

**ELECTRICAL SYMBOLS AND ABBREVIATIONS**

NOTE: ALL SYMBOLS AND ABBREVIATIONS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS

**GENERAL NOTES**

- REFER TO SPECIFICATIONS FOR MATERIALS AND METHODS OF ELECTRICAL CONSTRUCTION.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR THE EXACT LOCATION OF ALL CEILING MOUNTED DEVICES.
- REFER TO ARCHITECTURAL INTERIOR ELEVATION DRAWINGS, WHERE THE ARCHITECT HAS DRAWN SUCH ELEVATIONS, FOR THE LOCATIONS OF ALL WALL MOUNTED DEVICES.
- COORDINATE EXACT LOCATION OF ALL LIGHTING FIXTURES IN ELECTRICAL/MECHANICAL SPACES WITH EQUIPMENT, DUCTWORK AND PIPING.
- ALL RECEPTACLE OUTLETS LOCATED WITHIN 6"-0" OF A WET BAR OR SINK SHALL BE GFI TYPE. ALL RECEPTACLE OUTLETS LOCATED OUTDOORS SHALL BE WP/GFI. ALL RECEPTACLES SERVING VENDING MACHINES SHALL BE GFI TYPE. ALL RECEPTACLES SERVING ELECTRIC WATER COOLERS SHALL BE GFI TYPE. ALL RECEPTACLES IN KITCHEN AREAS SHALL BE GFI TYPE.
- ALL CONDUIT PENETRATIONS THROUGH THE ROOF TO SERVE MECHANICAL EQUIPMENT SHALL BE WITHIN THE ASSOCIATED EQUIPMENT ROOF CURB. COORDINATE LOCATIONS OF PENETRATIONS WITH THE MECHANICAL CONTRACTOR.
- PROVIDE THE TYPE OF MOUNTING HARDWARE AND TRIM NECESSARY FOR THE PROPER INSTALLATION OF SPECIFIED LIGHTING FIXTURES IN THE TYPE OF CEILING WHERE INSTALLED.
- PROVIDE ACCESS DOORS IN WALLS AND CEILINGS WHERE ACCESS TO CONCEALED ELECTRICAL BOXES AND DEVICES IS REQUIRED.
- EACH BRANCH AND FEEDER CIRCUIT SHALL BE PROVIDED WITH A GROUND CONDUCTOR SIZED PER ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE (NEPA 70). WHERE A CONDUIT CONTAINS MULTIPLE BRANCH CIRCUITS, PROVIDE A SINGLE GROUND CONDUCTOR UNLESS OTHERWISE NOTED.
- CONDUIT, LIGHT FIXTURES, AND OTHER COMPONENTS MAY BE SHOWN LARGER THAN ACTUAL SIZE. CONDUIT ROUTING IS SHOWN WITH AN EXAGGERATED SPACING FOR CLARITY. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ALL CONTRACTORS TO ENSURE CONDUIT PLACEMENT DOES NOT CONFLICT WITH LOCATION SENSITIVE COMPONENTS SUCH AS LIGHT FIXTURES.
- INTEGRATED EQUIPMENT RATINGS SHOWN ARE MINIMUMS. CONTRACTOR SHALL PROVIDE MANUFACTURER'S EQUAL OR NEXT HIGHER STANDARD RATINGS.
- ALL PULL CORD/WIRE PROVIDED FOR EMPTY RACEWAY/CONDUIT SYSTEMS SHALL HAVE A MINIMUM STRENGTH OF 200 LBS TENSILE STRENGTH. ALL EMPTY CONDUITS SHALL HAVE A PULL CORD.
- PROVIDE LUGS AS REQUIRED FOR ALL ELECTRICAL EQUIPMENT TO ACCEPT THE SIZE AND NUMBER OF CONDUCTORS SHOWN IN THESE DOCUMENTS.
- THE LIGHTING PLANS INDICATE SWITCHING AND BRANCH CIRCUIT NUMBERS FOR ALL LIGHTING FIXTURES. LOWER CASE LETTERS AT SWITCHES AND LIGHTING FIXTURES INDICATE SWITCHING WHERE THE CONTROL PATTERN IS NOT OBVIOUS. INSTALL BRANCH CIRCUIT WIRING IN RACEWAY TO ALL RIGIDLY ATTACHED LIGHTING FIXTURES, AND TO JUNCTION BOXES FOR ALL LAY-IN LIGHTING FIXTURES, AS REQUIRED TO PROVIDE SWITCHING AND CIRCUITING AS SHOWN ON THE DRAWINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- ALL LAY-IN LIGHTING FIXTURES SHALL BE CONNECTED TO A BRANCH CIRCUIT JUNCTION BOX WITH A FLEXIBLE FIXTURE TAIL. A MAXIMUM OF FOUR FIXTURE TAILS SHALL BE CONNECTED TO A SINGLE JUNCTION BOX. FIXTURE TO FIXTURE WIRING OF LAY-IN LIGHTING FIXTURES IS NOT PERMITTED, EXCEPT WHERE MASTER/SLAVE FIXTURE PAIRS ARE INDICATED OR SPECIFIED.
