

**NOTICE TO CONTRACTORS
FURNISHING AND INSTALLING STANDBY POWER
Seaside Fire Department, 150 S Lincoln St, Seaside, OR 97138**

**CITY OF SEASIDE
SEASIDE, OREGON**

Sealed bids for the **Furnishing and installing standby power for the City of Seaside Fire Department** will be received by the City of Seaside, at 989 Broadway, Seaside, OR 97138 until 2:00 p.m., Pacific Time, on **July 11, 2019** at which time and place, they will be publicly opened and read aloud.

Pre-bid meeting June 26, 2019 at the Seaside Fire Department – 10:00 AM.

This project consist of replacing an existing natural gas fired generator in the Fire Department. This generator will be upsized to accommodate the additional loads of the Fire department and provide standby power for City Hall. Change in size is from 30 KW to 60 KW. This change in generator sizing may require increasing the louvers and ducting to handle the cooling and combustion air requirements.

This project is ‘turn-key’ project. Contractor will design, build, furnish, and install all equipment to complete this project.

This project was originally designed with an outside diesel generator. The original drawings and specifications are provided to assist the contractor in designing and building this project. R&W Engineering was the designer of that project. They are not associated with this project.

Plans and Specifications (R&W) are a basis for selection of the generator, construction and materials. Submittals will be reviewed with applicable specifications.

In general, this consists of:

- Furnish and install a Natural Gas Sparked Fired Generator – 60 KW.
- Furnish and install matching Exhaust Silencer with mounting hardware.
- Furnish and install Automatic Transfer Switch (ATS).
- Furnish and install all conductors, conduit, panels, equipment, enclosures and materials for installation. All outside enclosures and hardware shall be stainless steel.
- Furnish and install gas piping for generator.
- Contractor to verify air flow requirements for the upsized generator. Air Flow Requirements: Cooling and combustion air. Replace generator louver with correctly sized louver. This will require brick and wood construction. Replace/repair interior wallboard as needed.
- Modify or construct new ducting from the louver to the new generator housing/radiator as required.
- Trenching and surface restoration – Fire Department to City Hall
- Obtain and Pay - Electrical Permits – Clatsop County
- Mechanical/Structural Permits – obtain from City of Seaside Building Codes – at no cost to contractor.
- Old Generator and Automatic Transfer Switch – Public Works will pick up from curb – remains property of city.

Complete all work to be done under the contract no later than 120 days after contract is signed

The City of Seaside may reject any bid not in compliance with all prescribed public bidding procedures and requirements, and may reject for any good cause any or all bids and delete items listed in the bid schedule upon a finding of the City of Seaside that it is in the public interest to do so.

Documents for this Bid Package:

1. Notice to Contractors (3 pages)
 - Bidder Source Information
 - Schedule Of Unit Prices
2. Plans: 3 SHEETS
3. Technical Specification:
 - SECTION 16010 - GENERAL ELECTRICAL REQUIREMENTS
 - SECTION 16100 - BASIC ELECTRICAL MATERIALS AND METHODS
 - SECTION 16200 - STANDBY POWER SYSTEM
 - SECTION 16400 - SERVICE AND DISTRIBUTION

CITY OF SEASIDE
PUBLIC WORKS
BIDDER SOURCE INFORMATION
SCHEDULE OF UNIT PRICES

1. Bidder Company Name: _____
 2. Address: _____
 3. City: _____
 4. Telephone: _____ Fax: _____
 5. E-mail: _____
- By: Authorized Representative: _____
Date: _____

SCHEDULE OF UNIT PRICES

Item	Description	Unit	Quantity	Unit Cost	Total Price
1	Install Generator, ATS, and panels with all associated work	LS	1		
2	Startup Coordination for generator and ATS	LS	1		
			Total		

Written Total: _____

Contractor: Provide Generator information on Bid Form. And provide manufactures catalog page for each item.

1. Generator Brand: _____
2. Model: _____

Note: Generator shall meet specifications for consideration of the bid.

Point of Contact:

Geoffrey G. Liljenwall, PE
City Engineer
City of Seaside
503-791-3010 (C)
gliljenwall@cityofseaside.us

SECTION 16010
GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. The work consists of furnishing all labor, materials, services, tools and other equipment necessary for the construction, installation, connection and testing of all electrical work for this project as shown on the drawings or specified herein.
- B. The Contractor shall be responsible for the complete installation of all project building equipment including all enclosures, package systems, panelboards, disconnects and the like. The contract documents provided under this scope of work outline the general installation requirements of the entire project scope of work the Contractor shall be responsible.
 - 1. Visit the site of proposed construction. Verify and inspect the existing site to determine all conditions that affect this work.
 - 2. Investigate and be apprized of the applicable codes, rules, and regulations as enforced by AHJs.
 - 3. Use this Specification as a guide for workmanship and materials of construction.
- C. The work includes termination of all conductors at all existing and new motor driven equipment, field devices, and control panels as shown on the drawings and specified under this Division.
- D. The work includes the demolition, removal, replacement and relocation of existing equipment as shown on the drawings.
- E. Costs/charges for installation of all permanent and temporary facilities shall be included in the lump sum bid. This includes any up-front money required by the utility to provide permanent service.

1.2 RELATED WORK:

- A. Section 16100 - Basic Materials and Methods
- B. Section 16200 –Standby Power System
- C. Section 16400 – Service and Distribution
- D. Section 16450 – Grounding

1.3 INTENT OF DRAWINGS AND SPECIFICATIONS:

- A. Riser and other diagrams are schematic only and shall not be used for obtaining quantities.
- B. The electrical drawings do not show complete details of the site conditions. The Contractor shall check actual conditions.

1.4 COORDINATION OF WORK:

- A. The contractor shall schedule all power outages with the Owner. Provide temporary power connections and temporary equipment as necessary to ensure continuity of building operations.
- B. The Contractor shall plan his work in coordination with the power and telephone utility authorities.
- C. The Contractor shall field verify all dimensions of equipment to be installed or provided by others so that correct clearances and connections may be made between the work installed by the Contractor and equipment installed or provided by others.
- D. The Contractor shall arrange all conduit runs so that they do not interfere with duct work, structural members, etc.
- E. All working measurements shall be taken from the sites, checked with those shown on the drawings, and if they conflict, reported to the Engineer at once, and before proceeding with the work. Should the Contractor fail to comply with this procedure, he shall alter his work at his own expense as directed by the Engineer.
- F. No extra payments will be allowed where obstructions in the work of other trades, or work under this contract requires offsets to conduit runs.
- G. The Contractor is responsible for all alterations in the work to accommodate equipment differing in dimensions or other characteristics from that shown or specified.

1.5 SUPERVISION:

- A. The Contractor shall maintain adequate supervision of the work and shall have a responsible person in charge during all times that work under this contract is in progress, or when necessary for coordination with other work.

1.6 CODES:

- A. Work shall conform to the National Electrical Code (NEC), and State codes and other applicable codes, even though not specifically mentioned for each item. These shall be regarded as the minimum standard of quality for materials and workmanship.

1.7 WORKMANSHIP:

- A. All work shall be performed by personnel skilled in the particular trade. Workmanship shall conform to National Electrical Contractors Association Standard of Installation.
- B. The Engineer shall be the sole judge as to whether or not the finished work is satisfactory; and if in his judgment any material or equipment has not been properly installed or finished, this Contractor shall replace the material or equipment whenever required, and reinstall in a manner entirely satisfactory to the Engineer without any increase in cost to the Owner.
- C. The following shall be regarded as the minimum standard of quality for materials and workmanship even though not specifically mentioned for each item:
 - 1. Conform to requirements of the NEC, latest adopted version with amendments by local AHJs.
 - a. All work shall meet all requirements of the NEC for wet locations. All wiring methods shall conform to NEC requirements for wet locations.
 - 2. Furnish products listed by UL or other testing firm acceptable to AHJ.
 - 3. Conform to requirements of the serving electric, telephone, and internet utilities as they apply.

1.8 PERMITS, FEES AND SERVICE CHARGES:

- A. Contractor shall obtain all electrical permits and pay all related fees.

1.9 CONTRACTOR'S RECORD DRAWINGS:

- A. The Contractor shall maintain a neatly marked set of record drawings. In addition, the locations of panels, field mounted instruments and panels, terminal boxes, junction boxes and any other materials included in this contract shall be shown. Drawings shall be kept current with the work as it progresses and shall be subject to inspection by the Engineer at any time.
- B. At the completion of construction, the Contractor shall provide "as-built" drawings to the Engineer showing the location of buried conduits and all changes or deviations from the original drawings.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.
- B. Provide material and equipment that is acceptable to AHJ as suitable for the use indicated. For example, provide wet labeled equipment in locations that are wet.
- C. All contract materials shall be new, of proven quality, without imperfections and blemishes. All material not specifically detailed in this specification required to accomplish the completion of this contract shall be of compatible quality to the item specified and be approved by the Engineer. All materials shall be products of manufacturers regularly engaged in production of such equipment and shall be of the manufacturer's latest design. Where 2 or more units of the same classes of equipment are required, these units shall be of the same manufacture. All material and equipment shall be per NEMA, ANSI, IEEE, or ICEA Standards as applicable, except as modified by these specifications. All material shall be UL labeled as applicable. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendations.

2.2 PORTABLE OR DETACHABLE PARTS:

- A. The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adaptors, blocking chips, and inserts until completion of his work.
- B. These parts shall be delivered to the Engineer and an itemized receipt obtained. This receipt, together with 2 copies of the final inspection certificate, shall be attached to the Contractor's request for final payment.
- D. All equipment shall be demonstrated to operate in accordance with the requirements of this specification and the manufacturer's recommendation.

2.3 RUBBER MATTING:

- A. Install rubber floor matting in electrical room in front of all power distribution equipment, motor controller and control panel.
- B. Corrugated non-slip rubber mat of high dielectric strength and long aging qualities. Mat size, minimum of 36 inches wide extending the entire length of each power panel and control panel. Comply with ASTM Specification D178.24. 10,000 volt minimum dielectric strength, 3/16" thick.

2.4 ACCESSORIES:

- A. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the items listed catalog number.

- B. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system or systems, in a safe and satisfactory working condition.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Construction Documents:
 - 1. Drawings are diagrammatic with symbols representing electrical equipment and wiring.
 - 2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
 - 3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.
- B. Clarification:
 - 1. The Drawings govern in matters of quantity, the Specification in matters of quality. In event of conflict on Drawings or in the Specifications, the greater quantity and the higher quality apply.
 - 2. Should the Electrical Documents indicate a condition conflicting with the governing codes and regulations, refrain from installing that portion of the work until clarified by Engineer.

