SPECIFICATION FOR
DEVELOPER PROVIDED STANDBY ELECTRIC POWER SYSTEMS
FOR THE CITY OF LAKELAND WASTEWATER DIVISION

City of Lakeland
Water Utilities Department
Engineering Division
August 26, 2009
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SECTION 1.0 - DESCRIPTION OF WORK

I.I SCOPE

The Scope of Work herein described is for a land developer to furnish and install a complete standby power system, including all equipment material and appurtenances, tested and accepted by the City.

These terms shall convey the following meanings.

Vender, contractor, and developer shall represent the group of parties collectively providing the equipment and appurtenances, installing the materials into a complete standby power system and turning that system over to the City of Lakeland. No distinction is intended to limit responsibilities between the individual members of this group.

Citv and Owner shall mean the City of Lakeland Water Utilities Department.

Owner's land shall mean land over which the City owns in fee simple, land over which the City holds an exclusive easement or over which the development plans indicate a developer commitment to convey land in fee simple or an exclusive easement.

1.2 SPECIFICATION

The technical specifications were prepared by the City of Lakeland Water Utilities Engineering Division.

1.3 COORDINATION BY CONTRACTOR

The contractor shall be responsible to coordinate with the radio telemetry vendor the contact information for the generator in order that the telemetry system will have compatible monitoring points.

1.4 FINALACCEPTANCE

Final acceptance shall take place after installation, start-up, and FDEP certification is received for the system.

SECTION 2.0 - TECHNICAL REQUIREMENTS

2.1 GENERAL REQUIREMENTS. The VENDOR shall be responsible for delivery of all materials identified in this Specification in full accordance with this Specification. Material that is not specifically identified below, but would be required to be provided in order for the VENDOR to perform the tasks identified below and in Section 1.0 of this Specification shall be included.

2.1.1 The VENDOR shall provide equipment which meets all applicable Federal, State, City and National Industry Standards, (IEEE, NEC, UL, OSHA, FADER, NACE, SSPC, etc.).

2.1.2 The VENDOR shall obtain applicable permits from the OWNER when performing any type of work on OWNER'S property when applicable.

2.2 GENERATOR SET

1. GENERAL

It is the intent of this specification to secure a standby generator system that has been prototype tested, factory built, production tested, site tested, of the latest commercial design, together with all accessories necessary for a complete installation as specified herein.

The equipment supplied and installed shall meet the requirements of the National Electric Code and all applicable local codes and regulations. All equipment shall be new, of current production by a firm which manufactures the generator and controls, transfer switch, and assembles the generator set as a matched unit so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained service personnel. Entire unit shall meet UL 2200 requirements. All products provided shall contain UL labeling.

2. SUBMITTAL

Submittal shall include specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, the transfer switch, and other remote devices if included elsewhere in these specifications. The complete installation manual shall be delivered with the submittal.

3. PRODUCTS

The standby generator set shall be rated standby power (defined as continuous operation for the duration of any power outage), 0.8 power factor at 150 feet altitude, 110 degrees Fahrenheit, as manufactured by Caterpillar, Olympian, , Kohler, or Blue Star. Heavy duty vibration isolators shall be provided between the engine-generator and welded steel base. Between the base of the tank and the concrete slab, (2) runs of *W'* thick commercial grade neoprene meeting ASTM D2000-BC-609 cut into 4" wide strips shall be placed the entire length of the tank. The standby generator shall be sized to operate all pumps starting sequentially plus all appurtenances. The generator main breakers, power panel and pump station main breaker and transfer switch main breaker shall be equally sized. The standby generator shall not be de-rated when variable frequency drive (VFD) or reduced voltage (soft start) motor starters are used.. If the belly tank exceeds 2' -0" in height, then a fiberglass catwalk or drained recessed base shall be provided. If

the recessed base is used, there shall be a minimum of 3'-0" clearance between the generator set and the wall of the enclosure. Either shall be supported by shop drawings.

4. ENGINE

The prime mover shall be a liquid cooled No. 2 diesel fueled engine of 4-cycle design, equipped with the following:

A. Engine driven or electric fuel transfer pump, primary and secondary fuel filters, water separators, and electric fuel shut-off valve.

