

<p>GENERAL</p> <p>1 The electrical system shall comply with the requirements of the latest edition of the Canadian Electrical Code and with all provincial and municipal laws, rules and ordinances, and to the authority having jurisdiction.</p> <p>2 Provide all materials, labour and equipment necessary for installing, testing and replacing in initial operation the complete electrical system.</p> <p>3 Examine all plans and specifications pertaining to this Contract. Notify Contract administrator of errors or omissions before submitting the price. Failing such notification, this Contractor shall meet all such requirements without extra cost to the City.</p> <p>4 Obtain all necessary permits, pay all necessary fees and give all necessary notices.</p> <p>5 All equipment supplied under this Contract shall be new and shall be CSA and locally approved.</p> <p>6 All Work shall be laid out in its mechanical appearance. It shall be logically arranged for simplicity of accessibility and electrical efficiency.</p> <p>7 Provide lamacoid nameplates for all electrical equipment/devices. Mount nameplates on all equipment to indicate function, designation voltage and power of devices: - Normal power: white/black letters, - UPS/emergency: yellow/black letters. Provide listing of lamacoids to Contract administrator for approval prior to ordering.</p> <p>8 The Contractor is to examine the conditions of the Site and be responsible for relocating or removing and replacing all equipment necessary for the Work required for this project.</p> <p>9 All Work completed to shall be accomplished in a first class and Workmanlike style.</p> <p>10 Submit 3 copies of shop drawings to Contract administrator, within 2 days of award of Contract for approval and inclusion in O&M manuals.</p> <p>11 This specification is not intended to restate the applicable codes. The Contractor will be responsible for providing all grounding, access panels, etc. and following all wiring methods.</p> <p>12 Prior to scheduling final inspection, Contractor is to ensure that all Work is completed and in particular that O&Ms are completed, all nameplates installed, verification tests have been done and certificates have been received that indicate Work installed conforms to requirements of the authority having jurisdiction.</p>	<p>WIRING METHODS</p> <p>1 Conductors shall be copper. Minimum wire size shall be #12 AWG RW90 unless as noted.</p> <p>2 Install a separate EMT conduit for each electrical system run. BX will be allowed in finished walls only.</p> <p>3 Mark all wires to indicate designation and/or function with self adhesive numbers at each termination and junction.</p> <p>4 Outlet, junction and switch boxes shall be galvanized steel and sized according to the latest edition of the CEC and to suit each application.</p> <p>5 All conduits to have separate insulated ground conductor.</p> <p>6 The entire installation shall be grounded in conformance with latest edition of the CEC.</p> <p>7 Install approved vapor boxes for each junction box mounted on a vapor barrier surface. Assure that all the wire penetrations are caulked.</p> <p>8 Run conduit parallel to building lines with maximum 4 (four) 90 degrees bends.</p> <p>9 All devices, wiring and electrical equipment shall be securely attached to the building structure to acceptable industry standards.</p> <p>PANELBOARDS</p> <p>1 Install circuit breakers in panelboards before shipment.</p> <p>2 Panelboards: to CSA C22.2 No.29-1989(R2004).</p> <p>3 Bus and breakers in branch circuit panelboards, shall be rated for 18kA (symmetrical) interrupting capacity minimum or as indicated.</p> <p>4 Provide panel cover for panelboard complete with two keys for each.</p> <p>5 Multi-pole breakers shall be of one piece construction with common trip.</p> <p>6 Mains shall be suitable for bolt-on with thermal and magnetic tripping. Each breaker to be identified with permanent number identification as to circuit number and phase.</p> <p>7 Tubs code gauge galvanized steel, reversible top and bottom, solderless connections, copper bus with neutral of same ampere rating as mains. Adjustable molded insulator assemblies integral with bus bars.</p> <p>8 Load centers shall not be accepted.</p> <p>9 Provide nameplate for each panelboard to indicate panel designation and voltage.</p> <p>10 Complete circuit directory with typewritten legend showing location and load of each circuit.</p> <p>11 Locate panelboards and mount securely, plumb true and square to adjoining surfaces. Install surface mounted panelboards on plywood backboards.</p> <p>12 Trim and door finished to be baked gray enamel flush or surface mounted as indicated.</p>	<p>2. Testing</p> <p>a) Design Prototype Tests:</p> <ol style="list-style-type: none"> Maximum power (kW). Maximum motor starting (kVA) at 35% instantaneous voltage dip. Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-32.40. Governor speed regulation under steady-state and transient conditions. Voltage regulation and generator transient response. Harmonic analysis, voltage waveform deviation, and telephone influence factor. Three-phase short circuit tests. Alternator cooling air flow. Torsional analysis to verify that the generator set is free of harmful torsional stresses. Endurance testing. <p>b) Production Tests</p> <p>- Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:</p> <ul style="list-style-type: none"> Single-step load pickup. Transient and steady-state governing. Safely shutdown device testing. Voltage regulation. Rated Power @ 0.8 PF Maximum Power. A certified test record to be sent prior to shipment. <p>c) Site Tests</p> <ol style="list-style-type: none"> Site Tests: An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The Contract administrator shall be notified of the time and date of the Site test. The tests shall include: 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. These shall include: block heaters, battery charger, alternator strip heaters, etc. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and frequency, and phase rotation. 	<p>1.4 Generator Controller</p> <p>a) Applicability</p> <ul style="list-style-type: none"> The control must be usable on 12 volt starting systems. Environment: -20°C to +70°C operating temperature range (without starting aids); 5-95% humidity, condensing. The control shall be mounted on the generator set or mounted on the generator set sound shield/enclosure. If mounted on the generator, the control must be easily viewable. <p>b) Hardware Requirements</p> <ul style="list-style-type: none"> The control shall have a run-off/reset-auto three-position master switch. The master switch reset will also be used to clear alarms. Light-emitting diode (LED) display for viewing faults (warnings and shutdowns), runtime, and make setup adjustments. Sealed keypad for menu selection and data entry. The control shall include potted electronics and sealed connections for environmental protection. <p>c) Control Functional Requirements</p> <ul style="list-style-type: none"> Field programmable adjustments for voltage, voltage gain, volts/hertz, governor speed, and governor gain. Field programmable adjustments of generator model, phase, frequency, voltage, magnetic pick-up, battery voltage, and communication settings. Programmable cyclic cranking for six crank cycles, 15 seconds per crank cycle, and time delay at start of crank cycle to allow solenoid action. A digital voltage regulator must be in the controller software. The accuracy must be 1% no-load to full-load. No separate voltage regulator is acceptable. <p>d) Generator System Monitoring Requirements</p> <p>- The following generator functions must be monitored and announced:</p> <ol style="list-style-type: none"> Generator runtime Crank Cycle Fault High Battery Voltage Fault High Engine Temperature Fault Low Battery Voltage Fault Low Coolant Level Fault Loss of Coolant Fault Low Oil Pressure Fault Overcrank Fault Over Frequency Fault Overspeed Fault Over Voltage Fault Under Frequency Fault Under Voltage Fault 	<p>2 TRANSFER SWITCH</p> <p>2.1 Transfer switch shall be 60 Amp current rating, 208 V, 3 Pole, 4 wire, 3 phase, 60Hz, solid Neutral. The withstand and closing ratings with any overcurrent protective device shall be 20,000 Amps. The ATS shall be furnished in a NEMA 1 enclosure with drip proof top cover.</p> <p>2.2 Mechanical Requirements</p> <ol style="list-style-type: none"> All main contacts shall be of silver composition. The main contacts shall be protected by arcing contacts in sizes 400 amperes and above. The main contacts shall be of the blow-on configuration and of segmented construction in ratings 600 amperes and above. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors. All contacts, coils, springs, and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power conductors. <p>2.3 Transfer Switch Control System</p> <ol style="list-style-type: none"> The control module shall direct the operation of the transfer switch. The module's sensing and logic shall be a built-in microprocessor-based system for maximum reliability, minimum maintenance, and inherent digital communications capability. The control settings shall be stored in nonvolatile EEPROM. The module shall contain an integral battery-backed programmable clock and calendar. The control module shall have a keyed disconnect plug to enable the control module to be disconnected from the transfer mechanism for routine maintenance. The control module shall be mounted separately from the transfer mechanism unit for safety and ease of maintenance. Interfacing relays shall be industrial control grade plug-in type with dust cover. The control module shall include a user interface keypad with tactile feedback pushbuttons and light-emitting diode status indication. These features shall be user accessible when the enclosure door is closed: <ul style="list-style-type: none"> Keypad pushbuttons: <ul style="list-style-type: none"> Start/end system test Lamp test/service reset Light-emitting diode status indicators: <ul style="list-style-type: none"> Contact Position: Normal, Off, Emergency Not in automatic mode <p>2.4 Output</p> <ol style="list-style-type: none"> Generator engine start. Pre-transfer load control. Generator running output. 