CITY OF COEUR D'ALENE, IDAHO
SEWER PUMP (LIFT) STATION DESIGN STANDARDS

GENERAL

1.1 PURPOSE

A. The following design standards are provided for sewage pump (lift) station designed and constructed by others for eventual acceptance, operation and maintenance by the City of Coeur d'Alene and the Wastewater Department.

B. Design plans and specifications shall be completed by an Idaho licensed professional engineer and licensed electrical engineer in accordance with these standards unless otherwise pre-approved by the Wastewater Department and permitted by the City.

C. At the option of the City, the pump station may be located in public right-of-way or property dedicated to the City for ownership, operation and maintenance of the pump station.

D. If the sewerage flow from the ultimate service area exceeds the needs of the particular area under consideration, the City may require pump station capacities greater than the size required. The City may participate in the project to the extent of the incremental cost of materials for the pump station oversize.

E. Any changes to these standards and/or pre-approved equivalents contained herein shall be clearly brought to the City's attention in a written transmittal attached to all preliminary, design, construction, and "As-Built" record drawings.

F. All pump (lift) stations shall be duplex centrifugal submersible pumps and motors for wastewater pumping applications.

G. All pump station components, force mains and appurtenances shall be of adequate size for the initial service area and future upgrades to serve the ultimate build-out peak hourly sewer flows. Pump stations larger than 300 GPM may be subject to additional requirements not included within herein.

H. Pumps stations exceeding 23' in depth shall include provisions for separate pump out cleaning operations.

I. All pump stations must be located above and outside of the 100-year flood plain elevation.

J. Pump Stations installed below the ground water table shall include buoyancy calculations with provisions to prevent uplift or floatation of all underground infrastructure.

K. Each pump shall be sized to pump 100% of the projected peak hourly flows at a maximum of five (5) starts per hour per pump. Provide a third (3rd) in kind spare pump to the City.

L. All force main piping and appurtenance shall be rated for a minimum 150 psi pressure rating with design flow velocities falling between 4.0 and 6.0 feet per second (fps).

M. Force main cannot discharge pressurized flow into any downstream gravity sewer structure without dissipation of flow energy prior to entry.

N. All pump stations equipment, materials and parts shall be new and free of defects. NO USED EQUIPMENT, MATERIALS, & PARTS will be accepted.

O. Valve vault shall be provided with piping and valve arrangement that allows for back flushing of one pump using the other pump.

P. Provisions shall be made for lifting pumps out of station without disassembling pipe, fittings or pump station structure.

Q. All elevations shall be on the approved City datum.

R. All addenda, change orders, product substitutions, and any modifications to approved plans shall be approved by the City prior to installation or construction.

1.2 STANDARDS AND REFERENCES

A. Pump station design and construction shall meet the standards set forth in the applicable portions of the following recognized standards:

1. ANSI – American National Standards Institute.
2. ASHRAE – American Society of Heating Refrigerating & Air-Conditioning Engineers.
3. ASME – American Society of Mechanical Engineers.
4. ASPE – American Society of Plumbing Engineers.
5. ASTM – American Society for Testing and Materials.
6. CBM – Certified Ballast Manufacturers.
7. ETL – Electrical Testing Laboratory.
8. FM – Factory Mutual Engineering Corporation.
9. IEEE – Institute of Electrical and Electronics Engineers.
10. IES – Illuminating Engineering Society of North America.
11. ISPWC – Idaho Standards for Public Works Construction.
12. NEMA – National Electrical Manufacturers Association.
13. NFPA – National Fire Protection Association.
14. NFPA – 70 National Electrical Code (NEC).
15. NFPA - 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
16. UL – Underwriters Laboratories Inc.

ELECTRICAL AND CONTROLS

1.3 GROUNDING

1.3.1 GROUNDING SYSTEM

A. System shall include a minimum of two ground rods separated by not less than (6) feet.

B. All equipment racks, vaults, concrete pads, antenna masts and metal fences shall be bonded to grounding electrode system.

C. All bonds buried below grade or embedded in concrete shall be exothermically welded.

D. All grounds rods shall be in ground rod boxes.

1.3.2 GROUND ROD BOXES

A. Ground rod boxes shall be concrete with traffic rated covers, Fogtite SP-1, or pre-approved equal.

1.3.3 GROUND RODS

A. Ground rods shall be a minimum of ¾" diameter by 10' long, steel core with 10 mil copper jacket (copper bonded). UL listed.

1.3.4 GROUND CLAMPS

A. Ground clamps for connecting grounding conductors shall be made of copper alloy. Clamps shall be designed to provide permanent and positive pressure and to avoid mechanical injury to the pipe. Use exothermic welds for connecting grounding electrode conductors to ground rods and for all below grade counterpoise grounds, grids, and elsewhere where connections are necessary.

1.3.5 EXOTHERMIC WELD CONNECTIONS

Use Cadweld or pre-approved equal system of exothermic welding for welded grounding connections. Use properly sized molds for each application.

1.4 UTILITY SERVICE

1.4.1 SERVICE CONFIGURATION

A. Individual pumps greater than 7.5 horsepower, shall be served by a 480Y/277V, 3-phase utility service.

B. Individual pumps 7.5 horsepower or less, may be served by either a 208Y/120V, 3-phase; 120/240V delta, 3-phase; or 120/240V, 1-phase utility service.

C. For locations where individual pump horsepower is greater than 7.5 and only single-phase service is readily available, variable frequency drives may be used for phase conversion if approved by the Wastewater Department.

1.4.2 METER ENCLOSURE

A. Meter enclosures shall meet the requirements of the serving utility. Installation shall be in vandal proof NEMA 3R enclosure with a lockable hinged door.

B. Coordinate with the serving Utility regarding the type of metering required.

1.4.3 CURRENT TRANSFORMER ENCLOSURE

A. Where CT metering is necessary, CT enclosures shall meet all requirements of the serving utility and shall be installed per utility company requirements.

1.4.4 SERVICE ENTRANCE RATED MAIN DISCONNECT

A. All lift stations must have a separate and clearly identified service entrance rated main disconnect.

B. Service entrance rated disconnect shall be an adjustable LSI enclosed circuit breaker.

C. Transfer switches shall not be used as service entrance equipment, unless approved by the Wastewater Department.

1.5 POWER DISTRIBUTION SYSTEM

1.5.1 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings.

B. Circuit breakers shall have lugs UL listed for both copper and aluminum.

C. Circuit breakers shall be capable of accepting conductors as required by NEC for the installation.

D. Comply with UL 489 with interrupting capacity to comply with available fault currents.

E. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.

F. Service entrance and standby power generator circuit breakers: Field replaceable rating plug, rms sensing, with field-adjustable instantaneous trip, long and short-time pickup levels, and long and short-time time adjustments (LSI) to mitigate arc flash hazards.

G. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Class A ground-fault protection (6-mA trip) with test button.

H. Circuit breaker enclosures shall be NEMA 3R rated.

1.5.2 PANELBOARDS

A. Comply with UL 67 “Panelboards”.

B. Busing Assembly
   1. Panelboard busing shall be tin-plated aluminum.
   2. Phase arrangement shall be per NEC Article 408.
   3. Bus structure and mains shall have ampacity ratings to serve the load with 25% spare capacity.

C. Panelboard Short-Circuit Current Rating:
   1. Panelboards shall have a short-circuit current rating not less than the available fault current or as indicated below. The available fault current and date the calculation was performed shall be provided on the service entrance disconnect.
      a) Panelboards rated 240V or less shall have short-circuit ratings not less than 10,000 A rms symmetrical.
      b) Panelboards rated above 240V shall have short-circuit ratings not less than 14,000 A rms symmetrical.
   2. Full Rated: All devices shall be fully rated; series rating is not permissible.

D. Panelboard Enclosures
   1. Provide galvanized steel enclosures, NEMA 3R for outdoor locations, minimum 16-gauge thickness, minimum 20-inch width, with no knockouts. Provide doors with concealed hinges, spring-loaded door pulls, flush lock and key, all panelboard enclosures keyed alike, equipped with interior circuit directory frame, card and clear plastic covering for all lighting and appliance panelboards. Door and trim shall be painted with manufacturers standard gray enamel finish over a rust inhibitor.
   2. All panelboards shall be provided with UL 1449, Type 1 surge protection fed from a branch circuit overcurrent protective device or provided with other disconnecting means.

1.5.3 SURGE PROTECTIVE DEVICES (SPD)

A. Provide surge protection system for the protection of all AC electrical circuits from the effects of lightning-induced currents, substation switching transients, and internally generated transients resulting from inductive and/or capacitive load switching.

B. SPDs shall be installed at each voltage level, providing a cascading level of surge protection. At a minimum, SPDs shall be provided at the panelboard, pump control panel and at each control panel. A pump control panel fed downstream of a panelboard shall be considered protected by an SPD installed at the upstream panelboard.

C. SPDs shall be listed in accordance with UL 1449, Standard for Surge Protective Devices.

D. SPDs shall be provided with form C dry contacts output to monitor alarm status.

E. SPDs shall be provided with a surge counter which displays the combined total number of transient voltage surges detected.

F. Visible indication of SPD status shall be provided and shall be visible without removal of the panel dead front.

G. The mounting position of the SPD shall permit a straight and short lead length connection between the suppressor and the point of connection to the main bus or circuit breaker.

