

SPECIFICATIONS

GENERAL

CONTRACTOR SHALL REFER TO ALL RELATED DOCUMENTS, ARCHITECTURAL, STRUCTURAL, CIVIL AND MEP DRAWINGS, AND FULLY UNDERSTAND THE SCOPE OF WORK AND CONDITION OF CONSTRUCTION.

THE WORK UNDER THIS SPECIFICATIONS AND DRAWINGS SHALL INCLUDE ALL LABOR.

ALL INSTALLATION OF DEVICES AND CONNECTION OF CONDUCTORS SHALL BE PERFORMED BY LICENSED AND SKILLED ELECTRICIAN OR JOURNEYMAN.

ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE OWNER. IF ANY PORTION OF THE WORK IS FOUND UNSATISFACTORY BY THE OWNER, IT SHALL BE REMOVED AND REINSTALLED WITHOUT DELAY AT NO COST TO THE OWNER.

THE WORK INCLUDES, BUT NOT LIMITED TO: THE COMPLETE ELECTRICAL DISTRIBUTION SYSTEM, ROUGH-IN AND FINAL CONNECTIONS TO ALL DEVICES REQUIRING ELECTRICAL POWER, INCLUDING OWNER PROVIDED EQUIPMENT, LIGHTING CONTROL, LIGHTING FIXTURES

EACH CONTRACTOR SHALL OBTAIN ALL PERMITS AND INSPECTIONS REQUIRED BY THE REGULATORY AUTHORITIES. ALL FEES RELATED TO OBTAINING PERMITS AND INSPECTION SHALL BE PAID FOR BY EACH CONTRACTOR IN HIS TRADE.

ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH LOCAL, COUNTY, STATE, AND NATIONAL ELECTRICAL CODE 2014, SPECIFICATIONS, UTILITY COMPANY REQUIREMENTS AND ALL INDUSTRY STANDARDS.

ANY DIFFERENCES IN ABOVE MENTIONED REQUIREMENTS, THE MOST STERN SHALL OVERRULE ALL OTHERS.

IN ADDITION TO ABOVE MENTIONED CODES AND SPECIFICATIONS, THE FOLLOWING INDUSTRY STANDARDS SHALL BE COMPLIED IF THEY ARE MORE STRINGENT.

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THE MANUFACTURERS PUBLISHED DIRECTIONS SHALL BE FOLLOWED IN THE DELIVERY, STORAGE, PROTECTION, INSTALLATION AND WIRING OF ALL EQUIPMENT AND MATERIAL.

THE DRAWINGS SHOW DIAGRAMMATICALLY THE LOCATIONS OF THE VARIOUS LINES, CONDUITS, FIXTURES, AND EQUIPMENT AND THE METHOD OF CONNECTING AND CONTROLLING THEM. IT IS NOT INTENDED TO SHOW EVERY CONNECTION IN DETAIL AND ALL FITTINGS REQUIRED FOR A COMPLETE SYSTEM. THE SYSTEMS SHALL INCLUDE BUT ARE NOT LIMITED TO THE ITEMS SHOWN ON THE DRAWINGS. EXACT LOCATIONS OF THESE ITEMS SHALL BE DETERMINED BY REFERENCE TO THE GENERAL PLANS AND MEASUREMENTS AT THE BUILDING AND IN COOPERATION WITH THE OTHER SUBCONTRACTORS, AND IN ALL CASES, SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER. THE OWNER RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGE IN THE LOCATION OF ANY PART OF THIS WORK WITHOUT ADDITIONAL COST TO THE OWNER.

CONTRACTOR SHALL SEEK APPROVAL FROM THE OWNER FOR ANY CHANGES TO THE SPECIFICATIONS OR CONTRACT DOCUMENTS.

ANY EXCEPTIONS, INCONSISTENCIES AND CONFLICTS IN CONTRACT DOCUMENTS, SPECIFICATIONS AND CONTRACT DOCUMENTS BY OTHER TRADE SHALL BE BROUGHT TO ATTENTION TO THE OWNER PRIOR TO BID.

