

DIVISION 16000 - ELECTRICAL SPECIFICATIONS

GENERAL

- I. GENERAL
A. PROVIDE ALL MATERIAL, LABOR & EQUIP. NECESSARY TO COMPLETELY INSTALL ELECTRICAL & RELATED WORK INDICATED ON THE DRAWINGS AND IN THESE SPECIFICATIONS FOR A SAFE AND FULLY OPERATING SYSTEM.
II. CODE
A. ALL EQUIPMENT, WIRING AND THE ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE NATIONAL ELECTRICAL CODE (N.E.C.), (NFPA 70), O.S.H.A. REQUIREMENTS, LIFE SAFETY CODE AND ALL LAWS AND ORDINANCES APPLICABLE TO WORK AT THIS SITE. OBTAIN AND PAY ALL INSPECTION FEES AND PURCHASE ALL PERMITS REQUIRED FOR THIS WORK.
III. LOCATION OF EQUIPMENT
A. THE ELECTRICAL DRAWINGS ARE INTENDED TO INDICATE ONLY THE EXTENT DIAGRAMMATICALLY GENERAL CHARACTER AND LOCATION OF THE WORK. WORK INTERFERED, BUT HAVING MINOR DETAILS OBVIOUSLY OMITTED, SHALL BE PROVIDED COMPLETE AS A REQUIREMENT OF THIS CONTRACT.
B. VISIT THE SITE OF THE WORK AND BECOME THOROUGHLY FAMILIAR WITH ALL EXISTING CONDITIONS, AND THOROUGHLY REVIEW ALL DRAWINGS, SPECIFICATIONS AND ADDENDA PRIOR TO BIDDING ON THIS WORK. NO EXTRA PAYMENTS TO THE CONTRACT AMOUNT WILL BE ALLOWED FOR FAILURE TO COMPLY WITH THIS REQUIREMENT.
IV. ROUGH-IN
A. VERIFY FINAL LOCATIONS FOR ROUGH-INS WITH SHOP DRAWINGS, FIELD MEASUREMENTS AND TO THE REQUIREMENTS OF THE ACTUAL EQUIPMENT TO BE CONNECTED PRIOR TO ROUGH-IN.
B. REFER TO EQUIPMENT SPECIFICATIONS AND DIMENSIONS SPECIFIED FOR ROUGH-IN REQUIREMENTS.
V. INSTALLATION
A. PROVIDE ALL EQUIPMENT AND MATERIALS FOR THIS CONTRACT NEATLY AND WITH WORKMANSHIP AS DEFINED BY N.E.C.A. "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION", LEVEL AND PLUMB, AND SECURELY SUPPORTED. THE ENTIRE INSTALLATION, AND MANNER OF INSTALLATION SHALL MEET THE COMPLETE SATISFACTION OF THE OWNER'S REPRESENTATIVE OR IT SHALL BE REMOVED AND REWORKED AS DIRECTED BY THE OWNER'S REPRESENTATIVE AS INCLUDED IN THE CONTRACT AMOUNT.
B. ALL WIRING SHALL BE IN CONDUIT. THE USE OF E.N.T., BX, NM, ETC. OR PRE-MANUFACTURED CABLE ASSEMBLIES OR ALUMINUM WIRE WILL NOT BE PERMITTED. CO-ORDINATE CONNECTION OF ELECTRICAL SYSTEMS WITH UTILITIES AS INDICATED ON THE DRAWINGS.
C. VERIFY TRANSFORMER LOCATION AND METERING SCHEME WITH LOCAL UTILITY COMPANY. EQUAL AND EQUIVALENT SHALL BE UNDERSTOOD TO MEAN OF THE SAME QUALITY, SIZE, NUMBER, VALUE, DEGREE, INTENSITY AND THE ITEMS ARE SIMILAR IN ALL RESPECTS. THE FINAL DECISION OF ACCEPTANCE OF THESE ITEMS WILL BE MADE BY THE ENGINEER. IT SHALL BE UNDERSTOOD THAT FOR ANY SPECIFIED ITEM ON THE DRAWINGS AND/OR IN THE SPECIFICATION, THIS TERM SHALL APPLY. DEFINITION OF SPECIAL TERMS SHALL BE INTERPRETED AS DESCRIBED HEREIN:
1. "PROVIDE" MEANS: FURNISH/SUPPLY ALL LABOR, MATERIALS, EQUIPMENT AND SUPPLIES, INCLUDING TESTS AND INSPECTIONS, NECESSARY TO INSTALL AND PLACE COMPONENTS AND/OR SYSTEMS IN A SAFE AND COMPLETE OPERATING CONDITION THAT IS FULLY FUNCTIONING.
2. "FURNISH" MEANS: SUPPLY AND/OR MAKE AVAILABLE AN ITEM, TO THE CONTRACTOR WHO WILL RECEIVE THE ITEM AND DO SOMETHING WITH IT. EXAMPLES INCLUDES OWNER FURNISHED ITEM OR ITEMS FURNISHED BY ANOTHER TRADE.
3. "INSTALL" MEANS: PLACE, SET OR FIX AND CONNECT AN ITEM INTO A POSITION READY FOR USE. RECEIVE AN INDICATED ITEM FROM A SUPPLIER (INCLUDING OFF LOADING AND MOVING INTO PLACE WHEN REQUIRED) AND PROCEED TO INSTALL THE ITEM COMPLETE WITH ALL REQUIRED PARAMETERS TO MAKE A COMPLETE, SAFE AND OPERATIONAL SYSTEM INCORPORATING THE ITEM FURNISHED.
VI. CUTTING AND PATCHING
