

MECHANICAL SYMBOLS LIST		
AC-1	TXF-1	EQUIPMENT SYMBOL
		RISER SYMBOL
AIR DEVICES		
		CEILING DIFFUSER SUPPLY
		CEILING DIFFUSER RETURN
		EXHAUST GRILLE
DUCT ACCESSORIES		
		BACKDRAFT DAMPER
		VOLUME DAMPER W/ ACCESS DOOR
		MOTORIZED DAMPER
		FIRE DAMPER
CONTROLS AND SENSORS		
		THERMOSTAT, SENSOR
		SMOKE DETECTOR
DUCTWORK		
		NEW SHEET METAL DUCTWORK & SIZE
		SUPPLY OR OUTSIDE AIR DUCT
		RETURN AIR DUCT
		DUCTWORK TRANSITION
		SUPPLY DUCT ELBOW UP OR DOWN
		RETURN DUCT ELBOW UP OR DOWN
		DUCT ELBOW WITH FIXED TURNING VANES
		DUCT BRANCH TAKE-OFF
		FLEXIBLE DUCTWORK

MECHANICAL ABBREVIATIONS	
AHU	AIR HANDLING UNIT
BTU	BRITISH THERMAL UNIT
CDS	CEILING DIFFUSER SUPPLY
CDR	CEILING DIFFUSER RETURN
CFM	CUBIC FEET PER MINUTE
DN	DOWN
EER	ENERGY EFFICIENCY RATIO
ESP	EXTERNAL STATIC PRESSURE
FC	FLEXIBLE CONNECTION
GC	GENERAL CONTRACTOR
HZ	FREQUENCY
MC	MECHANICAL CONTRACTOR
NC	NOISE CRITERIA
RTU	ROOFTOP UNIT
SEER	SEASONAL ENERGY EFFICIENCY RATIO
VD	VOLUME DAMPER
BOD	BOTTOM OF DUCT
BOE	BOTTOM OF EQUIPMENT
RTU	ROOF TOP UNIT
EG	EXHAUST GRILLE
TXF	TOILET EXHAUST FAN
RG	RETURN GRILLE
SG	SUPPLY GRILLE
ACCU	AIR COOLED CONDENSING UNIT
FR	FURNACE
CC	COOLING COIL
SA	SUPPLY AIR
RA	RETURN AIR
EX	EXHAUST AIR

PENNSYLVANIA BUILDING DEPARTMENT NOTES	
ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF PENNSYLVANIA BUILDING CODE 2018 AND ALL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.	
1. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.	
2. TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH 2018 INTERNATIONAL BUILDING CODE .	
3. THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.	
4. TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION MC 107 AND THE FOLLOWING SECTIONS OF THE 2018 INTERNATIONAL MECHANICAL CODE: A. REFRIGERATION SYSTEMS - MC 1108	
5. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD: A. STANDARDS OF HEATING - 2018-IMC 309.1 B. DUCT CONSTRUCTION AND INSTALLATION- 2018 IMC 603 C. AIR INTAKES, EXHAUSTS AND RELIEFS - 2018 IMC 401.5 D. AIR FILTERS - 2018 IMC 605 E. GAS FIRED EQUIPMENT - FUEL GAS CODE	
6. MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.	
7. VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018- IMC 401.	
8. A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY 2018- IMC 403.3	
9. REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION.	
10. THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.	
11. A WRITTEN REPORT DESCRIBING THE ACTIVITIES AND MEASUREMENTS COMPLETED IN ACCORDANCE WITH SECTION 2018-IECC, C408.2.1.	
12. ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.	
13. SMOKE DETECTOR SHALL MEET UL268A.	
14. INDOOR DUCT AND PLENUM INSULATION SCHEDULEU; (SECTION 230713) A. CONCEALED, RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-RETURN, OUTDOOR-AND EXHAUST-AIR DUCT AND AIR PLENUM INSULATION; B. FLEXIBLE ELASTOMERIC, MINERAL-FIBER BLANKET, MINERAL-FIBER BOARD OR POLYOLEFIN WITH MINIMUM INSTALLED THERMAL RESISTANCE AS FOLLOWS: UNCONDITIONED SPACES WITHIN BUILDING: R-6 WITHIN BUILDING ENVELOPE ASSEMBLY: R-8 OUTSIDE OF BUILDING: R-8	

MECHANICAL DRAWING LIST	
M001	MECHANICAL COVER SHEET
M002	MECHANICAL SPECIFICATIONS
M101	MECHANICAL FLOOR PLAN
M102	MECHANICAL ROOF PLAN
M201	MECHANICAL SCHEDULES(1 OF 2)
M202	MECHANICAL SCHEDULES(2 OF 2)
M401	MECHANICAL DETAILS (1 OF 3)
M402	MECHANICAL DETAILS (2 OF 3)
M403	MECHANICAL DETAILS (3 OF 3)

PENNSYLVANIAN CODES AND REGULATIONS
INTERNATIONAL BUILDING CODE 2018 (WITH AMMENDMENTS AS PER UCC REGULATION)
INTERNATIONAL ENERGY CONSERVATION CODE 2018
INTERNATIONAL FIRE CODE 2018
INTERNATIONAL FUEL GAS CODE 2018
INTERNATIONAL MECHANICAL CODE 2018
INTERNATIONAL PLUMBING CODE 2018

GENERAL NOTES	
1. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.	
2. BEFORE PROCEEDING WITH ANY WORK IN OCCUPIED OR USED AREAS, THE CONTRACTOR SHALL APPLY TO OWNER FOR PERMISSION TO ENTER SUCH AREAS. THE CONTRACTOR IS OBLIGED TO PERFORM HIS WORK ONLY AT THE TIMES DESIGNATED BY OWNER. THERE WILL BE NO ADDITIONAL COMPENSATION FOR THE WORK PERFORMED AFTER HOURS OR ON OFF-DAYS WITHOUT PRIOR WRITTEN APPROVAL.	
3. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.	
4. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.	
5. CONTRACTOR SHALL ASCERTAIN THE APPROPRIATE METHOD FOR BRINGING THE UNITS INTO AND THROUGH THE BUILDING TO POSITION UNIT IN LOCATION SHOWN ON THE PLANS. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH RESTRICTIVE SPACES. COORDINATE WITH BUILDING OWNER APPROPRIATE TIMES OF DAY SUCH EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.	
6. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.	
7. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.	
8. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.	
9. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. PROVIDE TEMPORARY DUCT CAPS AND/OR CONNECTIONS TO MINIMIZE SHUTDOWN TIME.	
10. SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 3000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75% OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER.	
11. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.	
12. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL (FIBERGLASS INSULATION IS NOT ACCEPTABLE).	
13. WHERE PENETRATIONS THROUGH FIRE RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.	
14. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.	
15. ACCESS DOORS ARE REQUIRED FOR ALL FANS, AND ACCESS DOOR SHALL HAVE THE EQUAL RATED CAPACITY (1HR, 2HR, ETC.) AS WALL. COORDINATE ALL LOCATIONS OF ACCESS DOORS WITH THE ARCHITECT.	
16. REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL VOLUME AND FIRE DAMPERS, AUTOMATIC DAMPERS AND ALL OTHER MECHANICAL EQUIPMENT AND DEVICES. HVAC CONTRACTOR TO FURNISH ACCESS LOCATION REQUIREMENTS TO GENERAL CONTRACTOR. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS, AND MARKERS TO IDENTIFY LOCATION OF CONCEALED VALVES, DAMPERS AND EQUIPMENT.	
17. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.	
18. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.	
19. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.	

GENERAL HVAC NOTES	
GENERAL:	
1. PROVIDE ALL MATERIAL AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.	
2. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK (HVAC, PLUMBING, AND FIRE PROTECTION) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.	
3. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.	
4. WHEN MECHANICAL WORK (HVAC, PLUMBING, SHEET METAL, FIRE PROTECTION, ETC.) IS SUBCONTRACTED, IT SHALL BE THE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE MECHANICAL CONTRACT OR WHICH CONTRACTOR PROVIDES FINAL CONNECTIONS FOR A PARTICULAR ITEM OF THE MECHANICAL CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE MECHANICAL CONTRACTOR, WHOSE DECISION SHALL BE FINAL.	
5. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.	
6. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.	
7. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.	
8. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.	
9. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND ELECTRICAL DIVISION OF THE SPECIFICATION.	
10. PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.	
11. LOCATE ALL TEMPERATURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH THE STRAIGHT SECTION OF PIPE OR DUCT UP AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY.	
12. WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO THE FABRICATION OF DUCTWORK, CUTTING OF PIPING, OR FABRICATION OF BEAMS.	
13. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN THE DETAILS FOR DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.	
14. PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE DAMPERS, VALVES, SMOKE DETECTORS, AND OTHER CONCEALED MECHANICAL EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION. ACCESS PANELS SHALL HAVE THE EQUAL RATED CAPACITY (1HR, 2HR, ETC.) AS WALL.	
15. MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM A METAL DECK.	
16. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND REQUIRED TO PROVIDE A VIBRATION-FREE INSTALLATION.	
17. ALL DUCTWORK, PIPING, AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED. THE USE OF C-CLAMPS SHALL NOT BE PERMITTED.	
18. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.	
19. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUIT, ETC., SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR APPROVED EQUAL.	
20. ALL RTU AND AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH RTU AND AIR HANDLING UNIT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, AND PIPED TO THE NEAREST DRAIN. SEE THE DETAILS SHOWN IN THE DRAWINGS OR THE CONTRACT SPECIFICATIONS FOR THE DEPTH OF THE AIR CONDITIONING CONDENSATE TRAP.	
21. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.	
22. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.	
23. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TESTING, ADJUSTING, AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THE AABC STANDARDS.	

SCOPE OF WORK	
SCOPE OF WORK	
1. THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEMS AS DESCRIBED IN THE SPECIFICATIONS, FLOOR PLAN(S) DESIGN, DETAIL DRAWINGS, NOTES, RFIS, ETC. FOR THIS PROJECT. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.	
2. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.	
3. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OF ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRS AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.	

HVAC DUCTWORK - SHEET METAL

1. CERTAIN ITEMS SUCH AS RISES AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC., ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS.

2. CONTRACTOR TO CHECK AND CORRECT ANY AND ALL DEFICIENCIES IN EXISTING DUCTS. ALL NEW DUCTWORK WILL COMPLY WITH THE LATEST SMACNA GUIDELINES AND CONFORM WITH REQUIREMENTS OF THE LATEST HANDBOOKS PUBLISHED BY ASHRAE.

3. PROVIDE VOLUME DAMPER AT EACH TAP TO MAIN DUCT AND WHERE NECESSARY TO PROPERLY BALANCE SYSTEM.

4. SUPPLY AND RETURN DUCTWORK 10' FROM ALL AC UNITS SHALL BE LINED WITH 1" ACOUSTICAL LINING.

5. RE-INSULATE ALL DUCTWORK AND PIPING IN WHICH INSULATION HAS BEEN REMOVED OR DAMAGED WITH INSULATION EQUAL TO THE EXISTING INSULATION.

6. CONTRACTOR SHALL SUPPLY AND INSTALL ALL NECESSARY SUPPLY DIFFUSERS AND RETURN AIR REGISTERS WHERE INDICATED ON THE DRAWING. COORDINATE LOCATION OF DIFFUSERS AND REGISTERS WITH REFLECTED CEILING PLAN.

7. IN CORRIDORS WHERE CEILING SPEAKERS AND AIR DIFFUSERS ARE INDICATED BETWEEN THE SAME LIGHT FIXTURES, INSTALL BOTH DEVICES AT THE QUARTER POINTS BETWEEN THE FIXTURES.

8. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS 4'-0" (CENTER LINE) ABOVE THE FINISHED FLOOR. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE PRECEDING LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION.

9. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.

10. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.

11. PROVIDE ALL 90-DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. ELBOWS IN KITCHEN EXHAUSTS SHALL BE OF UN-VANED SMOOTH RADIUS CONSTRUCTION WITH A RADIUS EQUAL TO 1-1/2 TIMES THE WIDTH OF THE DUCT. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.

12. COORDINATE DIFFUSER, REGISTER, AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.

13. ALL RTU AND AIR HANDLING UNITS SHALL OPERATE WITHOUT MOISTURE CARRYOVER.

14. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS, AND VALVING.

15. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN, AND EXHAUST) CONNECTED TO AIR HANDLING UNITS, FANS, AND OTHER EQUIPMENT THAT REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED.

16. EXTERIOR LOUVERS ARE INDICATED FOR SIZE, GENERAL LOCATION AND PERFORMANCE ONLY. DETAILED LOUVER DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS.

17. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 8 FT.

18. ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

19. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPERS, COILS, AND OTHER ITEMS LOCATED IN THE DUCTWORK THAT REQUIRE SERVICE AND/OR INSPECTION.

20. PROVIDE ACCESS DOORS IN DUCTWORK FOR THE OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL FANS, VALVES, AND MECHANICAL EQUIPMENT.

21. ALL DUCTS SHALL BE GROUNDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS. GROUNDING STRAPS SHALL BE BOLTED OR SOLDERED TO BOTH THE EQUIPMENT AND THE DUCT.

