ELECTRICAL SYMBOLS LIST

- DUPLEX CONVENIENCE OUTLET, +18" A.F.F. U.O.N., NUMBER DENOTES CIRCUIT, (EXAMPLE 3).
- SIMPLEX CONVENIENCE OUTLET, +18" A.F.F. U.O.N., NUMBER DENOTES CIRCUIT, (EXAMPLE 2).
- GFI DENOTES GROUND FAULT INTERRUPTING.
- WP DENOTES IN-USE WEATHERPROOF COVER.
- IG DENOTES ISOLATED GROUND.
- C DENOTES DEVICE MOUNTED ABOVE COUNTER. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
- E DENOTES EXISTING TO REMAIN.
- \oplus_{R} R DENOTES EXISTING TO BE REMOVED.
- SPECIAL RECEPTACLE OUTLET CONFIGURATION.
- DOUBLE DUPLEX RECEPTACLE OUTLET.
- WALL MOUNTED JUNCTION BOX FOR POWER SERVICE TO PANEL SYSTEM. NUMBER DENOTES CIRCUIT, EXAMPLE: 1)
- JUNCTION BOX, NUMBER DENOTES CIRCUIT (EXAMPLE 1)
- FLOOR MOUNTED OUTLET FOR POWER SERVICE, DATA SERVICE, AND TELEPHONE SERVICE TO PANEL SYSTEM. PROVIDE FINAL CONNECTIONS TO PANEL SYSTEM. NUMBER DENOTES CIRCUIT TYPICAL (EXAMPLE: 1).
- COMBINATION FIRE RATED POWER/TELEPHONE/DATA OUTLET.
- JUNCTION BOX WITH BLANK COVER PLATE +18" A.F.F U.O.N., PROVIDE PLASTER RING AND PULL STRING TO ACCESSIBLE CEILING SPACE.
- OUTLET FOR CABLE TV. +18" A.F.F. U.O.N. FURNISH AND INSTALL CONDUIT AND CABLE AS REQUIRED TO COMPLETE A FULLY OPERABLE SYSTEM.
- DATA CABLE SERVICE, +18" A.F.F U.O.N., PROVIDE PLASTER RING AND PULL STRING TO ACCESSIBLE CEILING SPACE.
- AUDIO/VISUAL JUNCTION BOX WITH BLANK COVER PLATE +18" A.F.F. U.O.N.. PROVIDE PLASTER RING AND PULL STRING TO ACCESSIBLE CEILING SPACE.
- COMBINATION FOUR (4) PORT COMMUNICATIONS OUTLET, PROVIDE TWO (2) COMMUNICATION CABLES AND JACKS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATION SECTION 270500.
- TELEPHONE OUTLET. +18" A.F.F. U.O.N. PROVIDE PLASTER RING AND PULL STRING TO ACCESSIBLE CEILING SPACE.
- TELEPHONE OUTLET. WALL MOUNTED +46" A.F.F. U.O.N. PROVIDE
- PLASTER RING AND PULL STRING TO ACCESSIBLE CEILING SPACE.
- WIRELESS ACCESS POINT. REFER TO SPECIFICATION SECTIONS 270500.
- CARD READER, +46" A.F.F U.O.N. PROVIDE SINGLE-GANG RECESSED BOX FOR CARD READER. WHERE CARD READER LOCATED ON BOTH SIDES OF DOOR, PROVIDE 3/4" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING ON "SECURE" SIDE OF WALL/DOOR. PROVIDE 3/4" CONDUIT BETWEEN CARD READER BOXES. WHERE CARD READER LOCATED ON PUBLIC SIDE ONLY, PROVIDE 3/4" CONDUIT STUBBED ABOVE CEILING ON "SECURE" SIDE OF WALL/DOOR. INTERCONNECT TO BUILDING FIRE ALARM SYSTEM TO RELEASE UPON FIRE ALARM. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE SECURITY CONTRACTOR FOR EXACT REQUIREMENTS
- FIRE ALARM MANUAL PULL STATION, +46" A.F.F. U.O.N. INTERFACE TO BASE BUILDING FIRE ALARM SYSTEM.
- ADA APPROVED CEILING MOUNTED STROBE LIGHT. MATCH BUILDING STANDARD.. INTERCONNECT TO BASE BUILDING FIRE ALARM SYSTEM. VERIFY CAPACITY OF POWER SUPPLY. PROVIDE NEW POWER SUPPLY AS REQUIRED.
- SMOKE DETECTOR, INTERCONNECT TO BASE BUILDING FIRE ALARM SYSTEM.
- SMOKE DETECTOR, DUCT MOUNTED, INTERCONNECT TO BASE BUILDING FIRE ALARM SYSTEM. DETECTOR TO SHUTDOWN ASSOCIATED HVAC UNIT UPON ALARM.
- FIREMAN'S COMMUNICATION JACK.
- A/V SPEAKER, PROVIDE PLASTER RINGS AND PULL STRING. COORDINATE EXACT REQUIREMENTS AND LOCATIONS WITH A/V INSTALLER.
- DISCONNECT SWITCH. FUSED.
- DISCONNECT SWITCH, NON-FUSED.
- COMBINATION STARTER, FUSED.
- COMBINATION STARTER. NON-FUSED.
- MANUAL MOTOR STARTER WITH THERMAL OVERLOAD.
- ELECTRIC MOTOR, NIEC, MAKE CONNECTIONS ONLY, NUMBER DENOTES CIRCUIT. (EXAMPLE: 2)
- PANELBOARD, SURACE MOUNTED
- PANELBOARD, RECESSED MOUNTED.
- ———— CONDUIT RUN BELOW SLAB OR UNDERGROUND.
 - CONDUIT HOMERUN, CONTINUOUS RUN TO PANEL OR EQUIPMENT

1/4"=1'-0"

- FLEXIBLE METALLIC CONDUIT.
- DOOR RELEASE PUSHBUTTON, +46" A.F.F. U.O.N.

- SINGLE POLE TOGGLE OR MOMENTARY CONTACT SWITCH, +46" A.F.F. U.O.N. "a" INDICATES FIXTURES SWITCHED. ALSO USED IN LOW VOLTAGE SWITCHING TO CONTROL REMOTE CONTACTOR OR IN DIRECT LINE VOLTAGE SWITCHING.
- THREE-WAY TOGGLE SWITCH, +46" A.F.F. U.O.N.
- WALL BOX DIMMER SWITCH, +46" A.F.F. U.O.N.
- CEILING MOUNTED OCCUPANCY SENSOR.
- WALL BOX OCCUPANCY SENSOR, +46" A.F.F. U.O.N.
- PHOTO SENSOR
- FLUORESCENT FIXTURE. LOWER CASE LETTER INDICATES CONTROLLING SWITCH, "a". UPPER CASE LETTER INDICATES FIXTURE TYPE, i.e. "B". NUMERAL INDICATES PANEL CIRCUIT NUMBER. i.e. "3". SWITCH. FIXTURE TYPE. AND CIRCUIT NUMBERS ARE TYPICAL FOR ALL LIGHTING FIXTURES. WHERE TWO SWITCHING DESIGNATIONS ARE SHOWN CIRUCIT ONE LAMP OF TWO LAMP FIXTURES AND OUTER LAMPS OF 3 AND 4 LAMP FIXTURES TO THE FIRST SWITCHING DESIGNATION SHOWN. AND THE REMAINING LAMP(S) TO THE SECOND DESIGNATION SHOWN.
- FLUORESCENT FIXTURE.
- INCANDESCENT, FLUORESCENT OR H. I. D. FIXTURE.
- INCANDESCENT, FLUORESCENT OR H. I. D. FIXTURE, WALL MOUNTED.
- INCANDESCENT, FLUORESCENT OR H. I. D. SCONCE.
- INCANDESCENT, FLUORESCENT OR H. I. D. WALL WASHER.
- WALL MOUNTED EGRESS FIXTURE.
- CEILING MOUNTED EGRESS FIXTURE.
- SINGLE FACE EXIT FIXTURE, CEILING OR WALL MOUNTED, PROVIDE DIRECTIONAL ARROW IF SHOWN. BRACKET DENOTES WALL MOUNTING. MOUNT FIXTURE FACE PARALLEL TO ADJACENT DOOR WHERE APPLICABLE.
- DOUBLE FACE EXIT FIXTURE, CEILING OR WALL MOUNTED, PROVIDE DIRECTIONAL ARROWS AS SHOWN. BRACKET DENOTES WALL MOUNTING MOUNT FIXTURE FACE PERPENDICULAR TO ADJACENT DOOR WHERE APPLICABLE.
- NUMBERED NOTE: REFER TO SHEET CONTAINING NUMBERED NOTES.
- V INDICATES VERIZON EQUIPMENT TO BE RELOCATED, COORDINATE RELOCATION WITH BUILDING PRIOR TO DEMOLITION AND RE-INSTALLATION.
- EMERGENCY FLUORESCENT FIXTURE. EMERGENCY LIGHT FIXTURE TO BE CONNECTED TO NEAREST LIFE SAFETY BRANCH CIRCUIT. REFER TO EMERGENCY BALLAST WIRING DIAGRAM.
- POLE MOUNTED SPEAKER PROVIDED AND INSTALLED BY OWNER.

ELECTRICAL GENERAL NOTES

- 1. COMBINATION OF HOMERUN CIRCUITS SHALL BE AS FOLLOWS:
- A. ALL CIRCUITS WITH SEPARATE HOMERUN ARROWS SHALL BE INSTALLED IN DEDICATED CONDUITS. DO NOT COMBINE WITH OTHER BRANCH CIRCUITS.
- B. ALL BRANCH CIRCUITS LARGER THAN 20A SHALL BE SEPARATELY HOMERUN TO PANEL
- C. A MAXIMUM OF SIX 20A BRANCH CIRCUIT PHASE CONDUCTORS IN COMMON HOMERUN.
- D. MINIMUM BRANCH CIRCUIT CONDUCTOR SHALL BE #12AWG, THHN.
- E. ALL 120V CIRCUITS SERVING NON-LIGHTING BRANCH CIRCUITS SHALL HAVE SEPARATE #12 AWG EQUIPMENT GROUNDING CONDUCTOR.
- 2. GROUNDING SYSTEM:

A. GENERAL:

- 1. EXCEPT AS OTHERWISE NOTED, THE COMPLETE ELECTRICAL INSTALLATION. INCLUDING THE NEUTRAL CONDUCTOR. METALLIC CONDUITS AND RACEWAYS, BOXES, CABINETS, AND EQUIPMENT SHALL BE COMPLETELY AND EFFECTIVELY GROUNDED IN ACCORDANCE WITH ALL CODE REQUIREMENTS, WHETHER OR NOT SUCH CONNECTIONS ARE SPECIFICALLY SHOWN OR SPECIFIED.
- 2. RESISTANCE FROM GROUNDED SURFACE OF THE ELECTRICAL SYSTEM TO THE GROUND ELECTRODE AND TO EARTH SHALL NOT EXCEED 5 OHMS.
- B. DISTRIBUTION SYSTEM GROUNDING:
- 1. A BARE COPPER GROUND CONDUCTOR SHALL BE INSTALLED IN A NON-METALLIC CONDUIT OR DUCT; THIS CONDUCTOR IS NOT SHOWN ON THE DRAWINGS.
- C. BRANCH CIRCUIT GROUNDING:
- 1. ALL 120V CIRCUITS SERVING NON-LIGHTING BRANCH CIRCUITS SHALL HAVE SEPARATE GROUNDING CONDUCTORS.
- 3. IDENTIFYING DEVICES:

NAMEPLATES: TYPE NP; ENGRAVED BLACK BAKELITE, 1" X 3 1/2" MINIMUM, WITH 1/2" HIGH WHITE LETTERS, MACHINE SCREW RETAINED. FOR PERMANENT IDENTIFICATION OF ALL SWITCHBOARDS, CIRCUIT BREAKERS IN SEPARATE ENCLOSURES, MOTOR STARTERS, RELAYS. TIME SWITCHES AND OTHER CABINET-ENCLOSED APPARATUS INCLUDING TERMINAL CABINETS. THIS APPLIES TO ALL NEW EQUIPMENT AND ANY EXISTING ELECTRICAL EQUIPMENT.

4. CUTTING PAINTING AND PATCHING:

STRUCTURAL MEMBERS OR FLOOR SHALL IN NO CASE BE DRILLED. BORED OR NOTCHED IN SUCH A MANNER THAT WILL IMPAIR THEIR STRUCTURAL VALUE. CUTTING OF HOLES, IF REQUIRED, SHALL BE DONE WITH CORE DRILL AND ONLY WITH THE APPROVAL OF THE OWNER REPRESENTATIVE.

5. SUPERVISION:

CONTRACTOR SHALL PERSONALLY OR THROUGH AN AUTHORIZED AND COMPETENT REPRESENTATIVE CONSTANTLY SUPERVISE THE WORK FROM BEGINNING TO COMPLETION AND WITHIN REASON, KEEP THE SAME WORKMEN AND FOREMAN ON THE PROJECT THROUGHOUT THE PROJECT DURATION.

- 6. PENETRATIONS:
- A. METAL SLEEVES: EXPOSED EXTERIOR CONDUIT RUNS PASSING THROUGH CONCRETE FLOORS OR WALLS. FOLLOWING CONDUIT INSTALLATION, SEAL ALL PENETRATIONS USING NON-IRON BEARING, CHLORIDE FREE, NON-SHRINKING, DRY-PACK GROUTING COMPOUND. CONDUITS PENETRATING EXTERIOR BUILDING WALLS AND BUILDING FLOOR SLAB SHALL BE RIGID STEEL.
- B. FIRE SEPARATION WALLS/FLOORS: PACK OPENING AROUND CONDUITS OR CABLES WITH FIRE BARRIER CAULK STI SPEC SEAL LCI INTUMESCENT FIRESTOP SEALANT.
- 7. ACCURACY:
- A. DRAWINGS FOR THE WORK UNDER THIS SECTION ARE DIAGRAMMATIC.
- B. CONTRACTOR SHALL VERIFY LINES, LEVELS AND DIMENSIONS SHOWN ON THE DRAWINGS AND SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE SETTING OUT OF WORK AND FOR ITS STRICT CONFORMANCE WITH EXISTING CONDITIONS AT THE SITE.
- 8. LOCATIONS OF CONDUIT RUNS:
 - PLAN IN ADVANCE OF THE INSTALLATION AND COORDINATE WITH DUCTWORK, PLUMBING, CEILING AND WALL CONSTRUCTION IN THE SAME AREAS AND NOT NECESSARILY CROSS OTHER CONDUITS OR PIPE, NOR PREVENT REMOVAL OF CEILING TILES OR PANELS, NOR BLOCK ACCESS TO MECHANICAL OR ELECTRICAL EQUIPMENT.
- 9. WHERE PRACTICAL, INSTALL CONDUITS IN GROUPS IN PARALLEL. VERTICAL, OR HORIZONTAL RUNS AND AT ELEVATIONS THAT AVOID UNNECESSARY OFF-SETS.
- 10. PROTECTION OF EQUIPMENT:

KEEP CONDUITS, JUNCTION BOXES, OUTLET BOXES AND OTHER OPENINGS CLOSED TO PREVENT ENTRY OF FOREIGN MATTER. COVER FIXTURES, EQUIPMENT, DEVICES, AND APPARATUS TO PROTECT THEM AGAINST DIRT. PAINT, WATER, CHEMICAL OR MECHANICAL DAMAGE. BEFORE AND DURING CONSTRUCTION PERIOD. RESTORE TO ORIGINAL CONDITION ANY FIXTURE, APPARATUS OR EQUIPMENT DAMAGED PRIOR TO FINAL ACCEPTANCE. INCLUDE RESTORATION OF DAMAGED SHOP COATS OF PAINT BEFORE FINAL ACCEPTANCE. PROTECT BRIGHT FINISHED SURFACES AND SIMILAR ITEMS UNTIL IN SERVICE. NO RUST OR DAMAGE WILL BE PERMITTED.

- 11. MATERIALS AND WORK SHALL BE DONE ACCORDING TO BASE
- 12. WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF ALL GOVERNING CODES, RULES AND REGULATIONS, INCLUDING THE FOLLOWING MINIMUM STANDARDS, WHETHER STATUTORY OR NOT:

BUILDING STANDARDS AND PRACTICES

- NATIONAL ELECTRICAL CODE (NEC).
- 2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA). INTERNATIONAL BUILDING CODE (IBC)
- 4. INTERNATIONAL MECHANICAL CODE (IMC)
- 5. AMERICAN DISABILITIES ACT (ADA) 6. BASE BUILDING SPECIFICATIONS
- 13. EQUIPMENT AND MATERIALS SPECIFIED UNDER THIS DIVISION SHALL CONFORM TO THE FOLLOWING STANDARDS WHERE APPLICABLE:
- 1. UNDERWRITER'S LABORATORIES (UL). 2. AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM).
- 3. CERTIFIED BALLAST MANUFACTURERS (CBM). 4. INSULATED POWER CABLE ENGINEERS ASSOCIATION (IPCEA).
- 5. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA). 6. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).
- 7. ELECTRICAL TESTING LABORATORIES (ETL). 14. WHERE CEILING SPACE IS A RETURN AIR PLENUM. ALL WIRING IN

CEILING SPACE MUST BE IN CONDUIT OR USE TEFLON JACKETED

- CABLE TO MEET RETURN AIR PLENUM REQUIREMENTS. 15. ALL BASE BUILDING 2X2 AND 2X4 RECESSED FLUORESCENT
- FIXTURES TO REMAIN SHALL HAVE THE LOUVER CLEANED AND RELAMPED. ALL ELECTRICAL DEVICES, 2X2 AND 2X4 FIXTURES SHALL BE BUILDING STANDARD U.O.N.
- 16. LIGHTING FIXTURES DESIGNATED AS "BUILDING STANDARD" MAY BE PURCHASED FROM LANDLORD STOCK (IF AVAILABLE) OR SHALL EXACTLY MATCH THE BUILDING STANDARD FIXTURES AS DEFINED BY THE LANDLORD.
- 17. CONTRACTOR TO LOCATE ALL LIGHTING FIXTURES PER ARCHITECTURAL REFLECTED CEILING PLANS.
- 18. ELECTRICAL CONTRACTOR TO COORDINATE THE MOUNTING HEIGHTS AND LOCATIONS OF ALL COMMUNICATION OUTLETS AND RECEPTACLES WITH ARCHITECTURAL DETAILS.
- 19. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF ALL FLOOR DEVICES. LOCATIONS SHALL BE IN ACCORDANCE WITH ALL UNDERWRITERS LABORATORIES AND LOCAL AUTHORITY REQUIREMENTS. IN NO CASE SHALL FIRE RATED POKE-THROUGH DEVICES BE INSTALLED LESS THAN 24" ON CENTER AND/OR MORE THAN ONE (1) PENETRATION PER 65 SQUARE FEET OF FLOOR AREA OF BEAM SPACE.
- 20. ALL EXISTING FLOOR OUTLETS WHICH ARE NOT USED FOR THIS TENANT IMPROVEMENT LEASE SHALL BE REMOVED AND THE SLAB PENETRATION SHALL BE REPAIRED TO RESTORE ORIGINAL FIRE RESISTANCE AND STRUCTURAL INTEGRITY.
- 21. IN AREAS WHERE COMMUNICATION OUTLETS ARE INSTALLED IN A WALL OF ROOM WITH GYPBOARD CEILING, CONTRACTOR SHALL INSTALL 3/4" CONDUIT FROM OUTLET TO ACCESSIBLE CEILING.
- 22. CONTRACTOR SHALL INSTALL A PULL STRING IN ALL EMPTY CONDUITS.
- 23. WHERE THERE ARE MORE THAN (1) SWITCH OR DIMMING DEVICE IN A LOCATION, CONTRACTOR SHOULD GANG DEVICES, PROVIDE AND INSTALL MULTI-GANG COVERPLATE.
- 24. SURFACE MOUNTED PANELS, DEVICES, AND RACEWAY WILL ONLY BE ALLOWED IN MECHANICAL AREAS U.O.N.
- 25. CONTRACTOR SHALL SURVEY SITE TO CONFIRM FIELD CONDITIONS SUCH AS LOCATION OF LIGHTING AND POWER JUNCTION BOXES. CONFIRM SPARE CIRCUITS IN PANELS, AND CONFIRM FIRE ALARM
- 26. DRAWINGS SHOW FINAL LOCATION OF LIGHTING FIXTURES AND POWER OUTLETS. THEY DO NOT NECESSARILY SHOW ALL DEMOLITION OF ELECTRICAL DEVICES OR FIXTURES THAT SHOULD OCCUR. HOWEVER. ALTHOUGH NOT SPECIFICALLY SHOWN TO BE REMOVED. CONTRACTOR SHALL PERFORM NECESSARY DEMOLITION SUCH THAT THE FINAL ELECTRICAL SYSTEM REFLECTS THE LIGHTING AND POWER WHICH SHOWN ON THE PLAN DRAWINGS. THE CONTRACTOR IS
- 27. THE SPACE ALLOCATION SHOWN ON THE PLAN DRAWINGS ARE BASED ON ONLY ONE MANUFACTURER. THE CONTRACTOR SHALL VERIFY THAT THE PROPOSED SWITCH GEAR (INCLUDING SWITCHBOARDS, PANELBOARDS AND TRANSFORMERS) WILL SATISFY THE SPACE REQUIREMENTS SHOWN ON THE DRAWINGS.

RESPONSIBLE FOR FIELD VERIFYING THESE CONDITIONS.