3.2 DEMOLITION

- A. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or damage.
- B. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.
- C. The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
- D. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, conduit, outlet boxes, wiring, light fixtures, equipment, and similar items, to provide this access and shall reinstall same upon completion of work in the areas affected.
- E. Outages of services as required by the new installation will be permitted but only at a time approved by the City and the Engineer. The Contractor shall notify the City and the Engineer 2 weeks in advance in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the

City. All costs of outages, including overtime charges, shall be included in the contract amount. Power outages shall not exceed 15 minutes in length due to the need to keep the City's emergency 911 system in operation. Provide temporary backup generation power for demolition and installation work requiring longer than 15 minute power disruptions of primary service. The Contractor shall provide a temporary portable generator or coordinate with the City in using the City's available backup portable generator. Provide a separate line item in the bid identifying the costs associated with this work.

- F. The Contractor shall modify, remove, or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals or dismantling shall be conducted in a manner as to produce maximum salvage.
- G. The Contractor shall survey the project with the City before demolition begins and determine all materials which the City specifically chooses to have salvaged. Pre-establish with the City locations where salvaged materials are to be stored. Salvage materials shall remain the property of the City, and shall be delivered to such destination as directed by the City.
- H. When items scheduled for salvage are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the City to such items and receive further instructions before removal. Items damaged during construction operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the City, at no additional cost.
- I. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Engineer.
- J. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Engineer.
- K. Certain work during the demolition and alteration phases of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the City at least 72 hours in advance.
- L. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems.
- M. Furnish all temporary conduit, wiring boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption.
- N. All existing lighting fixtures, switches, outlets, speakers, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.

3.3 PROTECTION DURING CONSTRUCTION:

- A. Throughout this Contract, provide protection for materials and equipment against loss or damage in accordance with provisions elsewhere in these Contract Documents. Protect everything from the effects of weather.
- B. Prior to installation, store items in clean, dry, indoor locations. Items subject to corrosion under damp conditions, and items containing electrical insulation, such as transformers

and conductors, shall be stored in clean, dry, indoor, heated locations. Energize all space heaters furnished with equipment.

- C. Following installation protect materials and equipment from corrosion, physical damage, and the effects of moisture on insulation. Cap conduit runs during construction with manufactured seals. Keep openings in boxes or equipment closed during construction. Energize all space heaters furnished with equipment.

3.4 INSTALLATION:

- A. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the electrical equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Engineer prior to proceeding with the installation.
- B. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
- C. Do not install outlet boxes back to back. Do not use straight through boxes.
- D. Earthwork:
 - 1. Perform excavation and backfill for the installation of electrical work.
- E. Support Backing:
 - 1. Provide any necessary backing required to properly support all fixtures and equipment installed under this contract.
- F. Cutting, Patching and Framing:
 - 1. The Contractor shall determine in advance the locations and sizes of all sleeves, chases, and openings necessary for the proper installation of his work.
 - 2. Whenever practical, inserts or sleeves shall be installed prior to covering work. Cutting and patching shall be held to a minimum. All required holes in concrete construction shall be made with a core drill and patched with non-shrink grout.
 - 3. Cutting, fitting, repairing and finishing of carpentry work, metal work, asphalt concrete (AC) patch work or concrete work, and the like, which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions, or floors; and holes required to be cut in floors must be drilled without breaking out around holes.
 - 4. AC patch work shall provide 3" AC cover, minimum. Sand and seal saw cut joints. All joints shall be saw cut.
- G. Cleaning and Touchup Painting:
 - 1. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes

matching as nearly as possible the color, consistency, and type of surface of the original finish.

3.5 FIELD QUALITY CONTROL:

A. Inspection:

1. All materials, equipment, and workmanship shall be subject to inspection at any time by the Engineer, or his representatives. Correct work, materials, or equipment not in accordance with these Contract Documents or found to be deficient or defective in a manner satisfactory to the Engineer.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 16. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
2. During site evaluations by Engineer provide an electrician with tools to remove and replace trims, covers, devices, and the like, so that a proper evaluation of the installation can be performed.
3. The Contractor shall furnish all labor, material, instruments and tools to make all connections for testing of the electrical and instrumentation installation. All equipment shall be demonstrated as operating properly prior to the acceptance of the work. All protective devices shall be operative during testing of equipment. The tests shall be made under the supervision of the Engineer. All deficiencies or unsatisfactory conditions as determined by the Engineer or inspecting authorities shall be corrected by the Contractor in a satisfactory manner at the Contractor's own expense.
4. General:
 - a. Perform the tests as described below. Upon completion of all tests, submit written test results in duplicate for approval by the Engineer prior to acceptance.
 - b. After visual inspection of joints and connections and the application of tape and other insulating materials, all sections of the entire wiring system shall be thoroughly tested for shorts and grounds. A log of results for each circuit shall be kept by the Contractor and presented to the Engineer.
 - c. A phase rotation check shall be made to demonstrate that all power receptacles, service feeders, main power feeders, and emergency generator have the same A-B-C phase rotation and ground relationships.
 - d. Equipment shall be tested by operating all electric motors, relays, controls, switches, heaters, etc. sufficiently to demonstrate proper installation and electrical connections. Control and emergency conditions shall be artificially simulated where necessary for complete system or subsystem.
 - e. Insulation resistance measurements of each circuit shall be made with loads connected and contactors, if any, blocked closed to give complete circuits. Insulation resistance of complete circuit shall be measured from the circuit breaker load terminals with the breaker open. A log of complete results shall be prepared by the Contractor and presented to the Engineer. Values of resistance shall be 10 megohms or greater.

3.6 CLEANING:

- A. Remove dirt and debris caused by the execution of the electrical work.
- B. Leave the entire electrical system installed under this Contract in clean, dust-free and proper working order.
- C. Vacuum clean interiors of electrical equipment enclosures.

3.7 GUARANTEE:

- A. Materials, equipment, and workmanship shall be guaranteed in accordance with provisions of Section 01000 GENERAL REQUIREMENTS, in these Contract Documents.

END OF SECTION

SECTION 16100
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. The work consists of furnishing all labor, materials, and equipment required for electrical work shown on the drawings and as further described in these specifications.

1.2 RELATED WORK:

- A. Section 16010 – General Electrical Requirements
- B. Section 16200 – Standby Power System Installation
- C. Section 16400 – Service and Distribution
- D. Section 16450 - Grounding

1.3 REGULATIONS AND PERMITS:

- A. The Contractor shall comply with all applicable codes, ordinances, and regulations, including the National Electrical Code, National Electrical Safety Codes, and the State of Oregon.
- B. The Contractor shall obtain a Certificate of Electrical Inspection from the local inspecting authority and submit to the owner upon completion of the project.

1.4 SUBMITTALS AFTER AWARD OF CONTRACT:

- A. Submittals after award of Contract shall be made in accordance with Section 16010, GENERAL ELECTRICAL REQUIREMENTS.

PART 2 - PRODUCTS

2.1 QUALITY OF MATERIALS

- A. All contract materials shall be new, of proven quality, without imperfections and blemishes. All material not specifically detailed in this specification required to accomplish the completion of this contract shall be of compatible quality to the item specified and be approved by the Engineer. All materials shall be products of manufacturers regularly engaged in production of such equipment and shall be of the manufacturer's latest design. Where 2 or more units of the same classes of equipment are required, these units shall be of the same manufacture. All material and equipment shall be per NEMA, ANSI, IEEE, or ICEA Standards as applicable, except as modified by these specifications. All material shall be UL labeled as applicable.

2.2 RACEWAYS:

- A. All raceways shall be UL approved for the application.
- B. Rigid Steel Conduit (RGS): Provide zinc-coated rigid steel conduit conforming to Federal Specification WW-C-581.
- C. PVC Coated Rigid Galvanized Steel (PVC-RGS): Provide rigid polyvinyl chloride (PVC) coated conduit. Rigid conduit used in the coating process shall be hot dipped galvanized inside and out in accordance with of the latest edition of Federal Specification WW-C-581-E, ANSI Standard C-80.1, and UL Standard #6. Finished conduit shall conform to the current NEMA RN-1 Standard and shall have label affixed indicating compliance with UL Standard #6.
- D. Rigid PVC Conduit (PVC): Provide rigid polyvinyl chloride conduit, schedule 40, UL listed for concrete encased, direct burial underground, and exposed use. Rigid PVC conduit, including couplings, elbows and nipples, shall conform to the requirements of the latest edition of Federal Specification WW-C-1094, NEC, and UL standards.
- E. Flexible Metallic Conduit (FLEX): Provide liquid tight flexible conduit, zinc-coated steel core, extruded gray PVC cover, UL approved, Sealtite type "UA" or Liquatite type "LA," or approved equivalent.

2.3 CONDUIT FITTINGS AND ACCESSORIES:

- A. Provide conduit fittings as follows unless otherwise noted or detailed. Catalog numbers shown are Appleton Electric Company unless otherwise noted. Other brands of the same construction will be accepted.
- B. Nonhazardous Area Fittings

Rigid Conduit 90 Degrees Elbows	Series LMFL, ELMF
Rigid Conduit Pulling Ells	Series LB, LL, LR, FFL, MFL
Rigid Conduit Expansion Unions	UNY, UNF, Expansion Series
Sheet Steel and Fiberglass Enclosures	Watertight HUB Series
Liquidtight Insulated Connectors Throat	-STB, STN, STL, STNMSeries

- C. PVC Conduit Fittings
 1. Provide conduit fittings as follows unless otherwise noted or detailed. Catalog numbers shown are Carlon Electrical Products. Other brands of the same construction will be accepted.
 2. Conduit body, type T, 1/2 inch, part no. E983D
 3. Conduit body, type LL, 1/2 inch, part no. E984D
 4. Conduit body, type LR, 1/2 inch, part no. E985D

5. Conduit body, type LB, 1/2 inch, part no. E986D
 6. Strain relief connectors and grommets, part no. H978E
 7. PVC locknut, 1/2 inch, part no. LT9LD
 8. Schedule 40 long line coupling, 2 inch, part no. E941J
- D. PVC Coated Conduit Fittings: Provide fittings for RGS conduit as specified with minimum 40-mil PVC coating. Perma-Cote Industries or equal.