- THERE SHALL BE NO SPLICES OF WIRING INSIDE PANELBOARDS OR DISCONNECT SWITCHES. ONLY ONE WIRE SHALL BE TERMINATED TO ANY SINGLE LUG ON A CIRCUIT BREAKER.
- ALL WIRING AND CONDUIT SIZES SHALL BE BASED ON THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE UNLESS OTHERWISE NOTED SPECIFICALLY.
- UNLESS OTHERWISE NOTED, FOR LIGHTING AND RECEPTACLE HOMERUNS HAVING A TOTAL LENGTH OF 100' TO 200', USE #10 CONDUCTORS; FOR HOMERUNS HAVING A TOTAL LENGTH OF 200' OR GREATER, USE #8 CONDUCTORS.
- COORDINATE THE REQUIREMENTS FOR OVERCURRENT PROTECTIVE DEVICE SIZE, DISCONNECT SWITCH SIZE, AND CONDUCTOR AND CONDUIT SIZES WITH THE REQUIREMENTS OF THE MECHANICAL EQUIPMENT THAT IS ACTUALLY TO BE INSTALLED AND PROVIDE AND INSTALL ALL ELECTRICAL COMPONENTS AS REQUIRED. THE ELECTRICAL COMPONENT SIZING SHOWN ON THESE DRAWINGS IS BASED UPON THE REQUIREMENTS FOR THE SPECIFIED MECHANICAL EQUIPMENT AVAILABLE AT THE TIME OF DESIGN. VARIATIONS IN REQUIREMENTS MAY OCCUR AS A RESULT OF THE PROVISION OF OTHER MANUFACTURER'S EQUIPMENT OR IN CHANGES TO THE SPECIFIED EQUIPMENT. SUCH REVISED REQUIREMENTS ARE A PART OF THIS CONTRACT AND SHALL BE ACCOMMODATED WITHOUT ADDITIONAL CHARGE.
- FOR COORDINATION PURPOSES, LIGHTING FIXTURES AND DEVICES MAY BE MOVED A MAXIMUM DISTANCE OF FIVE FEET, PRIOR TO INSTALLATION, AT NO COST TO THE OWNER, UPON INSTRUCTION BY THE ARCHITECT OR ENGINEER.
- COORDINATE THE EXACT LOCATION OF ALL THERMOSTATS, STARTERS, DISCONNECTS, ETC. AND COORDINATE ALL REQUIREMENTS FOR CONTROL AND POWER WIRING WITH THE MECHANICAL CONTRACTOR OR THE TRADE PROVIDING THE EQUIPMENT.
- WHERE RECEPTACLES ARE SHOWN BACK-TO-BACK ON A COMMON WALL, OFFSET THE TWO BOXES AT LEAST SIX INCHES.
- ALL CONDUCTORS SHALL BE THWN/THHN UNLESS OTHERWISE INDICATED. CONDUCTORS SHALL BE RATED FOR 75 DEGREES C. TERMINATIONS SHALL BE RATED FOR 75 DEGREES C. DEVIATIONS SHALL COMPLY WITH NEC ARTICLE 110-14(c) FOR EXACT EQUIPMENT BEING PROVIDED.
- VERIFY DEVICE PLATE COLORS WITH ARCHITECT.
- COORDINATE WITH AND PAY ALL FEES ASSOCIATED WITH OBTAINING SERVICE FORM ANY OF THE FOLLOWING UTILITIES RELATED TO THIS PROJECT:  
POWER COMPANY  
TELEPHONE COMPANY  
CABLE/INTERNET SERVICE PROVIDER
- ALL CIRCUITS FEEDING LOADS FROM VFD CONTROLLERS SHALL UTILIZE BELDEN VFD RATED CABLE SIZED AS RECOMMENDED BY THE MANUFACTURER BUT NOT LESS THAN THE RATING OF THE FEEDER SERVING THE VFD. RACEWAY SIZES FOR THE BELDEN CABLE SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE. CONTRACTOR SHALL VERIFY MOTOR BEING SERVED IS NEMA MG-31 RATED PRIOR TO FINAL TERMINATIONS AND NOTIFY A/E IF DISCREPANCIES ARE FOUND.
- CONTRACTOR IS RESPONSIBLE FOR COORDINATING NEW ELECTRIC SERVICE VOLTAGE AND AMP REQUIREMENTS WITH ELECTRIC UTILITY. COORDINATION PERFORMED BY ENGINEER EARLY IN DESIGN PROCESS IS PRELIMINARY IN NATURE AND THEREFORE SUBJECT TO CHANGE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING FINAL SERVICE REQUIREMENTS INCLUDING METERING REQUIREMENTS, VOLTAGE AND AMPACITY.