- 28. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXISTING FLECTRICAL SERVICE TO ALL REMAINING AREAS OF THE FACILITY THROUGHOUT THE PROJECT EXCEPT DURING SCHEDULED SHUTDOWN TIMES.
- ANY SHUTDOWNS OF THE EXISTING FACILITY SHALL BE MUTUALLY AGREED UPON BY OWNER AND CONTRACTOR. CONTRACTOR SHALL GIVE OWNER MINIMUM OF TWO WEEKS NOTICE OF ANY SHUTDOWNS OF EXISTING FACILITY.
- 29. DURING BIDDING PROCESS. CONTRACTOR SHALL SURVEY EXISTING BUILDING SYSTEMS TO VERIFY EXTENT AND COMPATIBILITY WITH NEW ELECTRICAL SYSTEMS. CONTRACTOR SHALL INCLUDE MISCELLANEOUS DEVICES NECESSARY TO COMPLETE A FULL WORKING SYSTEM, FOR EXAMPLE MOTOR STARTER HEATERS AND STARTER EXHAUST CONTACTS.
- 30. ALL RECEPTACLES SHALL BE NEMA 5-20R U.O.N.
- 31. ALL 120V, 20 AMP HOME RUNS LONGER THAN 100' AND ALL 277V, 20 AMP HOME RUNS LONGER THAN 150' SHALL BE #10 MINIMUM.

- 32. FOLLOWING ADDITION OF NEW LOADS TO PANEL ON FLOOR FOR TENANT DEVELOPMENT, UPDATE PANEL SCHEDULE WITH SPACE AND LOAD ON TYPEWRITTEN CARD. MAKE COPY OF NEW PANEL SCHEDULE AND SUBMIT TO ENGINEER FOR APPROVAL FOLLOWING CONSTRUCTION COMPLETION.
- 33. FOLLOWING ADDITION AND TESTING OF EMERGENCY LIGHTING, UPDATE EMERGENCY LIGHTING PANEL SCHEDULE WITH FLOOR, SPACE AND LOAD. SUBMIT TEST RESULTS AND A COPY OF NEW PANEL SCHEDULE TO ENGINEER FOR APPROVAL FOLLOWING CONSTRUCTION COMPLETION.
- 34. TEST ALL NEW AND EXISTING FIRE ALARM DEVICES WITHIN THE TENANT SPACE, INCLUDING, BUT NOT LIMITED TO, MANUAL PULL STATIONS, STROBES AND VOICE EVACUATION SPEAKERS AND SUBMIT TEST RESULTS TO ENGINEER FOR APPROVAL FOLLOWING CONSTRUCTION COMPLETION.
- 35. CONTRACTOR SHALL ALLOW A MAXIMUM OF 5% VOLTAGE DROP ON ALL EMERGENCY BRANCH CIRCUITS THROUGHOUT THE AREAS UNDER THIS CONTRACT. CONTRACTOR SHOULD SIZE THE EMERGENCY BRANCH CIRCUITS FEEDERS ACCORDINGLY TO MAINTAIN THE MAXIMUM VOLTAGE DROP AS LISTED ABOVE.
- 36. CONTRACTOR SHALL MAINTAIN MINIMUM SEPARATION OF 24" BETWEEN TELEPHONE CONDUIT AND PRIMARY CONDUIT.
- 37. THE CONTRACTOR SHALL FIELD VERIFY THE EXISTING CIRCUITS SERVING THE PRESENT LEASE SPACE AND THE EXISTING SPARE CIRCUITS IN THE PANELBOARDS SERVING THIS LEASE SPACE AND SHALL REPORT ANY FIELD CONDITIONS REQUIRING CIRCUITING DEVIATIONS IN WRITING TO THE ENGINEER FOR DIRECTION PRIOR TO PROCEEDING WITH CONSTRUCTION.
- 38. ALL EXISTING CONDUIT AND CONDUCTORS SERVING THE AREA UNDER CONTRACT NOT TO BE RE-USED SHALL BE TERMINATED AT LAST PORTION OF CIRCUIT REQUIRING ENERGIZATION BEFORE THE DEMOLITION AREA. IF A CIRCUIT SERVICES ONLY THE DEMOLITION AREA, REMOVE ALL CONDUITS AND CONDUCTORS BACK TO THE PANELBOARD AND DE-ENERGIZE THE CIRCUIT BREAKER, MAKING IT SPARE. NOTE SPARE ON PANELBOARD DIRECTORY
- 39. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING STARTER TYPE, OVERLOAD SIZE, AND DISCONNECT SIZE FOR ALL MOTORS IN EACH AIR HANDLER UNIT ROOM WITH MECHANICAL CONTRACTOR.
- 40. CONTRACTOR TO REFER TO PLUMBING DRAWINGS FOR EXACT LOCATION OF ALL FLOW SWITCHES. CONTRACTOR TO PROVIDE CONNECTION TO FLOW SWITCHES FROM FIRE ALARM SYSTEM. CONTRACTOR TO ALSO PROVIDE CONNECTION TO ALL TAMPER SWITCHES FOR EXACT LOCATIONS COORDINATE WITH FIRE PROTECTION (SPRINKLER) CONTRACTOR.
 - THE TAMPER SWITCHES WILL BE PROVIDED AT ALL FIRE PROTECTION VALVES EXCEPT FIRE DEPARTMENT HOSES.
- 41. SUBMITTALS
- A. GENERAL: REFER TO GENERAL CONDITIONS FOR SUBMITTAL PROCEDURES AND REQUIREMENTS.
- B. FORMAT: FURNISH SUBMITTAL DATA NEATLY BOUND IN AN 8-1/2" X 11" FOLDER OR BINDER WITH A TABLE OF CONTENTS LISTING SPECIFICATION SECTION. SUBMITTAL DATA ON ALL ELECTRICAL EQUIPMENT (PANELBOARDS, LIGHT FIXTURES, ETC.) SHALL BE MODIFIED. AS NECESSARY. TO BECOME "AS BUILT" DOCUMENTS.
- C. SUBMITTALS SHALL CONSIST OF DETAILED SHOP DRAWINGS, SPECIFICATIONS, "CATALOG CUTS" AND DATA SHEETS CONTAINING PHYSICAL AND DIMENSIONAL INFORMATION, PERFORMANCE DATA, ELECTRICAL CHARACTERISTICS, MATERIALS USED IN FABRICATION, MATERIAL FINISH AND SHALL CLEARLY INDICATE THOSE OPTIONAL ACCESSORIES WHICH ARE INCLUDED AND THOSE WHICH ARE EXCLUDED.
- D. SUBMIT SHOP DRAWINGS FOR:
- 1. PANELBOARDS.
- E. SUBMIT MANUFACTURER'S DATA FOR:
- 1. LIGHTING FIXTURES. 2. WIRING DEVICES AND DEVICE PLATES (ALL TYPES).
- 3. FIRE ALARM DEVICES. 4. TRANSFORMERS.
- 5. DISCONNECT SWITCHES. 6. PANELBOARDS 7. MOTOR STARTERS

8. METERS

42. THE CONTRACTOR IS RESPONSIBLE FOR SURVEYING THE SITE TO DETERMINE ALL EXISTING CONDITIONS RELATED TO THE NEW BUILDING. THIS INCLUDES ALL EXISTING UNDERGROUND UTILITIES. CONTRACTOR SHALL MAKE PROVISIONS FOR CROSSING.

BUILDING ARE ROUTED THRU THESE AREAS.

43. CONTRACTOR TO COORDINATE WITH LANDSCAPE PLANS FOR ACTUAL LOCATION OF ALL EXTERIOR LANDSCAPE FIXTURES.

DISCONNECTING IN THE EVENT NEW UTILITY SERVICE TO NEW

- 44. CONTRACTOR SHALL REVIEW ALL TRENCHING ON SITE WITH LANDSCAPE ARCHITECT AND OBTAIN APPROVAL BEFORE PERFORMING
- 45. ALL FIRE DETECTION SYSTEM WORK SHALL BE PERFORMED BY JOHNSON CONTROLS.
- 46. CONTRACTOR RESPONSIBLE TO FILL ALL NEW AND EXISTING FLOOR PENETRATIONS WITH FIRE-STOPPING MATERIAL TO RESTORE BUILDING FIRE INTEGRITY.
- 47. ALL LOW VOLTAGE INSTALLED IN CABLE TRAY TO BE PLENUM RATED. FIRE ALARM CABLING AND CONDUITS TO MATCH BUILDING



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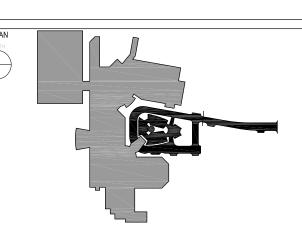
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otel



HR PHASE II & III **EXTERIOR** RENOVATION



Description

ELECTRICAL SYMBOLS LIST AND GENERAL NOTES

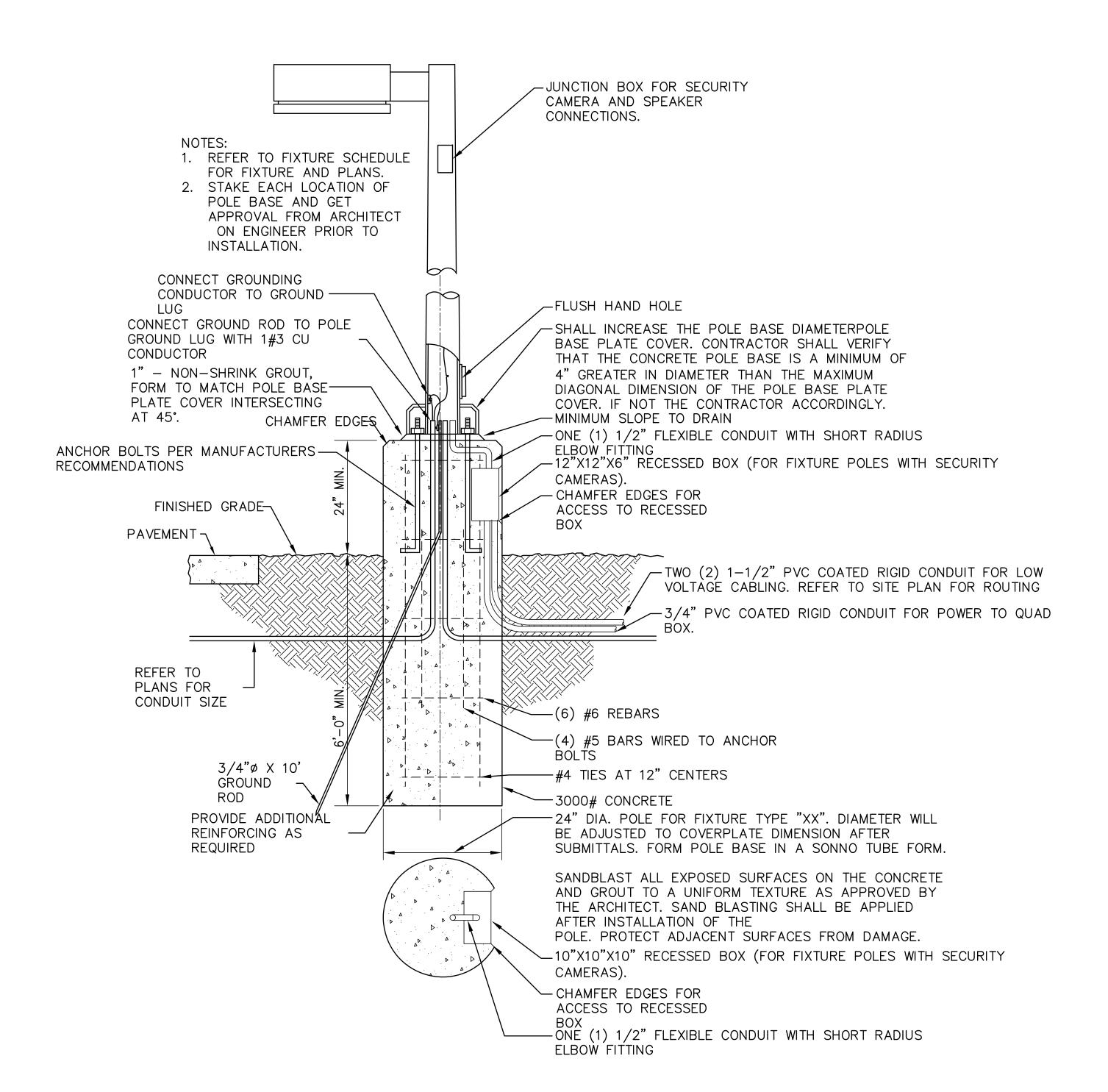
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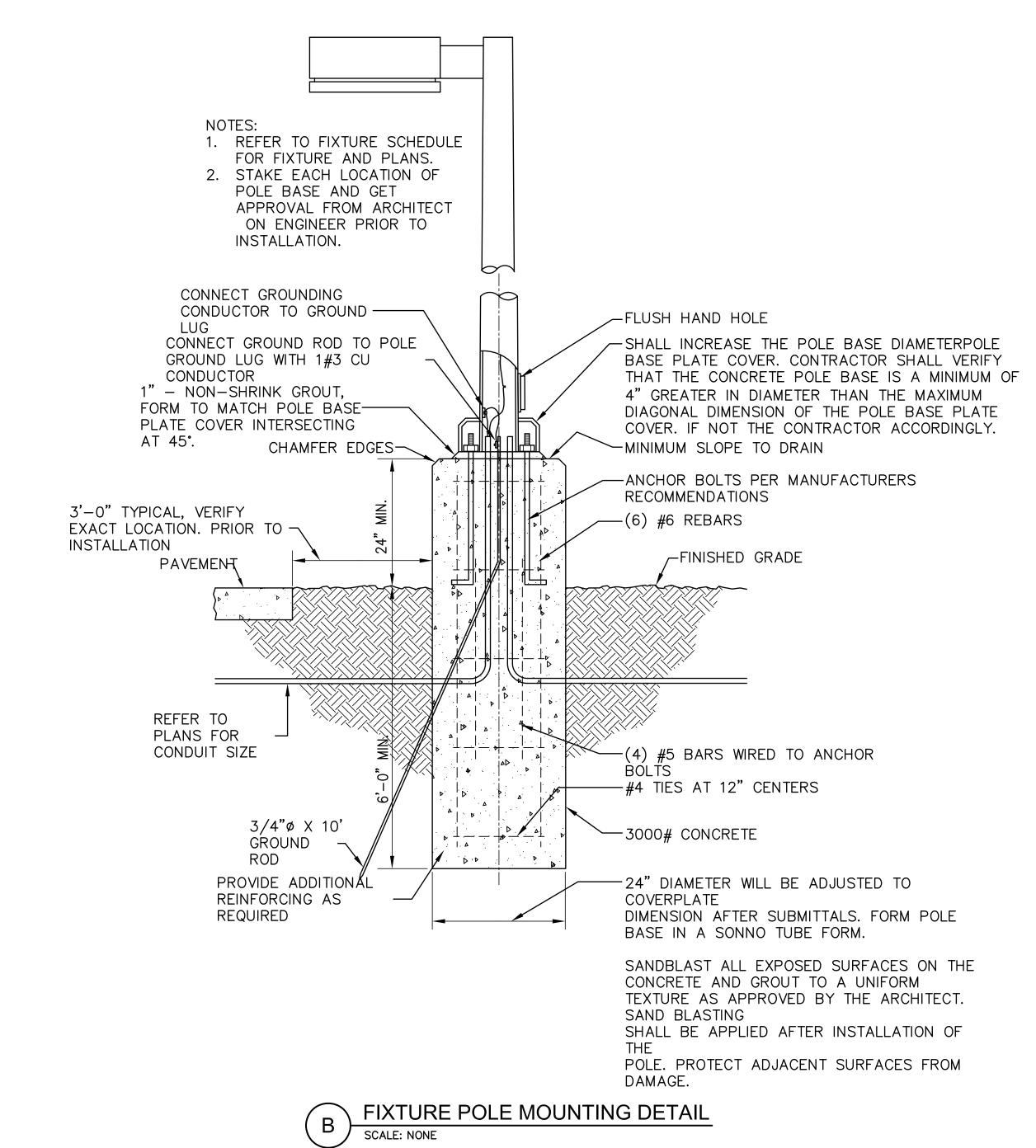
0 3" 6" 1 1/2"=1'-0" 3"=1'-0" 1/2"=1'-0" 3/4"=1'-0"

ELECTRICAL NUMBERED NOTES

- 1. PROVIDE NEW 6"X6"X2" GUTTER FOR PENETRATION INTO BUILDING. ROUTE TWO (2) 4" CONDUITS WITH FOUR (4) 1" INNERDUCTS EACH UP INTERIOR WALL OF STORAGE ROOM AND THROUGH CEILING TO IDF-35. VERIFY EXACT LOCATION AND CONDUIT ROUTING WITH OWNER.
- 2. PROVIDE TWO (2) 4" CONDUITS WITH FOUR (4) 1" INNERDUCTS EACH FROM WALL MOUNTED GUTTER TO IN GRADE PULL BOX. VERIFY ROUTING WITH OWNER.
- 3. PROVIDE ONE (1) 17"X30"X24" QUAZITE IN-GRADE PULL BOX FOR LOW VOLTAGE CABLE ROUTING TO SITE. VERIFY EXACT LOCATION WITH OWNER.
- 4. PROVIDE ONE (1) 4" CONDUIT WITH FOUR (4) 1" INNERDUCTS FROM QUAZITE PULL BOX TO MONUMENT SIGN. PROVIDE THIRTY—SIX (36) WESTPENN 454BK DMX CABLES IN TWO (2) 1" INNDERDUCTS FROM IDF—35 TO MONUMENT SIGN FOR LIGHTING CONTROL. VERIFY EXACT QUANTITY OF CABLES WITH OWNER.
- 5. PROVIDE ONE (1) 24"X24"X18" JUNCTION BOX FOR MONUMENT SIGN LIGHTING CONTROLS. VERIFY EXACT LOCATION AND REQUIREMENTS WITH MONUMENT SIGN MANUFACTURER AND OWNER.
- 6. PROVIDE ONE (1) 24"X24"X18" JUNCTION BOX FOR ELECTRICAL SERVICE TO MONUMENT SIGN. VERIFY EXACT LOCATION AND ÉLECTRICAL REQUIREMENTS WITH MONUMENT SIGN MANUFACTURER AND OWNER. CIRCUIT AS
- 7. PROVIDE ONE (1) DOUBLE DUPLEX RECEPTACLE RECESSED IN POLE BASE JUNCTION BOX FOR ELECTRICAL SERVICE TO SÈCURITY CAMERA. CIRCUIT AS INDICATED.
- 8. PROVIDE ONE (1) 12 STRAND SINGLE MODE ARMORED FIBER CABLE AND ONE (1) WESTPENN 25296B SPEAKER CABLE IN 1-1/2" CONDUIT FROM IDF-35 TO LIGHT POLE FOR DATA SERVICE TO SECURITY CAMERAS AND SPEAKERS. TERMINATE TWO (2) STRANDS OF FIBER CABLE AT EACH POLE REQUIRING SECURITY CAMERAS WITH LC CONNECTORS. DAISY CHAIN SPEAKER CABLE TO EACH POLE REQUIRING SPEAKERS. VERIFY EXACT LOCATION OF SECURITY CAMERAS AND SPEAKERS WITH OWNER.
- 9. PROVIDE NEW FACEPLATE INTO EXISTING PANEL SP1 TO ADD CAPACITY FOR NEW SINGLE POLE BREAKERS. PROVIDE NEW CIRCUIT BREAKERS AS REQUIRED.
- 10. PROVIDE NEW CIRCUIT BREAKERS INTO PANEL SP1A AS NEEDED.
- 11. PROVIDE THREE (3) 30A SINGLE POLE CIRCUIT BREAKERS INTO PANEL SP1 FOR ELECTRICAL SERVICE TO MONUMENT SIGN. VERIFY ELECTRICAL REQUIREMENTS WITH MONUMENT SIGN MANUFACTURER.

FIXTURE SCHEDULE							
TYPE	MANUFACTURER & CATALOG NUMBER	LAMP QUANTITY/TYPE MANUFACTURER	DESCRIPTION				
A	VISIONAIRE LIGHTING BLX-II SERIES BLX-6-T3-128LC-5-UNV -KM-BZ OR EQUAL BY MCGRAW- EDISON OR PHILLIPS	LED FURNISHED WITH FIXTURE	POLE-MOUNTED LED FIXTURE ASSEMBLY WITH 20'-0" POLE AND TYPE III DISTRIBUTION. FURNISH WITH 277V OPERATION AND BRONZE FINISH. PROVIDE POLE THAT IS COMPATIBLE TO RUN LOW VOLTAGE CABLE FOR SPEAKERS AND SECURITY CAMERAS. REFER TO PLANS FOR LOCATIONS OF SECURITY CAMERAS. ALL SPEAKER AND CAMERA LOCATIONS TO HAVE 30" CONCRETE BASE WITH 12"X12"X6" RECESSED JUNCTION BOX. PROVIDE DOCUMENTATION FROM FIXTURE MANUFACTURER FOR THE FIELD REPLACEABLE LED LAMPS OR LED LAMP MODULES FOR FUTURE LED LAMP REPLACEMENT. PROVIDE FIVE (5) YEAR MINIMUM COMPLETE MATERIALS AND LABOR REPLACEMENT WARRANTY FOR LIGHT FIXTURE.				





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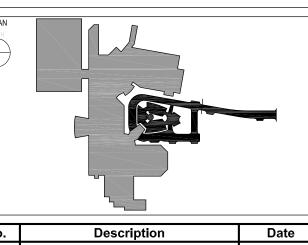
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HR PHASE II & III **EXTERIOR** RENOVATION



SHEET TITLE

ELECTRICAL FIXTURE SCHEDULE, KEYNOTE AND

E002

FIXTURE POLE MOUNTING DETAIL (SECURITY / A/V)

PART I GENERAL

1.01 DESCRIPTION

A. GENERAL: FURNISH LABOR, MATERIALS, APPARATUS, TOOLS, EQUIPMENT, TRANSPORTATION, TEMPORARY CONSTRUCTION AND SERVICES AS REQUIRED TO MAKE A COMPLETE WORKING ELECTRICAL INSTALLATION, AS SHOWN ON THE DRAWINGS OR DESCRIBED IN THESE SPECIFICATIONS. THE WORK SHALL INCLUDE MATERIALS, APPLIANCES AND APPARATUS NOT SPECIFICALLY MENTIONED HEREIN OR NOTED ON THE DRAWINGS, BUT REQUIRED FOR A COMPLETE INSTALLATION. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND UNUSED UNLESS OTHERWISE SPECIFIED. IN ADDITION, IT SHALL INCLUDE CONNECTION, INTERCONNECTION, AND POWER FOR ELECTRICAL EQUIPMENT FURNISHED UNDER OTHER SECTIONS.

