

SECTION 11 41 63 - FIXTURE AND EQUIPMENT ELECTRICAL INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY:

A. General:

1. This Section specifies the electrical installation of fixtures and equipment furnished by the Kroger Company referred to as the Owner.
2. This Section includes various store type installations. Some of the items specified in this Section will not be used on the Project. Refer to Refrigeration, Fixture and Building Electrical Drawings for items included in the Project.
3. Supervision to coordinate the activities of all trades will be furnished by others. The Installer is responsible for supervising their own Work and meet dates shown on the installation schedule.

B. Section includes:

1. All labor, material and equipment specified in this Section and on the Refrigeration, and Fixture Drawings necessary for a complete and working installation of Owner's fixtures and equipment.
2. Wiring and final connections for the Owner furnished equipment and fixtures shown on the Drawings (Fixture Plan) include, but are not limited to the following:
 - a. Refrigerated cases, equipment, condensing units.
 - b. High voltage 120/208V control wiring.
 - c. Defrost wiring.
 - d. Meat and produce preparation area air cooling.
 - e. Walk-in coolers and freezers coils.
 - f. Meat preparation equipment.
 - g. Seafood preparation equipment.
 - h. Produce preparation equipment.
 - i. Non-refrigerated cases and fixtures.
 - j. Deli/bakery equipment.
 - k. Starbucks kiosk equipment final connections.
 - l. Checklanes and express checklanes.
 - m. U-Scan checklanes.
 - n. Sales area office (prefabricated, but not wired).
 - o. Shelving, including fixture electrical installer furnished and installed outlets.
 - p. Floral equipment.
 - q. Display cases and merchandisers.
 - r. Refrigerated case electrical receptacles.
 - s. Office and administrative equipment.
 - t. Interior electric signs.
 - u. Specialty department equipment, if any, and as indicated on Drawings.
 - v. All greeting card fixtures lighting.
 - w. All book store fixtures lighting.

- x. Grocery in-line refrigerated cases (plug into outlet furnished and installed by the Building Electrical Contractor at location determined).
 - 3. Wiring and conduit from specified junction boxes located at floor or in ceiling structure to equipment and fixtures as specified in this Section or shown on the Fixture Plan. The Building Electrical Contractor will supply junction boxes with electrical power wiring within close proximity to equipment and fixtures as indicated on Drawings.
 - 4. Conformance to the installation schedule.
- C. Modifications and additions to this Section, if required, are indicated in Section 11 41 63.01 "Supplementary Fixture and Equipment Electrical Installation." If Section 11 41 63.01 "Supplementary Fixture and Equipment Electrical Installation" is not included in this Project Manual, no modifications and additions to this Section are indicated. Where any portion of this Section is modified or deleted by Section 11 41 63.01 "Supplementary Fixture and Equipment Electrical Installation," the unaltered portions shall remain in effect.
- D. Work performed by others (unless noted otherwise on the Drawings):
- 1. Temporary electric service.
 - 2. Electrical distribution system.
 - 3. Drop cords with waterproof receptacles in deli and meat prep areas.
 - 4. Lighting and power system.
 - 5. Starbucks kiosk electrical panel and distribution wiring receptacles and junction boxes.
 - 6. Walk-in cooler and freezer lighting.
 - 7. Store air conditioning, heating system and associated equipment.
 - 8. Deli exhaust hood and fire extinguisher system.
 - 9. Building and parking lot signs except for final connections.
 - 10. Intrusion alarm systems.
 - 11. Fire alarm system.
 - 12. General and refrigeration work, including unloading, uncrating, and joining of refrigerated cases and placement of equipment specified on the fixture plan.
 - 13. Low voltage wiring for communication system including telephone, scanning, public address and music systems.
 - 14. Low voltage refrigerated equipment temperature monitoring and control wiring. Refer to Section 11 41 43 "Refrigeration Controls Installation."

1.2 DEFINITIONS

- A. Certain terms and words used throughout Section shall be defined as follows:
- 1. **Owner:** The person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's Representative.
 - 2. **Contractor:** The General Contractor with overall responsibility to build a complete store, on schedule, ready for operation as a complete food store.
 - 3. **Installer:** The entity identified in this Section responsible for but not limited to the final power connections to the refrigerated and non-refrigerated equipment, and the complete installation of the electrical connectors and control devices, receptacles and other wiring devices necessary for final connection of fixtures and equipment as identified in this Section.

4. **Building Electrical Contractor:** The contractor responsible for the installation of the building electrical infrastructure to which the Installer of the work of this section will make their final connections.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Report to Owner any defaults in work furnished and installed by others that causes conditions unsuitable for Installer's Work. Failure to inspect and report unsuitable conditions shall constitute acceptance of work furnished and installed by others as fit and proper for coordination with the Installer's work.
- B. Cooperation with Other Trades: Cooperate with other installers doing work on the Project to prevent any conflict that would require moving or changing any devices, or other equipment, or require other installers to relocate devices and equipment when installed according to Contract Documents.
 1. Where interference exists, notify Owner before proceeding with installation.

1.4 WORK SCHEDULES

- A. Typical work schedule shall consist of five 8-hour workdays ending no earlier than 3:00 p.m. local time at the store or in shifts as required in the Phase Plan or Project Schedule.
 1. For non-local Installers, as approved by the Owner, work may be conducted in four 10-hour days provided the work day does not end prior to 3:00 p.m. local time.
- B. Office, Pharmacy, Computer Room and Customer Care Office Moves: For remodel projects involving modification or relocation of these areas, provide a laborer to assist in the move. The Work shall occur at night and the appropriate hours necessary to perform the work shall be included in the Installer's cost.