B. Gear driven governor capable of regulating the no load to full load frequency to a 5% maximum. Steady state regulation shall be 5%.

C. 12 volt positive engagement solenoid shift-starting motor.

D. Automatic battery charging alternator with solid-state voltage regulation.

E. Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.

F. Dry-type replaceable air cleaner elements.

G. A unit-mounted radiator, blower fan, water pump, thermostat, and radiator duct flange (unhoused only) shall properly cool the engine and be designed for operation at up to 110 degrees F ambient temperature.

5. ALTERNATOR

The alternator shall be a 4-pole revolving type with reconnectable 12 leads, self-ventilated, and of drip-proof construction. The insulation material shall meet the NEMA standard (MGI-22.40 and 16.40) for Class H. The excitation system shall be ofbrushless construction controlled by a solid-state voltage regulator with adjustable Volts-per-Hertz. The alternator shall have a permanent magnet.

On application of any load up to the rated load, the voltage dip shall not exceed 12.5% and shall recover to stable operation within two seconds.

The alternator shall be capable of sustaining at least 250% of rated current for at least 10 seconds under a 3 phase symmetrical short by inherent design or by the addition of an optional current boost system.

The alternator shall be capable of accepting the loads and instantaneous voltage dip when loads are started as specified.

A resettable line current sensing thermo-magnetic circuit breaker with inverse time versus current response shall be furnished and shall not automatically reset preventing restoration of voltage if a fault condition exists, or if maintenance is being performed. This breaker shall protect the generator from damage due to its own high current capability and shall not trip within

the 10 seconds specified above to allow selective tripping of downstream circuit breakers under a fault condition.

The generator shall be directly connected to the flywheel housing for permanent alignment by means of a shaft through a flexible coupling between the rotor and the flywheel.

Controller

Set-mounted controller capable of facing right, left, or rear shall be vibration isolated on the generator enclosure. The microprocessor control board shall be moisture proof and capable of operation from -40 to 85 degrees Celsius.

Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include:

A. Fused DC circuits.

B. Complete two-wire start/stop control which shall operate on closure of a remote contact.

C. Speed sensing and a second independent starter motor disengagement systems shall protect against the starter engaging with a moving flywheel.

D. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then reengage the starter.

E. Cranking cycler with pre-set time for ON and OFF cranking periods and cyclic cranking limiter which will not attempt to start the engine after a maximum of eight (8) attempts.

F. Overcrank protection designed to open the cranking circuit if the engine fails to start.

G. Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure, overspeed, or overcrank are received.

H. Engine cool down timer factory set to permit unloaded running of the standby set after transfer of the load to normal.

I. Three-position (Automatic - OFF - TEST) selector witch. In the test position, the engine shall start and run regardless of the position of the remote starting contacts. In the automatic position, the engine shall start when contacts in the remote control circuit clo e and stop after those contacts open. In the off position the engine hall not start even though the remote start contact close. Thi position shall also provide for immediate sh11tdown in case of an emergency. Reset of any fault lamp shall also be accomplished by putting the switch to the off position.

J. Indicating lights to signal:

Not-in-auto (red)
Overcrank (red)
Emergency stop (red)

High engine temperature(red)
Overspeed (red)
Low oil pressure (red)
Battery charger malfunction (red)
Low battery voltage (red)
Low fuel (red)
System ready (green)
Pre-alarm high engine temp. (yellow)
Pre-alarm low oil pressure (yellow)
Low coolant temp. (red)
Fuel tank inter-wall leak (yellow)
Low coolant level (red)

K. Test button for indicating lights.

L. Form "C" dry contacts shall be provided for each signal in J above for connection to remote monitoring devices.

Instrument Panel

A set mounted instrument panel shall include:

A. Dual range voltmeter.

B. Dual range ammeter.

C. Voltmeter-ammeter phase selector switch.

D. Frequency meter

E. Lights to indicate high or low meter scale.

F. Direct reading pointer-type frequency meter.

G. Panel illuminating lights.

H. Battery charging meter, if not located on the battery charger.

I. Coolant temperature gauge (liquid cooled models).

J. Oil pressure gauge.

K. Running time meter.

L. Voltage adjust rheostat(+ or - 5% range).

Accessories

The following accessories shall be provided:

A. Overvoltage protection will shut down the unit.

B. Battery rack, battery cables, 12-volt or 24-volt battery(ies) capable of delivering the minimum cold-cranking amps required at zero degrees Fahrenheit per SAE Standard J-537 for each particular KW rating. The battery rack shall be assessable for maintenance.