CONTRACTOR SHALL REVIEW ALL CONTRACT DOCUMENTS INCLUDING, BUT NOT LIMITED TO, ARCHITECTURAL CEILING PLANS, ARCHITECTURAL DETAILS, DOOR HARDWARE SCHEDULES, AND MECHANICAL DOCUMENTS. ALL POWER SERVICE WIRING, BRANCH CIRCUIT WIRING, CONTROL WIRING OR OTHER WIRING NECESSARY FOR COMPLETE OPERATION OF EQUIPMENT OR FIXTURES, NOT SPECIFICALLY REQUIRED TO BE INSTALLED UNDER ANOTHER SECTION OF THIS SPECIFICATION, SHALL BE PROVIDED WHETHER OR NOT SUCH WIRING IS SPECIFICALLY SHOWN ON ELECTRICAL DRAWINGS OR DESCRIBED IN DIVISION 16 SPECIFICATIONS.

B. WORK INCLUDED:

- 1. WORK DESCRIBED IN DIVISION 16.
- 2. ELECTRICAL WORK REQUIRED FOR CORRECT ELECTRICAL OPERATION OF EQUIPMENT AND APPARATUS FURNISHED UNDER DIVISION 15.
- 3. ELECTRICAL WORK REQUIRED FOR CORRECT ELECTRICAL OPERATION OF EQUIPMENT FURNISHED UNDER ALL OTHER DIVISIONS OF THIS SPECIFICATION OR ON DRAWINGS.
- C. WORK FURNISHED AND INSTALLED UNDER ANOTHER SECTION REQUIRING POWER SUPPLY WIRING AND/OR CONNECTIONS UNDER THIS SECTION:
- 1. ELECTRIC MOTORS.
- 2. PACKAGE MECHANICAL EQUIPMENT; FANS, PUMPS,
- COMPRESSORS, ETC.
 TEMPERATURE CONTROL EQUIPMENT POWER SUPPLY WIRING.
- D. THE CONTRACTOR SHALL NOTIFY THE ENGINEER, ARCHITECT AND CONSTRUCTION MANAGER IF THE DELIVERY SCHEDULE OF ANY SPECIFIED PRODUCT WILL PROHIBIT THE CONSTRUCTION TO BE COMPLETED AS SCHEDULED. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY EXPEDITED DELIVERY COSTS WHICH MAY BE NECESSARY TO ACCOMPLISH THE COMPLETION SCHEDULE. ALL NOTIFICATIONS SHALL BE MADE IN WRITING A MINIMUM OF SEVEN BUSINESS DAYS PRIOR TO THE BID DATE.
- E. ALL REQUESTS FOR PRODUCT SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER, ARCHITECT AND CONSTRUCTION MANAGER. ALL REQUESTS SHALL BE MADE IN WRITING A MINIMUM OF SEVEN BUSINESS DAYS PRIOR TO THE BID DATE.

1.02 GENERAL REQUIREMENTS, CODES AND STANDARDS

- A. REFERENCE TO CODES, STANDARDS, SPECIFICATIONS AND RECOMMENDATIONS OF TECHNICAL SOCIETIES, TRADE ORGANIZATIONS AND GOVERNMENTAL AGENCIES SHALL MEAN THAT LATEST EDITION OF SUCH PUBLICATIONS ADOPTED AND PUBLISHED PRIOR TO SUBMITTAL OF THE BID PROPOSED. SUCH CODES OR STANDARDS SHALL BE CONSIDERED A PART OF THIS SPECIFICATION AS THOUGH FULLY REPEATED HEREIN.
- B. WHEN CODES, STANDARDS, REGULATIONS, ETC. ALLOW WORK OF LESSER QUALITY OR EXTENT THAN IS SPECIFIED UNDER THIS DIVISION, NOTHING IN SAID CODES SHALL BE CONSTRUED OR INFERRED AS REDUCING THE QUALITY, REQUIREMENTS OR EXTENT OF THE DRAWINGS AND SPECIFICATIONS.
- C. WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF ALL GOVERNING CODES, RULES AND REGULATIONS, INCLUDING THE FOLLOWING MINIMUM STANDARDS, WHETHER STATUTORY OR NOT:
- 1. NATIONAL ELECTRIC CODE (NEC).
- 2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
- 3. AMERICAN DISABILITY ACT (ADA)4. LOCAL CODES AND AMENDMENTS
- 5. ADOPTED ENERGY CODE6. BASE BUILDING STANDARDS
- 6. BASE BUILDING STANDARDS
 7. UNIFORM BUILDING CODE (UBC)
- D. EQUIPMENT AND MATERIALS SPECIFIED UNDER THIS DIVISION SHALL CONFORM TO THE FOLLOWING STANDARDS WHERE APPLICABLE:
- 1. UNDERWRITER'S LABORATORIES (UL).
- 2. AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM).
- 3. CERTIFIED BALLAST MANUFACTURERS (CBM).
- 4. INSULATED POWER CABLE ENGINEERS ASSOCIATION (IPCEA).
 5. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA).
- 6. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).7. ELECTRICAL TESTING LABORATORIES (ETL).

BASE MATERIAL SHALL BE ASTM AND/OR ANSI STANDARDS. ELECTRICAL APPARATUS FURNISHED UNDER THIS SECTION SHALL CONFORM TO NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) STANDARDS AND THE NEC AND BEAR THE UNDERWRITER'S LABORATORIES (UL) LABEL WHERE SUCH LABEL IS APPLICABLE.

1.03 CUTTING, PAINTING AND PATCHING

1/16"=1'-0" 0 8' 16' 32'

A. STRUCTURAL MEMBERS SHALL IN NO CASE BE DRILLED, BORED OR NOTCHED IN SUCH A MANNER THAT WILL IMPAIR THEIR STRUCTURAL VALUE. CUTTING OF HOLES, IF REQUIRED, SHALL BE DONE WITH CORE DRILL AND ONLY WITH THE APPROVAL OF THE ARCHITECT AND OF THE BUILDING MANAGEMENT.

1.04 PENETRATIONS:

A. METAL SLEEVES: EXPOSED EXTERIOR CONDUIT RUNS PASSING THROUGH CONCRETE FLOORS OR WALLS. FOLLOWING CONDUIT INSTALLATION, SEAL ALL PENETRATIONS USING NON-IRON BEARING, CHLORIDE FREE, NON-SHRINKING, DRY-PACK GROUTING COMPOUND. CONDUITS PENETRATING EXTERIOR BUILDING WALLS

1/8"=1'-0"

- AND BUILDING FLOOR SLAB SHALL BE RIGID STEEL.
- B. FIRE SEPARATION WALLS/FLOORS: PACK OPENING AROUND CONDUITS OR CABLES WITH FIRE BARRIER CAULK 3M CP 25 NELSON FLAMESEAL.

1.05 SUPERVISION

A. CONTRACTOR SHALL PERSONALLY OR THROUGH AN AUTHORIZED AND COMPETENT REPRESENTATIVE CONSTANTLY SUPERVISE THE WORK FROM BEGINNING TO COMPLETION AND WITHIN REASON, KEEP THE SAME WORKMEN AND FOREMAN ON THE PROJECT THROUGHOUT THE PROJECT DURATION.

1.06 PROTECTION

A. KEEP CONDUITS, JUNCTION BOXES, OUTLET BOXES AND OTHER OPENINGS CLOSED TO PREVENT ENTRY OF FOREIGN MATTER. COVER FIXTURES, EQUIPMENT, DEVICES, APPARATUS AND PROTECT THEM AGAINST DIRT, PAINT, WATER, CHEMICAL OR MECHANICAL DAMAGE, BEFORE AND DURING CONSTRUCTION PERIOD. RESTORE TO ORIGINAL CONDITION ANY FIXTURE, APPARATUS OR EQUIPMENT DAMAGED PRIOR TO FINAL ACCEPTANCE. PROTECT BRIGHT FINISHED SURFACES AND SIMILAR ITEMS UNTIL IN SERVICE. NO RUST OR DAMAGE WILL BE PERMITTED.

1.07 FXAMINATION OF SITE

A. THE CONTRACTOR SHALL VISIT THE SITE AND DETERMINE THE LOCAL, WORKING CONDITIONS, CONFLICTING UTILITIES AND THE CONDITIONS IN WHICH THE ELECTRICAL WORK WILL TAKE PLACE. NO ALLOWANCES WILL BE MADE SUBSEQUENTLY FOR ANY COSTS WHICH MAY BE INCURRED BECAUSE OF ANY ERROR OR OMISSION DUE TO FAILURE TO EXAMINE THE SITE AND TO NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS AND ACTUAL SITE CONDITIONS.

1.08 SUBSTITUTIONS

A. DURING THE BIDDING PROCESS, THE CONTRACTOR MAY SUBMIT PERTINENT TEST DATA, CATALOG CUTS AND PRODUCT INFORMATION REQUIRED TO SUBSTANTIATE THAT THE PRODUCT IS IN FACT EQUAL. REFER TO GENERAL CONDITIONS AND DIVISION 1 FOR REQUIREMENTS. ONLY ONE SUBSTITUTION WILL BE CONSIDERED FOR EACH PRODUCT SPECIFIED EXCEPT FOR WIRING DEVICES. SUBSTITUTION REQUESTS SHOULD BE SUBMITTED IN A TIMELY FASHION TO ALLOW TIME FOR REVIEW AND PUBLICATION TO ALL CONTRACTORS. SUBSTITUTION REQUESTS WHICH DO NOT ALLOW FOR THE PRECEDING WILL NOT BE CONSIDERED.

1.09 SUBMITTALS

- A. GENERAL: REFER TO GENERAL CONDITIONS FOR SUBMITTAL PROCEDURES AND REQUIREMENTS.
- B. FORMAT: FURNISH SUBMITTAL DATA NEATLY BOUND IN AN 8-1/2" X 11" FOLDER OR BINDER WITH A TABLE OF CONTENTS LISTING SPECIFICATION SECTION AND PARAGRAPH NUMBER. DRAWINGS REQUIRED TO BE SUBMITTED SHALL BE PREPARED BY COMPETENT DRAFTING PEOPLE ACCORDING TO GENERALLY ACCEPTED DRAFTING PRACTICES. THESE DRAWINGS AND SUBMITTAL DATA ON ALL ELECTRICAL EQUIPMENT (PANELBOARDS, LIGHT FIXTURES, ETC.) SHALL BE MODIFIED, AS NECESSARY, TO BECOME "AS BUILT" DOCUMENTS.
- C. SUBMITTALS SHALL CONSIST OF DETAILED SHOP DRAWINGS, SPECIFICATIONS, "CATALOG CUTS" AND DATA SHEETS CONTAINING PHYSICAL AND DIMENSIONAL INFORMATION, PERFORMANCE DATA, ELECTRICAL CHARACTERISTICS, MATERIALS USED IN FABRICATION, MATERIAL FINISH AND SHALL CLEARLY INDICATE THOSE OPTIONAL ACCESSORIES WHICH ARE INCLUDED AND THOSE WHICH ARE EXCLUDED.

E. SUBMIT MANUFACTURER'S DATA FOR:

- 1. LIGHTING FIXTURES.
- WIRING DEVICES AND DEVICE PLATES (ALL TYPES).
 FIRE ALARM DEVICES.
- 4. TRANSFORMERS.
- 5. DISCONNECT SWITCHES.
- 6. PANELBOARDS7. MOTOR STARTERS
- 8. METERS

1.10 DRAWINGS

A. LAYOUT: GENERAL LAYOUT SHOWN ON THE DRAWINGS SHALL BE FOLLOWED EXCEPT WHERE OTHER WORK MAY CONFLICT WITH OTHER EQUIPMENT. IN SUCH CASE, ENGINEER SHOULD BE NOTIFIED.

B. ACCURACY:

- 1. DRAWINGS FOR THE WORK UNDER THIS SECTION ARE DIAGRAMMATIC.
- 2. CONTRACTOR SHALL VERIFY LINES, LEVELS AND DIMENSIONS SHOWN ON THE DRAWINGS AND SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE SETTING OUT OF WORK AND FOR ITS STRICT CONFORMANCE WITH EXISTING CONDITIONS AT THE SITE

1.11 EQUIPMENT LOCATION

A. SURFACE MOUNTED PANELS, DEVICES, AND RACEWAY WILL ONLY
BE ALLOWED IN MECHANICAL EQUIPMENT AREAS OR WHERE SUCH
CONSTRUCTION ALREADY EXISTS.

1.12 WORKMANSHIP

- A. PREPARATION, HANDLING AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND TECHNICAL DATA PARTICULAR TO THE PRODUCT SPECIFIED AND/OR ACCEPTED EQUAL EXCEPT AS OTHERWISE SPECIFIED. COORDINATE WORK AND COOPERATE WITH OTHERS IN FURNISHING AND PLACING THIS WORK. REVIEW SHOP DRAWINGS FOR WORK DONE BY OTHER TRADES AND TO FIELD MEASUREMENTS AS NECESSARY TO PROPERLY FIT THE WORK.
- B. CONFORM TO THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION'S "STANDARD OF INSTALLATION" FOR GENERAL INSTALLATION PRACTICE.

1.13 SPECIAL TOOLS

1/4"=1'-0"

A. ALL SPECIAL TOOLS FOR PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED UNDER THIS SECTION SHALL BE DELIVERED TO THE OWNER'S REPRESENTATIVE.

1/2"=1'-0"

1.14 PROJECT RECORD DRAWINGS

- A. REFER TO GENERAL CONDITIONS. PROVIDE PROJECT RECORD DRAWINGS, SUCH DRAWINGS SHALL FULLY REPRESENT INSTALLED CONDITIONS, INCLUDING ACTUAL LOCATION OF OUTLETS, TRUE PANELBOARD CONNECTIONS FOLLOWING PHASE BALANCING ROUTINES, CORRECT CONDUIT AND WIRE SIZING AS WELL AS ROUTING, REVISED FIXTURE SCHEDULE LISTING THE MANUFACTURER AND PRODUCTS ACTUALLY INSTALLED AND REVISED PANEL SCHEDULE. CHANGES TO DRAWINGS SHALL BE MADE BY QUALIFIED DRAFTSPERSONS TO MATCH EXISTING LINEWORK AND LETTERING AS CLOSE AS POSSIBLE. CHANGES SHALL BE MADE ON REPRODUCIBLE MYLAR SEPIAS OF ORIGINAL DRAWINGS FURNISHED BY CONTRACTOR. DRAWINGS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
- B. TYPEWRITTEN PANEL SCHEDULES SHALL BE PROVIDED FOR PANELBOARDS INDICATING THE LOADS SERVED AND THE CORRECT BRANCH CIRCUIT NUMBER. SCHEDULES SHALL MATCH THE FORMAT SHOWN ON THE PANEL SCHEDULES CONTAINED ON THE CONTRACT DOCUMENTS.

1.15 CLEANING

A. AFTER OTHER WORK SUCH AS SANDING, PAINTING, ETC. HAS BEEN COMPLETED, CLEAN LIGHTING FIXTURES, PANELBOARDS, SWITCHBOARDS AND OTHER ELECTRICAL EQUIPMENT TO REMOVE DUST, DIRT, GREASE OR OTHER MARKS AND LEAVE WORK IN CLEAN CONDITION.

1.16 VOLTAGE CHECK

A. AT COMPLETION OF JOB, CHECK VOLTAGE AT SEVERAL POINTS OF UTILIZATION ON THE SYSTEM WHICH HAS BEEN INSTALLED UNDER THIS CONTRACT. DURING TEST. ENERGIZE INSTALLED LOADS.

1.17 TESTS

A. PERFORM TESTS AS SPECIFIED TO PROVE INSTALLATION IS IN ACCORDANCE WITH CONTRACT REQUIREMENTS. TESTS SHALL BE CONDUCTED DURING THE CONSTRUCTION PERIOD AND AT COMPLETION TO DETERMINE CONFORMITY WITH APPLICABLE CODES AND WITH THESE SPECIFICATIONS. TYPED RECORDS OF ALL THE FOLLOWING TESTS SHALL BE INCLUDED IN MAINTENANCE INSTRUCTIONS. TESTS, IN ADDITION TO SPECIFIC SYSTEM TEST DESCRIBED ELSEWHERE, SHALL INCLUDE:

- CIRCUIT CONTINUITY: TEST FEEDER AND BRANCH CIRCUITS
 FOR CONTINUITY. TEST NEUTRALS FOR IMPROPER GROUNDS.
- 2. EQUIPMENT OPERATIONS: TEST MOTORS FOR CORRECT OPERATION AND ROTATION.
- 3. CIRCUIT NUMBERING VERIFICATION: SELECT ON A RANDOM BASIS, VARIOUS CIRCUIT BREAKERS IN THE PANELBOARDS AND CYCLE THEM ON AND OFF TO VERIFY COMPLIANCE OF THE TYPED PANEL DIRECTORIES WITH ACTUAL FIELD WIRING.
- 4. PRODUCT FAILURE: PRODUCTS WHICH FAIL DURING THE TESTS OR ARE RULED UNSATISFACTORY BY THE ARCHITECT SHALL BE REPLACED, REPAIRED OR CORRECTED AS PRESCRIBED BY THE ARCHITECT AT THE EXPENSE OF THE CONTRACTOR. TESTS SHALL BE PERFORMED AFTER REPAIRS, REPLACEMENTS OR CORRECTIONS UNTIL SATISFACTORY PERFORMANCE IS DEMONSTRATED.
- MISCELLANEOUS: INCLUDE TEST RESULTS IN THE MAINTENANCE MANUAL. COST, IF ANY, FOR ALL TESTS SHALL BE PAID BY THE CONTRACTOR.
- 6. FIRE ALARM AND INTERLOCK SYSTEMS: PRODUCE MALFUNCTION SYMPTOMS IN OPERATING SYSTEMS TO TEST ALARM AND INTERLOCK SYSTEMS. EACH FIRE ALARM SIGNAL INITIATING DEVICE, INCLUDING ALL SMOKE DETECTORS, SHALL BE ACTIVATED TO VERIFY PROPER ZONE ANNUNCIATION AND ALARM SIGNAL INTERLOCKS. ACTIVATION OF IONIZATION TYPE SMOKE DETECTORS, BOTH CEILING AND DUCT TYPE, SHALL BE ACCOMPLISHED BY MEANS OF A SMOKE EMITTING DEVICE PER MANUFACTURER'S RECOMMENDATIONS. PHOTOELECTRIC TYPE SHALL BE TESTED BY INTERRUPTING LIGHT BEAM. CORRECT OPERATION OF ALARM CIRCUIT ANNUNCIATION IN THE FIRE ALARM ZONE ANNUNCIATION PANEL SHALL BE VERIFIED. ALL FIRE ALARM DEVICES, BOTH EXISTING AND NEW, INSTALLED ON THE TENANT FLOORS SHALL BE TESTED.
- 7. EMERGENCY LIGHTING AND EXIT LIGHT: CONTRACTOR SHALL TEST IN FIELD AFTER INSTALLATION EACH EMERGENCY LIGHT AND EXIT LIGHT. TEST RESULTS SHALL BE DOCUMENTED IN TYPE WRITTEN REPORT AND SUBMITTED TO ENGINEER.

SECTION 16100

BASIC MATERIALS & METHODS

PART I GENERAL

1.01 DESCRIPTION

- A. GENERAL: WORK SPECIFIED IN THIS SECTION ENCOMPASSES PRODUCTS, ASSEMBLIES AND BASIC INSTALLATION METHODS REQUIRED FOR ELECTRICAL PROJECT SYSTEMS SPECIFIED UNDER THIS SECTION AND INCLUDES, BUT IS NOT LIMITED TO:
- CONDUIT, RACEWAYS AND FITTINGS.
 WIRES AND CABLES.
- 3. WIRE CONNECTIONS AND DEVICES.
- OUTLET BOXES.
 PULL AND JUNCTION BOXES.
- SWITCHES AND RECEPTACLES.
 DEVICE PLATES.
- B. MOTOR STARTERS.
 DISCONNECT SWITCHES.
- 10. CIRCUIT BREAKERS.11. BRANCH CIRCUIT PANELBOARDS.
- 12. LOW VOLTAGE DRY—TYPE TRANSFORMERS13. LIGHTING FIXTURES

PART 2 PRODUCTS

3/4"=1'-0"

2.01 CONDUIT AND FITTINGS

- A. ELECTRICAL METALLIC TUBING:
- 1. CONDUIT: FORMED OF COLD ROLLED STRIP STEEL, ELECTRICAL RESISTANCE WELDED CONTINUOUSLY ALONG THE LONGITUDINAL SEAM AND HOT-DIP GALVANIZED AFTER FABRICATION. CONFORM TO ANSI C80.3 AND MEET UL REQUIREMENTS.