1.5 SUBMITTALS

- A. The Owner will provide the following submittals for Owner supplied items for the Installer's information upon request:
 1. Product Data: For each item and accessory supplied by Owner.
 2. Shop Drawings: For special components and installations not detailed in manufacturer's product data.
- B. Quality Assurance Submittals:
 1. Certificates: For electrical installers, showing successful completion of an arc flash training course.
- C. Closeout Submittals

1. Operation and Maintenance Data: For equipment furnished and installed by Installer and equipment furnished by Owner to include installation, service and operation manuals and instructions.
 - a. Collect manuals for equipment installed in this Section and place in a three ring binder. Deliver to the Owner's store manager upon completion of the Work. Refer to General Conditions for additional requirements.
 - b. The Owner will supply the Installer with receiver copies of all equipment and fixture purchase orders to include in Operation and Maintenance Manual.
2. Record Drawings: As-built drawings showing the location of electrical circuits.

1.6 QUALITY ASSURANCE

- A. Work, materials, and equipment shall comply with rules and regulations of authorities having jurisdiction. Continually monitor field installation for code compliance and workmanship quality. Installation shall comply with all manufacturers' recommendations.
- B. Arc Flash Qualifications: Qualify procedures and personnel according NFPA E70
 1. Electrical installers performing work on energized panelboards, switchgear, and other electrical equipment capable of a rapid release of energy due to an arcing fault shall pass an arc flash protection training course pursuant to the requirements of OSHA 29CFR1910 332 subpart S and NFPA 70E, "Standard for Electrical Safety in the Workplace."
- C. Maintain a set of Contract Documents on the Project for Owner to review and verify any discrepancies.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of other construction by field measurements before beginning Work.
- B. Inspect all equipment with respect to electrical circuitry and report at once and confirm in writing any discrepancies, variances, or defects to the Contractor and Owner.

1.8 WARRANTY

- A. Installer's Warranty: Standard form in which Installer agrees to repair or replace any component that does not comply with requirements or that deteriorates or malfunctions as a result of improper installation by the Installer within specified warranty period.
 1. Warranty Period: 90 days from date of store Grand Opening provided installation is accepted and approved as completed in compliance with the Contract Documents by the Owner.
 2. Warranty Retainage: Until the end of the warranty period, 5 percent of the contract amount due the Installer will be held as a retainage unless a different retainage percentage is required by the Authority Having Jurisdiction.

3. Warranty Service: During the warranty period, regardless if the service call is due to failure of equipment or failure of the installation, the Installer shall enter the service call with Service Hub, the Owner's electronic service call system. Submit service reports to the Owner at the end of the warranty period.
 - a. As part of the Installer's warranty service, the Installer shall make arrangements to have a service technician present at the store for the Grand Opening day to correct problems or make adjustments designated by the Owner, working a minimum of four hours, commencing two hours before store opening.

B. Refer Division 00 Section "General Conditions" for general warranty information.

PART 2 - PRODUCTS

2.1 INSTALLER FURNISHED PRODUCTS

- A. General Product Requirements: Furnish and install products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Substitutions: Comparable products shall match the specified product in every respect. Provide certificates of conformance for comparable products when required by the Owner.

2.2 MATERIALS

- A. High Voltage (over 50 volts) Wiring: Wiring to be stranded #12 AWG minimum in size to home run wire. Wire sizes shall conform to applicable electric codes. The most current National Electric Code shall be the minimum standard.
 1. Insulation: Type THW, THWN, or THHN 600 VAC.
 2. Conductors to compressor/condensers.
 3. Other Conductors #8 or larger.
- B. Electrical Conductors: Copper.
- C. Receptacles: Generally furnished and installed by the Building Electrical Contractor for new store applications. Where specifically required by the project scope of work or directed in this Section, the Installer shall furnish and install receptacles for shelving, refrigerated case convenience outlets, cabinetry/fixtures, customer service office, and other fixtures and equipment as indicated in the Kroger Building Specifications.
 1. All other devices to be commercial grade wired 20-amp rated.
 2. Furnish and install watertight plugs for electrical drop cords per ESD-16.
 3. 120V Duplex Receptacles for All Service Areas: Hubbell, Inc.; # GF20ILA, Circuit Guard Lighted Ground Fault Circuit Interrupter Duplex Receptacle.
 4. 120V GFIC-WR Duplex Receptacles for All Wash Down Prep Areas: Hubbell, Inc.; # GFTR20I, reset type, LED indicator, tamper and weather resistant.

