

**ICEFIELDS PARKWAY
DAVID THOMPSON HIGHWAY**

**GENERATOR SKID PACKAGE
SPECIFIC DESIGN PERFORMANCE REQUIREMENTS**

TABLE OF CONTENTS

PART 1	INTRODUCTION	3
PART 2	DESIGN CONDITIONS	4
PART 3	SITE CONDITIONS	5
PART 4	EQUIPMENT, MATERIALS & LABOUR SUPPLIED BY VENDOR	5
PART 5	REFERENCE AND CODES AND SPECIFICATIONS	11
PART 6	VENDOR DATA REQUIREMENTS	11
PART 7	PROJECT SCHEDULE AND COORDINATION	12
PART 8	AS-BUILT DRAWINGS, O&M MANUALS & DATA BOOKS	12
PART 9	EQUIPMENT GUARANTEE	12
PART 10	QUALITY ASSURANCE	12
PART 11	CONFLICTING REQUIREMENTS	13
PART 12	SITE DRAWINGS	13

PART 1 INTRODUCTION

1.1 GENERAL

- .1 The David Thompson Gate has been previously located on Highway 11 and a new Greenfield site has been established as the new location for the David Thompson Gate. The site is without access to utility power and shall require a generator skid package complete with a 20kW propane fired generator to act as the primary electrical power for the site throughout the spring, summer and autumn seasons. In addition to the generator, the package shall include a series of solar arrays for 900W of secondary power to charge a battery UPS system for power to high efficiency roadway beacons. Battery storage shall be sufficient to allow for minimal draw down of the batteries by the roadway beacons.
- .2 This document contains the scope of work for the contractor to provide a standalone skid mounted modular building (the skid package) complete with all required apparatus to house the one (qty 1) prime 20kW generator, a 900W roof mounted solar array and one (qty 1) industrial grade universal power supply (UPS), hereforth referred to as the "Generator Package".
- .3 The Contractor shall carry all costs to engage an experienced (10 years minimum experience) Generator Package Vendor to supply, deliver, install and commission one (qty 1) generator skid package in accordance with this Generator Package Specification and the global Specifications for which this document is included within its appendix.
- .4 These units shall be suitable for the design conditions as specified herein, with high reliability and availability of service and spare parts.
- .5 The package shall be skid mounted with modular buildings.
- .6 The Generator Package shall include the following equipment and accommodate sufficient room for:
 - .1 One (1) 120/208 VAC/3ph 20 kW, Prime Propane Driven Power Generator. Engine combustion air intakes located outside.
 - .2 One (1) Skid Mounted Modular Building.
 - .3 Unit heaters, fans, air intake louvers and motorized dampers for building/enclosure heating and ventilation.
 - .4 Louver Snow hoods
 - .5 DC motor starter with batteries and automatic chargers for each package.
 - .6 One (1) Supervisory Control Panel.
 - .7 All filters, gas regulators, gas detection, vents, accessories, interconnecting piping, fittings, valves, safety devices, controls, alarms, instrumentation, electrical, structural steel, building heating / ventilation system, coating/painting shall be included in the package.
 - .8 Coolant heaters.
 - .9 To prevent contamination to the environment, full containment ring to retain coolant, oil lubricants, and all other fluids within the Generator Package.
 - .10 Emergency shutoff push button (colour: red, conspicuously labelled, "Emergency Shutdown"), one at each exit from the Generator Package.
 - .11 Manual transfer switch wired to generator and exterior mounted receptacle to allow for connection to mobile generator