1"=1'-0" 0 6" 1' 2'

2. COUPLINGS: STEEL, ZINC PLATED SET SCREW COUPLINGS.
OZ/GEDNEY 5000 SERIES.

B. FLEXIBLE METALLIC CONDUIT:

- 1. CONDUIT: FABRICATED IN CONTINUOUS LENGTHS FROM GALVANIZED STEEL STRIP, SPIRAL WOUND AND FORMED TO PROVIDE AN INTERLOCKING DESIGN.
- 2. FITTINGS: ONE SCREW (USE TWO SCREW WHEN AVAILABLE)
 DOUBLE CLAMP VARIETY CONNECTORS WITH CAST MALLEABLE
 IRON BODIES AND THREADED MALE HUBS WITH INSULATED
 THROATS.
- C. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT:
- 1. CONDUIT: ANACONDA TYPE UA, COLEMAN TYPE UXT1.
- 2. FITTINGS: CONNECTOR BODY AND GLAN NUT SHALL BE OF CADMIUM PLATED CAST MALLEABLE IRON, WITH TAPERED, MALE THREADED HUB; INSULATED THROAT AND NEOPRENE "O" RING GASKET RECESSED INTO THE FACE OF THE STOP NUT. THE CLAMPING GLAND SHALL BE OF MOLDED NYLON

WITH AN INTEGRAL BRASS PUSH-IN FERRULE.

2.02 WIRES AND CABLES

A. GENERAL:

- 1. APPROVED MANUFACTURERS: AMERICAN INSULATED WIRE, SOUTHWIRE, ROME CABLE, OR TRIANGLE.
- 2. CONDUCTOR MATERIAL: ALL WIRE AND CABLE SHOWN ON THE DRAWINGS IS INSULATED COPPER CONDUCTOR UNLESS OTHERWISE NOTED.
- 3. MINIMUM CONDUCTOR SIZE: AWG NO. 12 FOR POWER AND LIGHTING BRANCH CIRCUITS. ALL BRANCH CIRCUITS EXCEEDING 100' SHALL UTILIZE #10 MINIMUM CONDUCTOR. AWG NO. 14 FOR SIGNAL AND CONTROL CIRCUITS UNLESS OTHERWISE NOTED ON THE DRAWINGS OR SPECIFIED HEREIN.
- 4. COLOR CODING: COLOR CODING SHALL CONFORM TO ALL LOCAL AND GOVERNING CODES, RULES AND REGULATIONS. SYSTEM CONDUCTORS SHALL BE IDENTIFIED AS TO VOLTAGE AND PHASE CONNECTIONS BY MEANS OF COLOR IMPREGNATED INSULATION OR APPROVED COLOR MARKING TAPE AS FOLLOWS:
- A. FOR 120/208 VOLT, 3 PHASE, 4 WIRE SYSTEMS:
 - PHASE A BLACK
 - PHASE B RED PHASE C — BLUE
 - NEUTRAL WHITE
 - GROUND GREEN ISOLATED GROUND —

GREEN WITH A YELLOW TRAVELER

- B. FOR 277/480 VOLT, 3 PHASE, 4 WIRE SYSTEMS:
 - PHASE A BROWN
 PHASE B ORANGE
 - PHASE C YELLOW
 - NEUTRAL GRAY
 GROUND GREEN
- B. SECONDARY WIRE, 0 TO 600 VOLTS:
- 1. NEC TYPE THHN FOR FEEDERS AND BRANCH CIRCUITS IN DRY LOCATIONS, THWN IN WET LOCATIONS.
- 2. NEC TYPE THHN FOR WIRE INSTALLED IN FIXTURE RACEWAYS AND USED AS BRANCH CIRCUIT FEEDERS IN DRY LOCATIONS.

2.03 WIRE CONNECTIONS AND DEVICES

- A. WIRE JOINTS: WIRES IN SIZES FROM NO. 18 TO NO. 8 AWG, SOLID OR STRANDED CONDUCTOR, WITH INSULATION RATED 105°C. OR LESS SHALL BE JOINED WITH ELECTRICAL SPRING CONNECTORS OF THREE-PART CONSTRUCTION INCORPORATING A NON-RESTRICTED, ZINC COATED STEEL SPRING ENCLOSED IN A STEEL SHELL WITH AN OUTER JACKET OF VINYL PLASTIC WITH A FLEXIBLE INSULATING
- B. MECHANICAL COMPRESSION CONNECTORS AND TAPS: STRANDED CONDUCTORS FROM NO. 6 AWG TO 750 MCM SHALL BE JOINED OR TAPPED USING BOLTED PRESSURE CONNECTORS HAVING CAST BRONZE COMPRESSION BOLTS. FITTINGS SHALL BE WIDE RANGE—TAKING AND DESIGNED TO FACILITATE THE MAKING OF PARALLEL TAPS, TEES, CROSSES OR END—TO—END CONNECTIONS.
- C. FIXTURE CONNECTIONS: SPLICE FIXTURE WIRE TO CIRCUIT WIRING WITH SOLDERLESS CONNECTORS IN ACCORDANCE WITH PARAGRAPH A, PART 2, 2.03.
- D. TERMINATING LUGS: CONDUCTORS FROM SIZE NO. 6 AWG TO 750 MCM, COPPER, SHALL BE TERMINATED USING TIN PLATED COPPER COMPRESSION LUGS ATTACHED WITH HAND OR HYDRAULICALLY OPERATED CRIMPING TOOLS AND DIES AS STIPULATED BY THE LUG MANUFACTURER. LUGS SHALL BE 3M "SCOTCHLOK" SERIES 30014, BURNDY TYPE Y-AL SERIES.
- E. SPLICING AND INSULATING TAPE (600 VOLTS AND BELOW): GENERAL PURPOSE ELECTRICAL TAPE SHALL BE SUITABLE FOR TEMPERATURES FROM MINIMUM 18°C. 105°C., SHALL BE BLACK, ULTRAVIOLET PROOF, SELF-EXTINGUISHING, 7 MIL THICK WITH A DIELECTRIC STRENGTH OF 10,000 VOLTS.
- F. INSULATING PUTTY (600 VOLTS AND BELOW): PADS OR ROLLS OF NON CORROSIVE, SELF-FUSING, 1/8 INCH THICK RUBBER PUTTY WITH PVC BACKING SHEET. PUTTY SHALL BE SUITABLE FOR TEMPERATURES FROM MINUS 17.8°C. TO 80°C. AND SHALL HAVE A DIELECTRIC STRENGTH OF 570 VOLTS/MIL MINIMUM.
- G. INSULATING RESIN: TWO-PART LIQUID EPOXY RESIN WITH RESIN AND CATALYST IN PREMEASURED, SEALED MIXING POUCH. RESIN SHALL HAVE A SETUP TIME OF APPROXIMATELY 30 MINUTES AT 21.1°C. AND SHALL HAVE THERMAL AND DIELECTRIC PROPERTIES EQUAL TO THE INSULATION PROPERTIES OF THE CABLES IMMERSED IN THE RESIN.
- H. TERMINAL STRIP CONNECTORS: TERMINATE WIRE IN LOCKING TONGUE STYLE, PRESSURE TYPE, SOLDERLESS LUG WHERE

0 3" 6"

3"=1'-0"

0 3" 6" 1'

1 1/2"=1'-0"

APPLICABLE.

2.04 OUTLET BOXES A. STANDARD OUTLET BOXES: GALVANIZED, ONE—PIECE, DIE FORMED OR DRAWN STEEL, KNOCK—OUT TYPE OF SIZE AND CONFIGURATION

2-1/2 INCH IN DEPTH.

B. CONCRETE RINGS: GALVANIZED STEEL, 4 INCH OCTAGON RINGS WITH MOUNTING LUGS, BACKPLATE AND ADAPTER RING AS

BEST SUITED TO THE APPLICATION INDICATED ON THE PLANS.

MINIMUM BOX SIZE, 2 INCH IN WIDTH, 3-1/2 INCH IN HEIGHT AND

- REQUIRED. SELECT HEIGHT AS NECESSARY TO POSITION KNOCKOUTS ABOVE CONCRETE REINFORCING STEEL.

 C. SWITCH BOXES: 2 INCH WIDE BY 3 INCH LONG GALVANIZED STEEL SWITCH BOXES USED FOR THE INSTALLATION OF SINGLE SWITCHES.
- D. TILE BOXES: OUTLET BOXES INSTALLED IN TILE; STEEL CITY GW SERIES, APPLETON M SERIES. STANDARD OUTLET BOXES WITH

RAISED, SQUARE CORNERED, DEVICE COVERS ARE ACCEPTABLE.

INSTALL MULTIPLE SWITCHES IN STANDARD GANG BOXES WITH

RAISED DEVICE COVERS SUITABLE FOR THE APPLICATION

E. CAST METAL OUTLET BOXES: 4 INCH, CAST IRON ALLOY WITH THREADED HUBS AND MOUNTING LUGS AS REQUIRED. BOXES SHALL BE FURNISHED WITH CAST COVER PLATES OF THE SAME MATERIAL AS THE BOX AND NEOPRENE COVER GASKETS. CROUSE—HINDS FS AND FD SERIES. APPLETON JBX SERIES.

2.05 PULL AND JUNCTION BOXES

- A. SHEET METAL BOXES: USE STANDARD OUTLET OR CONCRETE RING BOXES WHEREVER POSSIBLE, OTHERWISE USE MINIMUM 16 GAUGE GALVANIZED SHEET METAL. NEMA 1 BOXES, SIZED TO CODE REQUIREMENTS WITH COVERS SECURED BY CADMIUM PLATED MACHINE SCREWS LOCATED 6 INCHES ON CENTERS. CIRCLE AW PRODUCTS, HOFFMAN ENGINEERING COMPANY.
- B. CAST METAL BOXES: USE STANDARD CAST MALLEABLE IRON OUTLET OR DEVICE BOXES WHEREVER POSSIBLE; OTHERWISE USE CADMIUM PLATED, CAST MALLEABLE IRON JUNCTION BOXES WITH BOLT—ON, INTERCHANGEABLE CONDUIT HUB PLATES WITH NEOPRENE GASKETS. CROUSE HINDS SIDEWALK BOXES, TYPE WJBF OR APPLETON RS SERIES.

2.06 RECEPTACLES AND SWITCHES

A. GENERAL:

- 1. ALL GENERAL PURPOSE 20 AMPERE, 125/250 VOLT RECEPTACLES AND 120/277 VOLT SWITCHES (NEMA WD-1).
- 2. UNLESS OTHERWISE NOTED BY THE ARCHITECT, THE COLOR OF ALL DEVICES SHALL BE IVORY EXCEPT DEDICATED COMPUTER (ISOLATED GROUND) RECEPTACLES SHALL BE IVORY WITH AN ORANGE TRIANGLE
- 3. UNLESS OTHERWISE NOTED BY THE ARCHITECT, THE FINISH OF ALL DEVISE PLATES SHALL BE IVORY.

B. RECEPTACLES, NEMA 5-20R, 20 AMP, 125 VOLT, 2 POLE, 3 WIRE,

GROUNDING TYPE:

1. GENERAL PURPOSE SINGLE OUTLET SELF-GROUNDING, SIDE WIRED, WITH BINDING HEAD STAKED TERMINAL SCREW.

LEVITON 5351 OR EQUAL BY GENERAL ELECTRIC. PASS AND

- SEYMOUR, HUBBELL.

 2. GENERAL PURPOSE DUPLEX RECEPTACLES SELF-GROUNDING, SIDE WIRED, WITH BINDING HEAD STAKED TERMINAL SCREWS AND BREAK-OFF STRIP FOR TWO CIRCUIT WIRING. LEVITON 5342 OR EQUAL BY GENERAL ELECTRIC, PASS AND SEYMOUR,
- HUBBELL.

 3. ISOLATED GROUND DUPLEX RECEPTACLES SELF-GROUNDING, SIDE WIRED WITH BINDING HEAD STAKED TERMINAL SCREWS. LEVITON 5362-IG-I OR EQUAL BY GENERAL ELECTRIC, PASS

AND SEYMOUR. HUBBELL.

4. CLOCK RECEPTACLE/HANGER, SIDE WIRED WITH BINDING HEAD STAKED TERMINAL SCREWS. LEVITON 628—I OR EQUAL BY GENERAL ELECTRIC, PASS AND SEYMOUR, HUBBELL.

C. LIGHT SWITCHES: TWENTY AMPERE 120/277 VOLT, FAST

- MAKE-FAST BREAK, QUIET TYPE SWITCH WITH SILVER CADMIUM ALLOY CONTACTS, BINDING HEAD TERMINAL SCREWS, SIDE WIRED.

 1. SINGLE-POLE, SINGLE-THROW: LEVITON 1121 SERIES OR
- EQUAL BY GENERAL ELECTRIC, PASS AND SEYMOUR, HUBBELL

 2. DOUBLE-POLE, SINGLE-THROW: LEVITON OR EQUAL BY GENERAL ELECTRIC, PASS AND SEYMOUR, HUBBELL. MATCH
- THREE-WAY: LEVITON OR EQUAL BY GENERAL ELECTRIC, PASS AND SEYMOUR. HUBBELL. MATCH ITEM 1 STYLE.
- D. DIMMER(S) SHALL BE LUTRON NOVA T SERIES, SIZE AND DERATE IN ACCORDANCE WITH LUTRON'S RECOMMENDATIONS. SWITCHES AT DIMMER LOCATIONS SHALL BE LUTRON NOVA T SERIES. AT LOCATIONS WHERE BOTH DIMMER CONTROLS AND SWITCHES ARE SHOWN CONTRACTOR SHALL FURNISH AND INSTALL ONE—PIECE MULTIGANG FACEPLATE WHICH SHALL INCLUDE DIMMERS AND SWITCHES. UNLESS OTHERWISE NOTED BY THE ARCHITECT, THE COLOR OF ALL DIMMERS AND FACEPLATES SHALL BE IVORY.
- E. MOTOR RATED SWITCHES: FRACTIONAL HORSEPOWER MANUAL STARTERS WITH MELTING ALLOY TYPE THERMAL OVERLOAD RELAY, PILOT LIGHT AND LOCK-OFF/HANDLE GUARD. 1 OR 2 POLE, 115/230 VOLT. SQUARE D. CLASS 2510.

2.07 DEVICE PLATES

A. GENERAL:

- 1. FURNISH DEVICE PLATES FOR SWITCHES AND RECEPTACLES.
 DEVICE PLATE COLOR AND MATERIAL SHALL BE SELECTED BY
 ARCHITECT AT SUBMITTAL TIME REGARDLESS OF WHAT IS
 SPECIFIED BELOW.
- 2. PLATES: SMOOTH AND FREE OF GROOVES, EMBOSSING OR OTHER EMBELLISHMENT.
- 3. MOUNTING SCREWS: MATCH PLATE FINISH.
- 4. MARKER PLATES: PERMANENTLY ENGRAVED WITH 1/8 INCH HIGH PAINT FILLED LETTERS, UNLESS OTHERWISE NOTED.



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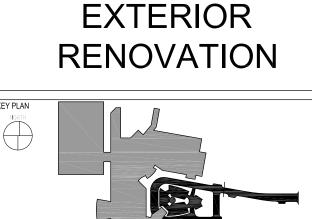
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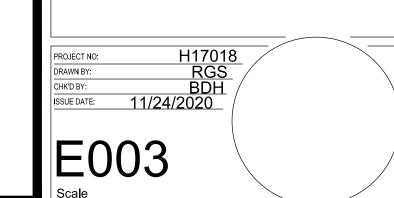




HR PHASE II & III

No. Description Date

SHEET TITLE
ELECTRICAL
SPECIFICATIONS



C. STAINLESS STEEL DEVICE PLATES: SOLID 0.032" THICK TYPE 430 WITH OPENINGS TO ACCOMMODATE DEVICES INDICATED ON THE DRAWINGS. LEVITON, PASS AND SEYMOUR, HUBBELL.

2.08 MOTOR STARTERS

A. FULL VOLTAGE STARTERS: ACROSS—THE—LINE, MAGNETIC TYPE, DOUBLE—BREAK SILVER ALLOY CONTACTS, GRAVITY DROP—OUT, MOLDED OPERATING COIL AND MELTING ALLOY THERMAL OVERLOAD RELAYS ON PHASE CONDUCTORS. 120V CONTROL WITH TRANSFORMER. SIZE: 0 MINIMUM. ALL LINE AND LOAD TERMINALS OF THE DEVICE RATED 100 AMPERES OR LESS SHALL BE RATED FOR 75°C.

B. OVERLOAD RELAYS AND THERMAL UNITS:

- 1. ELEMENTS FOR 100% FULL LOAD CURRENT FOR 55°C. RISE MOTORS OR 115% FULL LOAD CURRENT FOR 40°C. RISE MOTORS AND SHALL BE AMBIENT COMPENSATED.
- 2. IF THE OVERLOAD ELEMENTS ARE OF THE WRONG SIZE FOR THE NAMEPLATE RATING OF THE MOTOR, REPLACE WITH ELEMENTS OF THE CORRECT SIZE.

2.09 FIRE RATED POKE THROUGH

A. SERVICE FITTING: CAST ALUMINUM HOUSING WITH FINISH SELECTED BY ARCHITECT. REFER TO 2.06 FOR RECEPTACLE SPECIFICATION. PROVIDE COMPLETE BARRIER BETWEEN LOW TENSION AND 120 VAC SERVICE. SUBMIT TO ENGINEER PRIOR TO INSTALLATION.

2.10 SEPARATELY ENCLOSED COMBINATION STARTERS

A. MEET THE REQUIREMENTS OF MOTOR STARTERS. IN ADDITION, STARTER AND FUSED DISCONNECT DEVICE SHALL BE HOUSED TOGETHER IN ENCLOSURE OF REQUIRED TYPE MEETING OR EXCEEDING NEMA STANDARDS. GREEN "RUNNING" INDICATING LAMP WITH PUSH TO TEST FEATURE. HAND/OFF/AUTO CONTROL SWITCH ON COVER. 120 VOLT CONTROL VOLTAGE. NEMA 1 FOR INDOORS AND NEMA 3R FOR OUTDOORS OR AS SHOWN ON DRAWINGS. ALL LINE AND LOAD TERMINALS OF THE DEVICE RATED 100 AMPERES OR LESS SHALL BE RATED FOR 75°C.

2.11 DISCONNECT SWITCHES

- A. SWITCH INTERIOR: DEAD—FRONT CONSTRUCTION WITH HINGED ARC SUPPRESSER AND SWITCH BLADES WHICH ARE FULLY VISIBLE IN THE "OFF" POSITION AND WITH DOOR OPEN.
- B. SWITCH MECHANISM: QUICK-MAKE AND QUICK-BREAK OPERATING HANDLE AND MECHANISM WITH A DELETE DUAL COVER INTERLOCK TO PREVENT UNAUTHORIZED OPENING OF THE SWITCH DOOR IN THE "ON" POSITION OR CLOSING THE SWITCH MECHANISM WHILE THE DOOR IS OPEN. AN ELECTRICAL INTERLOCK SWITCH SHALL BE PROVIDED TO DEGENERIZE CONTROL WIRING AS REQUIRED. ALL LINE AND LOAD TERMINALS OF THE DEVICE RATED 100 AMPERES OR LESS SHALL BE RATED FOR 75°C.
- C. RATINGS: SWITCHES HORSEPOWER RATED FOR 600 VOLTS, 60 HZ AND WHERE INDICATED TO BE FUSED SHALL HAVE PROVISIONS FOR FUSES.
- D. ENCLOSURES: NEMA 1, CODE GAUGE SHEET STEEL WITH HINGED COVER, UNLESS USED WHERE EXPOSED TO THE WEATHER, IN WHICH CASE, USE NEMA 3R.

2.12 PROTECTIVE DEVICES

A. FUSED SWITCHES:

- 1. GENERAL: FUSED SWITCHES FOR SIZES 30 AMP THROUGH 1200 AMP.
- 2. FUSIBLE SWITCHES: QUICK-MAKE, QUICK-BREAK OF THE SIZES SHOWN ON THE DRAWINGS. APPROVED BY UNDERWRITER'S LABORATORIES AND, WHERE APPLICABLE, DUAL HORSEPOWER RATED FOR BOTH STANDARD ONE—TIME OR DUAL ELEMENT FUSES. ALL LINE AND LOAD TERMINALS OF THE DEVICE RATED 100 AMPERES OR LESS SHALL BE RATED FOR 75°C.
- 3. UNITS PADLOCKING: IN THE "OFF" POSITION AND THE OPERATING HANDLING POSITION SHALL GIVE POSITIVE SWITCH INDICATION, I.E., HORIZONTAL "OFF". DIAGONAL "ON". SWITCHES SHALL PASS INDUSTRY STANDARD I—SQUARED—T WITHSTANDABILITY TEST AND FUSE RACE TEST.

B. CIRCUIT BREAKERS:

- 1. CIRCUIT BREAKERS: INTERRUPTING CAPACITY AS NOTED ON THE DRAWINGS AND IF NOT SHOWN, BREAKERS FOR 208 VOLT SYSTEM SHALL HAVE INTERRUPTING CAPACITY OF NOT LESS THAN 10,000 AMPS. CIRCUIT BREAKERS FOR 480 VOLT SYSTEM SHALL HAVE A MINIMUM INTERRUPTING RATING OF 18,000 AMPS. CIRCUIT BREAKERS MOLDED CASE, TRIP INDICATING, THERMAL MAGNETIC TYPE, 40°C., AMBIENT TEMPERATURE COMPENSATED 40°C. RATED OR AMBIENT COMPENSATED. ALL LINE AND LOAD TERMINALS OF THE DEVICE RATED 100 AMPERES OR LESS SHALL BE RATED FOR 75°C.
- 2. FACTORY CERTIFICATION OF TRIP CHARACTERISTICS PROVIDED WITH THE SUBMITTALS FOR EVERY CIRCUIT BREAKER.
- 3. COVERS: SEALED ON NON-INTERCHANGEABLE TRIP BREAKERS AND TRIP UNIT COVERS SEALED ON INTERCHANGEABLE TRIP BREAKERS TO PREVENT TAMPERING. BREAKER CIRCUIT RATINGS CLEARLY VISIBLE AFTER INSTALLATION OR ENGRAVED NAMEPLATES STATING THE RATING. FERROUS PARTS PLATED TO MINIMIZE CORROSION.
- 4. BREAKERS: BOLT ON, TOGGLE, QUICK-MAKE AND QUICK-BREAK OPERATING MECHANISMS WITH TRIP-FREE FEATURE TO PREVENT CONTACTS BEING HELD CLOSED AGAINST OVERCURRENT CONDITIONS IN THE CIRCUIT. TRIP POSITION OF THE BREAKERS SHALL BE CLEARLY INDICATED BY OPERATING HANDLES MOVING TO A CENTER POSITION.
- 5. MAGNETIC TRIP ELEMENT: EACH POLE BEING INDIVIDUALLY CALIBRATED. MULTIPLE BREAKERS SHALL HAVE A SINGLE HANDLE TO OPEN AND CLOSE CONTACT SIMULTANEOUSLY IN BOTH MANUAL OPERATING AND UNDER AUTOMATIC TRIPPING. INTERPOLE BARRIERS SHALL BE PROVIDED INSIDE THE BREAKER TO PREVENT ANY PHASE—TO—PHASE FLASHOVER. EACH POLE OF THE BREAKERS SHALL HAVE ADEQUATE

1/8"=1'-0"

MEANS OF ARC EXTINCTION.