2.4 JUNCTION, PULL AND OUTLET BOXES:

- A. Provide metallic outlet boxes as follows unless otherwise noted or detailed. No nonmetallic boxes will be permitted.
1. Boxes on rigid conduit systems shall have threaded hubs and case gasketed cover, meeting F.D. W-C-586. Any type, design, form, and style will be acceptable unless otherwise specified or shown on the drawings.
 2. Boxes on PVC coated conduit systems shall be as specified for RGS conduit system with minimum 40-mil PVC coating. Perma-Cote Industries or equal.

2.5 WIRING DEVICES:

- A. Provide wiring devices indicated. Catalog numbers shown are Hubbell unless otherwise noted. Equivalent devices by other manufacturers may be substituted. All devices shall be submitted for approval. Provide all similar devices of same manufacturer unless indicated otherwise.
- B. Switches: Provide flush switches, AC-type, rated 20 amp or higher suitable for the type load to be controlled.
1. Double-pole: 4803-GRY/20AC1GRY
- C. Receptacles: Provide grounding-type receptacles as follows, all receptacles shall be Ground Fault Interrupter (GFI).
1. Ground fault interrupter:
 - a. Unit shall be furnished with internal, solid state, ground fault current sensing and tripping.
 - b. The receptacles shall include built-in "TEST" and "RESET" switches and "TRIPPED" indicator and shall be rated 20-amp, 120-volt.
 - c. The "GFI" receptacle shall be the "feed-thru" type and shall protect all receptacles on the same circuit.

2.6 PLATES:

- A. Provide plates for all wiring devices. Where devices are installed in exposed fittings or boxes, use Appleton, Pyle-National, Crouse-Hinds, or equal, "FSK" covers.
- B. Where weatherproof devices are specified on exterior or damp locations, provide UL-Listed NEMA 3R, cast aluminum, in-use weatherproof covers. Hubbell WP26M or approved equal. Provide stainless-steel plates in all other finished areas.
- C. Provide corrosion resistant covers on all receptacle outlets.

2.7 CONDUCTORS AND CABLES:

- A. This specification covers all conductors not specifically specified in other sections. Furnish conductors and cable conforming to UL, Federal Specification J-C-30, or IPCEA as applicable. Provide new cable manufactured within 1 year prior to installation. Deliver to jobsite in original cartons bearing U.L. label.
- B. 600V Power, Lighting and Control Circuits: Provide stranded copper conductors. Aluminum will not be allowed. Copper conductors shall conform to Federal Specification J-C-30. For type XHHW, XLP-USE, provide cross-linked polyethylene insulation conforming to IPCEA S-66-524. Color code insulation for wire sizes No. 14 through No. 6.
- C. For type RHW and RHH, provide insulation conforming to ICEA S-19081. For type XHHW, provide insulation conforming to ICEA S-66-524. Provide neoprene jacket on RHW-RR type cables in accordance with ICEA S-19-81 specifications.
- D. Provide control cable with 600 volt TW type insulation for all multi-conductor, Class 1 remote control and signal wiring unless otherwise specified. Provide overall jacket complying with ICEA S-61-402. Color code control cable in accordance with ICEA S-61-402, Table 5-1.
- E. Minimum conductor size: Provide No. 12 AWG minimum branch circuit wire size. Provide No. 14 AWG control circuits unless otherwise specified or required by over-current protection. Provide smaller conductor sizes for specific applications where minimum size requirements cannot be physically be accommodated.
- F. Class 2 remote control and signal conductors: Provide cables UL approved for such use. Voltage rating shall be not less than 600 volts. Utilize multi-conductor cables with like or related functions generally grouped together. Unless otherwise specified or shown on the drawings, utilize No. 14 AWG conductors.
- G. Instrumentation cables: Multi-conductor cables shall have the quantity and size of conductors shown on the plans. Individual conductors shall be bare soft annealed copper Class B, 7-strand concentric per ASTM B-8. Individual conductor insulation shall be flame-retardant per UL 13, 15 mils nominal thickness, with a 105 degree C temperature rating. Conductor pairs shall be uniquely identified according to manufacturer's standard method. Overall cable assembly shall have 2.35 mil (minimum) aluminum-polester tape

shield overlapped for 100% coverage and provided with a 7-strand tinned copper drain wire the same size as an individual conductor. The jacket shall be flame-retardant per UL 13, with a 105 degree C temperature rating and a rip cord laid longitudinally under the jacket to facilitate removal. Conductors shall be twisted pairs and the cable shall be rated for operation to 600 volts.

- H. Twisted shielded pairs (TSP) shall be 7 or 19-strand, No. 16 AWG, tinned-copper conductors, 600 volt, individually insulated with color-coded cross-linked polyethylene, insulated conductors twisted into a pair, pair-shielded with a spirally applied aluminum/mylar tape shield and a 7-strand drain wire. Cable to have an overall 45 mil jacket. The jacket shall be flame-retardant per UL 13, with a 90 degree C temperature rating.

2.8 MOUNTING HARDWARE:

- A. Provide PVC coated mounting hardware in exposed corrosive locations. Perma-Cote Industries or equal.

2.9 CABLE TERMINATORS

- A. Cable terminators shall be able to effectively seal one or more single or multiple conductor cables and the conduit against entrance of water, damp or corrosive atmospheres, hot or cold air dust.
- B. Cable terminators shall be rated for the following:
 - 1. Indoor or outdoor use.
 - 2. Use with IMC, EMT, PVC or RGS conduit types.
- C. Material finish shall be provided in cast aluminum for corrosive protection.
- D. Provide O-Z Gedney Type CRC with top cover, or approved equivalent.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION:

- A. Conduit buried in earth: Install raceways to provide not less than 30 inches cover to finished grade. Pitch to drain away from buildings; avoid trapped runs. Grade trenches and place pipe bedding material to provide uniform trench bottom for raceway support. Buried raceway shall not be smaller than 1 inch and shall be Schedule 40 PVC as specified. All underground elbows shall be PVC coated RGS.
- B. Provide rigid steel conduit for raceways embedded in structural reinforced concrete, for all exposed installations unless otherwise directed in the contract documents; for sizes 1-1/4-inch and larger; and at all locations not otherwise specified.

- C. Provide flexible (FLEX) connections at all motors and transformers plus other equipment connections subject to vibration. Utilize suitable fittings, keep route neat, at nominal right angles, and in conformance with equipment lines.
- D. Exposed conduit shall be run in straight lines parallel to column lines, walls, or beams. Where conduit is grouped, the bends and fittings shall be installed to present an orderly appearance. Unnecessary bending or crossing shall be avoided.
- E. Supports for exposed conduit runs shall be furnished and installed within 3 feet of each box. Supports shall be secured by means of expansion inserts in concrete.
- F. Conduit and fittings shall be properly protected during the construction period against mechanical injury from any cause. Conduit which extends out of floors, walls or slabs shall be boxed or otherwise protected and ends shall be capped with metal pipe plugs.
- G. Rigid conduit joints and connections shall be made thoroughly watertight and rustproof by means of thread compound which will not insulate the joint. Each threaded joint shall be thoroughly cleaned to remove all the cutting oil before the compound is applied. Running threads will not be allowed. Erickson couplings may be used in dry and exposed locations provided that they are installed with fixed threaded connection at the top of vertical runs.
- H. Size: Use raceways no smaller than 3/4 inch, but in no instance shall raceways be smaller than as shown in the circuit schedule.
- I. Raceways in reinforced concrete: Do not displace reinforcing steel to accommodate the installation of raceways and outlet boxes. In general, locate all embedded conduits in the physical center of the particular section of concrete. Wooden plugs inserted in concrete or masonry are not acceptable as a base for raceway fastenings.
- J. All fittings, boxes, and supports on PVC coated raceways shall be PVC coated as specified.
- K. Raceways through roof: Where raceways penetrate the roof seal, provide suitable pitch pockets or lead flashing. Submit shop drawings of the method to be used for approval.

3.2 WIRE AND CABLE INSTALLATION:

- A. Conduit shall be thoroughly cleaned of all foreign material just prior to pulling the wire or cable. Lubricants shall be compounds specifically prepared for cable pulling and shall not contain petroleum or other products that will affect cable insulation. Lubrications shall be UL approved.
- B. Splicing of conductors No.8 AWG or smaller shall be by pre-insulated spring-pressure connectors, such as "Scotchlok" Types Y, R and B, or Ideal "Wingnut." Similar products by other manufacturers may be considered for use on this project based on comparison to these lines. Approval of substitutions is solely at the discretion of the Engineer. All uninsulated splices, joints, and free ends of conductors shall be covered with rubber and friction tape or high-dielectric strength, plastic tape. All splices in underground boxes or

direct buried shall be insulated and waterproofed, using scotchcast epoxy splicing compounds suited for the purpose.

- C. Terminal strips in panels shall be identified throughout the equipment utilizing unique numbering system at the equipment enclosures and control panels.
- D. Wires terminating on terminal strips shall be tagged with the designation of the terminal strip and the number of the terminal to which they are connected. Wires shall be numbered with Brady heat shrink wire markers at all accessible locations. Wire markers shall be permanent type. Submit shop drawings of the type to be used for approval.
- E. Wiring diagram shall show the terminal strips, terminals, and their identifying designations.
- F. Color code

- 1. All secondary service, feeder, and branch circuit conductors shall be color coded as follows:

208/120 Volt	Phase	480/277
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray

- 2. All No. 12 and No. 10 branch circuit conductors shall have solid color compound or solid color coating. All neutral sizes shall have solid color compound or solid color coating.
- 3. No. 8 AWG and larger phase conductors shall have either:
 - a. Solid color compound or solid color coating.
 - b. Stripes, bands, or hashmarks of colors specified above.
 - c. Colored pressure-sensitive plastic tape. Tape shall be applied in half overlapping turns for a minimum of 3 inches for all terminal points, and in all junction boxes, pull boxes, troughs, manholes, and handholes. Tape shall be 3/4 inch wide with colors as specified above. The last two laps of tape shall be applied with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.
- G. Installation: Keep all conductors within the allowable tension limits during installation. Lubricants for wire pulling, if used, shall be approved for the insulation and raceway material. Observe cable manufacturer's and industry standard cable bending radius recommendations. For type THHN/THWN conductors, avoid abrasion and damage to outer jacket. Wiring showing damage after installation shall be replaced by the Contractor at his own expense.