22. SMOKE DETECTORS SHALL BE FURNISHED AND WIRED BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MOUNTING THE SMOKE DETECTOR IN DUCTWORK AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS.

23. SEE SPECIFICATIONS FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.

SPECIFICATIONS SECTION 0001 - NOTICE TO BIDDERS

1.1 BIDDERS REPRESENTATIONS
A. THE BIDDER BY MAKING A BID REPRESENTS THAT: THE BIDDER HAS READ AND UNDERSTANDS THE BIDDING DOCUMENTS TO THE EXTENT THAT SUCH DOCUMENTATION RELATES TO THE WORK FOR WHICH THE BID IS SUBMITTED, AND FOR OTHER PORTIONS OF THE PROJECT, IF ANY, BEING BID CONCURRENTLY OR PRESENTLY UNDER CONSTRUCTION.
B. THE BID IS MADE IN COMPLIANCE WITH THE BIDDING DOCUMENTS.
C. THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO SERVE JOINTLY AS A BASIS FOR THE BIDDER TO SUBMIT A CONTRACT PRICE FOR THE MATERIAL AND LABOR.
D. SHOULD CONFLICTS OR DISCREPANCIES OCCUR WITHIN THE BIDDING DOCUMENTS, THE ITEM OR ITEMS IN DISPUTE THAT REPRESENT THE GREATER COST SHALL PREVAIL IN THE FINAL BID.
E. THE BID IS BASED UPON THE MATERIALS, EQUIPMENT AND SYSTEMS REQUIRED BY THE BIDDING DOCUMENTS WITHOUT EXCEPTION.

1.2 EXISTING CONDITIONS AND COORDINATION
A. THE BIDDER HAS VISITED THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED AND HAS CORRELATED THE BIDDER'S PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE PROPOSED BIDDING DOCUMENTS.
B. THE BIDDER SHALL PROPOSE COORDINATION OF WORK SUCH THAT CONFLICTS WITH OTHER TRADES AND SPACE ALLOCATIONS ARE AVOIDED.

1.3 RESPONSIBILITIES
A. THE BIDDER UNDERSTANDS THAT ANY CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE TIMELY COMPLETION AND ACCEPTANCE OF THEIR WORK AND THAT ANY ITEMS DAMAGED, LOST OR STOLEN DURING TIME OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED WITHOUT ANY ADDITIONAL COST TO THE OWNER.
B. THE BIDDER UNDERSTANDS THAT ANY PROPOSED WORK IN OCCUPIED TENANT SPACES SHALL BE PERFORMED DURING TIMES OF NON-TENANT OCCUPANCY OR AS SCHEDULED OR DIRECTED BY THE BUILDING MANAGER.
C. THE BIDDER UNDERSTANDS THAT ANY PROPOSED SHUT-DOWN OF EXISTING SYSTEMS DURING CONSTRUCTION SHALL BE PRE-ARRANGED WITH THE BUILDING MANAGER AND THAT SUCH SHUT-DOWNS ARE TO BE KEPT TO A MINIMUM.
END OF SECTION 0001

SECTION 0101 - QUALITY OF WORK

1.1 WORKMANSHIP
A. ALL WORK SHALL BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE.
B. ALL DEFECTS WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ARCHITECT OR BUILDING MANAGER AT NO ADDITIONAL COST TO THE OWNER.
C. UPON COMPLETION OF THE WORK THE CONTRACTOR SHALL REMOVE FROM THE SITE, ALL TOOLS, DEMOLISHED APPLIANCES AND ANY SURPLUS MATERIAL.
D. PRIOR COMPLIANCE
1.2 CODE COMPLIANCE
A. ALL WORK SHALL MEET ALL STATE AND LOCAL CODES HAVING JURISDICTION.
END OF SECTION 0101

SECTION 0102- REQUIRED DOCUMENTS
1.1 SHOP DRAWINGS
A. A SET OF PRINTS FOR ANY MECHANICAL WORK INCLUDING BUT NOT LIMITED TO, DUCTWORK AND PIPING LAYOUT SHALL BE SUBMITTED FOR APPROVAL TO THE ENGINEER PRIOR TO CONSTRUCTION OR PURCHASE OF MATERIALS.
1.2 SUBMITTALS
A. EQUIPMENT SUBMITTALS OF ALL PROPOSED MECHANICAL AND ANCILLARY EQUIPMENT INCLUDING ALL ACCESSORIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. ALL PERTINENT MODELS, SIZES, ACCESSORIES AND CHOICES SHALL BE CLEARLY CHECKED, PRINTED OR OTHERWISE INDICATED ON THE SUBMITTALS.
1.3 RECORD DRAWINGS
A. UPON COMPLETION OF THE WORK, A RECORD DRAWING SHALL BE SUBMITTED TO THE OWNER DEPICTING ALL SUBSEQUENT CHANGES, ADDITIONS AND OR CORRECTIONS TO THE CONTRACT DRAWINGS AND OR CONTRACT SCOPE MADE DURING CONSTRUCTION. THIS DRAWING SHALL REPRESENT A COMPLETE RECORD OF THE WORK INSTALLED.
1.4 EQUIPMENT OPERATING INSTRUCTIONS

A. ON COMPLETION AND ACCEPTANCE OF WORK, THIS CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS, EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.
B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE-RING BINDERS WITH CLEAR ACETATE COVERS. THE CONTRACTOR SHALL PREPARE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE ELECTRONIC COPY TO THE ENGINEER.
C. THE INSTRUCTION BOOKLET SHALL BE ORGANIZED IN SECTIONS, WITH ONE SECTION PER SYSTEM. THE COVER OF THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND PHONE NUMBER OF THE PROJECT, ARCHITECT, ENGINEER, MECHANICAL CONTRACTOR AND SUBCONTRACTORS.
END OF SECTION 0102

SECTION 078413-PENETRATION FIRE-STOPPING
1.1 QUALITY ASSURANCE
A. INSTALLER QUALIFICATIONS: AN FM GLOBAL-APPROVED FIRE-STOP CONTRACTOR OR A UL-QUALIFIED FIRE-STOP CONTRACTOR.
B. FIRE-TEST-RESPONSE CHARACTERISTICS: UL, INTERTEK ETL SEMKO OR FM GLOBAL.
1.2 PENETRATION FIRESTOPPING
A. PENETRATIONS IN FIRE-RESISTANCE-RATED WALLS: F-RATINGS PER ASTM E 814 OR UL 1479.
B. PENETRATIONS IN HORIZONTAL ASSEMBLIES: F- AND T-RATINGS PER ASTM E 814 OR UL 1479.
C. PENETRATIONS IN SMOKE BARRIERS: L-RATINGS PER UL 1479.
D. W-RATINGS: PER UL 1479.

1.3 INSTALLATION
A. IDENTIFICATION: PREPRINTED METAL OR PLASTIC LABELS.
1.4 FIELD QUALITY CONTROL
A. INSPECTION OF INSTALLED FIRE-STOPPING: BY OWNER-ENGAGED AGENCY ACCORDING TO ASTM E 2174.
1.5 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE
WHERE UL-CLASSIFIED SYSTEMS ARE INDICATED, THEY REFER TO SYSTEM NUMBERS IN UL'S "FIRE RESISTANCE DIRECTORY" UNDER PRODUCT CATEGORY XHEZ.
FOR THE FOLLOWING SYSTEMS:
A. METALLIC AND NON-METALLIC PIPES, CONDUIT, OR TUBING, ELECTRICAL CABLES, CABLE TRAYS WITH ELECTRIC CABLES, MISCELLANEOUS ELECTRICAL PENETRANTS, INSULATED PIPES, GROUPINGS OF PENETRANTS, USE ON OR MORE THE FOLLOWING MATERIALS:
a. LATEX SEALANT
b. SILICONE SEALANT
c. INTUMESCENT PUTTY
d. ORTAF
e. SILICONE FOAM
f. PILLOWS/BAGS
j. INTUMESCENT WRAP STRIPS
k. INTUMESCENT COMPOSITE SHEET
l. HILTI CONSTRUCTION CHEMICAL, INC
2. TREMCO INC.
3. 3M FIRE PROTECTION PRODUCTS
END OF SECTION 078413

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
1.1 SLEEVE-SEAL SYSTEMS
A. FIELD-ASSEMBLED, MODULAR SEALING-ELEMENT UNIT FOR FILLING ANNUAL SPACE BETWEEN PIPING AND SLEEVE.
1. SEALING ELEMENTS: EPDM RUBBER OR NBR.
2. PRESSURE PLATES: CARBON STEEL, PLASTIC, STAINLESS STEEL
3. CONNECTING BOLTS AND NUTS: CARBON STEEL WITH CORROSION-RESISTANT COATING, STAINLESS STEEL.
B. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. ADVANCE PRODUCTS & SYSTEMS, INC.
2. CALPICO, INC.
3. METRAFLEX COMPANY (THE).
4. PIPELINE SEAL AND INSULATOR, INC.
5. PROCO PRODUCTS, INC.
1.2 SLEEVE-SEAL FITTINGS
A. MANUFACTURED PLASTIC, SLEEVE-TYPE, PLASTIC OR RUBBER WATER-STOP ASSEMBLY MADE FOR IMBEDDING IN CONCRETE SLAB OR WALL.
1.3 GROUT
A. NON-SHRINK, FACTORY PACKAGED.
1.4 SLEEVE AND SLEEVE-SEAL SCHEDULE
A. USE SLEEVES AND SLEEVE SEALS FOR THE FOLLOWING PIPING-PENETRATION APPLICATIONS:
1. INTERIOR PARTITIONS
a. PIPING SMALLER THAN NPS 6 (DN 150): GALVANIZED-STEEL-PIPE SLEEVES, PVC-PIPE SLEEVES
b. PIPING NPS 6 (DN 150) AND LARGER: GALVANIZED-STEEL-SHEET SLEEVES.
END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING
PART 2 - PRODUCTS
2.1 ESCUTCHEONS
A. ONE-PIECE, CAST-BRASS TYPE: WITH POLISHED, CHROME-PLATED AND ROUGH-BRASS FINISH AND SETSCREW FASTENER.
B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.
C. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

SECTION 230519 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
PART 1 - SUMMARY
1.1 SUMMARY
A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:
1. AIR SYSTEMS: CONSTANT-VOLUME SYSTEMS
2. EXISTING SYSTEMS.
1.2 QUALITY ASSURANCE
A. THE CONTRACTOR SHALL PROCURE THE SERVICES OF A TESTING, ADJUSTING AND BALANCING (TAB) SPECIALIST WHO SPECIALIZES IN HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS. THE TAB AGENT SHALL HAVE THE FOLLOWING QUALIFICATIONS: AABC, NEBB OR TABB CERTIFIED.

2.2 FLOOR PLATES
A. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE WITH HOLES FOR FASTENERS.
PART 3 - EXECUTION
3.1 INSTALLATION
A. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.
B. THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL NEW AIR AND HYDRONIC SYSTEMS AS LISTED ABOVE IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.
1. ESCUTCHEONS FOR NEW PIPING:
a. PIPING WITH FITTING OR SLEEVE PROTRUDING FROM WALL: ONE-PIECE, DEEP-PATTERN TYPE
b. INSULATED PIPING: ONE-PIECE, STAMPED-STEEL TYPE
c. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED, CHROME-PLATED FINISH OR STAMPED-STEEL TYPE.
3.2 FIELD QUALITY CONTROL
A. REPLACE BROKEN AND DAMAGED ESCUTCHEONS AND FLOOR PLATES USING NEW MATERIALS.
END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
1.1 PERFORMANCE REQUIREMENTS
A. DELEGATED DESIGN: DESIGN TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.
B. STRUCTURAL PRIORITY: HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7.
1. DESIGN SUPPORTS FOR MULTIPLE PIPES CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, SYSTEM CONTENTS, AND TEST WATER.
2. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND
3. DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.
1.2 SUBMITTALS
A. SHOP DRAWINGS: SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.
1.3 QUALITY ASSURANCE
A. AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE - STEEL."
1.4 COMPONENTS
A. METAL PIPE HANGERS AND SUPPORTS: CARBON OR STAINLESS STEEL.
B. TRAPEZE PIPE HANGERS: CARBON OR STAINLESS STEEL.
C. FIBERGLASS PIPE HANGERS: CLEVIS, CENTURY COMPOSITES, COOPER B-LINE
D. METAL FRAMING SYSTEMS: MFMA MANUFACTURER
E. FIBERGLASS STRUT SYSTEMS: COOPER B-LINE
F. THERMAL-HANGER SHIELD INSERTS
G. FASTENER SYSTEMS: POWDER-ACTUATED FASTENERS OR MECHANICAL-EXPANSION ANCHORS
H. PIPE STANDS: COMPACT, LOW TYPE, SINGLE PIPE, HIGH TYPE, SINGLE PIPE, HIGH TYPE, MULTIPLE PIPES, CURB-MOUNTED TYPE
I. EQUIPMENT SUPPORTS
END OF SECTION 230529

SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT
PART 1 - GENERAL
1.1 COMPONENTS
A. VIBRATION ISOLATORS:
1. ISOLATOR PADS: NEOPRENE, RUBBER, HERMETICALLY AND/OR SEALED COMPRESSED FIBERGLASS
2. RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS: FACTORY-ASSEMBLED, FULLY ENCLOSED, INSULATED, AIR- AND WATERTIGHT CURB RAIL, WITH SPRING ISOLATORS MOUNTED ON ELASTOMERIC ISOLATION PADS, AND SNUBBER BUSHINGS.
D. VIBRATION ISOLATION EQUIPMENT BASES:
1. STEEL BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS.
2. INERTIA BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS READY FOR FIELD-APPLIED, CAST-IN-PLACE CONCRETE
1.2 FIELD QUALITY CONTROL
A. TESTING: BY EITHER: OWNER-ENGAGED AGENCY, CONTRACTOR-ENGAGED AGENCY, OR CONTRACTOR.
PART 2 - PRODUCTS
1.1 VIBRATION ISOLATORS & SEISMIC-RESTRAINT DEVICES
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
B. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. ACE MOUNTINGS CO., INC.
2. AMBER/BOOTH COMPANY, INC.
3. CALIFORNIA DYNAMICS CORPORATION.
4. HILTI, INC.
5. ISOLATION TECHNOLOGY, INC.
6. KINETICS NOISE CONTROL.
7. LOOS & CO.; CABLEWARE DIVISION.
8. MASON INDUSTRIES.
9. TOLCO INCORPORATED; A BRAND OF NIBCO INC.
10. UNISTRUT; TYCO INTERNATIONAL, LTD.
END OF SECTION 230548

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
1.1 SUMMARY
A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:
1. AIR SYSTEMS: CONSTANT-VOLUME SYSTEMS
2. EXISTING SYSTEMS.
1.2 QUALITY ASSURANCE
A. THE CONTRACTOR SHALL PROCURE THE SERVICES OF A TESTING, ADJUSTING AND BALANCING (TAB) SPECIALIST WHO SPECIALIZES IN HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS. THE TAB AGENT SHALL HAVE THE FOLLOWING QUALIFICATIONS: AABC, NEBB OR TABB CERTIFIED.

1.3 EXECUTION
A. THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL EXISTING AIR AND HYDRONIC SYSTEMS THAT ARE TO REMAIN OR TO BE INCORPORATED INTO NEW WORK PRIOR TO THE STARTING OF WORK IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.
B. THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL NEW AIR AND HYDRONIC SYSTEMS AS LISTED ABOVE IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.
C. THE REPORT SHALL INDICATE A SCHEMATIC DIAGRAM INDICATING LOCATIONS OF ALL EQUIPMENT TESTED AND MEASUREMENT LOCATIONS.
D. PRIOR TO FINAL INSPECTION OF THE WORK, THE TAB SPECIALIST SHALL BALANCE ALL SYSTEMS AS INDICATED ABOVE TO THE REQUIREMENTS OF THE DESIGN.
E. THE CONTRACTOR SHALL HAVE FURNISH AND INSTALL ALL ADDITIONAL BALANCING EQUIPMENT, PRESSURE TAPS, GAUGES AND OTHER EQUIPMENT AS REQUIRED FOR A PROPERLY BALANCED SYSTEM AT NO ADDITIONAL COST TO THE OWNER. SUCH ADDITIONAL EQUIPMENT SHALL ADHERE IN STRICT ACCORDANCE WITH THE RESPECTIVE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
F. THE CONTRACTOR SHALL HAVE THE TESTING AND BALANCING SPECIALIST COORDINATE ALL WORK OF THIS SECTION WITH THE BUILDING MANAGER. BALANCING WORK SHALL NOT CONFLICT WITH OTHER WORK SO AS TO MAINTAIN COMPLETION WITHIN THE SPECIFIED TIME.
G. ALL INSTRUMENTS USED FOR TAB SHALL BE MAINTAINED IN GOOD WORKING CONDITION AND ACCURATELY CALIBRATED.
H. TOLERANCES: PLUS OR MINUS 6 PERCENT OF DESIGN VALUES
I. INSPECTIONS: RANDOM CHECKS BY OWNER OR ARCHITECT TO VERIFY FINAL TESTING, ADJUSTING, AND BALANCING REPORT.
J. ADDITIONAL TESTS: RANDOM TESTS WITHIN 90 DAYS OF COMPLETING TAB TO VERIFY BALANCE CONDITIONS AND SEASONAL TESTS.
END OF SECTION 230593

SECTION 230713 - DUCT INSULATION
1.1 QUALITY ASSURANCE
A. SURFACE-BURNING CHARACTERISTICS: ALL INSULATION SHALL HAVE COMPOSITE (INSULATION JACKET OR FACING AND ADHESIVE USED TO ADHERE THE FACING OR JACKET TO THE INSULATION) A FLAME-SPREAD INDEX OF 25, AND SMOKE-DEVELOPMENT INDEX OF 50 FOR INSULATION INSTALLED INDOOR, 75, AND SMOKE-DEVELOPMENT INDEX OF 150 FOR INSULATION INSTALLED OUTDOORS, ACCORDING TO ASTM E 84.
1.2 FIELD QUALITY CONTROL
A. FIELD INSPECTIONS: BY OWNER-ENGAGED AGENCY.
1.3 INDOOR DUCT AND PLENUM INSULATION SCHEDULE:
A. CONCEALED, RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-RETURN, OUTDOOR AND EXHAUST-AIR DUCT AND AIR PLENUM INSULATION:
1. FIBROUS ELASTOMERIC, MINERAL-FIBER BLANKET, MINERAL-FIBER BOARD OR POLYOLEFIN WITH MINIMUM INSTALLED THERMAL RESISTANCE AS FOLLOWS:
UNCONDITIONED SPACES WITHIN BUILDING: R-8
WITHIN BUILDING ENVELOPE ASSEMBLY: R-8
OUTSIDE OF BUILDING: R-8
1.4 ITEMS NOT INSULATED:
1. FIBROUS-GLASS DUCTS.
2. METAL DUCTS WITH DUCT LINER OR SUFFICIENT THICKNESS TO COMPLY WITH NFPA 90A AND NFPA 901.
3. FACTORY-INSULATED FLEXIBLE DUCTS.
4. FACTORY-INSULATED PLENUMS AND CASINGS.
5. FLEXIBLE CONNECTORS.
6. VIBRATION-CONTROL DEVICES.
7. FACTORY-INSULATED ACCESS PANELS AND DOORS.
8. DUCTS THAT HAVE INTERNAL ACOUSTICAL LINING.

1.5 PRODUCTS
A. THE FOLLOWING INSULATION MANUFACTURERS WILL BE ACCEPTABLE:
1. JOHNS-MANVILLE
2. OWENS-CORNING
1.6 ACOUSTICAL TREATMENT
1. WHERE SHOWN ON THE DRAWINGS, LOW PRESSURE DUCTWORK SHALL BE LINED WITH 1/2" THICK R-8 AS MANUFACTURED BY DUCTMATE, 1-1/2 POUND MINIMUM DENSITY, NEOPRENE COATED, FLEXIBLE FIBERGLASS DUCT LINER, LINING SHALL COMPLY WITH NFPA 90A AND SHALL HAVE A FLAME SPREAD CLASSIFICATION OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING NOT MORE THAN 50. DUCT SIZES WHERE LINING IS INDICATED ON PLANS ARE MINIMUM INSIDE CLEAR DIMENSIONS REQUIRED.
1.7 SEALANT MATERIALS
1. TWO-PART TAPE SEALING SYSTEM.
2. WATER-BASED JOINT AND SEAM SEALANT.
3. SOLVENT-BASED JOINT AND SEAM SEALANT.
4. FLANGED JOINT SEALANT.
5. FLANGE GASKETS.
END OF SECTION 230713

SECTION 233113 - METAL DUCTS
1.1 CONSTRUCTION
A. EACH DUCT SYSTEM SHALL BE CONSTRUCTED FOR THE SPECIFIC SMACNA DUCT PRESSURE CLASSIFICATIONS SHOWN ON THE CONTRACT DRAWINGS, WHERE NO PRESSURE CLASS IS SPECIFIED BY THE DESIGNER, THE SMACNA 2" THICK 1/2" WG PRESSURE CLASS IS THE BASIS OF COMPLIANCE WITH THESE STANDARDS, REGARDLESS OF THE VELOCITY IN THE DUCT.
B. ALL DUCTWORK SHALL BE CONSTRUCTED TO SMACNA 2" WG DESIGN AND NOT LESS THAN THE FOLLOWING STANDARDS:
1. DUCTWORK SHALL BE TRANSVERSELY JOINTED BY CONNECTING SEAMS OF COMPANION ANGLES, FORMED FROM 1-1/2"x1-1/2"x1/8" GALVANIZED ANGLES, TACK-WELDED OR RIVETED TO THE DUCT, THE ANGLE FRAME SHALL BE CONTINUOUSLY FLANGED UP INTO UPRIGHT OF EACH ANGLE AND EACH CORNER SHALL BE FILLED IN AND GROUND SMOOTH. JOINTS SHALL BE GASKETED WITH 1/8" THICK REINFORCED GASKET, OVERLAPPED AT CORNERS, GASKET SIMILAR TO 3M-1202 OR APPROVED EQUAL.
2. RECTANGULAR DUCTS SHALL BE SUPPORTED ON NOT MORE THAN 6' CENTERS, VERTICAL RISERS SHALL BE SUPPORTED AT EACH FLOOR.
4. LONGITUDINAL SEAMS FOR RECTANGULAR DUCTWORK SHALL BE PITTSBURGH LOCK SEAMS WITH SEALING COMPOUND, EQUAL TO BENJAMIN FOSTER NO. 30-03 INSERTED INTO SEAM. ALL SEAMS SHALL BE BRUSHED WITH NO. 30-02 AND COVERED WITH APPROVED SEALING TAPE.
5. RECTANGULAR DUCTWORK 18 GAUGE AND HEAVIER, FILLER RODS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS FOR IRON AND STEEL GAS WELDING RODS, ASTM 216; AWG A5.2.
6. FITTINGS SUCH AS ELBOWS, TEES, ETC., SHALL BE NO. 20 GAUGE ZINC COATED STEEL. ELBOWS SHALL BE OF FIVE (5) PIECE WELDED AIRTIGHT CONSTRUCTION.

C. WHERE LATEST EDITION OF SMACNA DOES NOT CLEARLY STATE GAUGES AND/OR STIFFENERS TO BE USED OR, WHERE SMACNA STANDARDS REQUIRE INTERPRETATION, THE FOLLOWING MINIMUM METAL GAUGES AND BRACING SHALL BE USED:
USG MAX. SLIDE INCHES TRANSVERSE JOINTS AND BRACING
22 UP TO 12 S SLIP, DRIVE SLIP, ONE INCH POCKET LOCK ON 8 FOOT CENTERS
22 13 TO 24 1"x1"x1/8" ANGLES ON 4 FOOT CENTERS
20 25 TO 35 1"x1"x1/8" ANGLES ON 2 FOOT CENTERS

D. PROVIDE TAPPING IN DUCTS FOR THERMOMETERS WHERE SPECIFIED. IN ADDITION, PROVIDE TAPPED TAPPING FOR FLAT SIDES SAME AS SPECIFIED FOR THE FOLLOWING:
1. UPSTREAM OF EACH REHEAT COIL AND VAV BOX.
2. DOWNSTREAM OF EACH REHEAT COIL AND VAV BOX.
E. FLAT OVAL OR ROUND DUCTWORK MAY BE PROVIDED IN LIEU RECTANGULAR DUCTWORK WITH THE REINFORCEMENT FOR FLAT SIDES SAME AS SPECIFIED FOR THE RECTANGULAR DUCTWORK, AND AS PER SMACNA FLAT OVAL DUCT CONSTRUCTION STANDARDS SHOWN IN FIG. 3-6 AND AS SHOWN IN FIG. 3-1 AND 3-2 FOR ROUND DUCTWORK.
F. ALL DUCTWORK SHALL BE SEALED TO CLASS "A" AND LEAK TESTED TO MEAT SMACNA CLASS 6 FOR RECTANGULAR AND CLASS 3 FOR ROUND DUCTS.
1.2 MATERIALS
A. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
B. SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
C. SHEET METAL MATERIALS:
1. GALVANIZED SHEET STEEL.
2. STAINLESS-STEEL SHEETS.
3. ALUMINUM SHEETS.
4. FACTORY-APPLIED ANTI-MICROBIAL COATING.
D. DUCT LINER:
1. FIBROUS GLASS, TYPE I, FLEXIBLE,
a. WITH ANTI-MICROBIAL EROSION-RESISTANT COATING.
2. FLEXIBLE ELASTOMERIC.
3. NATURAL FIBER.
E. SEALANT MATERIALS:
1. TWO-PART TAPE SEALING SYSTEM.
2. WATER-BASED JOINT AND SEAM SEALANT.
3. SOLVENT-BASED JOINT AND SEAM SEALANT.
4. FLANGED JOINT SEALANT.
5. FLANGE GASKETS.
6. ROUND DUCT JOINT O-RING SEALS.
1.3 DUCT CLEANING
A. CLEAN EXISTING DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.
B. CLEAN THE FOLLOWING ITEMS:
1. AIR OUTLETS AND INLETS
2. SUPPLY, RETURN, AND EXHAUST FANS.
3. AIR-HANDLING UNITS.
4. COILS AND RELATED COMPONENTS.
5. RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
6. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.
1.4 DUCT SCHEDULE
A. ALL DUCTS SHALL BE GALVANIZED STEEL EXCEPT AS FOLLOWS:
8. MOIST ENVIRONMENT DUCT MATERIAL: ALUMINUM.
END OF SECTION 233113