- 6. CIRCUIT BREAKERS OF STANDARD RATINGS: UNDERWRITER'S LABORATORIES, INC. LABEL AND NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION PUBLICATION AB-1-1975.
- 7. ALL 20 AMP CIRCUIT BREAKERS SHALL BE RATED FOR FREQUENT SWITCHING, SWD RATING.

C. FUSES, UNLESS OTHERWISE NOTED ON THE DRAWINGS:

1. MOTOR CIRCUITS, FEEDERS AND FEEDERS FOR CIRCUIT BREAKER PANEL BOARDS — DUAL ELEMENT FUSES: 0-600 AMPS, BUSSMAN LOW-PEAK (LPN-RK, LPS-RK), CLASS RK-1.

2.13 ELECTRICAL SUPPORTING DEVICES

- A. CONCRETE FASTENERS: PHILLIPS "RED—HEAD". POWER DRIVEN CONCRETE PIN FASTENERS, LOW VELOCITY TYPE. POWER DRIVEN FASTENERS SHALL BE REMINGTON, RAMSET OR HILTI POWER DRIVEN CONCRETE PIN FASTENERS. LOW VELOCITY TYPE.
- B. CONDUIT STRAPS: HOT-DIP GALVANIZED, CAST MALLEABLE IRON, ONE HOLE TYPE STRAP WITH CAST CLAMP-BACKS AND SPACERS AS REQUIRED. OZ/GEDNEY NO. 14-50G STRAP AND NO. 141G SPACER; EFCOR NO. 23L STRAP AND NO. 131 SPACER.
- C. CONCRETE INSERTS: PRESSED GALVANIZED STEEL, SPOT INSERT WITH OVAL SLOT CAPABLE OF ACCEPTING SUPPORT NUTS OF 1/4 INCH TO 1/2 INCH DIAMETER THREAD. UNISTRUT NO. M2506 SERIES, GLOBE-STRUT CSI SERIES.
- D. CONSTRUCTION CHANNEL: 1 5/8 INCH BY 1 5/8 INCH 12 GAUGE GALVANIZED STEEL CHANNEL WITH 17/32 INCH DIAMETER BOLT HOLES, 1-1/2 INCH ON CENTER, IN THE BASE OF THE CHANNEL. KINDORF 905 SERIES, UNISTRUT P-1000-HS.
- E. CABLE TIES AND CLAMPS: THOMAS AND BETTS CO. "TY-RAPS" PANDUIT "PAN-TY", ONE-PIECE, NYLON, REUSABLE TYPE LASHING TIES.
- F. FASTENERS (GENERAL): WOOD SCREWS FOR FASTENING TO WOOD.
 MACHINE SCREWS FOR FASTENING TO STEEL. TOGGLE BOLTS FOR
 FASTENING TO GYPSUM BOARD OF PLASTER WALLS. EXPANSION
 ANCHORS FOR ATTACHMENTS TO PREPOURED CONCRETE.

2.14 FIRE ALARM SYSTEM

A. ALL FIRE ALARM SYSTEM COMPONENTS SHALL BE BASE BUILDING UNLESS OTHERWISE NOTED.

2.15.1 BRANCH CIRCUIT PANELBOARDS

- A. MANUFACTURE SHALL BE CUTLER—HAMMER, SQUARE D, GENERAL ELECTRIC, CHALLENGER OR ITE SIEMENS..
- B. CONSTRUCTION: CABINETS SHALL BE PROVIDED WITH STRETCHER LEVELED, STEEL DOORS AND TRIM OF CODE THICKNESS, COMPLETE WITH CONCEALED BUTT HINGES. PROVIDE COMBINATION SPRING CATCH AND LOCK ON INSIDE EDGE OF DOOR TRIMS WITH FLUSH FITTING JOINT BETWEEN DOOR AND TRIM. LOCKS ON ALL PANELBOARDS SHALL BE KEYED ALIKE.

C. BUS ASSEMBLY:

- 1. BUS SHALL BE PLATED ALUMINUM WITH TAPS ARRANGED FOR "DISTRIBUTED PHASE" CONNECTIONS TO BRANCH CIRCUIT BREAKERS.
- 2. SPACE CONNECTORS SHALL BE DRILLED AND TAPPED FOR BOLT ON CIRCUIT BREAKER CONNECTIONS, ARRANGED FOR DOUBLE ROW PLACEMENT OF BREAKERS AND DESIGNED TO PERMIT REMOVAL OR ADDITION OF PROTECTIVE DEVICES WITHOUT DISTURBING ADJACENT BREAKERS OR REMOVING MAIN BUS CONNECTIONS.
- D. FINISH: FIVE—STEP ZINC PHOSPATIZING PRE—TREATMENT, ONE COAT RUST INHIBITING DICHROMATE PRIMER, ONE COAT BAKED—ON ENAMEL.
- E. TERMINAL LUGS: APPROVED FOR USE WITH COPPER CONDUCTORS.
- F. MISCELLANEOUS REQUIREMENTS:
- 1. CIRCUIT NUMBERING: STARTING AT THE TOP, ODD NUMBERED CIRCUITS IN SEQUENCE DOWN THE LEFT HAND SIDE AND EVEN NUMBERED CIRCUITS DOWN THE RIGHT HAND SIDE.
- 2. DIRECTORIES: A CIRCUIT DIRECTORY FRAME AND CARD WITH CLEAR PLASTIC COVERING SHALL BE PROVIDED INSIDE THE PANEL DOOR.
- 3. EQUIPMENT GROUND BUS: PROVIDE A SEPARATE EQUIPMENT GROUNDING BUS.
- 4. REFER TO PANEL SCHEDULES AND ELECTRICAL DRAWINGS FOR THE FOLLOWING:
- A. SERVICE VOLTAGE.
 B. TERMINAL LUG SIZE, LOCATION AND QUANTITY. (WHERE NOT SPECIFIED, USE ARRANGEMENT COMPATIBLE WITH EXTERNAL
- WIRING.)
 C. BUS AMPACITY.
 D. INTERRUPTING CAPACITY OF BUS AND BREAKERS. (USE BREAKER
- RATING SPECIFIED IN SECTION 16100 WHEN NOT SPECIFIED ON SCHEDULE).

 E. QUANTITY, POLES AND RATING OF PROTECTIVE DEVICES.

2.16 LOW VOLTAGE K-RATED DRY-TYPE TRANSFORMER

A. SHALL HAVE THE FOLLOWING FEATURES:

- 1. SELF-COOLED BY NATURAL CONVECTION, ISOLATING WINDINGS, INDOOR, DRY TYPE APPROVED BY THE UL. AUTOTRANSFORMERS WILL NOT BE ACCEPTED.
- 2. RATINGS AND WINDING CONNECTIONS SHALL BE AS INDICATED ON THE DRAWINGS. UNLESS OTHER SPECIFIED TRANSFORMERS SHALL BE 480–208Y/120V, DELTA CONNNECTED PRIMARY AND WYE CONNECTED SECONDARY.
- 3. RATINGS INDICATED ARE FOR CONTINUOUS DUTY WITHOUT THE USE OF COOLING FANS.
- 4. TEMPERATURE RISE SHALL NOT EXCEED 150°C WITH LIMITING TEMPERATURE IN ACCORDANCE WITH NEMA STANDARDS.

1/2"=1'-0"

5. CORE AND COIL ASSEMBLIES:

1/4"=1'-0"

- A. RIGIDLY BRACED TO WITHSTAND THE STRESSES CAUSED BY SHORT CIRCUIT CURRENTS AND ROUGH HANDLING DURING SHIPPING.
- B. CORES SHALL BE COMMON CORE CONSTRUCTION HAVING LOW HYSTERISIS AND EDDY CURRENT LOSSES. CORE FLUX DENSITY SHALL BE BELOW SATURATION PINT AT RATED HARMONIC AND 60 HERTZ LOADS.
- C. COILS SHALL BE CONTINUOUS WINDINGS WITHOUT SPLICES EXCEPT FOR TAPS.
- D. COIL LOSS AND CORE LOSS SHALL BE OPTIMUM FOR EFFICIENT OPERATION.
- E. PRIMARY, SECONDARY AND TAP CONNECTIONS SHALL BE BRAZED OR PRESSURE TYPE.
- B. SOUND LEVELS SHALL NOT EXCEED THE FOLLOWING MAXIMUM LEVELS IN ACCORDANCE WITH NEMA STANDARDS:
- 1. 25-50 KVA, 45 DB
- 2. 51–150 KVA, 50 DB 3. 151–300 KVA, 55 DB
- C. IMPEDANCE SHALL CONFORM TO NEMA STANDARDS WITH A MINIMUM OF 3.2 PERCENT AND MAXIMUM OF 5.2 PERCENT.
- D. CORE ASSEMBLIES SHALL BE GROUNDED TO THEIR ENCLOSURES BY ADEQUATE, FLEXIBLE, GROUND STRAPS.

E. ENCLOSURES:

- 1. NOT LESS THAN CODE GAUGE STEEL
- 2. TEMPERATURE RISE AT HOTTEST SPOT SHALL CONFORM TO NEMA STANDARDS.
- 3. VENTILATION OPENINGS SHALL PREVENT ACCIDENTAL ACCESS TO LIVE COMPONENTS.
- 4. THOROUGHLY CLEAN AND PAINT AT THE FACTORY WITH PRIMER AND MANUFACTURER'S STANDARD FINISH.
- F. STANDARD NEMA FEATURES AND ACCESSORIES INCLUDING GROUND PAD, LIFTING PROVISIONS AND NAMEPLATE WITH THE WIRING DIAGRAM AND SOUND LEVEL INDICATED.
- G. DIMENSIONS AND CONFIGURATIONS SHALL CONFORM TO THE SPACES DESIGNATED FOR THEIR INSTALLATIONS.
- H. THE NEUTRAL BUS SHALL BE SIZED AND CONFIGURED FOR A MINIMUM CAPACITY OF 200% OF THE FULL LOAD CURRENT.
- I. FULL CAPACITY TAPS SHALL BE PROVIDED ON THE PRIMARY SIDE OF THE TRANSFORMER HAVING TWO 2.5% ABOVE NORMAL AND FOUR 2.5% BELOW NORMAL.
- J. TRANSFORMER SHALL BE UL LISTED FOR THE REQUIRED K RATING.
- K. TRANSFORMER SHALL INCORPORATE AN ELECTROSTATIC SHIELD GROUNDED TO THE TRANSFORMER CORE FOR ATTENUATION OF SPIKES, LINE NOISE AND TRANSIENTS.
- L. USE PEABODY ISOLATION HANGERS MODEL SFH AT ALL—THREADS FOR SUSPENDED TRANSFORMERS WITH PEABODY MODEL NGD ISOLATION PADS BETWEEN TRANSFORMER AND ITS SUPPORTING STRUCTURE. USE PEABODY MODEL RD ISOLATION PADS FOR FLOOR MOUNTED TRANSFORMERS.
- M. MANUFACTURER: CUTLER—HAMMER/WESTINGHOUSE, SQUARE D, GENERAL ELECTRIC, CHALLENGER, OLSUN OR ITE SIEMENS.

1"=1'-0" 0 6" 1' 2'

3/4"=1'-0"

0 3" 6"

3"=1'-0"

0 3" 6" 1'

1 1/2"=1'-0"



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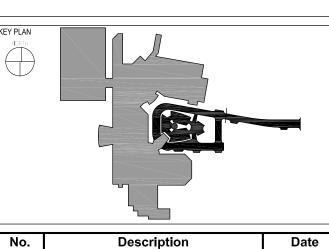
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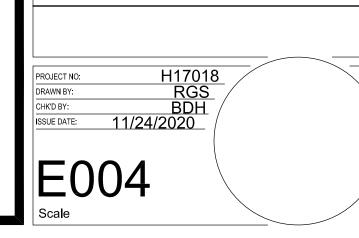


HR PHASE II & III EXTERIOR RENOVATION



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SHEET TITLE
ELECTRICAL
SPECIFICATIONS



1.1 SUMMARY

- A. SECTION DESCRIBES THE PRODUCTS AND EXECUTION REQUIREMENTS RELATING TO FURNISHINGS AND INSTALLATION OF HORIZONTAL CABLING, COPPER AND FIBER BACKBONES ALONG WITH RELATED SUB-SYSTEMS AS PART OF A STRUCTURED CABLING SYSTEM ARE COVERED UNDER THIS DOCUMENT.
- B. PRODUCT SPECIFICATIONS, GENERAL DESIGN CONSIDERATIONS, AND INSTALLATION GUIDELINES ARE PROVIDED IN THIS DOCUMENT. QUANTITIES FOR ALL STRUCTURED CABLING PRODUCTS SHALL BE PROVIDED AS REQUIRED TO COMPLETE THE HORIZONTAL CABLING FOR ALL WORK STATIONS AS SHOWN ON FLOOR PLANS.
- C. THIS SECTION DESCRIBES THE PRODUCTS AND EXECUTION REQUIREMENTS RELATING TO FURNISHING AND INSTALLATION OF TELECOMMUNICATIONS CABLING AND TERMINATION COMPONENTS AND WORK ALSO INCLUDES REMOVAL AND RECYCLING OF UNUSED, UNDOCUMENTED AND OTHERWISE "ABANDONED" CABLES AS IDENTIFIED IN PART 3 OF THIS SECTION UNDER "SALVAGE MATERIALS".
- THE SAME MANUFACTURER'S PRODUCT SHALL BE UTILIZED THROUGHOUT THE ENTIRE PROJECT FOR ALL COPPER AND FIBER OPTIC STRUCTURED
- E. SUBSTITUTIONS: NO SUBSTITUTED PRODUCTS SHALL BE INSTALLED EXCEPT WITH WRITTEN APPROVAL BY OWNER.
- 1.2 SYSTEM DESCRIPTION

A. GENERAL:

- FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND SERVICES FOR THE INSTALLATION IN ACCORDANCE WITH GENERAL PROVISIONS OF SPECIFICATIONS AND THE CONTRACT DRAWINGS.
- 2. COMPLETELY COORDINATE WITH WORK OF ALL OTHER TRADES.
- PROVIDE ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES AND DEVICES INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION, WHETHER OR NOT SPECIFICALLY INDICATED IN THE CONTRACT DOCUMENTS.
- PROVIDE ALL FLOOR PENETRATIONS, FLOOR SLEEVES, CONDUIT RACEWAYS, WALL PENETRATIONS, ETC. NOT SHOWN ON THE ELECTRICAL PLANS BUT NEEDED FOR THE ROUTING OF CABLING PROVIDED HEREIN.
- 5. PROVIDE LABOR FOR TESTING HORIZONTAL AND BACKBONE CABLING.
- 6. PROVIDE RE-ENTERABLE FIRE STOPPING.
- 7. PROVIDE TELECOMMUNICATIONS BONDING AND GROUNDING SYSTEM.
- B. PROVIDE COMPLETE INSTALLATION FOR STRUCTURED CABLING SYSTEM AND PHYSICAL SUPPORT SYSTEM INCLUDING BUT NOT LIMITED TO:
- BACKBONE PATHWAY: CONFORM TO EIA/TIA-569-B USING CONDUIT AS
- HORIZONTAL PATHWAY: CONFORM TO EIA/TIA-569-B USING CONDUIT AS INDICATED
- PREMISE WIRING: BY CONTRACTOR. COMPLETE FROM FACILITY ENTRANCE TO EACH OUTLET, USING WIRING, CABLE, EQUIPMENT, AND DEVICES AS SPECIFIED OR NOT SPECIFICALLY MENTIONED OR SHOWN, WHICH MAY BE NECESSARY TO COMPLETE OR PERFECT ALL PARTS OF THE INSTALLATION.
- 4. CATEGORY 6 UTP HORIZONTAL CABLES.
- 5. SINGLE-MODE AND MULTI-MODE OPTICAL FIBER BACKBONE CABLES.
- 6. WORK AREA TELECOMMUNICATION OUTLETS
- 7. WALL MOUNTED OUTLETS.
- 8. EQUIPMENT MOUNTING RACKS AND RACK ENCLOSURES.
- 9. CATEGORY 6 SHIELDED MODULAR AND DISCRETE PATCH PANELS.
- 10. OPTICAL FIBER ENCLOSURES.
- 11. OPTICAL FIBER CONNECTORS.
- 12. CATEGORY 6 SHIELDED PATCH AND EQUIPMENT CORDS
- 13. OPTICAL FIBER PATCH CORDS
- 14. WIRE MANAGEMENT
- 15. FIELD TESTING.
- 16. CONDUIT FLOOR SLEEVES, CONDUIT AND SUPPORTS REQUIRED FOR INSTALLATION OF ALL CABLING.
- 17. RE-ENTERABLE FIRE STOPPING.
- 1.3 RELATED SECTIONS
- A. APPLICABLE PROVISIONS OF DIVISION 1 GOVERN WORK UNDER THIS SECTION.
- B. DIVISION 26 SECTION "COMMON WORK RESULTS FOR ELECTRICAL"
- C. DIVISION 26 SECTION "GROUNDING AND BONDING"
- D. DIVISION 26 SECTION "RACEWAY AND BOXES"
- E. DIVISION 26 SECTION "WIRING DEVICES"
- F. SECTION 281300 ACCESS CONTROL
- G. SECTION 282300 VIDEO SURVEILLANCE
- 1.4 REFERENCES
- A. DESIGN, CONSTRUCT, TEST AND INSTALL TELECOMMUNICATIONS CABLING NETWORKS PER MANUFACTURER'S REQUIREMENTS AND IN ACCORDANCE STATE CODES, LOCAL CODES, AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (AHJ). DEMONSTRATE A THOROUGH KNOWLEDGE AND UNDERSTANDING OF ALL CURRENT INDUSTRY STANDARDS AND INSTALLATION MANUALS THAT RELATE PRINCIPALLY TO THE FOLLOWING STANDARDS:
- 1. NFPA 70 -- NATIONAL ELECTRICAL CODE (NEC)
- 2. NFPA 101 —— LIFE SAFETY CODE
- 3. ANSI/NECA/BICSI 568-2006 -- STANDARD FOR INSTALLING COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING

1/8"=1'-0"

4. ANSI/TIA STANDARDS:

- a. ANSI/TIA-568-C.O -- GENERIC TELECOMMUNICATIONS CABLING FOR CUSTOMER PREMISES
- b. ANSI/TIA-568-C.1 -- COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARD
- ANSI/TIA-568-C.2 -- BALANCED TWISTED-PAIR TELECOMMUNICATION CABLING AND COMPONENTS STANDARD
- d. ANSI/TIA-568-C.3 -- OPTICAL FIBER CABLING COMPONENTS STANDARD
- e. TIA-569-B -- COMMERCIAL BUILDING STANDARD FOR TELECOMMUNICATIONS PATHWAYS AND SPACES
- ANSI-J-STD-607-B -- COMMERCIAL BUILDING GROUNDING (EARTHING) AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
- ANSI/TIA-758-A -- CUSTOMER-OWNED OUTSIDE PLANT TELECOMMUNICATIONS INFRASTRUCTURE STANDARD
- ANSI/TIA-606-A -- ADMINISTRATIVE STANDARD FOR COMMERCIAL TELECOMMUNICATIONS INFRASTRUCTURE
- TIA-1152 -- REQUIREMENTS FOR FIELD TEST INSTRUMENTS AND MEASUREMENTS FOR BALANCED TWISTED-PAIR CABLING
- NECA/FOA-301-2009 -- STANDARD FOR INSTALLING AND TESTING
- 5. INSTALL CABLING IN ACCORDANCE WITH THE MOST RECENT EDITION OF **BICSI PUBLICATIONS:**
- a. BICSI TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL (TDMM)
- b. BICSI -- INFORMATION TECHNOLOGY SYSTEMS INSTALLATION

METHODS MANUAL (ITSIMM)

- c. BICSI NETWORK DESIGN REFERENCE DESIGN MANUAL (NDRM)
- d. BICSI —— OUTSIDE PLANT DESIGN REFERENCE MANUAL (OSPDRM)
- e. BICSI —— WIRELESS DESIGN REFERENCE MANUAL (WDRM)
- ANSI/BICSI 005-2013 -- ELECTRONIC SAFETY AND SECURITY (ESS) SYSTEM DESIGN AND IMPLEMENTATION BEST PRACTICES
- BICSI -- ELECTRONIC SAFETY AND SECURITY REFERENCE MANUAL
- h. INFOCOMM/BICSI —— AUDIO VISUAL DESIGN REFERENCE MANUAL (AVDRM)
- NECA/BICSI 607-2011 -- STANDARD FOR TELECOMMUNICATIONS BONDING AND GROUNDING PLANNING AND INSTALLATION METHODS FOR COMMERCIAL BUILDINGS

