

J. Floor Power Outlets on Grade: For floor signal outlets, slab on grade, provide a rectangular box, flush with the face of finished floor. Box to be non-metallic, to accommodate required power conduit(s). Box and conduit to be cast in floor adjacent to a similar signal outlet box. Power conduits may be daisy chained to similar floor outlets on the same circuit, in the same room. Extend power conduit from the floor outlet location over to rise up inside of a nearby wall or column, riser to transition to EMT conduit with the conduit stubbed into a junction box in accessible ceiling space. Floor box to be similar to Hubbell PFBRG series or Carlon E976 series. Power outlet floor box is to be ganged adjacent to similar signal outlet floor box, arranged to be provided with a single multi-gang coverplate.

K. In-Grade Pull or Junction Boxes: Box to be Oldcastle heavy-duty polymer concrete box, H1118-12 or similar with traffic rated coverplate. Provide label cast into coverplate "ELECTRIC" for site branch circuitry or feeders, provide similar coverplate "TELECOMM" for site conduits with telecomm and/or security and/or fire alarm circuitry. Provide one additional collar ring and provide a concrete floor for the in-grade pull or junction box.

26 05 34 EMPTY RACEWAYS FOR COMMUNICATIONS SYSTEMS:

A. General: Unless otherwise noted on the drawings, provide wall outlet device boxes, plaster rings, cover plates and empty 3/4" conduit and pull string stubbed above to an accessible location in the mechanical mezzanine for TV, Telephone, Data, Security, Communications, Audio Visual and Fire Alarm Systems. Wiring for these systems is provided by others.

B. Floor Signal Outlets on Grade: For floor signal outlets on grade, provide a rectangular box flush with grade. Box to be non-metallic, to accommodate a 3/4" signal conduit. Box and conduit to be cast in floor adjacent to similar power outlet box. Extend 3/4" signal conduit from each signal outlet box location over to rise up inside of a nearby wall or column, transition to EMT conduit with the conduit stubbed above to an accessible location in the mechanical mezzanine. Provide a pull string from the floor box to the ceiling space. Floor box to be similar to Hubbell PFBRG series or Carlon E976 series. Signal outlet floor box is to be ganged adjacent to power outlet floor box, arranged to be provided under a single, multi-gang coverplate.

C. Signal Outlet Conduit and Cabling in Mechanical Mezzanine: Extend a conduit from the outlet location(s) indicated over to an accessible location in the mechanical mezzanine area. Signal conduits stubbed shall not extend to the mezzanine located above the kitchen area. Each signal conduit shall be labeled (TV, Telephone, Data, Security, Communications, Audio Visual and Fire Alarm Systems Communication System, etc.) and shall be provided with a pull string. Conduits shall be arranged with a series of "J" hooks mounted for each system, no more than 5' apart and arranged such that when signal cables are pulled, the "J" hooks will allow the cables to be run in the mechanical mezzanine area in a neat and orderly fashion, parallel and perpendicular to the major building lines. From each mechanical mezzanine, provide (3)-3" conduits and (3)-2" conduits from the mezzanine area, stubbed below grade, to extend to the telecommunications closet.

D. Telecomm Entrance: Provide quantity of 4" empty conduits from the telecommunications closet, routed to property edge as indicated on the Drawings. At the property edge, cap conduits and mark the end of the run with a 6"x 6" X 12" concrete marker flush with grade. Label marker "TELE". Stub conduits approximately 3" above floor, provide pull string(s) in conduits. Provide a 3/4" plywood backboard, painted white, where the conduits stub up. Plywood to be 4' x 8' (minimum) or larger as indicated on the Drawings. Provide a grounding bus at the 3/4" plywood where the conduits stub into the room. Provide a 250 Kcmil grounding conductor back to the service entrance grounding point. Grounding conductor to be insulated copper. Where grounding conductor is routed outside of the room, provide a 3/4" conduit, bond the grounding conductor to both ends of the conduit.

26 05 26 GROUNDING AND BONDING:

A. General: All conduit work and electrical equipment shall be effectively and permanently grounded in accordance with NEC requirements. Provide a green equipment grounding conductor in all feeder circuits. Provide a green equipment grounding conductor with all power and receptacle and lighting branch circuit. Green equipment grounding conductor shall be routed throughout the electrical distribution system, from the service entrance ground, through the panel ground bus to final devices. Bond all metallic equipment that may become energized, such as ductwork, cable tray, etc. to the grounding system.