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- .12 42 circuit 120/208VAC 100A c/w main surface mount distribution panel fed from generator
 - .13 12 circuit 120VAC surface mount distribution panel fed from secondary outputs of multimode off grid inverter.
 - .14 Propane heater for heating interior
 - .15 Exterior junction box with terminals for 120/208V field wiring connectivity
 - .16 Building grounding system and ground bar.
 - .17 Roof mounted 900W solar array in accordance with solar specifications section.
 - .18 1000W industrial grade multimode inverter c/w capability for generator backup and a 120V inverter in accordance with section 26 54 00 Solar Electric Power Generation System. Generator Package Vendor shall carry Solar Vendor for sub system installation and commissioning. Allow for sufficient interior space for solar power distribution system.
 - .19 A battery bank sufficient to provide 8 hours of run time at 1000W rated for conditions at -10 degrees Celcius.
 - .7 The Generator Package Vendor shall provide the following services:
 - .1 Equipment transportation to the David Thompson Gate site;
 - .2 Equipment installation at David Thompson Gate site;
 - .3 Truck loading/unloading facility
 - .4 Connection to the propane fuel system.
 - .5 Interconnecting piping and valves from the propane fuel system to the skid fuel system (regulator).
 - .6 Interconnecting power and control wiring.
 - .7 Specification of the foundation design and requirements for the Generator Package based on available soil conditions and geotechnical report.
 - .8 Assist the Electrical Contractor with connection to field wiring and site grounding system. Coordinate efforts during design of Generator Package.
 - .8 The General Contractor shall be responsible for:
 - .1 Construction of the equipment foundation as required to install the Generator Package as directed by the Generator Package Vendor.

PART 2 DESIGN CONDITIONS

2.1 GENERAL

- .1 Obtain and reference the complete “NiBlock and David Thompson Gate Rehabilitation” book specifications, drawing package and addenda for complete project requirements.
- .2 As a Sub-Contractor, the Generator Package Vendor shall support the efforts of the General, Mechanical and Electrical Contractors and other stakeholders in order to deliver the successful installation of the fully functioning Generator Package.

PART 3 SITE CONDITIONS

3.1 GENERAL

- .1 The General Contractor shall ensure that a complete set of Project drawings in PDF format shall be made available to the Generator Package Vendor.
- .2 The site information is detailed in the geotechnical report and site drawings.
- .3 Ensure all intake louvers/vents will not be blocked by snow drifts, minimum 1.5 m from grade to bottom louvers and dampers.

PART 4 EQUIPMENT, MATERIALS AND LABOUR SUPPLIED BY VENDOR

4.1 GENERAL

- .1 In general, all equipment, materials and labour required to complete the work in accordance with the documents shall be provided by the Vendor. This includes, but is not limited to what is described in the following paragraphs.
- .2 Vendor shall furnish all engineering, labour, supervision, payroll burdens, subsistence, consumable supplies, construction utilities, tools, and all other items necessary to properly carry out the work as outlined in the documents.
- .3 Vendor shall supply enclosures for the purpose of storing materials requiring protection from weather damage and/or theft as required.
- .4 All supplied electric or electronic equipment shall be approved by an accredited agency and bear its label. It shall be the Vendor's responsibility to have CSA or equivalent accredited inspection carried out on all non-approved equipment, and pay for all associated fees to do this inspection. Vendor shall provide copy of the accredited agency report.
- .5 Minimum of 750mm of wall space shall be left available for future owner supplied controls/communication/instrumentation/weather systems.
- .6 Vendor, at its expense, shall provide all services necessary to complete the work including but not limited to the following:
 - .1 Preparation of all shop drawings and documentation required for the production of the Generator Package. Submit to Engineering Consultant for review prior to procurement and commencement of construction
 - .2 Supply & installation of all materials, equipment and instrumentation;
 - .3 Receiving, offloading and setting of equipment at Vendor's shop;
 - .4 Supply and fabrication of skids and all structural steel;
 - .5 Supply of complete Generator Package buildings/enclosures;
 - .6 Shop assembly and alignment checks of all components with final witnessing performed by Engineering Consultant prior to delivery to site;
 - .7 Supply and installation of piping,
 - .8 Supply and installation of manual and automatic control valves
 - .9 Supply and installation of tubing and tube fittings;
 - .10 Supply and installation of instrumentation and electrical materials;