H. SPDs shall meet or exceed the following criteria:

1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
2. Protection modes for grounded wye circuits with 480Y/277V or 208Y/120V, 3-phase, 4-wire circuits shall not exceed the following:
   a) Line to Neutral: 1200V for 480Y/277V; 700V for 208Y/120V.
   b) Line to Ground: 1200V for 480Y/277V; 1200V for 208Y/120V.
   c) Line to Line: 2000V for 480Y/277V; 1000V for 208Y/120V.
3. Protection modes for center tapped ground 240/120V, 3-phase, 4-wire circuits shall be the same as 208Y/120V 3-phase systems.
4. Protection modes for 240/120V, 1-phase, 3-wire circuits shall not exceed the following:
   a) Line to Neutral: 700V.
   b) Line to Ground: 700 V.
   c) Line to Line: 1000V
5. Short Circuit Current Rating (SCCR): Equal or exceed 100 kA.

I. Suppressors shall be solid-state and shall operate bidirectionally.

1.6 STANDBY POWER SYSTEM

A. All new and upgraded Public Sewer Pump Stations require a permanently mounted, natural gas fueled factory Generator installed within the pump station fence.

B. The generator system and controls shall be manufactured by one of the following acceptable manufacturers**:**

Cummins Corporation.

Caterpillar Incorporated.

Kohler Company.

C. The complete generator set assembly shall be listed UL 2200.

1.6.2 REQUIRED PERFORMANCE

A. Performance of the generator set shall be based on operation of the assembly with fan, battery charging alternator and all specified and required appurtenances.

B. The generator set shall be capable of starting and operating the lift station load without exceeding the temperature ratings of the engine or the generator. The load of the lift station includes all connected load.

C. The generator set shall be rated for continuous standby service, however the temperature rise of the generator shall not exceed 105°C above a 40°C ambient, when producing full rated load for a continuous period of time.

D. Voltage Drop: The engine generator unit supplied must start the load with a sustained RMS voltage drop no greater than 15% of rated voltage during the pump starting period. The pump starting period shall be from zero up to 3 seconds. The instantaneous voltage dip may be greater than 15% but shall not cause motor starter chatter or relay drop out or exceed a level which causes undesirable motor starting.

E. Steady-State Voltage Operational Bandwidth: 3% of rated output voltage from no load to full load.

F. Transient Voltage Performance: Not more than 20% variation for 50% step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.

G. Steady-State Frequency Operational Bandwidth: 0.5% of rated frequency from no load to full load.

H. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

I. Transient Frequency Performance: Less than 5% variation for 50% step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.

J. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5% total and 3% for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50%.

K. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250% of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator.

1.6.3 ENGINE

A. The engine shall be a water-cooled, in-line or V-type, four-stroke cycle, spark ignited, natural gas fuel unit. The engine shall be fully and completely capable

of and equipped for driving electrical generators. The specific model of engine selected by the manufacturer of the generator set shall have an acceptable history of successful similar applications.

B. The engine shall be equipped with an electronic governor which shall control the speed of the engine and generator. The speed shall be controlled to maintain the generator output frequency within 0.25% of rated frequency from no load to full load.

C. The engine shall be equipped with a pressurized oil lubricating system which shall include threaded, spin-on type, full flow lubricating oil filters which are located for easy removal. The lubricating system shall be equipped with spring-loaded bypass valves which will allow oil circulation if the filters are plugged.

D. The engine shall be equipped with an electric starting system which includes a lead acid battery set, an engine-driven battery charging alternator and appropriate electrical controls. The batteries shall be mounted adjacent to the generator set on a fabricated steel housing. Batteries shall be rated minimum 225 ampere-hours.

E. The engine shall be equipped with a unit-mounted, radiator type cooling system which shall maintain the jacket water temperature at the level required for proper operation of the engine from no load to full load. The engine shall be equipped with one or two, as required, water jacket heater(s), which shall be thermostatically controlled to maintain the coolant temperature at 120°F. Operation of the heater(s) shall be stopped while the engine is turning.

1.6.4 GENERATOR

A. The generator shall be brushless, revolving field-type, and shall be fully and completely capable of and equipped to be driven by a natural gas engine, and able to produce the starting and running kVA demanded by the connected load. The specific model of generator, selected by the manufacturer of the generator set, shall have an acceptable history of successful similar applications.

B. The generator shall utilize PMG excitation.

C. The generator shall be equipped with a solid-state type regulator (separate from exciter) which is compatible with both the engine and the generator.
   1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5% adjustment of output-voltage operating band.
   2. Maintain voltage within 15% on one step, full load.
   3. Provide anti-hunt provision to stabilize voltage.
   4. Maintain frequency within 5% and stabilize at rated frequency within 2 seconds.
   5. The regulator shall be housed and mounted for protection of all components against moisture and vibration.

D. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125% of rating, and heat during operation at 110% of rated capacity.

E. Enclosure: Drip proof.

F. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

G. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

1.6.5 CONTROL PANEL

A. The generator shall be equipped with a control panel. The control panel shall be readily accessible, visible and shall be mounted such that the top of the control panel is no higher than 6’-0” above the finished grade when installed.

B. The generator control panel shall include the following status displays:

1. Engine coolant temperature.
2. Engine lubricating oil temperature.
3. Engine lubricating oil pressure.
4. Engine running time.
5. Battery charge ammeter.
6. Engine/generator tachometer.
7. Voltmeter.
8. Ammeter.
9. Frequency.
10. Voltage adjustment (minimum plus/minus 5%).
11. Emergency stop push button.
12. Indication for:
    a) Selector switch in OFF position.
    b) Selector switch in AUTOMATIC position.
    c) High water temperature.
    d) Low water temperature.
    e) Low water level.
    f) Low lubricating oil pressure.
    g) Engine starting prohibited after three (3) cranking cycles.
    h) High engine/generator speed.
    i) Generator run failure.
    j) High battery voltage.
    k) Low battery voltage.
    l) Battery charger failure.

C. The generator control panel shall include the following dry contacts wired to a terminal strip for:

1. Common remote "trouble" alarm.
2. Common remote "fail" alarm.
3. Generator in auto indication.
4. Generator running indication.

D. Three position (automatic/off/test) selector switch which shall:
   1. In the automatic position allow the engine to automatically start when contacts in the transfer switch control circuit close and stop after the control circuit contacts open.
   2. In the off position prohibit starting of the engine.
   3. In the test position cause the engine to start and remain in operation until the selector switch is moved to either of the other positions.
   4. Provide separate dry contact for each switch position.

E. An automatic starting system that shall cause and control operation of the engine starter motor until the engine has started. The starting system shall include manually adjustable timing circuits for control of the time of operation of the engine starter motor and the time from stopping of operation of the starter motor (after the engine has failed to start) to re-initiation of operation of the starter motor. The starting system shall enable the number of starting cycles to be manually selected and shall prohibit operation of the starter motor if the engine fails to start after three (3) starting cycles. The starting system circuitry shall include dry contacts for remote indication of generator set running and not running conditions.

F. Engine emergency shutdown controls shall include sensors and control circuits which shall stop operation of the engine when the engine coolant temperature rises to a preselected value; when the engine coolant drops below a preselected level; the engine lubricating oil pressure drops to a preselected value; when the fuel level reaches the critical low level; and the engine speed rises to a preselected value. The controls shall prohibit subsequent restarting of the engine until a reset switch is manually engaged.

G. Generator Protector: Control panel shall provide microprocessor-based protection that shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of the alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator main breaker shall open the breaker to disconnect the generator from load circuits. The protector shall perform the following functions:
   1. Initiate a generator overload alarm when generator has operated at an overload equal to 110% of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
   2. Under single or three-phase fault conditions, regulates generator to 300% of rated full-load current for up to 10 seconds.

3. As overcurrent heating effects on the generator approach the thermal damage point of the unit, protector switches the excitation system off, opens the generator main breaker, and shuts down the engine generator.
4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

1.6.6 MAIN CIRCUIT BREAKER

A. Molded-case, electronic-trip type; 100% rated; complying with UL 489.

B. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.

C. Trip Settings: Selected to coordinate with generator thermal damage curve.

D. Mounting: Adjacent to or integrated with control and monitoring panel in a NEMA 1 enclosure.

1.6.7 SUPPORT FRAME

A. Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1.6.8 FUEL SYSTEM

A. Diesel fuel generator systems are not acceptable.

B. For Natural Gas fuel systems, the fuel delivery system shall include all necessary piping for the specific fuel requirements of the supplied generator and shall include written approval of the piping design parameters by the generator manufacturer’s representative. Provide manual fuel shut-off valve. All piping shall be installed per application national and local codes.

1.6.9 GENERATOR BATTERY CHARGER

A. Provide fully automatic constant voltage, current limiting battery charger sized for the generator starting batteries.

B. Charger shall have the following features: Protection fuses, DC ammeter, temperature compensating voltage regulator, and LED alarm lamps indicating AC power fail, low battery voltage, high battery voltage. Form C contacts for alarm indication, high and low battery alarm adjust pots, float voltage adjustment pot.

C. Charger shall monitor the battery voltage and control the SCR to deliver the optimum current level to the battery. The battery shall be permanently connected and when the battery approaches full charge preset voltage, the charging current shall automatically taper to zero amperes or to the steady state load on the battery.

