requirements, locations, mounting heights, connection points, etc. of mechanical equipment.

Provide lugs, lug kits and related accessory work as required to accommodate the conductor sizes and quantities needed for each application. Coordinate with single-line diagram, field conditions, equipment installers, etc.

HACR Breakers: Coordinate in field with the respective trades and determine case by case, which equipment is factory listed for use with Heating and Air Conditioning Rated (HACR) breakers. To minimize requirements for stocking of fuses by the owner, utilize HACR breakers at the source panelboards as the required overcurrent protection wherever possible (in lieu of fusing local disconnect switches).

Disconnect and Controller Locations: Locations shown on drawings are indicated for schematic purposes only. Determine exact locations in field. Refer to Electrical Coordination Schedules on drawings. Provide disconnects, starters, accessories, wiring, connections, services, etc. where defined as "EC" in the schedule. Information in this section supplements the information in the schedules. Provide power wiring and connections for all equipment (including motor dampers and accessories where applicable) as required to render equipment fully operational. Install local disconnects and starters at 48 inches to top of outlet box or enclosure where applicable above finished floor/slab/grade. Provide flush mounted units in finished areas. Provide key operated manual starters where accessible to unauthorized personnel, including general public.

Maintenance Receptacles for Rooftop Units, Rooftop Exhaust Fans and any Miscellaneous Exterior Equipment: Provide Type WR duplex GFCI weatherproof receptacle within 25 feet of all electrically operated equipment of any nature that requires periodic testing or maintenance.

Refer to Coordination Schedules on drawings for information associated with equipment. Provide disconnects, starters, accessories, wiring, connections, services, etc. where defined as "EC" in the schedule. Information in this section supplements the information in schedule(s).

Domestic Water Heaters (Electric): Provide local disconnect switch, and power wiring and connections. Provide interlock wiring with circulating pumps, flow switches and aquastat controls where applicable.

Electric Water Coolers: Provide l20V duplex receptacle or direct 120V connection with lock-out/tag-out provisions at source circuit breaker (verify required method in field with electric water cooler installer). Provide GFCI circuit breaker to feed the circuit that serves electric water coolers, even if not indicated on panelboard schedule. Install outlets at height and location as directed by water cooler installer. Conceal outlets within water cooler enclosure if enclosure is designed for such an installation. Assemble and connect cord if applicable and needed. Coordinate all specifics with water cooler installing contractor prior to rough-in of related work.

Electronic Plumbing Fixture Valves: Provide electrical wiring and connections as required for full automatic operation of direct-wired electronic sensor operated valves. Install and wire 120V/24V remote box mounted transformers. Install above nearby accessible acoustical tile ceiling and provide local single-pole switch above ceiling at the transformer to switch primary power. Provide secondary fusing if not integral to the transformer (verify in field). Provide required 24VAC wiring (#14 AWG "MC" Cable with ground), concealed. Field coordinate work carefully prior to rough-in.

26 09 23.00 - LIGHTING CONTROL DEVICES

Submittal Requirements
Product Data: For equipment, materials and systems specified in this section. Include product data, descriptive information, technical data, wiring diagrams, load restrictions, etc

365-Day Multi-Purpose Time Clocks. Provide Intermatic #ET90415CR series Multi-Purpose Time Clock (or equal by Tork), which is programmable 365-day/24-hour with override controls. Provide four-channel unit. Provide required external contactors, relays, etc. to render the control systems fully operational. Verify zone control requirements in field prior to rough-in. Provide 100-hour carryover carryover.

Occupancy Sensors, Dual Technology Wall Switches: Provide Wattstopper DW-100 wall switch (or equivalent) and configure as manual on, auto off (vacancy sensor) unless otherwise specified on drawings. Provide with time delay as specified on drawings. If no time delay is specified, program to 10 minutes.

Occupancy Sensors, Dual Technology Ceiling Sensors: Provide Wattstopper DT-300 ceiling mounted occupancy sensor (or equivalent). Provide with time delay as specified on drawings. If no time delay is specified, program to 20 minutes. Adjust sensitivity based on field conditions and occupancy of room to provide 100% coverage without nuisance tripping. Provide Wattstopper BZ-50 universal voltage pack(s) as required to properly power all occupancy sensors and provide switching per the design intent. In areas where multiple occupancy sensors control a single zone together, interlock occupancy sensors/power packs per manufacturer instructions to meet control intent.