C. Gasproof, seamless, stainless steel, flexible exhaust connector(s) ending in pipe thread or flange and gasket connections. Flexible exhaust connectors shall be as long as necessary to establish connection between exhaust manifold and exhaust silencer.

D. Metal clad flexible fuel line(s) rated 300 degrees F and 100 PSI ending in pipe thread.

E. Engine exhaust silencer, coated to be temperature and rust resistant, rated for critical applications. Exhaust noise shall be limited to 85 dba as measured at 10 feet in a free-field environment. Silencer shall include rain cap.

F. Block heater of proper wattage and voltage, thermostatically controlled to maintain engine coolant at 90 degrees Fahrenheit (32 degrees Celsius) to meet the start-up requirement of NFPA-99 or NFPA-110 Regulations. Transformer, switchgear, and enclosure shall be provided to convert the primary power source secondary voltage to the voltage and current level required.

G. Automatic float and equalize battery charger with constant voltage regulation from no load to full load, current limited during engine cranking and short circuit conditions, temperature compensated for ambients from -40 degrees C to +60 degrees C, voltmeter and ammeter, fused, reverse polarity and transient protected. Optional alarm circuit board to meet the requirements of NFPA-110 for low battery voltage, high battery voltage, and battery charger malfunction.

H. Transformer, switchgear, and enclosure of sufficient size shall be provided to convert the primary power source secondary voltage to the voltage and power level required by the block heater, battery charger, and controls.

I. I-light remote alarm panel shall monitor all controller functions described in Article J of the controller section. An integral horn silence switch shall be included, which meets the requirements ofNFPA-110.

J. Break-glass type remote emergency stop station which meets the requirements of NFPA-110.

K. Sound attenuated aluminum weather-protective enclosure with removable or hinged side panels to allow inspection and maintenance. Sound level shall not exceed 71 db at a distance of 23 feet. Wind load rating on the enclosure shall be 150 mph. The enclosure shall be coated with primer and two coats of high-gloss, weather-proof, sag resistant vinylac in the manufacture's standard color through an electrical bonding process. The specified exhaust silencer shall be integrated inside the enclosure. The enclosure is to have large piano style hinged doors to allow access to engine, alternator, and control panels. Each door is to be fitted with stainless steel lockable hardware with identical

keys. Padlocks do not meet this specification.

L. Double wall sub-base mounted steel fuel tank with local level gauge, 4-20mA analog GEMS model XT800 or approved equal level sensor, and low level alarm contact, both to be connected to telemetry. Fuel capacity shall be 48 hours supply at full load. All diesel fuel tanks must be coated on the exterior with "Liner Xtreeme" (Product Code BLK20), an expoxy/urethane blend painting system, for a minimum total dry mils of 40, but not exceeding 125 dry mils.

M. Fuel tank leak detector with form "C" dry contacts for connection to telemetry. Leak detector must be on Florida Department of Health's approved list.

N. Fuel Filter, Oil/Water Separator

2.3. AUTOMATIC TRANSFER SWITCH

A. ATS

1. The automatic transfer switch shall consist of a power transfer module and a control module, interconnected to provide complete automatic operation. The automatic transfer switch shall be mechanically held and electrically operated by a single-solenoid mechanism energized from the source to which the load is to be transferred. The switch shall be rated for continuous duty and be inherently double-throw. The switch shall be mechanically interlocked to ensure only one of two possible positions - normal or emergency. The automatic transfer switch shall be suitable for use with emergency sources, such as an engine or turbine-driven generator source, or another utility source.

2. All main contacts shall be of silver composition. They shall be protected by non-arcing contacts in sizes 400 amperes and over. They shall be of the blow-on configuration and of segmented or brush construction in ratings 600 amperes and over. Their opening transfer time in either direction shall not exceed one-sixth (1/6) of a second.

3. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection ofpower conductors.