- D. Receptacle Covers: Stainless steel unless otherwise noted on the Drawings or specifications. Raised covers are permitted on surface mounted outlet boxes under counters.
- E. While-In-Use Receptacle Covers for All Wash Down Prep Areas: Die cast aluminum, weather resistant.
 - 1. Products:
 - a. Hubbell, Inc.; #WP826.
 - b. Intermatic, Inc; #WP1010MC.
- F. Switches:
 - 1. Product:
 - a. Disconnect Switch: Hubbell Wiring Device –Kellems, #HBL7832D.
 - b. Timer Switchs: Schneider Electric; #XB4BA42, 22mm, pushbutton, Red, #XB4BA3, 22mm, momentary , Green.
- G. Relay: Grainger; Dayton, Time delay, Dpdt, Dual Function, #4GY65
- H. Switch Cover:
 - 1. Lockable: Hubbell, Inc.; #96061.
 - 2. Weatherproof: Bell, a Hubbell Company; #5152-0 1; Single gang receptacle or toggle switch cover.
- I. Plugtrak:
 - 1. Hubbell, Inc; HBL24GB606IV 6 feet, 20 AMP Plugtrakw/outlets 6 inches O.C.
 - 2. Hubbell, Inc; HBL24GB612IV 6 feet, 20 AMP Plugtrakw/outlets 12 inches O.C.
 - 3. Hubbell, Inc; HBL2048IV Single gang device connection box.
 - 4. Hubbell, Inc; HBL20482IV Two gang device connection box.
- J. Conduit, Fittings, Flexible Conduit, Junction Boxes, and Outlet Boxes: Comply with National Electric Code.
- K. Connectors for Compressors: With adhesive insulating covers
 - 1. Products:
 - a. Thomas & Betts Corporation; Hinson Jr.
 - b. Burndy, LLC; Versitap type QPX
- L. Junction Boxes:
 - 1. Dry Areas: Furnish and install one of the following or an approved substitution:
 - a. Galvanized steel: Raco, a Hubbell Company.
 - b. Cast aluminum: Hubbell, Inc.

2. Under Cases in Preparation Areas or Other Wet Areas: Furnish and install the following or an approved substitution:
 - a. Plastic Boxes: Thomas & Betts Corp.; Carlon brand.
3. Service Case Retrofit: 6.75 inch (170 mm) by 6.75 inch (170 mm) by 4.376 inch (111 mm) PVC box with cover
- M. Plywood Backing Panels (as required): DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, 3/4-inch (19-mm) nominal thickness.
- N. Other materials and devices as specified in Part 3 and as required for a complete and operational installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of fixture and equipment electrical installation work.
- B. Examine roughing-in for fixture and equipment electrical connections to verify actual locations of electrical connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. For remodel projects perform work in a manner as to provide a minimum of annoyance and interference to Owner's operations, its customers and vendors.
- B. Confirm wiring to refrigerated equipment is properly sized and stranded. No solid wire to be used on refrigerated equipment.
- C. Do not perform any Work that voids a manufacturer's warranty.
- D. Compressor-condenser unit components are prewired at the factory. Refer to refrigerated equipment manufacturer's application data for compressor/condenser electrical loads.
- E. Seal all openings through refrigerated cases coolers and freezers for electrical wiring with polyurethane foam insulation.

3.3 COMPRESSOR ROOM ELECTRICAL INSTALLATION

- A. Conductors:

1. Refer to Drawings for Building Electrical Contractor furnished and installed compressor feeder conductors routed inside three 6 inch by 6 inch (150 mm by 150 mm) wireways in the compressor room.
 2. Install compressor connections with adhesive insulating covers.
 3. Balance the electric loads across the phases.
 4. Do not exceed electric loading of the feeder conductor circuits. Coordinate placement of the compressors with the Refrigeration Installer.
 5. Install conductors continuous from wire way tap (maximum 10 feet (3 m) per NEC) to main breaker in control panel. Do not use wires within Hussmann control panel unless this code can be met. Double taps are not permitted.
- B. Verify tightness of all electrical connections in compressor control panels, feeders, and other similar equipment.
- C. Close and secure electrical raceways in compressor room after completing connections.
- D. Install refrigeration alarm system. Furnish and install sensors, wiring, alarm, strobes and all required connections to HVAC control panel relays.
- 3.4 AIR COOLED COMPRESSOR ELECTRICAL INSTALLATION AND CONTROL WIRING
- A. Reference electrical and refrigeration Drawings and Hussmann legend sheets.
- B. Verify all conductor sizes and special requirements for all refrigeration and control wiring.
- C. Most compressor-condenser unit components are pre-wired at the factory. Refer to refrigerated equipment manufactures application data for compressor/condenser electrical loads and control specifications.
- D. Install all compressor connections, branch and feeders, to cases and panels furnished. Insure all conductors and branch circuit breakers are properly sized, and equally phased. Coordinate placement of the compressors with the Refrigeration Installer to maintain a balanced load between motor room panels. Assure feeder conductor rating is not exceeded.
- E. Check all electrical connections in compressor control panels, feeders, cases, etc.
- F. Close and secure all electrical raceways in compressor room after completing connections.
- G. When required, install and terminate one- eight wire, 22 AWG stranded conductor cable from each compressor line to the control system. Loop cable to the remainder of compressors in the line. Run cable from the closest compressor rack to the controller or alarm (conventional systems). Verify proper cable and wire requirements as required by manufacturer prior to installation. Review plans and ledger sheets for additional information.
- H. Perform the following installation items for remodel Projects when required:
1. Repair any old equipment used during a project for temporary or permanent use. It will be this installers' responsibility to supply materials and wire any equipment relocated or installed for temporary purpose as per the project schedule.

2. Furnish and install independent breakers for each case in compressor control panel for over current protection of the defrost conductors (This is typically only required when using old compressor racks with new cases).
 - a. Verify Work prior to bidding.
3. Furnish and install properly sized breakers, contactors, and relays on compressors re-applied during a remodel project.
- I. Remote Condensers: Furnish and install conduit and complete wiring to remote condensers including Variable Speed Drives (VSD's). Furnish and install a separate conduit for power wiring and a separate conduit for control wiring. (Refer to Electrical, Refrigeration Mechanical plans, and Hussmann Legend sheets.)