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
END OF SECTION 233713

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
END OF SECTION 233713

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
END OF SECTION 233713

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
END OF SECTION 233713

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
END OF SECTION 233713

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND LOADS SHOWN ON THE DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIR, INC.
e. NAILOR INDUSTRIES INC.
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END OF SECTION 233713

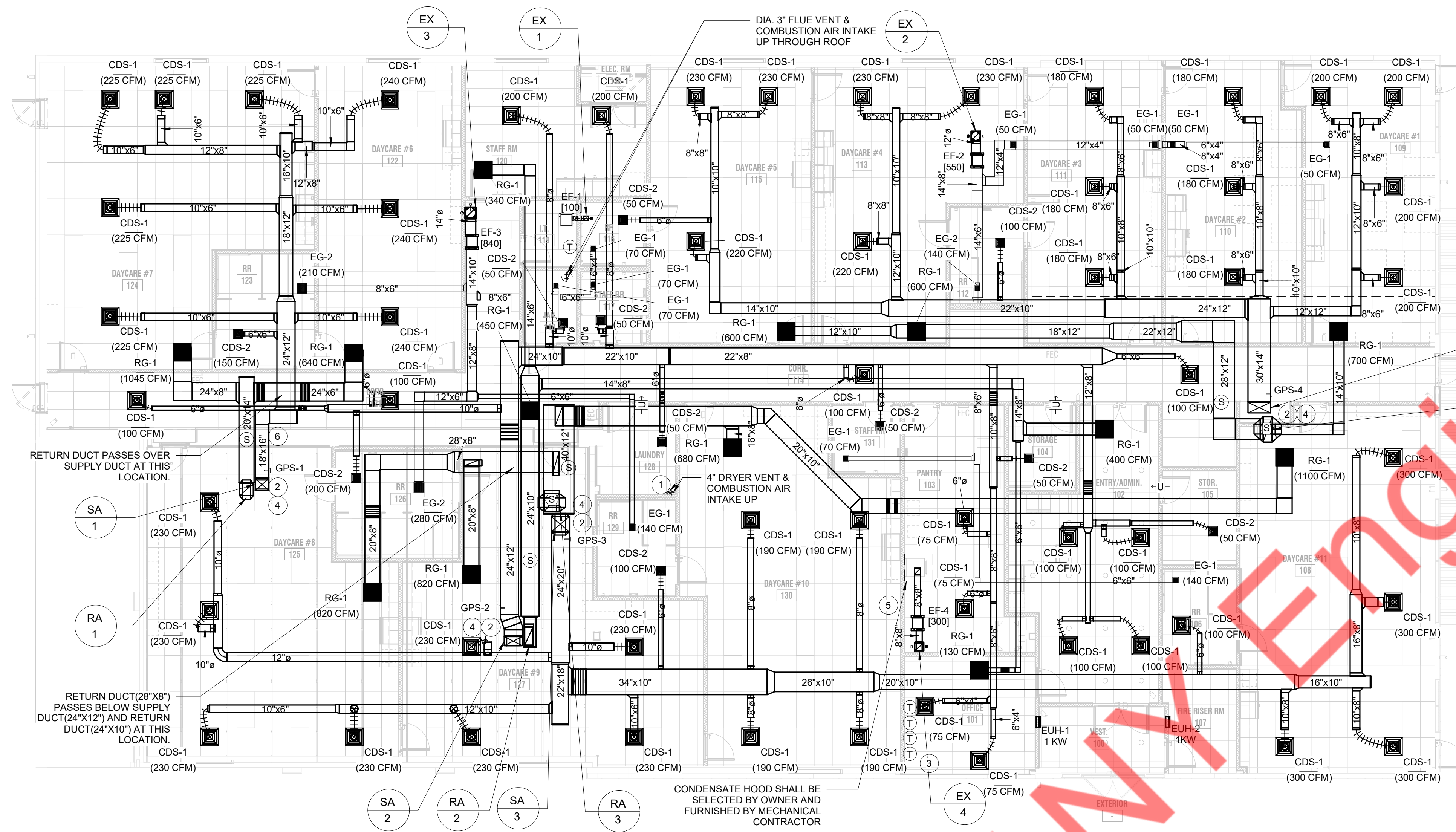
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SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES
1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPAC



GENERAL NOTES:

1. FOR SUPPLY AND RETURN AIR DUCTS PROVIDE ACOUSTICAL LINING WITH R-6 INSULATION RATING UP TO 20' OF DUCT RUN FROM AC UNITS. PROVIDE R-6 THERMAL INSULATION AFTER 20' OF DUCT RUN FROM AC UNITS.
2. ALL DUCT SIZES SHOWN ON MECHANICAL FLOOR PLANS ARE CLEAR INSIDE. INTERNAL AND EXTERNAL INSULATION THICKNESS OF DUCTS SHALL BE CONSIDERED SEPARATELY.
3. PROVIDE OPPOSED BLADE VOLUME DAMPERS AT FACE OF ALL CEILING SUPPLY DIFFUSERS, RETURN AND EXHAUST GRILLES.
4. PROVIDE REMOTE TEMPERATURE SENSORS MOUNTED IN RETURN DUCT. RUN CONTROL WIRING FROM TEMPERATURE SENSOR TO THE CORRESPONDING THERMOSTAT IN THE OFFICE.
5. CONTRACTOR TO VERIFY ACTUAL JOIST LOCATION ON-SITE AND ROUTE DUCTWORK ACCORDINGLY TO AVOID CLASHES.
6. PROVIDE GRAVITY BACKDRAFT DAMPER OR MOTORIZED DAMPER AS APPLICABLE AT EXHAUST OUTLET LOCATIONS.

KEY NOTES:

1. RUN 4" VENT & CAL UP TO ROOF. INSTALL & TERMINATE AS PER MANUFACTURERS INSTRUCTIONS.
2. CONTRACTOR TO COORDINATE EXACT ROOF PENETRATIONS AT SITE.
3. THERMOSTAT BANK MOUNTED ON OFFICE WALL AND ALIGNED NEATLY. COORDINATE EXACT LOCATION WITH FURNITURE LAYOUT AND ARCHITECTURAL PLANS.
4. CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONDITION OF EXISTING FIRE DAMPERS PROVIDED AT ROOF PENETRATIONS. REPLACE FIRE DAMPERS IF NOT IN SATISFACTORY WORKING CONDITION.
5. 300 CFM EXHAUST PROVIDED FOR DISHWASHER HOOD AS PER IMC 2018 CHAPTER 5 SECTION 507.5.5
6. USE EXISTING OPENING IN WALL TO ROUTE THIS DUCT. PROVIDE NECESSARY BENDS, OFFSETS, AND TRANSITION REQUIRED AS PER FIELD CONDITIONS.

① LEVEL 1 MECHANICAL FLOOR PLAN
1/8" = 1'-0"

Property of N ENGINEERING

TERMINATE EXHAUST DUCT WITH GOOSENECK AND SCREEN AT MINIMUM 24" ABOVE ROOF.

TERMINATE EXHAUST DUCT WITH GOOSENECK AND SCREEN AT MINIMUM 24" ABOVE ROOF.

TERMINATE EXHAUST DUCT WITH GOOSENECK AND SCREEN AT MINIMUM 24" ABOVE ROOF.

TERMINATE DIA. 3" WATER HEATER FLUE VENT WITH RAIN CAP. TERMINATE COMBUSTION AIR INTAKE WITH GOOSENECK AND SCREEN AT MINIMUM 24" ABOVE ROOF.

DIA. 4" DRYER VENT & COMBUSTION AIR INTAKE. INSTALL PER MANUFACTURER INSTRUCTIONS.

TERMINATE EXHAUST DUCT WITH GOOSENECK AND SCREEN AT MINIMUM 24" ABOVE ROOF.

KEY NOTES:

1. CONTRACTOR TO COORDINATE EXACT RTU LOCATION AS PER EXISTING ROOF PENETRATION IN FIELD.
2. RTU TO BE RETROFITTED WITH ECONOMIZER AND HOT GAS REHEAT IF NOT ALREADY INSTALLED.

① MECHANICAL ROOF PLAN
1/8" = 1'-0"

Property of NY Engineers

AIR TERMINAL							
TAG	MANUFACTURER	MODEL	TYPE	CFM RANGE	NECK SIZE	NOMINAL FACE SIZE	REMARKS
CDS-1	TITUS	TMSA	SUPPLY DIFFUSER	0-200	8"Ø	24X24	-
				200-400	10"Ø	24X24	
CDS-2	TITUS	TMSA	SUPPLY DIFFUSER	0-100	6"Ø	12X12	-
			SUPPLY DIFFUSER	100-200	8"Ø	12X12	
RG-1	TITUS	350FL	RETURN GRILLE	0-1160	-	24X24	-
EG-1	TITUS	50F	EXHAUST GRILLE	0-100	-	6X6	-
EG-2	TITUS	50F	EXHAUST GRILLE	100-300	-	12X12	-

NOTES:
 1) ALL DIFFUSERS : CONTRACTOR SHALL COORDINATE WITH LATEST ARCHITECTURAL REFLECTED CEILING PLANS TO ENSURE PROPER AIR DEVICE BORDER SELECTION.
 2) REFER ARCHITECTURAL DRAWINGS FOR CEILING TYPE.
 3) COORDINATE COLOR/FINISH WITH ARCHITECT.

ELECTRIC UNIT HEATER SCHEDULE										
UNIT ID	QUANTITY	MODEL	SERVING	kW	ELECTRICAL				WEIGHT (LBS.)	BASIS OF DESIGN
					HZ	VOLTS	PHASE	FLA		
EUH-1	1	CWH	VESTIBULE 100	1	60	120	1	8	12	QMARK
EUH-2	1	CWH	FIRE 107	1	60	120	1	8	12	QMARK

NOTES FOR HEATER
 1. SEMI-RECESSED MOUNTING SLEEVE/ADAPTER
 2. WALL MOUNTED
 3. ALL UNIT HEATERS SHALL BE INSTALLED IN ACCORDANCE WITH THE LISTING AND MANUFACTURER'S INSTALLATION INSTRUCTIONS.
 4. SUPPOSED-TYPE UNIT HEATER SHALL BE SUPPORTED BY ELEMENTS THAT ARE DESIGNED AND CONSTRUCTED TO ACCOMMODATE THE WEIGHT AND DYNAMIC LOADS.

EXHAUST FANS											
TAG	DRIVE TYPE	SERVICE	MODEL	AIRFLOW (CFM)	ESP (IN W.G)	ELEC. DATA (V/Hz/Ph.)	WATTS	FAN SPEED (RPM)	WEIGHT (LBS.)	MAKE	CONTROL
EF-1	DIRECT	IT	SP-A90-130-VG	100	0.35	115/60/1	12	960	12	GREENHECK	THERMOSTATIC CONTROL
EF-2	DIRECT	RESTROOMS & DAYCARE	CSP-A700-VG	550	0.35	115/60/1	89	1043	39	GREENHECK	TIMECLOCK CONTROL
EF-3	DIRECT	RESTROOMS	CSP-A1050	840	0.55	115/60/1	467	1070	59	GREENHECK	TIMECLOCK CONTROL
EF-4	DIRECT	CONDENSATE HOOD	SP-A390-VG	300	0.8	115/60/1	88	1612	24	GREENHECK	INTERLOCK WITH DISHWASHER

NOTES :-
 1) COORDINATE WITH ARCH./G.C. ACCESS DOORS FOR SERVICING ALL FANS WITHIN CEILINGS.
 2) FAN SPEED SHALL BE EASILY FIELD ADJUSTABLE.
 3) REFER TO DETAILS, FAN SHALL BE MOUNTED W/SUPPORT FRAMING BY OTHERS.
 4) PROVIDE MOTOR STARTERS, DISCONNECTS WITH NEMA-3R (IF NOT FACTORY PROVIDED). ALL EQUIPMENT NORMAL POWER WIRING BY ELECTRICAL CONTRACTOR. COORDINATE POWER REQUIREMENTS.
 5) PROVIDE RUBBER IN SHEAR ISOLATION AND ALL-THREAD HANGING RODS FOR INLINE FANS.