A. PROVIDE ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF ELECTRICAL WORK.
B. NO ADDITIONAL COMPENSATION WILL BE AUTHORIZED FOR CUTTING AND PATCHING WORK THAT IS NECESSITATED BY ILL-TIMED, DEFECTIVE OR NON-CONFORMING INSTALLATIONS.
VII. ELECTRICAL SUBMITTALS
A. REFER TO THE CONDITIONS OF THE CONTRACT (GENERAL AND SUPPLEMENTARY WHICH INCLUDED AND OTHER DIVISIONS) REFERENCING SUBMITTALS FOR SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES FOR SUBMITTAL DEFINITIONS, REQUIREMENTS AND PROCEDURES.
B. IN ADDITION TO THE OTHER REQUIREMENTS IN PARAGRAPH A ABOVE, THE FOLLOWING APPLIES TO SUBMITTALS OF THIS DIVISION:
1. DO NOT INSTALL ELECTRICAL EQUIPMENT REQUIRING SUBMITTALS IN THE PROJECT UNTIL SUBMITTALS HAVE BEEN ACCEPTABLY REVIEWED BY THE OWNER'S REPRESENTATIVE AND STAMPED ACCORDINGLY.
2. MAKE ALL ELECTRICAL SUBMITTALS AT ONE TIME AND WITHIN FOURTEEN (14) CALENDAR DAYS OF OWNER'S "NOTICE TO PROCEED".
3. SUBMIT A MINIMUM OF SIX (6) COMPLETE SETS TO OWNER'S REPRESENTATIVE. ONE SET SHALL REMAIN WITH THE OWNER'S REPRESENTATIVE, ONE SET SHALL BE DELIVERED TO THE OWNER AND THE OTHERS WILL BE RETURNED TO DISTRIBUTE AS REQUIRED.
4. IF ANY ITEM IN THE SUBMITTAL IS "NOT ACCEPTABLE" FOR ANY REASON, IT AUTOMATICALLY VOIDS THE ENTIRE SET, AND A RE-SUBMIT OF ALL IS REQUIRED TO OBTAIN ACCEPTANCE OF ALL ITEMS.
5. EACH SET SHALL BE BOUND AND INDEXED INTO GROUPS SUCH AS FIXTURES, PANELS, WIRING DEVICES, DISCONNECT SWITCHES, ETC.
6. MAKE EACH SET IDENTICAL.
7. SUBMIT CUT SHEETS AND TECHNICAL DATA ON THE FOLLOWING ITEMS: LIGHTING EQUIPMENT, PANELS, WIRING DEVICES-SWITCHES AND RECEPTACLES, DISCONNECT SWITCHES/SAFETY SWITCHES, MOTOR STARTERS, TRANSFORMERS AND ANY OTHER ITEM REQUIRED BY NOTES. ALL SUBMITTALS SHALL BE ONLY ORIGINALS, COPIES OF CUT SHEETS ARE NOT ACCEPTABLE.
8. IN CASE OF DISCREPANCIES BETWEEN SETS OF SUBMITTALS, THE SET RETAINED BY THE OWNER'S REPRESENTATIVE SHALL HAVE PRECEDENCE.
VIII. IDENTIFICATION NAMEPLATES
A. PROVIDE NAMEPLATES ON ALL ITEMS OF ELECTRICAL EQUIPMENT THAT HAS A CONTROL PANEL AND ALL ITEMS WHERE A SUBMITTAL WAS MADE, EXCEPT FOR WIRING DEVICES AND LIGHTING MAKE NAMEPLATES FROM WHITE ENGRAVING STOCK WITH BLACK LETTERS AND BLACK FOUR EDGE BEVEL. WORDING SHALL SUITABLY DESCRIBE ITEMS SUCH AS PANEL ID, SOURCE OCPD AND VOLTAGE. NAMEPLATES SHALL BE ATTACHED USING PROPER SIZE AND TYPE STAINLESS STEEL BOLTS, LOCK WASHERS AND NUTS. GLUE ON, TAPE ON OR TAPE TYPE NAMEPLATES ARE NOT ACCEPTABLE FOR THE EQUIPMENT. PROVIDE CIRCUIT NUMBERS (PANEL-#) AND RECEPTACLE USING TAPE TYPE IDENTIFICATION AT EACH RECEPTACLE OR OTHERS WHERE IDENTIFIED.
IX. WARRANTIES
A. GUARANTEE ALL ELECTRICAL SYSTEM MATERIALS AND WORKMANSHIP TO BE FREE FROM DEFECTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE AND PROPERLY CORRECT ALL DEFECTS ARISING WITHIN THIS PERIOD UPON NOTIFICATION BY THE OWNER'S REPRESENTATIVE WITHOUT ADDITIONAL COMPENSATION.
X. CLEANING
A. REGULARLY DURING EACH WORKING DAY, REMOVE REFUSE AND DEBRIS ACCUMULATING FROM ELECTRICAL CONSTRUCTION AND LEAVE AREA CLEAN AT END OF THE WORK DAY. PRIOR TO ACCEPTANCE OF THIS WORK, LEAVE THE PREMISES "BROOM CLEAN" IN SO FAR AS APPLICABLE BY ELECTRICAL WORK.
B. CLEAN ALL LIGHT FIXTURES, LAMPS AND LENSES PRIOR TO FINAL ACCEPTANCE.
C. CLEAN THE INTERIOR OF EACH ELECTRICAL COMPONENT OF DIRT AND CONSTRUCTION DUST INCLUDING BUT NOT LIMITED TO PANELBOARDS, CONTROLLERS AND SWITCHES BEFORE ENERGIZING.
D. CLEAN THE EXTERIOR OF ELECTRICAL COMPONENTS PRIOR TO ACCEPTANCE OF WORK.