Momentary-Contact Toggle Switches: Provide Standard of Quality equal to Legrand LV 3 Amp, 24 VAC/VDC, single-pole, double-throw with center rest, designed to fit conventional toggle switch openings.

26 24 16.00 – PANELBOARDS

Submittal Requirements
Product Data: For each provide bus configuration, current ratings, voltage ratings, SCCR Ratings, overcurrent protective device(s), surge suppression device(s), accessory, and components indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

Subject to compliance with requirements, provide panelboard products of one of the following (for each type and rating of panelboard and enclosure): Square D Company, General Electric Company, Siemens, Eaton/Cutler-Hammer.

Panelboards shall bear UL labels for their specific applications. Panelboards shall be suitable for service voltage with number of branch circuits of capacity scheduled. Unless otherwise indicated, panelboards and sections thereof, if any, shall have main-lugs-only of capacity equal to, or greater than, the rating or setting of the over the current protective device next back on the line. All circuit breaker panelboard bus assemblies shall be of the distributed (sequence) bussing type throughout, so that any 2 adjacent single pole breakers and/or spaces shall be replaceable by a 2-pole internal common trip breaker, and any 3 adjacent single pole breakers and/or spaces shall be replaceable by a 3 pole internal common trip breaker, 15 amp through 70 amp inclusive, without disturbing any other breaker. All panelboards shall be UL listed and labeled for use as service entrance equipment where being used as such.

208Y/120V panelboards shall be equal to Square D NQ with bolt-on branch breakers

All bussing shall be copper.

All branch circuit breakers shall be full ambient compensated thermal magnetic molded case with quick-make and quick-break action and positive handle trip indication, both on manual and on automatic operation. Breakers shall be of the over-the-center toggle operating type with the handle going to a position between "on" and "off" to indicate automatic tripping. All breakers shall be bolt-on type.

All circuit breakers shall be full size. "Tandem" or "split" breakers shall not be permitted. All multi-pole breakers shall have internal common trip with all load side box lugs of one breaker in the same gutter. All circuit breakers shall have sealed cases to prevent tampering. All 15 and 20 ampere branch circuit breakers shall be UL Listed as SWD (switching duty). All 15-70 ampere branch circuit breakers shall be HACR Type. All GFCI circuit breakers shall be UL Class A with maximum threshold of 5 mA. All branch circuit breakers serving all ballasted (fluorescent/HID) lighting loads shall be HID rated.

Provide all electrical distribution related equipment with appropriately braced bussing and properly rated breakers, fuses, etc. for the available fault currents. In existing buildings where fault current values are not indicated on drawings, coordinate with existing "upstream" distribution equipment provide equipment AIC ratings to meet or exceed same.

Fill out panelboard's circuit directory card upon completion of installation work. Directories shall be neatly typewritten. All panelboard directories shall include the actual room names/numbers that are selected for interior signage/designation.

All recessed panelboards shall be provided with a minimum of three 1-1/4" empty conduits terminated to a single 12" X 12" X 6" deep junction box above accessible ceiling.

26 27 26.00 - WIRING DEVICES

Submittal Requirements
Product Data: For each type include electrical characteristics, configurations, ratings, markings, colors, etc.

General:

Unless specifically indicated otherwise, or directed otherwise in field, provide white color for normal utility wiring devices.

Provide grounded ("neutral") conductors in all wall switch, dimmer and other lighting control outlet boxes, even if not immediately utilized.

Provide wall plates with engraved legends where indicated on drawings and/or where required per 26 05 53.00 - IDENTIFICATION FOR ELECTRICAL SYSTEMS Section. All device wall plates shall be standard size; "midway", "oversized" ("jumbo") or "extra deep" wall plates shall not be acceptable. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Except where/if indicated otherwise on drawings, wall plates in finished areas shall be commercial specification grade, satin finish stainless steel, with beveled edges, equal to Leviton Type 430 series. Wall plates in unfinished areas shall be galvanized steel unless otherwise noted. Refer to architectural finish schedules and owner representative for additional information.

Wall-Box Type Lighting Controls:

Provide wall switches, that are flush self-grounding with green ground screw and color-coded cover, snap toggle type, back and side wired, specification grade. Provide wall switches rated 20A, 120/277 volts, 1 HP at 120V, A.C. quiet type.