3.5 PROTOCOL REFRIGERATION EQUIPMENT

- A. General: Protocol units are a remote compressor unit that is placed in various locations throughout the store as indicated on the Fixture and Refrigeration Drawings. Each protocol unit is furnished with a branch circuit and compressor panel located in the front door of the unit. A main breaker is located on top. These panels are designed to feed all lights, fans, as well as defrost heaters at the cases and prep coils. These remote compressors work in conjunction with a fluid cooler, pump station and/or air cooled condenser. Refer to Hussmann Legend sheets.
- B. Feed conductors for Protocols will be routed to the Protocol location by the Building Electrical Contractor. Conduit and conductors from the rooftop condenser to the disconnect shall also be furnished and installed by the Building Electrical Contractor. Complete all wiring between these points for a complete and operational system (refer to single line diagram details in supplied building Drawings). This Work includes:
 1. Setting the Protocol transformer (if applicable for 490v applications).
 2. Installing the defrost subpanel, if applicable.
 3. Installing the VSD controller for the condenser.
 4. Wiring protocol internal disconnects.
 5. Installing all wire and conduit from the protocol primary bus to the protocol transformer, back to the protocol defrost sub-panel and VSD controller through to the disconnect for the rooftop condenser.
- C. Locate feeder and branch circuit conductors within **6 feet (1830 mm)** of each protocol unit and cases with pigtails. Extend the conductors into the protocol units and make final connections. Extend the conductors into these units and make final connections. (Refer to Electrical and Refrigeration Drawings for scope of responsibility).
 1. The same as above applies at each case and coil location.
- D. Furnish and install a control network cable for CPC "CAREL" Controller (22 AWG, 4 conductor stranded twisted shielded pair) between the Protocol P.C. work station indicated on the Fixture Drawing and each protocol unit in the conduits provided. Install RJ-11 biscuit jack at each end. Install the cables in a three home run system, that is, #1 frozen food units, #2 rear hall /prep room units, # 3 deli bakery/ floral units. Tag each cable **6 inches (152 mm)** from the connector with a tag indicating what systems are on the home run.

- E. Furnish and install a control cable for Probes and Digital Terminations (22 AWG, 4 conductor stranded twisted shielded pair) from each Protocol unit to each case on that system. Wire to defrost termination klaxon and case temperature sensor and control panel as indicated on Refrigeration plans and Hussmann legend sheets. Tag each cable **6 inches (152 mm)** from the end with its termination location.
- F. Roof Top Condensers: Furnish and install 16AWG or 18AWG control wire for suction stop/valve control, based on valve current and distance to terminations.
- G. Remote Protocol Panels
 - 1. In some cases it is required to install a remote panel furnished by Hussmann with the equipment. The Building Electrical Contractor will install panels within **6 feet (1830 mm)** of protocol unit. Refer to the Hussmann legend sheets and panel schedule for installation information.
 - 2. Connect the wiring to the remote panels from the switchgear and/or Protocol unit and complete the terminations at both.
 - 3. The defrost circuit will be controlled from the Protocol unit. Furnish and install all necessary wiring for the electric defrost and the controls associated with it. Review the Drawings and the Hussmann legend sheets and panel schedule for more information.
 - 4. Furnish and install any conduit required from the remote panel to the cases or the protocol unit. The conduit from the switchgear to the remote panel will be supplied and installed by the Building Electrical Contractor.
- H. Case solenoids: Protocol Units may have multiple refrigeration circuits. One case on each refrigeration circuit will require two #14 control wires from the Protocol unit to the case to operate the solenoid.

3.6 FULD COOLER / PUMP STATION

- A. If required for Project, install control wiring for the pump station and fluid cooler within raceways provided. (Reference Electrical, Mechanical and Refrigeration Drawings).
 - 1. When required, install 120 volt control circuit located at the pump station, to the pump station and fluid cooler per manufacturer's installation instructions.
 - 2. Install 120-volt control field wiring to fluid cooler per manufacturer's pump station installation instructions.
 - 3. Install low voltage control cable to fluid cooler from pump station per manufacturers' installation instructions.
 - 4. Furnish and install pipe and wiring for heat trace cables, controls and sensors.
 - 5. Terminate fluid cooler and pump station from circuits provided.

3.7 PARALLEL REFRIGERATION SYSTEMS

- A. Compressor Room Electrical Installation
 - 1. Panels will be installed to within approximately **20 feet (6 m)** of the motor room wire way. Furnish and install flexible metal conduit and other materials to complete the wiring of the units.

2. On Hussmann 460 volt parallel systems, the control panels require 208 volt single phase power for the control circuit. Connect control circuits from the junction box provided and check that breaker-locking devices have been installed.
3. Complete hook-up of air-cooled condensers supplied by Owner for the parallel refrigeration systems. Note that some of the condenser fans have cycling controls.

B. Heat Reclamation

1. Verify that the building HVAC control wiring energizes all units connected to the duct reclaim coil. Verify the operation of the reclaim water heater thermostat, which is to control the heat reclaim valves on (usual number) two heat reclaim valves.
2. See the R-1 plan for controls furnished. Some gas defrost systems are temperature terminated by wiring to be connected between case thermostats and the unit control panel. A liquid line solenoid near the case is wired to control case temperature. Wiring for case temperature control and defrost control thermostats is wired to the unit control panels. Thermostats shall not control liquid line solenoid valves installed more than **10 feet (3 m)** from the expansion valve. System pump down does not include pump out of liquid line back to the rack manifold solenoid valves.

3.8 REFRIGERATION START UP AND TESTING

- A. Prior to start up, verify that all electrical connections are tight.
- B. Check phase monitor for correct polarity.
- C. Check motors for proper rotation.

3.9 COMPRESSOR AND CONDENSING UNIT REMOVAL

- A. Remove existing condenser units as indicated on R1 Drawing or Scope of Work. Disconnect and remove electrical supply and terminate in wire way or junction box.