- H. 600 volt conductors: Provide one of the conductor types indicated for the function and location listed below unless otherwise indicated on the drawings or approved by the Engineer. Provide ground and neutral wires identical to circuit wires.
- I. Observe code restrictions with respect to wet and dry locations. At the Contractor's option, conductors with insulation systems rated for high operating temperatures may be substituted for lower temperature rated conductors. However, no reduction in conductor size will be permitted from that indicated. When using small diameter wire, do not reduce conduit size below that required for Type THW as shown in NEC Table 3A.

<u>LOCATION</u>	<u>THHN/THWN</u>	<u>XHHW</u>
Lighting Circuits Interior: General	X	
Special fixture requirements Within 3 inches of ballast	X	
Receptacle and single-phase	X	
Motor circuits: Interior single phase motor circuits	X	
Polyphase motor circuits		X
Motor controls	X	
Power outlets		X
Feeders		X
Underground-in raceway		X

- J. Wire Pulling:
1. Provide suitable installation equipment to prevent cutting or abrasion of conduits during pulling of feeder.
 2. Ropes used for pulling feeders shall be made of suitable non-metallic material.
 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Engineering.
 4. All cables in a single conduit shall be pulled in together.
 5. The cable jacket and/or conduit walls shall be completely lubricated when cable is pulled into conduit. The lubricant shall be applied immediately before or during a pull. Minimum quantities of lubricant are as follows:
 - a. One (1) quart of lubricant per 100 feet of 1-inch conduit.
 - b. Two (2) quarts of lubricant per 100 feet of 2-inch conduit.
 - c. Three (3) quarts of lubricant per 100 feet of 3-inch conduit.
 - d. One (1) gallon of lubricant per 100 feet of 4-inch conduit.

- e. This quantity shall be increased as needed for difficult pulling situations (high temperatures, multiple bends, poorly placed conduit, etc.)

3.3 EQUIPMENT INSTALLATION

- A. Boxes and cabinets shall be installed on the surface level and plumb and affixed to the surface with expansion inserts in concrete and machine screws to tapped holes in metal surfaces.
- B. Interconnections between equipment shall be made per manufacturer's wiring diagram. All wiring shall be clearly labeled and external connections in control panel and remote cabinet brought out to terminal blocks. All equipment connected to telephone lines shall be protected against voltage transients.

3.4 EXCAVATION AND BACKFILL

- A. Perform all necessary excavation and backfilling for buried conduits and conductors.
- B. No backfilling shall be done until all direct burial cables, conduits and penetrations to be covered have been inspected and approved.

END OF SECTION

SECTION 16200
STANDBY POWER SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. This section covers the work necessary to furnish a natural gas engine power generating system complete and ready for operation.
- B. Provide and install Standby Engine-Generator, including all devices and equipment supplied with engine-generator, shown on the drawings, or required for a complete and operable system. The system described herein shall include the engine-generator set, engine auxiliaries, sound attenuated enclosure, battery charger, control panel, shall be furnished by a single manufacturer who is regularly engaged in the production of engine-generator sets and associated control products. The responsibility for performance of this Specification in its entirety must be assumed solely by the manufacturer of the system.

1.02 RELATED SECTIONS

- A. Section 16010 - General Provisions
- B. Section 16100 - Basic Materials and Methods
- C. Section 16400 - Service and Distribution

1.03 QUALITY ASSURANCE

- A. Equipment and equipment installation shall meet all applicable state and local codes. Equipment supplied shall meet or exceed requirements of the following:
 - 1. NFPA 70 National Electrical Code
 - 2. NFPA 110 Emergency and Standby Power Systems
 - 3. NFPA 37 Installation of Stationary Engines
 - 4. UL 2200 - The generator set shall be listed to UL 2200, Standard for Safety for Stationary Engine Generator Assemblies.

1.04 WARRANTY

- A. The contractor shall provide for all products against defects in materials and workmanship for a minimum of a one year period from the date of substantial completion.

1.05 SUBMITTALS

- A. The following specific information shall be provided:
 - 1. An outline drawing showing the proposed engine-generator set, drive system, and enclosure. The outline drawing shall indicate the required clearances for door and access panel opening, maintenance, and cooling.

2. Submit sound ratings at 23 feet when the unit is enclosed in the manufacturer's sound attenuated housing.
 3. Catalog cuts and technical description of the proposed engine-generator set; the technical description shall include materials and dimensions of cylinders, pistons, crankshaft, and other major parts, and a complete list of all accessories that are to be provided.
- B. Curves showing the engine fuel consumption and kW output.
 - C. Generator descriptive information, output ratings, and transient response characteristics. Provide printouts of generator sizing based on the motors to be started and run, and their sequence of starting.
 - D. Description of parts and service availability.

PART 2 – PRODUCTS

2.01 GENERAL

- A. The generator set manufacturer shall verify the engine as capable of driving the generator with all accessories in place and operating, at the generator set kW rating after derating for the range of temperatures expected in service and the altitude of the installation. Service ambient temperature: minus 15^o C to plus 40^o C.
- B. Voltage regulation shall be $\pm 4\%$ of rated voltage for any constant load between no load and rated load. Frequency regulation shall be not more than 0.5% from steady state no load to steady state rated load.
- C. The total harmonic distortion (THD) of the generator set operating with no load shall be less than 5% measured line to neutral, with a maximum of 3% in any single harmonic order.
- D. The telephone influence factor (TIF) shall be less than 50 per NEMA MG-122.43.
- E. Transient Voltage Performance: not more than 10% variation for 50% step-load increase or decrease. Voltage recovers to remain within steady state operating band within 2 seconds.
- F. Transient Frequency Performance: less than 2-Hz variation for a 50% step-load increase or decrease. Frequency recovers to remain within steady state operating band within 3 seconds.
- G. Starting Time: maximum total time period for a cold start, with ambient temperature at the low end of the specified range, is 7 seconds. Time period includes output voltage and frequency settlement within specified steady state bands.
- H. The generator set shall be capable of feeding all loads downstream of the transfer switch up to rated load specified herein.
- I. Provide with a 120V/208V coolant heater, sized appropriately as determined by the generator manufacturer.
- J. Provide thermal-magnetic overcurrent protective circuit breaker, 80% rated.

- K. Provide a complete package system designed for harsh coastal and marine environments to prevent and minimize corrosion.

2.02 SPARK IGNITED ENGINE

- A. The engine shall be natural gas fueled, radiator and fan cooled. Minimum displacement shall be 350 cubic inches, with 8 cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories.
- B. Complete engine fuel system, including all pressure regulators, strainers, and control valves. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set.
- C. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous or parallel states.
- D. Skid-mounted radiator and cooling system rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the generator air inlet, based on 0.5 in H₂O external static head. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture. Rotating parts shall be guarded against accidental contact.

2.03 AC GENERATOR

- A. The AC generator shall be synchronous, four pole, revolving field, drip-proof construction, air cooled by a direct drive centrifugal blower fan, having a single pre-lubricated sealed bearing, and shall be directly connected to the engine with flexible drive disc(s). The stator shall have skewed laminations of insulated electrical grade steel, two-thirds pitch windings. The rotor shall be dynamically balanced, and shall have amortisseur (damper) windings. The exciter shall be brushless, three phase, with full wave silicon diodes mounted on the rotating shaft and a surge suppressor connected in parallel with the field winding.
- B. All insulation system components shall meet NEMA MG1 standard temperature class limitations for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 105° Centigrade. The generator shall be broad range, 12 lead re-connectable. The generator shall be capable of delivering rated output kVA at rated frequency and power factor, at any voltage within the broad range. The main generator and exciter insulation systems must be suitable impregnated for operation in severe environments for resistance to sand, salt, and sea spray. A permanent magnet generator (PMG) shall provide excitation power to the automatic voltage regulator for immunity from voltage distortion caused by non-linear SCR controlled loads from the generator. The PMG shall sustain main field excitation power for optimum motor starting and to sustain short circuit current for selective operation and coordination of system overcurrent devices.

- C. The automatic voltage regulator shall be temperature compensated, solid state design. The voltage regulator shall be equipped with three-phase RMS voltage sensing.
- D. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. Overvoltage protection shall sense the AC generator output voltage and in the event of a regulator failure or loss of reference, shut down regulator output on a sustained overvoltage of one (1) second duration. Overexcitation protection shall sense regulator output and shut down regulator output if overloads exceed ten (10) seconds duration. Both overvoltage and overexcitation protection shutdowns shall be latched, requiring the AC generator to be stopped for reset.
- E. The regulator shall include an under-frequency roll off torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of 58-59 HZ. The torque-matching characteristic shall include differential rate of frequency change compensation to use maximum available engine torque and provide optimal transient load response. Regulators that use fixed V/HZ characteristic are not acceptable.

2.04 ENGINE GENERATOR SET CONTROL

- A. Provide an NFPA-110 Level 2 control panel with digital display and microprocessor control. Control panel shall include an auto-off-manual selector switch. Control panel shall be powered directly from starting batteries. Control panel shall include surge suppression for protection of solid state components. Operation of shut down circuits shall be independent of indication and pre-alarm circuits. A dry alarm contact for all pre-alarm conditions (generator trouble), a dry alarm contact for generator run (generator run), a dry alarm contact for generator fault, shall be provided in the control panel. Generator shall accept separate remote engine start and emergency shutdown dry contacts. Dry alarm contacts specified here shall be rated at 10A, 120V.
- B. At a minimum, the following information shall be available from the digital display:
 - 1. Battery Voltage
 - 2. Number of hours of generator set operation
 - 3. Engine oil temperature and pressure
 - 4. Engine coolant temperature

2.05 ACCESSORIES

- A. Base: Set shall be mounted on a heavy duty durable powder coat aluminum construction base to maintain proper alignment between components, and each set shall incorporate vibration isolators of the type and quantity as specified by the set manufacturer.
- B. Main circuit breaker: Breaker shall be mounted and wired on the unit at the factory. Provide molded case standard function 80% rated circuit breakers, rating as shown on the drawings.
- C. Batteries: Batteries shall be lead acid type, sized as recommended by the set manufacturer, and shall be supplied with battery cables and connectors.