XI. TEST AND ADJUSTMENT

- A. PROVIDE ALL LABOR, INSTRUMENTS, AND OTHER SERVICES REQUIRED FOR COMPLETE AND SATISFACTORY TEST AND ADJUSTMENT OF ELECTRICAL SYSTEMS AND RELATED WORK.
1. CHECK ALL MOTORS AND ROTATING EQUIPMENT FOR PROPER ROTATION.
2. TEST ALL FEEDERS WITH MEGGER PRIOR TO ENERGIZING TO ASSURE CODE RESISTANCE IS MET, (AND WITHOUT "SHORTS" OR "OPEN CIRCUITS").
3. CHECK ALL FUSES AND OVERLOADS FOR PROPER SIZING. VERIFY FUSE LABELS ARE VISIBLE.
4. CHECK ALL ELECTRICAL POWER AND CONTROL WIRING, INTERLOCKS, ETC., RELATED TO MECHANICAL EQUIPMENT TO DETERMINE THAT ALL WIRING IS CORRECT.
5. IMMEDIATELY REMEDIATE ALL EQUIPMENT PROVIDED UNDER THIS DIVISION THAT TESTS PROVE TO BE DEFECTIVE OR OPERATING IMPROPERLY AS A PART OF THIS CONTRACT.
RACEWAYS
I. RACEWAYS
A. EXTENT OF RACEWAY WORK IS INDICATED DIAGRAMMATICALLY ON THE DRAWINGS AND IN THE SCHEDULES. (PROVIDE ONLY TYPE REQUIRED FOR APPLICATION).
1. WHEN SIZE IS NOT INDICATED ON PLANS, CONDUIT SHALL BE SIZED FOR CONDUCTORS IN ACCORDANCE WITH APPLICABLE ARTICLES OF THE N.E.C.. THE ROUTING AND METHOD OF INSTALLATION OF ALL CONDUITS SHALL BE CO-ORDINATED SO AS NOT TO INTERFERE WITH OTHER EQUIPMENT INSTALLATIONS AND SHALL MEET WITH THE COMPLETE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
2. THE USE OF INTERMEDIATE METAL CONDUIT (IMC), ELECTRICAL NON-METALLIC TUBING (ENT), ARMORED CABLE (AC), (MC), OR MANUFACTURED CABLE ASSEMBLIES SHALL NOT BE INCORPORATED INTO THE WORK.
3. USE ONLY THE TYPES OF RACEWAYS SPECIFIED HEREIN.
4. TYPES OF RACEWAYS SPECIFIED IN THIS SECTION INCLUDE THE FOLLOWING:
1. ELECTRICAL METALLIC TUBING (EMT); MINIMUM TRADE SIZE 3/4".
2. FLEXIBLE METAL CONDUIT (FMC); MINIMUM TRADE SIZE 3/4".
3. LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LFMC), (SEALIGHT) MINIMUM TRADE SIZE 3/4".
4. RIGID METAL CONDUIT (RMC); MINIMUM TRADE SIZE 3/4".
5. RIGID NONMETALLIC CONDUIT (PVC), SCHEDULE 40, MINIMUM TRADE SIZE 3/4".
FITTINGS
1. FITTINGS FOR EMT SHALL BE STEEL COMPRESSION TYPE WITH FACTORY INSTALLED INSULATED THROAT CONNECTORS. DIE CAST OR POT METAL FITTINGS ARE NOT ACCEPTABLE.
2. FITTINGS FOR FLEXIBLE CONDUIT SHALL BE STEEL OR CAST IRON.
3. FITTINGS FOR RIGID CONDUIT SHALL BE STEEL THREADED TYPE.
4. FITTINGS FOR PVC SHALL BE SCHEDULE 40 GLU-ON TYPE.
II. INSTALLATION OF RACEWAYS
A. PROVIDE ALL CONDUITS CONCEALED, EXCEPT IN EQUIPMENT ROOM, CHASES OR AS INDICATED ON THE DRAWINGS. ALL CONDUITS, EXPOSED AND CONCEALED SHALL BE RUN PARALLEL AND PERPENDICULAR TO BUILDING LINES AND GROUPED TOGETHER AS MUCH AS POSSIBLE, EVEN ABOVE LAY-IN CEILING.
B. PROVIDE A SEPARATE GROUNDING CONDUCTOR IN ALL RUNS. THE CONDUCTOR SHALL BE SIZED AS INDICATED IN THE N.E.C. ALL GROUNDING CONDUCTORS SHALL HAVE A GREEN OUTER COVERING, OR GREEN MARKING TAPE OVER THEIR ENTIRE EXPOSED LENGTHS. MECHANICALLY FASTEN TOGETHER METAL CONDUITS, ENCLOSURES, AND RACEWAYS FOR CONDUCTORS TO FORM A CONTINUOUS ELECTRICAL CONDUCTOR. CONNECT BONDS TO ELECTRICAL BOXES, FITTINGS AND CABINETS TO PROVIDE ELECTRICAL CONTINUITY AND FIRM MECHANICAL ASSEMBLY.
C. AVOID USE OF DISSIMILAR METALS THROUGH SYSTEM TO ELIMINATE POSSIBILITY OF ELECTROLYSIS.
D. PROVIDE EXPANSION FITTINGS IN RACEWAYS EVERY 200' LINEAR RUN OR WHEREVER STRUCTURAL EXPANSION JOINTS ARE CROSSED.
E. PROVIDE NYLON PULL CORD IN ALL EMPTY CONDUITS. (MINIMUM 90# TENSILE STRENGTH).
F. CONDUIT INSTALLATION (EXCEPT AS NOTED) USE:
1. RIGID METAL CONDUIT (RMC) FOR ALL WEATHER EXPOSED WORK, FOR ALL STUB-UPS IN WET/DAMP AREAS, FOR ALL ROOF PENETRATIONS AND FOR ANY FREEZER/ COOLER PENETRATIONS.
2. E.M.T. FOR ALL INTERIOR CONCEALED AND FOR INTERIOR EXPOSED WORK NOT SUBJECT TO MECHANICAL INJURY.
3. USE P.V.C. FOR ALL UNDERGROUND WORK OR WORK INSTALLED IN CONCRETE AND USE RIGID METAL CONDUIT ELBOW AT STUB-UP LOCATIONS.
4. FLEXIBLE METAL CONDUIT FROM OUTLET BOXES TO RECESSED LIGHTING FIXTURE AND FINAL 24" OF CONNECTION TO ITEMS SUBJECT TO MOVEMENT OR VIBRATION.
5. LIQUID-TIGHT FLEXIBLE CONDUIT FOR FINAL 24" CONNECTION TO ITEMS WHERE SUBJECT TO ONE OR MORE OF THE FOLLOWING CONDITIONS:
a. EXTERIOR LOCATION.
b. MOIST OR HUMID ATMOSPHERE WHERE CONDENSATE CAN BE EXPECTED TO ACCUMULATE.
c. CORROSIVE ATMOSPHERE.
d. SUBJECTED TO WATER SPRAY OR DRIPPING OIL, WATER OR GREASE.
e. FINAL CONNECTION TO ROTATING OR VIBRATING EQUIPMENT.
H. CUT CONDUITS STRAIGHT, PROPERLY BEAM AND CUT THREADS FOR HEAVY WALL CONDUIT DEEP AND CLEAN INTERIOR AND EXTERIOR THREADS. FIELD GALVANIZE THREADS WITH APPROVED COMPOUND FOR THE PURPOSE.
I. FIELD BEND CONDUIT WITH BENDERS DESIGNED FOR THE PURPOSE OF PREVENTING DISTORTION NOR VARY INTERNAL DIAMETER.