3.10 REFRIGERATED CASE ELECTRICAL INSTALLATION

- A. Installation Instructions: Instructions for installation of refrigerated cases, including necessary wiring diagrams are shipped with each case. Take possession of installation Instructions immediately upon receipt of the cases and wire cases accordingly. Upon completion of work, turn over one bound set of case installation instructions to the Owner.
- B. Install final connections on refrigerated cases from circuited junction boxes or stub- ups at floor and walls (furnished and installed by the Building Electrical Contractor). Refer to refrigerated equipment manufacturer's application data for electrical loads and construction Drawings for junction box locations. Refrigerated cases are internally prewired. Wire and make final connections to liquid line solenoids and thermostats on all cases as per R-1 and R-2 plan. (Refer to E sheets)

1. Cases can be configured for 208 volt, 1-phase single or 3-phase feeders from the defrost panel. For 3-phase systems, cases are to have manufacturer factory installed fuses. See refrigeration schedule in Shop Drawings for electrical configuration.
- C. Circuit Identification: Install PTouch type label (white label with black letters) indicating designated panel, lighting circuit, fan circuit, defrost circuit, breaker number.
 1. Attach label to lower front right corner just above kick plate of the first case of the system line up served by same circuits
 2. Attach label to lower back right corner just above kick plate of all service cases.
- D. The Building Electrical Contractor will furnish and install circuits at floor and wall junction boxes for anti-sweat heaters, fans, and lights (see Building Drawings).
 1. Extend circuits through wire ways supplied in refrigerated equipment and install final connection.
 2. Maintain case fans, anti-sweat heaters and lights on separate circuits.
 3. Furnish and install defrost circuits and control wiring for refrigerated equipment.
 - a. Install separate branch circuit conductors from the condensing unit to each individual case defrost circuit.
 - b. The condensing units will be supplied with multiple defrost circuit breakers, one per case. See manufacturer's legend sheets for electrical loads.
 - c. Wire defrost circuits for best possible phase balance.
 - d. Furnish and install conduit from electrical wireways in compressor room to a location within 10 feet (3 m) of the refrigerated equipment. Verify circuit connections to equipment are in accordance with building electric panel schedules.
 4. Anti-Sweat Glass Door Heaters: Install the wiring from the PMAC controller to the cases for the anti-sweat glass door heaters.
 - a. Description: The anti-sweat glass door heaters are controlled at the CPC Environmental Control Panel through the PMAC controller. The PMAC controller will control groups of doors based on the number of required channels. A channel is defined as a single anti-sweat load of 16 amps or less (i.e. a quantity of doors equivalent to an anti-sweat load of 80 amps would require five channels within the PMAC). The respective loads for RL and RL Innovator door are 1.68 and 1.16 Amps per door. After calculating the required load (i.e. number of channels) based on the number of doors, install wiring through supplied conduits and terminate at both the case and the PMAC controller.
 5. Case Motion Sensors: Install and make final connections to Owner's supplied motion sensors for glass door frozen cases.
 - a. Description: A motion sensor will generally control LED lighting for two cases. Motion sensors are not to be used on cases along a wall, at the end of aisles, or on glass door cases that can be seen without walking into the aisle. Confirm locations with Owner. Reference EISD-1 and supplemental Kroger guidelines and instructions for installation of motion sensors

- E. Furnish and install necessary junction boxes, conduit and wire at stub-ups for final connections to all cases and displays.
- F. Meat and Seafood Service Cases: When existing cases are not equipped with a push button automatic shut down for case cleaning, retrofit as follows:
 - 1. Furnish and install a 6.75 inch (170 mm) by 6.75 inch (170 mm) by 4.376 inch (111 mm) PVC junction box, drill holes in cover and install two push button, install with socket and relay to facilitate shut down of existing solenoid valve, fans, and mister pump for case cleaning. Wire water solenoid on normally open between terminal 9 and 11, and refrigeration solenoid on normally closed between 8 and 11
 - 2. Furnish and install the junction box on the back of a case as high as possible.
 - 3. Furnish and install an engraved plastic laminate tag (red background with 1/2 inch (13 mm) high white letters) above switch that reads "Warning - Turn case off by pushing red button to activate activating timer before cleaning."
- G. Coordinate with all other trades and Owner's personnel to insure continuity of compressor start-ups, testing and cleaning.
- H. Repair of Cases: All cases shall be in complete working order before Work of this Section is considered completed. Provide any repairs required to cases due to manufacturer defects. Payment for this work will be made by the manufacturer. Maintain all model and serial numbers from each case repaired to assist in manufacturer reimbursement.
- I. Barker PT Dome Cases
 - 1. Rack & Protocol Systems: Furnish and install a conduit with three wires from the case to the compressor room. Terminate each as follows:
 - a. If required, one wire from the upper coil electronic temperature sensor to the rack or protocol controller.
 - b. One wire from the lower coil electronic temperature sensor to the rack or protocol controller.
 - c. One wire from the supplemental time clock to the suction stop solenoid on the UPPER coil.
 - 2. Single Compressor System: One wire from the controller to the condensing unit for defrost control and one wire from the supplemental time clock to the suction stop solenoid on the UPPER coil.
- J. Inspect all case lights for proper operation. Replace bad bulbs or ballasts with new equipment furnished by the original equipment manufacturer (OEM). Coordinate directly with OEM.

