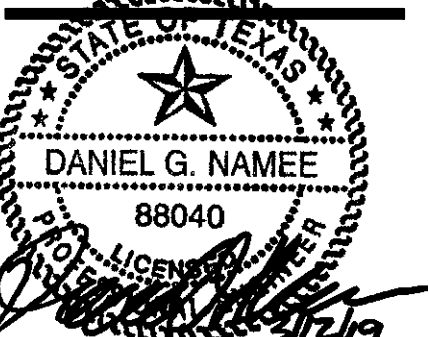
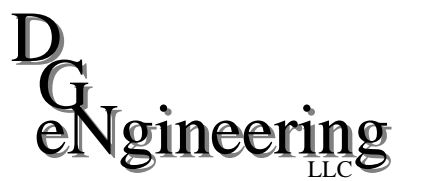


Project Information:



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SHOPS ON GOSLING
RETAIL CENTER
SHELL BUILDING DEVELOPMENT
24309 GOSLING ROAD
SPRING, TEXAS 77389

Sheet Title:

**ELECTRICAL
SPECIFICATIONS**

Issue:

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B. Fusible Switches

All fusible switches shall be quick-make, quick-break with visible blades and dual horsepower ratings. Switch handles shall physically indicate "ON" and "OFF" positions. Switches shall be lockable only in the "OFF" position and accept three interlock type heavy duty padlocks. Switch covers and handles shall be interlocked to prevent opening in the "ON" position. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Switches shall include positive pressure rejection type fuse clips for use with UL class R fuses and be UL listed for 200,000 A/C, Class J fuses shall be UL listed for 200,000 AC the lugs for terminating conductors shall be rated at 75C.

C. Cabinets and Fronts

The panelboard bus assembly shall be as shown in a steel cabinet with multiple knockouts. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder handle-type lock with catch and spring-loaded stainless steel door pull. All panel board lock shall be keyed alike. Fronts shall have adjustable locking trim covers which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. OGA panelboard front shall have exposed trim covers. A circuit directory frame and cord with a clear plastic covering shall be provided on the inside of the door. Where required by local code, provide memo 3R enclosure where installed in a sprinklered area.

D. Safety Barrier

The distribution panelboard interior assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on the sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the main lugs shall have barriers.

E. Integrated Equipment Short Circuit Rating

Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the over-current devices mounted in the panelboard. The short circuit tests on the over-current devices and on the panelboard structure shall be made simultaneously by connecting the fault to each over-current device with short circuit current or greater. Testing of panelboard over-current devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating of the supply voltage and shall be UL listed.

2-10 MANUAL MOTOR STARTERS

Manual starters shall consist of a manually operated toggle switch equipped with melting alloy type thermal overload relay. Thermal unit shall be of one-piece construction and interchangeable. Starter shall be responsive if thermal unit is removed. Contacts shall be double break, silver alloy, visible from both sides of starter. Manual starters shall be Square -D class 2510 or 2512 or approved equal. Provide the size and number of poles shall be shown and marked by equipment serial. Turnish red pilot light as indicated.

All manual motor starter enclosures shall be NEMA 1, general purpose enclosures, unless shown otherwise. Provide memo 3R enclosure where installed outside or in a sprinklered area when required by local code.

MOTOR CONNECTIONS: Connections as follows:

Provide electrical and grounding connections to motors as indicated.

- Not less than 18 inch length of Setoffs, extending from motor connection box to motor branch circuit conduit on outdoor and wet locations. Provide Greenfield for inside dry locations.
- Install connections mechanically secure, assuring electrical continuity, proper and effective grounding.

INSTALLATION OF MOTOR STARTER

Install motor starters in accordance with the manufacturer's written instructions, the applicable requirements of the NEC and the NEMA -Standard of Installation-, and recognized industry practices to ensure that products serve the intended function.

2-11 CURRENT - LIMITING FUSES:

Provide 200,000 amp interrupting capacity current limiting fuses of the ampacity and voltage indicated and scheduled.

Upon completion of the building the contractor shall provide the owner with spare fuses as shown below.