B. Grounding Electrodes: Provide 3/4" x 10-ft long, copper-clad, steel grounding rod. For below-grade connections provide exothermic welded type connections (trade name: Cadweld); for above grade connections provide mechanical bolted-type connections utilizing high conductive copper alloy or bronze lugs or clamps.

C. Service Entrance Ground Resistance: Ground resistance at the service entrance must be less than 25 Ohms. Provide additional ground rods as required to obtain 25 Ohms or less.

D. Ground Bars: Provide a 1/4" thick by 4" high by 24" long grounding bar at the main service entrance and the telecommunications room. Grounding bar to be drilled to accept double-lug type compression connectors. Grounding bar to be mounted on non-conductive stand-offs in a convenient location in the room. Refer to grounding bus detail and grounding schematic for additional information.

26 05 53 ELECTRICAL IDENTIFICATION:

A. Conduit System Identification: Mark all branch conduits with the appropriate circuit numbers at each surface mounted panel location where the conduits enter the panelboard. For recessed panels, mark branch conduit in ceiling plenum just above panels.

B. Conductor Color Code: Conductors insulation colors shall follow the City of Sugar Land existing color codes. If the City of Sugar Land does not enforce conductor insulation color codes, the following conductor insulation color codes shall be used:

	480Y/277V 3 Ph, 4W	208Y/120V 3 Ph, 4W	240/120V 3 Ph, 4W	120/240V 1 Ph, 3W
Phase A	Brown	Black	Black	Black
Phase B	Purple	Red	Orange	Red
Phase C	Yellow	Blue	Blue Leg	--
Neutral	Gray or White	White	White	White
Ground	Green	Green	Green	Green

C. Panelboard Nameplate Designations: All branch circuit and distribution panelboards shall be identified using engraved nameplates with 4 rows of text (letter height shall be 1/4" minimum). Panel nameplates shall be an engraved plaque, three-layer laminated plastic, white letters on black background for normal power. Secure nameplates to the equipment using screws or rivets.

Example:
 PANEL "XX" 225 AMPS MCB, SECTION #1 of 2-SECTION PNL
 208Y/120V, 3 PHASE, 4 WIRE
 FEEDER SIZE 4 # 4/0 THWN, 1 # 4 G, 2 1/2" C.
 FED FROM DIST PANEL "XXX", 1ST FLOOR

D. Equipment Nameplate Designations: All switches, starters, combination starter/disconnect, transformers, wireways, communication cabinets, junction and pull boxes etc. shall be provided with a nameplate, similar to the Panelboard nameplate described above.

26 05 73 ELECTRICAL STUDIES:

Provide short circuit calculation, protective device coordination and arc flash hazard studies. Where emergency system(s) are provided, studies shall include overcurrent devices selective coordination with all supply side overcurrent protective devices. Studies shall encompass electrical distribution system from normal power source or sources to and including (branch breakers in each panelboard). Prepare study prior to ordering distribution equipment to verify equipment ratings required. Submit report with equipment submittals for the Engineer's review.

Perform study with aid of computer software programs. Report shall include: (a) Calculation methods and assumptions, (b) one line diagram, (c) state conclusions and recommendations. Studies and report shall be prepared by a professional engineer licensed in the state of Texas. Contractor shall provide warning labels on electrical equipment indicating incident energy level, level of hazard and the required personal protection equipment. Equipment shall include, but not limited to, switchboards, distribution panels, motor control centers, panels, contactors, disconnect switches and motor starters.

26 09 26 LIGHTING CONTROL PANELBOARDS:

Provide a complete microprocessor based control system for building lighting, made up of modular components and readily programmable on site to achieve flexible, automatic control of identified lighting branch circuits. Panel(s) and switches to be daisy-chained together using Cat. 5 patch cable with RJ45 connectors. A photosensor input to be provided to control exterior lights. Panels in the building to be networked to each other such that a switch input connected to any panel is able to affect the state of lighting relays in any other panel. Each panel to accommodate up to (16) relays. In addition to the quantity of relays indicated on the Drawings, each panel to be provided with a minimum of (4) additional relays. Panel shall include a 32-channel, 365-day/astromical time clock. A 21 by 8 character display is to act as programming interface for the system. Non-volatile memory shall hold all programming indefinitely. Panel to provide optional "blink-warn" feature, causing a lighting zone to blink approximately 5 minutes before scheduled "OFF" time. Programming software shall be offered as a standard feature. Programming software is to allow programming of system scheduling via a standard PC. System shall retain programming such that once the system has been programmed, the PC no longer will need to be connected for the schedule program to run. A modem to be included in the panel and lifetime factory programming is to be offered as a standard feature. Manual override feature is to be allowed for individual relays, zones or entire panel. Relays are to be 30A latching type to remain in the last state prior to power outage. Relays are to be UL listed for 18,000 amp short circuit current available at 120V. Lighting control panel to be similar to GR1400 series (Blue Box) as manufactured by Lighting Control & Design. Override switches to be similar to "Chelsea" style, as manufactured by Lighting Control & Design, provide number of switch buttons and zones of control at each location as indicated on the Drawings.