CONTRACTOR SHALL COORDINATE AND VERIFY THE WORK WITH EXISTING CONDITIONS AND THE WORK OF OTHER TRADE PRIOR TO ANY FABRICATIONS OR INSTALLATION. IF THE LOCATION OF THE DEVICES ON DRAWINGS ARE IMPRACTICAL TO THE CONDITION IN FIELD, CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY PRIOR TO ANY FABRICATION OR INSTALLATION.

ELECTRICAL DEVICES ARE INDICATED ON DRAWINGS AT APPROXIMATE LOCATIONS. THE OWNER RESERVE THE RIGHT TO MAKE REASONABLE CHANGES IN LOCATIONS WITHOUT ADDITIONAL COSTS.

THE LINES INDICATING BRANCH CIRCUITS DO NOT REPRESENT THE ROUTING OF ELECTRICAL CONDUITS. THEY INDICATE THE LAYOUT AND CONTROL OF CIRCUITS.

PRODUCTS AND WORK

MATERIALS FURNISHED SHALL BE NEW AND BY STANDARD MANUFACTURERS AND MUST CONFORM TO THE NATIONAL BOARD OF FIRE UNDERWRITERS REQUIREMENTS AND BEAR THE UNDERWRITERS LABORATORIES SEAL OF APPROVAL.

LISTED MANUFACTURERS, MODELS, OR CATALOGUE NUMBERS IN PART OR ALL SHALL ENTAL TO INCLUDE THE PUBLISHED MANUFACTURERS DESCRIPTION AND SPECIFICATION.

CONTRACTOR SHALL NOT INTERPRET THAT THE LISTED MANUFACTURERS IN SPECIFICATIONS OR DRAWINGS TO EXCLUDE ALL OTHER MANUFACTURERS

CONTRACTOR SHALL MAKE CERTAIN THAT ALL EQUIPMENT FIT IN THE SPACE DESIGNATED AND DESIGNED FOR THE SURROUNDINGS IT OCCUPIES.

COMPLETE CATALOGUE ILLUSTRATION AND DESCRIPTIONS OF ALL EQUIPMENT SHALL BE SUBMITTED TO THE OWNER PRIOR TO ORDERING ANY EQUIPMENT.

ALL HORIZONTAL RUNS OF CONDUITS SHALL BE SUPPORTED BY MEANS OF APPROVED HANGER FROM THE STRUCTURAL CEILING.

COORDINATE THE WORK UNDER THIS SECTION WITH ALL OTHER TRADES.

CONDUITS AND RACEWAYS:

MANUFACTURERS: SQUARE D, B-LINE, ALLIED TUBE & CONDUIT, HOFFMAN, C&E ELECTRICAL, WIREMOLD.

OUTDOORS EXPOSED: RIGID STEEL.
OUTDOORS CONCEALED ABOVE GROUND: RIGID STEEL.
OUTDOORS UNDERGROUND: TYPE EPC-40-PVC
OUTDOORS CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND MOTOR DRIVEN EQUIPMENT): LFMC.
BOXES AND ENCLOSURES ABOVE GROUND: NEMA 3R UNLESS NOTED OTHERWISE ON PLANS.
INDOORS EXPOSED NOT SUBJECT TO PHYSICAL DAMAGE: RIGID PVC.
INDOORS EXPOSED NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID PVC.
INDOORS EXPOSED SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID PVC.
INDOORS CONCEALED IN CEILING: INTERLOCK WALLS AND PARTIAL WALLS: EMT.
INDOORS CONNECTION TO VIBRATING EQUIPMENT: LFMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
INDOORS DAMP OR WET LOCATIONS: EMT.
INDOORS LOW-VOLTAGE CABLES: EMT.

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INDOORS DAMP OR WET LOCATIONS: EMT.
INDOORS LOW-VOLTAGE CABLES: EMT.

ADJUSTABLE TIME-DELAY OVER A RANGE OF 1 TO 30 MINUTES.
SENSOR OUTPUT: CONTACTS RATED TO OPERATE THE CONNECTED RELAY, COMPLYING WITH UL773A. SENSOR IS POWERED FROM POWER PACK.

POWER PACK: DRY CONTACTS RATED FOR 20-A BALLAST LOAD AT 120 OR 277 VAC.
AUTOMATIC LIGHT-LEVEL SENSOR: ADJUSTABLE FROM 2 TO 200 FC (21.5 TO 2152 LUX); TURN LIGHTS OFF WHEN SELECTED LIGHTING LEVEL IS PRESENT.

