

AN ASSEMBLY SIMILAR TO WIREMOLD EVOLUTION SERIES A95, FOR ABOVE FLOOR FITTINGS POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TELDATA COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTINGS TO RESTORE FIRE RATING OF FLOOR. FLOOR BOXES FOR FURNITURE SYSTEMS SHALL UTILIZE SEPARATE FIRE RATED PORE-THRU'S FOR POWER AND TELDATA. WIREMOLD TYPE RC-9 MAY BE UTILIZED FOR EACH POWER AND TELDATA INF-FEED LOCATION WITH 2 INCH CONDUIT CONNECTION FOR EACH INF-FEED CONNECTION.

D. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.

E. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REMOVE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS AS REQUIRED FOR ACCESSIBILITY. SUPPORT BOXES FROM BUILDING STRUCTURE. INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES OR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES. COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING. ADD BOX VOLUME WHERE REQUIRED.

F. FIRE SLATS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE PARTITIONS.

G. PERFORM CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE 25 OHMS. ANY FEEDERS FOUND TO EXCEED THIS TOLERANCE SHALL BE REPLACED AT CONTRACTORS EXPENSE.

13. WIRE AND CABLE:

A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG AND/OR KCMIL EXCEPT AS NOTED.

B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 75FT UP TO 100 FT CIRCUIT LENGTH, PROVIDE NO. 10 MINIMUM. AT 27 VOLTS AND OVER 150FT UP TO 250 FT CIRCUIT LENGTH, PROVIDE NO. 10 MINIMUM.

C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH, PROVIDE NO. 12 MINIMUM.

D. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZES AS REQUIRED TO MAINTAIN CODE MAXIMUM VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.

E. INSULATION SHALL BE RUBBER AND THERMOPLASTIC, 90 DEG C MEETING ASTM AND ICA STANDARDS. TYPE THINWALL SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. SFF-2 SHALL BE USED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS ROW FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG C. UNDERGROUND SERVICE ENTRANCE CABLING SHALL BE USE. PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW) IN EXTERIOR LOCATIONS INCLUDING UNDERGROUND NON-SERVICE CABLES.

F. METAL-CLAD CABLE (TYPE MC) WITH GROUND WIRES MAY BE UTILIZED WHEN PERMITTED BY BUILDING RULES AND REGULATIONS FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILING WALLS. TYPE MC CABLE MAY NOT BE INSTALLED IN EXPOSED CEILINGS WITHOUT WRITTEN APPROVAL BY ARCHITECT AND ENGINEER. WHEN USED IN LIEU OF WIRING IN CONDUIT, STATE IN PROPOSAL THAT PRICE IS BASED UPON THE USE OF MC CABLE. MC CABLE SHALL INCLUDE COPPER CONDUCTORS AND STEEL OR LIGHTWEIGHT STEEL JACKET. TYPE MC CABLE UTILIZED IN HEALTH CARE FACILITIES AND AREAS AS DEFINED BY THE NATIONAL ELECTRICAL CODE ARTICLE 671 SHALL BE EQUIVALENT TO FFC CABLES WITH 90-AND-90-AND UTILIZED FOR NORMAL CIRCUITS ONLY. SIX CABLE (TYPE AC) SHALL NOT BE UTILIZED. ALL BRANCH CIRCUIT HOMERUNS AND WIRING WITH ELECTRICAL CLOSETS SHALL BE RUN IN CONDUIT.

G. COLOR CODING SHALL BE AS FOLLOWS:

1) 120/208 VOLT SYSTEM
BLACK FOR A PHASE
RED FOR B PHASE
BLUE FOR C PHASE

2) 277/480 VOLT SYSTEM
BROWN FOR A PHASE
ORANGE FOR B PHASE
YELLOW FOR C PHASE

3) NEUTRAL WIRE SHALL UTILIZE WHITE OUTER COVERING THROUGHOUT. EQUIPMENT GROUND WIRE SHALL UTILIZE GREEN OUTER COVERING THROUGHOUT.

H. PROVIDE FLAMEPROOF LINEN OR FIBER TAGS IN ACCESSIBLE LOCATIONS. FOR FEEDERS INDICATE FEEDER NUMBER, SIZE, PHASE AND POINTS OF ORIGIN AND TERMINATIONS. FOR CONTROL AND ALARM WIRING, INDICATE TYPE (CONTROL OR ALARM), SIZE OF WIRE, AND POINTS OF ORIGIN AND TERMINATIONS. SPRING TO STRANCO PRODUCTS, INC.

I. TERMINATIONS: SPLICES AND TAPS UNDER 800 VOLTS. COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION-TYPE OF TWIST-ON SPRING-LOADED CONNECTORS AND CLEAR NYLON-INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. COILING LISTS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS. USE ANTI-SIZE COMPOUND.

J. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. IF MORE THAN THREE CIRCUITS, DEDICATE CURRENT CARRYING CAPACITY AND MAINTAIN CODE REQUIREMENTS FOR CONDUIT FILL. NEUTRAL CONDUCTOR SHALL BE COUNTED AS A CURRENT CARRYING CONDUCTOR. SUBMIT TO ENGINEER FOR REVIEW PRIOR TO INSTALLATION. PULL NO. THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF NORMAL AND EMERGENCY SYSTEMS. 120/208V AND 277/480 VOLT SYSTEMS. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.

K. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.

L. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS AND MOTOR BRANCH CIRCUITS OVER 25 HP. PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS TO CORRECT OR REPLACE CABLE TESTING BELOW MANUFACTURERS STANDARDS.

14. GROUNDING

A. A SEPARATE EQUIPMENT GROUNDING CONDUCTOR COMMONLY DESCRIBED AS A GREEN WIRE SHALL BE PROVIDED FOR ALL BRANCH CIRCUITS PROTECTED BY OVERCURRENT DEVICES. A GREEN WIRE GROUND SHALL ALSO BE PROVIDED FOR FLEXIBLE CONDUIT AND MOTOR CIRCUITS. METAL CHASISWAY CONTINUITY SHALL BE MAINTAINED WITH A BARE NO. 6 WIRE. WHERE ISOLATED GROUNDING BRANCH CIRCUITS ARE USED, PROVIDE A SEPARATE AND DISTINCTLY MARKED GREEN GROUND WIRE. EACH GROUNDING CONDUCTOR SHALL SERVE A MAXIMUM OF THREE CIRCUITS/POLES.

B. SERVICE AND EQUIPMENT:

1) FOR SEPARATELY DERIVED SERVICES AND ALL SERVICE SWITCHES, GROUND THE NEUTRAL CONDUCTOR THROUGH DISCONNECT LINK AND GROUND TERMINAL TO WATER SERVICE GROUND CLAMP, BUILDING STEEL AND DRIVEN GROUND RODS.

2) GROUND THE CENTER TAP OF Y-CONNECTED TRANSFORMERS THROUGH SECONDARY NEUTRAL AND GROUND BUS TO WATER SERVICE GROUND CLAMP. CONNECTIONS TO BUILDING STEEL WILL BE CONSIDERED ONLY WHERE PERMITTED BY CODE AND BY APPROVAL.

3) GROUND CLAMPS SHALL BE BRONZE, SOLDERLESS TYPE WITH BRONZE SCREWS, SUITABLE FOR RECEIVING NOTED CONDUCTORS. MOUNT GROUND CLAMP ON WATER SERVICE AT STREET SIDE OF MAIN SERVICE VALVE. PROVIDE JUMPER TO BY-PASS WATER METER.

C. RUN INSULATED GROUND CONDUCTORS IN RIGID METALLIC CONDUIT WITH CONDUIT CONNECTED TO CONDUIT, THROUGH GROUND FITTING AT EACH END.

D. GROUND NONCURRENT CARRYING METAL PARTS OF DISTRIBUTION PANELS, SWITCHBOARDS, TRANSFORMER ENCLOSURES, RACEWAYS, BUSWAY ENCLOSURES, CONTROLLER ENCLOSURES, MOTOR FRAMES AND OTHER ELECTRICAL EQUIPMENT.

E. ALL COMPONENTS FOR GROUNDING SYSTEMS SHALL BE UL 467 LISTED.

F. MISCELLANEOUS:

1. GROUND THE FOLLOWING:

- a. TELDATA/VIDEO VISUAL SYSTEMS
- b. FIRE ALARM SYSTEM
- c. EMERGENCY DISTRIBUTION SYSTEM
- d. COMPUTER EQUIPMENT/ENCLOSURES
- e. RAISED FLOORS
- f. LINE AND LOAD SIDE OF MVFD.

15. POWER WIRING

A. PROVIDE ALL POWER WIRING IN CONDUIT TO ALL MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS ON THE PROJECT. INCLUDE EXTENSIONS FROM CONTROLLERS TO MOTORS AND MOTOR CONNECTIONS MOUNT AND WIRE ALL CONTACTORS AND POWER DEVICES FURNISHED UNDER ALL CONTRACTS.

B. PROVIDE ONE (1) DEDICATED 120V 20A CIRCUIT FOR EACH HVAC CONTROL PANEL. COORDINATE QUANTITY AND LOCATION WITH HVAC/EMS CONTRACTOR.