**ELECTRICAL EQUIPMENT**

- SWITCHBOARD OR DISTRIBUTION PANEL
- PANELBOARD - FLUSH OR SURFACE MOUNT AS INDICATED ON PLAN SCHEDULE
- PLYWOOD TERMINAL BOARD, FOR TELEPHONE SYSTEM UNLESS NOTED, 4' X 8' X 3/4" UNLESS OTHERWISE NOTED

**POWER DEVICE SCHEDULE**

SYMBOL	WIRING DEVICES, DISCONNECT SWITCHES AND MOTOR CONTROL
	20A DUPLEX RECEPTACLE 18" AFF UNLESS NOTED OTHERWISE
	20A DUPLEX RECEPTACLE, TAMPER-PROOF, 18" AFF UNLESS NOTED OTHERWISE
	20A SIMPLEX RECEPTACLE 18" AFF UNLESS NOTED OTHERWISE
	20A QUADRUPLEX RECEPTACLE 18" AFF UNLESS NOTED OTHERWISE
	20A DUPLEX RECEPTACLE ABOVE COUNTER/ COUNTER BACK SPLASH SPECIAL PURPOSE RECEPTACLE AS NOTED IN PLAN VIEWS
	USB OUTLET
	FLOOR RECEPTACLE
	FLOOR RECEPTACLE WITH DATA, FOR TELEPHONE OR DATA, PROVIDE 1" WITH PULL STRING UP TO 6" ABOVE ACCESSIBLE CEILING LOCATION FOR WIRING BY OTHERS
	JUNCTION BOX FOR DIRECT CONNECTION AS NOTED IN PLAN VIEWS
	PUSH BUTTON CONTROL AS NOTED IN PLAN VIEW. PROVIDE A SINGLE GANG JUNCTION BOX WITH 3/4" WITH PULL STRING UP TO 6" ABOVE CEILING FOR WIRING BY OTHERS
	MOTOR LOCATION AS NOTED IN PLAN VIEWS
	DISCONNECT SWITCH - (200/3/150) DENOTES (AMPS/POLE/FUSE); "NF" DENOTES NON-FUSED, NEMA 1 ENCLOSURE UNLESS NOTED OTHERWISE
	COMBINATION STARTER DISCONNECT SWITCH - (200/3/150) DENOTES (AMPS/POLE/FUSE); "NF" DENOTES NON-FUSED, NEMA 1 ENCLOSURE UNLESS NOTED OTHERWISE, NEMA STARTER AS INDICATED IN PLAN VIEW
	MOTOR RATED SWITCH, MANUAL MOTOR STARTER WITH THERMAL OVERLOAD

GENERAL NOTES APPLY TO ALL DEVICES:

- ALL DEVICES USED TO SUPPORT SPECIFIC EQUIPMENT PROVIDED BY OTHERS ARE TO BE COORDINATED WITH PROVIDER OF EQUIPMENT FOR NEMA PLUG CONFIGURATION AND WIRING.