1.5 SUBMITTALS

- A. SEE DIVISION 1 SECTION "SUBMITTAL PROCEDURES" FOR SUBMITTING PRODUCT DATA.
- B. PRODUCT DATA: PROVIDE THE MOST CURRENT CATALOG DATA FOR ALL PRODUCTS SPECIFIED AND SHOWN ON DRAWINGS, THESE SPECIFICATIONS AND CONTRACT DOCUMENTS.
- C. SHOP DRAWINGS: THE CONTRACTOR SHALL SUBMIT COMPLETE INFORMATION (SHOP DRAWINGS AND EQUIPMENT SUBMITTALS) ON PROPOSED ITEMS IN THIS DIVISION OF THE SPECIFICATIONS TO THE ENGINEER AND OR OWNER FOR REVIEW. SUCH SUBMITTALS SHALL INDICATE WHERE THE PROPOSED EQUIPMENT OR MATERIAL WILL BE INSTALLED AND SHALL INCLUDE SUFFICIENT MANUFACTURER'S INFORMATION TO DETERMINE THAT THE MATERIAL IS IN ACCORDANCE WITH THESE SPECIFICATIONS.
- D. FIELD QUALITY-CONTROL TEST REPORTS.
- WARRANTIES: THE CONTRACTOR SHALL WARRANTY THE EQUIPMENT AND THE INSTALLATION THEREOF FROM DEFECT FOR A PERIOD OF TWENTY (20) YEARS AFTER FINAL ACCEPTANCE OF THE BUILDING (UNLESS NOTED OTHERWISE FOR A SPECIFIC ITEM OF EQUIPMENT OR INDICATED OTHERWISE IN THE GENERAL OR SUPPLEMENTAL CONDITIONS)

1.6 PROJECT RECORDS

- A. SEE DIVISION 1 SECTION "PROJECT RECORD DOCUMENTS" FOR SUBMITTING RECORD DRAWINGS, RECORD SPECIFICATIONS AND RECORD PRODUCT DATA
- B. PROVIDE PROJECT MEP RECORD DRAWINGS, SUCH DRAWINGS SHALL FULLY REPRESENT INSTALLED CONDITIONS, INCLUDING ACTUAL LOCATION OF OUTLETS AND LABELING OF OUTLETS. THE RECORD WILL SHOW THE CABLE NAME, AND MUST DESCRIBE THE ORIGIN POINT AND DESTINATION POINT OF THE CABLE. THE CABLE RECORD WILL PROVIDE FIELDS FOR WHAT SERVICES AND/OR CONNECTIONS ARE ASSIGNED TO EACH CABLE PAIR OR OPTICAL FIBER STRAND INCLUDED IN THE INFRASTRUCTURE. RECORDS MUST BE MAINTAINED IN A COMPUTER WORKSHEET, OR IN A COMPUTER DATABASE, E.G. MICROSOFT EXCEL 2010. A CABLE RECORD IS PREPARED FOR EACH BACKBONE CABLE. FULL ELECTRONIC FILE SET OF THE RECORD DRAWINGS SHALL BE MADE BY QUALIFIED DRAFTSPERSONS TO MATCH EXISTING LINE WORK AND LETTERING AS ACCURATE AS POSSIBLE.
- C. LABELING AND ADMINISTRATION DOCUMENTATION
- D. MANUFACTURERS EXTENDED WARRANTY
- E. COPPER AND OPTICAL CABLE CERTIFICATION TEST RESULTS AND FILES IN
- OPTICAL FIBER POWER METER/LIGHT SOURCE TEST RESULTS IN DIGITAL

1.7 QUALITY ASSURANCE

- A. ALL DIVISION 27 DESIGN SERVICES SHALL BE DIRECTLY PERFORMED BY A BICSI (BUILDING INDUSTRY CONSULTING SERVICE) RCDD (REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER) HAVING A MINIMUM OF FIVE (5) YEARS ACTIVE DESIGN EXPERIENCE UNDER THIS CREDENTIAL. SPECIFIC DUTIES ASSIGNED TO THE RCDD SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING: ALL ASPECTS OF STRUCTURED CABLING, RACK ELEVATIONS, PATHWAYS, ENTRANCES, GROUNDING AND BONDING, ETC. THE ARCHITECT/DESIGNER SHALL BE RESPONSIBLE TO ASSURE THAT OTHER MEP FUNCTIONS DO NOT INTERFERE WITH, OR OTHERWISE INFRINGE UPON, CRITICAL ELEMENTS OF THE DESIGN.
- B. THE STRUCTURED CABLING SYSTEM SHALL BE PANDUIT ALONG WITH BELDEN CABLING SYSTEMS. THE TELECOMMUNICATION TECHNICIANS EMPLOYED SHALL CERTIFIED, FULLY TRAINED AND QUALIFIED IN THE INSTALLATION AND ESTING OF THE EQUIPMENT TO BE INSTALLED. EVIDENCE THAT THE CONTRACTOR AND ITS TECHNICIANS ARE QUALIFIED TO INSTALL THIS EQUIPMENT SHALL BE INCLUDED WITH SHOP DRAWING SUBMITTALS. THE CONTRACTOR SHALL HAVE AS AN EMPLOYEE AT LEAST ONE BICSI RCDD ON

- STAFF.
 - . MANUFACTURER CERTIFICATIONS SHALL NOT BE PROJECT SPECIFIC AND SHOULD BE VALID FOR ANY AND ALL PROJECTS COMPLETED BY
-). THE CONTRACTOR FOR ALL NEW CONSTRUCTION INVOLVING RENOVATIONS OR REMODELING IN ANY BUILDINGS OR STRUCTURES WERE A 20-YEAR EXTENDED SYSTEM WARRANTY IS IN EFFECT SHALL BE AN APPROVED AND AUTHORIZED INSTALLER OF THE EXISTING INSTALLED SYSTEM. ANY NEW COMMUNICATIONS CABLING SHALL BE OF THE SAME MANUFACTURER AND WARRANTY UPDATED TO INCLUDE ANY NEW INSTALLATIONS.
- THE ONSITE SUPERVISOR AND/OR PROJECT LEAD OF THE INSTALLATION TEAM SHALL BE CURRENT WITH THE MANUFACTURER'S PARTNER TRAINING REQUIREMENTS AS A MINIMUM REQUIREMENT PRIOR TO, DURING AND THE CLOSING OF THE PROJECT.
- MATERIAL AND EQUIPMENT SHALL BE NEW, AND CONFORM TO GRADE, QUALITY, AND STANDARDS SPECIFIED. EQUIPMENT AND MATERIALS OF THE SAME MANUFACTURER
- . SUBCONTRACTORS SHALL ASSUME ALL RIGHTS AND OBLIGATIONS TOWARD THE CONTRACTOR ASSUMES TOWARD THE OWNER AND ENGINEER/DESIGNER

PART 2 - PRODUCTS

2.20 CABLE AND WIRING

A. HORIZONTAL CABLE

- . PLENUM CAT-6 BELDEN MEDIA TWIST BONDED-PAIR NETWORK CABLE 1874A OR APPROVED EQUAL WILL BE ALLOWED FOR ALL INDOOR CATEGORY 6 SHIELDED PREMISE CABLING CHANNELS, CONNECTING
- HARDWARE, PATCH PANELS, FACEPLATES OR MOUNTING FRAMES CONTAINED WITHIN SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES CONFORMING TO THE REQUIREMENTS OF THE WORK AND OF THE CONTRACT DOCUMENTS. 2. <u>CORNING LANSCAPE SOLUTIONS</u> OR APPROVED EQUAL WILL BE ALLOWED FOR ALL INDOOR OR OUTDOOR OPTICAL FIBER PREMISES CABLING,
- CONTRACT DOCUMENTS. 3. WHERE NO MANUFACTURER IS SPECIFIED OR COLOR AVAILABLE, PROVIDE PRODUCTS OF MANUFACTURERS IN COMPLIANCE WITH REQUIREMENTS. SUBSTITUTE WITH EQUIVALENT IN SPECIFICATIONS. SUBMIT FOR OWNER'S

CONNECTING HARDWARE. PATCH PANELS. FACEPLATES OR MOUNTING

SAMPLES CONFORM TO THE REQUIREMENTS OF THE WORK AND OF THE

FRAMES CONTAINED WITHIN SHOP DRAWINGS, PRODUCT DATA, AND

- 4. THE COMPONENTS AND CABLE SHALL BE FROM THE COMPONENT MANUFACTURER'S APPROVED SYSTEM AND ALL OF THE PRODUCTS SHALL BE MANUFACTURED BE ONE OF THE APPROVED MANUFACTURERS OR DOCUMENTED AND APPROVED EXCEPTION AND SHALL BE INCLUDED MITHIN THE WARRANTY.
- 5. PROVIDE PRODUCTS OF MANUFACTURERS AS NAMED IN INDIVIDUAL ARTICLE SECTIONS.
- NOTICE*** THIRD PARTY INSTALLED PREMISE CABLING SYSTEMS THAT ARE NOT INCLUDED IN THIS SECTION SHALL BE AN ALTERNATE JACKET COLOR THAT IS NOT DESIGNATED IN THIS SECTION SHALL BE APPROVED BY OWNER BEFORE INSTALLATION; E.G. ACTIVE AND PASSIVE ELECTRONIC ADAPTER DEVICES UTILIZED TO CONNECT COMPONENTS OVER LOW-VOLTAGE CABLE.
- 2.21 WORK AREA OUTLETS

1. PANDUIT

- A. ACCEPTABLE MANUFACTURERS:
- 2. SUBSTITUTIONS: PERMITTED
- B. SINGLE-GANG STAINLESS STEEL WALL PLATE WITH LABEL HOLDERS AND FOUR (4) OPENINGS CONTAINING THE FOLLOWING DEVICES:
- DATA OUTLET -- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
- 2. WALL PLATE: PANDUIT #CFP4
- BLANK OUTLET COVER BLACK OR GRAY
- 2.22 WALL OR HARD LID DATA WORK AREA OUTLETS (WIRELESS ACCESS POINT)
 - PANDUIT
 - 2. SUBSTITUTIONS: PERMITTED

A. ACCEPTABLE MANUFACTURERS:

- . SINGLE-GANG WHITE WALL PLATE WITH LABEL HOLDERS AND TWO (2)
 OPENINGS INSTALLED IN 1-GANG RECESSED MOUNTING FRAME, CONTAINING THE FOLLOWING DEVICES:
- DATA OUTLET -- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUSOVE CEILING DATA ONLY WORK AREA OUTLETS (WIRELESS ACCESS POINT)
- A. ACCEPTABLE MANUFACTURERS:
- 1. PANDUIT
- 2. SUBSTITUTIONS: PERMITTED
- B. CATEGORY 6 CABLE INSTALLED WITH A FIFTEEN (15) FOOT SERVICE LOOP AND TERMINATED WITH A UTP MODULE (KEYSTONE JACK). CABLE SHALL BE INSTALLED WITHOUT A FACEPLATE AND STORED ABOVE ACCESSIBLE CEILING TO BE LOCATED BY INSTALLER:
- I. DATA OUTLET -- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B PANDUIT MINI-COM TX-6 PLUS.

2.24 WALL OR HARDLID DATA ONLY WORK AREA OUTLETS (SECURITY CAMERA) A. ACCEPTABLE MANUFACTURERS:

- PANDUIT
- 2. SUBSTITUTIONS: PERMITTED
- OPENINGS INSTALLED IN 1-GANG RECESSED MOUNTING FRAME, CONTÁINING THE FOLLOWING DEVICES:
- 1. DATA OUTLET -- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
- 2. BLANK OUTLET COVER BLACK OR GRAY

2.25 ABOVE CEILING DATA ONLY WORK AREA OUTLETS (SECURITY CAMERA) A. ACCEPTABLE MANUFACTURERS:

PANDUIT

- 2. SUBSTITUTIONS: PERMITTED
- B. CATEGORY 6 CABLE INSTALLED WITH A FIFTEEN (15) FOOT SERVICE LOOP AND TERMINATED WITH A UTP MODULE (KEYSTONE JACK). CABLE SHALL BE INSTALLED WITHOUT A FACEPLATE AND STORED ABOVE ACCESSIBLE CEILING TO BE LOCATED BY INSTALLER:
- 1. DATA OUTLET -- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
- 2. BLANK OUTLET COVER BLACK OR GRAY

2.26 RACK MOUNTED COPPER PATCH PANEL AND JACKS (CATEGORY 6)

- A. ACCEPTABLE MANUFACTURERS:
- ANGLED PATCH PANEL. PANDUIT: #UICMPPA48BLY
- 2. SUBSTITUTIONS: PERMITTED
- 2.27 RACK MOUNTED OPTICAL FIBER TERMINATION PANEL AND SHELF
- A. ACCEPTABLE MANUFACTURERS:
- 1. CORNING LANSCAPE SOLUTIONS, CCH-01U, CCH-02U, CCH-04U,

DUPLEX, SINGLE-MODE (OS1), CCH PIGTAILED CASSETTES

- CLOSET CONNECTOR HOUSING (CCH) 2. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AE-POORE, 24 F, LC, UPC,
- 3. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AD-POOQE, 24 F, LC, UPC, DUPLEX, MULTIMODE (OM4), CCH PIGTAILED CASSETTES
- 4. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AE-POORJ, 24 F, LC, UPC, DUPLEX, SINGLE-MODE (OS1), CCH RIBBON PIGTAILED CASSETTES
- 5. FIBER OPTIC ARMOR GROUNDING MANUFACTURERS CORNING, ELECTRIC MOTION COMPANY, PANDUIT, TE, SIEMON, COMMSCOPE OTHÉRS; SUBMIT EQUIVALENTS FOR GROUNDING AND BONDING ONLY.
- 6. SUBSTITUTIONS: PERMITTED
- B. CCH 19" RACK MOUNTED, OPTICAL FIBER TERMINATION SHELF, 1U SHELF HOLDS UP TO TWO (2) CCH PANELS, 2U SHELF HOLDS UP TO FOUR (4) CCH PANELS, 4U SHELF HOLDS UP TO TWELVE (12) CCH PANELS. EACH CASSETTE HOLDS UP TO TWENTY-FOUR (24) LC DUPLEX SHUTTERED
- C. CAMPUS BUILDING SHALL PROVIDE SPACE FOR TERMINATING AND ORGANIZATION OF OPTICAL FIBERS. TERMINATION OF OPTICAL FIBER SHALL LC TYPE CONNECTION IN ALL NEW WORK AND ANY REPLACED CONNECTIONS FROM AFFECTED OLD WORK CONSTRUCTION. OPTICAL FIBER SHELVING SHALL BE RACK MOUNTABLE AND SIZED TO ACCOMMODATE FOTAL NUMBER OF OPTICAL FIBERS BEING TERMINATED IN THE RACK COUPLINGS SHALL ACCOMMODATE THE TYPE OF FIBER. ANY OTHER CONNECTING HARDWARE OR EXPANSION PANELS FOR THE SHELVES WILL BE INSTALLED PER THE MANUFACTURER. COORDINATE QUANTITIES AND TYPE WITH OWNER.
- D. STRAIN RELIEF BRACKET FOR RACK MOUNT HARDWARE AND ARMORED CABLE GROUNDING SHALL BE FURNISHED AND INSTALLED TO SUPPORT EACH CABLE INDEPENDENTLY. CABLES SHARING THE SAME CLAMP AND OR STRAIN-RELIEF KIT WILL NOT BE ACCEPTABLE. A METAL STRUT OR BRACKET BUILT TO SUPPORT MORE THAN ONE CABLE AT THE SAME TIME AND CAN BE USED TO PROPERLY BOND THE METALLIC ARMOR MAY BE ACCEPTABLE UPON APPROVAL OF SUBMITTAL. PROVIDE MINIMUM 4'
- E. GROUNDING AND BONDING ACCESSORIES AS SPECIFIED AND REQUIRED. 2.28 DATA AND TELECOMMUNICATIONS SERVICE BACKBONE CABLE
- A. ACCEPTABLE MANUFACTURERS:
- 1. CORNING, SINGLE-MODE (OS1) SMF-28E+®, RIBBON INTERLOCKING PLENUM CABLE
- CORNING, 50 MM MULTIMODE (OM4), RIBBON INTERLOCKING PLENUM
- 3. SUPERIOR ESSEX ARMM (VERTICAL RISER DISTRIBUTION), CATEGORY 6 VOICE GRADE
- 4. SUPERIOR ESSEX CATEGORY 3 (HORIZONTAL DEMARCATION EXTENSION) 5. CIRCA, EMERSON, SIEMON, PANDUIT, SUPERIOR ESSEX, TE, ORTRONICS, ITW, HUBBELL, HOFFMAN, PREFORMED (HARDWARE, TERMINAL HARDWARE
- 6. SUBSTITUTIONS: PERMITTED
- MULTIMODE, 50/125 µM DIAMETER TIGHT-BUFFERED, INSIDE PLANT OM4 OPTICAL FIBER, WITH FIBER COUNTS AS INDICATED ON DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.3.
- C. NOTE: LISTED TYPE OFCP (AS REQUIRED IN THE NEC 2011)
- D. SINGLE-MODE, 9/125 µM DIAMETER TIGHT-BUFFERED, INSIDE PLANT OS1 OPTICAL FIBER, WITH FIBER COUNTS AS INDICATED ON DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.3.
- E. NOTE: LISTED TYPE OFCP (AS REQUIRED IN THE NEC 2011)
- F. SOLID COPPER, 24 AWG, 100 BALANCED, MULTI-PAIR, CATEGORY 3 CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.2.
- G. NOTE: LISTED TYPE CMP (AS REQUIRED IN THE NEC 2011)
- SOLID COPPER, 24 AWG, 100 BALANCED, MULTI-PAIR, ARMM RISER RATED SHIELDED CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.2.
- I. NOTE: LISTED TYPE CMR (AS REQUIRED IN THE NEC 2011)

R886B10H1D)

A. ACCEPTABLE MANUFACTURERS: 1. SUPERIOR ESSEX OSP BROADBAND, ALUMINUM TAPE SHIELD (BBDN6)

2.29 UNDERGROUND DATA STATION AND TELECOMMUNICATIONS CABLE (COPPER)

S(.218) C(.31) 3. ELECTRIC MOTION COMPANY, SHIELD BOND CONNECTOR WITH LEADS, (EM

2. ELECTRIC MOTION COMPANY, SHIELD BOND CONNECTOR, EM 9556-BW

4. SUBSTITUTIONS: PERMITTED B. SOLID COPPER, 23 AWG, 100 BALANCED FULLY SCREENED UNSHIELDED

- TWISTED—PAIR (S/UTP) CATEGORY 6 BROADBAND OSP CABLES WITH FOUR INDIVIDUALLY TWISTED-PAIRS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS IN ANSI/TIA-568-C.2 UP TO 250MHZ. FOLLOW TECHNICAL GUIDELINES, TG36, FOR OSP BROADBAND INSTALLATION.
- C. SOLID COPPER, 24 AWG, 100 BALANCED MULTI-PAIR, GEL-FILLED DUCTS PE-89 CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.2 AND ANSI/TIA-758-A.
- D. OVERVOLTAGE BUILDING ENTRANCE PROTECTORS ARE REQUIRED ON BOTH ENDS OF THE CABLE FOR LENGTHS LONGER THAN 150' FROM PERIMETER

2.30 UNDERGROUND TELECOMMUNICATIONS CABLE (OPTICAL FIBER)

A. ACCEPTABLE MANUFACTURERS:

OF CABLE SERVICE ENTRANCE.

- CORNING LANSCAPE SOLUTIONS, SST-RIBBON™ SINGLE-TUBE, GEL-FREE, ARMORED CABLE, AND SINGLE-MODE (OS1) SMF-28E+® OUTDOOR RATED PE OUTER JACKET, E.G. PART NUMBER: 048EC5-14100D53.
- 2. CORNING LANSCAPE SOLUTIONS, GEL-FREE, ARMORED CABLE, AND
- 3. SUBSTITUTIONS: PERMITTED
- SINGLE-MODE, 9/125 µM DIAMETER, SINGLE JACKET/SINGLE ARMOR, GEL-FREE, OUTDOOR, STRANDED LOOSE TUBE, OS1 OPTICAL FIBER CABLE, WITH NUMBER OF USABLE FIBERS AS SHOWN ON DRAWINGS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.3 AND ANSI/TIA-758-A
- MULTI-MODE, 50/125 µM DIAMETER, SINGLE JACKET/SINGLE ARMOR, GEL-FREE, OUTDOOR, STRANDED LOOSE TUBE, OM4 OPTICAL FIBER CABLE WITH NUMBER OF USABLE FIBERS AS SHOWN ON DRAWINGS. WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.3 AND ANSI/TIA-758-A
- D. EXISTING OUTSIDE PLANT FIBER OPTIC CABLE NEEDS TO BE ACCESSED FOR VIABILITY OF BEING USED IN PLACE OF INSTALLING NEW. A NEW EQUIVALENT OR LARGER STRAND COUNT OPTICAL FIBER CABLE SHALL BE REQUIRED TO BE INSTALLED IF EXISTING CABLE CAN'T BE UTILIZED FOR
- 2.31 UNDERGROUND INNERDUCT
- A. ACCEPTABLE MANUFACTURERS:
- MAXCELL TRACEABLE INNERDUCT (WWW.MAXCELLINNERDUCT.COM)
- 2. SUBSTITUTIONS: PERMITTED

2.32 TERMINATION BACKBONE

ROOM BUILD OUT.

