS NORTH VANCOUVER, B.C.

SCALE: AS SHOWN
DATE: 30/08/12
APPROVED BY: ENGINEER B.H. CLIENT
DRAWN BY: D.C.
CHECKED BY: B.H.

PINKUT CREEK SPAWNING CHANNEL
FUEL SYSTEM UPGRADES
PUMPHOUSE AREA DAY TANK DETAILS

DRAWING NUMBER 21-18-M28
REV 0

APPENDIX A

SITE PHOTOS

Fisheries and Oceans Canada
Pinkut Creek Spawning Channel – Fuel System Upgrade

PHOTO 1: PUMPHOUSE BUILDING AND DIESEL FUEL STORAGE TANK

PHOTO 2: PUMPHOUSE DIESEL FUEL STORAGE TANK
Existing propane storage tank in front of diesel shed has now been removed

PHOTO 3 & 4: PUMPHOUSE DIESEL FUEL STORAGE TANK
Tank labelling and ULC Label

PHOTO 5: PUMPHOUSE DIESEL FUEL STORAGE TANK
Tank support saddles

PHOTO 6: PUMPHOUSE DIESEL FUEL STORAGE TANK
Tank drain valve

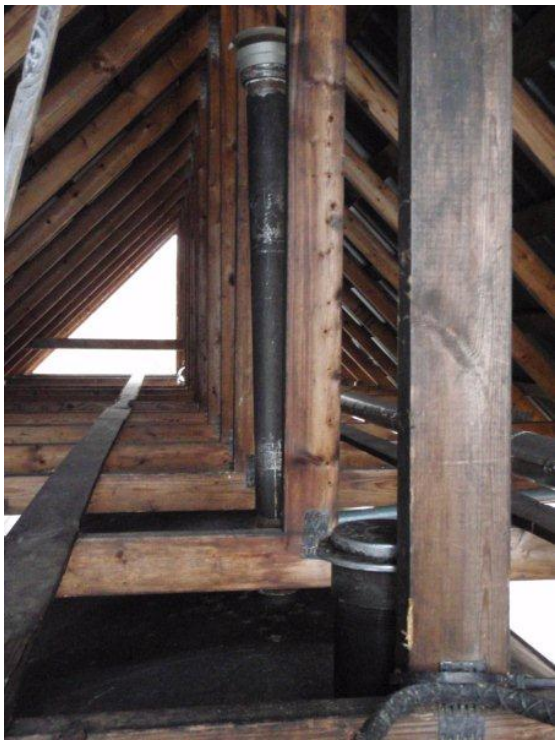


PHOTO 7: PUMPHOUSE DIESEL FUEL STORAGE TANK
Tank top fittings


PHOTO 8 & 9: PUMPHOUSE BUILDING AND DIESEL FUEL STORAGE TANK
Fuel transfer and Overflow/Vent piping

PHOTO 10: PUMPHOUSE BUILDING AND DIESEL AUXILIARY (DAY) TANK
Fuel transfer and Overflow/Vent piping

PHOTO 11: PUMPHOUSE BUILDING AND DIESEL AUXILIARY (DAY) TANK
Fuel transfer pump and controls

PHOTOS 12: PUMPHOUSE BUILDING AND DIESEL AUXILIARY (DAY) TANK
Engine fuel supply and return piping