**MOUNTING HEIGHTS**

- TOGGLE AND DIMMER SWITCHES:  
- 48" AFF TO CENTER OF SWITCH
- RECEPTACLES:  
- FINISHED AREAS-18" AFF TO CENTER OF RECEPTACLE  
- UNFINISHED AREAS-48" AFF TO CENTER OF RECEPTACLE  
- WATER COOLERS-DIRECTLY BEHIND COOLER - COORDINATE ELEVATION. COOLER TO BE INSTALLED PRIOR TO ROUGH-IN  
- ABOVE COUNTER-6" ABOVE COUNTER/BACKSPLASH TO CENTER OF RECEPTACLE
- DATA OUTLETS:  
- FINISHED AREAS-18" AFF TO CENTER OF OUTLET  
- UNFINISHED AREAS-48" AFF TO CENTER OF OUTLET  
- ABOVE COUNTER-6" ABOVE COUNTER/BACKSPLASH TO CENTER OF OUTLET
- TELEPHONE OUTLETS:  
- FINISHED AREAS-18" AFF TO CENTER OF OUTLET  
- UNFINISHED AREAS-48" AFF TO CENTER OF OUTLET  
- WALL MOUNTED TELEPHONES-48" AFF TO CENTER OF OUTLET  
- ABOVE COUNTER-6" ABOVE COUNTER/BACKSPLASH TO CENTER OF OUTLET
- WALL MOUNTED EMERGENCY LIGHTING FIXTURES:  
- 84" AFF TO CENTER OF FIXTURE  
- CENTERED 3" ABOVE TOP OF DOOR FRAME TO BOTTOM OF FIXTURE WHERE MOUNTED ABOVE DOOR

**MISCELLANEOUS**

- DRAWING NOTE REFERENCE (I.E. NOTES BY SYMBOL)
- CONNECTION INTO EXISTING
- JUNCTION BOX, A RECESSED SINGLE GANG BOX, BLANK COVERPLATE, WITH 3/4" C. STUBBED UP TO 4" ABOVE CEILING.
- TELEPHONE OR DATA OUTLET (SINGLE PORT) A RECESSED SINGLE GANG JUNCTION BOX, BLANK COVERPLATE, WITH 1" C. STUBBED UP TO 4" ABOVE CEILING.
- DATA OUTLET (MULTI PORT) ADJACENT NUMBER INDICATES QUANTITIES. A SINGLE OR DOUBLE GANG JUNCTION BOX AS APPROPRIATE FOR NUMBER OF PORTS, BLANK COVERPLATE, MULTIPLE 1" C'S STUBBED UP TO 4" ABOVE CEILING.
- EXISTING SINGLE DATA OUTLET TO REMAIN. NUMBER ADJACENT INDICATES NUMBER OF PORTS WHERE KNOWN. EC INDICATES BLANK COVERPLATE.
- CARD READER, A SINGLE GANG JUNCTION BOX, BLANK COVERPLATE, WITH 3/4" C. STUBBED UP TO 4" ABOVE CEILING.

**FIRE ALARM EXPANSION**

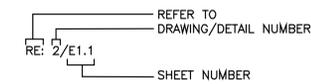
THE CONTRACTOR SHALL EMPLOY A FIRE ALARM PLANNING SUPERINTENDENT, CERTIFIED BY THE STATE FIRE MARSHAL'S OFFICE, TO DESIGN AND INSTALL A FIRE ALARM SYSTEM.

THE FIRE ALARM PLANNING SUPERINTENDENT SHALL PREPARE PERMIT DOCUMENTS, USING EXACT DEVICES TO BE PROVIDED BY THE MANUFACTURER, AND SHALL BE RESPONSIBLE TO INSURE THAT THE DESIGN MEETS ALL OF THE REQUIREMENTS OF NFPA, ADA, NEC, ALL LOCAL CODES AND AMENDMENTS, AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

MODIFICATION TO THE EXISTING FIRE ALARM TO ACCOMMODATE THE NEW FACILITY AND THE RENOVATED AREAS WITHIN THE EXISTING FACILITY. WHERE NEW EQUIPMENT MUST BE ADDED IT SHALL BE NON-PROPRIETARY PER CITY OF MANSFIELD REQUIREMENTS

CITY OF MANSFIELD FIRE DEPARTMENT ALLOWS KNOX 3502 KEY SWITCH FOR SHUNT TRIPPING THE MAIN ELECTRICAL SERVICE. CONSTRUCTION DRAWINGS INDICATES MAIN SERVICE RATED DISCONNECT SWITCH. IF THE CONTRACTOR DECIDES TO UTILIZE THE KNOX BOX 3502 KEY SWITCH INSTALL PER MANUFACTURERS RECOMMENDATIONS.