D. The battery charger shall be mounted in the generator enclosure.

1.6.10 SOUND ATTENUATED GENERATOR ENCLOSURE

A. Generator shall be enclosed in a weather-proof sound attenuating housing. The unit shall be skid mounted and the walls and roof shall be adequately reinforced to carry all dead and live loads. The enclosure shall be sized to contain the generator set, control panel, main circuit braker, battery charger, batteries, and to allow adequate room to service the entire unit.

B. The enclosure shall be a manufacturer's standard vandal-resistant, sound-attenuating, weatherproof steel, wind resistant (up to 100 mph) protective housing; enclosure shall provide sound attenuation to adhere to all City, state and local noise emission requirements.

C. Doors shall be provided on each side of the enclosure to provide adequate access to components requiring maintenance and a control panel access door shall be provided. All doors shall be equipped with handles and latches which are keyed alike.

D. Provide manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

E. The operating louver assembly, including the louver, motor, and guard shall be completely factory assembled.

F. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

G. Muffler Location: Within enclosure.

1.6.11 GENERATOR PAD AND CLEARANCES

A. A concrete pad shall be provided and installed per generator manufacturer's requirements. At a minimum, the pad shall have the following characteristics:
   1. Size: Pad shall extend 12 inches beyond generator enclosure dimensions and provide positive drainage away from generator.
   2. Concrete: 4000 PSI, 6-inch-thick minimum; sides and edges shall be chamfered.
   3. Rebar: #4 bar on 12-inch centers, both directions.
   4. Rebar shall be bonded to the grounding electrode system.

B. Generator shall have 4 feet of clearance on all sides.

1.6.12 VIBRATION ISOLATION DEVICES

A. Elastomeric Isolator Pads: Oil and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern, and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area and factory cut to sizes that match requirements of supported equipment.

B. Material: Standard neoprene separated by steel shims.

C. Minimum Deflection: 1 inch.

1.7 AUTOMATIC TRANSFER SWITCH

A. The transfer switch shall be mechanically and electrically held and rated to 600V for all classes of load and continuous inductive duty.

B. The transfer switch shall conform to UL 1008 (current revision) provisions for Withstand Current Ratings and Closing Ratings.

C. The switch shall be capable of enduring 6000 cycles of complete opening and closing at rated current and voltage at a rate of 6 cycles per minute without failure.

D. The switch shall be double throw, inherently interlocked mechanically and electrically to prevent supplying the load from both sources simultaneously. The operating current shall be obtained from the source to which the load is to be transferred. The transfer mechanism shall be of the double break design with solid silver cadmium surface contacts and individual heat resistant arc chambers.

E. Single break contacts will also be acceptable if arc barriers and magnetic blow-out coils are used. The contacts shall be capable of carrying 20 times the continuous rating for interrupting current.

F. All contacts, coils, etc. shall be readily accessible for replacement from front of panel without major disassembly of associated parts.

G. The transfer switch shall have UL 1008 label and listing.

H. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

1.7.2 CONTROLS HARDWARE

A. All relays shall be provided with indicating LED lights for energized position indication.

B. Time delay relays shall be provided with timing and timed out LED indicators.

C. All fuses shall be provided with “blown fuse” indicators.

D. All wiring shall be numbered at each end with basic wiring numbering scheme.

E. All terminals shall be clearly labeled.

F. All internal equipment shall be labeled.

G. All external devices shall be clearly labeled.

1.7.3 CONTROLS FEATURES

A. The transfer switch shall include the following accessories:

1. Undervoltage Sensor: Adjustable solid-state low voltage sensing relays. Provide for each phase.
2. Time Delay Start and Stop: Solid state adjustable time delay on start (0 to 15 seconds).
3. Time Delay Stop: Solid state adjustable time delay (0 to 10 minutes) to allow generator to cool down after normal power is restored and retransfer occurs.
4. Time Delay Transfer & Retransfer: Solid state, time delay, relay adjustable; 2 to 120 seconds for transfer to emergency and 0 to 30 minutes for retransfer to normal.
5. With or Without Load Selector Switch: Switch to select exercise with or without load.
6. Normal-Test Switch: Switch such that in the "Normal" mode the transfer switch will operate automatically and in the "Test" mode the generator will start for test purposes. This switch shall work in conjunction with the "With" or "Without" load switch. An extra contact block shall be provided on the normal-test switch for wiring to the Programmable Controller if one is required.
7. Exercise Clock: An exerciser clock shall be provided which shall be programmable to exercise the generator set. The exerciser shall be adjustable from 15 to 60 minutes once each week. The exercise shall be either with or without load. If power fails during the exercise cycle, the load shall automatically pick up.
8. Programmed Transition: The load transfer control shall be capable of remaining in the neutral position for an adjustable time of .5 to 60 seconds, when transferring from one-line power source to the other, to allow residual voltages to decay before application of the source.

B. The switch shall have dry contacts each with terminals for field connection, 10A rated at 120VAC.
   1. Two, separate, normally open dry auxiliary contacts; one indicating transfer switch is in “Normal” position and one indicating switch is in “Standby” position.
   2. Four, separate, normally open, dry contacts; two indicating "commercial power / normal power" available, and two indicating generator / emergency power available.
   3. Normally open, dry contact indicating generator called to run.

C. Individual indication lights for emergency power available, normal power available, normal position and emergency position.

1.8 EQUIPMENT SUPPORTS, IDENTIFICATION AND STRUCTURES

1.8.1 ELECTRICAL EQUIPMENT SUPPORTS

A. Material requirements:

1. Galvanized steel: ASTM A123 or ASTM A153
2. Stainless steel: AISI Type 316

1.8.2 WIRE MARKERS

A. For all control panels, electrical gear, pull and junction boxes all wires shall be identified with a label corresponding to the appropriate electrical design schematic:
   1. Material: Heat shrinkable polyolefin.
   2. Colors: White background, black printing.

1.8.3 VAULT/HANDHOLE LABELS

A. All vaults, handholes and exterior pad mounted electrical gear shall be identified:
   1. Material: Aluminum or stainless steel.
   2. Legend: Embossed.
   3. Fasteners: Weld, nylon, urethane or polypropylene strap.

1.8.4 CONDUIT TAGS

A. All raceways shall include conduit tags related to a conduit and wire identification schedule.
   1. ID Tag: Aluminum, 1/8-inch-thick, embossed with conduit name.
   2. Tie: Stainless steel, tensile strength 100 PSI min.

1.8.5 LIFT STATION EQUIPMENT RACK

A. An outdoor equipment rack shall be installed to mount electrical equipment.

B. The rack shall be single sided and covered with corrugated painted steel roofing material. Cover shall have a 1:12 roof pitch toward the back of the rack and extend 4 feet beyond the front of the rack, 2 feet beyond the back of the rack, and 1 foot beyond either side of the rack. Rack shall be sized so that all conduits are not required to bend around concrete footings. All fastening hardware shall be stainless steel. All structural components shall be prefabricated hot-dipped galvanized. On-site fabrication and welding is not permissible. The minimum sizes for rack structural components shall be as follows:
   1. Rack Frame:
      a) Uprights: 4”x4”x1/4” square tube steel, length as required. If rack is longer than 8 feet add an upright structural member to the middle of the rack for additional support.
      b) Horizontal Cross-Members: 4”x4”x1/4” square tube steel, length as required.
   2. Rack Cover Frame:
      a) Cross-Members: 2”x4”x3/8” square tube steel, length as required.
   3. Upright mounting flanges: 8”x8”x1/2” square mounting flange.

C. Rack shall be mounted plumb and level; existing grade shall be modified as required. The following rack base and mounting components are required:
   1. Mounting Flange Anchor Bolts: 24" x ½" dia., provide stainless steel leveling washers and nuts as required.
   2. Cast-in-place, Sonotube Concrete Footings: 4000-PSI concrete, 24" dia. x 48" deep.
   3. Concrete Slab: 4000-PSI concrete, #4 Rebar on 12-inch centers each direction, extend 4 feet beyond rack frame front, 2 feet beyond rack frame back, and 1 foot beyond either side of rack frame. Slab shall be 6-inch-thick; top of slab shall be sloped at minimum 1% grade to drain away from rack.
   4. Rack shall be bonded to the grounding electrode system.
   5. Provide grout as required to fill in the space in between the slab and the upright mounting flanges.

1.8.6 LIGHTING

A. The electrical equipment rack shall include area lighting. The lighting shall illuminate all the rack mounted equipment.

B. Luminaires
   1. Luminaires shall be LED with frosted acrylic lenses.
   2. Luminaires shall be dark sky compliant.
   3. Luminaires shall include photocell control.

C. Mounting: Install luminaires centered above equipment on the underside of the rack cover in accordance with the manufacturer's written instructions and recognized industry practices.

D. Provide a weatherproof switch.

1.9 SUBMERSIBLE MOTORS

A. Definite purpose submersible motors shall conform to the following:

B. Motor shall be designed for service in a liquid temperature of 25˚C. Set controls to permit operation only when fully submerged unless specifically rated for non-submerged duty.

C. Motor shall have two mechanical seals; the lower one outside the motor and protecting the upper one which shall be in an oil filled chamber.