- 10K (minimum of 3) of each type and rating of installed fuses shall be supplied as spares.
- BUSMAN spare fuse cabinets - Catalog No. 37C - shall be provided to store the above spares.

Main, Feeders and Branch Circuits

1. Circuits to a 600 ampere shall be protected by current limiting BUSMAN LOW-PEAK Dual Element Fuses, LP. All dual-element fuses shall have separate overload and short-circuit elements. Fuse shall incorporate a spring actuated thermal overload element having a 284 degree Fahrenheit melting point alloy and shall be independent of the short-circuited clearing chamber. The fuse must hold 500% of rated current for a minimum of 10 seconds and listed by Underwriters Laboratories Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuse shall be UL Class J.

2-12 SAFETY AND DISCONNECT SWITCH:

- Products shall be designed, manufactured, tested and installed in compliance with applicable standards.
- NEMA KSJ - Enclosed switches
- Federal specification W-5-865C-Heavy duty switches

Products shall conform all applicable UL standards, including UL88 (standard for safety, enclosed and dead front switches) and shall be UL-listed.

Acceptable manufacturers are:

General Electric Company, Square D Company, or Siemens.
Furnish and install heavy-duty type safety switches with the number of switched poles as indicated on the plans and specifications. All safety switches shall be NEMA Heavy Duty Type HD, and Underwriters Laboratories listed.

B. Switch Interior

All switches shall have setblades, which are fully visible in the "OFF" position when the door is open. Switches shall have removable arc suppressors when necessary to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60°C and 75°C copper aluminum cables. All switches blades and contacts shall be plated copper.

C. Switch Mechanism

Switches shall have a quick-make and quick-break operating handle and mechanism, which shall be on integral part of the box, not the cover. Locking provisions shall be provided for locking in the "OFF" position with at least three padlocks. Switches shall have a dual cover interlock to prevent unscheduled opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Handle position shall indicate if switch is -ON- or -OFF-.

D. Neutral

Provide a solid neutral with the safety switch where a neutral is present in the circuit.

E. Ratings

Switches shall be horsepower rated for ac and/or dc as indicated by the plans. The fused switches shall have Class R rejection fuse clips when required. Adjust load side terminal block as required to accept Class J fuses. UL listed short circuit ratings of the switches, when equipped with Class R or Class J fuses, shall be 200,000 symmetrical amperes.

F. Enclosures

- Indoor switches shall be furnished in NEMA 1 enclosures.
- Outdoor switches, switches located in wet areas, or inside a sprinklered area shall be furnished in NEMA 3R enclosures.

G. Service Entrance

Switch shall be suitable for use as service entrance equipment when installed in accordance with the National Electrical Code.

H. Hubs:

Provide bolt-on hubs for rainproof or wet area applications.

2-13 LIGHTING FIXTURES:

All fixtures shall conform to all applicable UL standards and shall be UL label including damp and wet location ratings.

All fluorescent ballasts shall comply with certified ballast manufacturer (CMB) standard and CMB label.

Acceptable manufacturers for ballasts are: Advance Transformer Company or Magretek Universal Manufacturer.
Acceptable manufacturers for lamps are General Electric Company, Osram-Sylvania or North American Philips, General Electric Constant Color, is the only MR-16 lamp acceptable.

Provide the size, type and rating of each light fixture shown and scheduled. All light fixtures shall be complete with reflectors, lens, trim rings, flanges, lamps, lamp holders, ballast, starters, fuses wiring, earthquake clips, etc. to provide a complete functioning light fixture.