- D. Battery Charger: A 10 amp voltage regulated battery charger shall be provided for the set. Input AC voltage shall be as indicated on the drawings. Output DC voltage shall be as required for batteries provided. Chargers shall be provided with float, taper, and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30 VDC for remote indication of:
1. Loss of AC power - red light
 2. Low battery voltage - red light
 3. High battery voltage - red light
 4. Power on - green light (no contact)
- E. Mounted exhaust system
1. An exhaust silencer shall be provided. The silencer shall be of chambered construction and shall be of the critical silencing type and shall provide a maximum dBA level of 85 at a distance of 10 feet in a free field environment. Silencer shall be sized to assure proper operation without excessive back pressure when installed in the exhaust system.
 2. Provide vertical and lateral support system (seismic zone 3) for exhaust system and piping as shown on the Drawings and in accordance with applicable codes; or provide alternative support system with calculations stamped by a professional engineer registered in Oregon and submit for approval by the Engineer. Thermally insulate silencer and exhaust piping using 4-inch molded calcium silicate covered with a 0.010 inch thickness weatherproof stainless steel jacket having a moisture barrier and held in place by ½ inch stainless steel bands. The exhaust silencer shall be supplied with a condensation trap and rain cap and two coats of aluminized high temperature paint.
 3. Provide flexible connections of the exhaust system at the engine. Flexible bellow exhaust pipe shall be seamless stainless steel exhaust pipe with a minimum length of 12 inches.
 4. Silencer shall be mounted inside the sound attenuated enclosure specified herein.
- F. Sound Attenuated Weather Protective Housing
1. The engine generator sets shall be enclosed in weather protective sound attenuating aluminum housing suitable for use in coastal environments. The enclosure shall have sound insulation that reduces the engine generator noise to a maximum of 70 dBA at 23 feet from the generator in all directions.
 2. The weather protective housing shall be designed to permit sufficient flow of air for efficient cooling and combustion in an ambient temperature of 50 degrees C (122 F).
 3. The enclosure shall be of corrosion resistant aluminum construction. Doors shall be lockable with stainless steel hardware. Weather protective seals shall be provided around all doors.
 4. Enclosure heater: Provide thermostatically controlled enclosure heater to maintain temperature at non-condensing limit.

2.06 AUTOMATIC TRANSFER SWITCH (ATS)

- A. Transfer switch shall be UL listed per UL standard 1008, and CSA Approved.
- B. The transfer switch shall be furnished by the generator manufacturer.
- C. Transfer switch shall be rated for voltage, continuous current, and ampere interrupting capacity (AIC) as specified.
 - 1. Voltage: 208/120VAC
 - 2. Current: The minimum current rating of each ATS provided shall be 225A.
 - 3. AIC Ratings: The ATS equipment shall be provided with a minimum AIC rating of 22kAIC.
- D. Transfer switch shall be rated for continuous operation in ambient temperatures of -40°C to +50°C, with relative humidity of up to 95% (condensing), and altitudes of up to 10,000 feet.
- E. Transfer switch withstand and closing rating shall be equal to or greater than the available fault current. Withstand and closing ratings shall be verified by UL witnessed test and shall be the ratings listed by UL for the transfer switch supplied.
- F. Transfer switch shall be double-throw construction, positively electrically and mechanically interlocked by a mechanical beam to prevent simultaneous closing (for make before break operation) and mechanically held in both normal and emergency positions.
- G. Transfer switch shall be equipped with permanently attached operating handle and quick-break, quick-make contact mechanism suitable for manual operation under load.
- H. Transfer switch shall have one Form C, 10 Amp 250 VAC auxiliary switch on both normal and standby sides, operated by the transfer switch. Transfer switch shall have additional Form C, 10 Amp relay contacts for "Normal Power Available" and "Standby Power Available".
- I. Transfer switch terminal lugs shall be UL listed and CSA approved as suitable for copper and aluminum conductors, and shall be provided for normal, emergency, and load connections. Wire bend space shall comply with NEC article 373.
- J. Transfer switch shall be floor mounted or Contractor shall provide mounting frame for wall mounted equipment when floor mounted option is not available. Manual operating handle and all control switches other than key-operated shall be accessible to authorized personnel only by opening the key-locking cabinet door.

- K. Transfer switch shall have automatic solid state controls mounted inside of cabinet. Solid state controls shall simultaneously monitor all phases of the normal source and the emergency source. Upon partial loss of voltage on any phase of the normal source, the transfer switch shall signal the engine generator set to start, and once the generator set reaches proper voltage and frequency, shall transfer the load to the generator set. Upon restoration of normal power, the transfer switch shall transfer the load back to the normal power source. Voltage dropout and pickup settings shall be adjustable from 85% to 98%, with a fixed dropout time delay of 0.5 seconds. A solid state time delay start, adjustable from 0 to 15 seconds, shall be provided to avoid nuisance startups. A solid state time delay retransfer adjustable from 0 to 30 minutes shall also be provided. Start contacts for the engine control shall be gold type, dry contacts wired to a terminal block and compatible with the generator set control equipment furnished.
- L. Transfer switch shall be factory equipped with a means to prevent large inrush currents due to transfer between energized sources. This feature shall provide a field adjustable time delay during switching in both directions, during which time the load is isolated from both power sources, to allow residual voltage of motors or other inductive loads (such as transformers) to decay before completing the switching cycle. This programmed transition feature shall have an adjustable time range of 0 to 60 seconds.
- M. Transfer switch enclosure shall be NEMA 1, suitable for indoor mounting locations.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's installation instructions and instructions included in the listing or labeling of UL listed products.
- B. Provide and install standby system conductors in a raceway system separate from other wiring. Control interconnection wiring shall be properly sized and run in a raceway system separate from power cables.

3.02 FACTORY TESTS

- A. Generator set factory production tests: on the equipment to be shipped, shall be performed at rated load and 0.8 PF. These tests shall include; (1) hour run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and safety shutdowns.
- B. Provide a factory certified test record of the production testing. The production test shall be witnessed by the engineer, or his authorized agent. The production test shall be witnessed by an independent testing laboratory, as approved by the engineer.

3.03 ON-SITE ACCEPTANCE TEST

- A. The complete installation shall be tested for compliance with the engine-generator specification following completion of all site work. Testing, coordinated by the City Engineer and Library Director, shall be conducted by representatives of the generator set manufacturer. Notify the City Engineer and Library Director two weeks in advance of availability to perform on-site acceptance testing.

- B. Installation acceptance tests, to be conducted for each site, shall include:
1. Provide a "Cold Start" test per NFPA 110 (1988), 5-13.2.3 with the unit connected to the required load bank.
 2. Provide a (2) hour, full load, load bank test per NFPA 110, 5-13.2.5. Contractor shall provide a portable resistive load bank and make temporary connections. Data, which is specified to be recorded in the "cold start" test, shall be recorded at the start of the full load test and every 15 minutes thereafter. The unit shall be connected to the required load bank during this test.
 3. Provide a one step rated load increase and decrease test in accordance with NFPA 110, 5-13.2.6. The unit shall be connected to the required load bank during this test. Use recording oscilloscope to measure voltage and frequency transients. This test can be performed by an independent testing agency, or a consultant, upon completion of the manufacturer's on-site acceptance test.
 4. Provide a functional test of all safeties and remote signals, which are specified and provided.
 5. Provide a (2) hour functional test of all facility operations under loss of normal power. During the functional test, the engine-generator shall be connected to the automatic transfer switch. The test shall include automatic start-up, by means of simulated power outage to test automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted by the generator set commissioning agent for proper system coordination. Engine coolant temperature, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test.

3.05 OPERATING AND MAINTENANCE MANUALS

- A. Provide (2) sets each of the following: manufacturer's catalog information and diagrams (specific only to the equipment supplied), installation manual and Operating and Maintenance Manuals.

3.06 TRAINING

- A. Provide one day for library personnel training on proper operation and maintenance of engine generator sets. Training shall be conducted concurrent to the on-site acceptance test specified herein.

END OF SECTION

SECTION 16400
SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Work consists of providing the complete service and distribution system shown on the drawings and specified herein. The requirements of all other sections of the specification are equally applicable to the work to be performed under this section.

1.2 RELATED WORK:

- A. Section 16010 – General Provisions
- B. Section 16100 - Basic Materials and Methods
- C. Section 16200 – Standby Power System Installation
- D. Section 16450 – Grounding

1.3 SUBMITTALS:

- A. Submit product data and shop drawings of the following for approval of the ENGINEER:
 - 1. Safety Switches and Disconnects
 - 2. Main Circuit Breaker
 - 3. Panelboards
 - 4. Grounding System
- B. Provide complete coordination study of the electrical system. Include trip settings and trip curves for each overcurrent device mounted in the generator, service disconnect, branch feeder breakers, motor starters, and panelboards. The coordination study shall conform to the requirements of the latest IEEE standard 242 – Protection and Coordination.
- C. The CONTRACTOR shall submit a coordination study report to the ENGINEER for review prior to project completion. The ENGINEER may direct the CONTRACTOR to make adjustments to trip settings based on the coordination study report findings. These adjustments shall be at no additional cost to the Owner.

1.4 POWER SERVICE:

- A. The division of responsibility between the Power Company and the Contactor shall be the secondary side lugs of the meter base. Coordinate all work associated with the existing meter base with the power company. Contact Marilyn Brockey with Pacific Power, (503) 861-6005.
- B. Furnish all labor and install all material not furnished by the utility company to render temporary service to the project site. Verify and coordinate construction details, service de-energization and re-energization, etc., and include all costs related to utility service in bid proposal. Provide ground services as required to satisfy utility company and code requirements. Verify all service installation details with the utility company and observe utility company standards throughout. The CONTRACTOR shall pay all Power Company fees.

PART 2- PRODUCTS

2.1 SAFETY SWITCHES AND DISCONNECTING MEANS

- A. Furnish safety switches and disconnecting means where required by the NEC, state and local codes or where required by the AHJ. All equipment shall conform to NEMA standards latest revision as applicable.
- B. Switches shall be heavy-duty class, quick-make, quick-break, safety-type, externally operable, with by-passable interlock to prevent opening of cover in "ON" position. Switch shall have positive indication of "OFF" and "ON" position. Devices shall have visible blades unless molded-case breaker mechanism is used. Switches shall be so constructed as to preclude single phasing of switch blades due to mechanical failure. Switches shall be pad-lockable in the "OFF" position.
- C. Switches shall be of the proper horsepower, ampere and voltage rating with number of poles required to open all ungrounded conductors and with S/N bar where required. Provide auxiliary switch contacts in all disconnect switches.
- D. Unless otherwise indicated, indoor individually-mounted switches shall be in NEMA type 1 enclosures. Outdoor individually-mounted switches shall be in NEMA type 3R enclosures.