DUAL SENSOR TYPE: DETECT OCCUPANCY AREA USING PIR (PASSIVE INFRARED) AND ULTRASONIC DETECTION METHOD.

SPECIFICATIONS

CONDUCTORS:

COPPER CONDUCTORS #10 AND SMALLER:

LABELED PER UL 83, TYPE THHN/THWN, SOLID COPPER 600 VOLT INSULATION, UNIFORM COLOR CODED JACKET WITH JACKET DATA. METAL CLAD (TYPE MC) CABLE WHERE INSTALLED IN ACCORDANCE WITH NEC ARTICLE 330.

COPPER CONDUCTORS #6 OR LARGER:

LABELED PER UL 83, TYPE THHN/THWN, STRANDED COPPER, 600VOLT INSULATION, UNIFORM COLOR CODED JACKET WITH JACKET DATA.

ACCEPTABLE MANUFACTURERS OF CONDUCTORS:

- PIRELLIE
SOUTHWIRE
AETNA
REPUBLIC
AFC
ENCORE WIRE
KERITE

CONTRACTOR MAY USE ALUMINUM CONDUCTORS FOR #4 AWG OR LARGER IN THE PLACE OF COPPER CONDUCTORS. CONTRACTOR SHALL REFER TO NEC TABLE 310-1 G FOR EQUIVALENT AMPACITY AND SHALL COMPENSATE FOR VOLTAGE DROP.

MOLDED CASE CIRCUIT BREAKER:

INCLUDE SCHEDULE OF ALL FUSES, RATINGS, TIME COORDINATION DATA, MANUFACTURERS STANDARD DATA AND TIME-CURRENT CURVES. ALL DATA SHALL BE BASED ON TEST OF STANDARD PRODUCTS.

APPROVED MANUFACTURERS:

- GENERAL ELECTRIC
CUTLER HAMMER
SQUARE D
SIEMENS

THERMAL-MAGNETIC BOLT-IN TYPE CIRCUIT BREAKERS WITH QUICK-MAKE, QUICK-BREAK CONTACTS; TRIP-FREE OPERATION WITH OVER-THE-CENTER TOGGLE HANDLE OR NON-REMOVABLE MONOLITHIC TIE-HANDLE.

MULTI-POLE BREAKERS SHALL HAVE INTERNAL COMMON TRIP AND COMMON RESET WITH A SINGLE TOGGLE HANDLE OR NON-REMOVABLE MONOLITHIC TIE-HANDLE.

TRIP RATINGS SHALL BE MOLDED ON THE HANDLE OR FACE OF BREAKER.

BREAKER TERMINALS SHALL BE RATED TO ACCOMMODATE A MINIMUM OF 75 DEGREE C. CONDUCTORS.

BREAKER SHALL BE RATED FOR MOUNTING AND OPERATION IN ANY POSITION; SHALL ACCOMMODATE AND MATCH THE TYPE OF TERMINATIONS REQUIRED.

SINGLE POLE BREAKERS RATED 15 AND 20 AMPERES SHALL BE UL LABELED AS "SWITCHING BREAKERS" AT THE APPLIED CIRCUIT VOLTAGE.

MULTI-POLE BREAKERS RATED 100 AMPERES AND LARGER SHALL BE MOLDED CASE THERMAL-MAGNETIC BOLT-IN TYPE BREAKER WITH ADJUSTABLE INSTANTANEOUS TRIP.

LIGHTING FIXTURE

SUBMITTAL:

SCHEDULE BY TYPE DESIGNATION ALL LIGHTING FIXTURES, EACH COMPLETE WITH DATA SHEET WITH COMPLETE PHYSICAL, ELECTRICAL AND LIGHTING CHARACTERISTICS, LAMP TYPE AND LAMP DATA.

REFER TO THE "LIGHTING FIXTURE SCHEDULE" IN THE DRAWINGS FOR INDIVIDUAL FIXTURE DESCRIPTIONS AND MANUFACTURER TYPES.