16. CONTROL WIRING

A. PROVIDE ALL CONTROL WIRING IN CONDUIT FOR MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS AND AS SPECIFICALLY SHOWN ON THE DRAWINGS AND SPECIFICATIONS. INCLUDE MOUNTING AND WIRING OF ALL CONTROL DEVICES FURNISHED WITH EQUIPMENT.

17. WIRING DEVICES:

A. PROVIDE COMPLETE MATERIAL AND ACCESSORIES AS NOTED BY LEVITON, HUBBELL, OR EQUAL. ALL DEVICE TYPES, FINISH AND COLOR ARE SUBJECT TO APPROVAL BY ARCHITECT.

B. LOCAL WALL SWITCHES SHALL BE SPECIFICATION GRADE. TOGGLE, QUIET TYPE, RATED 20 AMP, 120/277 VOLT, AC. ALL SWITCHES SHALL BE GANGED WITH MULTI DEVICE PLATES. IN AREAS WHERE DIMMERS ARE SPECIFIED, WIRE AND EQUIPPED WITH ALL NECESSARY LAMPING, SOCKETS, DIMMERS/BALLASTS, SUPPORTING HARDWARE, PLASTER RINGS, BACKBOXES, CONDUIT CONNECTION POINTS, ETC. AS REQUIRED FOR A COMPLETE ASSEMBLY. LISTED CATALOG NUMBERS DO NOT NECESSARILY DENOTE REQUIRED MOUNTING EQUIPMENT OR ACCESSORIES AND SHALL BE INCLUDED AS APPLICABLE TO MEET THE DESIGN INTENT AND VENDOR CONDITIONS RELEVANT TO PROPER INSTALLATION AND OPERATION. CONTRACTOR SHALL CAREFULLY COORDINATE WITH LIGHTING VENDOR THE MEANS AND METHODS OF INSTALLATION.

C. FIXTURES SHALL BE COMPLETE AND CONSTRUCTED TO COMPLY WITH APPLICABLE CODE, REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND BUILDING STANDARDS. FIXTURES SHALL BE UL LISTED AND INDICATION OF SAME INCLUDED ON ALL FIXTURES. LISTINGS BY OTHER NATIONALLY RECOGNIZED TESTING LABORATORIES SUCH AS INTERTEK TESTING SERVICES (ETL) MAY BE CONDITIONALLY ACCEPTED.

D. ALL FIXTURES SHALL BE INDEPENDENTLY MOUNTED FROM BLACK IRON OR BUILDING STRUCTURE AS REQUIRED AND NOT FROM CEILING GRILL. ELECTRICAL INSTALLER/CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION OF CEILING CONSTRUCTION TYPES WITH LIGHTING FIXTURES. FIXTURES SHALL BE PROVIDED FOR OPERATION WITH PROPER VOLTAGE CHARACTERISTICS. REFER TO PLANS FOR INFORMATION.

E. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATIONS AND QUANTITIES OF LIGHTING FIXTURES.

F. LED FIXTURES SHALL HAVE REMOVABLE BOARDS & ACCESSIBLE DRIVERS FOR END OF LIFE REPLACEMENT OF SOURCE.

G. LED DRIVERS SHALL BE 0-10V 1% DIMMING TYPE, UNLESS OTHERWISE INDICATED ON ARCHITECTURAL/LIGHTING DESIGN DOCUMENTS.

H. LED COLOR TEMPERATURE SHALL BE 3500 KELVIN AND SHALL MATCH ALL OTHER SOURCES, UNLESS OTHERWISE INDICATED IN LIGHTING FIXTURE SCHEDULE.

I. FLUORESCENT LIGHTING FIXTURES SHALL COMPLY WITH IES STANDARDS RP-1 AND RP-24 AND NEMA STANDARD PUBLICATION L1; FLUORESCENT INDUSTRIAL FIXTURES SHALL COMPLY WITH ILM STANDARDS INSTITUTE AND SHALL BEAR THE ILM LABEL.

J. FURNISH ALL FLUORESCENT, INCANDESCENT, HID OR TUNGSTEN HALOGEN LAMPS AS INDICATED ON THE ARCHITECTS AND LIGHTING DESIGNER LIGHTING FIXTURE SCHEDULE AND AS REQUIRED FOR EACH FIXTURE. ALL FLUORESCENT LAMPS SHALL BE T5 OR T8, 30X25 RS (MIN. CR) 80+ UNLESS OTHERWISE NOTED. LAMPS SHALL BE SUPPLIED BY PHILIPS, GENERAL ELECTRIC, OSRAM/SILVANIA.