2 additional NO&NC generator status contacts (running/off) <p>2.5 Operation</p> <ol style="list-style-type: none"> All phases of normal and all phases of emergency shall be monitored for over and under voltage and single phase of normal and emergency for over- and under-frequency. In addition, the controller shall use anti-single phasing protection that detects regenerative voltage (using the phase angle of the source) to determine a failed source condition. Emergency generator shall start on a signal from transfer switch, on loss of normal power and transfer the transfer switch. Selector switch in auto position and the normal supply voltage operating, the generator unit is on "automatic service" and shall start and transfer automatically on power failure. Upon return of normal power supply voltage, the generator set will continue to run for a pre-set period of time (5 minutes) and will then automatically return the transfer switches to normal. The engine will continue running for a preset period of time and will then be automatically turned off. Selector switch in "manual" position, engine starts and runs up to output until shut off manually. (no transfer takes place). Selector switch in "test" position, engine starts and system transfer switch, to emergency service. (simulating power failure as described for automatic conditions). 																												
<p>WORK IN EXISTING BUILDING</p> <p>1 The building shall remain open and in normal operation during the construction period.</p> <p>2 Where existing services such as electrical power, fire alarm system, sound system, etc. are required to be disrupted and/or shut down, coordinate the shutdowns with the City and carry out the Work at a time and in a manner acceptable to them. Carefully schedule all disruption and/or shutdowns and ensure that the duration of same is kept to the absolute minimum. Allow for scheduling of shutdowns to after-hours.</p> <p>3 Should any temporary connections be required to maintain services during Work in the existing building, supply and install all necessary material and equipment and provide all labor at no extra cost. Should any existing system be damaged, make full repairs without extra cost, and to the satisfaction of the Contract Administrator.</p> <p>4 Patch and repair walls, floors and ceilings in existing areas that have been damaged or cut open due to the new electrical installation.</p> <p>5 Where new cables or conduits have been installed through existing fire rated walls, seal opening around cables and conduit to maintain fire rating.</p> <p>6 New electrical equipment/devices required to be tied into existing electrical systems shall match the existing manufacturer and system.</p> <p>7 Where services are concealed within walls, floors or ceilings, and cannot be visually recognized, Contractor shall provide acceptable means to locate and identify concealed services prior to commencing Work.</p> <p>CLEANING</p> <p>1 Maintain the Work in tidy condition, free from the accumulation of waste products and debris.</p> <p>2 Remove waste material and debris from Site and deposit in waste containers at the end of the each Working day.</p> <p>3 Clean interior areas prior to commencement of finish Work. Maintain areas free of dust and other contaminants during finishing operations.</p>	<p>DELIVERABLES</p> <ol style="list-style-type: none"> Contractor shall maintain at the job Site one set of plans, which he shall clearly note all changes or deviations from the Contract document as the job progress. Submit to the Contract administrator at the competition of the Work. Provide 3 (three) copies of O&M manuals. O&M manuals to be in accordance with the requirements of technical bulletin #15 issued by the joint MAA/WCA committee and the Contract general conditions. Submit one preliminary copy to the Contract administrator prior to competition of Work. Revise as directed and submit final copies, also include a copy of the panel directories and all inspections and testing certificates. <p>GENERATOR SET</p> <p>GENERAL</p> <p>1. Shop Drawings and Product Data:</p> <p>1.1. Submit shop drawings for review and approval. Include:</p> <ol style="list-style-type: none"> Engine: make and model, Alternator: make and model, Voltage regulator make, model and type, Automatic transfer switch: make, model and type, Battery: make, type and capacity, Battery charger: make, type and model, Governor type and model, Continuous full load output of set at 0.8 pf lagging. Description of set operation including: <ul style="list-style-type: none"> automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency manual starting automatic shutdown and alarm on: <ul style="list-style-type: none"> overcranking overspeed high engine temperature low lube oil pressure Over and under frequency protection, Over and under voltage protection, Enclosure construction shop drawings, Alarms and extra contacts. 	