- .11 Non-destructive inspection of piping welds, as required;
- .12 Surface preparation, priming and finish painting;
- .13 Four (4) hour full load witnessed run test at vendor's shop;
- .14 Hydrostatic testing of piping strictly to ASME B31.3 (as required);
- .15 Preparation of skid for shipment;

4.2 PROPANE FUEL SYSTEM

- .1 There will be (a) propane tank(s) supplied and installed through a contract with others (the Fuel Supplier). The Generator Package Vendor and General Contractor are required to carry all costs for coordinating the connection and commissioning of the fuel-generator systems with the Fuel Supplier.
- .2 The design shall meet all latest Code requirements,
- .3 The Vendor is to specify the criteria for sizing the piping, valves, regulators, vents and all other fuel system apparatus.
- .4 The Vendor shall provide drawings, schedules, data sheets, bill of materials, QA/QC plan and test reports for the Engineering Consultants review and approval.

4.3 PIPING AND VALVES

- .1 The Vendor shall be responsible for the design, fabrication, installation, radiography and testing of all piping, valving, etc.
- .2 The Vendor shall be responsible for purchasing and installing all piping, valves and fittings required for complete, operable systems.
- .3 Piping must be arranged to allow adequate operation and maintenance avoiding tripping hazard. Whenever possible, piping shall be laid down parallel to the skid edges.
- .4 Vendor shall provide ANSI 150# and 300# RFWN fittings
- .5 All piping/tubing entering and leaving the skid shall be supported at the skid edge and shall be terminated with a flanged or a tube fitting connection.
- .6 All piping and fittings shall conform to the appropriate piping specification for the service onto which they will be installed;
- .7 Threaded connections must be avoided.
- .8 The Vendor shall provide high point vent valves and low point drain valves on package piping as required.
- .9 All flanged openings shall be capped with full face covers and rubber gaskets, and securely attached with a minimum of four bolts.
- .10 The Vendor shall supply, install and adjust pipe supports, support rods, clamps, U-bolts, etc.
- .11 The Vendor shall include adequate pipe support systems for vibrating service, as applicable.
- .12 Materials shall be unloaded and stored in such a manner as to prevent damage or deterioration.
- .13 Letters of material compliance shall be obtained by Vendor for all piping components.

- .14 All non-destructive testing shall be performed by the Vendor prior to hydrotesting.
- .15 When applicable, all pressure piping shall be hydrotested per ASME B31.3 and ABSA. A pressure and temperature recorder shall be used on all hydrotests. The pressure and temperature recorder must be checked and certified by a competent instrument company one week prior to its use.
- .16 All piping shall be drained and blown dry following hydrostatic test.
- .17 When applicable, hydrostatic testing shall be performed with biodegradable or methanol-water based winter fluid regardless of location and time of the year.
- .18 Vendor shall provide sufficient space on the skid platform around the radiators, fans and motors for service accessibility.

4.4 DRIP PANS

- .1 Drip pans shall be supplied and installed where there is a possibility of drips from piping and equipment.
- .2 Drip pans shall be made of light plate and sloped towards one end with a supplied 1-1/2" NPS ball type drain valve.
- .3 A containment rim shall be provided around the skid edge. The height of the rim shall be adequate to contain the volume of the total volume of all fluids present in the Generator Package.

4.5 INSTRUMENTATION

- .1 The Vendor shall supply and install all instruments, instruments on equipment, instrument supports, drains, tubing, fittings, steel raceways, air supply branch lines and any other items that will make each instrument loop safe and operable.
- .2 The Vendor shall supply a UPS, sufficient battery storage and 120V inverter sized to provide constant power the generator PLC, security system, and traffic beacons .
- .3 The Vendor shall supply one (1) copy of the PLC and HMI program on flash drive
- .4 The Control Panel shall provide (but not limited to) the following signals :
 - .1 remote shutdown;
 - .2 remote run status;
 - .3 remote trouble status;
 - .4 general alarm
 - .5 over-temp alarm
 - .6 low oil pressure alarm
 - .7 building / enclosure temperatures;
 - .8 between a 120/208 Volt, 3 phase, 3 wire, 60 Hz bus.
- .5 The Generator Package Vendor shall assist with on site Generator Package Commissioning which shall include integrating signals to remote monitoring via wireless security system.