K. ALL LED FIXTURES SHALL HAVE MINIMUM 5 YEAR WARRANTIES ON LED BOARDS AND DRIVERS.

L. FLUORESCENT BALLASTS SHALL BE NEMA PREMIUM ELECTRONIC TYPE, WHEREVER DIMMERS ARE SHOWN ON PLANS. FIXTURES SHALL BE PROVIDED WITH COMPATIBLE DIMMING BALLAST EQUAL TO LUTRON H-LINE MATCHING LOCAL OR CENTRAL DIMMING SYSTEM. CONTRACTOR SHALL FURNISH AND INSTALL ALL BALLASTS IF FIXTURE DOES NOT INCLUDE SAME.

M. EMERGENCY DRIVERS/BATTERY SHALL BE UL LISTED AND APPROVED FOR USE IN APPLICABLE JURISDICTION, OPERATING LED BOARDS OR (2) FLUORESCENT LAMPS WITH MINIMUM 5 YEAR WARRANTIES. FOR T8 LAMP, BATTERY SHALL BE BODINE OR IOTA WITH HIGHEST LEVEL OF OUTPUT WATTS AVAILABLE TO MATCH FIXTURE SPECIFIED UNLESS OTHERWISE NOTED. CONTRACTOR SHALL PROVIDE COLD TEMPERATURE LOCATIONS IN PROFILE EMERGENCY DRIVER/BATTERY AS NECESSARY FOR A COMPLETE FUNCTIONAL SYSTEM AS PER DESIGN INTENT. WHERE EMERGENCY DRIVER/BATTERY IS NOT AVAILABLE OR PRACTICABLE FOR A PARTICULAR LOCATION, CONTRACTOR SHALL PROVIDE SUITABLE ALTERNATIVES EQUAL TO PHILIPS BODINE ELI-S SERIES, IN LIEU OF INDIVIDUAL EMERGENCY UNITS. INVERTERS SHALL BE CHOSEN TO MINIMUM PHYSICAL SIZE NEEDED FOR EMERGENCY OPERATION. COORDINATE THE MOUNTING LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. ALL EMERGENCY DRIVERS/BALLASTS SHALL INCLUDE A NON-SWITCHED CIRCUIT IN ADDITION TO THE CONTROLLED CIRCUIT FOR VOLTAGE MONITORING.

N. ALL LIGHTING LAYOUTS/SPECIFICATIONS MUST COMPLY WITH LATEST

DECORA PLUS #M1636-HGW (TAMPER RESISTANT #M163-HGW)

3) COMBINATION DUPLEX RECEPTACLE AND USB CHARGER. LEVITON T532 20A, 120V DUPLEX RECEPTACLE WITH DUAL 3.6A, 5.0VDC TYPE A USB CHARGERS

4) ALL OTHER AREAS: EXTRA HEAVY DUTY SPECIFICATION GRADE: LEVITON #M532-2W OR DECORA PLUS #M36-W.

a) ISOLATED GROUND: LEVITON #M532-IGW OR DECORA PLUS #M1636-IGW.

5) SINGLE RECEPTACLES: COMMERCIAL SPECIFICATION GRADE: LEVITON #361 OR DECORA # 1632.

6) SPECIAL USE: NON-INTERCHANGEABLE TYPES AND RATINGS MATCHING EQUIPMENT PLUG.

7) LOCKS: SINGLE RECESSED RECEPTACLE SIMILAR TO LEVITON #361-C1.

8) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE WITH SELF-PROTECTION AND LED INDICATOR LIGHT. SIMILAR TO HUBBELL RFP532 OR EQUAL BY LEVITON, ARROW HART OR PASS & SEYMOUR LEGRAND.

a) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES IN DAMP LOCATIONS SHALL BE WEATHER RESISTANT.

b) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES IN WET LOCATIONS SHALL BE WEATHER RESISTANT WITH METALLIC WHILE-IN-USE COVER.

9) SURGE PROTECTION RECEPTACLES: SHALL BE BACK AND SIDE WIRED WITH A MAXIMUM SINGLE PULSE RATING OF 24KA, 1LN, LEVITON #5300 (20 AMP).

a) ISOLATED GROUND: LEVITON 5380-IG (20 AMP).

D. MOMENTARY CONTACT SWITCHES: FOR REMOTE CONTROL SWITCHES, SIMILAR TO LEVITON #1257.

E. PILOT LIGHTS: NEON LAMP, SIMILAR TO HUBBELL NO. 11375, WITH 125-VOLT LAMP.

F. DEVICE PLATES: COORDINATE WITH ARCHITECT FOR FINAL TYPE, COLOR, MATERIAL AND FINISH. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.