VENTILATION CALCULATION												
ROOM NAME	AREA (SQ.FT.)	NUMBER OF PEOPLE/1000sq.ft AS PER IMC 2018	NUMBER OF PEOPLE AS PER IMC 2018	NUMBER OF CHAIR	FINAL PEOPLE NO.	MIN OUTSIDE AIR AS PER IMC 2018		REQ. OA (CFM)	AFTER 75% IAQ	EXHAUST AIRFLOW RATE (CFM/SQ.FT OR /FIXT.)	TOTAL EXHAUST REQUIRED (CFM)	PROVIDED EXHAUST (CFM)
						CFM/PEOPLE	CFM/SQ.FT					
DAYCARE 1	440	25	11	0	11	10	0.18	189	145	0	0	50
DAYCARE 2	433	25	11	0	11	10	0.18	188	145	0	0	50
DAYCARE 3	540	25	14	0	14	10	0.18	237	180	0	0	50
DAYCARE 4	457	25	12	0	12	10	0.18	202	155	0	0	50
DAYCARE 5	532	25	14	0	13	10	0.18	226	170	0	0	0
DAYCARE 6	529	25	14	0	13	10	0.18	225	170	0	0	0
DAYCARE 7	851	25	22	0	21	10	0.18	363	275	0	0	0
DAYCARE 8	822	25	21	0	21	10	0.18	358	270	0	0	0
DAYCARE 9	845	25	22	0	21	10	0.18	362	275	0	0	0
DAYCARE 10	836	25	21	0	21	10	0.18	360	275	0	0	0
DAYCARE 11	966	25	25	0	25	10	0.18	424	320	0	0	0
ENTRY	440	30	14	0	10	5	0.06	76	76	0	0	0
VESTIBULE	96	30	3	0	0	5	0.06	6	6	0	0	0
CORRIDOR	1069	0	0	0	0	0	0.06	64	64	0	0	0
PANTRY	288	0	0	0	0	0	0.12	35	35	0	0	300
STOR.	87	0	0	0	0	0	0.12	10	10	0	0	0
JAN	49	0	0	0	0	0	0.12	6	6	0	0	70
STORAGE/UTILITY	187	0	0	0	0	0	0.12	22	22	0	0	0
LAUNDRY	82	0	0	0	0	0	0.12	10	10	0	0	0
IT	45	0	0	0	0	0	0.12	5	5	0	0	100
OFFICE	178	5	1	0	1	5	0.06	16	16	0	0	0
STAFF	241	50	13	0	13	5	0.06	79	79	0	0	0
REST ROOM	729	0	0	0	0	0	0	0	0	70	1120	1120
TOTAL								3465	2710	-	Total	1790

AIR BALANCE					
UNIT	AREA SERVED	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR
RTU-1	DAYCARE	2000	445	1685	0 CFM
RTU-2	COMMON AREA	2000	325	1320	0 CFM
RTU-3	DAYCARE	4000	1140	3420	0 CFM
RTU-4	DAYCARE	3400	795	2820	0 CFM
EF-1	IT	-	-	-	100 CFM
EF-2	RESTROOMS & DAYCARE	-	-	-	550 CFM
EF-3	RESTROOMS	-	-	-	840 CFM
EF-4	CONDENSATE HOOD	-	-	-	300 CFM
TOTAL:		11400 CFM	2705 CFM	9245 CFM	1790 CFM
BUILDING PRESSURE:				365 CFM	POSITIVE

GLOBAL PLASMA AIR DUCT TUBE SCHEDULE									
TAG	MANUFACTURER	MODEL	QUANTITY	LOCATION	ELECTRICAL			WEIGHT	REMARKS
					POWER (W)	VOLTS	PHASE		
GPS-1	GLOBAL PLASMA SOLUTIONS	DM48-AC	1	SEE PLAN	12	24	1	60	2.31
GPS-2		DM48-AC	1	SEE PLAN	12	24	1	60	2.31
GPS-3		DM48-AC	1	SEE PLAN	12	24	1	60	2.31
GPS-4		DM48-AC	1	SEE PLAN	12	24	1	60	2.31

NOTES
 1) ALL TUBES SHALL BE MOUNTED ON THE SUPPLY DUCTWORK AS PER PLANS.



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Zone Tag	Facility Type	Zone Use	Zone Floor Area (square ft)	Zone Max Occupancy	Table 6.1 OA per Occupant	Table 6.1 cfm/f2	Pz * Rp	Az * Ra	Table 6.2 Ventilation Effectiveness Ez	Outdoor Air to Zone (CFM) with Ez correction (Vbz/Ez)
RTU-1	Educational Facilities	Daycare (through age 4)	1,380.0	34.0	10.0	0.18	340	248	0.8	736 OA required per VRP

Zone Height (feet)	Desired Outside Air (Vo) IAQP (CF)	Supply Air (Vs) (CFM)	Return Air (Vr)	Recirc. Flow Factor (R)	Ventilation Effectiveness (Ez)	Level of Physical Activity	Filter Location	HVAC Flow Type	Outdoor Air Flow Type
9.0	445	2,000	1,555	0.78	0.8	Sedentary	B	Constant	Constant

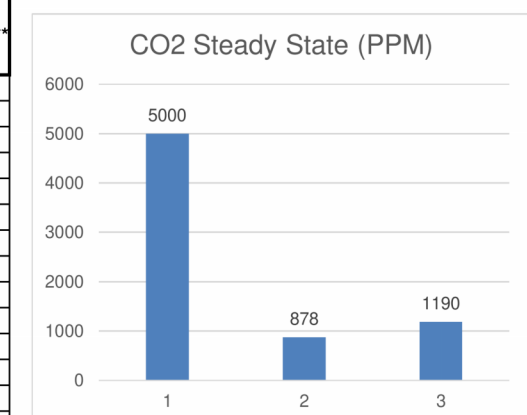
Indoor Contaminants	Maximum Threshold Value Based on OSHA or NIOSH (PPM)	Using the VRP* (Prescribed OA) Ionization Off	Using the IAQ Method (Reduced OA) Ionization On	Is Steady State Level Acceptable at Reduced OA Levels?	Contaminant Generation Rate lb/person/min	Filtration Effectiveness	Cognizant Authority**
Acetaldehyde	100.0	1.9947E-09	7.8732E-10	Yes	1.2903E-08	50%	OSHA
Acetone	250.0	7.6953E-09	5.3013E-09	Yes	1.2993E-07	50%	NIOSH
Ammonia	25.00	1.7644E-07	1.2362E-07	Yes	3.0522E-06	50%	NIOSH
Benzene	1.0	8.9372E-09	6.0192E-09	Yes	1.4602E-07	50%	OSHA
2-Butanone (MEK)	200.0	5.1080E-07	3.5797E-07	Yes	8.8396E-06	50%	NIOSH
Carbon dioxide**	5000	4.6383E-05	4.7314E-05	Yes	2.4692E-05	0%	NIOSH
Chloroform	2.0	1.5862E-08	1.1065E-08	Yes	2.7342E-07	50%	NIOSH
Dioxane	100.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Hydrogen Sulfide	10.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Methane	NA	6.8698E-08	6.8698E-08	Yes	0.0000E+00	0%	NA
Methanol	200.0	6.4939E-09	1.0961E-08	Yes	1.1163E-07	0%	NIOSH
Methylene Chloride	25.0	4.6393E-07	3.2505E-07	Yes	8.0262E-06	50%	OSHA
Propane	1000.0	1.1242E-09	1.1242E-09	Yes	0.0000E+00	0%	NIOSH
Tetrachloroethane	5.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Tetrachloroethylene	100.0	5.2690E-07	3.6911E-07	Yes	9.1140E-06	50%	OSHA
Toluene	100.0	2.5669E-09	1.8832E-09	Yes	2.2806E-08	50%	NIOSH
1,1,1-Trichloroethane	350.0	2.2142E-05	1.5517E-05	Yes	3.8318E-04	50%	NIOSH
Xylene	100.0	6.2453E-10	1.5249E-10	Yes	0.0000E+00	50%	OSHA

Building materials and furnishings assumed to have no VOCs and off-gassing is complete. All yellow shaded boxes require user input or review. Is IAQ acceptable at reduced outside air levels? Yes

Date	19-01-2024
Job Name	BRIGHTPATH KIDS, SOUDERTON, PA
Representative	
Engineer	NY Engineers
Contractor	

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Zone Tag	Facility Type	Zone Use	Zone Floor Area (square ft)	Zone Max Occupancy	Table 6.1 OA per Occupant	Table 6.1 cfm/f2	Pz * Rp	Az * Ra	Table 6.2 Ventilation Effectiveness Ez	Outdoor Air to Zone (CFM) with Ez correction (Vbz/Ez)
RTU-2	Educational Facilities	Office space	2,717.0	24.0	10.0	0.06	120	163	0.8	354 OA required per VRP

Zone Height (feet)	Desired Outside Air (Vo) IAQP (CF)	Supply Air (Vs) (CFM)	Return Air (Vr)	Recirc. Flow Factor (R)	Ventilation Effectiveness (Ez)	Level of Physical Activity	Filter Location	HVAC Flow Type	Outdoor Air Flow Type
9.0	325	2,000	1,675	0.84	0.8	Sedentary	B	Constant	Constant

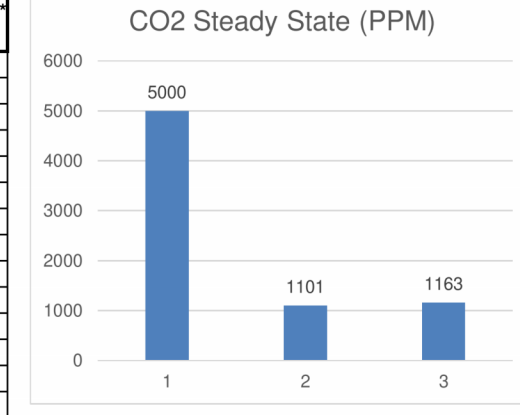
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Acetaldehyde	100.0	2.3426E-09	5.7489E-10	Yes	1.2903E-08	50%	OSHA
Acetone	250.0	1.1205E-08	3.8273E-09	Yes	1.2993E-07	50%	NIOSH
Ammonia	25.00	2.5892E-08	1.8222E-08	Yes	3.0522E-06	50%	NIOSH
Benzene	1.0	1.2892E-08	4.3470E-09	Yes	1.4602E-07	50%	OSHA
2-Butanone (MEK)	200.0	7.4915E-07	2.5837E-07	Yes	8.8396E-06	50%	NIOSH
Carbon dioxide**	5000	4.7050E-05	4.7235E-05	Yes	2.4692E-05	0%	NIOSH
Chloroform	2.0	2.3248E-08	8.0015E-09	Yes	2.7342E-07	50%	NIOSH
Dioxane	100.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Hydrogen Sulfide	10.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Methane	NA	6.8698E-08	6.8698E-08	Yes	0.0000E+00	0%	NA
Methanol	200.0	9.4609E-09	1.0304E-08	Yes	1.1163E-07	0%	NIOSH
Methylene Chloride	25.0	6.8077E-07	2.3462E-07	Yes	8.0262E-06	50%	OSHA
Propane	1000.0	1.1242E-09	1.1242E-09	Yes	0.0000E+00	0%	NIOSH
Tetrachloroethane	5.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Tetrachloroethylene	100.0	7.7302E-07	2.6641E-07	Yes	9.1140E-06	50%	OSHA
Toluene	100.0	3.1830E-09	8.6430E-10	Yes	2.2806E-08	50%	NIOSH
1,1,1-Trichloroethane	350.0	2.4249E-05	1.1200E-05	Yes	3.8318E-04	50%	NIOSH
Xylene	100.0	6.2453E-10	9.8875E-11	Yes	0.0000E+00	50%	OSHA

Building materials and furnishings assumed to have no VOCs and off-gassing is complete. All yellow shaded boxes require user input or review. Is IAQ acceptable at reduced outside air levels? Yes

Date	19-01-2024
Job Name	BRIGHTPATH KIDS, SOUDERTON, PA
Representative	
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Zone Tag	Facility Type	Zone Use	Zone Floor Area (square ft)	Zone Max Occupancy	Table 6.1 OA per Occupant	Table 6.1 cfm/f2	Pz * Rp	Az * Ra	Table 6.2 Ventilation Effectiveness Ez	Outdoor Air to Zone (CFM) with Ez correction (Vbz/Ez)
RTU-3	Educational Facilities	Daycare (through age 4)	3,470.0	86.0	10.0	0.18	880	625	0.8	1881 OA required per VRP

Zone Height (feet)	Desired Outside Air (Vo) IAQP (CF)	Supply Air (Vs) (CFM)	Return Air (Vr)	Recirc. Flow Factor (R)	Ventilation Effectiveness (Ez)	Level of Physical Activity	Filter Location	HVAC Flow Type	Outdoor Air Flow Type
9.0	1,140	4,000	2,860	0.72	0.8	Sedentary	B	Constant	Constant