(INTUMESCENCE)

2.33 UNDERGROUND VAULT

- MATERIALS: PLYWOOD FIRE RESISTANCE COVERING EVERY WAL DETERMINED BY INFORMATION TECHNOLOGY SERVICES ENGINEER. WALLS WILL BE COVERED FROM 18 A.F.F. TO CEILING OR 10' A.F.F. SEE CURRENT BICSI TOMM CHAPTER 6 PAGE 19 FOR TELECOMMUNICATIONS
- B. SIZE: AS INDICATED, 34 INCH THICK, GRADE AC
- C. FINISH: PPG SPEEDHIDE 42-7 INTERIOR FIRE RETARDANT FLAT LATEX

VAULT, A6001440TAP48MT, 48" X 48" VAULT AND COVER

A. ACCEPTABLE MANUFACTURERS:

2. SUBSTITUTIONS: PERMITTED

ARMORCAST POLYMER CONCRETE

ASSEMBLY, TORSION ASSIST, 48" DEPTH

2.34 FABRICATION A. FABRICATE CUSTOM-MADE EQUIPMENT WITH CAREFUL CONSIDERATION GIVEN TO AESTHETIC, TECHNICAL, AND FUNCTIONAL ASPECTS OF EQUIPMENT AND

- 2.35 EQUIPMENT RACKS AND CABLE SUPPORT SYSTEM
- A. ACCEPTABLE MANUFACTURERS:
- 1. PANDUIT: #CMR19X84, CABLE MANAGEMENT RACK

2. CHATSWORTH: #46353-703, CABLE MANAGEMENT RACK

- 3. B-LINE: #SB556084XU, CABLE MANAGEMENT RACK
- 4. PANDUIT: #NCMV8, VERTICAL MANAGER
- 5. CHATSWORTH: #30095-703, VERTICAL MANAGER 6. B-LINE: #SB-571-66D-084, VERTICAL MANAGER

AN ESTIMATED 2'X2' RACK FOOTPRINT.

7. SUBSTITUTIONS: PERMITTED B. RACKS ARE TO BE MOUNTED SECURELY TO THE FLOOR PER MANUFACTURER'S RECOMMENDATIONS WITH CONCRETE ANCHORS AND SAE GRADE 8 BOLTS. PLACEMENT OF FOOTPRINT TO BE DETERMINED BY OWNER'S ITS ENGINEER. THERE WILL BE A MINIMUM OF ONE CABLE TRAY SECTION THAT SPANS OVER THE RACKS TO DISTRIBUTE CABLE. THE CABLE WILL EXIT THE CABLE TRAY ON WATERFALL AND OR SPILLWAYS. THE LADDER RACK OR CABLE TRAY SYSTEM WILL BE UL RATED FOR GROUNDING AND BONDING ACCORDING TO THE STANDARD ANSI/TIA-607-B IN LIEU OF INSTALLING GROUNDING STRAPS, GRINDING PAINT AND DRILLING HOLES THROUGH SUPPORT STRUCTURE TO MOUNT BOLTS. PROVIDE RACK

EXTENSIONS TO CONNECT FLOOR MOUNT RACK TO LADDER RACK. THE TR

DESIGN TO BE COORDINATED AND APPROVED BY THE OWNER'S ITS

- C. THERE WILL BE A MINIMUM OF TWO (2) SPECIFIED RACKS FURNISHED FOR EVERY 350 DATA WORK AREA OUTLET TERMINATIONS OR 70% FILL OF RACK UNIT SPACES. THERE WILL BE A MINIMUM OF ONE (1) SPECIFIED RACK FOR DATA STATION WORK AREA OUTLETS AND ONE (1) FÓR OWNER PROVIDED NETWORK EQUIPMENT. FURNISH AND INSTALL SPECIFIED VERTICAL CABLE MANAGEMENT SYSTEM CHANNELS BETWEEN RACKS AND ON THE ENDS. THE ROOM WILL BE SIZED TO ALLOW FOR 3' OF WORKING CLEARANCE AROUND FRONT SIDE OF THE RACK INCLUDING THE CABLE MANAGEMENT BASED ON
- 2.36 TV SYSTEM
- A. COAXIAL CABLE SHALL BE RG-6 (TYPICAL) AND RG-11 FOR CHANNEL LENGTHS LONGER THAN 150'. TYPE SHALL BE QUAD SHIELDED; SWEEP TESTED A MINIMUM UP TO 1GHZ AND LISTED TYPE CMP, AS REQUIRED PER
- B. OUTLETS: COMPRESSION F-CONNECTER SUITABLE FOR INSTALLATION IN COMMON WALL PLATE WITH VOICE AND DATA OUTLETS. OUTLETS MANUFACTURER SHALL BE THE SAME AS THE WALL PLATE FOR THE STRUCTURED CABLING SYSTEM MANUFACTURER.



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> SDZ BRIAN D. HUNLEY 11-24-20 **25504**

HR PHASE II & III **EXTERIOR** RENOVATION

Description

ELECTRICAL SPECIFICATIONS

SSUE DATE: 11/24/2020

MULTI-MODE (OM4) SMF-28E+® OUTDOOR RATED PE OUTER JACKET. 1403 S 70th East Avenue

> 4815 Soouth Harvard Avenue, Suite 290 Tulsa, OK 74135 918.277.4784

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ARCHITECTURAL & INTERIOR DESIGN 15 West 6th St., Ste. 2100 Tulsa, OK 74119 918-576-6700

3449 South Zunis Avenue

Sin

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otel

Hard

Ch

- C. ACCEPTABLE MANUFACTURERS:
- BELDEN, E.G. 1189AP, RG-6, COAX BROADBAND CATV COAXIAL
- 2. BELDEN, E.G. 1523AP, RG-11, COAX CATV CABLE
- 3. EXTRON

4. LIBERTY

- SUPERIOR ESSEX
- 6. CONNECTOR: SINGLE PIECE COMPRESSION F-PLUG FOR PLENUM QUAD
- 7. CONNECTOR MANUFACTURERS: BELDEN, HOLLAND ELECTRONICS
- 8. SUBSTITUTIONS: PERMITTED
- PART 3 EXECUTION
- 3.1 INSIDE PLANT RACEWAY AND LOW VOLTAGE CABLE
- A. ALL CONDUIT ENDS SHALL HAVE PLASTIC BUSHINGS INSTALLED BEFORE THE CABLE IS PULLED INTO THE CONDUIT.
- CONDUITS WILL NOT BE RUN NEXT TO HOT WATER LINES, STEAM PIPES, OR OTHER UTILITIES THAT MAY PRESENT A SAFETY HAZARD OR CAUSE A DEGRADATION OF SYSTEM PERFORMANCE.
- CONDUITS ENTERING THE TELECOMMUNICATIONS ROOM (TR) SHOULD BE DESIGNED AND ENTER A MINIMUM OF 6" INCHES ABOVE CABLE TRAY ALLOWING FOR THE MOST FLEXIBILITY IN THE ROUTING AND RACKING OF
- D. CONDUITS OR CONDUIT SLEEVES ENTERING THROUGH THE FLOOR OF THE TR SHALL TERMINATE FOUR (4) INCHES ABOVE THE FINISHED FLOOR. TO MAXIMIZE THE USABLE FLOOR SPACE THE ARRAY OF CONDUITS OR SLEEVES NEED TO BE LINED UP ALONG THE REAR CORNER WALL OF INSTALLED ROOMS OPPOSITE THE DOOR WAY.
- . ALL METALLIC TELECOMMUNICATIONS CONDUITS ENTERING THE TR, EQUIPMENT ROOM (ER), OR ENTRANCE FACILITY (EF) SHALL BE BONDED TOGETHER. AND BÒNDÉD TO THE TELECOMMUNICÀTIÓNS MAIN GROUNDING BUSBAR (TGMB) OR TELECOMMUNICATIONS GROUNDING BUSBAR (TGB) WITH #6 AWG GROUND CABLE PER ANSI/TIA-607-B.
- ALL IN-USE AND SPARE CONDUITS ENTERING THE TR, ER, OR EF SHALL BE SEALED AND PLUGGED TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT. WITHIN FIVE DAYS OF RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLE, THE CONDUIT INSTALLATION CONTRACTOR SHALL PROVE ALL CONDUITS TO BE CLEAN AND DRY. UTILIZING MAXCELL REUSABLE TERMINATION BAGS IS THE PREFERRED METHOD FOR OCCUPIED DUCTS TO WATER SEAL. TYPICAL PLASTIC AND RUBBER EXPANSION PLUGS CAN BE USED FOR EMPTY DUCTS
- G. ALL ISP CONDUITS AND INNER-DUCT, USED AND SPARE, SHALL B PLUGGED WITH WATERTIGHT PLUGS AT BOTH ENDS TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT
- H. ALL ISP CONDUITS SHALL HAVE PULL LINES RATED AT A MINIMUM OF 90 KG (200 LB.) PULLING TENSION INSTALLED. THE PULL LINES MUST BE RE-PULLED EACH TIME AN ADDITIONAL CABLE IS INSTALLED.
- PRIOR TO RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLES, ALL ISP CONDUITS MUST BE CLEANED WITH A BRUSH PULLED THROUGH THE CONDUIT AT LEAST TWO TIMES IN THE SAME DIRECTION AND SWABBED WITH CLEAN RAGS UNTIL THE RAG COMES OUT OF THE CONDUIT CLEAN AND DRY. ALL ISP CONDUITS MUST BE TESTED WITH A MANDREL TO PROVE COMPLIANCE WITH THE SWEEP RADIUS REQUIREMENTS THROUGHOUT THE CONDUIT RUN. WITHIN FIVE DAYS OF RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLE, THE CONDUIT INSTALLATION CONTRACTOR SHALL PROVE ALL CONDUITS TO BE CLEAN AND DRY.
- J. PULL BOXES USED WITH TELECOMMUNICATIONS CONDUITS IN INTERIOR LOCATIONS SHALL BE RATED NEMA-1.
- K. PULL BOXES USED IN DAMP OR WET LOCATIONS SUCH AS PLUMBING CHASES OR OUT OF DOORS SHALL BE RATED NEMA-3R.
- L. PULL BOXES SHALL BE INSTALLED IN CONDUITS AT AN INTERVAL NO GREATER THAN EVERY 100 FEET.
- M. A PULL BOX SHALL BE INSTALLED IN CONDUIT RUNS WHENEVER THERE ARE TWO 90°SWEEPS, OR A TOTAL OF 180°OF SWEEPS, IN A CONDUIT RUN.
- 3.2 HORIZONAL AND BACKBONE CABLE INSTALLATION
- INSTALL PREMISE CABLING FROM EACH INFORMATION OUTLET TO THE BACKBONE SYSTEM. INSTALL THE BACKBONE CABLING FROM THE MAIN CROSS CONNECTS TO THE INTERMEDIATE CROSS CONNECTS AND HORIZONTAL CROSS-CONNECTS AS INDICATED.
- B. EACH RUN OF CABLE BETWEEN THE CROSS CONNECT BLOCKS AND THE INFORMATION OUTLET SHALL BE CONTINUOUS WITHOUT ANY JOINTS OR SPLICES AND SHALL NOT EXCEED 90 METERS. CABLE SHALL BE RUN IN CONDUIT OR AS INDICATED. CONDUIT RUNS SHALL NOT CONTAIN MORE THAN TWO (2) 90-DEGREE BENDS AND SHALL NOT EXCEED 100 FEET WITHOUT UTILIZING APPROPRIATELY SIZED BOXES. LONG SWEEP ELBOWS WITH A BEND RADIUS AT LEAST SIX TIMES CONDUIT DIAMETER SHALL BE USED. ALL ELBOWS FOR COMMUNICATIONS CABLE WILL BE SMART CONDUIT BODY™ BY SMART PATHWAYS (WWW.SMARTLB.COM).
- C. CABLE THAT IS NOT RUN IN CONDUIT OR TRAY SHALL BE BUNDLED WITH VELCRO STRAPS SPACED NOT LESS THAN FIVE (5) FEET. THE BUNDLING SHALL BE SUPPORTED VIA "J" HOOKS SECURELY ATTACHED TO THE BUILDING OR BUILDING STRUCTURE AND SHALL NOT BE SUPPORTED BY CEILING SUSPENSION WIRES. PLENUM—RATED CABLE SHALL BE USED IN ALL APPROPRIATE AREAS AND WHERE INDICATED. CABLE TIES ARE NOT TO BE USED. COAXIAL CABLE SHALL BE SUPPORTED INDEPENDENTLY OF VOICE/DATA CABLING. CABLES WILL NOT REST ON LIGHTS, WATER, CEILING SYSTÉMS OR POWER LINES.
- D. MAXIMUM CABLE FILL OF CONDUIT SHALL BE 40%.
- 3.3 INFORMATION OUTLET INSTALLATION
- A. ALL WORK AREA OUTLETS (WAO) AND PATCH PANELS SHALL BE CLEARLY MARKED USING PERMANENT MEÁNS. USE THE FOLLOWING SYSTEM OF NUMBERING (MDF/IDF + WAO ROOM # + PHYSICAL NUMBER OF OUTLET 1-24, E.G. MDF-1234-01)
- 1. ALL WAO AND PATCH PANEL LABELS MUST MATCH ACTUAL OWNERROOM NUMBERS. CAREFUL CONSIDERATION SHOULD BE GIVEN WHEN DEVELOPING AND MAINTAINING A NUMBERING SCHEME THAT IT MATCHES EXACTLY THE ACTUAL ROOM NUMBERS; NOT THE CONSTRUCTION DOCUMENT ROOM NUMBER.
- 2. ALL VOICE AND DATA TERMINATIONS MADE IN THE TELECOM ROOM (TR) SHALL BE MADE IN A NUMERICAL ORDER BY ROOM NUMBER OF EACH
- 3. OUTLET NUMBERS SHALL BE MARKED BY PERMANENT MEANS ON EACH CABLE AT THE OUTLET AND AT THE TR. THE ORDER SHOULD BEGIN WITH THE UPPER FLOORS FIRST WORKING YOUR WAY DOWN IF
- WIRELESS ACCESS POINTS (WAP) AND SECURITY CAMERAS (SC) INSTALLED, LABELED, AND TERMINATED. USE THE FOLLOWING SYSTEM OF NUMBERING (MDF/IDF + PHYSICAL NUMBER OF OUTLET 1-24, E.G. MDF-1234-WAP01 ÒR MDF-1234-CAM01)

- C. THE TYPICAL WIRELESS ACCESS POINT OR SECURITY CAMERA WORK AREA CAN BE INSTALLED IN ACCESSIBLE CEILING SPACE THAT TYPICALLY CONSISTS OF A FIFTEEN (15) FOOT SERVICE LOOP AND ONE (1 STANDARDS COMPLIANT WORK AREA OUTLETS INSTALLED FROM THE WORK AREA OUTLET TO THE TR. TERMINATE DATA CABLES ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK. UNLESS NOTED OTHERWISE.
- D. THE TYPICAL WIRELESS ACCESS POINT OR SECURITY CAMERA INDOOR WORK AREA INSTALLED IN HARD LID CEILING OR WALL MOUNTED LOCATIONS CONSISTS OF A RECESSED JUNCTION BOX. SINGLE-GANG STAINLESS STEEL PLATE WITH LABEL HOLDERS AND ONE (1) STANDARDS COMPLIANT WORK AREA OUTLETS INSTALLED FROM THE WORK AREA OUTLET TO THE TR. TERMINATE DATA CABLES ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK. OUTLETS CAN BE ADJUSTED APPROPRIATELY.
- ONE WORK AREA OUTLET CONSISTS OF TWO (2) FOUR-PAIR DATA CATEGORY 6 PLENUM CABLES AND TWO (2) BLANKS, INSTALLED FROM THE WORK AREA OUTLET TO THE TR. QUANTITIES OF WORK AREA OUTLETS TO BE SHOWN ON ELECTRICAL DRAWINGS. TERMINATE DATA CABLE ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK.
- VERTICAL/HORIZONTAL BACKBONE, RISER SYSTEM, HORIZONTAL DATA AND VOICE CABLING WITH ASSOCIATED TERMINATIONS, MOUNTING EQUIPMENT, CABLE PATHWAY AND MANAGEMENT SYSTEMS. TESTING AND OTHER ITEMS/MATERIALS, AS SPECIFIED IN DRAWINGS, THESE SPECIFICATIONS, AND CONTRACT DOCUMENTS.
- 6. VERTICAL/HORIZONTAL CAMPUS BACKBONE CABLING CONSISTS OF OF 50/125 µM OM4 MULTIMODE OR 9/125 µM OS1 SINGLE-MODE FOR RUNS OVER 400 FEET, GEL-FREE, SINGLE LAYER ARMOR, LOOSE TUBE RIBBON OPTICAL FIBER SHALL BE INSTALLED FROM THE MAIN CROSS-CONNECT ON CAMPUS BACKBONE FIBER NODE TO THE INTERMEDIATE CROSS-CONNECT IN THE APPROPRIATE EF. THE SINGLE-MODE WILL BE UTILIZED FOR INTER-BUILDING DATA COMMUNICATIONS, TELECOMMUNICATION SERVICE AND PREMISES NETWORK SWITCHING EQUIPMENT.
- H. VERTICAL/HORIZONTAL RISER SYSTEM CABLING CONSISTS OF 50/125 µM OM4 MULTIMODE OR 9/125 µM OS1 SINGLE-MODE (FOR RUNS OVER 400 FEET), GEL-FREE, INTER-LOCKING ARMOR, OPTICAL FIBER PLENUM ARMÓRED CABLE SHALL BE INSTALLED FROM THE INTERMEDIATE CROSS—CONNECT IN THE APPROPRIATE EF TO EACH TR. THE MULTIMODE WILL BE UTILIZED FOR INTERIOR INSTALLATIONS ONLY FOR EXTENDING DATA COMMUNICATIONS. TELECOMMUNICATION SERVICE AND INTERCONNECTING PREMISE NETWORK SWITCHING EQUIPMENT BETWEEN TR'S.
- WAO MOUNTED IN SURFACE MOUNTED METALLIC RACEWAY, E.G. WIREMOLD'S 2000, 4000, OR 5000 SERIES RACEWAYS SHALL BE FURNISHED WITH A COMPATIBLE MOUNTING FRAME OR PLATE TO FIT INSTALLED APPROVED SCS WAO. THE WAO SHALL BE SURFACE OR FLUSH MOUNTED AS INDICATED ON THE NUMBERED NOTES AS SPECIFIED IN DRAWINGS, THESE SPECIFICATIONS, AND CONTRACT DOCUMENTS.
- J. ALL INDOOR WAO SHALL HAVE A MINIMUM THREE-QUARTER INCH CONDUIT WITH PULL STRING. INCREASE THE CONDUIT SIZE AS NECESSARY FOR THE QUANTITY OF CABLES TO BE INSTALLED. CABLE FILL SHALL NOT EXCEED
- K. ALL INDOOR WAO OUTLETS, INSTALLED IN WET LOCATIONS SHALL HAVE A 3.5 PATHWAY INSTALLATIONS MINIMUM 1" INCH CONDUIT AND CABLING WILL BE RATED FOR WET LOCATION PER NEC. INCREASE THE CONDUIT SIZE AS NECESSARY FOR THE QUANTITY OF CABLES TO BE INSTALLED. CABLE FILL SHALL NOT EXCEED 40%.
- L. ALL WAO SHALL BE MOUNTED IN A MINIMUM FOUR (4)-INCH BY FOUR (4)-INCH BY TWO AND ONE-HALF (2 ½)-INCH DEEP DOUBLE GANG OUTLET BÓX WITH A SINGLE GANG MUD RING.
- M. ALL INDOOR WALL MOUNTED OR HARD LID WAP OR SECURITY CAMERA WAO SHALL BE MOUNTED IN A DEEP SINGLE GANG RECESSED ELECTRICAL BOX.
- N. ALL EXTERIOR WALL/CEILING MOUNTED WAP OR SECURITY CAMERA WAO SHALL BE MOUNTED' IN A WEATHER PROOF SINGLE GANG JUNCTION BOX VERTICALLY FLUSH-MOUNTED WITH CONDUIT AND PULL STRING EXTENDING INSIDE THE BUILDING TO AN ACCESSIBLE SPACE. JUNCTION BOX SHALL B COVERED WITH A STAINLESS STEEL FACEPLATE. THE JUNCTION BOX MAY NOT BE UTILIZED FOR OTHER PURPOSES OR CONTAIN NON-NETWORK CONNECTIONS. VISUAL OBSTRUCTIONS OR BRIGHT LIGHTS THAT MAY PREVENT APPROPRIATE VIEWING ANGLES OR PICTURE QUALITY FOR THE SECURITY CAMERA MAY NOT EXIST WITHIN FOUR (4) FEET OF SECURITY CAMERA IN ANY DIRECTION.
- O. ALL EXTERIOR POLE MOUNTED SECURITY CAMERA WAO SHALL CONTAIN A SUITABLY-SIZED 10" X 10" X 5" WEATHERPROOF ENCLOSURE AT THE BASE OF THE POLE. ENCLOSURE SHOULD BE DEDICATED TO SECURITY CAMERA EQUIPMENT. ENCLOSURE SHOULD BE CAPABLE OF HOLDING A 2" X 4.5" X 7" MEDIA CONVERTER AND 3.5" X 6.5" X 9" POWER INJECTOR. FIBER CABLE IS TERMINATED IN THE BASE OF THE POLE WITH A MINIMUM OF 6 FEET OF SLACK CABLE. 120 VAC POWER SHOULD BE PROVIDED IN A STANDARD NEMA 5-20R RECEPTACLE INSIDE THE ENCLOSURE. POWER SHOULD BE INDEPENDENT OF THE POLE'S LIGHTING AND ALWAYS ENERGIZED (NO TIMERS). POWER SHOULD BE ON ITS OWN CIRCUIT AND CAPABLE OF BEING POWER CYCLED VIA ELECTRICAL BREAKER IN BUILDING. LOCATION SHOULD BE PROVIDED AT TOP OF POLE FOR A SECURITY CAMERA TO BE INSTALLED WITH STRAP AND PENDANT MOUNT. ACCESS PANEL OR HOLE (MINIMUM 1.5" DIAMETER) SHOULD BE PROVIDED AT SECURITY CAMERA LOCATION WITH PULL STRING TO ENCLOSURE AT BASE OF POLE. ACCESS PANEL OR HOLE SHOULD BE FITTED WITH APPROPRIATE REMOVABLE WEATHERPROOF COVERING
- P. AN ELECTRICAL OUTLET SHALL ALWAYS BE LOCATED WITHIN THREE (3) FEET OF A TELECOMMUNICATIONS OUTLET EXCLUDING SPECIAL CIRCUIT DEVICES LIKE POE POWERED DEVICES, E.G. WIRELESS ACCESS POINT AND IP SECURITY CAMERAS.
- 3.4 OUTSIDE PLANT PIPING AND CABLE
- A. DIRECT BURIAL OF TELECOMMUNICATIONS CABLE WILL NOT BE APPROVED.
- B. ALL OSP TELECOMMUNICATIONS CONDUITS SHALL BE SCHEDULE-40 OR SCHEDULE-80 (IF PLACED NEAR THE PHYSICAL PLANT WATER LINES) RIGID NONMETALLIC CONDUIT, POLYVINYL CHLORIDE (PVC), AND MUST MEET THE REQUIREMENTS OF NEMA TC 6. ALL CONDUIT SECTIONS SHALL BE GLUED WITH PVC PIPE GLUE TO FORM A WATERTIGHT JOINT. SPACERS ARE REQUIRED TO MAINTAIN PROPER SEPARATION BETWEEN MULTIPLE CONDUITS IN A RUN.
- C. ALL OSP CONDUITS SHALL BE INSTALLED WITH A SLIGHT DRAIN SLOPE (0.125 INCHES-PER-FOOT) AWAY FROM BUILDINGS TO PREVENT THE ACCUMULATION OF WATER IN THE CONDUIT OR INGRESS TO THE BUILDINGS.
- D. ALL DISTRIBUTION CONDUITS MUST BE BURIED A MINIMUM OF 24"-INCHES BELOW GRADE, WITH PREFERRED TOP OF CONDUIT DEPTH OF 36"-INCHES AND MARKER TAPE 12"-INCHES ABOVE THE TOP OF THE CONDUIT IF PLACED BY THE CONVENTIONAL TRENCHING METHOD.
- E. ALL CABLE SHALL BE INSTALLED IN THE LOWEST AVAILABLE CONDUIT IN A DUCT BANK, WORKING UP AS ADDITIONAL CABLES ARE INSTALLED.
- F. ALL OSP CONDUITS AND INNER-DUCT, USED AND SPARE, SHALL PLUGGED WITH WATERTIGHT PLUGS AT BOTH ENDS TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT. ALL OSP CONDUITS SHALL HAVE QUARTER 1/4)-INCH POLYPROPYLENE PULL ROPES INSTALLED. THE PULL ROPES MÚST BE RE-PULLED EACH TIME AN ADDITIONAL CABLE IS INSTALLED. ALI OSP CONDUITS MUST BE TESTED WITH A MANDREL TO PROVE COMPLIANCE WITH THE BEND RADIUS REQUIREMENTS THROUGHOUT THE CONDUIT RUN. WITHIN FIVE DAYS OF RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLE, THE CONDUIT INSTALLATION CONTRACTOR SHALL PROVE ALL CONDUITS TO BE CLEAN AND DRY. UTILIZING MAXCELL REUSABLE TERMINATION BAGS IS THE PREFERRED METHOD FOR OCCUPIED DUCTS TO WATER SEAL. TYPICAL PLASTIC AND RUBBER EXPANSION PLUGS CAN BE

USED FOR EMPTY DUCTS AND CONDUITS.