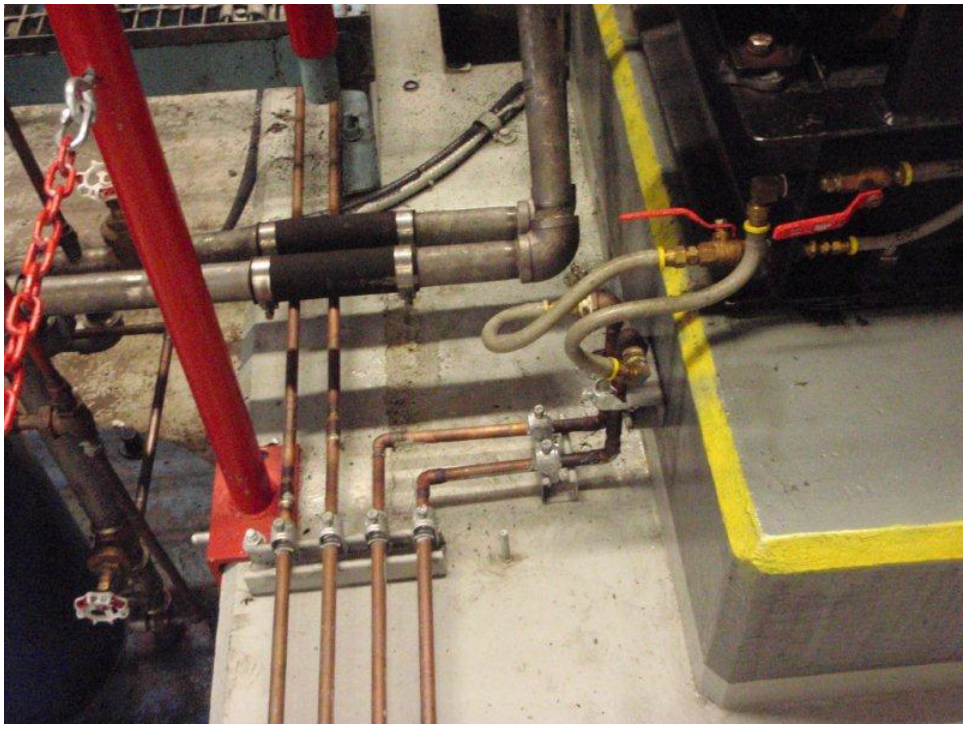
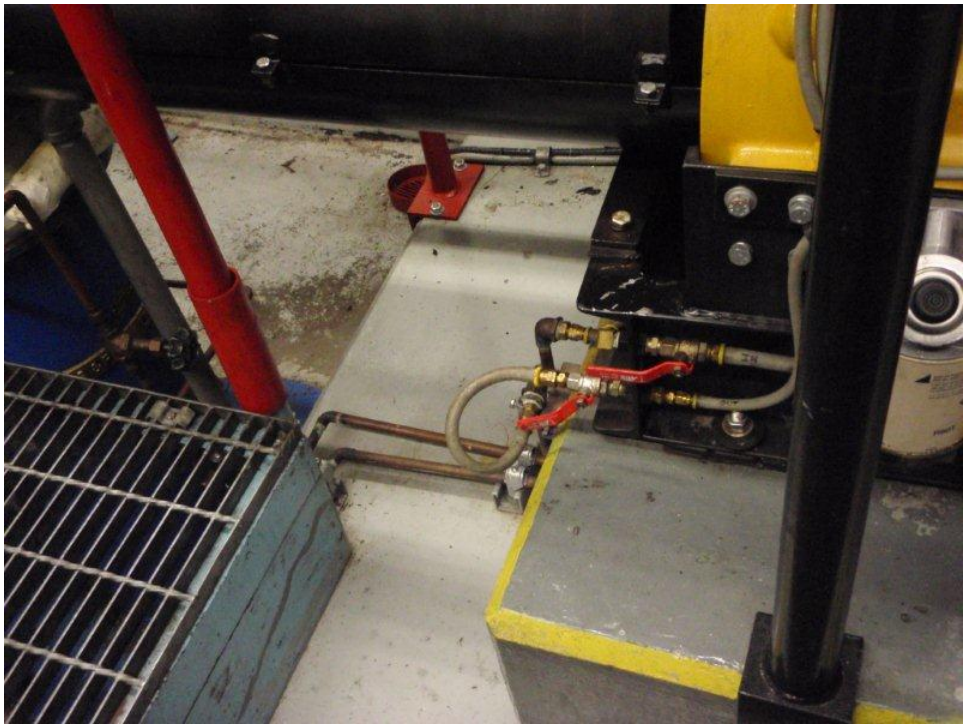


PHOTO 13: PUMPHOUSE BUILDING
Engine fuel supply and return piping, and engine fuel hose connections



PHOTOS 14: PUMPHOUSE BUILDING
Engine fuel supply and return piping, and engine fuel hose connections