A. Lighting Fixture Types:

- Fluorescent fixtures
- Fixture ballast and lamp holders shall be pre-wired and installed. Fixture shall be equipped with a top access plate with knockouts for conduit entry. Fixtures shall also include knockouts at each end plate for conduit entry.
- Provide battery packs for emergency operation when specified.
- Inconcealment Fixtures
- Provide appropriate trim rings for recessed mounted fixtures compatible with the ceiling in which the fixture is installed.
- All lamps shall include treated unless otherwise noted or scheduled.
- High Intensity Discharge Fixtures (HID)
- Fixtures shall be pre-wired with frame-in kit and integral thermal protection required by UL for recessed fixtures. Ballast shall be enclosed and potted and mounted on the frame-in kit.
- Provide remote ballast mounted on a separate mounting plate where indicated or scheduled. Ballast shall include a splice box.
- Provide a heat resistant glass shield below the lamp to contain lamp glass envelope and ARC tube to prevent them from falling to the floor or causing damage to life and property. Lampes rated for open bottom fixtures may be used in lieu of the glass shield if approved by the engineer.
- Provide a fuse and fuse holder installed on the line side of each ballast to prevent branch circuit from tripping due to faulty ballast. The fuse and fuse holder shall be mounted in a junction box for recessed fixtures and in the base of all poles. The fuse holder shall be waterproof when installed in damp or wet locations. Fuse size and type shall be as recommended by ballast manufacturer.
- Exit signs shall meet all federal, State, and local codes.
- Provide the alarm interface relay when required to flash exit signs.
- Provide battery packs for emergency operation when specified.

B. Ballasts - Coordinate with Light Fixture Schedule

- Fluorescent % minimum, operate lamp at 20 KHZ, less
- Electronic ballast shall be high power factor (PF) minimum, operate lamp at 20 KHZ, less than 20% total harmonic content, full light output, crest factor less than 1.6 configuration, multi-lamp, class -P- thermally protected, sound -A- rating, enclosed and potted and 50 degree F minimum starting temperature. Provide 5 year warranty parts and labor. Ballast shall be Advanced Mark V or Magretek HP Series.
- Magnetic ballast shall be energy saving, high power factor, rapid start, class P thermally protected, enclosed and potted, sound -A- rating, and a 60 degree F temperature rating. Ballast shall be CMB certified by an ET, and UL approved. Ballast shall be Advance Mark II or equal by Magretek Universal.
- All outdoor ballast unless otherwise noted shall be high power factor, rapid start, class P thermally protected, enclosed and potted, sound rating B and a 0 degree F temperature rating. Ballast shall be CMB certified by an ET, and UL approved. Provide outdoor ceiling ballast where indicated.
- Compact fluorescent ballast shall be high power factor, sound rating -A8 and UL approved.
- HID
- Provide high power factor, constant wattage auto-transformer with a -20 degree F temperature rating. Ballast shall have a sound rating of -B8 for lamps less than 400 watts. Ballast for recessed downlights or located remotely shall be enclosed and potted and shall be provided with a splice box. Provide 120 volt tap for auxiliary lamp when specified.

C. Lamps - Coordinate with Light Fixture Schedule

- F03T8 fluorescent lamps shall be 32 watt energy saving and 4100 degree K.
- F40T12 fluorescent lamps shall be 34 watt energy saving and cool white.
- All interior F40T12 fluorescent lamps used with 0 degree ballast shall be 40 watt.
- All inconcealment lamps shall be halide treated, extended life rated for 2500 hours unless otherwise noted. 130 watt lamps may be used to provide extended life.

D. Coordination

- The contractor shall verify the type of fixtures with the ceiling types as indicated on the drawings. Any discrepancies shall immediately be brought to the architect's attention before the contractor places his order and accepts delivery. Fixtures shall fit exact in the types of ceiling scheduled. Provide plaster frames, trim rings and other accessories required for a correct fit.
- Provide supports attached to structural member to support fixtures when the ceiling system cannot maintain support. Provide separate supports for all recessed ceiling mounted HID fixtures.
- Refer to architectural reflected ceiling plan for the exact location of all light fixtures. Notify the architect for any discrepancies or conflicts with structure architectural, mechanical piping or ductwork before installation.

E. Mounting

Pendant or surface mounted fixtures shall be provided with required mounting devices and accessories, including hangers and stud-anchors, ball-sockets, canopy and stems. Locations of fixtures in mechanical areas shall be coordinated with mechanical contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field. The allowable variation tolerance in mounting individual fixtures shall not exceed 1/4 inch and shall not vary more than 1/2 inch from the floor mounting height shown on the Drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Fixtures shall employ shade - not bars - stem hangers unless otherwise noted.