CONDUCTORS

- I. CONDUCTORS
A. ALL WIRE SHALL BE COPPER UNLESS OTHERWISE INDICATED.
B. DO NOT USE ALUMINUM (AL), ALUMINUM COPPER (AL-CU), NM, OR ANY MANUFACTURED CABLE ASSEMBLY.
C. ALL WIRE SHALL BE IN CONDUIT (EXCEPT AS NOTED).
D. CONNECTIONS OF CONDUCTORS SHALL BE AS FOLLOWS:
1. 200V SYSTEM: PHASE A - RED, PHASE B - BLUE, NEUT. - WHITE, GND. - GREEN.
2. 480V SYSTEM: PHASE A - YELLOW, PHASE B - BROWN, PHASE C - ORANGE, - NATURAL GRAY, GND. - GREEN.
E. AWG #10 AND SMALLER SHALL BE SOLID. AWG #8 AND LARGER SHALL BE STRANDED.
F. WIRE CONNECTIONS
ALL FEEDER AND SUB-FEEDER WIRING CONNECTIONS SHALL BE MADE WITH COMPRESSION CONNECTORS BY SQUARE D OR ACCEPTABLE EQUIVALENT. ALL BRANCH WIRING CONNECTIONS SHALL BE 3M SCOTCH LOCK CONNECTORS OR ACCEPTABLE EQUIVALENT.
C. WHERE CABLE CONNECTIONS REQUIRE INSULATION, SCOTCH #33, ELECTRICAL TAPE SHALL BE USED FOR WRAPPING.
BOXES AND FITTINGS
I. BOXES AND FITTINGS
A. EXTENT OF ELECTRICAL BOX AND ASSOCIATED FITTING WORK IS GENERALLY INDICATED BY DRAWINGS AND SCHEDULES. PROVIDE BOXES AND FITTINGS FOR ALL WORK.
II. OUTLET BOXES
A. CEILING: 4" SQUARE, 2-1/8" DEEP FOR EXPOSED OR FURRED WORK; 3" DEEP FOR BOXES POURED IN CONCRETE. PROVIDE CONCRETE POUR BOXES OF THE TYPE SPECIALLY DESIGNED FOR THE APPLICATION. PROVIDE PLASTER RINGS OR EXTENSION RINGS WHERE REQUIRED. PROVIDE DEEPER BOXES WHERE REQUIRED.
B. WALL: 4" SQUARE, 2-1/8" DEEP BOXES; PROVIDE EXTENSION RINGS OR COVERS OF SUFFICIENT DEPTH TO BRING COVERS FLUSH WITH THE FINISHED SURFACE.
C. MASONRY: FOR FLUSH MOUNTED BOXES IN EXPOSED MASONRY OR TILE, PROVIDE COVERS WITH SQUARE CORNERS ON THE RAISED PORTION AND WITH SUFFICIENT DEPTH TO TRIM OUT FLUSH WITH FINISHED SURFACE.

- D. EXPOSED AND WET OR DAMP AREA AT EQUIPMENT, SUCH AS EXTERIOR, ROOFS OR KITCHENS WHEN PRESENT, PROVIDE TS OR TD BOXES WITH SUITABLE WEATHERPROOF COVERS. PROVIDE COVERS OF "M USE" TYPE COVERS WHERE CORDS/PLUGS ARE INSTALLED AND MUST REMAIN AS "IN USE".
III. PULL AND JUNCTION BOXES
A. PROVIDE BOXES WHERE REQUIRED TO FACILITATE THE PULLING OF WIRES OR CABLES. BOXES SHALL BE IN ACCORDANCE WITH ARTICLE 378 OF N.E.C..
IV. ACCESSORIES
A. PROVIDE CORROSION-RESISTANT KNOCKOUT CLOSURES, CONDUIT LOCKNUTS AND MALLEABLE IRON CONDUIT BUSHINGS, OFFSET CONNECTORS, OF TYPES AND SIZES, TO SUIT RESPECTIVE INSTALLATION REQUIREMENTS AND APPLICATIONS.
V. INSTALLATION OF BOXES AND FITTINGS
A. POSITION RECESSED OUTLET BOXES ACCURATELY TO ALLOW FOR SURFACE FINISH THICKNESS.
B. FASTEN ELECTRICAL BOXES FIRMLY AND RIGIDLY TO SUBSTRATES OR STRUCTURAL SURFACES TO WHICH ATTACHED OR SOLIDLY EMBED ELECTRICAL BOXES IN CONCRETE OR MASONRY.
VI. LOCATIONS OF OUTLETS
A. IN GENERAL, THE VARIOUS OUTLETS ARE TO BE LOCATED AT THE FOLLOWING HEIGHTS ABOVE FINISHED FLOOR TO THE CENTER LINE OF BOX, UNLESS NOTED OTHERWISE AT AN INDIVIDUAL OUTLET ON THE DRAWINGS, OR WHEN SCHEDULED (VERIFY ALL WITH EQUIPMENT REQUIREMENTS BEFORE BIDDING).
1. WALL SWITCHES (VERT. MTD.) 48"
2. RECEPTACLES (VERT. MTD.) 18"
3. PHONE OUTLETS (VERT. MTD.) 18"
4. OUTLETS ABOVE COUNTERS (VERT. MTD.) 6" ABOVE BACKSPLASH.
B. OUTLET MOUNTING HEIGHTS INDICATED ON THE DRAWINGS AT OUTLETS TAKE PRECEDENCE. REFER TO DRAWINGS FOR DETAILS OF OTHER EQUIPMENT MOUNTING HEIGHTS. MOUNTING HEIGHTS FOR FLUSH OUTLETS IN BLOCK WALLS MAY BE CHANGED FOR INSTALLATION. CONSULT OWNER'S REPRESENTATIVE IN FIELD PRIOR TO ANY SUCH INSTALLATION.