D. Provide (1) normally closed embedded thermostat in each phase winding for thermal alarm and motor cut-out.

E. Provide moisture detector probes (seal fail) in oil chamber.

F. Provide one or more multiconductor cables of approved construction and suitable length to extend from the motor to the indicated receptacle. Provide stainless steel strain relief for the cable.

G. If separate cables are provided for power and alarm conductors, provide separate cord and plug connections.

H. Motor cord connections shall be continuous to a location outside of the wet well where they are to terminate in a cord and plug connection to the pump control panel outside the Class 1, Division 1 area.

I. Motor cords, both power and control shall not be spliced in the wet well and shall be installed to allow for disconnection and removal of the pumps.

1.10 MOTOR CORD PLUG AND RECEPTACLE

1.10.1 MOTOR CORDS

A. Motor cords, both power and control shall extend out of the wet well and terminate in a weatherproof plug/receptacle combination located outside of the classified area.

B. The pump cords and plug shall be able to be removed with the submersible pump without any disconnection, damage or modification.

C. Provide switch rated plug and receptacle. Horsepower rated with phase and ground as required for pump with (4) auxiliary contacts, NEMA Type 4X. Unit shall have the following options:

1. Plug: Handle with cord grip.
2. Receptacle: Poly angle (70 degrees) with aluminum wall box with NPT port.

D. If a separate control cord is supplied with the pump, provide a separate plug and receptacle with connections as required.

E. Manufacture: Meltric DS series with options, or pre-approved equal.

1.10.2 GROUND FAULT PROTECTION

A. For electrical systems rated 150V or less to ground coordinate with the City to determine which of the following design options to provide. The option selected is at the sole discretion of the City.

1. Provide ground fault protection for all power receptacles per NEC Article 210.8(B)(4).
2. Ground fault protection for power receptacles is not required. The City will provide an assured equipment grounding program as required per NEC Article 210.8(B)(4), Exception No. 2.

1.11 PUMP CONTROL PANEL

A. A separate control panel shall be provided for the pump power distribution system, including starters, solid state overload monitoring and control, and emergency pump control equipment.

B. The pump control panel shall be manufactured and labeled in accordance with UL 508A and 698A standards.

C. The pump control panel shall be capable of operating pumps in a lead-lag-alternate manner based on back-up floats, independent of the telemetry control panel. This shall be accomplished by relay logic and not a separate PLC or electronic controller.

1.11.2 EQUIPMENT ENCLOSURE

A. The control panel shall be NEMA 4X, stainless steel.

B. On enclosures 36 inches or larger, use 3-point draw roller type latching mechanism with a stainless-steel handle.

C. Provide a dead front panel. All control interface devices shall be mounted on an interior swing-out door.

1.11.3 ENCLOSURE DOOR LATCHES

A. Door latches shall be fast operating type 3-point latch door handle. Where a 3-point latch shall not meet rating requirements, use fast operating clamp assembles. Hoffman Bulletin A-80 or pre-approved equal. The latch handle shall operate toward the center of the panel to open the door and be pointing down when closed and locked. All cabinets shall be lockable with a padlock.

1.11.4 ENCLOSURE HEATERS

A. Provide a fan-driven resistance heater with 120 VAC line thermostat. Heaters shall be sized to keep control enclosure at temperatures acceptable to meet the operational requirements of the enclosed equipment. Heaters shall be 150 watts minimum and 400 W for enclosures 36 inches and wider. The thermostat shall be adjustable between 40°F. and 80°F. Heaters shall be as manufactured by Hoffman Engineering, bulletin D-85, or pre-approved equal.

1.11.5 ENCLOSURE COOLING

A. Provide a 120VAC cooling filter fan system with 120 VAC line thermostat in each control enclosure. Cooling system size shall be sized to keep control enclosure at temperatures acceptable to meet the operational requirements of the enclosed equipment. Thermostat shall be adjustable between 40°F. and 105°F.

B. If variable frequency drives (VFD’s) are required for pump starters, a panel mounted air-conditioning unit shall be provided to limit the internal enclosure temperature to 95°F.

C. Provide thermostats to monitor/alarm to PLC if enclosure temperature is too low (below 40°F) or too high (above 100°F).

D. Provide weather protective shrouds over all ventilation openings that also prohibit insect intrusion.

1.11.6 PANEL LIGHT

A. Provide a motion activated LED panel light with automatic “door-activated” switch in each control enclosure.

1.11.7 ELAPSED TIME METERS

A. Two meters for each pump, one meter shall record pump runtime, the other meter shall record the number of starts. Elapsed Time Meters (ETM) or run time meters (RTM) on control panels shall be 2-inch diameter nominal size round case type for flush panel mounting. The meters shall have a 6-digit non-reset register with the last digit indicating tenths of an hour.

1.11.8 SELECTOR SWITCHES

A. Provide one selector switch for “Hand-Off-Auto” control of each pump, and bubbler equipment and any other electrically controlled mechanical equipment. Selector switches shall be 30-mm, NEMA 13, or NEMA 4X as required by mounting location. Selector switches shall be 2, 3, or 4 position as required by the application. Units shall be heavy duty type.

1.11.9 PUSHBUTTONS AND INDICATING LIGHTS

A. Provide a pushbutton for fault/overload reset for each pump. For each pump, provide indicating lights for pump running, pump fault, high discharge pressure, motor overtemperature, and high moisture indication. Pushbuttons and indicating lights shall be 30-mm, NEMA 13 oil-tight, dust-tight or NEMA 4X heavy duty type with detachable contact blocks. Indicating lights shall be push-to-test 24 VDC or 120VAC LED type as required.

1.11.10 RELAYS FOR GENERAL PURPOSE

A. Relays for general purpose use shall have, 10A contacts with the appropriate coil voltage for the application. All relays shall have an integral indicating light to show if coil voltage is present. They shall have an 8-pin/blade base and matching socket.

1.11.11 PUMP SUPERVISION RELAYS

A. Supervision relays shall be provided to monitor for overtemperature and moisture leakage conditions in the lift station submersible pump motor. Supervision relays shall have two form C dry contacts, one for overtemperature and one for moisture leakage, for interface with the pump motor controls. Supervision relays shall have LED alarm indicating lights for indication of contact changeover and reset pushbutton.

B. Supervision relays shall be mounted on the interior swing-out door of the Pump Control Panel.

1.11.12 INTRINSICALLY SAFE REPEATER RELAYS (ISR)

1. Intrinsically safe repeater relays shall be provided with minimum of one (1) N.O. and one (1) N.C. contact as required.

1.11.13 INTRINSICALLY SAFE BARRIERS (ISB)

1. Intrinsically safe barriers shall be provided as required.

1.11.14 CONTROL PANEL CIRCUIT BREAKERS

A. Control panel circuit breakers shall be thermal-magnetic type, supplementary overcurrent devices. Circuit breakers shall be snap mountable on same mounting rails as the terminal blocks. Circuit breakers shall be sized for actual circuit load. Provide one (1) spare circuit breaker of each size used.

1.11.15 FUSES

A. Fuses shall be of the type and amperage required to serve the intended load.

B. Provide blown fuse indicators on all fuses.

1.11.16 TERMINALS

A. Provide terminals for all wire connections to field wiring and internal power distribution. Analog loops that are 24 VDC powered shall have a knife switch to disable the loop if necessary. Connections shall have box type lugs capable of terminating (2) No.14 AWG stranded wires. Terminals shall be din rail mounted.

B. Fuse terminal blocks shall be hinged disconnect level type with “blown fuse” indicators.

C. Disconnecting terminal blocks shall be knife type with light indicator.

D. Provide five (5) spare terminals or 10% whichever is the greater amount. In addition, provide extra din rail with enough space for 20% more terminals.

1.11.17 WIREWAYS

A. Provide molded plastic wireways complete with covers, slotted for wire connections for all wiring in the panels.

1.11.18 SOLID STATE SOFT STARTERS

A. Three phase pumps shall be controlled by reduced voltage solid-state starters (soft starters, SSS), soft starters shall be suitable for operation for the voltage, phase, and wiring at 60 Hz.

B. The solid-state motor controller shall have two silicon-controlled rectifiers (SCR) per phase in a reverse parallel configuration; it shall also have a separate bypass contactor to be used in the case of power electronics failure. The starter shall have its own control power transformer, logic boards, and heat sinks. Each unit shall be completely prewired with all control wiring numbered and terminated on terminal strips.

C. The solid-state motor controller shall be sized/rated for 1 size larger, standard/normal duty, than motor HP; for example, if the motor is 5 HP the SSS shall be nominally rated for 7.5 HP.

D. Across the line starters (FVNR) or variable frequency drives (VFD) may be used for single phase applications, with Wastewater Department approval of alternate starting method prior to submittal of plans and specifications.

1.11.19 SOLID STATE STARTER CONTROL

A. The solid-state starter shall be wired such that if there is an overload, motor overtemp, or Emergency stop activated, the starter shall stop immediately and shall not “ramp down”.

B. The solid-state starter shall automatically restart after a utility power loss, phase fail or overvoltage.

1.11.20 INSPECTION AND STARTUP

A. The soft starter as a component of the pump control panel shall be tested in the manufacturer’s panel shop. All operations shall be simulated including but not limited to ramp up, ramp down, emergency operation, and immediate stop in the case of overload, motor overtemp, or e-stop.

B. The field installation and wiring of the soft starter equipment shall be inspected and certified by a factory authorized representative of the soft starter prior to initial operation.