3.11 COOLERS AND FREEZERS ELECTRICAL INSTALLATION

- A. Furnish and install wiring from respective compressor control panel through control conduit to respective cooling coils with electric defrost heaters. Check control wiring to ensure that the coils operate properly between cooling and defrost cycles. Refer to refrigerated and coil manufacturers' application data. Check sequence of defrost operation. Check coil electrical

loads. Refer to fixture plan for types of coolers and freezers (Any switches required by governing codes shall have a lockable cover to prevent accidental disconnection of the circuit).

1. Connect cooler fans to circuits furnished by Building Electrical Contractor at nearby junction boxes. Furnish and install a disconnect switch with weatherproof cover and make final connections to junction box above coolers and freezers for cooling coil fan motors. Refer to coil manufacturer's electrical application data. Wire meat cooler, meat holding cooler, walk-in freezer, and deli freezer electric defrost and fan circuits from the coils to junction boxes and then through conduits furnished and installed by the Building Electrical Contractor to the compressor room.
2. Seal all walk-in cooler or freezer conduit penetrations inside and outside panels around conduits and fill open ends of conduit both inside and outside panels.
3. Walk-In Freezers and Meat Coolers: Furnish and install connections for defrost controls on both freezers. See EISD-82 for field wiring between coils and compressor room. Furnish and install wiring to control suction stop valve and fan relay in evaporator cabinet to shut off fans and refrigeration when door is open.
4. Furnish and install a 120V duplex receptacle with continuous duty cover connected to GFCI breaker in grocery and deli walk-in freezer on wall behind coil housing for drain line heater tape. Furnish and install heat tape with class B, protection for freezers drains wrapped in a spiral helix around the drain line. Make final connections, with GFI protection as required by governing codes.
5. Multiplex meat holding cooler with meat cooler to one compressor when indicated. Wire control circuits for meat cooler and meat holding cooler to respective control panel. Furnish and install one single pole relay with 208 volt coil, normally open contacts rated 10 amps at 250 volts in condensing unit panel to temperature terminate defrost on both coils. See detail EISD-83 for field wiring between compressor room and coolers.
6. Wire liquid line solenoids and thermostats as shown on the R-1 plan and EISD-90.
7. Rear Load Dairy Cooler: Install the display door lights on switch located beside the door and label accordingly.
8. Seal all openings through cooler walls or ceiling.
9. Wire any coil with electrical defrost and 208 volt fans to the compressor rack for which the system originates. On Protocol stores, wire to protocol unit serving these coils
10. Walk-in freezer: Furnish and install wiring and make connections for defrost controls on both all freezers. See EISD-401-402-or 404, for field wiring between coils and compressor room.
11. Walk-in Door Monitor: Install Owner furnished unit shipped with each cooler and freezer door on insulated wall panel above door per EISD-4, Furnish and install conduit, wiring to make final connections to fans and suction stop valves and control wiring to EMS. Refer to installation guide for additional information.

3.12 PREPARATION ROOM AIR CONDITIONING ELECTRICAL INSTALLATION

- A. Install final connection to prewired refrigeration coils to electrical junction boxes above ceiling.
- B. Manual lift solenoids and thermostats will be furnished and installed by the Refrigeration Installer. Thermostats and solenoids will be located above ceiling near cooler ceiling. Furnish and install necessary materials (including switch) to wire thermostats, solenoids, fans and switch in accordance with Drawings.
- C. Refer to construction Drawings and manufacturer's application data for circuit loads.

- D. Any switches required by governing codes shall have a lockable cover to prevent accidental disconnection of the circuit.

3.13 FRONT END AND CHECKOUT

- A. Checklanes: Install power pole furnished by Owner to top of register stand at right/rear corner up to and secure to building structural steel. Furnish and install electrical power supply wiring from junction boxes in structural steel to junction boxes supplied in bottom of checklanes and make final 120 V connections to prewired checkout counters and cash register stands. Power outlets for cash registers are to be on separate circuits from check lane belts, refer to building Electrical Drawings. Inspect power belt on checkout counters for proper rotation.
- B. Checklane Light: Install lane light on power pole and feed power cord through power pole. Plug power cord for light into designated outlet under checklane belt stand identified for lane light. See ESD-62.
- C. U-Scan: Install power poles furnished by checklane manufacturer from floor up to and secure to building structural steel. Furnish and install electrical power supply wiring from junction boxes in structural steel to junction boxes supplied in bottom of checklanes and make final 120 V connections to prewired checkout counters and cash register stands. Power outlets for cash registers are to be on separate circuits from check lane belts, refer to building Electrical Drawings. Inspect power belt on checkout counters for proper rotation.
 - 1. Furnish and install the following under each U-Scan unit:
 - a. (1) 4 plex receptacle.
 - b. (1) 4 plex isolated ground (CR panel)
- D. U-Scan Lanelight: Install (1) 120V duplex receptacle and light switch in surface mounted shallow switch/receptacle box mounted on power pole feeding U-Scan unit. Furnish and install electrical power supply wiring from junction boxes in structural steel to light switch and from switch to 120V duplex receptacle. Install lane light on power pole and feed power cord through power pole and plug into outlet. See ESD-62A
- E. Install (1) 120V duplex receptacle on rear of checklane belt and U-Scan unit turned horizontally for vendor supplied refrigerated cases as indicated on Fixture Plan. Furnish and install electrical power supply wiring from junction boxes in ceiling structure with designated electrical circuits for 120V duplex receptacle.
- F. U-Scan Supervisor Station: Tap closest U-Scan for general purpose and isolated ground. Furnish and install 4 plex receptacles for u-scan supervisor station.
- G. Temporary Checkout Equipment: Furnish and install electrical connections and assist in installing communications cables to temporary checkout equipment.