CONNECTIONS FOR EQUIPMENT

- I. CONNECTIONS FOR EQUIPMENT
A. GENERAL: FOR EACH ELECTRICAL CONNECTION INDICATED PROVIDE COMPLETE ASSEMBLY OF MATERIALS, INCLUDING BUT NOT NECESSARILY LIMITED TO, PRESSURE CONNECTORS, TERMINALS (LUGS), ELECTRICAL INSULATING TAPE, HEAT-SHRINKABLE INSULATING TUBING, CABLE TIES, SOLDERLESS WIRE-NUTS, AND OTHER ITEMS AND ACCESSORIES AS NEEDED TO COMPLETE SPLICES AND TERMINATIONS OF TYPES INDICATED.

WIRING DEVICES

- I. WIRING DEVICES
A. THE EXTENT OF WIRING DEVICE WORK IS INDICATED BY THE DRAWINGS AND SCHEDULES. COORDINATE PLATE COLORS WITH ARCHITECTURAL REQUIREMENTS. PROVIDE WIRING DEVICES WHICH ARE U.L. LISTED AND LABELED.
II. ACCEPTABLE MANUFACTURERS
A. HARVEY HUBBELL CO.
B. LEGRAND-PASS AND SEYMOUR.
C. LEVITON MFG. CO.
III. FABRICATED WIRING DEVICES
A. SWITCHES SHALL BE 20 AMP, 120/277 VOLT RATED, HUBBELL #1221 - IVORY OR BROWN, COLOR AS DESCRIBED AND/OR SELECTED BY ARCHITECT TO MATCH FINISHES. RECEPTACLES SHALL BE HEAVY DUTY GROUNDING TYPE, 20 AMP 125 VOLT RATED, HUBBELL #5382 - IVORY OR BROWN, AND/OR SELECTED BY ARCHITECT TO MATCH FINISHES. FOR OTHER TYPES/STYLES ETC, AND APPLICATIONS SEE DRAWINGS.
B. PROVIDE SMOOTH FINISH PLATES FOR ALL DEVICES WITH APPROPRIATE MOUNTING ARRANGEMENTS FOR GAUGED DEVICES. FOR TELEPHONE AND COMPUTER/AMX AND MICROPHONE OUTLETS PROVIDE BUSHED HOLE COVER PLATES. PLATES SHALL BE IVORY, BROWN OR GRAY STAINLESS STEEL.
1. GRAY STAINLESS STEEL PLATES FOR SERVICE AREAS, KITCHEN STORAGE AND RESTROOMS.
2. IVORY PLATES FOR ALL OTHER AREAS EXCEPT BROWN PLATES FOR FOOD OR DAMP SURFACES.
3. IVORY DEVICES WHERE 302 STAINLESS STEEL IVORY PLATES ARE USED.
4. BROWN DEVICES WHERE BROWN PLATES ARE USED.

MOTOR DISCONNECTS

- I. DISCONNECT SWITCHES AND SAFETY SWITCHES
A. ACCEPTABLE MANUFACTURERS
1. SQUARE D COMPANY
2. EATON-OUTLET HAMMER
3. SIEMENS
B. HEAVY-DUTY SAFETY SWITCHES: PROVIDE SURFACE MOUNTED, HEAVY DUTY TYPE, SHEET STEEL ENCLOSED SWITCHES THAT ARE PAINTED WITH PRIME COATS AND FINAL ENAMEL COATS THAT IS SUITABLE FOR EXPOSURE TO EXTERIOR ELEMENTS WITHOUT CORROSION. PROVIDE SWITCHES WITH SPECS. SHOWN ON ELECTRICAL CHARACTERISTICS INDICATE TYPE SWITCHES OR MAKE TYPE SWITCHES. SWITCH BLADE SHALL BE VISIBLE IN CLOSED POSITION WITH THE DOOR OPEN. EQUIP. WITH OPERATING HANDLE THAT IS AN INTEGRAL PART OF ENCLOSURE BASE AND WHOSE OPERATING POSITION IS CLEARLY INDICATED AND IS UNLOCKABLE IN THE OFF POSITION. CONSTRUCT CURRENT CARRYING PARTS OF HIGH-CONDUCTIVITY COPPER AND SILVER-ANGSTEN TYPE SWITCH CONTACTS. PROVIDE NEMA TYPE 1 FOR INTERIOR AND NEMA TYPE 3R FOR EXTERIOR AND PROVIDE TYPE INDICATED FOR SPECIAL CASES. PROVIDE VISIBLE SWITCHES WITH FUSES REQUIRED. PROVIDE CONTROL INTERLOCKS WHEN INDICATED.