Single-Pole Switches: Equal to Leviton #1221-2 series.
LED Dimmers: Specification grade; modular; thin profile; compatible with dimming drivers; dimmer-driver combination capable of consistent full-range dimming. Provide dimming drivers and dimmer switches that are fully compatible with each other. Do not break off side heat-sink sections when ganging dimmers. Provide dimmer and wall plate colors that match other wiring devices in the respective room. Multiple wallbox dimmers may be used sporadically throughout the project on common circuits; provide compatible dimmers accordingly. Install dimmers within terms of their listing. Verify that dimmers used for fan speed control are listed for that application. Provide dedicated neutrals for circuits serving loads controlled by dimmers. Provide unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

Receptacles:

Special purpose receptacles shall be of the size, type and manufacturer as indicated on the plans or as determined in field.

Weather Resistant (WR) GFCI Receptacles: Provide for all receptacles installed in damp or wet locations. Any receptacle shown on the drawings with "WP/GFCI" next to it denoting exterior cover shall be installed with a WR GFCI receptacle. Provide duplex weather resistant receptacles equal to Leviton # W7899 series. Provide Weather-Resistant Receptacles with UL "WR" marking. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents.

Duplex and Single Specification Grade Receptacles: 2-pole, 3-wire grounding, self-grounding, green grounding screw, ground terminals and poles internally connected to mounting yoke, color coded base, 20-amperes, 125-volts, with metal plaster ears, back and side wiring, NEMA configuration 5-20R. Provide duplex receptacles equal to Leviton #5362 series. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents. Provide receptacles equal to Leviton #5361 series for simplex (single) applications. Provide clock hanger receptacles equal to Leviton #5361-CH.

Self-Grounding Commercial Specification grade, Duplex Receptacles, Ground-Fault Circuit Interrupters: Feed-thru type, capable of protecting connected downstream receptacles on single circuit, grounding type UL-rated 943, Class A, Group 1, specification grade, 20-amperes rating (device and feed-thru), 125-volts, 60 Hz; with solid-state ground-fault sensing and signaling (maximum threshold of 5mA at 0.025 seconds maximum); equip with 20-ampere plug configuration, NEMA 5-20R. Provide ground fault circuit interrupter duplex receptacles equal to Leviton #8898 series. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents. Where GFCI protected receptacles are shown on drawings, provide a separate GFCI receptacle for each one shown. Do not feed downstream receptacles from load-side (GFCI-protected) terminals of upstream receptacles.

Self-Grounding, Duplex Combination USB-Charger/Tamper-Resistant Type Receptacles: 2-pole, 3-wire grounding, self-grounding, green grounding screw, ground terminals and poles internally connected to mounting yoke, color coded base, 20-amperes, 125-volts, with metal plaster ears, back and side wiring, NEMA configuration 5-20R, with shutter mechanisms for tamper resistant applications. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and UL 943 Class A, and UL 1310. Provide one 20 Amp, 125 Volt, Decora Tamper-Resistant Duplex Receptacle, NEMA 5-20R. Provide two 3.6 Amp, 5VDC, 2.0 Type A USB Chargers. Provide integral smart chip that recognizes and optimizes the charging power of the plugged-in device. Label to comply with prevailing codes. Provide duplex safety type receptacles equal to Leviton #T5832 series. For receptacle circuits protected with 15A breakers, provide NEMA 5-15R equivalents.

26 51 00.00 - LIGHTING

Submittal Requirements
Product Data: For each type include detailed product information, light source, color temperature, color rendering index, lumen outputs, life, driver manufacturer, model and type, ceiling connection details, integral controls as applicable, drawings of custom fix-tures or components, wiring diagrams, warranty, etc. Arrange luminaire submittals in booklet form with separate sheets for each luminaire, assembled by luminaire "type" in alphabetical order.

All recessed luminaires shall be equipped with necessary plaster frames and surface trim.

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All junction boxes and serviceable components for recessed luminaires shall be readily accessible for service or replacement from below the ceiling, without removing any ceiling components (other than tiles).

All luminaires utilized for emergency and/or egress lighting shall be connected ahead of switching. All ballasts of the same type shall be of the same manufacturer and catalog number. All lamps of the same type shall be of the same manufacturer and catalog number.