4.6 ELECTRICAL

- .1 The Vendor shall be responsible for wiring the instruments to the local control panels.
- .2 Each separate piece of equipment shall be provided with a grounding point bonded to the equipment metal framework, ready for purchaser connection. All electrical components and enclosures shall be grounded.
- .3 Cable trays entry points shall be from the top with enough height to allow personnel to walk safely under the trays.
- .4 The generator shall be equipped with a charging system for the starter batteries to automatically ensure optimum energy levels at all times.
- .5 All electrical and instrumentation shall be CSA approved.
- .6 The GENERATOR PACKAGE building will be **unclassified**.
- .7 The electrical distribution criteria are as follows:
 - .1 Power requirements: 120/208VAC 3 phase 60 hertz:
 - .2 The Generator Package Vendor shall include service outlets (110V single phase and 208V/3ph) and 120V building lighting.
 - .3 The Vendor shall supply individual junction boxes mounted on the outside of the building as follows:
 - .1 120/208VAC junction box for 4 wire connection to the Gate House and site lighting
 - .2 120 VAC junction box for 2 wire connection from the UPS/inverter to the traffic signals.
 - .3 CAT6 junction box for security systems connectivity from the Generator Package and the Gate House.
 - .4 Insulation Class H.
 - .5 RTD's two per phase – 3 per phase shown on data sheet, so one RTD per phase is spare.
 - .6 Wye connected, neutral point to be brought out to a junction box
 - .7 Metering – a digital link (Ethernet) to the vendor generator controller is expected to provide all required metering information.

4.7 STRUCTURAL STEEL

- .1 The Generator Package Vendor shall supply all necessary design, materials, labour and equipment for the complete fabrication of structural steel including major structural members, pipe supports, temporary shipping bracing, lifting lugs, checker plate, plain floor plate, in-skid drain sumps, etc.
- .2 Checker plate shall be locally removable at locations of welding skid to the foundation.
- .3 All equipment shall be installed on steel skid suitable to be transported in Alberta. The Generator Package shall be supplied on its own skid. The skid shall be designed and constructed to withstand harmful deflections during lifting, transporting and in-situ operation. The skid shall also be designed and constructed to transmit equipment generated forces (static and dynamic) and couples to the foundation.
- .4 The Generator Package Vendor supplied lifting lugs shall be suitable to lift the skid mounted assembly including all equipment and piping.

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- .5 The Generator Package Vendor shall supply structural steel drawings showing skid weight, package weight, weights for individual package components and skid design pile locations.
 - .6 Pile/pad design loads shall be based on dynamic analysis and signed by a professional engineer to practice in the Province of Alberta.
 - .7 Equipment shall be mounted on skid load-bearing structural members and secured by bolting, or welding.
 - .8 The Generator Package shall include a containment rim with tie-in flange for truck connection.
 - .9 The Vendor shall supply all design, materials, labour and equipment for complete installation of any miscellaneous pipe supports that are required for pipe stability. This also applies to any other miscellaneous steel required for any other purpose to provide a complete, operable package. Supports and braces shall not be attached to unsupported floor plates.
 - .10 Vendor shall provide temporary foundations in his shop of adequate size to properly support and prevent settlement of the skids during assembly.
 - .11 The structural steel base of each skid shall be set level within a tolerance of plus/minus 1.5 mm prior to assembly.
 - .12 Skid flooring shall be 6 mm oil-field type checker plate where applicable. All floor plates shall be continuously welded to provide a liquid tight floor.
 - .13 No splices will be allowed of the structural steel members without customer approval and an approved splicing procedure.
 - .14 All welding shall conform to CSA W59-M, welders and welding operators shall be certified to the Canadian Welding Bureau, in accordance with W47.1-M (Division 1 or 2.1).
 - .15 Welding electrodes shall be E480XX, conforming to CSA W48.1-M.
 - .16 Structural steel drawings shall be stamped and signed by a Professional Engineer registered to practice in the Province of Alberta.