G. COLORS: AS SPECIFIED AND COORDINATED WITH ARCHITECT.

H. MOUNTING ORIENTATION OF RECEPTACLES (HORIZONTAL OR VERTICAL): COORDINATE WITH ARCHITECT.

18. LIGHTING FIXTURES:

A. LIGHTING FIXTURE SCHEDULE SHOWN ON ENGINEERING DRAWINGS IS FOR INFORMATION PURPOSES ONLY. REFERENCE LIGHTING DESIGNS AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR COMPREHENSIVE LIGHTING INFORMATION. ENGINEER IS NOT RESPONSIBLE FOR INFORMATION SHOWN AS IT MAY BE GENERAL IN NATURE OR SUPERSEDED. ANY REVISIONS MADE HEREIN OF LIGHTING FIXTURE SCHEDULE REFERS TO AND INCLUDES ARCHITECTURAL AND LIGHTING DESIGN DOCUMENTS.

B. PROVIDE LIGHTING FIXTURES, LEDSLAMPS AND COMPONENTS AS PER ARCHITECT/LIGHTING DESIGNER LIGHTING FIXTURE SCHEDULE AND SPECIFICATIONS. FIXTURES SHALL BE COMPLETELY FACTORY ASSEMBLED, WIRED AND EQUIPPED WITH ALL NECESSARY LAMPING, SOCKETS, DIMMERS/BALLASTS, SUPPORTING HARDWARE, PLASTER RINGS, BACKBOXES, CONDUIT CONNECTION POINTS, ETC. AS REQUIRED FOR A COMPLETE ASSEMBLY. LISTED CATALOG NUMBERS DO NOT NECESSARILY DENOTE REQUIRED MOUNTING EQUIPMENT OR ACCESSORIES AND SHALL BE INCLUDED AS APPLICABLE TO MEET THE DESIGN INTENT AND VENDOR CONDITIONS RELEVANT TO PROPER INSTALLATION AND OPERATION. CONTRACTOR SHALL CAREFULLY COORDINATE WITH LIGHTING VENDOR THE MEANS AND METHODS OF INSTALLATION.

C. FIXTURES SHALL BE COMPLETE AND CONSTRUCTED TO COMPLY WITH APPLICABLE CODE, REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND BUILDING STANDARDS. FIXTURES SHALL BE UL LISTED AND INDICATION OF SAME INCLUDED ON ALL FIXTURES. LISTINGS BY OTHER NATIONALLY RECOGNIZED TESTING LABORATORIES SUCH AS INTERTEK TESTING SERVICES (ETL) MAY BE CONDITIONALLY ACCEPTED.

D. ALL FIXTURES SHALL BE INDEPENDENTLY MOUNTED FROM BLACK IRON OR BUILDING STRUCTURE AS REQUIRED AND NOT FROM CEILING GRILL. ELECTRICAL INSTALLER/CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION OF CEILING CONSTRUCTION TYPES WITH LIGHTING FIXTURES. FIXTURES SHALL BE PROVIDED FOR OPERATION WITH PROPER VOLTAGE CHARACTERISTICS. REFER TO PLANS FOR INFORMATION.

E. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATIONS AND QUANTITIES OF LIGHTING FIXTURES.

F. LED FIXTURES SHALL HAVE REMOVABLE BOARDS & ACCESSIBLE DRIVERS FOR END OF LIFE REPLACEMENT OF SOURCE.

G. LED DRIVERS SHALL BE 0-10V 1% DIMMING TYPE, UNLESS OTHERWISE INDICATED ON ARCHITECTURAL/LIGHTING DESIGN DOCUMENTS.

H. LED COLOR TEMPERATURE SHALL BE 3500 KELVIN AND SHALL MATCH ALL OTHER SOURCES, UNLESS OTHERWISE INDICATED IN LIGHTING FIXTURE SCHEDULE.

I. FLUORESCENT LIGHTING FIXTURES SHALL COMPLY WITH IES STANDARDS RP-1 AND RP-24 AND NEMA STANDARD PUBLICATION L1; FLUORESCENT INDUSTRIAL FIXTURES SHALL COMPLY WITH ILM STANDARDS INSTITUTE AND SHALL BEAR THE ILM LABEL.

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K. ALL LED FIXTURES SHALL HAVE MINIMUM 5 YEAR WARRANTIES ON LED BOARDS AND DRIVERS.

L. FLUORESCENT BALLASTS SHALL BE NEMA PREMIUM ELECTRONIC TYPE, WHEREVER DIMMERS ARE SHOWN ON PLANS. FIXTURES SHALL BE PROVIDED WITH COMPATIBLE DIMMING BALLAST EQUAL TO LUTRON H-LINE MATCHING LOCAL OR CENTRAL DIMMING SYSTEM. CONTRACTOR SHALL FURNISH AND INSTALL ALL BALLASTS IF FIXTURE DOES NOT INCLUDE SAME.