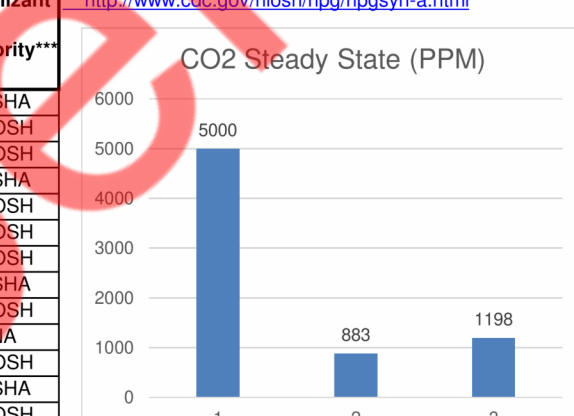
Indoor Contaminants	Maximum Threshold Value Based on OSHA or NIOSH (PPM)	Using the VRP* (Prescribed OA) Ionization Off	Using the IAQ Method (Reduced OA) Ionization On	Is Steady State Level Acceptable at Reduced OA Levels?	Contaminant Generation Rate lb/person/min	Filtration Effectiveness	Cognizant Authority**
Acetaldehyde	100.0	2.0037E-09	9.8560E-10	Yes	1.2903E-08	50%	OSHA
Acetone	250.0	6.6586E-09	7.7897E-09	Yes	1.2993E-07	50%	NIOSH
Ammonia	25.00	1.7896E-07	1.5282E-07	Yes	3.0522E-06	50%	NIOSH
Benzene	1.0	9.0399E-09	7.5595E-09	Yes	1.4602E-07	50%	OSHA
2-Butanone (MEK)	200.0	5.1702E-07	4.4966E-07	Yes	8.8396E-06	50%	NIOSH
Carbon dioxide**	5000	4.6400E-05	4.7338E-05	Yes	2.4692E-05	0%	NIOSH
Chloroform	2.0	1.6654E-08	1.3925E-08	Yes	2.7342E-07	50%	NIOSH
Dioxane	100.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Hydrogen Sulfide	10.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Methane	NA	6.8698E-08	6.8698E-08	Yes	0.0000E+00	0%	NA
Methanol	200.0	6.5288E-09	1.0771E-08	Yes	1.1163E-07	0%	NIOSH
Methylene Chloride	25.0	4.6958E-07	4.0832E-07	Yes	8.0262E-06	50%	OSHA
Propane	1000.0	1.1242E-09	1.1242E-09	Yes	0.0000E+00	0%	NIOSH
Tetrachloroethane	5.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Tetrachloroethylene	100.0	5.3217E-07	4.6365E-07	Yes	9.1140E-06	50%	OSHA
Toluene	100.0	2.5829E-09	1.4893E-09	Yes	2.2806E-08	50%	NIOSH
1,1,1-Trichloroethane	350.0	2.2411E-05	1.9422E-05	Yes	3.8318E-04	50%	NIOSH
Xylene	100.0	6.2453E-10	1.6422E-10	Yes	0.0000E+00	50%	OSHA

Building materials and furnishings assumed to have no VOCs and off-gassing is complete. All yellow shaded boxes require user input or review. Is IAQ acceptable at reduced outside air levels? Yes

Date	19-01-2024
Job Name	BRIGHTPATH KIDS, SOUDERTON, PA
Representative	
Engineer	NY Engineers
Contractor	

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The University of Denmark conducted a study to confirm CO2 levels at 5,000 PPM had no impact on cognitive function. Zhang X, Wargocki P, Lian Z, Human Responses to Carbon Dioxide, a Follow-up Study at Recommended Exposure Limits in IMC 2006 & later allows for ASHRAE 62 IAQP through the engineered exception found in Section 403.2 Exhaust flow rates may differ from Table 6.5 based on ASHRAE 62 IAQP via Section 6.5.2



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VERSION 2.2 running ASHRAE 62.1-2016

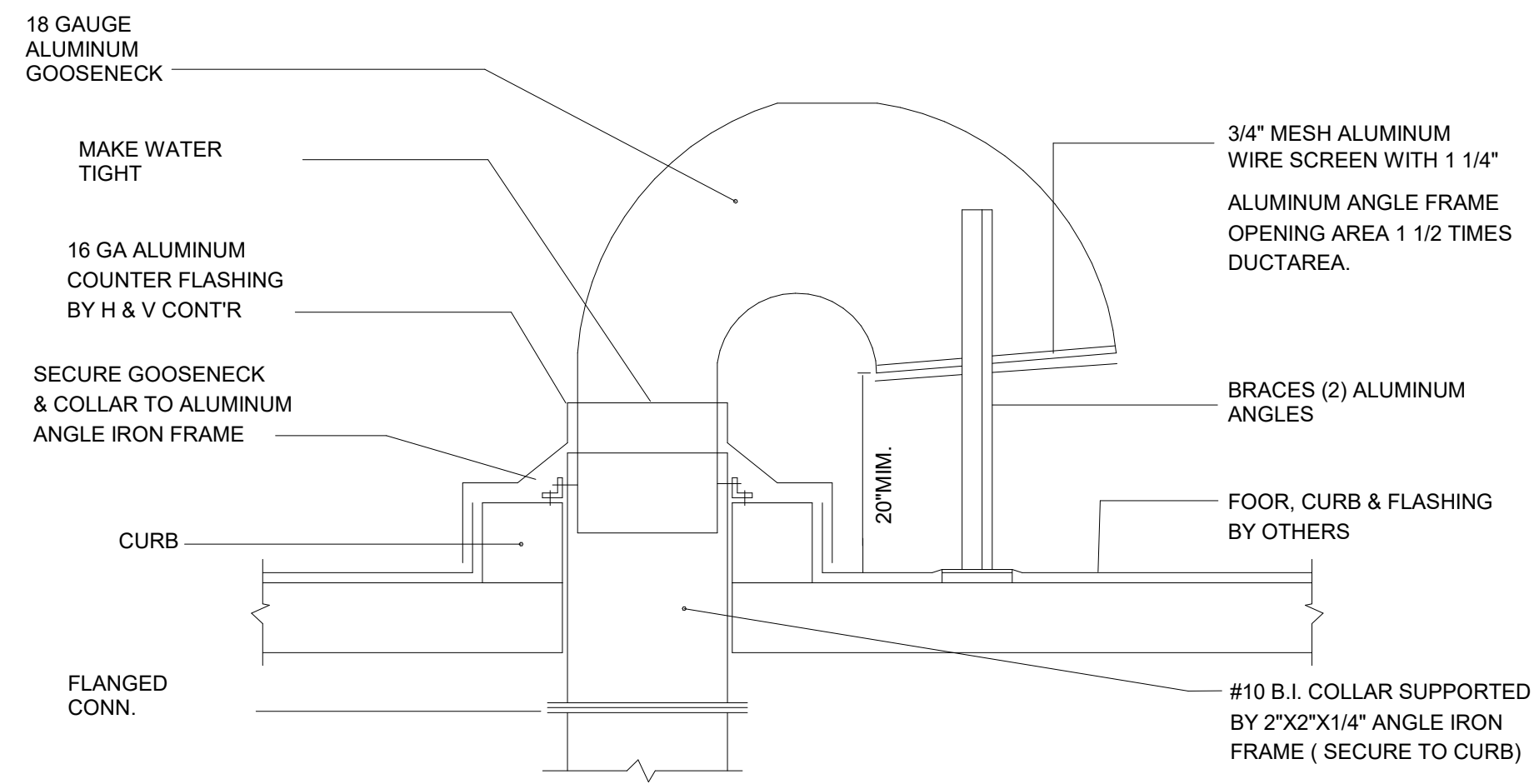
Zone Tag	Facility Type	Zone Use	Zone Floor Area (square ft)	Zone Max Occupancy	Table 6.1 OA per Occupant	Table 6.1 cfm/f2	Pz * Rp	Az * Ra	Table 6.2 Ventilation Effectiveness Ez	Outdoor Air to Zone (CFM) with Ez correction (Vbz/Ez)
RTU-4	Educational Facilities	Daycare (through age 4)	2,402.0	61.0	10.0	0.18	610	432	0.8	1303 OA required per VRP

Zone Height (feet)	Desired Outside Air (Vo) IAQP (CF)	Supply Air (Vs) (CFM)	Return Air (Vr)	Recirc. Flow Factor (R)	Ventilation Effectiveness (Ez)	Level of Physical Activity	Filter Location	HVAC Flow Type	Outdoor Air Flow Type
9.0	795	3,400	2,605	0.77	0.8	Sedentary	B	Constant	Constant

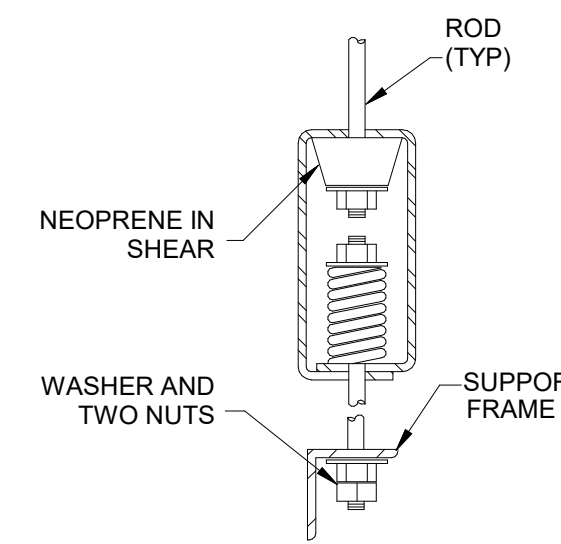
Indoor Contaminants	Maximum Threshold Value Based on OSHA or NIOSH (PPM)	Using the VRP* (Prescribed OA) Ionization Off	Using the IAQ Method (Reduced OA) Ionization On	Is Steady State Level Acceptable at Reduced OA Levels?	Contaminant Generation Rate lb/person/min	Filtration Effectiveness	Cognizant Authority**
Acetaldehyde	100.0	2.0042E-09	5.2686E-10	Yes	1.2903E-08	50%	OSHA
Acetone	250.0	7.7911E-09	5.5673E-09	Yes	1.2993E-07	50%	NIOSH
Ammonia	25.00	1.7896E-07	1.2982E-07	Yes	3.0522E-06	50%	NIOSH
Benzene	1.0	9.0449E-09	6.3207E-09	Yes	1.4602E-07	50%	OSHA
2-Butanone (MEK)	200.0	5.1732E-07	3.7592E-07	Yes	8.8396E-06	50%	NIOSH
Carbon dioxide**	5000	4.6401E-05	4.7324E-05	Yes	2.4692E-05	0%	NIOSH
Chloroform	2.0	1.6063E-08	1.1642E-08	Yes	2.7342E-07	50%	NIOSH
Dioxane	100.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Hydrogen Sulfide	10.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Methane	NA	6.8698E-08	6.8698E-08	Yes	0.0000E+00	0%	NA
Methanol	200.0	6.5326E-09	1.0706E-08	Yes	1.1163E-07	0%	NIOSH
Methylene Chloride	25.0	4.6958E-07	3.4137E-07	Yes	8.0262E-06	50%	OSHA
Propane	1000.0	1.1242E-09	1.1242E-09	Yes	0.0000E+00	0%	NIOSH
Tetrachloroethane	5.0	0.0000E+00	0.0000E+00	Yes	0.0000E+00	50%	OSHA
Tetrachloroethylene	100.0	5.3352E-07	3.8763E-07	Yes	9.1140E-06	50%	OSHA
Toluene	100.0	2.5837E-09	1.2468E-09	Yes	2.2806E-08	50%	NIOSH
1,1,1-Trichloroethane	350.0	2.2424E-05	1.6292E-05	Yes	3.8318E-04	50%	NIOSH
Xylene	100.0	6.2453E-10	1.3846E-10	Yes	0.0000E+00	50%	OSHA

Building materials and furnishings assumed to have no VOCs and off-gassing is complete. All yellow shaded boxes require user input or review. Is IAQ acceptable at reduced outside air levels? Yes