PANELBOARDS

- I. DESCRIPTION OF WORK
TYPES OF PANELBOARDS FOR THIS PROJECT ARE AS FOLLOWS:
1. PROVIDE PANELS MATCHING VOLTAGES, PHASE AND WIRES AS NOTED ON THE PANEL SCHEDULES. AS A BASIS OF DESIGN, USE SQ. D TYPE "NQ", "NF" UNLESS OTHERWISE NOTED ON THE PANEL SCHEDULE OR AS A NOTE ASSOCIATED WITH THE PANEL SCHEDULE. FOR RENOVATION TO EXISTING PANEL, FOLLOW INSTRUCTIONS ON THE PANEL SCHEDULE OR NOTES.
II. ACCEPTABLE MANUFACTURERS
1. SQUARE D CO. (BOLT ON BREAKERS)
2. SIEMENS (BOLT ON BREAKERS)
3. EATON/OUTLET HAMMER (BOLT ON BREAKERS)
III. PANELBOARDS
A. PROVIDE DEAD-FRONT SAFETY CONSTRUCTED FACTORY-ASSEMBLED CIRCUIT BREAKER TYPE PANELBOARDS IN SIZES AND RATINGS AS INDICATED. EQUIP. WITH PANELBOARD UNIT DEVICES, OF TYPES, RATINGS AND CHARACTERISTICS INDICATED. BUS STRUCTURE AND MAIN LUGS OR MAIN BREAKER SHALL HAVE CURRENT RATINGS AS SHOWN ON THE PANELBOARD SCHEDULE. SUCH RATINGS SHALL BE ESTABLISHED BY TEST CONDUCTED IN ACCORDANCE WITH UNDERWRITERS LABORATORIES STANDARD UL 67. THE USE OF CONDUCTOR DIMENSIONS WILL NOT BE ACCEPTED IN LIEU OF ACTUAL HEAT TEST. BUS BAR CONNECTIONS TO THE BRANCH CIRCUIT BREAKERS SHALL BE "PHASE-SEQUENCE" TYPE. THREE-PHASE, FOUR WIRE BUSSING SHALL BE SUCH THAT ANY THREE ADJACENT SINGLE-POLE BREAKERS ARE INDIVIDUALLY CONNECTED TO EACH OF THE THREE DIFFERENT PHASES IN SUCH A MANNER THAT TWO OR THREE-POLE BREAKERS CAN BE INSTALLED AT ANY LOCATION. ALL CURRENT CARRYING PARTS OF THE BUSS ASSEMBLY SHALL BE PLATED COPPER WITH CONDUCTIVITY OF NOT LESS THAN 98%. PANELBOARD ENCLOSURE: PROVIDE GALVANIZED SHEET STEEL CABINET TYPE ENCLOSURES, IN SIZES AND NEMA TYPES AS INDICATED, CODE GAUGE MINIMUM 16-GAUGE THICKNESS. CONSTRUCT WITH MULTIPLE KNOCKOUTS AND WIRING GLITCHES. PROVIDE FRONTS WITH ADJUSTABLE TRIM CLAMPS, AND DOORS WITH FLUSH LOCKS AND KEYS. ALL PANELBOARD ENCLOSURES KEYS ALIKE, WITH CONCEALED PLANO DOOR HINGES. EQUIP WITH INTERIOR CIRCUIT DIRECTOR FRAME, AND GARD WITH CLEAR PLASTIC COVERING. PROVIDE BAKED GRAY ENAMEL FINISH OVER A RUST INHIBITOR COATING. PROVIDE ENCLOSURES FABRICATED BY SAME MANUFACTURER AS PANELBOARDS. MINIMUM DEPTH OF 5-3/4" & MINIMUM WIDTH OF 20" FOR PANELS. SEE PANEL SCHEDULE NOTES FOR SPECIFIED ALTERNATE SPECIAL CONDITIONS.

- C. BALANCE AMPERES OF CIRCUITS AFTER ACTIVE LOADS ARE ENERGIZED TO WITHIN 10% MAXIMUM AND PROVIDE TYPEWRITTEN PANELBOARD SCHEDULE WITH CORRECTED LOADS.
D. PROVIDE PANELBOARD WITH CIRCUIT BREAKERS HAVING THE SHORT CIRCUIT RATING (SCCR) INDICATED. PROVIDE CIRCUIT BREAKERS HAVING THE AIC RATING INDICATED AND IF THE PANELBOARD IS "SERIES RATED", MANUFACTURER SHALL PROVIDE LABELING REQUIRED BY N.E.C. RELATIVE TO THIS RATING, AND SHALL SUBMIT DATA WITH THE PANELBOARD AND CIRCUIT BREAKER SUBMITTAL.
LIGHTING FIXTURES
I. LIGHTING FIXTURES
A. HANDLE LIGHTING FIXTURES CAREFULLY TO PREVENT DAMAGE, BREAKING AND SCORING. DO NOT INSTALL DAMAGED FIXTURES OR COMPONENTS, REPLACE WITH NEW. STORE LIGHTING FIXTURES IN A CLEAN DRY PLACE. PROTECT FROM WEATHER, DIRT, FUMES, WATER CONSTRUCTION DEBRIS AND PHYSICAL DAMAGE.
B. SHIP FIXTURES FACTORY ASSEMBLED, WITH PARTS REQUIRED FOR A COMPLETE INSTALLATION.
C. FLUORESCENT BALLAST SHALL BE CLASS P, LOW-ENERGY RAPID START SOUND RATED A.
D. PROVIDE LAMPS IN WATAGES AND TYPES INDICATED.
E. SUPPORT FIXTURE WEIGHT.
F. INSTALL FLUSH MOUNTED FIXTURES TO ELIMINATE LIGHT LEAKAGE BETWEEN FRAME AND FINISHED SURFACE.
G. AT DATE OF SUBSTANTIAL COMPLETION REPLACE LAMPS IN ALL FIXTURES WHICH ARE OBSERVED TO BE INOPERATIVE OR NOTICEABLY DIMMED AFTER CONSTRUCTION USE AS JUDGED BY THE OWNER'S REPRESENTATIVE.