M. EMERGENCY DRIVERS/BATTERY SHALL BE UL LISTED AND APPROVED FOR USE IN APPLICABLE JURISDICTION, OPERATING LED BOARDS OR (2) FLUORESCENT LAMPS WITH MINIMUM 5 YEAR WARRANTIES. FOR T8 LAMP, BATTERY SHALL BE BODINE OR IOTA WITH HIGHEST LEVEL OF OUTPUT WATTS AVAILABLE TO MATCH FIXTURE SPECIFIED UNLESS OTHERWISE NOTED. CONTRACTOR SHALL PROVIDE COLD TEMPERATURE LOCATIONS IN PROFILE EMERGENCY DRIVER/BATTERY AS NECESSARY FOR A COMPLETE FUNCTIONAL SYSTEM AS PER DESIGN INTENT. WHERE EMERGENCY DRIVER/BATTERY IS NOT AVAILABLE OR PRACTICABLE FOR A PARTICULAR LOCATION, CONTRACTOR SHALL PROVIDE SUITABLE ALTERNATIVES EQUAL TO PHILIPS BODINE ELI-S SERIES, IN LIEU OF INDIVIDUAL EMERGENCY UNITS. INVERTERS SHALL BE CHOSEN TO MINIMUM PHYSICAL SIZE NEEDED FOR EMERGENCY OPERATION. COORDINATE THE MOUNTING LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. ALL EMERGENCY DRIVERS/BALLASTS SHALL INCLUDE A NON-SWITCHED CIRCUIT IN ADDITION TO THE CONTROLLED CIRCUIT FOR VOLTAGE MONITORING.

N. ALL LIGHTING LAYOUTS/SPECIFICATIONS MUST COMPLY WITH LATEST

VERSION OF ENERGY CONSERVATION CONSTRUCTION CODE OR ASHRAE 90.1, AS APPLICABLE.

19. EMPTY CONDUIT SYSTEMS

A. PROVIDE COMPLETE SYSTEM OF EMPTY CONDUIT, FITTINGS, PULL BOXES, OUTLETS, SLEEVES AND FISH-PULLING WIRES.

B. EQUIPMENT AND INSTALLATION SHALL CONFORM TO REQUIREMENTS OF THE TELECOMMUNICATION SYSTEMS CONTRACT DRAWINGS AND EIA/TA REQUIREMENTS.

1) OUTLETS SHALL BE:

a) WALL: 4 IN. SQUARE WITH REDUCER RING. COVER PLATE PROVIDED INTEGRAL WITH OUTLET DEVICE. BLANK OFF WHERE NO DEVICE IS INSTALLED.

b) FLOOR: IN-FLOOR CAST IRON WITH LOW-TENSION FITTING OR AS SPECIFIED FOR POKE THRU FLOOR ASSEMBLIES.

2) CONDUIT FROM OUTLETS SHALL BE 1 IN. MINIMUM WHERE SIZE IS NOT SHOWN ON DRAWINGS. FURNISH EMPTY CONDUIT FROM OUTLETS TO NEAREST ACCESSIBLE HUNG CEILING OR AS NOTED. TERMINATE OPEN END WITH INSULATED BUSHING.

C. PROVIDE FISHWIRE, IN RACEWAYS OVER 10 FT LONG AND AT ALL DROPS TO OUTLETS.

D. PROVIDE RISER PULL BOXES AT A MINIMUM OF 90 FEET INTERVALS. FOR 2-INCH CONDUITS AND SMALLER, PROVIDE PULL BOX FOR EVERY 100 FEET FOR STRAIGHT RUNS. PROVIDE PULL BOX FOR EVERY 180 DEGREES OF BENDS. BENDING RADIUS SHALL NOT BE LESS THAN 10 TIMES INTERNAL CONDUIT DIAMETER.

E. BOND ALL RACEWAYS SYSTEMS TO PROVIDE A COMMON GROUND PATH.

F. DEVICES, CONNECTORS AND WIRING COMPLETE WILL BE PROVIDED UNDER OTHER WORK SCOPES.

G. FURNITURE SYSTEM CONNECTIONS FOR TELDATA SHALL BE A MINIMUM SIZE OF 2 UNLESS OTHERWISE NOTED ON DRAWINGS. FLOOR BOXES FOR TELDATA FURNITURE SYSTEM INF-FEEDS SHALL BE SEPARATE FROM POWER INF-FEEDS.

20. SECURITY SYSTEM

A. FOR EACH SECURITY SYSTEM OUTLET, PROVIDE AN OUTLET BOX AND WITH PLATE WHERE REQUIRED (PLATES TO BE SAME TYPE AS WIRING DEVICES BUT TO MATCH SECURITY SYSTEM EQUIPMENT).

B. FROM EACH SECURITY SYSTEM OUTLET, PROVIDE 1" EMPT CONDUIT TERMINATED WITH 90 DEGREE SWEEP THIRTEEN INCHES ABOVE HUNG CEILING OR AT CLOSEST ACCESSIBLE CEILING WITH APPROVED BUSHING AND WITH DRAG WIRES.