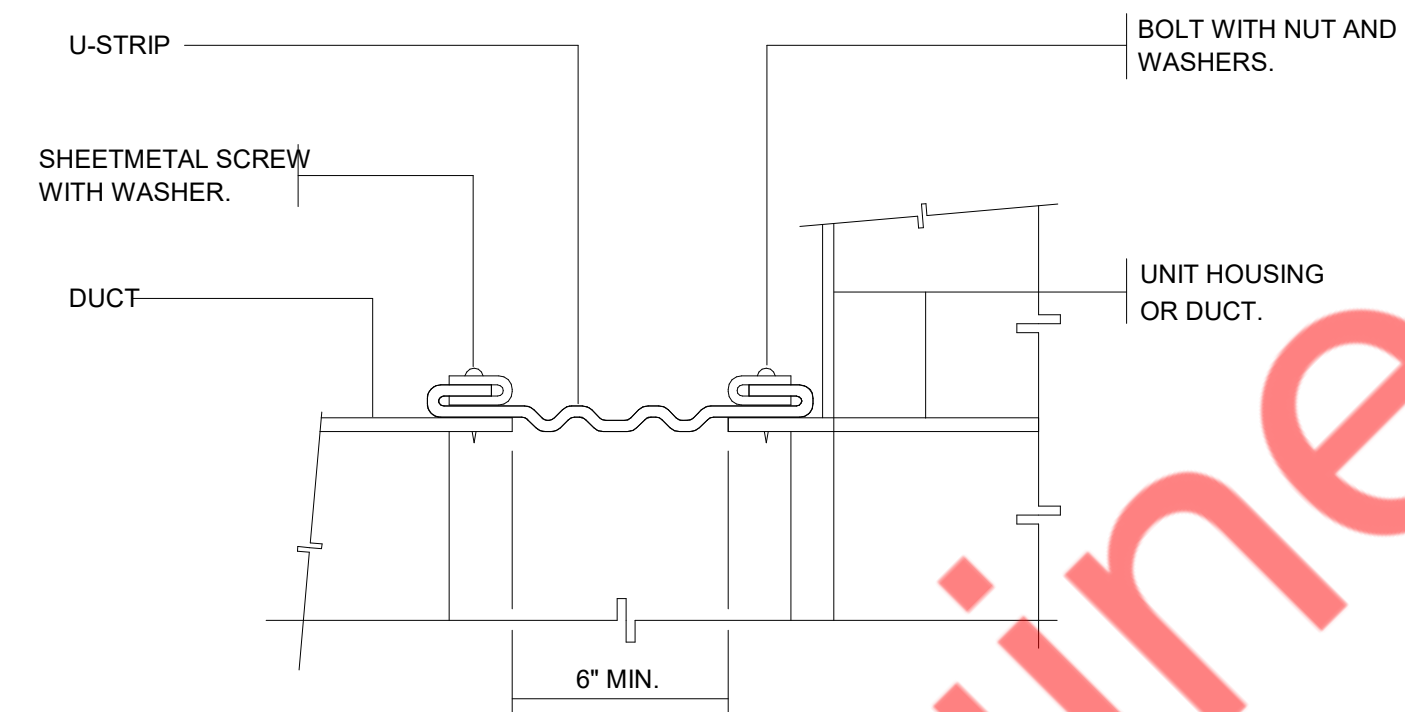
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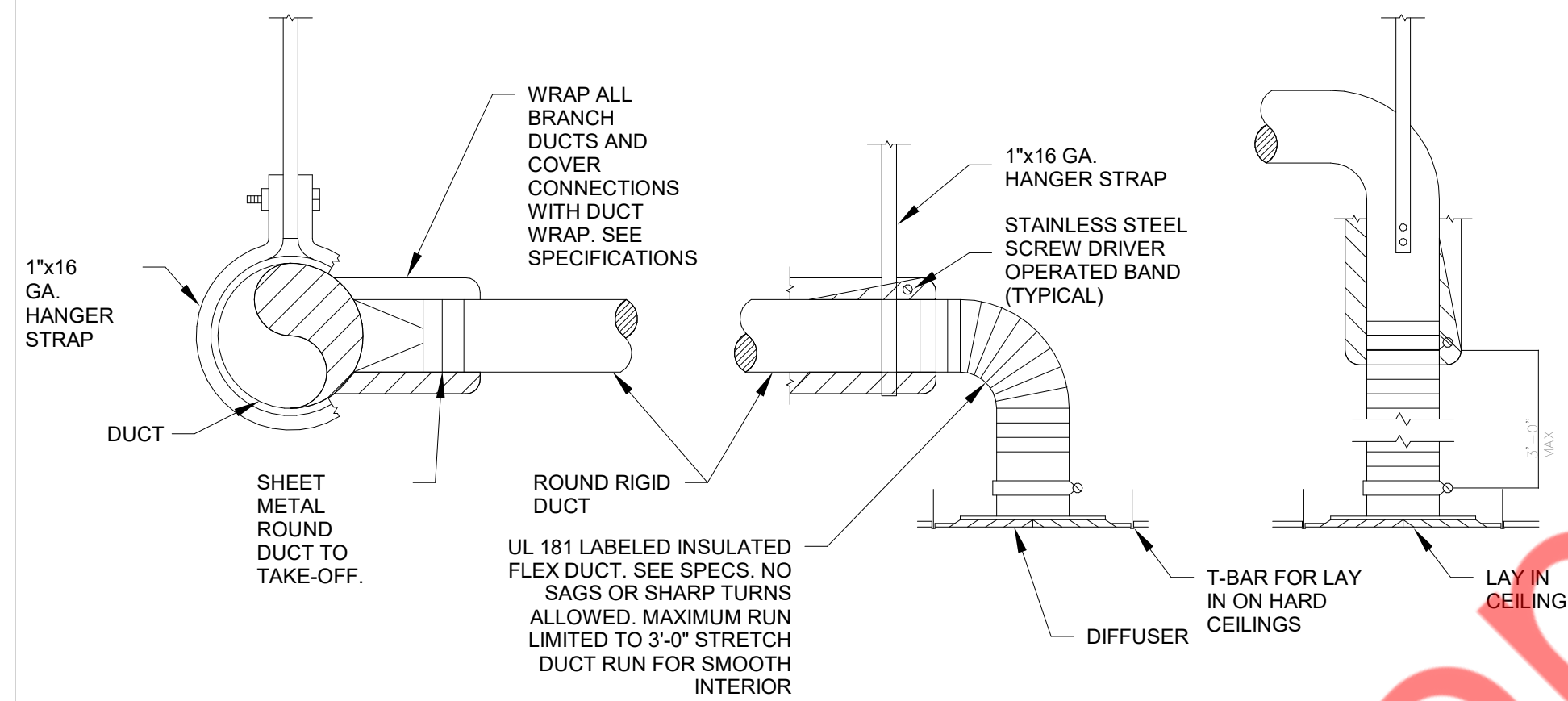
1 TYPICAL DETAIL OF ROOF GOOSENECK
M401 N.T.S



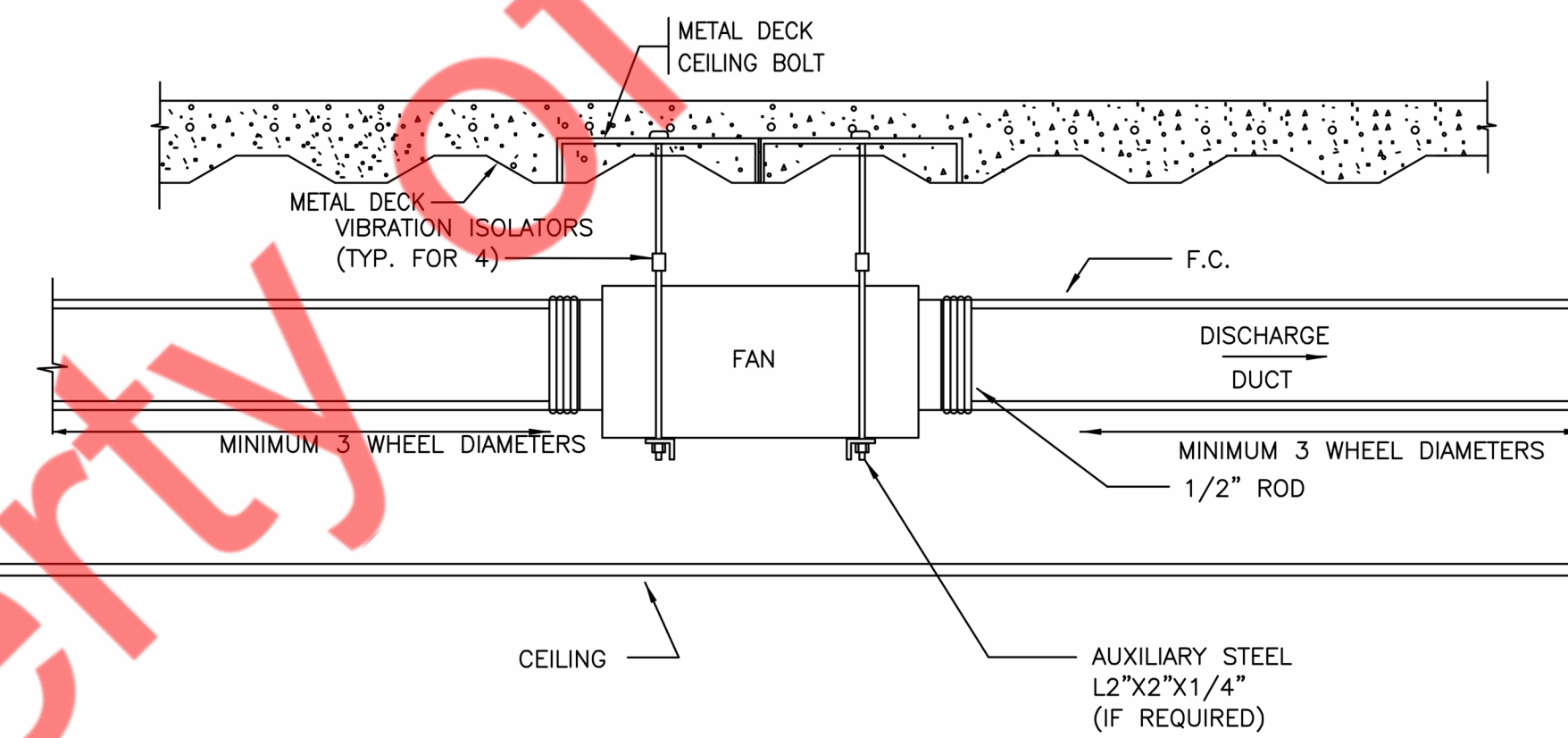
2 VIBRATION ISOLATOR DETAIL
M401 N.T.S



3 FLEXIBLE CONNECTION (DUCT-EQUIPMENT)
M401 N.T.S

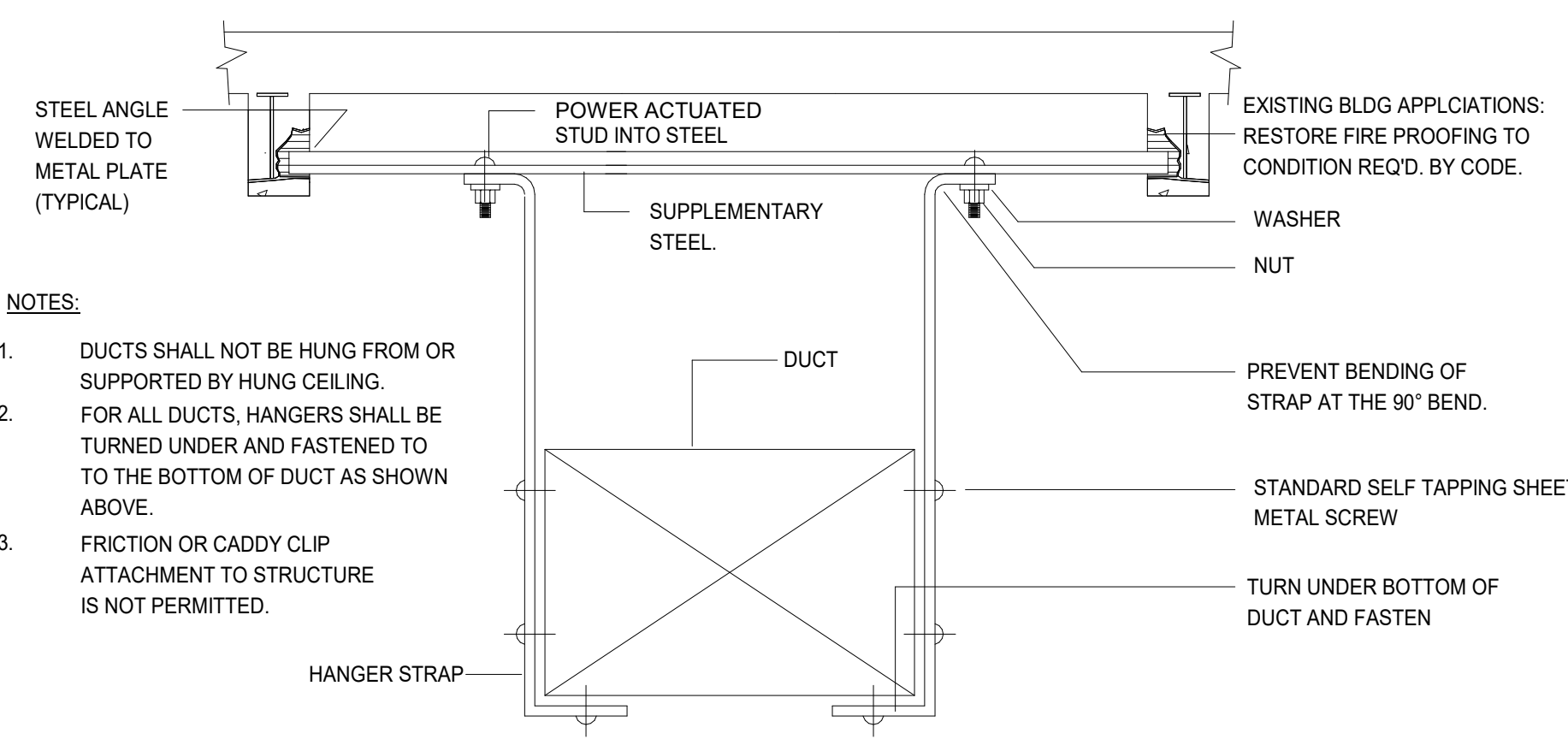


4 TYPICAL DIFFUSER CONNECTION DETAIL
M401 N.T.S



NOTE:
1. DUCT LENGTH TO BE MINIMUM THREE WHEEL DIAMETER ON DISCHARGE AND INLET.