PROVIDE LAMPS FOR EACH FIXTURE OF QUANTITY, TYPE AND COLOR AS LISTED IN LIGHTING FIXTURE SCHEDULE. GE, SYLVANIA OR PHILIPS ARE ACCEPTABLE.

EACH LIGHTING FIXTURE SHALL BE UL LABELED FOR PROPER OPERATION IN THE TYPE OF CEILING CONSTRUCTION AND FOR THE MOUNTING ARRANGEMENT ON/IN WHICH IT IS INSTALLED.

FIELD VERIFY ACTUAL CEILING SLOPE FOR FIXTURES INSTALLED IN SAME AND ACTUAL FIELD DIMENSIONS AND ANGLES OF CONSTRUCTION FOR ANY FIXTURE CONFORMING TO THE SHAPE AND LENGTH OF SAME, FOR COORDINATION OF FIXTURE CONSTRUCTION.

PANELBOARD

SUBMITTAL:

INCLUDE SCHEDULE OF EACH PANELBOARD WITH ALL DEVICES AND COMPLETE WITH PHYSICAL AND ELECTRICAL DATA AND WITH RATINGS FOR EACH COMPONENT, INCLUDING OVERFUSE OVERLAY CURVES.

LABELED PER UL #67 AND #50, CONFORM WITH NEMA #250 AND IEC, NFFA #70-384 AND 70-373. ALL JUNCTION BOXES SHALL BE LABELED WITH PANEL AND CIRCUIT DESIGNATION.

PROVIDE TYPED CIRCUIT DIRECTORY WITH EACH CIRCUIT SERVING DEVICES AND AREA ITS SERVING.

APPROVED MANUFACTURERS:

- GENERAL ELECTRIC
CUTLER HAMMER
SQUARE D
SIEMENS

LIGHTING CONTROL:

SOLID STATE, PROGRAMMABLE, WITH ALPHANUMERIC DISPLAY; COMPLYING WITH UL 917. BALLAST LOAD, 120/240VAC.

TWO ON-OFF SET POINTS ON A 24-HOUR SCHEDULE AND ANNUAL HOLIDAY SCHEDULE THAT OVERRIDES THE WEEKLY OPERATION ON HOLIDAYS.

ALLOW CONNECTION OF A PHOTOELECTRIC RELAY AS SUBSTITUTE FOR ON-OFF FUNCTION OF A PROGRAM.

BATTERY BACKUP FOR NOT LESS THAN SEVEN DAYS RESERVE TO MAINTAIN SCHEDULES AND TIME CLOCK.

INDOOR OCCUPANCY SENSORS:

WALL OR CEILING MOUNTED SOLID-STATE INDOOR OCCUPANCY SENSORS WITH A SEPARATE POWER PACK.

ADJUSTABLE TIME-DELAY OVER A RANGE OF 1 TO 30 MINUTES.

SENSOR OUTPUT: CONTACTS RATED TO OPERATE THE CONNECTED RELAY, COMPLYING WITH UL773A. SENSOR IS POWERED FROM POWER PACK.

POWER PACK: DRY CONTACTS RATED FOR 20-A BALLAST LOAD AT 120 OR 277 VAC.
AUTOMATIC LIGHT-LEVEL SENSOR: ADJUSTABLE FROM 2 TO 200 FC (21.5 TO 2152 LUX); TURN LIGHTS OFF WHEN SELECTED LIGHTING LEVEL IS PRESENT.

DUAL SENSOR TYPE: DETECT OCCUPANCY AREA USING PIR (PASSIVE INFRARED) AND ULTRASONIC DETECTION METHOD.

SPECIFICATIONS

GROUNDING AND BONDING

ALL GROUNDING AND BONDING SHALL CONFORM TO NEC ARTICLE 250.

COPPER WIRE OR CABLE INSULATED FOR 600V UNLESS REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.

INSTALL SOLID CONDUCTOR FOR #8 AWG AND SMALLER AND STRANDED CONDUCTORS FOR #6 OR LARGER.

INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS FOR ALL EQUIPMENT.