C. ALL CONDUIT SHALL BE MINIMUM EMT AND INSTALLED CONCEALED IN FINISHED AREAS OR AS NOTED EXCEPT WHERE CONDUIT IS RUN IN SLABS, OUTDOORS OR SUBJECT TO PHYSICAL DAMAGE WHERE RIGID GALVANIZED STEEL SHALL BE USED.

D. ALL SECURITY SYSTEM EQUIPMENT SHALL BE PROVIDED BY OTHERS.

E. SECURITY SYSTEM WIRING (PROVIDED BY OTHERS) SHALL BE PLENUM RATED WITH TEFLON TYPE OUTER JACKET IN SUSPENDED CEILING USE FOR AIR HANDLING PURPOSES.

21. INSTALLATION OF OFFICE FURNITURE SYSTEM

A. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL NECESSARY REGARDING ELECTRICAL POWER AND TELDATA AS APPLICABLE FOR COMPLETE FURNITURE SYSTEMS. THIS WORK SHALL INCLUDE, BUT NOT LIMITED TO THE FOLLOWING:

1) INSTALL ALL BASE SECTIONS ON TO THE MAIN FURNITURE PANEL WHERE POWER AND COMMUNICATIONS ARE REQUIRED.

2) INSTALL ALL POWER AND COMMUNICATIONS "WHIP" CONNECTORS, RECEPTACLES, ETC., WHERE REQUIRED.

3) WHERE A PRE-WIRED FURNITURE SYSTEM IS NOT SPECIFIED, FURNISH AND INSTALL ALL WIRING WITHIN FURNITURE SYSTEM INCLUDING, BUT NOT LIMITED TO: WIRING, JUNCTION BOXES, WIREMOLD, TABLE-TOP BOXES ETC TO PROVIDE CONFIGURATION AS SHOWN.

4) FURNISH AND INSTALL BRANCH CIRCUIT WIRING FROM ELECTRICAL PANELS VIA JUNCTION BOXES AT FLOOR, WALL OR CEILING WHERE SHOWN ON DRAWINGS OR AS REQUIRED TO ACCOMMODATE CONDITION.

5) FURNISH AND INSTALL EMPT CONDUIT WITH JUNCTION BOXES AND DRAG WIRES FOR TELEPHONE AND DATA CABLES.

6) INSTALLATION OF THE TASK LIGHTING SYSTEM, WHEN APPLICABLE.

22. INSTALLATION OF PRE-PURCHASED EQUIPMENT

A. INSTALLER/CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS AS REQUIRED TO INSTALL PRE-PURCHASED EQUIPMENT.

23. FIRE ALARM SYSTEM

A. REFER TO FIRE ALARM DRAWINGS, SYSTEM WIRING DEVICES, ETC. SHALL BE IN ACCORDANCE WITH APPLICABLE CODE REQUIREMENTS, BUILDING STANDARDS AND SYSTEM MANUFACTURER. STROBE POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED. SYSTEM RE-PROGRAMMING TO ACCOMMODATE DEMOLITION AND NEW DEVICES SHALL BE INCLUDED. ALL LABOR AND MATERIALS FOR SYSTEM PRE-TEST AND TEST WITH BUILDING VENDOR AND FIRE DEPARTMENT SHALL BE INCLUDED.

24. ELECTRICAL TESTING (CONTRACTOR TO FOLLOW APPLICABLE NETA STANDARDS)

A. PROVIDE ALL NECESSARY METERS, INSTRUMENTS, TEMPORARY WIRING AND LABOR TO TEST AND ADJUST ALL EQUIPMENT AND WIRING INSTALLED AND/OR CONNECTED UNDER THIS CONTRACT, INCLUDING ELECTRICAL EQUIPMENT FURNISHED BY OTHERS, TO DETERMINE PROPER CLARITY AND PHASING, FREEDOM FROM GROUND FAULTS AND SHORTS AND PROPER OPERATION OF EQUIPMENT. ALL MEASURING INSTRUMENTS MUST BE PROPERLY CALIBRATED.

B. WHENEVER THE AUTHORITIES HAVING JURISDICTION REQUIRE THAT ANY WORK BE TESTED OR APPROVED, CONTRACTOR SHALL PROVIDE PROPER FACILITIES FOR ACCESS FOR INSPECTION.

C. CHECK ALL LIGHTING FIXTURES AND RECEPTACLES FOR PROPER OPERATION.

D. MOTORS:

1) MAKE THE FOLLOWING TESTS ON THE MOTORS BEFORE STARTING UP:

a. CHECK MOTOR NAMEPLATE FOR HORSEPOWER, SPEED AND PHASE AND VOLTAGE.