EQUIPMENT CONNECTION COORDINATION

- I. COORDINATE EXACT LOCATION OF OUTLETS, EQUIPMENT CONNECTIONS AND REQUIREMENTS PRIOR TO ROUGH-IN AND INSTALLATION OF DEVICES. AS DETERMINED BY THE ACTUAL EQUIPMENT AND FURNITURE LAY OUT. VERIFY WITH FIXTURE PLAN AND EQUIPMENT INSTALLER.
J. COORDINATE ELECTRICAL REQUIREMENTS OF EQUIPMENT NOT SHOWN ON DETAILS (I.e. ROOF-TOP UNITS, UNIT HEATERS, FANS, ETC.) AND EQUIPMENT/DEVICES REQUIRING AN ELECTRICAL CIRCUIT AND CONTROL.)

DEMOLITION NOTES

- 1. IN EVERY INSTANCE OF DEMOLITION AND/OR REMODELING, THE CONTRACTOR SHALL FIGURE A COMPLETE, SAFE AND FULLY OPERATING JOB AS NONE OTHER SHALL BE ACCEPTED.
2. THE DRAWINGS ARE TO BE USED ONLY AS A GUIDELINE FOR DEMOLITION. VISIT THE SITE PRIOR TO BIDDING TO VERIFY ALL WORK REQUIRED FOR A COMPLETE JOB & INCLUDE THE COST OF SUCH WORK IN THE BID.
3. DISCONNECT & REMOVE ELECTRICAL SERVICE TO ALL MECHANICAL EQUIPMENT OR OTHER ITEMS HAVING AN ELECTRICAL CONNECTION BEING REMOVED AS A RESULT OF THE REMODELING.
4. ELECTRICAL EQUIPMENT & DEVICES SHALL BE REMOVED COMPLETE INCLUDING CONDUIT, WIRE AND SUPPORTS.
5. REMOVE CONDUCTORS TO FLUSH MOUNTED WALL OUTLETS AND BLANK-OFF WITH A COVERPLATE. COVERPLATE COLOR SHALL BE SELECTED BY ARCHITECT.
6. ANY EXISTING CONDUIT, WIRING AND/OR ELECTRICAL & MECHANICAL DEVICES BEING DISTURBED BY THE WORK SHALL BE REWORKED AS REQUIRED TO RETURN TO ITS FORMER EXISTING OPERATING CONDITION.
7. ANY CIRCUITS FEEDING THROUGH DEVICES OR EQUIPMENT BEING RELOCATED, REWORKED, OR ABANDONED & SERVING OTHER ELECTRICAL DEVICES, AND/OR EQUIPMENT SHALL BE MAINTAINED BY PROVIDING J-BOXES OR OTHER ACCEPTABLE METHOD AS REQUIRED, WHERE TEMPORARY DISCONNECTION OF AN ACTIVE DEVICE IS MADE, RECONNECT AND ESTABLISH OPERATION TO NORMAL.
8. ALL WALLS, CEILING, FLOORS, ETC., BEING DISTURBED BY THE ELECTRICAL WORK SHALL BE RETURNED TO FINISHED CONDITIONS TO MATCH EXISTING AND PROVIDE CUTTING & PATCHING AS NECESSARY UNDER THIS CONTRACT.
9. TURN OVER EXISTING MATERIALS TO THE OWNER IF NOT REQUIRED BY OWNER, REMOVE THESE MATERIALS FROM THE PROJECT.
10. DO NOT INSTALL CONDUIT, BOXES, WIRING, OR CABLES WITHIN 1 1/2" OF THE LOWEST POINT OF THE UNDERGROUND OR ROOF DECK, NOR SHALL THEY BE INSTALLED CONCEALED WITH METAL OR RIGID ROOF JACKING, REPLACEMENT AND/OR REWORK EXISTING CONDUIT, BOXES, WIRING, AND LABELING THAT IS NOT IN COMPLIANCE WITH THIS REQUIREMENT.
11. ALL CONDUIT AND CABLES TO BE PROPERLY SUPPORTED AS REQUIRED BY THE NATIONAL ELECTRICAL CODE. REPLACE AND/OR REWORK EXISTING CONDUIT AND/OR WIRING THAT IS NOT IN COMPLIANCE WITH THIS REQUIREMENT.

- 1. HOOD FIRE SUPPRESSION PULL STATION NOM. 42" A.F.F. PER ADA
2. FIRE ALARM PULL STATION NOM. 42" A.F.F. PER ADA
3. FIRE ALARM AUDIO/VISUAL STATION 80" A.F.F. PER ADA
4. FIRE ALARM VISUAL STATION 80" A.F.F. PER ADA
5. FIRE ALARM AUDIO STATION 80" A.F.F. PER ADA
6. REMOTE INDICATOR LIGHT/TEST SWITCH FOR DUCT SMOKE DETECTORS
7. DUCT SMOKE DETECTOR WITH REMOTE INDICATOR LIGHTS AND TEST SWITCH
8. SMOKE DETECTOR
9. FLOW SWITCH
10. TAMPER SWITCH
11. FIRE ALARM CONTROL PANEL
12. FIRE ALARM ANNUNCIATOR PANEL