ELECTRICAL GENERAL NOTES

- 1. ALL EXIT SIGNS, NIGHT LIGHTS AND EMERGENCY BALLAST CHARGING CIRCUITS SHALL BE CONNECTED TO UNSWITCHED PORTION OF LIGHTING CIRCUIT SHOWN.
2. FIXTURE TYPE INDICATED BY UPPER CASE CHARACTERS, SWITCHING AND GROUPING DESIGNATED BY LOWER CASE LETTER AND CIRCUIT BY NUMBER (WHERE APPLICABLE).
3. WHEN CONDUCTOR OR CONDUIT SIZE IS INDICATED FOR BRANCH CIRCUIT HOME RUN, THE CONDUCTOR AND CONDUIT SIZE INDICATED SHALL BE USED FOR THE COMPLETE CIRCUIT.
4. REFER TO THE ARCHITECTURAL INTERIORS DOCUMENTS FOR ACTUAL DEVICE LOCATIONS AND DIMENSIONS.
5. REFER TO THE APPROPRIATE DRAWINGS FOR THE EXACT LOCATION OF EQUIPMENT INSTALLED UNDER OTHER DIVISIONS OF THE DOCUMENTS, WHICH REQUIRE ELECTRICAL SERVICE.
6. REFER TO APPROPRIATE DRAWINGS AND MANUFACTURERS INSTALLATION MANUAL TO PROVIDE ALL SUPPLEMENTARY AND CONTROL CIRCUITS TO BRING EQUIPMENT TO FULL WORKING CONDITION.
7. EQUIPMENT GROUNDING CONDUCTORS SHALL BE INSTALLED IN ALL RACEWAYS.
8. WALL SWITCHES CONTROLLING CIRCUITS OF OPPOSITE PHASES SHALL NOT BE INSTALLED IN COMMON BOX UNLESS PERMANENT BARRIER IS PROVIDED.
9. ALL RACEWAY AND EQUIPMENT SUPPORTS AND HANGERS SHALL BE FULLY COORDINATED WITH STRUCTURAL DRAWINGS.
10. REFER TO THE ARCHITECTURAL INTERIORS REFLECTED CEILING PLANS FOR EXACT FIXTURE PLACEMENT AND DIMENSIONS.
11. REFER TO THE ARCHITECTURAL INTERIORS DOCUMENTS FOR ACTUAL DEVICE LOCATIONS AND DIMENSIONS. FIELD VERIFY BEFORE WORK WITH EXISTING CONDITIONS AND STRUCTURE PRIOR TO BEGINNING INSTALLATION.
12. SEE HVAC DRAWINGS FOR LOCATIONS OF EQUIPMENT AND POWERED.
13. COORDINATE WITH MECHANICAL DRAWINGS AND PROVIDE ADDITIONAL CONTROL CIRCUITS AS REQUIRED BY MANUFACTURER.
14. GENERAL DIAGRAMMATICALLY SHOW INTERCONNECTIONS OF EQUIPMENT, FIXTURES AND DEVICES ARE LABELED ON FLOOR AND REFLECTED CEILING PLANS, REFER TO STRUCTURAL AND ARCHITECTURAL PLANS FOR ELEVATION CHANGES AND RACEWAY ROUTES.
15. EACH PENETRATION OF FIRE RESISTANT RATED ASSEMBLY BY A PIPE, TUBE WIRE OR CONDUIT SHALL BE PROTECTED BY A THROUGH PENETRATION FIRE STOP SYSTEM THAT HAS BEEN TESTED ACCORDING TO ASTM E814 OR E199.
16. BOLLARD FIRE RESISTANCE RATED WALLS. THEY SHALL BE AT LEAST 24-INCHES APART.

ELECTRICAL LEGEND

Table with columns: SYMBOLS, DESCRIPTION, MOUNTING. Contains symbols for duplex receptacles, quadraplex receptacles, switches, outlets, and fire alarm devices.

ABBREVIATIONS

Table with columns: AC, AF, AFF, AL, BFC, BKR, CND, CONN, CTB, CU, DN, EC, ELEC, FACP, FAA, G OR GRND, GFCI OR GF, IG, ISC, LTG, MTD, N, NL, NEC, PNL, RECPT, TEL, TTB, TV, TVSS, TYP, XFMR, UG, WP. Lists electrical abbreviations and their meanings.

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Table with columns: REV #, DATE, DESCRIPTION. Revision control table.

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