1.11.21 OPERATIONAL REQUIREMENTS

A. The soft starter shall be rated for continuous operation.

B. The soft starter shall function properly with input voltage variations of +10% and an input frequency variation of +3%. The unit shall be rated for operating within ambient temperatures of 0-50^{o}C (32^{o} - 122^{o}F), 5 to 95% relative humidity (non-condensing). Unit shall be fully rated to an elevation of 3000 feet above sea level.

1.11.22 SCR REQUIREMENTS

A. The SCRs shall be assembled in pairs on power poles with fan forced cooling and so a single pole may be replaced independently. The SCRs shall have overload ratings of:

1. Continuously at 115% of FLA at 50°C ambient
2. 30 seconds at 300% of FLA at 50°C ambient
3. 10 seconds at 600% of FLA at 50°C ambient

B. The SCR shall be 98% efficient or better. Each SCR shall be rated to block 2.5 times the normal line to line voltage, or 1200V minimum repetitive peak inverse voltage.

C. SCRs shall be protected with metal oxide varistors (MOV) across the SCR pairs and rated to clamp transient voltages to 10% below the rated blocking voltage of the SCR. The energy absorbing capability shall be a minimum of 100 joules. Resistor/capacitor snubbers shall be employed to prevent false firing.

1.11.23 CONTROLS AND PERFORMANCE

A. The starting ramp shall have all necessary dwell times, voltage boost, and ramps so the pumps can be brought up to system pressure and accelerate up to full speed pumping into the system so there will be no system disturbances.

B. The SSS shall be capable of starting the load and maintain a maximum of 50% of rated starting current.

C. Ramp times shall be separately adjustable for starting and stopping from 0 to 30 seconds.

D. The stopping ramp shall have all capabilities mentioned for starting ramp separately adjustable. The stopping ramp shall reduce the pumping flow to zero while maintaining system pressure and holding at that speed for an adjustable time to allow check valve to close smoothly. Then continue to ramp down and stop the motor. Starting and stopping ramp times shall be separately adjustable.

E. A motor voltage regulator adjustment shall be supplied to prevent higher than motor nameplate voltage from being applied to the motor when higher line voltages are present. An energy saving/power factor circuit shall be supplied if available. The device shall be phase rotation sensitive. A shorted SCR detector shall be supplied with an interlock contact that will prevent starting of a device with shorted SCRs, with alarm contacts.

F. Wired terminals shall be provided which shall include:
   1. Call to run and stop.
   2. Remote signals for running and failure status.
   3. Overload/fault reset.

1.11.24 OVERLOADS

A. If internal electronic overload relays are not supplied integral to the SSS, provide overload relays follows:
   1. Overload relays shall be setpoint adjustable with selector for either auto or manual reset and a test button to simulate an overload. Provide a normally open contact from the relay for alarm or control use.

1.11.25 SURGE PROTECTION

A. Provide factory surge protection for all soft starters.

1.11.26 PROTECTION AND INDICATION

A. Soft starters shall have protection and indication as detailed below.
   1. Provide starting and running fault protection to shut down or inhibit starting on:
      - Start fault.
      - Phase loss.

- Line fault.
- Motor overload protection.
- Temperature fault.
- Shorted SCR.
- Stalled motor.

2. Provide indicating lights/system on the panel dead front door for the above faults and status:
    - Human interface module.
    - Running.
    - Fault.

1.11.27 POWER DISTRIBUTION TERMINAL BLOCKS

A. Line and load terminals shall be arranged for entry (top, bottom) for power wiring termination. Provide terminals and adequate space for all field wiring.

1.11.28 ACCEPTABLE MANUFACTURERS

A. Solid-state starters shall be manufactured by one of the following acceptable manufacturers:
    1. Allen-Bradley
    2. Schneider Electric
    3. Eaton
    4. ABB

1.12 TELEMETRY CONTROL SYSTEM

A. Design and Assembly
    1. All equipment and materials utilized in the system shall be the products of reputable, experienced manufacturers with at least five (5) years' experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same manufacturer. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring of operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing. All equipment, where practical, shall be of solid state, integrated circuit design.
    2. The system shall be completely assembled in a UL 508A/698A panel shop by a Control System Integrator. All components and equipment shall be prewired to the maximum extent possible.
    3. All components, including both internally and face-mounted instruments and devices, shall be clearly identified with phenolic nameplates of white background with black letters. Nameplates on the interior of panels shall be White Polyester with printed thermal transfer lettering and permanent pressure sensitive acrylic; TYTON 822 or pre-approved equal.

B. The telemetry control panel shall be manufactured and labeled in accordance with UL 508A/698A standards

1.12.2 EQUIPMENT ENCLOSURE

A. The control panel shall be NEMA 4X, stainless steel.

B. On enclosures 36 inches or larger, use 3-point draw roller type latching mechanism with a stainless-steel handle.

C. Provide a dead front panel. All control interface devices shall be mounted on an interior swing-out door.

1.12.3 ENCLOSURE DOOR LATCHES

A. Door latches shall be fast operating type 3-point latch door handle. Where a 3-point latch shall not meet rating requirements, use fast operating clamp assembles. The latch handle shall operate toward the center of the panel to open the door, and be pointing down when closed and locked. All cabinets shall be lockable with a padlock.

1.12.4 ENCLOSURE HEATERS

A. Provide a fan-driven resistance heater with 120 VAC line thermostat. Heaters shall be sized to keep control enclosure at temperatures acceptable to meet the operational requirements of the enclosed equipment. Heaters shall be 150 watts minimum and 400W for enclosures 36 inches and wider. The thermostat shall be adjustable between 40°F. and 80°F. Heaters shall be manufactured by Hoffman Engineering, bulletin D-85, or pre-approved equal

1.12.5 ENCLOSURE COOLING

A. Provide a 120VAC cooling filter fan system with 120 VAC line thermostat in each control enclosure. Cooling system size shall be sized to keep control enclosure at temperatures acceptable to meet the operational requirements of the enclosed equipment. Thermostat shall be adjustable between 40°F. and 105°F.

B. Provide thermostats to monitor/alarm to PLC if enclosure temperature is too low (below 40°F) or too high (above 100°F).

C. Provide weather protective shrouds over all ventilation openings that also prohibit insect intrusion.

1.12.6 PANEL LIGHT, CONVENIENCE RECEPTACLE, AND INTERFACE PORT.

A. Provide a motion activated LED panel each control enclosure.

B. Provide a GFIC duplex outlet, 120VAC, 15A, in all panels that require a computer or other maintenance tools that may need a power source. Provide an individual dedicated circuit.

C. Provide interface port with (1) ethernet RJ45 connection and (1) simplex receptacle (labeled for computer use only) on the front of the swing-out panel. Grace Port #P-R2-F2R0, or pre-approved equal.

1.12.7 RELAYS FOR GENERAL PURPOSE

A. Relays for general purpose use shall have, 10A contacts with the appropriate coil voltage for the application. All relays shall have an integral indicating light to show if there is coil voltage present. They shall have an 8-pin/blade base and matching socket.

1.12.8 CONTROL PANEL CIRCUIT BREAKERS

A. Control panel circuit breakers shall be thermal-magnetic type, supplementary overcurrent devices. Circuit breakers shall be snap mountable on same mounting rails as the terminal blocks. Circuit breakers shall be sized for actual circuit load. Provide one (1) spare circuit breaker of each size used.

1.12.9 FUSES

A. Fuses shall be of the type and amperage require to serve the intended load.

B. Provide blown fuse indicators on all fuses.

1.12.10 TRANSIENT VOLTAGE SURGE SUPPRESSER

A. Provide a surge suppressor, with indicator, in the control panel(s) to protect against overvoltage transients. Unit shall have a 120 VAC service voltage rating, a 500V peak maximum voltage protection level, a maximum surge current rating of 10,000A and a response time of less than 5 nanoseconds. Unit shall be provided with electrically isolated contact closure for remote status monitoring of suppressor.

1.12.11 POWER SUPPLIES

A. Power supplies for 24 VDC and 12 VDC power shall be linear type, sized to be able to supply the demand. The power supply for the current loops shall be separate from the other DC loads. Units shall be open frame type and have overvoltage and overcurrent protection.

1.12.12 UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. The uninterruptible power supply (UPS) to be installed shall be a continuously on-line type or have a transfer time of less than 1 millisecond. Unit shall be sized to operate on a 30A, 120 VAC 60 Hz. feeder and maintain 120 VAC load on battery backup for 10 minutes. Unit shall be shelf mounted and cord and plug wired to control system power. The UPS size shall be chosen by the Control System Integrator for the connected load plus 30%.

B. UPS shall include built in transient voltage surge suppresser (UL 1449) with a THD less than 5% at full load, for clean power to the PLC, power supplies and other power sensitive equipment. UPS shall include user interface with

indication of battery condition, capacity and programmable operating parameters.

C. UPS shall have dry contacts for monitoring utility power status and battery life.

D. UPS unit shall be designed to operate on both utility and standby power.

1.12.13 TERMINALS

A. Provide terminals for all wire connections to field wiring and internal power distribution. Analog loops that are 24 VDC powered shall have a knife switch to disable the loop if necessary. Connections shall have box type lugs capable of terminating (2) No.14 AWG stranded conductors.