26 21 13 ELECTRICAL SERVICE ENTRANCE:

Contractor shall make arrangements for temporary and permanent service. Comply with all service installation standards of the serving utility. Electrical service characteristics shall be as shown on the electrical one line diagram. Contractor shall coordinate location of service entrance with the Power Company. Provide materials and equipment required to connect the project service to the utility system. Contractor shall submit to the Power Company an application for service. Contractor shall submit service application to the Power Company within 30 days after award of project contract. Contractor shall secure a Service Outlet and Data Statement ("statement") from the Power Company. Contractor shall verify that the information on the statement is correct, including voltage, phase and number of wires, type of service, service facility arrangements, and location of service outlet. Contractor shall provide a copy of the Service Outlet and Data Statement for the Engineer's review. Failure to submit service application to the Utility or failure to submit the Service Outlet and Data statement in a timely manner may cause project delay and additional cost. All such cost due to Contractor's failure to apply and coordinate for service in a timely manner shall be borne by the Contractor. The Contractor shall coordinate and assist the Owner if application is required to be submitted by the Owner

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26 24 16 PANELBOARDS:

A. General: All panelboards shall have tin plated or silver plated copper buses. At contractor's option, equipment may be provided with tin plated Aluminum buses. Load center type panelboards are not acceptable and shall not be used.

B. Breakers: Provide molded case thermal-magnetic or adjustable trip type circuit breakers which are quick-make and quick-break on both manual and automatic operation. Use a trip-free type circuit breaker which is trip indicating. Thermal-magnetic breakers shall incorporate inverse time characteristic by bimetallic overload elements and instantaneous characteristic by magnetic trip. Adjustable trip type circuit breakers shall use current sensing and on-board computers or combination of sensing, computers and thermal-magnetic trip units to adjust inverse time/current trip curves of the circuit breaker. For 2-pole and 3-pole breakers, use the common-trip type so that an overload or fault on one pole will trip all poles simultaneously. Handle ties or other field installed trip handle devices are not acceptable. All breakers shall be bolt-on type, stab-on type breakers are not acceptable. Tandem type circuit breakers or circuit breakers which are smaller than the standard breaker with which the panelboard has been U.L. listed are not acceptable. All circuit breakers rated 100 amp or less shall be suitable for terminating 75°C wire insulation (breakers rated for only 60°C wire insulation is not acceptable. Refer to specification section 26 05 19 – BUILDING WIRE AND CABLE, 600V).

C. Labeling: All equipment shall be labeled, panelboards shall be labeled both on the panel covers and on the panel interiors. Refer to specification section 26 05 33 ELECTRICAL IDENTIFICATION.

D. Panelboard Directories: Provide a steel directory frame mounted inside the door with a heat-resistant transparent face and a directory card for identifying the loads served. Identify each circuit with load and locations (room names and room numbers) and indicate with typed directories. (Example: 5 duplex receptacles, Office, RM XXX). Install the panelboards such that the center of the switch or circuit breaker in the highest position will not be more than 6 1/2 feet above the floor or working platform.

E. Spare Conduits: For each panel, provide one spare 3/4" conduit for every 6 spares and/or spaces in the panel. Each spare conduit shall be installed with pull string stubbed to a J-box located in accessible mechanical mezzanine space. Install a minimum of one spare 3/4" conduit for every new panel shown on plans, even if there are no spares/spaces in those panels.

F. Acceptable manufacturers are GE, Square D, Eaton, and Siemens

26 27 26 WIRING DEVICES:

A. General: Provide wiring devices where indicated on drawings. All switches and receptacle devices shall be Leviton "Decora" type, or approved equal unless specified otherwise by the Architect. All receptacles shall be specification grade type.