4. The control module shall be supplied with a protective cover and be mounted separately from the transfer switch for ease of maintenance. Sensing and control logic shall be electromechanical relays. Relays shall be industrial-control-grade plug-in type with dust covers and locking clips.

5. Automatic transfer switches utilizing components of molded-case circuit breakers, contactors, or parts thereof which have not been intended for continuous duty or repetitive load transfer switching are not acceptable.

6. The automatic transfer switch shall conform to the requirements of NEMA

Standard ICS 2-447 and Underwriters' Laboratories, Inc. UL-1008 and shall be UL listed as follows:

a. For use in emergency systems in accordance with Articles 517 and 700 of the National Electrical Code.

b. Rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric-heating and tungsten-filament loads as referred to in Paragraph 30.9 ofUL-1008.

c. Transfer switches rated 400 amperes and less shall be suitable for 100% tungsten-filament lamp load. Switches rated above 400 amperes shall be suitable for 30% or 400 amperes tungsten-filament lamp load, whichever is higher.

7. The automatic transfer switch shall be rated to withstand the rms symmetrical short circuit current available at the automatic transfer switch terminals with the type of overcurrent protection, voltage, and X/R ratio.

8. The automatic transfer switch shall be mounted in a stainless steel NEMA 3R enclosure with 3 point latching. Switch and accessory devices shall be supplied by one manufacturer with number of poles rated.

B. All production units shall be subjected to the following factory tests:

1. The complete automatic transfer switch shall be tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency, and time delay setting are in compliance with the specification requirements.

2. The complete automatic transfer switch shall be subjected to a dielectric strength test per NEMA standards ICS 1-109.05.

3. The control panel shall meet or exceed a voltage surge in accordance with ANSI C37.90a-2978 and the impulse withstand voltage test in accordance with NEMA Standard ICS 1-109.

C. Operation

1. Two-pole switches shall be used for single-phase service and three-pole switches for three-phase service. Neutral conductor terminal lugs shall be provided as required for the power system.

2. The automatic transfer switch control panel shall utilize solid-state sensing on normal or emergency for automatic, positive operation. The following shall be provided:

a. For single-phase switches, the normal source voltage across live lines shall be monitored, and for three-phase switches, all phases of the normal shall

be monitored line-to-line. The transfer to emergency will be initiated upon reduction of normal source to 70% of nominal voltage and retransfer to normal shall occur when normal source restores to 90% of nominal.

b. A test switch to momentarily simulate normal source failure.

c. Harnessing between transfer switch and control panel shall be built-in disconnect for routine maintenance.

3. All moveable parts of the operating mechanism shall remain in positive mechanical contact with the main contacts during the transfer operation without the use of separate mechanical interlocks. Automatic operation of the switch shall not require power from any source other than the line-to-line voltage of the source to which the switch is transferring.

2.4. ACCESSORIES

A. The switches shall include voltage and frequency sensing of the emergency source. Sensors shall be factory set to allow transfer to emergency when that source is at least 90% of rated voltage and frequency.

B. Gold-plated contacts rated 10 amps, 32 volts DC which close when the normal source fails shall be provided to initiate engine starting.

C. One auxiliary contact closed when the switch is in the normal position and one closed when the switch is in the emergency position shall be provided. Contacts shall be rated 10 amps, 480 volts, AC.

D. An in-phase monitor shall be provided and shall control transfer/retransfer operation between live sources so that closure on the other source will occur only when the two sources are approaching synchronism and the two sources are within 15 electrical degrees maximum so that in rush currents do not exceed normal starting currents. The monitor shall function over a frequency range of up to 60 +/- 7Hz.

E. A fully programmable engine exerciser with seven independent routines to exercise the engine generator, with or without loads, on a daily, weekly, bi-weekly, or monthly basis shall be provided. Exerciser will be solid state, selectable type with battery back up. Engine exerciser setting should be able to be displayed and changed from the user interface key pad. An event log display is required, and shall show the event number, time and date of the event, the event type, and event reason (if applicable). The log display shall be capable of storing up to 300 events. The exerciser shall be RS 485 Communications Port Enabled, and shall have a common alarm output contact.