2.2 MAIN CIRCUIT BREAKER

- A. Furnish and install Main Circuit Breaker where indicated. Main circuit Breaker shall be enclosed in a NEMA 1 general purpose enclosure unless otherwise noted, with a front cover mounted metal nameplate that contains a permanent record of catalog number and maximum ratings, and a handle that is lockable in the "OFF" position. Enclosed Main Circuit Breaker shall be rated for "service entrance".
- B. Main Circuit Breaker shall be molded case and shall have the electrical characteristics, rating, and modifications as shown. Main Circuit Breaker shall have a quick-make, quick break, over-center toggle type, trip-free mechanism to prevent holding contacts closed against a position between "ON" and "OFF" when tripped automatically. Breaker shall be common trip such that an overload or short circuit on any one pole will result in all poles opening simultaneously.
- C. The interrupting capacity of the Main Circuit breaker shall be at least equal to the available short circuit current at the line terminals of the breaker, but in no instance shall the rating be less than 22 kAIC at 208 volts.

2.3 PANELBOARDS

- A. General: Provide panelboards in conformance with the following specification for installation as shown on the drawings.
- B. Panelboards shall be dead-front, flush mounted or surface mounted with sub-breakers, main lugs, double lugs, or main breakers as shown on the drawings. Lugs shall be sized for feeders and shall conform to the specification for splicing and terminations. Buses shall be copper, full panel length. Buses shall be identified. Minimum bus rating shall not be smaller than the setting of the feeder protective device. Provide copper ground bus in all panelboards. Unless otherwise indicated, the interrupting rating for panelboards shall be 22 kAIC at 208 VAC, minimum; provide higher ratings, if required.
 - 1. Circuit breakers: Provide molded case bolt-on circuit breakers with thermal magnetic trip units, and a common trip bar for two or three-pole breakers, connected internally

to each pole so that the tripping on one pole will automatically trip all poles of each breaker. Handle bales or clips will not be acceptable. Provide breakers of the trip-free and trip-indicating type, with quick-make, quick-break contacts. Provide single, two or three pole breaker interchangeability.

2. Special features: Provide split-bus, sub-feed lugs, sub-feed protective device and contactors as indicated on the drawings or specified in this or other sections of these specifications.
3. Tandem, duplex, or half-sized circuit breakers: Do not use this type of equipment.
4. Lighting and appliance panelboards (240 V class): Minimum breaker interrupting rating shall be 10,000 amps, symmetrical. Provide breakers and panel of higher interrupting rating where indicated on the drawings. Provide minimum box dimensions per NEC.
5. Covers: Covers shall be hinged front. Inside cover shall have panel schedule neatly typewritten in a plastic pouch.

2.4 GROUNDING SYSTEM:

- A. This grounding specification is applicable to this and all other sections of the work. Provide all grounding systems and make connections mechanically secure and electrically continuous. Ground all line voltage electrical systems completely and effectively as required by code and as specified herein.
- A. Ground all raceway systems and equipment enclosures. Where not otherwise indicated, grounding conductor size shall conform to the most stringent of the governing codes.
 1. Ground the service and transformers in an approved manner.
 2. Provide grounding where indicated on the drawings. All ground mat conductors shall be bare soft drawn copper, sized as noted. Bury all conductors approximately 12-inches below grade.
 3. Grounding conductor connections shall be bolted except at inaccessible ground rods, buried ground conductors and reinforcing steel grounding conductor connections, where connections shall be brazed. Consideration will be given to bolted connections in lieu of brazed connections, subject to the ENGINEER's approval. Exothermic welded connections may be substituted for brazed connections subject to the ENGINEER's approval and demonstration on the project with actual test connections that the connections will be successfully made.
 4. Ground conductors, unless otherwise noted, shall be insulated and shall be run in conduit.
 5. Continuity of equipment ground shall be maintained throughout the entire raceway, cabinet and equipment enclosure system. Ground bushings and jumpers shall be used wherever normal conduit termination does not insure continuity. Where nonmetallic conduit is used for distribution or where direct burial cables are employed, install a green insulated equipment ground conductor with each circuit.
 6. Metal parts of lighting fixtures not otherwise grounded by bolted fastenings shall be bonded to conduit system with green ground wire. Receptacles shall be grounded to outlet boxes with green ground wire and machine screw.
 7. Motors and equipment shall be bonded to the equipment grounding system by a continuous green insulated equipment ground conductor run with each circuit through approved flexible conduit connections as permitted by code. Where flexible conduit size exceeds the code approved limits, provide a separate green grounding

conductor inside each flexible conduit, bonded to the inside of the connection box and to the nearest accessible supply end conduit junction box.

8. Where concrete pad is provided for utility-furnished transformers, suitable grounding systems shall be provided under this section, including driven ground rods. Installation shall conform with the serving utility company requirements.

PART 3 - EXECUTION

3.1 EQUIPMENT BASES:

- A. Provide equipment bases for all floor-mounted electrical equipment. Unless otherwise indicated, bases shall be poured-in-place concrete, nominally four inches high, and be one inch larger on all exposed edges than the equipment to be mounted. On all equipment bases in interior locations, unless otherwise noted, provide two or more parallel, cast-in-place continuous-slot channel erection system concrete inserts for equipment mounting. Bolt equipment to channels. Provide additional surface-mounted channels where required to match and lineup with existing equipment. Provide concrete pads and mounting provisions for all exterior equipment. Equipment shall be anchored to equipment pad so that it is secure and meets the equipment manufacturer's installation recommendations for outdoor installations. Adhere to specific directions indicated on the drawings or specified in other portions of the specifications. Provide engineered calculations for anchorage of any self-supporting enclosure pad stamped and signed by a registered professional structural engineer licensed in the state of Oregon.

3.2 SUPPORTS:

- A. Provide hangers or other devices such as pads, channels, struts, joists, anchors, etc., necessary for the support of electrical equipment. Provide the design, fabrication and erection of supplementary structural framing electrical equipment. Show on shop drawing supplementary framing including design loads, member size and location. When supplementary framing is indicated, verify that dimensions are suitable for the equipment furnished. Provide additional strength when equipment furnished is heavier than that specified.

3.3 DAMP AND WET LOCATION:

- A. Provide 1/4-inch air space behind all electrical equipment mounted in damp and wet locations and on concrete walls below grade. Use corrosion-resistant washers, bolts and anchors.

3.4 MECHANICAL EQUIPMENT:

- A. Provide convenience receptacle and disconnect for each mechanical device as required by NEC 210.63, and NEC 430.101 through 430.113.

3.5 START-UP AND TESTING:

- A. The CONTRACTOR shall perform and provide the following:
 1. Inspecting for proper wiring and functionality.
 2. Set all circuit breakers, including the generator circuit breaker, per the coordination study specified herein.

3. Provide ENGINEER with documentation on each setting of each circuit breaker as programmed. Omission of proper documentation shall result in start-up and testing Failure, and cause for the system to be re-tested and re-commissioned at the CONTRACTOR's expense.

END OF SECTION

SECTION 16450
GROUNDING

PART 1 - GENERAL

1.1 Related Work

- A. Section 16010 - General Electrical Requirements
- B. Section 16100 - Basic Electrical Materials and Methods.
- C. Section 16200 - Standby Generator System.
- D. Section 16400 - Service and Distribution.

1.2 System Description

- A. Provide grounding and bonding of electrical service, circuits, equipment, signal, and control systems.
- B. Performance Requirements: Supplement the grounded neutral of the secondary distribution system with an equipment grounding system to properly safeguard the equipment and personnel. Install equipment grounding such that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

1.3 Submittals

- A. Provide Shop drawings and product data for the grounding material.

1.4 Regulatory Requirements

- A. Conform to requirements of the NEC, latest adopted version with amendments by local AHJ's.
- B. Furnish products listed by UL or other testing firm acceptable to AHJ.

1.5 Sequencing and Scheduling

- A. Building Ground Electrode: Coordinate placement of ground rods and grounding electrode conductor in base of building footing prior to placement of concrete. Coordinate bonding of rebar with rebar installer prior to rough-in.

PART 2 PRODUCTS

2.1 Materials

- A. Ground Rods: Copperclad steel, 3/4-inch diameter, 10-feet long, tapered point, chamfered top. Manufacturers: Weaver, Thomas & Betts, Talley, or approved.
- B. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors.

Mechanical type of connectors are not acceptable. Manufacturers: Burndy Hyground Compression System, Erico/Cadweld, Amp Ampact Grounding System or approved.

- C. Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe. Burndy GAR Series, O-Z Gedney, Thomas & Betts or approved.
- D. Telecommunications Grounding Bar: 1/4-inch thick by 4-inch high by 20-inch long copper ground bar with insulators. Manufacturers: Erico/Cadweld or approved.
- E. Grounding Electrode Conductor: Bare copper stranded conductor.

PART 3 EXECUTION

3.1 General

- A. Provide all grounding systems and make connections mechanically secure and electrically continuous. Ground all line voltage electrical systems completely and effectively as required by code and as specified herein.
- B. Ground all raceway systems and equipment enclosures. Where not otherwise indicated, grounding conductor size shall conform to the most stringent of the governing codes, except that no grounding conductor shall be smaller than 12 AWG.
 - 1. Ground the service and transformers in an approved manner.
 - 2. Provide grounding where indicated on the drawings. All ground mat conductors shall be bare soft drawn copper, sized as noted. Bury all conductors approximately 12-inches below grade.
 - 3. Grounding conductor connections shall be bolted except at inaccessible ground rods, buried ground conductors and reinforcing steel grounding conductor connections, where connections shall be brazed. Consideration will be given to bolted connections in lieu of brazed connections, subject to the Engineer's approval. Exothermic welded connections may be substituted for brazed connections subject to the Engineer's approval and demonstration on the project with actual test connections that the connections will be successfully made.
 - 4. Equipment grounding conductors, unless otherwise noted, shall be the same insulation type as the circuit conductors and shall be run in conduit.
 - 5. Continuity of equipment ground shall be maintained throughout the entire raceway, cabinet and equipment enclosure system. Ground bushings and jumpers shall be used wherever normal conduit termination does not insure continuity. Where nonmetallic conduit is used for distribution or where direct burial cables are employed, install a green insulated equipment ground conductor with each circuit.
 - 6. Metal parts of lighting fixtures not otherwise grounded by bolted fastenings shall be bonded to conduit system with green ground wire. Receptacles shall be grounded to outlet boxes with green ground wire and machine screw.
 - 7. Motors and equipment shall be bonded to the equipment grounding system by a continuous green insulated equipment ground conductor run with each circuit through approved flexible conduit connections as permitted by code. Where flexible conduit size exceeds the code approved limits, provide a separate green grounding

conductor inside each flexible conduit, bonded to the inside of the connection box and to the nearest accessible supply end conduit junction box.