B. Fuse terminal blocks shall be hinged disconnect level type with “blown fuse” indicators.

C. Disconnecting terminal blocks shall be knife type with light indicator.

D. Provide five (5) spare terminals or 10% whichever is the greater amount. In addition, provide extra din rail with enough space for 20% more terminals.

1.12.14 WIREWAYS

A. Provide molded plastic wireways complete with covers, slotted for wire connections for all wiring in the panels.

1.12.15 INTERCONNECTION WIRING/TERMINALS

A. The control panel manufacturer shall determine all requirements for field-installed interconnecting wiring between control system components, sensors, pumps and equipment. The Contractor shall determine the number, size, and type of wires and the number, size, type, and location of conduits and wireways.

B. All interconnecting wires installed by the Contractor shall be numbered at each end using custom pre-printed heat shrink sleeve markers. Terminations shall be made using solderless pressure connectors at all terminations. All conductors shall be stranded wire with thermoplastic insulation and shall be cabled to groups and supported so as to prevent breaking and to present an orderly arrangement and neat appearance. All outgoing wiring shall be terminated on a marked terminal strip capable of connection of at least (2) No.14 AWG stranded conductors. All terminal connections shall be numbered consecutively throughout the system.

C. For all energized circuits powered from the pump control panel and extending outside of the panel, provide an individual terminal for each circuit.

D. For all energized circuits powered outside of the panel which extend into the panel, provide a disconnecting terminal to isolate each individual circuit.

E. In general, all control wiring shall be stranded No.14 AWG.

F. Provide wireways as necessary in the enclosure to contain all internal wiring and all field wiring. Size wireways such that there is ample room for the wiring required by this contract. Wireways shall be filled to a maximum of 70% to allow 30% more future wire.

G. Low voltage DC control and signal conductors shall be bundled separately from alternating current circuits. Separate raceways and wire gutters shall be dedicated for AC and DC wiring, and labeled as such on the shop drawings. Wiring may cross at right angles if necessary. All wiring shall be neatly tied in position with nylon cable ties.

H. All wiring and tubing crossing hinges shall be installed in a manner to prevent chafing. Bundles of similar conductors shall be clamped securely to the door and to the panel, and the bundles shall run parallel to the hinge for at least 12 inches. Spiral nylon cable wrap shall be provided in the hinge section of the bundle to fully protect the conductors or tubing against chafing.

1.12.16 PROGRAMMABLE CONTROL EQUIPMENT

A. Programmable Logic Controllers (PLC's)
   1. Allen Bradley CompactLogix 5370 L1; exact model of PLC may be revised over time, contact the Wastewater Department for current model prior to design.

B. Programming of Programmable Controller
   1. Obtain Ethernet IP addresses from Wastewater Department.
   2. Test and startup programming provided by panel manufacturer.
      a) Panel manufacturer shall provide a copy of the test and startup program to City.
   3. Final Program: Owner Furnished.

1.12.17 OUTDOOR ALARM BEACONS

A. The outdoor alarm beacon shall be a vandal resistant, vapor proof, bracket mount fixture suitable for wet locations. The beacon shall be 120 VAC powered steady-on type LED light with red colored globe.

B. Provide and install all required mounting hardware.

1.12.18 DIGITAL PANEL METER

A. Panel meters for use with a 4-20mA DC signals shall be 4-1/2-digit, field scalable digital displays. LED readout shall have .56-inch-high numbers and have a selectable decimal point. Displays shall operate on 120 VAC power.
   1. Provide a digital panel for wet well level indication.
   2. Panel meter shall be mounted on the interior swing-out door.

1.12.19 WIRELESS NETWORK PROVIDER

A. All pump stations shall be equipped with a cellular modem and WIFI router operating on the City's existing Verizon Wireless 4G/5G Network Plan.

1.12.20 CELLULAR NETWORK PROPAGATION

A. Perform a software propagation study to determine and/or verify the following:
   1. Antenna type and gain.
   2. Antenna/cable system losses.
   3. Calculated RSRP, RSRQ and SINR.

B. The minimum acceptable RSRP shall be -75dBm. The minimum acceptable RSRQ shall be -5dB and the minimum acceptable SINR shall be 10. Adjust system parameters (Antenna gain, height, location) to achieve the minimum requirements.

C. The propagation study shall be submitted for Wastewater Department approval.

D. After approval of the software propagation study, perform field verification of the parameters using comparable modem and antenna equipment at the project site. This verification shall take place prior to placing the final equipment order. Submit results of field verification to Wastewater Department for approval and recommendation to proceed with equipment procurement.

1.12.21 CELLULAR MODEM

A. City approved cellular modem compatible with WIFI router configured to work with City's network plan. City will provide the modem, and the contractor shall reimburse the City.

1.12.22 WIFI ROUTER

1.12.23 TOSIBOX Lock 250, configured from the manufacture to communicate with City's VPN TOSIBOX LOCK 210 router. Exact model of router may be revised, contact the Wastewater Department for current model prior to design

1.12.24 ANTENNA

A. External antenna shall be Omni directional permanently mounted in secured location that provides the greatest cellular signal strength.

B. All antenna cables shall be standard coax or approved equivalent. Provide extra length of 10' for external antenna adjustment.

C. Contractor shall supply installation fixtures, and any mounting equipment required for the applicable installation including, but not limited to, the following:
   1. Towers/support.
   2. Cable ties.
   3. Surge protection devices.
   4. Cable.
   5. Antennas.

6. Grounding.
7. All other appurtenances as required by the manufacturer.

D. Provide raceways for antenna cable up to 10 feet above finished grade for cable protection.

1.12.25 LIGHTNING/SURGE ARRESTOR

A. Lightning/surge arrestors shall be installed on every antenna system installed. A ground conductor shall be run directly from the lightning/surge arrestor to a suitable ground rod via the shortest path possible in accordance with the NEC. The ground rod shall be bonded to the grounding electrode system.

B. Lighting arrestor ground connections shall be exothermically welded to the grounding electrode system.

C. Lightning/surge arrestors shall be UL Listed.

1.12.26 SPARE PARTS

A. Provide the following spare parts with the telemetry control panel.

1. Qty 1 Relay of each type used or 10% whichever is the greater amount
2. Qty 1 lamp of each type used or 10% whichever is the greater amount.
3. Qty 200% spare fuses (two spare fuses for each fuse supplied)

1.13 CONTROL SENSORS

A. All control sensors shall be rated for the environment in which they will be located. In general, devices mounted outdoors, or in wet or corrosive environments shall be NEMA 4X; devices located in hazardous areas (Class 1, Division 1; or Class 1, Division 2) shall be NEMA 7/9 or intrinsically safe.

1.13.2 WET WELL LIQUID LEVEL TRANSMITTER (PRIMARY)

A. Provide one “liquid-level” measuring device using radar technology for sewer applications with highway addressable remote transducer (HART) communication per wet well.

B. Primary lift station pump/level control shall be based on the digital signal detecting pre-determined wet well levels from the radar sensor.

C. Radar sensor shall be suspended on 1/8-inch diameter SS cable with epoxy coated or rigid stainless-steel mount weighted from underside of wet well lid and vertically positioned to avoid possible signal interference or false reflections. Sensor cables are not designed as sensor supporting or suspension cables.

D. Radar sensor shall be connected via an un-spliced sensor cable to a NEMA 4X junction box with aneroid bellows and shall be rated intrinsically safe, 24 VDC loop powered with an output signal of 4-20mA hardwired to the pump control panel.

E. Radar level sensor shall be Endress + Hauser, Micropilot FMR20 HART series installed per manufacturer's recommendations, or pre-approved equal.

F. An optional Bluetooth® wireless technology interface may be proposed and configured using the SmartBlue® App in lieu of the un-spliced sensor cable. This option must be presented prior to design and pre-approved by the Wastewater Department prior to installation.

G. The device shall be equipped with integrated overvoltage protection.

H. Pressure transducers and Ultrasonic level measurement equipment are not acceptable as primary lift station pump/level control devices.

1.13.3 FLOAT-TYPE LEVEL SWITCHES (BACK-UP)

A. Provide (2) float switches for pump control:
   1. LSHH: High-high level alarm and call all pumps on.
   2. LSLL: Redundant pumps off, and low-low level alarm.

B. Float control shall be hardwired to the pump control panel.

C. All float status feedback shall be wired to the telemetry control panel for monitoring.

D. Float-type level switches shall be mercury tilt tube switch type with a separate, epoxy coated, adjustable weight on the cord. Switches shall have polypropylene housing, permanently encapsulated N.O. (or N.C.) rated at 12A at 115V. Cable shall be 3 No.16 AWG, stranded, with PVC jacket, integral to float with sufficient length to meet requirements. Float switches shall be Consolidated Electric Model LS, or pre-approved equal. Provide stainless-steel mounting hardware to meet the requirements for the installation.

1.13.4 FLOAT CORD WEDGE CLAMPS

A. Float-Cord wedge clamps shall be aluminum service wedge clamps with flexible bail, American Electric W-1 or W-1B series.

1.13.5 WET WELL CABLE SUPPORT

1. Provide a stainless-steel mounting bracket in an accessible location inside the wet well for suspending all control cables from stainless steel cord grips.
2. Install individual color-coded tape on all float cords for ease of identification.