4.8 PAINTING

- .1 The Vendor shall prepare and paint all equipment, structural steel, and piping as per Parks Canada specification. Obtain approval from Parks Canada for colour selection prior to commencement of work.

4.9 BUILDINGS / ENCLOSURES

- .1 The Vendor shall supply a skid mounted package c/w a modular building.
- .2 The modular buildings shall be provided with the following:
 - .1 Steel single door, (18 ga doors, 16 ga. frames) minimum R-value of 7, with locking panic hardware and hydraulic door closures. The quantity of doors shall depend on the size, configuration of the building, standards and local construction codes. Door location and size shall allow for convenient removal of generator. Number of doors and locations shall meet Code requirements.

- .2 In addition to typical allowance for loading, the roof structural design shall allow for the solar array loading. Consult solar array Vendor for weights and fastenting requirements.
- .3 Other accessories to be included are: eave troughs, downspouts, ice rakes, and door canopies.
- .4 All openings in building walls and roofs are to be flashed.
- .5 The Fabricator shall supply a building drawing showing HVAC equipment locations and specifications. The building drawing shall be stamped by a Professional Engineer registered to practice in the Province of Alberta.
- .6 The buildings / enclosures are to be unclassified.
- .7 Fire detection: 2 fixed temperature heat detectors wired to terminal box for tie in to security system.
- .8 Walls to have a minimum R Value of 28.
- .9 Roof to have a minimum R Value of 39.
- .10 Floor to have a minimum R Value of 15 (spray foam to underside of skid).
- .11 Operable louvers to be equal to TAMCO Series 9000BF.

4.10 SHIPMENT PREPARATION AND SHIPPING

- .1 Generator Package Vendor shall pre-assemble the Generator Package to the maximum extent possible so as to minimize field assembly.
- .2 The Generator Package Vendor shall remove all sensitive instruments or internals and protect for shipping purposes.
- .3 Any instruments or other components shipped loose shall be suitably crated for shipment and shall be clearly tagged as to their intended location. All items shipped loose must accompany the skid.
- .4 No components shall be shipped loose unless components have been previously installed on skid to ensure correct fit-up and subsequently removed.
- .5 The Generator Package Vendor shall supply and install packing, closures and protective covers for the protection of installed materials and equipment during transportation. This shall include as a minimum the following items:
 - .1 Wooden covers with rust prevention for open flanges and buttweld valves;
 - .2 Plastic caps on open pipe and tracer ends; and,
 - .3 Plugs or caps for threaded ends of pipe.
- .6 The Generator Package Vendor shall brace securely all items subject to movement/damage during module transportation to the jobsite:
- .7 A final check shall be made and documented prior to shipment to ensure all structural and flange bolts are tight.
- .8 Generator Package Vendor shall load the module onto a truck for shipment and shall ensure it is adequately supported. Preparation for shipment is the responsibility of the Generator Package Vendor c/w itemized list for all ship loose items contained within.
- .9 The Generator Package Vendor is to notify the Engineering Consultant of the shipping time and date with at least 3 labour days prior to shipment.

- .10 Generator Package Vendor is responsible for shipping, delivery, off loading, installation and commissioning of the Generator Package.

4.11 GENERATOR PACKAGE CONTROL SYSTEM PROGRAMMING

- .1 The Generator Package control panel shall be programmed by the Generator Package Vendor. The program shall meet the requirements of CSA B149.3.
- .2 Once the systems are commissioned and have passed testing, the Generator Package Vendor shall allow for one (1) day (eight hours per day) for on site for training of Parks Canada Staff.