B. Project Standard Color: Project standard color for devices and coverplates shall be white. Confirm the project standard color with the Architect prior to ordering. Duplex receptacles served from homerun designated as "dedicated" (serving computer type outlets and or sensitive type loads) shall be color grey with project standard color coverplates. Isolated Ground (IG) type power receptacles (if used) shall be orange in color or shall be provided with an orange triangle on the device face.

C. Dimmer Switches: Provide a separate neutral conductor for each dimmer on a dimmer controlled lighting circuit, do not share neutral conductor with any other branch circuit(s). Breaking the fins (heat sinks) off of the dimmer switch causes the dimmer to become de-rated. Do not breaker the fins off of the dimmer switch. (Derated dimmer switches may be used only where specifically approved by the Engineer.) Certain dimmer switches require oversized back-boxes when mounted adjacent to other devices, coordinate the required back-box size for dimmers when mounted adjacent to other devices. For dimmers mounted adjacent, provide a single custom coverplate for the dimmers, up to (4) dimmers under a single custom coverplate. Field cutting multiple single-gang coverplates is not acceptable.

D. Ground Fault Circuit Interrupter (GFCI) Type Receptacle: GFCI type receptacles shall comply with 2006 UL 943 safety standard. GFCI type receptacle shall have integral end-of-life LED indicator light, and continuous sensing and self-testing every 60 seconds. Provide Hubbell GFR-5352 or approved equal. For "faceless" GFCI type receptacle, provide a 20A GFCI trip/reset mechanism with end-of-life indicator light to serve downstream "Ground Fault Protected" receptacle. For "Ground Fault Protected" receptacle that is served from an up-stream GFCI device, in addition to the panel and circuit number serving the receptacle, provide a label on the coverplate indicating "GROUND FAULT PROTECTED" and the room number of the GFCI mechanism that is protecting the receptacle

E. Cover plates: high abuse nylon or stainless steel per the Architect. Provide circuit number label on all power outlet and switch type device plates. For special equipment called out on the Drawing (e.g. COPIER), provide an additional label for the equipment name. For wall mounted switches controlling equipment, such as dish washers, garbage disposals, etc., provide an additional label for the equipment name.

F. Labeling: For required circuit designation and/or device use designation required on the coverplate, provide lettering a minimum of 18 point font, with a label-maker such as Brother P-touch or similar, black lettering on white tape.

G. Fire rated walls: All electrical boxes on opposite sides of corridor wall and fire rated walls must be separated by a horizontal distance of not less than 24 inches.

H. Testing and Certification: Contractor shall deliver a written report certifying that every receptacle has been tested as follows and found acceptable:

1. The physical integrity of each receptacle shall be confirmed by visual inspection.
2. The continuity of the grounding circuit in each electrical receptacle shall be verified.
3. Correct polarity of the hot and neutral connections in each electrical receptacle shall be confirmed.
4. The retention force of the grounding blade of each electrical receptacle (except locking-type receptacle) shall be not less than 115 grams (4oz.).

26 28 16 ENCLOSED SAFETY SWITCHES:

All safety switches shall be heavy-duty type with quick-make, quick-break contacts and suitable for terminating 75°C wire. Provide each switch with a ground lug. Provide a defeatable, front accessible, coin-proof door interlock to prevent opening the door when the switch is in the ON position and to prevent turning the switch ON when the door is open. Provide incoming line terminals with an insulated shield so that no live parts are exposed when the door is open. Voltage rating for all 208V three phase or 208V single phase safety disconnect switches to be 240V. Provide each 208V three phase or 208V single phase switch with an isolated, fully rated neutral block with provisions for bonding the block to the enclosure. Where fusible switches are shown, provide switches with rejection-type fuse holders which are suitable for use with fuses. In general, mount switches so that operating handle is approximately 44 inches above finished floor; where grouped, align tops of switches. Acceptable manufacturers are GE, Square D, Eaton, and Siemens.