2) MAKE THE FOLLOWING TESTS ON ALL MOTORS DURING OR IMMEDIATELY AFTER START UP:

a. CHECK SHAFT ROTATION: CHECK BEARING TEMPERATURE: CHECK MOTOR FOR SMOOTH OPERATION.

b. TAKE A CURRENT READING OF FULL LOAD USING A CLAMP ON AMMETER. IF AMMETER READING IS OVER THE RATED FULL LOAD CURRENT, DETERMINE THE REASON FOR THE DISCREPANCY AND TAKE THE NECESSARY CORRECTIVE ACTION.

29. DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

A. SUBMIT WRITTEN CERTIFICATION THAT ELECTRICAL SYSTEMS ARE

6. FOLLOWING ESTABLISHED PROCEDURES EQUIPMENT SHALL BE ENERGIZED AFTER CERTIFICATIONS BY THE CONTRACTOR THAT THE INSTALLATIONS SATISFACTORY. ALL MOTORS AND EQUIPMENT SHALL BE TESTED FOR PROPER OPERATION.

4. OVERLOAD ELEMENTS IN MOTOR STARTERS SHALL BE ADJUSTED AND CHECKED FOR SUITABILITY TO THE MOTOR CHARACTERISTICS. CONTRACTOR SHALL REPLACE ANY OVERLOADING ELEMENT THAT IS INADEQUATE. THE CAUSE OF ANY MOTOR OPERATING PROBLEMS SHALL BE INVESTIGATED AND THE CAUSE SHALL BE REMOVED INSTEAD OF INCREASING THE OVERLOAD RELAY TRIP RATING. THESE OPERATIONAL TESTS SHALL DETERMINE THAT THE INSTALLATION IS CORRECT.

E. AFTER ALL ADJUSTMENTS ARE COMPLETE, TAKE CURRENT READINGS AT FULL LOAD USING A CLAMP ON AMMETER AND SUBMIT TO ENGINEERING FOR REVIEW AND APPROVAL.

F. CHECK ALL CONDUCTORS FOR PROPER INSULATION RESISTANCE USING A MEGOHMMETER TEST SET IN ACCORDANCE WITH MANUFACTURERS STANDARD INSTRUCTIONS AND THE INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA). TEST INSULATION RESISTANCE OF ALL NEW AND AFFECTED EXISTING FEEDERS PRIOR TO ENERGIZING AND REPLACE ANY CONDUCTORS FOUND TO BE BELOW MANUFACTURERS ACCEPTABLE VALUES.

G. UPS TESTING:

1) CONTRACTOR TO PROVIDE LABOR AND MATERIALS TO PERFORM ON SITE LOAD BANK TESTING OF THE UPS AS PER THE MANUFACTURERS REQUIREMENTS AND RECOMMENDATIONS. IF APPLICABLE, THE LOAD BANK UTILIZED FOR UPS TESTING SHALL BE RIGGED AND PLACED INTO AN AREA WITH APPROPRIATE VENTILATION AS APPROVED BY LANDLORD AND CLIENT BY THIS CONTRACTOR. INCLUDE INSTALLATION OF LOAD BANK WITH ALL REQUIRED TEMPORARY CABLES AND POWER. ALL TESTING SHALL BE DONE ON OFF-HOURS AS APPROVED BY BUILDING MANAGEMENT. BREAKDOWN AND REMOVAL OF THE LOADBANK AND ASSOCIATED WIRING SHALL BE BY THIS CONTRACTOR.

25. SURGE PROTECTIVE DEVICE (SPD):

A. PROVIDE AND INSTALL AT MAIN SERVICE AND DISTRIBUTION PANELS AS WELL AS ALL OTHER LOCATIONS NOTED ON DRAWINGS, AN EXTERNALLY MOUNTED ANSUL1 1449 (MOST RECENT EDITION), TYPE 1, 20KA-NOMINAL SURGE PROTECTIVE DEVICE (SPD). SPD PROTECTION MODES SHALL BE EACH LINE TO NEUTRAL, LINE TO GROUND AND NEUTRAL TO GROUND. THE MINIMUM SINGLE-PULSE SURGE CURRENT RATING PER MODE SHALL NOT BE LESS THAN 200KA PER MODE AND INCLUDE INTEGRATED DIAGNOSTICS WITH RED AND GREEN STATUS LEDS, DIAGNOSTIC TEST SWITCHES, DRY CONTACTS AND AN AUDIBLE ALARM. THE SPD SHALL BE DUTY LIFE CYCLE TESTED TO WITHSTAND A MINIMUM OF 10KA, 200V IEEE C62.41-2:2002 CATEGORY C