3.14 DELI/BAKERY, MEAT, SEAFOOD AND PRODUCE PREPARATION EQUIPMENT ELECTRICAL INSTALLATION

- A. General: Install final connections on equipment shown on the Fixture Plan, listed in the legend, found in any contract addendum, or as designated by the Owner.

1. Most large equipment will require direct wiring to junction boxes or conduit furnished and installed by the Building Electrical Contractor.
2. Other equipment will require the addition of a plug to match the receptacle.
3. Some equipment will be supplied with plug and ready to plug into receptacle.

B. Deli/Bakery Equipment

1. Equipment is prewired by manufacturer.
2. After assembly of oven by others, provide final electrical connections and check for proper operation. Verify that all elements are operating. Oven may be gas or electric.
3. Provide two 120V duplex receptacles where indicated in the serving line area and one receptacle on the cake decorating booth.
4. Mount 120V duplex receptacles for deli drink counter below counter. Cut holes in rear of cabinet for access. Relocate in field if required.
5. Provide 120V duplex receptacles for pressure fryer warming lights.
6. Provide one 20A 120V duplex receptacle and circuit for seven-section menu boards.
7. Provide 208V tandem slot receptacle for 208V toaster. Drill hole in stainless island counter and mount receptacle below counter. Add rubber grommet around hole.
8. Make all final connections to all equipment on drink bar.
9. Make final connections to Bakery rack oven and dishwasher from disconnect or j-box furnished and installed by the Building Electrical Contractor.
10. Plug in, and check operation all equipment indicated on Fixture Plan.
11. Make connections for equipment under exhaust hoods with shunt-trip control (hood, breakers and automatic fire extinguisher equipment installed by others).
12. When a Starbucks coffee kiosk is shown on Fixture Plan, make final connections to fixtures, counters, lights and equipment.
13. For equipment on tables not located against wall, convert plugs on equipment to twist lock plugs to match drop cords fed from GFCI breakers associated with each piece of equipment.

C. Meat and Seafood Equipment

1. Check all equipment for proper operation and proper motor rotation. Modify plug on all three-phase equipment if required for correct rotation, not in-house electric circuit.
2. Inspect plugs supplied with meat slicers and tenderizer. Provide twist lock plug and waterproof cover to connect to waterproof overhead drop cord receptacle when equipment is shown on table not located against prep room wall.
3. Make all final connections to all new or relocated equipment per plan that may include but not limited to self-contained ice-maker, seafood steamer, wrappers, lobster tank, slicers, computer desk, service case humidity systems, etc.
4. Make all final connections to all refrigerated meat and seafood cases using Seallight 'flexible' conduit.
5. For equipment on tables not located against wall, convert plugs on equipment to twist lock plugs to match drop cords fed from GFCI breakers associated with each piece of equipment.

6. When electric is fed from overhead drop cords to meat saws, grinder, wrappers or belt sealers, convert plugs on equipment to twist lock plugs to match drop cords fed from GFCI breakers associated with each piece of equipment.

D. Produce Equipment

1. Wall outlets, junction boxes, and disconnects furnished by building electrical contractor.
2. Provide 120V duplex receptacle above for corner produce corner wall case to TV/VCR and RES strobe lights for thunder and lighting effects.
3. Salad Bar: When indicated on plans, furnish and install materials as required to complete electrical installation of salad bar and lighted salad bar canopy. Furnish and install a 120V duplex receptacle at one end of salad bar for scale (if not provided).
4. Install a receptacle for the produce case misting system. Verify exact location with Owner.
5. Install and wire speakers and strobe light furnished on top of cases at equal distances hiding the strobe behind the speaker for thunder and lighting effects.
6. Wire other new or relocated equipment per plan that may include but not limited to self-contained ice maker, sink disposer, wrappers, r/o filter equipment, computer desk, etc.
7. Install three GFIC 120V duplex receptacles on top of wall cases for case cleaning.

3.15 SALES AREA EQUIPMENT ELECTRICAL INSTALLATION

- A. Install fluorescent fixtures (supplied by Owner) in cosmetic display valence. Provide electrical connections from fixtures to junction box on floor duct under shelving. Use same circuit as used for receptacle on shelving. Provide D35 lamps in fixtures.
- B. Install single lamp 8 foot or 4 foot, 3 or 2 tube t-8 electronic fluorescent fixtures (furnish and install lamps) as required with 35k lamps as required for all Hypermaxi shelving and shelving with overhead canopies. Furnish and install three 4 Plex 120V receptacles mounted in canopy for promotional use. Refer to Fixture Plan. Fixtures Supplied by Owner.
- C. Provide one 120V duplex receptacle for each coffee mill (Minimum two coffee mills). Refer to fixture plan for coffee mill location. Verify location of coffee mills with Owner before installing.
- D. Interior Signs: Connect to designated electrical circuit or tap closest circuit of required voltage for indoor signs. For exposed structure installations provide white power cord from the power supply junction box to sign. Verify circuit is not overloaded per N.E.C.
- E. Digital Photo Center: Provide and install three 4 Plex 120V receptacles and connect digital photo center equipment.
- F. Customer Service Office and Accounting Room: Provide 120V duplex receptacles for lottery, ticket master, western union and other machines in prefabricated office (maximum of 6 outlets). Provide 16 feet (4.88 m) of plug mold strip, connect currency counters and other countdown equipment to circuits powered from emergency generator. See Owner for locations.
- G. Furnish and install all isolated and dedicated outlets required in prefabricated sales area office to circuits provided. Refer to Fixture plan and Owner for locations.