Light Emitting Diode (LED) Systems: Provide factory installed LED modules that are specifically designed for, and matched and mated to, the respective luminaire in which they are used. Provide LED modules that can easily be replaced in the field and are readily accessible for replacement. Provide color temperature as indicated in Luminaire Schedule. Provide factory installed driver(s) for the LED source utilized that are specifically coordinated to the LED source and luminaire in which they are used. Provide driver(s) having specific operating characteristics defined in the Luminaire Schedule. Provide driver(s) that can easily be replaced in the field and are readily accessible for replacement. Provide specification sheet for the specific driver as part of the Luminaire Submittal. Provide Total Harmonic Distortion (THD) rating of less than 20 percent. Provide factory-installed integral filtering system to ensure THD does not exceed 20 percent regardless of quantities and/or mixes with other manufactured LED systems.

All surface and recessed ceiling luminaires installed on grid or tile ceilings shall be installed to agree with module of ceiling either displacing a tile, or unit on center of tile, or centered on grid lines.

Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. All luminaires installed in or on suspended ceiling systems shall be anchored directly to the building structural system above. Such anchoring shall be independent of the ceiling support system. All luminaires shall be installed plumb and level. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud.

Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark. Adjust aimable luminaires in the presence of Owner's Representative and Design Professionals.

28 46 21.25 - FIRE ALARM SYSTEM EXTENSION

General:

Refer to Division 26 sections for requirements associated with all electrical work not specifically defined in this section, which shall be considered additional and concurrent scope of work that is associated with work of this section. Provide all work in strict compliance with all prevailing codes, standards and ordinances, including NFPA 70 and NFPA 72.

Qualifications of system designers, installers, programming personnel, inspection personnel, testing personnel and maintenance personnel shall be trained and certified by manufacturer for installation of units required for this Project. Provide all materials, labor and services to provide fully operational modifications to and extensions of existing facility fire alarm system(s).

Provide submittals for equipment, materials and systems specified in this section. Include cuts, descriptive information, technical data, wiring diagrams, system battery calculations, plan-view layouts, legend, point-to-point wiring, etc. Identify all information that is specific to this project.

The fire alarm system supplier shall provide to the electrical contractor a complete set of floor plan drawings showing conduit sizes and number of conductors required to all components plus detailed wiring connections required at each type of device.

It shall be the responsibility of the Fire Alarm System Manufacturer to furnish submittals to the authority having jurisdiction for approval. This action shall be taken during the shop drawing procedure. The system must be approved by this authority and a copy submitted to the Engineer with the shop drawing submittal. All fire alarm system working drawings shall be provided by manufacturer.

Program detailed device and room descriptions so that any trouble, supervisory or alarm condition clearly annunciates floor level, room number, room name, device, and indication of normal, alarm, trouble and supervisory status at fire alarm control panel(s), at fire alarm annunciator panel(s) and at the supervising central station.

Initiating Device, Notification Appliance and Signaling Line Circuits: Class A or Class A and B (provide Class A for circuits that provide isolation module protection for zones). Provide power-limited cables that have a temperature rating of at least 60 degrees C; provide additional marking for conductor size and temperature ratings for cables rated in excess of 60°C (140°F).

Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless owner and others have been notified with at least two-day notice and approval.

Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service.

28 51 00.00 - LIGHTING

Submittal Requirements
Product Data: For each type include detailed product information, light source, color temperature, color rendering index, lumen outputs, life, driver manufacturer, model and type, ceiling connection details, integral controls as applicable, drawings of custom fix-tures or components, wiring diagrams, warranty, etc. Arrange luminaire submittals in booklet form with separate sheets for each luminaire, assembled by luminaire "type" in alphabetical order.

All recessed luminaires shall be equipped with necessary plaster frames and surface trim.

All junction boxes and serviceable components for recessed luminaires shall be readily accessible for service or replacement from below the ceiling, without removing any ceiling components (other than tiles).

All luminaires utilized for emergency and/or egress lighting shall be connected ahead of switching. All ballasts of the same type shall be of the same manufacturer and catalog number. All lamps of the same type shall be of the same manufacturer and catalog number.

Light Emitting Diode (LED) Systems: Provide factory installed LED modules that are specifically designed for, and matched and mated to, the respective luminaire in which they are used. Provide LED modules that can easily be replaced in the field and are readily accessible for replacement. Provide color temperature as indicated in Luminaire Schedule. Provide factory installed driver(s) for the LED source utilized that are specifically coordinated to the LED source and luminaire in which they are used. Provide driver(s) having specific operating characteristics defined in the Luminaire Schedule. Provide driver(s) that can easily be replaced in the field and are readily accessible for replacement. Provide specification sheet for the specific driver as part of the Luminaire Submittal. Provide Total Harmonic Distortion (THD) rating of less than 20 percent. Provide factory-installed integral filtering system to ensure THD does not exceed 20 percent regardless of quantities and/or mixes with other manufactured LED systems.