8. Where concrete pad is provided for utility-furnished transformers, suitable grounding systems shall be provided under this section, including driven ground rods. Installation shall conform with the serving utility company requirements.

3.2 Installation

A. Concrete Encased Ground Electrode:

1. From the service equipment ground bus install grounding electrode conductor to footing foundation rebar.
2. Bond the grounding electrode conductor to three independent steel rebars. Each rebars minimum length is 20-feet.
3. Protect grounding electrode conductor extension from footing/foundation to service equipment with rigid PVC conduit. Do not use metal conduit for grounding electrode conductor protection.

B. Water Service Grounding: Bond building ground electrode and water service pipe to service ground bus. Connect to water pipe on utility side of isolating fittings or meters, bond across water meters.

C. Raceways:

1. Ground all metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay-in lug.
2. Connect all metal raceways, which terminate within an enclosure but without mechanical connection to the enclosure, by grounding bushings and ground wire to the grounding bus.
3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.
4. Install equipment grounding conductor, code size minimum unless noted on Drawings, in all nonmetallic and metallic raceway systems.

D. Feeders and Branch Conduits:

1. Install continuous insulated equipment copper ground conductors within the following circuits; feeders, circuits for computer systems and other circuits as indicated on Drawings.
2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment ground conductors for feeders and branch circuits sized in accordance with Table 250-95.

- E. Boxes, Cabinets, Enclosures and Panelboards:
 - 1. Bond grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.
 - 2. Bond all sections of service equipment enclosure to service ground bus.
- F. Motors, Equipment and Appliances: Install code size equipment grounding conductor from outlet box to (motor) equipment frame or manufacturer's designated ground terminal.
- G. Receptacles: Connect ground terminal of receptacle to equipment ground system by No. 14 conductor bolted to outlet box except isolated grounds where noted. Self grounding nature of receptacle devices does not eliminate conductor bolted to outlet box.
- H. Telecommunications Backboard: provide telecommunications grounding bar at each telecommunications backboard. Bond the grounding bar to service grounding bar in the main service equipment with a 6AWG copper equipment grounding conductor.
- I. Separately Derived Systems: Ground each separately derived system per NEC 250-26.

END OF SECTION

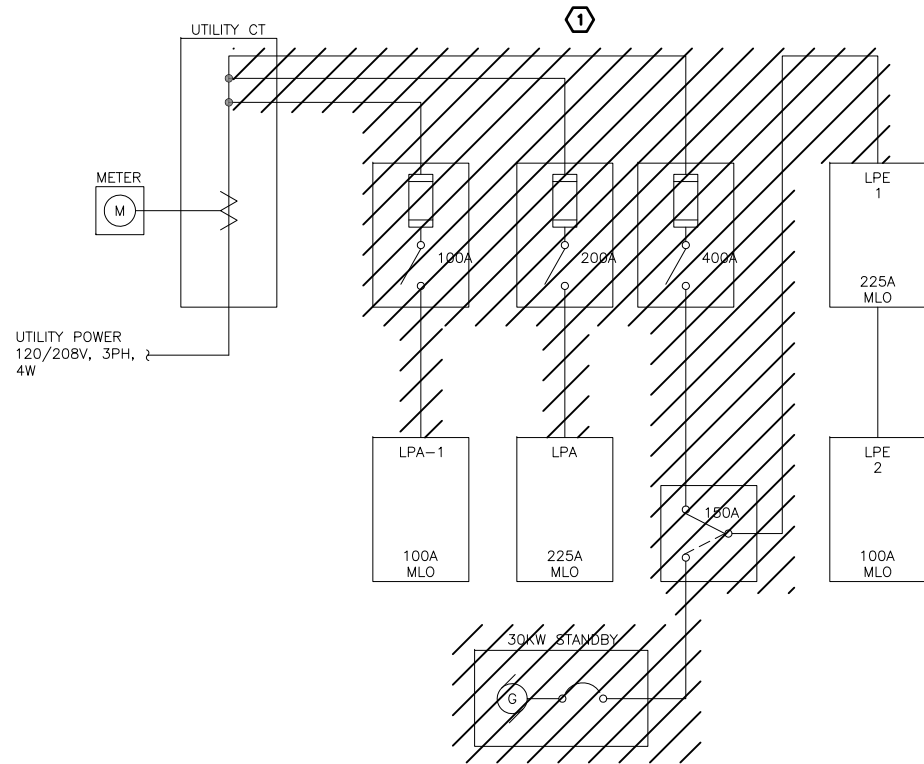
W:\WF\587_City of Seaside\021_City Hall and Fire Department Generator Upgrade\001_Design and Construction Services\DWG\E1.0.dwg Plotted: Mar 04, 2016 - 2:58pm By: HeidiS

GENERAL NOTES

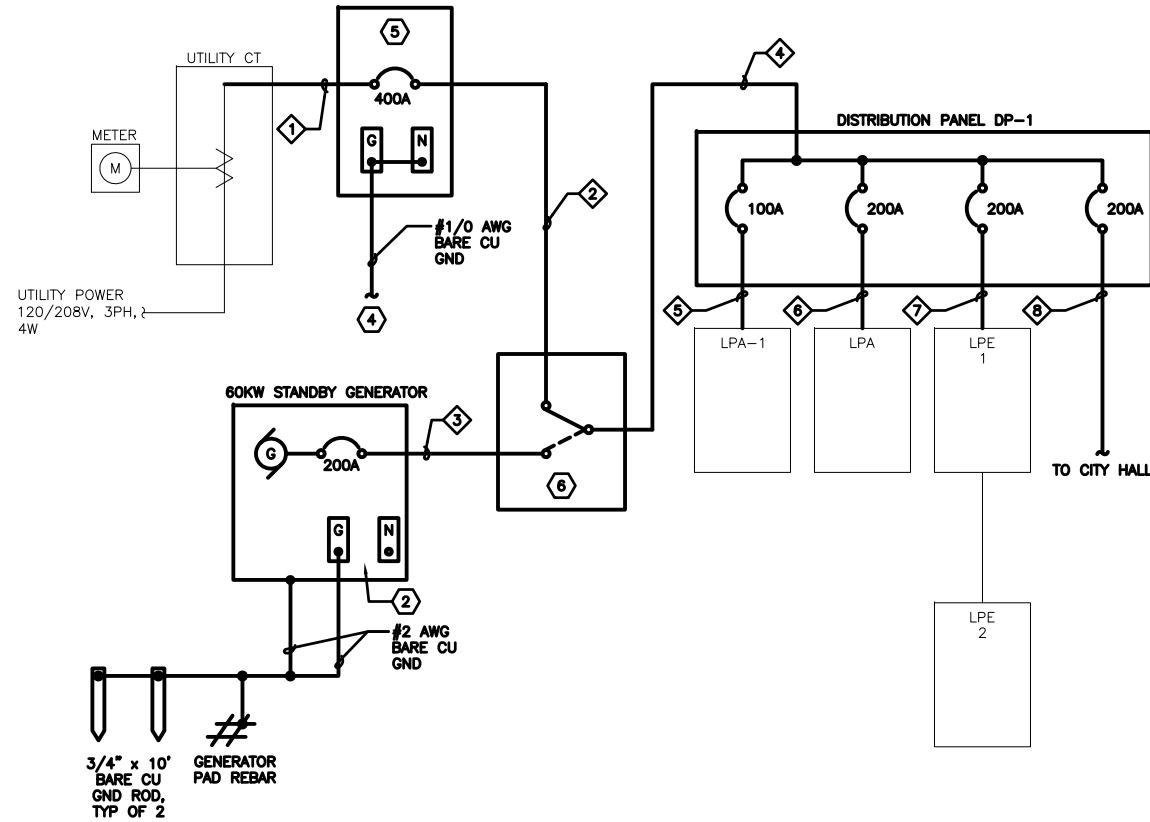
- A. CONTRACTOR SHALL COORDINATE AND VERIFY ALL EXISTING UTILITY SERVICE CONNECTIONS AND EQUIPMENT WITH UTILITY REPRESENTATIVE PRIOR TO DEMOLITION EXISTING SERVICE EQUIPMENT OR INSTALLATION OF NEW EQUIPMENT.
- B. ALL NEW EQUIPMENT SHALL BE RATED 22KAIC, MINIMUM. THE UTILITY CALCULATED SERVICE FAULT CURRENT IS xxxxx AIC.

NOTES THIS SHEET

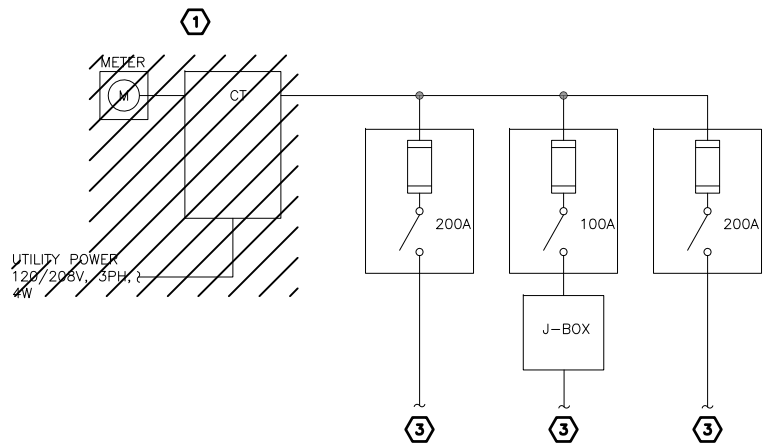
- 1 CONTRACTOR SHALL DEMOLISH INDICATED EQUIPMENT AND SALVAGE BACK TO THE OWNER.
- 2 CONTRACTOR SHALL REMOVE THE GENERATOR N-G BOND STRAP DURING GENERATOR INSTALLATION.
- 3 SEE EXISTING BUILDING AS-BUILT DRAWINGS FOR CIRCUIT CONTINUATION.
- 4 FIELD VERIFY BOND POINT FOR CONNECTION OF NEW SERVICE GROUNDING CONDUCTOR AND EXISTING SERVICE GROUNDING SYSTEM.
- 5 NEW SERVICE ENTRANCE RATED MAIN DISCONNECT BREAKER.
- 6 NEW EMERGENCY RATED, 3-POLE, 200A AUTOMATIC TRANSFER SWITCH.
- 7 PROVIDE A NEUTRAL AND GROUND BAR IN THE POWER DISTRIBUTION BLOCK ENCLOSURE. DO NOT BOND THEM AND VERIFY THAT NONE OF THE EXISTING FUSED DISCONNECTS HAVE N-G BONDS.