- H. Produce Weigh Station: When indicated on the Fixture Plan provide 120V duplex receptacles on produce island cases. Install on at least two cases.
- I. Island Cases: Provide a flush mounted 120V duplex receptacle as high as possible on the kick plate in each end of the kick rail of all island cases, connect two receptacles per breaker. Connect to junction box as shown on the electrical drawings.
- J. Glass Door End Cases - Provide one general-purpose 120V duplex receptacle in the kick rail of each glass door end case, connect two receptacles per breaker.
- K. Provide at least three 120V duplex receptacles on the back of each case in the deli self-serve cases in front of salad prep area, above stainless tables.
- L. Customer Coffee Station: Provide 120V duplex receptacle in customer rest area counter for coffee maker. Install inside of cabinet and drill hole in counter top with 2 inch (50 mm) minimum color matching grommet for routing of electric cords.
- M. Floral Workstation: Provide two 120V duplex receptacles in workstation. Provide light switch for lighted display.
- N. Floral Slat Wall and Bases: Install and wire fluorescent lighting as required. Provide 3500 k lamps.
- O. Hexagon Hot Chicken Display Case: Provide 120V duplex receptacle mounted on kick plate.
- P. Book, Magazine, and Greeting Card Light Fixtures: Provide final connection to light fixtures when supplied.
- Q. Cosmetic/General Merchandise/HBC: Provide final connection and install light fixtures with T8 lamps and case displays. Lamps to be sp35 series.
- R. In-Line Refrigerated Cases: Extend circuiting from appropriate junction box under shelving and make final connections to self-contained 'in line' display cases as shown on merchandising plan. Each case requires circuits as follow:
 - 1. 4 Foot Case: One 30 AMP 120V.
 - 2. 8 Foot Case: One 30 AMP 120/208V.
 - 3. 12 Foot Case: Two 30 AMP 120/208V .
- S. Install dual temperature control switches (minimum of 3) in island frozen dual-temperature island cases through thermostats.
- T. Wine Shop: When indicated, plug in wine chiller to outlet.
- U. Nutrition Shop: Provide 4 plex 120V receptacles in nutrition shop for power cords for nutrition information center equipment.
- V. Customer Service Office: Install 1-1/4 inch (32 mm) minimum diameter hole in customer service office floor for Sensormatic security system cables,
- W. Bread Shelving Canopy: Install fluorescent light fixtures with T8 lamps in shelf mounted canopy, provide sp35 series lamps. Wire fluorescent canopies, furnished and installed by others

on grocery shelving b-lines where indicated on Fixture or Merchandising Plan. Make final electrical connections from fixtures to junction box on floor duct under island shelving. Provide power switch in electrical box mounted in canopy and conceal all j-boxes.

- X. Technology IDF Equipment: Furnish conduit, wire, and outlet and install two (2) 120V duplex receptacles on isolated ground circuit in Rx and backroom for Technology IDF cabinet. Mark panel accordingly. Exact location to be determined by Owner and store personnel.
- Y. Refrigerated Dog Food Cases: Provide one 120V duplex receptacle for two cases. Refer to Fixture Plan for location.
- Z. Vacuum Displays: Provide a minimum of 8 feet (2440 mm) long plug molding on shelving for promotional display area. Provide a minimum of two rows of electrical plug molding on top of shelving for lamp displays. Quantity of plug in molding shall be commensurate with number of electrical circuits provided.
- AA. Lamp Deck: Provide plug mold, with outlets on 6 inch (150 mm) centers, under top shelves, both sides for entire length of lamp display shelving indicated on Fixture Plan.
- BB. Shelving Electric: Furnish and install EMT conduit thru holes in shelving base shoes and mount receptacle box to shelving base shoes. Furnish and install wiring fed from under floor raceway or from overhead junction box mounted in structural steel thru ridged EMT conduit to shelving. See EISD-2 for detail for electric fed from overhead.

3.16 MISCELLANEOUS EQUIPMENT ELECTRICAL INSTALLATION

- A. Signs: Provide final electrical connections to Owner supplied signs, including but not limited to signs for restaurants, cheese shop, fragrance area, film sign, video sign, nutrition and service cosmetics accent lighting.
- B. Cleaning Area: Install Owner supplied battery charger for battery operated equipment.
- C. Install fly grids per fixture plan. Relocate as required to meet board of health inspection.
- D. Pharmacy Counter Equipment: Install 20 feet (6 m) long electrical plug mold on backsplash of front pharmacy counter and island work counter. Each counter space will require 75 percent coverage for general-purpose power. Route cabling concealed at counter to behind each device or equipment. Provide 2-1/8 inch (60 mm) grommets behind each piece of equipment.
- E. Pharmacy Showcase: When indicated, make final connection to fluorescent light fixtures in pharmacy display shelving, installer is to supply lamps for fixtures.
- F. Specialty Department Equipment: Make final electrical connections to specialty department equipment as shown on the Fixture Plan.
- G. Water Purification Machine: Provide 120V duplex receptacle for water purification machine on sales area.
- H. Provide 120V isolated grounded receptacle adjacent to "ALTECH" HVAC control panel for modem.

- I. ECR Room Computer Racks: Provide an isolated ground dedicated circuit 4 plex outlets on each side of the new rack system.

3.17 EQUIPMENT TESTING

- A. Verify proper operation of all lights, motors, heating elements, and other items that are part of equipment to be furnished and installed by Installer. Correct problems as necessary.
- B. Equipment shall be 100 percent operational before work of this Section is considered complete.
- C. Complete the baler installation/operational checklist and submit to Owner. Checklist is shipped with baler.

END OF SECTION 11 41 63