1.14 ARC-FLASH HAZARD RISK ASSESSMENT

1. Arc-Flash Risk Assessment shall be conducted per NFPA-70E utilizing the calculation method via IEEE 1584-2018. The risk assessment shall include the following studies:
   a) Short-circuit study.
   b) Selective coordination study.
   c) Arc-flash study.

- The study shall be performed from source down to all 120V panels.
- The "2-second" rule shall be utilized, where appropriate.
- Standard electrical distribution equipment conductor distances shall be used.
- Conductor orientations shall be analyzed and used.

2. Report Format at a minimum include the following sections:
   a) Cover sheet.
   b) Professional engineer stamp sheet.
   c) Table of contents.
   d) Executive summary, assumptions, conclusions, and recommendations.
   e) Short-circuit study analysis, deficiencies, and results.
   f) Selective coordination study analysis, deficiencies, and results.
   g) Arc-flash study analysis, deficiencies, and results.
   h) Appendices:
      - One-line diagram displaying all analyzed electrical equipment, OCPD settings, conductor/conduit types, lengths, and sizes.
      - OCPD cutsheets indicating product number and installed location.
      - Individual OCPD TCC curves.
      - Selectively coordinated OCPD TCC curves.
3. All data collection and imported data.
4. Provide arc-flash hazard labels per NFPA-70E and City labeling standard.
5. Analysis shall be performed using one of the following power system analysis software:
   a) ETAP.
   b) Easy Power.
   c) SKM.

CIVIL

1.15 WET WELL AND VALVE VAULT

A. Wet well size shall be 96” inside diameter or larger and deep enough to provide storage capacity for a 90-minute response time during projected peak flows from high water alarm elevation to overflow conditions at the nearest manhole or dwelling sewer stub. Minimum wall thickness of 6 inches is required.

B. Minimum valve vault size shall have inside dimensions (round) 72” dia. x 7’-0” tall or (square) 6’-0” x 6’-0” x 7’-0” tall. Minimum wall thickness of 6 inches is required. Valve vault shall be located no farther than 5 feet from the wet well.

C. All wet wells and valve vaults shall be watertight reinforced precast concrete manhole modular sections (ASTM C478) conforming with ACI 318 and accommodating a minimum AASHTO Load Rating of H-20 Loads.

D. All modular sections shall be tongue and groove joints and gasketed with Vulkem 116, extruded butyl rubber or pre-approved gasket conforming with ASTM C923.

E. Cement shall have a minimum ultimate compressive strength of 3000 psi at 28 days conforming with ASTM C150

F. Reinforcing requirements shall conform with ASTM A615 and A185.

G. Wet well base shall accommodate a 1:1 hopper bottom to avoid solids accumulation at the pump intake and along the edges on the bottom of the wet well.

H. All interior surfaces of wet well valve vault and discharge gravity sewer structure shall be coated with a self-priming polyurethane lining material prior to the installation of appurtenances. Allow for sufficient cure time.

I. Wet well and valve vault concrete surfaces around the hatches shall be broom finished or covered in a non-slip finish.

J. All penetrations through wet well and valve vaults must be shown on plans and shall be cored with KOR-N-SEAL® grouted in-place or pre-approved flexible connector.

K. Wet well inlet shall include PVC tee installed to direct sewage away from and avoid turbulence near pump intake. No down spout stand pipe shall be required.

L. Wet wells deeper than 15’ require a single inlet. An upstream manhole accepting converging gravity sewer pipes may be required.

M. All drainage inside the valve vault shall have a broom finished floors that drains back into the neighboring wet well through a 4” drain pipe employing a check valve, wall flapper, or pre-approved plumbing venting device.

N. Wet well access dimensions and location shall be centered over wet well and orientated in accordance with the pump manufacturer’s minimum clear opening requirements plus (+) the next larger hatch size such that pump entry system is not in conflict with the hatch and fall protection grating. Minimum valve vault access clear opening dimensions shall be 48” x 48” centered above valve vault. Opening swing direction as directed by City.

O. All access hatches shall be all aluminum frames with spring assist and lockable “diamond pattern” aluminum cover plates. All internal components and hardware to be stainless steel T-316 or pre-approved equal.

1. Wet well access hatches shall conform with Halliday® Series W1S single-door hatch standard features and specifications or pre-approved equal.
2. Valve vault access hatches shall conform with Halliday® Series H1R4848 single-door hatch standard features and specifications or pre-approved equal.

P. Fall protection grates installed per access hatch manufacturer's requirements shall be required on all new wet wells and valve vaults. Grate panel must be able to sustain a 300 lb. load and shall be powder coat finished in Safety Orange color. All internal components and hardware shall be stainless steel T-316 or pre-approved equal.

Q. Pumps and related pipes and appurtenances shall be labelled as Pump #1 and Pump #2 on inside wall within wet well and valve vault below access opening.

1.16 PUMP(S)

A. Pumps shall be Flygt centrifugal non-clog vertical submersible pumps and motors for wastewater pumping applications and capable of passing minimum three-inch (3") solids as manufactured by Xylem or pre-approved equal. Each pump shall also be explosion-proof (NEC Class 2, Division 1, Group D).

B. Only pump manufacturers with local sales and service within 25-mile radius or 30-minute response time to Coeur d'Alene are acceptable.

C. Hydraulic connectors, guide rails and lifting chains (cables not acceptable) must be provided by pump manufacturer. All steel appurtenances and hardware shall be stainless steel T-316.

D. All pumps, piping, and appurtenances shall be protected from freezing temperatures and the elements of local weather conditions.

1.17 ODOR CONTROL

A. All pump stations shall anchor (secure) a polyethylene container filled with activated carbon inside pump station fence to suppress escaping sewage odors. Unless approved by the City otherwise, carbon filters shall be Orenco® CF4 or pre-approved equal.

B. All underground vent piping and fittings shall be 4-inch C900 PVC pipe buried a minimum of 24 inches below finish grade and sloped to drain back into wet well. Vent pipe shall extend from wet well wall to carbon filter inlet inside unobstructed corner or edge of pump station fence. Outlet shall be covered to prevent precipitation accumulation inside filter and with #18 mesh screen to prevent insect intrusion.

C. Activated carbon media shall have a capacity of 0.14 grams hydrogen sulfide H2S removal per cubic centimeter media and capable of removing other general acid gases and odors common to sewage pump stations.

D. Wet well circulation equipment shall be secured to the bottom of wet well with minimum of 6.0 CFM ambient air supplied continuously through a ½ HP compressor securely mounted within a separate waterproof box with air intake screen adjacent to control panel. Circulation equipment shall be a Gridbee® Model AP500 as manufactured by Medora Corporation or pre-approved equal.

E. Circulation equipment, mounting bracket, hardware, and retrieval chain shall be stainless steel T-316. All hoses and fittings shall be EPDM and PVC.

1.18 FORCE MAIN AND APPURTENANCES

A. All pipes within wet well and through valve vault shall be a minimum 4" dia. Ductile Iron (DI) Class 51 or 52 pipe conforming with ANSI/AWWA C151/A21.51 with a 350-psi pressure rating. Two (2) DI flexible sleeve-type pipe couplers per pump discharge pipe between the wet well and valve vault is required (4 total).

B. All force mains (outside of valve vault) shall be a minimum of 4" dia. PVC pipe conforming with ANSI/AWWA C-900 or C-905 DR-18 (ASTM D3139, F477) and installed at uniform grades of no less than 0.50% between high and low points, fittings, and appurtenances. Curved force mains must not exceed manufacturer's recommended bending radii. Minimum bury of 5' is required on all force mains.

C. Metallic "pressure sewer below" warning tape shall be placed 24" directly over all force mains within backfill.

D. Ten (10) gauge T.H.H.N. copper insulated tracer locating wire shall be securely taped directly to the top of all force mains. Tracer locating wire shall extend to finish grade within isolation valve can(s), locating wire boxes marked "sewer", or witness post with warning signs. All wire breaks shall be spliced with 3M Splice Kit® or pre-approved watertight splice kit.

E. Immediately after paving, tracer locating wire continuity test and painted locates shall be demonstrated to the City before acceptance of force main.

F. All flanged fittings shall be coated Ductile Iron (DI) fittings conforming with ANSI/AWWA C110/A21.10 with a 250-psi pressure rating and installed with manufacturer provided rubber gaskets for sewer applications.

G. All mechanical joint fittings shall be coated Ductile Iron (DI) fittings conforming with ANSI/AWWA C110/A21.10 and C111/A21.11 (C153/A21.53) with a 350-psi pressure rating and require "Mega-Lug® mechanical joint restraints, and/or concrete thrust blocks, or as required by the City.

H. All cast-in-place concrete thrust blocks shall require all fittings to be completely wrapped entirely in plastic prior to concrete placement. City inspection is required prior to concrete placement. Precast concrete suitcases are not acceptable alternatives.

I. All nuts, washers, bolts, and other miscellaneous hardware shall be stainless steel T-316. Field coating of any of the aforementioned steel hardware, pipes, fittings and appurtenances will not be acceptable.

J. All thrust bracing, anchors, and pipe support/clamps inside wet well and valve vault shall be stainless steel T-316 or pre-approved equal.

K. On the valve vault discharge pipe and at all low points on the force main, a 4" dia. pressure sewer cleanout with isolation valve shall be required. Secure 3"

dia. stainless steel female camlock connection with stainless steel male camlock plug to top of stand pipe located directly below valve vault or manhole structure access cover. Stand pipe shall be secured to inside wall of valve vault or manhole with approved pipe support/clamps.