PART 5 REFERENCE AND CODES AND SPECIFICATIONS

5.1 GENERAL

- .1 The Vendor shall adhere to all Provincial and Federal Codes and regulations as applicable. These codes include, but are not limited to, the following:
- .1 American Society of Mechanical Engineers (ASME);
 - .2 American National Standards Institute (ANSI);
 - .3 American Welding Society (AWS);
 - .4 Welding Research Council Bulletin 107;
 - .5 National Electrical Manufacturer's Association (NEMA);
 - .6 American Society for Testing and Materials (ASTM);
 - .7 National Association of Corrosion Engineers (NACE);
 - .8 Institute of Electrical and Electronics Engineers (IEEE);
 - .9 Canadian Electrical Code;
 - .10 Instrument Society of America (ISA);
 - .11 Canadian Standards Association (CSA);
 - .12 Alberta Safety Codes Act;
 - .13 National Building Code of Canada (NBC), including supplements,
 - .14 Alberta Building Code (ABC);
 - .15 Alberta Occupational Health and Safety (OH&S);
 - .16 Alberta Energy Resources Conservation Board (ERCB) Directives;
 - .17 Canadian Council of Ministers of the Environment (CCME);
- .2 The Generator Package Vendor shall comply with all applicable Project Specifications listed in the "Table of Contents" (this document being a part of) as well to those standards/codes referred therein.
- .3 In case of requiring any additional specification referred but not included in the bid package (specifications and drawings), the Generator Package Vendor shall duly request for it.

PART 6 VENDOR DATA REQUIREMENTS

6.1 GENERAL

- .1 Design documentation as outlined within this section is required for review by the Consulting Engineer.

- .2 The following items (Issued for Construction revision) need to be P. Eng. (Alberta) stamped by the Generator Package Vendor representative:
 - .1 Skid and Structural Steel Drawings.
 - .2 Building Drawings
 - .3 Foundation Design for the Skid and Building

PART 7 PROJECT SCHEDULE AND COORDINATION

7.1 GENERAL

- .1 The Generator Package Vendor shall provide a detailed fabrication schedule for approval within five (5) business days of award of contract. This schedule shall be continuously monitored and updated as required.

PART 8 AS-BUILT DRAWINGS, O&M MANUALS & DATA BOOKS

8.1 GENERAL

- .1 At the completion of the work, the Generator Package Vendor shall provide a complete set of "As-Built" drawings, operating manuals, and data books as per the attached Vendor Data Requirements form.
- .2 The Generator Package Vendor must provide one (1) preliminary copy, to ship with the Generator Package, of all operating manuals and data books.

PART 9 EQUIPMENT GUARANTEE

9.1 GENERAL

- .1 The Generator Package Vendor shall guarantee that all equipment will perform according to the design conditions identified in this document and the attached datasheets.
- .2 Should the equipment fail to meet the above stated guarantee, the Generator Package Vendor shall take immediate action as deemed necessary, which may include modifying or replacing one or more pieces of equipment, in order to satisfy the above stated guarantee, at no cost to the Owner.

PART 10 QUALITY ASSURANCE

10.1 GENERAL

- .1 The Parks Canada appointed inspector may audit any of the following areas at his discretion.
 - .1 Suitable methods of marking and segregating materials;
 - .2 Welder certification and testing procedures;
 - .3 Surface preparation and coatings;
 - .4 NDE procedures and proposed Sub-contractors;
 - .5 Hydrostatic testing procedures,
 - .6 Generator Package Vendor's QC manual and procedures.
 - .7 Thermal Insulation and vapour barrier, and

.8 Electrical Installations

- .2 The inspectors shall have full access to all relevant documents and activities during the Generator Package Vendor's working hours. The Generator Package Vendor is to provide three (3) days notice prior to testing, to allow client sufficient time to schedule witness testing activities. Inspector to provide shipping release upon satisfactory completion of all deficiencies prior to shipping.

PART 11 CONFLICTING REQUIREMENTS

11.1 GENERAL

- .1 Any unresolved conflict shall be referred to WSP Canada for clarification prior to fabrication.

PART 12 SITE DRAWINGS

12.1 GENERAL

- .1 The Vendor shall obtain and refer to the David Thompson Gate Site drawings and shall adequately familiarize themselves to the site requirements and conditions.

END OF SECTION