2.5. TESTING

The intent of this specification is to provide equipment of proven reliability and compatibility. In addition to providing factory prototype test date, two separate production tests shall be preformed; factory production tests and field tests. The equipment shall be installed by the Vendor/Contractor in accordance with the manufacturer's recommendations and all applicable

codes.

2.5.1 Factory prototype tests.

To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer shall be responsible for design prototype tests as described herein: Components of the emergency system, such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes which will not be sold, shall be used for these tests. Prototype test programs shall include the requirements of NFPA-110 and the following:

A. Maximum power (kw).

B. Maximum starting (kva) at 35% instantaneous voltage dip.

C. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.

D. Governor speed regulation under steady-state and transient conditions.

E. Voltage regulation and generator transient response.

F. Fuel consumption at 1/4, 1/2, 3/4, and full load.

G. Harmonic analysis, voltage waveform deviation, and telephone influence factor.

H. Three-phase line-to-line short circuit test.

I. Cooling air flow.

J. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.

K. Endurance testing.

L. The following test data shall be provided for the Automatic Transfer Switch:

a. Overload and endurance at rated voltage, per Tables 21.2 and 23.2 of UL-1008 when enclosed according to Paragraph 5A(l-8).

b. Temperature rise tests after the overload and endurance tests to confirm the ability of the transfer switches to carry their rated current within the allowable temperature limits of the insulation in contact with current-carrying parts.

c. Withstand current tests per Paragraph 25 of UL-1008 for rated amperes rms symmetrical at rated voltage and X/R ratio of 6.6.

d. No welding of contacts. Transfer switch must be operable by the normal means after contacts withstand current tests.

2.5.2 Factory Production Tests .

Before shipment of the equipment, all components shall be tested under rated load and power factor for performance and proper functioning of control and interface. These tests shall be performed to the name plate power factor rating with a reactive load bank. Certified copies on the test results shall be supplied to the engineer for approval before final acceptance by the owner.

2.5.3 Field Test After Installation .

A. The complete installation shall be initially checked, started and tested for operational compliance by a factory representative. The time and date of the site tests shall be coordinated with the Owner.

B. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations under the environmental conditions present and expected. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. This shall include: engine heaters, battery charger, generator strip heaters, remote annunciator, etc.

C. Initial start-up testing shall include check for exhaust leaks, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation while running a known test load. Upon completion of initial start-up and system check out, the supplier of the Emergency Generator set shall perform a field test to demonstrate load carrying capability, stability, voltage, and frequency. It shall be tested under varying loads with guards and exhaust system in place.

D. The equipment shall be tested to show it is free of defects and will start automatically by means of simulated power outage. Prior to this test, all transfer switch timers shall be adjusted for proper systems coordination. It shall be subjected to testing by using portable load banks provided by generator set supplier. Engine temperature, oil pressure and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test. Load bank shall be capable of definite and precise incremental loading and shall not be dependent on generator control instrumentation to read amperage and voltage of each phase. Test instrumentation shall serve as a check of generator set meters. Salt water brine tanks are not acceptable. Under no circumstances shall job site load be utilized for this test. Load bank testing shall be done in the presence of the Owner's Representative after unit is permanently installed in accordance with the drawings and specifications. Testing shall be for a minimum of four hours under full load. Tests shall include:

1) Single-step load pickup.
2) Transient and steady-state governing.
3) Safety shutdown device testing
4) Voltage regulation.
5) Rated Power.
6) Maximum Power.

E. Prior to acceptance, any defects which became evident during this test shall be corrected at no additional expense to the Owner.

2.6. SUBMITTAL, OPERATOR'S MANUAL, CERTIFICATION, AND WARRANTY

A. Submittal shall include specification sheets showing all standard and optional accessories to be supplied; foundation plan; schematic wiring diagrams; dimension drawings; and interconnection diagrams identifying by terminal number of each required interconnection between the generator set, the transfer switch, and the remote annunciator panel and the load. The complete installation manual shall be delivered with the submittal. Equipment shall not be released for manufacture until submittal materials are approved.

B. Each standby electrical power system shall be provided with an operator's manual providing installation and operating instructions.

On request, the manufacturer shall provide a letter certifying compliance with all requirements of the transfer switch specification. The certification shall identify equipment by serial number.

C. The standby generator system and the automatic transfer switch shall be warranted by the generator set manufacturer for one year or 2,000 hours, whichever occurs first, from the date of the system start-up and acceptance.