L. A combination air release/vacuum (ARV) valve shall be placed within a manhole structure at all force main high points. All ARV valves shall be appropriately sized and require a stainless-steel conical body-shaped assembly for sewage application as manufactured by A.R.I.® or pre-approved equal. All assemblies shall be secured to inside wall and/or ceiling of manhole with approved pipe supports/clamps. ARV valves shall vent sewer gases into a contained activated carbon filter inside manhole or nearby gravity sewer system. All fittings, pipe, valves, and other hardware shall be stainless steel and/or pressure rated PVC. Galvanized or coated materials will not be acceptable alternative.

M. All valves inside valve vault shall be flanged plug valves with quarter turn handle operations. All plug valves shall be manufactured by DeZurik® or pre-approved equal and shall be coated with corrosive resistant fusion-bonded epoxy coating as provided by the manufacturer for sewage application. Field coating will not be acceptable alternative. Match force main size.

N. Isolation valves shall be required on all new force mains at a minimum of 1000-foot intervals or as required by the City. Match force main size.

O. All isolation or buried valves shall be resilient wedge gate valves with non-rising stem and 2” square nut operator directly under valve cans marked “sewer”. All plug valves shall be manufactured by Tyler/Clow/Kennedy/M&H® or pre-approved equal and coated with corrosive resistant fusion-bonded epoxy coating as provided by the manufacturer for sewage application. Field coating will not be acceptable alternative. Match force main size.

P. All check valves inside valve vaults shall be swing check valves with removable top and external lever arm and spring. All swing check valves shall be manufactured by Tyler/Clow/Kennedy/M&H® or prior pre-approved equal and coated with corrosive resistant fusion-bonded epoxy coating as provided by the manufacturer for sewage application. Field coating will not be acceptable alternative. Match force main size.

Q. A pressure gauge assembly with dial face and pressure switch/diaphragm seal shall be tapped directly onto ductile iron fitting within valve vault for each pump. Gauge shall be glycerin filled with dial orientated so pressure readings can be seen from above through access hatch. All parts shall be stainless steel T316 and located above a 1” Stainless steel ball valve.

R. A flanged inline magnetic flow meter is required on force mains downstream of valve vault within a separate vault or manhole structure at all pump stations. Magmeter shall be chemical and corrosion resistant rated for sewage applications with remote display. Remote display shall be placed

with external display within control panel or within a separate box mounted adjacent to control panel.

S. All sleeves encasing force main shall conform to ISPWC latest edition.

1.19 PUMP STATION SITE

A. Pump station shall be located adjacent to a public street within a separate parcel lot dedicated to the City. Minimum site shall be sized as approved by the City Land lock parcels will only be acceptable with City approved approach, 20' wide easement dedicated to the City and 12' wide all-weather driveway access (asphalt or concrete hard surface). Copies of easement shall be provided to the City, shown on all drawings and Plat, and recorded with the County Assessor's Office.

B. Pump station access from public street approach shall be designed to accommodate wastewater vehicular H-20 traffic on an approved all-weather access (asphalt or concrete hard surface) such that the vehicle does not impede traffic flow when access gate is closed.

C. A 6-foot-high galvanized chain-link fence conforming with ISPWC shall be required around and enclose all pump stations. Fence shall include a lockable 16-foot clear opening double swing or 16' roller gate located at vehicular access. Enclosure size and gate location shall be approved by City. All fences shall include 6'-tall uniform colored privacy slats and appropriate signs facing outward.

D. When access gate is open, vehicles shall have unimpeded direct access to wet well and valve vault. All electrical, mechanical, control panel, generator inside pump station fence shall be accessible and free of obstacles including tripping hazards.

E. Unless specified by the City otherwise, all ground surface area inside pump station fence shall be graded to drain away from wet well with no finish surface slope greater than 3.5% in any direction. Access driveway and pump station are not to be subject to flooding from stormwater runoff.

F. All finish surface area within pump station fence shall be paved with 3" asphalt on 6" compacted base rock on compacted subgrade. Compaction testing report are required.

G. Unless public drainage facilities are readily available, all stormwater runoff within the pump station parcel shall be mitigated with an "onsite" storm water management system conforming to the latest revision to the local storm water ordinance.

H. Account for snow storage within pump station fence. All surrounding property shall be mitigated in a separate storm water management system.

I. All disturbed areas during construction shall be restored in kind or better. All restored surfaces outside of pump station fence may require hydroseeding with a dryland grass mixture approved by the City.

1.20 REQURIED SUBMITTALS

A. Design Calculations. Submittal shall include a complete set of design calculations, including the following:

1. Design criteria, assumptions and operating parameters,
2. Calculations for average and peak hourly sewer flows for initial and ultimate build out using C-100 for DI Pipe and C=120 for PVC Pipe.
3. Calculations for wet well volume and cycle times for average and peak hourly flows.
4. Pump performance and system head curves,
5. Stormwater calculations,
6. Force main performance calculations (head loss and velocity),
7. Conclusive data showing impact of discharge on the existing downstream sewer system, and
8. Storage capacity during pump and power failure.

B. Construction Plans. (1) Full size and (1) reproducible reduced-size (11”x17”) copies showing the following:

1. Site plan showing vicinity location map, outlining sewer service area, access, existing contours, lot lines with all easements and R/W within 300’, all utilities, and public safety equipment during construction,
2. General pump station layout (plan view) showing finish surface contours and spot elevations, location of all pump station components, fencing, stormwater system,
3. Cut away section profile showing wet well, valve vault with elevations, pipe, fittings, appurtenances, pump, controls, odor control, hatch locations, etc.,
4. Plan and profile showing elevations of gravity sewer system, force main and all appurtenances,
5. Details needed for construction and inspection, and
6. Plan and profile of all wiring, controls, mechanical and electrical components including panels.
7. Site restoration plans including landscaping, irrigation, etc.

C. Technical Specifications. Material and construction specifications, including all civil, electrical and mechanical components.

D. City and Other Regulatory Agency Approval. Written approval for construction by the State of Idaho Department of Environmental Quality (IDEQ) including IDEQ’s Wastewater Pumping Station Checklist shall be submitted to City for City of Coeur d’Alene approval prior to construction.

E. Pump station contractor shall be solely responsible for securing all Agency approvals, required permits, paying fees and setting up inspections.

1.21 FINAL ACCEPTANCE BY THE CITY

A. Prior to final acceptance of the pump station, the applicant must submit the following at no additional cost to the City:

1. No sewer may be introduced to pump station until City Accepts and takes ownership of the pump station.
2. Pressure Test. All force mains shall be tested and witnessed by the City at a minimum pressure of 150 psi for 2 continuous hours or according to the latest revision of the Idaho Standards for Public Works Construction (ISPWC) for water mains. All blow-off valves shall be verified by the City.
3. Start-up. Results of testing, inspections, and certification by the Engineer of Record that the system passed all start-up tests and that the pumps operate at the rated design capacity. Each pump must be tested continuously for a total of at least 30 minutes. All alarm and control features shall also be tested and certified. Representatives of the City shall be present for the pump station start-up testing procedures. Pump stations that are not utilized within 1 year of City Acceptance will require a re-demonstration of pump station start-up performance prior to the City issuance of Certificate of Occupancies to potential public sewer dischargers.
4. Guarantee. Dedication of the ownership of the force main and pump station to the City free and clear of all liens and encumbrances. The applicant shall guarantee the constructed system for a period of one year from the date of written acceptance. Any repairs, replacement, or system failures will be corrected by the applicant at no cost to the City.
5. Bonds. A bond or other suitable guarantee to cover all maintenance, power, pump replacement, and repair costs for one (1) year following written acceptance by the City.
6. Warranty. An extended 2-year warranty on the pumps must be provided by the pump supplier, except for systems where the initial flow is less than 25% of the design flow.
7. Record “As-Built” Drawings. One (1) reproducible full-size and reduced (11"x17") Recorded “As-Built” drawings shall be submitted to the State of Idaho Department of Environmental Quality (IDEQ) and the City of Coeur d’Alene in accordance with within thirty (30) calendar days of completion of the pump station project. Prior to City final acceptance, IDEQ must approve the record “As-Built Drawings. All wires shall be tagged and all programs submitted to the City on disc. Record As-Built drawings shall also be placed in all Operation and Maintenance Manuals.
8. Easements. All rights-of-way and/or easements for construction, operation and maintenance of the system shall be recorded with the Kootenai

County Assessor's Office and copies placed in all Operation and Maintenance Manuals.

9. City Costs. All user equity fees and all City administration, inspection, and other costs have been paid in full.
10. O&M Manuals. Two (2) hard copies and one PDF copy of the Operation and Maintenance Manuals approved by the City. Operation and Maintenance Manuals shall contain operation and maintenance instructions, repair data, parts lists, manufacturer's warranty, Record As-Built documents (drawings), permits, easements, photographs, test results, schematics for all mechanical, electrical, and civil design components, and all other pertinent information.

Note: Any or all of these policies and procedures may change without notice. The City may grant variances from the individual policies on a case-by-case basis. Approval of Plans by the City is independent of any other agency approval. It is the responsibility of the Owner or applicant to secure approvals and permits from all other regulatory agencies.