All surface and recessed ceiling luminaires installed on grid or tile ceilings shall be installed to agree with module of ceiling either displacing a tile, or unit on center of tile, or centered on grid lines.

Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. All luminaires installed in or on suspended ceiling systems shall be anchored directly to the building structural system above. Such anchoring shall be independent of the ceiling support system. All luminaires shall be installed plumb and level. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud.

Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark. Adjust aimable luminaires in the presence of Owner's Representative and Design Professionals.

28 46 21.33 - DUCT SMOKE DETECTORS

Refer to Division 26 sections for requirements associated with all electrical work not specifically defined in this section, which shall be considered additional and concurrent scope of work that is associated with work of this section. Provide submittals for equipment, materials and systems specified in this section. Include cuts, descriptive information, technical data, wiring diagrams, plan-view layouts, legend, point-to-point wiring, etc. Identify all information that is specific to this project. Submit to applicable authority or authorities having jurisdiction and obtain fire alarm permit prior to submitting to consultant for review.

Provide conventional photoelectric duct smoke detector with sampling tube. Install the duct detector in an indoor accessible location. Provide sampling tube, test station and all other required accessories.

Install all duct smoke detectors in the return air duct/plenum of the respective air handling equipment, or in multiple locations of the return duct branches if necessary to meet the minimum straight distances that are required by manufacturer of smoke duct detectors. Refer to HVAC ductwork drawings, and to HVAC installer's coordination drawings, for configurations when determining actual locations and quantities of duct smoke detectors. Where more than one detector is already indicated associated with a particular piece of air handling equipment, there are special reasons for the additional detectors (i.e. split returns, return risers serving multiple floors, etc.); coordinate all locations for same with the HVAC installer.
Provide all required power and control wiring so that upon detection of smoke, the following sequence of operations occurs: An alarm signal is sent to alarm system (fire alarm system or remote test station or both as applicable); The HVAC unit shut down (including applicable dampers); Associated smoke dampers close, if present (wired to automatically re-open on duct detector reset).

Provide keyed test/monitor station (with status/alarm/trouble indicating LED's) on the ceiling or wall (flush in finished areas) beneath the duct detector at discreet but readily visible location as determined in field unless specific location is shown on drawings. Provide engraved (or approved equivalent method) plate at each remote station to read: "#### Duct Smoke Detector", where #### is the equipment identification used on drawings. Connect to fire alarm system.

If required by authority having jurisdiction, provide identified key-operated air handler reset station on the ceiling or wall (flush in finished areas) beneath the air handler at discreet but readily visible location as determined in field unless specific location is shown on drawings. Provide engraved (or approved equivalent method) plate at each reset station to read: "#### Reset Switch to reset #### after a duct smoke detection event has been cleared and the fire alarm system has been reset.", where #### is the equipment identification used on drawings. Coordinate with authority having jurisdiction for verification of, or required modification to, the language to be engraved. Connect to fire alarm system.

Provide 20A/120VAC power as required to energize components. This requirement applies whether or not such power work is shown on the drawings. Dedicate branch circuits serving fire alarm related equipment to fire alarm related equipment only.

Properly identify system components, wiring, cabling, and terminals. Install framed instructions in a location visible from fire-alarm control unit. Provide red color on jacket of all fire alarm cables associated with the fire alarm system. Provide red-colored breaker handle and red-colored lock-on device at source circuit breakers that feed fire alarm related equipment. Provide red coloring for all fire alarm system junction boxes, along with identification.

END OF SPECIFICATION

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ISSUE INFORMATION
1.10.2019
REVISIONS

FRCH / ARCHITECTURE, INC., P.C.

PROJECT INFORMATION
Marketplace Center
MSS #5158
1948 Old Fort Pkwy
Murfreesboro, TN 37129

PROJECT #: 20994

SHEET INFORMATION
ELECTRIC SPECIFICATIONS

DRAWN BY: DMT
REVIEWED BY: LGF
SCALE: As Noted
AUTHORIZED FOR: Bid/Permit/LL

E-6.1

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