**DRAWING/DETAIL REFERENCE**



**ABBREVIATIONS**

A	AMPS	L	LENGTH
AC	ABOVE COUNTERTOP	LB	POUNDS
AFF	ABOVE FINISHED FLOOR	LRA	LOCKED ROTOR AMPS
AFG	ABOVE FINISHED GRADE	LTC	LIGHTING
ATS	AMPERE INTERRUPTING CURRENT	LTX	MAXIMUM
AWG	AUTOMATIC TRANSFER SWITCH	MCA	MINIMUM CIRCUIT AMPACITY
BKR	AMERICAN WIRE GAUGE	MCB	MAIN CIRCUIT BREAKER
BLDG	BREAKER	MH	METAL HALIDE
C	BUILDING	MIN	MINIMUM
CDT	CONDUIT	MLO	MAIN LUGS ONLY
CLG	CIRCUIT	N/A	NOT APPLICABLE
D	CEILING	NEC	NATIONAL ELECTRICAL CODE
DEG	DEPTH	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
DIS	DEGREES	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
DPST	DISCONNECT	NO	NUMBER
EA	DOUBLE-POLE, DOUBLE-THROW	N/O,N/C	NORMALLY OPEN, NORMALLY CLOSED
EPO	EACH	OC	ON CENTER
EWC	EMERGENCY POWER OFF	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
FA	ELECTRIC WATER COOLER	PDU	POWER DISTRIBUTION UNIT
FACP	FIRE ALARM	PF	POWER FACTOR
FT	FIRE ALARM CONTROL PANEL	PH	PHASE
FLA	FULL LOAD AMPS	PROVIDE	FURNISH AND INSTALL
FVNR	FOOT, FEET	PVC	POLYVINYL CHLORIDE
G	FULL-VOLTAGE, NON-REVERSING	RE	REFERENCE, REFER
GA	GROUND	RLA	RUNNING LOAD AMPS
GFI	GROUND FAULT	SPST	SINGLE POLE DOUBLE THROW
GFR	INTERRUPTER	THRU	THROUGH
GND	GROUND FAULT RELAY	TYP	TYPICAL
GRS	GROUND	U/F	UNDERFLOOR
H	GALVANIZED RIGID STEEL	U/G	UNDERGROUND
HID	HEIGHT	U/S	UNDERSLAB
HOA	HIGH INTENSITY DISCHARGE	UL	UNDERWRITERS LABORATORIES, INC.
HP	HAND-OFF-AUTOMATIC	U.O.N.	UNLESS OTHERWISE NOTED
HPS	HORSEPOWER	UPS	UNINTERRUPTIBLE POWER SUPPLY
HVAC	HIGH PRESSURE SODIUM HEATING, VENTILATING AND AIR CONDITIONING	VA	VOLT-AMPERE
HZ	HERTZ	VAC	VOLTS ALTERNATING CURRENT
IER	INTEGRATED EQUIPMENT RATING	WATT, WIDTH	WATT, WIDTH
IG	ISOLATED GROUND	W/O	WITHOUT
IN	INCH, INCHES	WP	WEATHERPROOF DEVICE. RECEPTACLES SHALL BE WEATHER-RESISTANT TYPE GFI RECEPTACLES IN WEATHERPROOF WHILE IN-USE BOX.
J-BOX	JUNCTION BOX	XFMR	TRANSFORMER
kcmil	1000 CIRCULAR MILS		
kV	KILOVOLT		
kVA	KILOVOLT-AMPS		
kVAR	KILOVOLT-AMPS REACTIVE		
kW	KILOWATT		
kWH	KILOWATT-HOUR		

**BASIS OF ELECTRICAL DESIGN**

- PRIMARY CODES:  
ELECTRICAL: 2017 NEC/2023 NEC PER STATE OF TEXAS ADOPTION.  
ENERGY: 2021 INTERNATIONAL ENERGY CODE (WITH CITY AMENDMENTS).
- FIRE: 2021 INTERNATIONAL FIRE CODE (WITH CITY AMENDMENTS).  
BUILDING: 2021 INTERNATIONAL BUILDING CODE (WITH CITY AMENDMENTS).
- ACCESSIBILITY: AMERICAN'S WITH DISABILITIES ACT (ADA); TEXAS ACCESSIBILITY STANDARDS (TAS); TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR)

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03/28/2024 REVISION 3 - CITY COMMENTS

**PERMIT SET**

Drawing Title:

ELECTRICAL LEGEND

Project No.	Date:
2307	1/12/2024

Sheet No.	<b>EO.1</b>
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