<p>PRODUCTS</p> <p>1 Generator Set</p> <ol style="list-style-type: none"> The generator set shall be rated 13 kW stand by rating, 120/208 V 3ø/ 4 wire, 0.8 power factor, 60Hz, using natural gas as fuel. The generator set shall be capable of this rating while operating in an ambient condition of 25°C and 1000 m above sea level. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base. Acceptable genset manufacturers shall be Kohler, Onan and Caterpillar. <p>1.1 Engine</p> <ol style="list-style-type: none"> The engine shall be complete with an electronic isochronous governed speed of 1800 rpm, capable of +0.5% steady-state frequency regulation, 70-Ampere minimum automatic battery charging alternator with solid-state voltage regulation, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain, dry-type replaceable air cleaner elements for normal applications. The naturally aspirated engine shall be fuelled with natural gas and be supplied with a unit-mounted electric solenoid fuel shut-off valve, flexible fuel line, and secondary fuel pressure regulator. The engine shall have a minimum of 4 cylinders, and be liquid-cooled by a unit-mounted radiator, blower fan, water pump, and thermostats. <p>1.2 Cooling System</p> <ol style="list-style-type: none"> A unit mounted radiator for the standby generator set to be complete with all necessary connections. The coolant shall be supplied with a 60% ethylene glycol solution, capable of withstanding temperatures down to -50°C. Provide air intake motorized dampers to open to provide cooling/combustion air during operating conditions. <p>1.3 Alternator</p> <ol style="list-style-type: none"> The alternator shall be salient-pole, brushless, 12-lead reconnectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-33.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotor and stator shall be limited to 130°C. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/- 2% at any constant load from 0% to 100% of rating. The alternator having a single maintenance-free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel. 	<p>1.5 Accessories</p> <ol style="list-style-type: none"> An 80% rated line circuit breaker of 60 amperes, 60 amps sensor, 600 volt rated, molded case type, generator mounted. Engine block heater thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA-99 and NFPA-110, Level 1. 6-Ampere automatic float and equalize battery charger with +/- 1% constant voltage regulation from no load to full load over +/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambient temperatures from -40oC to +60oC, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected. Fuel shut-off solenoid valve. Starting battery and cables. 12V starter motor. <p>1.6 Weatherproof enclosure:</p> <ol style="list-style-type: none"> Constructed from G60 galvanized high strength, low alloy steel. Primed and finish coated with paint. Enclosures will be finished in the manufacturer's standard color. The enclosures must allow the generator set to operate at full load in an ambient of 40°C with no additional derating of the electrical output. Enclosures must be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear-facing door is required. Access to the controller and main line circuit breaker must meet the requirements of the Canadian Electric Code. Doors must be hinged with stainless steel hinges and hardware and be removable. Doors must be equipped with lockable latches. Locks must be keyed alike. Enclosures must be mounted to the generator set skid. The enclosure roof must be pitched to prevent accumulation of water. A duct between the radiator and air outlet must be provided to prevent re-circulation of hot air. The complete exhaust system shall be internal to the enclosure. Enclosures with roof mounted or externally exposed silencers are not acceptable. The silencer shall be an insulated critical silencer with a tailpipe and rain cap. The unit shall have motorized dampers installed for cooling/combustion air, 500W 120V 1ø space heater c/w thermostat to maintain ambient enclosure temperature and 2 120V receptacles. 	<p>THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT BUILDING SERVICES DIVISION 100 MAIN STREET, MAIN FLOOR WPG, MB, R3C 1A4 (204) 986-7266</p> <p>Winnipeg</p> <p>PROJECT: Emergency System Upgrade Bonivital Pool, 1215 Archibald St.</p> <p>SHEET TITLE: Conditions</p> <table border="1"> <tr> <td>REV.</td> <td>BY:</td> <td>DATE:</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> <table border="1"> <tr> <td>PROJ. 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