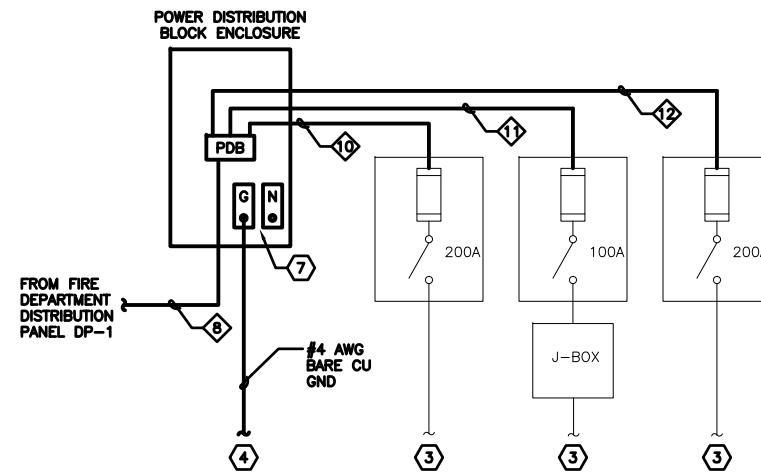
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E1.0 NOT TO SCALE



2 ONE-LINE DIAGRAM - FIRE DEPARTMENT NEW INTERCONNECTION
E1.0 NOT TO SCALE



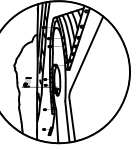
3 EXISTING ONE-LINE DIAGRAM - CITY HALL DEMO
E1.0 NOT TO SCALE



4 ONE-LINE DIAGRAM - CITY HALL NEW INTERCONNECTION
E1.0 NOT TO SCALE

CITY OF SEASIDE, OREGON

ENGINEERING DEPARTMENT
SEASIDE, OR
989 BROADWAY
97138 503-738-5112



NO.	DATE	REVISION COMMENTS	BY

DESIGN DRAWN	CHKD	DATE	INITIAL	ISSUE DATE:
SMR	MJP	SMR	3/04/16	3/04/16

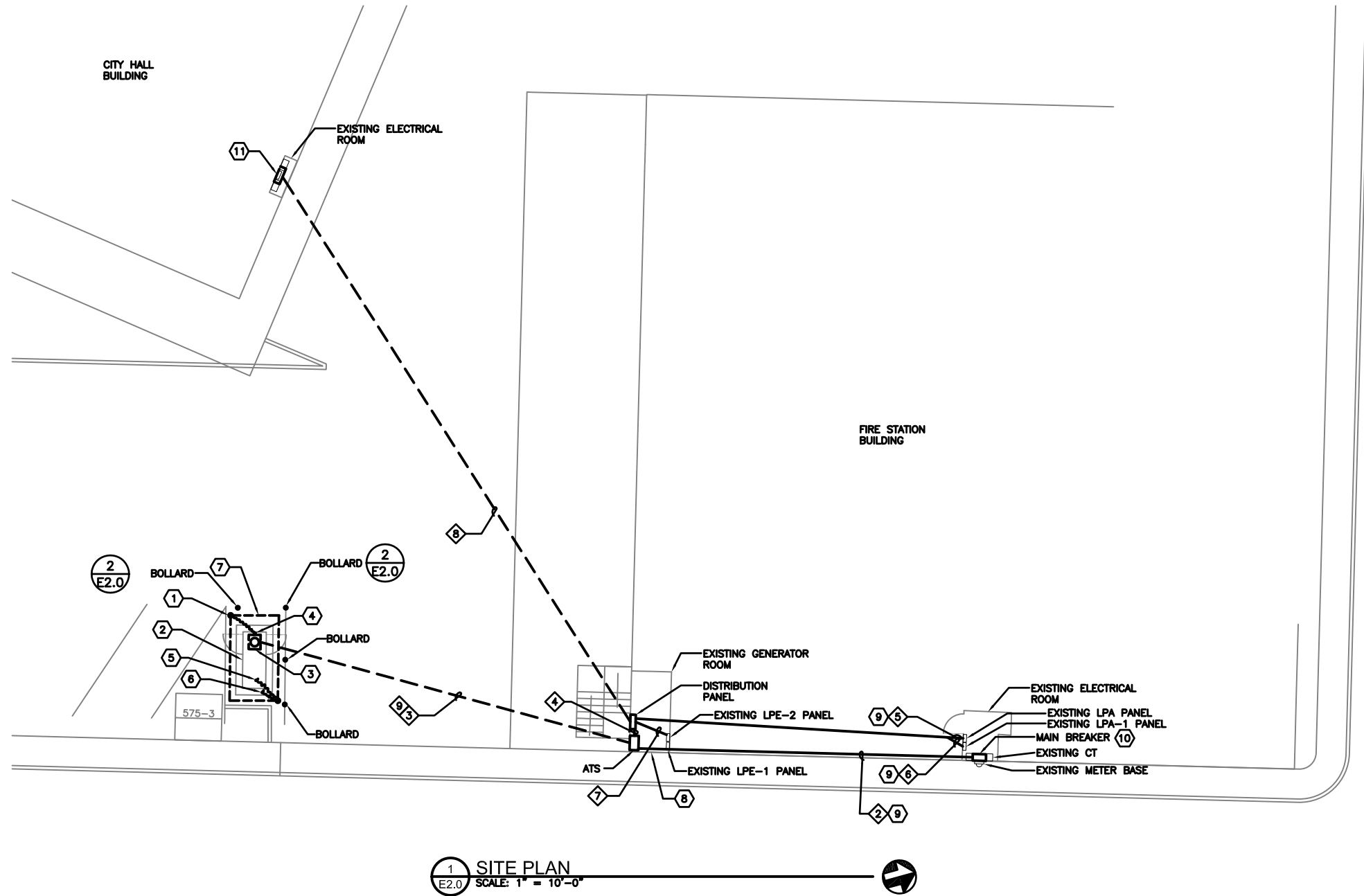
100% DESIGN SUBMITAL

CITY HALL AND FIRE STATION
GENERATOR IMPROVEMENTS
ONE-LINE DIAGRAM
SEASIDE, OREGON 97138

R&W
ENGINEERING, INC.
"Engineering Integrated Solutions"
9815 S.W. Allen Boulevard
Suite 107
Beaverton, Oregon 97005
Phone: (503) 726-3331
Fax: (503) 726-3326
E-mail: rweg@rweg.com
Project No.: 587.021.001 Contact: SAM RUSSUM

E1.0

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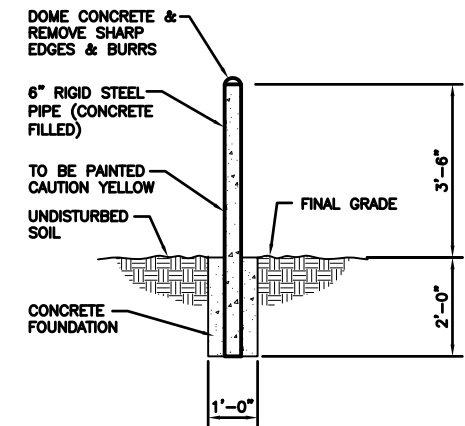


GENERAL NOTES:

A. SAW-CUT, PATCH, AND REPAIR PARKING LOT ASPHALT FOR INSTALLATION OF NEW UNDER-GROUND CIRCUITS.

NOTES THIS SHEET

- 1 BARE COPPER-CLAD GROUND ROD, TYPICAL OF 4.
- 2 STANDBY NATURAL GAS GENERATOR. SEE ONE-LINE DIAGRAM.
- 3 COORDINATE CONDUIT STUB-UP AREA LOCATION WITH EQUIPMENT MANUFACTURER.
- 4 PROVIDE #2 AWG GROUND CONDUCTOR FOR BONDING GENERATOR ENCLOSURE TO GROUND RING.
- 5 PROVIDE #2 AWG GROUND CONDUCTOR PIGTAIL FROM GROUND RING TO BOND TO GENERATOR GROUND BUS.
- 6 PROVIDE #2 AWG GROUND CONDUCTOR PIGTAIL FROM GROUND RING TO BOND TO GENERATOR PAD REBAR.
- 7 GENERATOR GROUND RING. PROVIDE #2 AWG GROUND CONDUCTOR FOR GROUND RING AROUND PERIMETER OF NEW GENERATOR PAD. BOND GROUND RING TO PAD REBAR, GENERATOR FRAME AND GENERATOR GROUND BUS. MAKE ALL BOND CONNECTIONS AND WIRE INACCESSIBLE FROM OUTSIDE GENERATOR ENCLOSURE.
- 8 CONTRACTOR SHALL PROVIDE AND INSTALL STAINLESS STEEL PLATE ABOVE EXTERIOR DOOR TO COVER AND REPAIR DEMOLISHED EXISTING GENERATOR EXHAUST VENT.
- 9 CONTRACTOR SHALL FIELD VERIFY AND COORDINATE SPECIFIC ROUTING OF CIRCUITS IN DROP CEILING BETWEEN EXISTING ELECTRICAL ROOMS.
- 10 INSTALL NEW MAIN SERVICE DISCONNECT ABOVE EXISTING CT ENCLOSURE.
- 11 POWER DISTRIBUTION BLOCK ENCLOSURE, INSTALL BELOW EXISTING DISCONNECTS.



2 BOLLARD DETAIL
NOT TO SCALE

R&W
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"Engineering Integrated Solutions"
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Fax: (503) 726-3326
E-mail: rweg@rweg.com
Project No.: 587.021.001 Contact: SAM RUSSUM

100% DESIGN SUBMITTAL

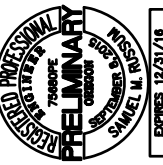
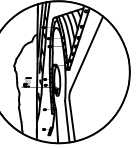
**CITY HALL AND FIRE STATION
GENERATOR IMPROVEMENTS
SITE PLAN**

SEASIDE, OREGON 97138

E2.0

CITY OF SEASIDE, OREGON

ENGINEERING DEPARTMENT
SEASIDE, OR
989 BROADWAY
97138 503-738-5112



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DESIGN DRAWN	CHKD	DATE	INITIAL	ISSUE DATE:
SMR	MJP	SMR	3/04/16	3/04/16