ABBREVIATIONS
WP WEATHERPROOF
AFF ABOVE FINISHED FLOOR
UNO UNLESS NOTED OTHERWISE
GFI GROUND FAULT INTERRUPT
O.C ON CENTER
ETR EXISTING TO REMAIN
STANDARD MOUNTING HEIGHTS (UNLESS OTHERWISE NOTED)
A.F.F. (IN.) DESCRIPTION
84" AUDIBLE APPLIANCES
48" ALARMS
48" ANNUNCIATOR PANELS
84" CLOCK OUTLETS (CENTERLINE)
48" CONTROLS (CENTERLINE)
80" EXIT SIGNS (WALL MOUNTED, BOTTOM)
60" FIRE ALARM ANNUNCIATOR PANEL (DISPLAY)
120" FIRE ALARM BELL (EXTERIOR)
60" FIRE ALARM CONTROL PANEL/UNIT (DISPLAY)
36" INTERCOM (AREA ONLY)
48" INTERCOMS
72" PANELS/PANELBOARDS (TOP)
48" PULL STATIONS (HANDLE)
144" PHOTOCELLS
18" RECEPTACLES (CENTERLINE)
24" RECEPTACLES (EXTERIOR)
26" RECEPTACLES (GARAGES)
48" RECEPTACLES IN EQUIPMENT ROOMS
48" REMOTE INDICATING LIGHT (EQUIPMENT ROOMS)
CEILING REMOTE INDICATING LIGHT (FINISHED AREAS)
48" SAFETY SWITCHES
48" STARTERS
48" SWITCHES (CENTERLINE)
1048" 1036" TELEPHONES (PUBLIC)
18" TELEPHONE DATA OUTLETS (CENTERLINE)
6" TELEPHONE TERMINAL BOARD (BOTTOM)
18" TELEVISION OUTLETS
84" VISIBLE APPLIANCES (CENTERLINE)

FIELD VERIFY ALL CONDITIONS

NOTE! ALL WIRING LAYOUTS, PIPING LAYOUTS AND DUCT LAYOUTS ARE SCHEMATIC. EXACT LOCATIONS SHALL BE DETERMINED BY THE CONSTRUCTION AND STRUCTURE OF THE BUILDING AND SHALL BE VERIFIED AND COORDINATED IN THE FIELD. EACH TRADE CONTRACTOR SHALL VERIFY WITH THE GENERAL CONTRACTOR THAT A THOROUGHLY REVIEWED AND COORDINATION OF ALL LOCATIONS AND ROUTINGS WITH ALL OTHER TRADES PRIOR TO FABRICATION OF CONDUITS, DUCTS, OR PIPING, AND START OF INSTALLATION OF SAME (INCLUDING SPRINKLER PIPING WHEN PRESENT ON JOB). ANY INSTALLATION OR CONSTRUCTION CONFLICTS WHICH OCCUR IN THE FIELD SHALL BE RESOLVED BY THE TRADE PROVIDER TO THE SATISFACTION OF THE OWNER AND/OR ARCHITECT AND AT NO EXPENSE TO THE OWNER, ARCHITECT AND/OR GENERAL CONTRACTOR.

THE CONTRACTOR SHALL CONTACT THE ARCHITECT, ENGINEER OR OWNER PRIOR TO BIDDING FOR INTERPRETATIONS AND CLARIFICATIONS OF THE DESIGN AND INCLUDE IN THE BID ALL COSTS TO MEET THE DESIGN INTENT. CLARIFICATIONS MADE BY THE ARCHITECT, ENGINEER OR OWNER AFTER BIDDING WILL BE FINAL AND SHALL BE IMPLEMENTED AT CONTRACTORS COST.

BIDDING CONTRACTORS SHALL HAVE A WORKING KNOWLEDGE OF ALL CODES, REGULATIONS, UTILITY REQUIREMENTS, LAWS AND ORDINANCES APPLICABLE TO THIS SITE AND SHALL INCLUDE IN THE BID THE COSTS FOR ALL WORK PROVIDED IN STRICT ACCORDANCE WITH THESE GOVERNING ITEMS, THE PLANS AND SPECIFICATIONS NOT WITHSTANDING, THE CONTRACTOR SHALL ALERT ARCHITECT, ENGINEER AND/OR OWNER OF ANY APPARENT DISCREPANCIES BETWEEN ARCHITECTING CODES AND DESIGN INTENT FOR DIRECTIONS.

LEGEND (NOT ALL SYMBOLS ARE USED WITHIN THIS SET OF DRAWINGS)

- LIGHTING
EXIT LIGHT (HATCHING DENOTES FACE)
SURFACE MOUNTED OR RECESSED EMERGENCY LIGHTING FIXTURE
SWITCH (P) PILOT LIGHT (R) ROTARY SWITCH
MOTOR RATED SWITCH
TOGGLE SWITCH (X) DENOTES CONTROL LABEL
OCCUPANCY SENSOR
PHOTOCELL OR DAYLIGHT SENSOR
TIMECLOCK
POWER
SINGLE RECEPTACLE
DUPLIX RECEPTACLE
QUAD RECEPTACLE
CEILING MOUNTED RECEPTACLE
GROUNDING SHADING IN RECEPTACLE DENOTES ISOLATED GROUND
TOP OF RECEPTACLE DENOTES GFCI PROTECTED
SPECIAL PURPOSE RECEPTACLE (AS NOTED)
PHONE OUTLET
DATA OUTLET
VOICE/DATA COMBINATION OUTLET
JUNCTION BOX
SYMBOL IN SQUARE DENOTES FLOORMOUNTED
MOTOR, FAN, PUMP OR AIR CONDITIONING UNIT
PANELBOARD
FUSED DISCONNECT SWITCH, RATING AS NOTED.
NON-FUSED DISCONNECT SWITCH, RATING AS NOTED.
FIRE ALARM
HOOD FIRE SUPPRESSION PULL STATION NOM. 42" A.F.F. PER ADA
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2 01.04.18 ISSUED/RELEASED
1 12.28.17 FOR CONSTRUCTION
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E.O.O
ELECTRICAL SPECIFICATIONS
CHECKED: DAS DRAWN: C J B

INTERPLANS

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SEAL:
THIS DOCUMENT IS NOT FOR CONSTRUCTION
UNLESS THE ARCHITECT OR ENGINEER'S
SIGNATURE AND SEAL APPEAR BELOW.

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