26 36 12 GAS-ENGINE DRIVEN GENERATOR SETS:

A. General: Provide a spark-ignited (gas-engine) type standby generator. The proposed Standby Generator System shall be classified as Level 2 Emergency Power Supply System, type 60 (60 seconds), per NFPA 110 (Emergency and Standby Power Systems). Engine and alternator shall be assembled in the factory as a unit, to be UL 2200 listed. Fuel system for the engine shall be Natural Gas, approximately 1720 CFH, pressure between 11" and 14" H2O. The generator shall be provided with the following features and requirements:

1. Rating: 100 KW at 0.8 Power Factor, 125 KVA, 208Y/120V, 3 phase, 4 wire, standby rating.
2. Governor: Electronic isochronous type.
3. Fuel System: Natural Gas, down draft type carburetor with secondary fuel regulator and fuel shut-off solenoid. Operating pressure for the generator shall be between 11" and 14" water column.
4. Enclosure: Weatherproof, sound attenuating outdoor type. Access panels to be provided with key type locks, all keyed the same.
5. Exhaust: Critical-type exhaust silencer mounted inside of housing, stainless steel flexible exhaust connector, stainless steel tail pipe and rain cap.
6. Radiator: Unit mounted type with up-scoop for noise attenuation.
7. Vibration Isolation: Minimum 6" deflection vibration isolation. Provide flexible disc coupling between engine and alternator.
8. Mounting Base: Provide a single mounting base for the unit. Pour an 8" housekeeping pad with mounting bolts.
9. Radio Emissions: Provide radio frequency suppression to commercial standards.
10. Output Breaker: Provide a single output circuit breaker, 80% rated, mounted to the frame of the generator.
11. Jacket Heater: Provide a jacket heater (coolant heater) with a thermostat.
12. Battery: Battery to be rated for 32 degree F minimum ambient. Provide a battery heater kit rated for 0 degree F minimum ambient. Provide battery rack and cables. Battery charger to be equalize/float-type
13. Misc. Additional Features:
 - Lifting eye.
 - Load connection kit.
 - Fan and belt guard
 - Oil drain extension to skid.
 - Flexible fuel lines from gas piping on the site to the engine.
 - Solenoid Fuel Shutoff Valve
 - Operating instructions and Operations and Maintenance (O&M) Manual.

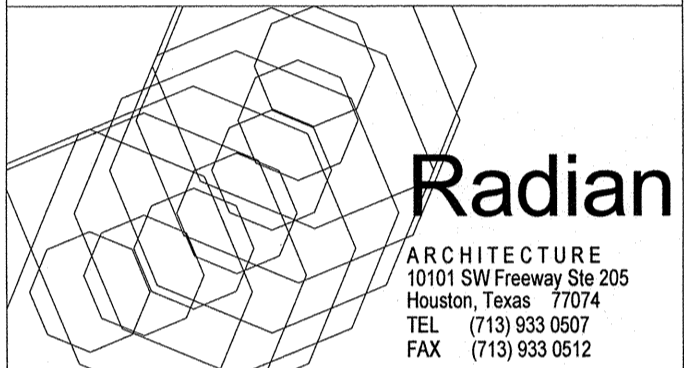
B. Controls and Alarms: Generator shall be provided with microprocessor controller console. Consult unit to be mounted on vibration isolators and shall include panel lights. Controller to include the following controls and indicators:

1. Run-Stop-Remote/Auto Switch
2. Remote Start-Stop terminal
3. Oil Pressure Gauge
4. Coolant Temperature Gauge
5. Charge rate Ammeter
6. Solid State engine Monitor with lamp Test Switch, Cycle Cranking, Common Alarm Contact
7. Generator mounted Indicator (annunciator) panel with 12 Lights indicating each of the following alarm and trouble conditions:
 - a. Pre-Low Oil Pressure Alarm
 - b. Overcrank Shutdown
 - c. Pre-High Coolant Temperature
 - d. Overspeed Shutdown
 - e. Low Oil Pressure Shut down
 - f. Generator Running
 - g. High Coolant Temp Shut down
 - h. Low Fuel Pressure Shut down
 - i. Low Coolant temperature
 - j. Switch Not in Auto
 - k. Two Customer Selected Faults
8. AC Output Controls, provided with the following controls and indicating the following information:
 - a. AC Voltmeter (dual range, indicated all voltages)
 - b. Voltmeter switch, Phase selector with an Off position
 - c. AC Ammeter (dual range, indicates current each phase Meter Switch, Voltmeter-
 - d. Ammeter Phase
 - e. Selector with an Off Position
 - f. Voltage Adjusting Rheostat
 - g. Frequency Meter
 - h. Run Time Meter
 - i. Exciter Circuit Breaker, Manual Reset
 - j. Fine Speed Control Potentiometer

REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL PHASING INFORMATION.



OPTIMUM CARE
SUGAR LAND, TEXAS



Revision Schedule		
#	Date	Description

Project No.
ELECTRICAL SPECIFICATIONS
 Sheet No.

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