- G. IN NEW CONSTRUCTION AND NEW CONDUIT, FIBER OPTIC BACKBONE CABLES SHALL ALWAYS BE INSTALLED IN FIBER OPTIC INNER-DUCT. NORMALLY TO FOUR LOBED MAX-CELL TRACEABLE INNER-DUCTS CAN BE PLACED IN A FOUR (4)-INCH CONDUIT. WHERE FIBER-OPTIC CABLE IS INSTALLED INTO EXISTING CONDUITS, THE USE OF FIBER OPTIC INNER-DUCT IS PREFERRED IF SPACE IS AVAILABLE. INNER-DUCT IS USED TO SEPARATE AND SEGREGATE CABLES, AND TO PREVENT THE TANGLING OF CABLES IN A CONDUIT. TYPES OF TEXTILE INNER-DUCT, MAXCELL, ARE THE PREFERRED PRODUCT TO BE USED. OTHERWISE NEW CONDUIT SHALL BE INSTALLED TO MAINTAIN WORKING OSP SYSTEM.
- H. ALL PIPING AND CABLES WILL BE AFFIXED TO THE INTERIOR WALL AND LID IN EACH OSP VAULT AND PULL-BOX WITH APPROPRIATE WEATHER PROOF SELF-ADHESIVE LABELS THAT WILL TELL THE OWNER'S I.T. PERSONNEL WHICH BUILDINGS THE CABLING IS INSTALLED AND WHAT BUILDING IT IS GOING TO RESIDE. UTILIZE ANSI/TIA/EIA-606-A LABELING SCHEME.
- EVERY INDIVIDUAL INSTALLED PIPING WILL HAVE A NEPTCO TRACE-SAFE #RT1800W 19-GAUGE WATER BLOCKING ORANGE CONDUCTOR AND CONNECTORS AS NEEDED PULLED THROUGH IT FOR LOCATING PURPOSES. INSTALL TRACER LINE IN ALL OLD WORK IF NONE EXISTS.
- J. ALL TRENCHES AFTER PIPE HAS BEEN INSTALLED SHALL HAVE WARNING CAUTION TAPE OR RIBBON PLACED NO LESS THAN 12" ABOVE PIPING.
- K. ALL CABLE THAT ENTERS OR LEAVES THE PULL BOXES WILL HAVE NO LESS THAN A 12' FOOT SLACK LOOP IN EACH BOX OR VAULT. IT WILL BE MANAGED, ORGANIZED, LABELED AND SECURED ON THE WALL OF THE WITH PURPOSE BUILD SUPPORT RACKS AND RAILS TO ALLOW FREE ACCESS TO PULL BOX FOR FUTURE USE.
- TELECOMMUNICATIONS HAND-HOLES SHALL BE PLACED IN OUTSIDE PLANT CONDUIT RUNS AT AN INTERVAL NO GREATER THAN EVERY 500 FEET. CONDUITS ROUTING BETWEEN TWO TELECOMMUNICATIONS HAND-HOLES, OR BETWEEN A HAND—HOLE AND A BUILDING, SHALL CONTAIN NO MORE THAN TWO 90°SWEEPS OR A TOTAL OF 180°OF SWEEPS. IF ADDITIONAL CONDUIT SWEEPS ARE REQUIRED, PLACE ADDITIONAL HAND-HOLES AS NEEDED. TELECOMMUNICATIONS HAND-HOLES ARE TYPICALLY CONSTRUCTED IN PRE-FABRICATED CAST CONCRETE, TIER-15 RATING FOR WALL AND LID(S). TYPICAL HAND-HOLE SIZE SHALL BE 4'X4'X4'.
- 1. IF WALL SECTIONS MUST BE STACKED, THESE TELECOMMUNICATIONS HAND-HOLE SECTIONS MUST BE INSTALLED WITH A WATERTIGHT JOINT SEALER BETWEEN THE SECTIONS OF THE MANHOLE.
- 2. BARE EARTH FOR THE FLOOR OF A HAND-HOLE IS NOT ALLOWED. GRAVEL PACKED FLOOR PER MANUFACTURER, I.E. ARMORCAST.
- 3. TELECOMMUNICATIONS HAND-HOLES MUST CONTAIN CABLE RACKS FOR DRESSING AND SECURING CABLES THAT ROUTE THROUGH THE MANHOLE. FACH MUST CONTAIN STRUTS OR RAILS FOR INSTALLING CANTILEVER SUPPORT RACK ARMS PER HAND-HOLE WALL.
- 4. ALL METAL HARDWARE IN THE HAND-HOLE (RACKS AND LADDERS) MUST BE GROUNDED TO THE BONDING TABS PRE-CAST IN THE HAND-HOLE, WITH THE BONDING TABS BONDED TO THE GROUND ROD IF
- 5. THE COVER OF ALL TELECOMMUNICATIONS MANHOLES MUST BE A MINIMUM OF ONE (1) INCH ABOVE THE FINISHED GRADE AFTER ALL LANDSCAPING IS COMPLETED. IF MANHOLES ARE LOCATED IN PAVED AREAS, THE PAVEMENT MUST BE TAPERED UP TO THE MANHOLE COVER.
- A. ALL CONCEALED WIRING IN BUILDING PERIMETER WALLS AND NON-ACCESSIBLE CEILINGS SHALL BE INSTALLED IN CONDUIT NOT TO EXCEED 40% FILL RATE. ALL WIRING IN ACCESSIBLE CEILINGS SPACES SHALL BE INSTALLED IN A PREDETERMINED AND DESIGNED PATHWAY CREATED USING A SUPPORT METHOD BY PANDUIT PRO J-HOOK, J-HOOK LIKE, TRAYS, BASKETS, AND LADDERS SECURELY FASTENED TO THE BUILDING STRUCTURE AT A MAXIMUM OF 5' FOOT INTERVALS. ALL CONCEALED WIRING IN BUILDING INTERIOR WALLS SHALL HAVE A MINIMUM OF 3/4" EMT WITH NYLON PULL STRING IN WALL CAVITY TO 6" INCHES INTO OR ABOVE ACCESSIBLE CEILING. PROVIDE PROTECTIVE BUSHING AT WALL STUD PENETRATIONS FOR BUILDING INTERIOR WALL INSTALLATIONS TO PREVENT THE CABLE FROM BEING IN CONTACT WITH THE SHARP EDGES BEFORE CABLE IS INSTALLED. WHERE PREMISE CABLE MAKES TRANSITION FROM CONDUIT TO ANOTHER METHOD, THE END OF THE CONDUIT SHALL HAVE AN INSULATING BUSHING TO PREVENT THE CABLE FROM BEING IN CONTACT WITH THE SHARP EDGES.
- B. INSTALL POLYETHYLENE FLAT PULL STRING WITH FOOTAGE MARKS WITH THE MINIMUM BREAKING STRENGTH OF 200-LB IN ONE PIPE OR SMALLER AND PULLING STRENGTH OF 1200-LB IN PIPE 1-1/4" AND LARGER.
- C. CABLES THAT PENETRATE FIRE—RATED WALLS SHALL BE FIRE AND SMOKE STOPPED WITH UL APPROVED METHODS AND MATERIALS SUITABLE FOR THE RE-ENTERABLE PENETRATION:
- 1. APPROVED MANUFACTURERS:
- a. SPECIFIED TECHNOLOGIES INC. EZ—PATH SERIES
- b. SPECIFIED TECHNOLOGIES INC. EZ-PATH FIRESTOP GROMMET
- c. WIREMOLD/LEGRAND FLAME STOPPER FS SERIES
- d. HILTI CORP. FIRESTOP SLEEVE CP 653

e. SUBSTITUTIONS: PERMITTED

- D. INSTALL ALL CONDUCTORS, CONNECTIONS, AND DEVICES IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE OR AHJ.
- E. PATHWAYS BETWEEN TR, ER, AND EF SHALL HAVE A MINIMUM OF TWO (2) 2" INCH RACEWAYS FOR UTP DATA STATION CABLING AND (2) 4" INCH RACEWAY DEDICATED FOR ACCESS CONTROL CABLING. QUANTITY DETERMINED BY FILL AND FUTURE WORK.
- F. ALL CORE-DRILLED HOLES THROUGH FLOORS AND PENETRATIONS THROUGH FIRE WALLS SHALL BE SLEEVED AND THE CORRECT FITTINGS WILL BE PLACED AT BOTH ENDS OF THE PIPE FOR PROTECTING THE CABLE.
- G. ALL COMPONENTS WILL MEET OR EXCEED ANSI/TIA/EIA-569-B STANDARDS
- H. FOR POWER SYSTEMS OPERATING AT 480V OR GREATER, INCLUDING ELECTRICAL DISTRIBUTION PANELS, STEP DOWN DEVICES OR TRANSFORMERS, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 6 M (20 FT.) FROM ALL TELECOMMUNICATIONS CROSS-CONNECTS.
- FOR POWER SYSTEMS OPERATING AT 480V OR GREATER, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 10' FEET (3-METERS) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO ELECTRICAL POWER CABLES OR CONDUITS.
- SEPARATION DISTANCE OF 4' FEET (1.2-METERS) FROM ALL TELECOMMUNICATIONS CABLING.

K. FOR LIGHTNING PROTECTION SYSTEM CONDUCTORS (NEC 800-13), MAINTAIN

A MINIMUM SEPARATION DISTANCE OF 6' FEET (1.8-METERS) FROM ALL

J. FOR LARGE ELECTRICAL MOTORS OR TRANSFORMERS, MAINTAIN A MINIMUM

FOR POWER SYSTEMS OPERATING AT LESS THAN 480V, INCLUDING ALL CONDUIT AND CABLES USED FOR ELECTRICAL POWER DISTRIBUTION. MAINTAIN A MINIMUM SEPARATION DISTANCE OF 2' FEET (0.6-METERS) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO ELECTRICAL POWER CABLES OR CONDUITS.

TELECOMMUNICATIONS CABLING.

M. FOR FLUORESCENT LIGHTING, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 5" INCHES (12-CM) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO FLUORESCENT

- N. FOR BRANCH CIRCUITS (SECONDARY) POWER (120/240V, 20A) WHERE ELECTRIC LIGHT OR POWER CIRCUITS COEXIST WITH TELECOMMUNICATIONS CABLING, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 2" INCHES (0.50 MM).
- 3.6 TESTING
- A. TESTING OF COPPER CABLING SHALL BE PERFORMED PRIOR TO COMPLETION OF THE WORK AND PROJECT CLOSEOUT. ONE HUNDRED (100%) PERCENT OF THE COPPER BACKBONE AND HORIZONTAL WIRING PAIRS SHALL B TESTED FOR OPENS SHORTS, CORRECT POLARITY, PAIR TRANSPOSITION, AND PRESENCE OF A/C VOLTAGE WITH FLUKE NETWORKS OR EQUIVALENT CERTIFYING TESTER. VOICE AND DATA HORIZONTAL WIRING LINK SHALL BE TESTED FROM THE WAO TO THE TR. THE NETWORKING STRUCTURED CABLING SYSTEM WILL BE TESTED FOR CONFORMANCE TO THE SPECIFICATIONS OF ANSI/TIA-568-C.2 CATEGORY 6 PERMANENT LINK. THE 「 SHALL INCLUDE MUTUAL CAPACITANCE, CHARACTERISTIC IMPEDANCE, ATTENUATION, NEAR-END CROSS TALK, AND RESISTANCE.
- ALL FIBER OPTIC CABLE MUST BE VISUALLY INSPECTED AND OPTICALLY TESTED ON THE REEL UPON DELIVERY TO THE INSTALLATION SITE. USING AN OPTICAL TIME DOMAIN REFLECTOMETER (OTDR), AN ACCESS JUMPER WITH LIKE FIBER, A PIGTAIL, AND A MECHANICAL SPLICE, ALL FIBERS SHALL BE TESTED FOR CONTINUITY AND ATTENUATION. TESTING FOR CONTINUITY AND ATTENUATION ON THE BULK CABLE REEL MUST CONFIRM FACTORY SPECIFICATIONS TO ENSURE THAT THE FIBER OPTIC CABLE WAS NOT DAMAGED DURING SHIPMENT. THE TEST RESULTS MUST MATCH THE RESULTS OF THE FACTORY—ATTACHED TAG ON THE REEL, OR THE FIBER SHALL NOT BE USED. REEL DATA SHEET MUST BE PROVIDED SHOWING TEST
- C. END-TO-END OTDR AND OTLS TEST MEASUREMENTS SHALL BE PROVIDED FOR OS1 SINGLE-MODE AND OM4 MULTIMODE OPTICAL FIBERS (2 WAVE LENGTHS PER TEST ARE REQUIRED PER FIBER TYPE) PER ANSI/TIA-568-C.3 STANDARD. TEST RESULTS MUST BE SUBMITTED FOR REVIÉW AS PART OF THE INSTALLATION INSPECTION REQUIREMENTS. TEST RESULTS SHALL BE IN PAPER AND ELECTRONIC FORM, AND MUST CONTAIN THE NAMES AND SIGNATURES OF THE TECHNICIANS PERFORMING THE TESTS.
- D. OPTICAL FIBERS MUST BE CERTIFIED, TESTED, RATED AND GUARANTEED FOR A MINIMUM PERFORMANCE OF GIGABIT ETHERNET TRANSMISSION OVER FIBER (1000BASE-X) AND MAXIMUM OF 10 GIGABIT ETHERNET (10GBASE-X). ADDITIONALLY, ALL FIBER OPTIC CABLE LINKS MUST PASS ALL INSTALLATION AND PERFORMANCE TESTS BOTH RECOMMENDED AND MANDATED BY THE CABLE MANUFACTURER.
- RECORDS OF ALL TESTS SHALL BE COMPILED ONTO COMPACT DISC OR PORTABLE MEDIA AND SUBMITTED TO THE OWNER UPON COMPLETION OF THE WORK. THE TEST RESULTS SUMMARY, RAW TEST FILE, CSV, AND PDF VERSIONS MUST BE SUBMITTED (E.G. FLUKE NETWORKS LINK WARE) AS PER THE MANUFACTURER'S WARRANTY SUBMITTAL PROCEDURE DEFINES. TEST RESULTS MAY BE ELECTRONICALLY SUBMITTED DIRECTLY SUBMITTED TO THE OWNER'S I.T. DEPARTMENT. A FINALIZED REPORT WITH ALL RECORD DRAWINGS, WARRANTY AND TEST RESULTS WILL BE SUBMITTED TO THE OWNER'S I.T. DEPARTMENT IN AN ORGANIZED 3-RING BINDER. THE REPORT WILL BE SUBMITTED WITH SECTIONS DEFINED WITHIN A TABLE OF CONTENTS MATCHING THE TABBED SECTIONS. SEE DIVISION 1 "GENERAL REQUIREMENTS".
- THE OPTICAL FIBER MANUFACTURER WARRANTY MUST BE REGISTERED WITH CORNING CABLING SYSTEMS OR APPROVED SUPPLIER SEPARATELY BY THE SAME LOW-VOLTAGE CONTRACTOR FOR THE COPPER STRUCTURED CABLING
- 3.7 OPTICAL FIBER AND COPPER SPLICES
- A. THE SPLICING OF OPTICAL FIBER CABLE SHALL ONLY BE ALLOWED TO TERMINATE FACTORY PIGTAIL CONNECTORS AND RIBBON CABLES
- COPPER COUNT SPLICES SHALL UTILIZE 710 SPLICE METHOD CONNECTIONS PER THE CONDITION.
- TELECOM SPLICE CANISTERS WILL BE FROM PREFORMED ARMADILLO STAINLESS STEEL MODELS AND JELLY FILLED TO FACTORY PRESSURE ONCE ALL OF THE MULTI-PAIR CABLE HAS BEEN CERTIFIED FOR PRECISION AND ACCURACY IN BEING IDENTIFYING AND LABELED.
- 3.8 TRASH AND MATERIALS
- A. TRASH WILL BE KEPT CLEARED FROM THE WORK AREAS DAILY.
- B. MATERIALS WILL BE KEPT IN A NEAT AND WORKMANSHIP LIKE MANNER.
- 3.9 SALVAGE MATERIALS

REMOVE DEVICES.

- A. REMOVE AND RECYCLE UNUSED, UNDOCUMENTED AND OTHERWISE "ABANDONED" CABLES PRIOR TO THE COMPLETION OF THE PROJECT.
- B. "ABANDONED CABLE" IS DEFINED PER NEC 2008 ARTICLES: 640, 645, 725, 760, 770, 800, 820 AND 830. FURTHER DEFINITION IS CONTAINED IN NFPA-75, NFPA-76 AND NFPA-90A.
- C. DISCONNECT ABANDONED TELECOMMUNICATIONS OUTLETS, WORK AREAS AND
- D. REMOVE CABLING AND COMMUNICATIONS DEVICES IN WALLS, FLOORS, AND CEILINGS SCHEDULED FOR REMOVAL.
- E. PROVIDE BLANK COVER FOR ABANDONED TELECOMMUNICATIONS OUTLET AND WORK AREA BOXES THAT ARE NOT REMOVED.
- F. SCHEDULE WORK WITH OWNER AND OTHER CONTRACTORS.
- G. IF SALVAGED MATERIALS ARE TO BE RE-USED OR OTHERWISE RETURNED TO THE OWNER, MAKE SURE THE ITEMS TO BE REMOVED FROM SERVICE AND TURNED OVER TO THE OWNER ARE IDENTIFIED ON THE DRAWINGS.
- H. EXCEPT WHERE NOTED ON THE PROJECT DRAWINGS, MATERIALS REMOVED SHALL BECOME THE PROPERTY OF AND SHALL BE DISPOSED/RECYCLED BY THE CONTRACTOR
- I. MAINTAIN MATERIALS AND EQUIPMENT TO BE TURNED OVER TO THE OWNER AND/OR REUSED IN CONDITION EQUAL TO THAT EXISTING BEFORE WORK BEGAN. REPAIR OR REPLACE MATERIALS OR EQUIPMENT DAMAGED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.



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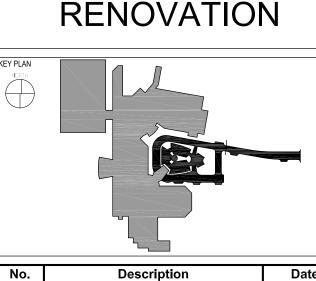
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SADZIA

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HUNLEY



ELECTRICAL SPECIFICATIONS

SSUE DATE: 11/24/2020 E006

0 3" 6" 1/16"=1'-0" U o 10 ---1"=1'-0" 1 1/2"=1'-0" 3"=1'-0" 3/4"=1'-0" 1/8"=1'-0" 1/4"=1'-0" 1/2"=1'-0"