2. All structure mounted fixtures (i.e. bracket mounted, pipe mounted and surface mounted) shall be provided with cables of suitable size and weight to support the weight of the fixture. Cables shall be installed around or fastened to the housing of the fixture. On pendant fixtures, one safety cable of suitable size and weight to support the weight of the fixture assembly shall connect the top of the pendant to the supporting structure by means of welding to the hating, and one safety cable shall connect the housing of the fixture to the bottom of the pendant. Where more than one pendant per fixture occurs, only one pendant must be cased. Track fixtures for pendant mounted track shall also be applied with off-on safety cables of suitable size and weight to support the weight of the fixture.

F. Electrical Connection

1. All light fixtures installed in an accessible suspended ceiling shall be connected from a branch circuit junction box using 1/2" flexible metal conduit, fixture pigtail not exceeding 6"- 0". All fixtures must be grounded by using a grounding conductor or the conduit system. Fixture to fixture wiring of fixtures installed in an accessible ceiling is not permitted.

G. Fire Rated Ceiling

1. Provide fire rated canopy or enclosure for O11 fixtures recessed in a fire rated ceiling. The fire rated canopy or enclosure shall be as required by the UL design number listed in the UL the resistance directory. Refer to architectural drawing for the UL design number. Coordinate with ceiling installer and manufacturer.

H. Air Handling Fixtures

1. Install all air handling light fixtures with return air slot in the open position, if it is to be as on air handling fixture. Coordinate with mechanical contractor.

I. Final Inspection:

- Remove all plastic and protective coating from all fixtures. Fixtures shall be thoroughly cleaned. Replace any damaged fixture or fixture parts including reflectors, lenses, lens and metal parts that show signs of corrosion.
- All final inconcealment lamps used during construction shall be replaced with new lamps. Replace all other defective ballast, lamps or discolored lamps, showing signs of excessive usage.
- Demonstrate proper operation of all fixtures and controls.

2-14 ELECTRICAL SERVICE ENTRANCE:

- POWER SOURCE:
- SOURCE VOLTAGE: Main Distribution 460/277 volt 3-phase, 4-wire
- Field coordinate exact requirements and include in bid.

2-15 TELEPHONE RACEWAY SYSTEM

A. Provide pullboxes in telephone conduit runs spaced not greater than 100 ft. apart, and on backboard side of race with more than the right angle bends. Place telephone label on pull and junction boxes. Provide pullwire in each telephone run. Provide plywood backboards and duplex receptacle in the telephone equipment room. Confirm location on plans prior to installation. All terminal cabinets/backboards and conduit shall be sized per the recommendations of the telephone system installer.

B. Provide telephone service conduit. Field coordinate exact requirements and include in bid.

2-16 MISCELLANEOUS ELECTRICAL CONTROLS AND WIRING

- The types of miscellaneous control devices and wiring include but not limited to the following:
 - Controlers
 - Relays
 - Photocells
 - Time switches
- Additional control wiring and safety devices as shown and specified.

Various control devices, of an electrical nature, for the safe operation and temperature control of the heating, ventilating, air conditioning and plumbing systems are provided under Division 15.

All control wiring and conduit shall be furnished under Division 15. All power wiring 120 volt or larger shall be provided by Division 16.

B. CONTACTORS AND RELAYS: Provide contactors and relays with the number of poles, ampere-rating, control wiring as required, as shown and specified for a complete function system. Acceptable manufacturers are General Electric Company, Square D Company, and Automatic Switch Company. Provide 2-wire or 3-wire control modules as required to operate lighting contactors.

c. Photocells provide a specification grade self-contained, weatherproof, photoelectric control that shall be mounted on an FS type weatherproof junction box. The photo cell shall:

- Switch "ON" at dusk and "OFF" at dawn.
- Adjustable from 2 to 50 foot candles.
- Rated at 2000 watts.
- Use 1/2 diameter coaxium shield cable.
- Have a 2 minute delay to prevent false switching.

Acceptable manufacturers are York Inc, Intermatic Time Controls, and AMF Paragon
Install photo cells on the roof unless otherwise directed by Architect. Coordinate any roof penetrations with all other trades and