2.7 CODES AND REGULATIONS

2.7.1 All materials and equipment shall be in accordance with any and all applicable Federal, State, and Local codes, laws, and ordinances in effect at the jobsite. All of the above referenced codes, laws, and ordinances shall take precedence over these specifications in case of any conflict. All such conflicts shall be referred to the OWNER for adjudication.

2.7.2 The following industry, association, and government codes and standards shall be followed as applicable to the design, fabrication, assembly, installation, and testing of all materials and equipment furnished under this specification:

AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
FM	Factory Mutual
IEEE	Institute of Electrical and Electronics Engineers
NACE	National Association of Corrosion Engineers
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Administration
SBCC	Southern Building Code Congress
SSPC	Structural Steel Painting Council

UL **Underwriters Laboratories**

SECTION 3.0 -DELIVERY & ACCEPTANCE OF EQUIPMENT

3.1 ACCEPTANCE OF MATERIAL

3.1.1 The material will be accepted after all work included in the contract is completed to the satisfaction of the OWNER, after the material has been installed, connected, and placed in operation by the Vendor/Contractor, and when performance guarantees have been met.

3.1.2 The VENDOR shall schedule training to take place on installed and existing equipment.

3.2 IDENTIFICATION

3.2.1 Each complete field assembly shall be given an IDENTIFICATION number or letter, and each part of each field assembly which is not permanently connected in shop assembly shall be legibly marked. Shop assembly and subassemblies as used herein are defined as minor assembly or parts for ease of shipment. Descriptions and diagrams of all such markings shall be supplied. Each piece or subassembly separately packaged for shipment shall be labeled or tagged with the project name. Material shipped without a complete packing list shall be subject to rejection.

All material shall be furnished with a permanently attached stainless steel nameplate. If the equipment is to be insulated the nameplate shall be raised at least one inch above the surface. As a minimum, the following information is to be on the plate:

a) Manufacturer's Name
b) Model and Serial Number
c) Size and/or Type
d) Item Number
e) Design Data
f) Date of Manufacture

3.2.2 A shipping tag must be securely attached to each package shipped. This tag must be durable and must be plainly marked with the project name and equipment item number. Separate packages for a single item must be so marked as to identify the component(s) in each package.

3.3 SPARE PARTS. The VENDOR'S instruction manual shall include an itemized list of recommended spare parts that should be stocked by OWNER, after warranty expires, to assure proper and expedient maintenance. The VENDOR shall stock spare parts for the material or guarantee delivery of parts within 48 hours.

3.4 TRAINING. The VENDOR shall include sufficient training to assure proper operation and maintenance of the equipment, and to . MimllHiffi aeeeptal=>le shall l=>eight (8) ho:ars ea site certify the OWNER'S personnel in safely operating and maintaining the equipment.

3.5 DRAWINGS

3.5.1 The VENDOR shall furnish drawings of sufficient detail to document, identify, and define the system(s) and equipment supplied under this Contract.

3.5.2 The drawings shall provide both general and detailed information as follows:

a) System drawings shall show the physical and/or operational relationships of the composite system and major sub-systems. These drawings may include general layout, outline, plan, elevation, and schematic drawings. All drawings shall reference other related system and detail drawings.

b) Detail and section drawings shall show all component parts, and shall include dimensions, manufacturer, and part numbers. These drawings shall reference the related system drawing.

c) Detail drawing showing internal measurements of the fuel tank.

3.5.3 The transmittal of drawings shall include one AutoCAD drawing file stored on CD, and one (1) reproducible print

3.6 INSTRUCTION MANUALS.

3.6.1 The VENDOR shall furnish operation manuals that provide detailed instructions relative to proper unloading, storage, installation, calibration, and maintenance of equipment supplied and an itemized list of recommended spare parts.

3.6.2 The transmittal of instruction manuals shall include one (1) printed copy and one (1) electronic copy.

3.7 DOCUMENT DISTRIBUTION. The mailing address for all correspondence, drawings, and manuals will be as follows:

City of Lakeland
Water Utilities Engineering
501 E. Lemon Street Lakeland, FL 33801
Tag: Project Manager & Project Name