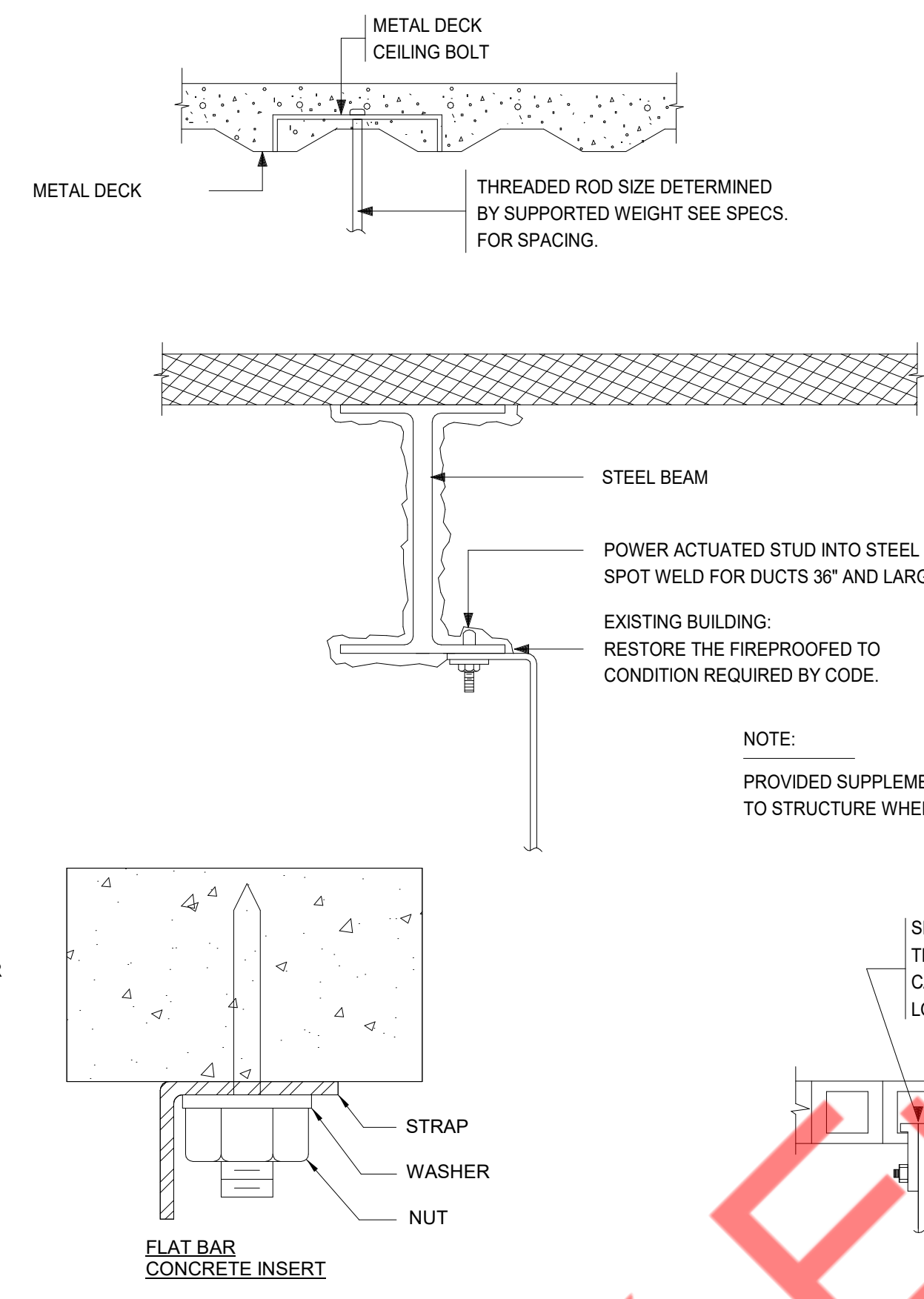
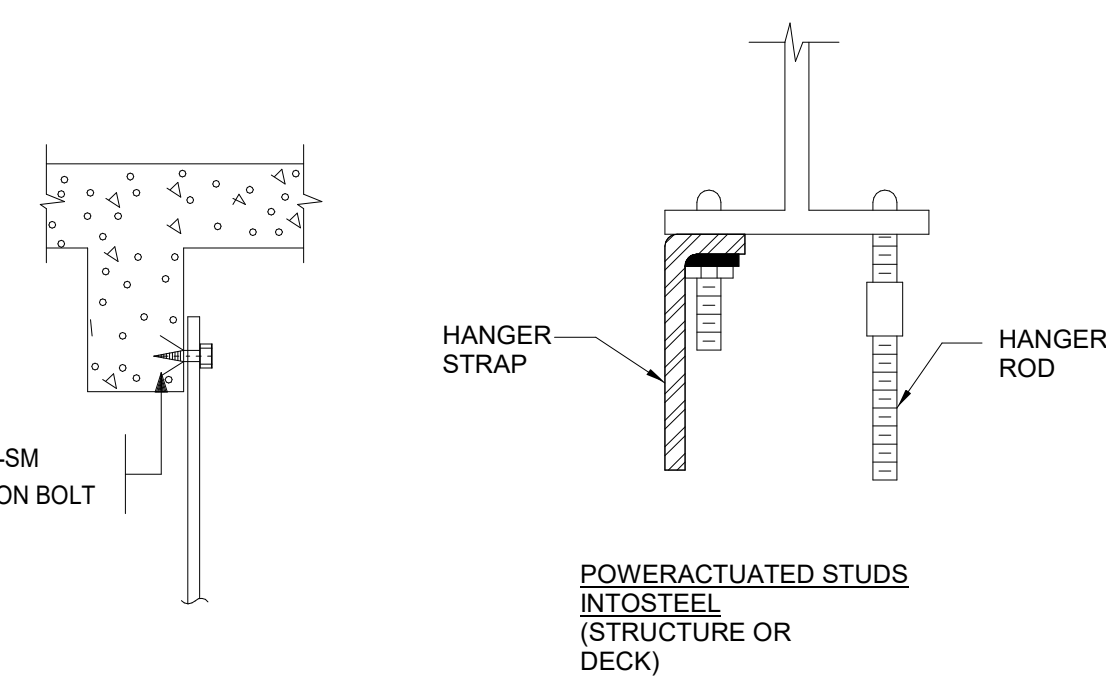
5 EXHAUST INLINE FAN
M401 N.T.S



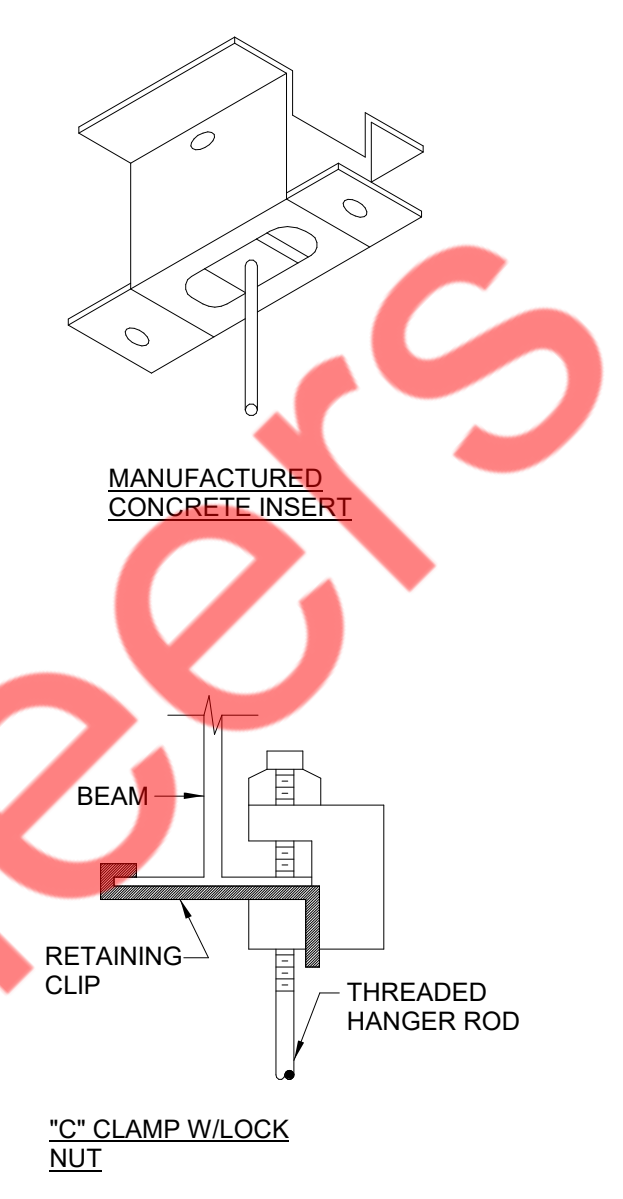
- NOTES:
1. DUCTS SHALL NOT BE HUNG FROM OR SUPPORTED BY HUNG CEILING.
 2. FOR ALL DUCTS, HANGERS SHALL BE TURNED UNDER AND FASTENED TO TO THE BOTTOM OF DUCT AS SHOWN ABOVE.
 3. FRICTION OR CADDY CLIP ATTACHMENT TO STRUCTURE IS NOT PERMITTED.

DUCT HANGER SCHEDULE		
DUCT CROSS SECTIONAL AREA	STRAP HANGER SIZE	MAX. SPACING
UNDER 2 SQ FT.	1" X 1/16"	6'-0" O.C.
2 TO 4 SQ FT.	1" X 1/8"	8'-0" O.C.
4 TO 8 SQ FT.	1" X 1/8"	6'-0" O.C.
OVER 8 SQ FT.	1" X 1/8"	4'-0" O.C.

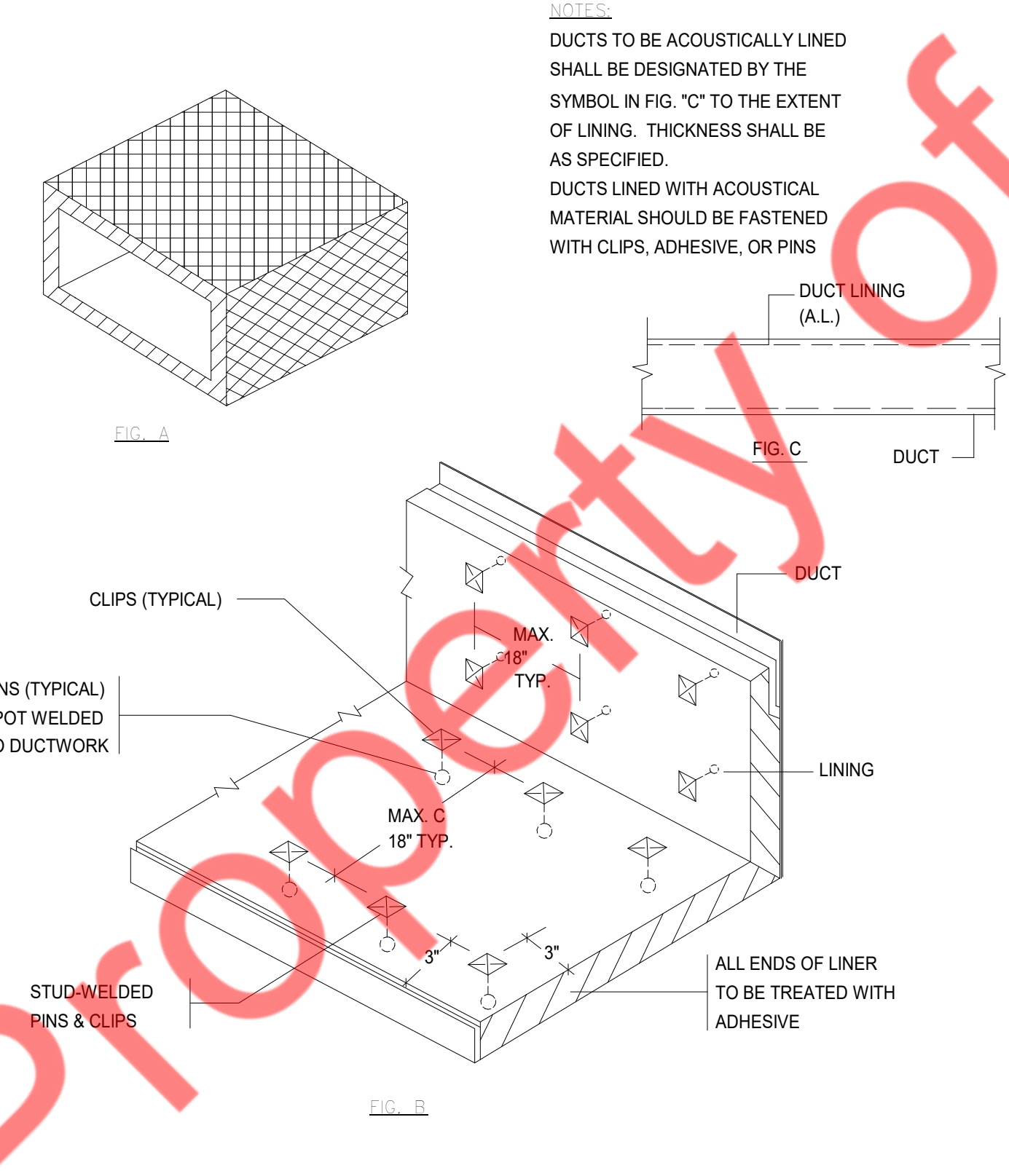
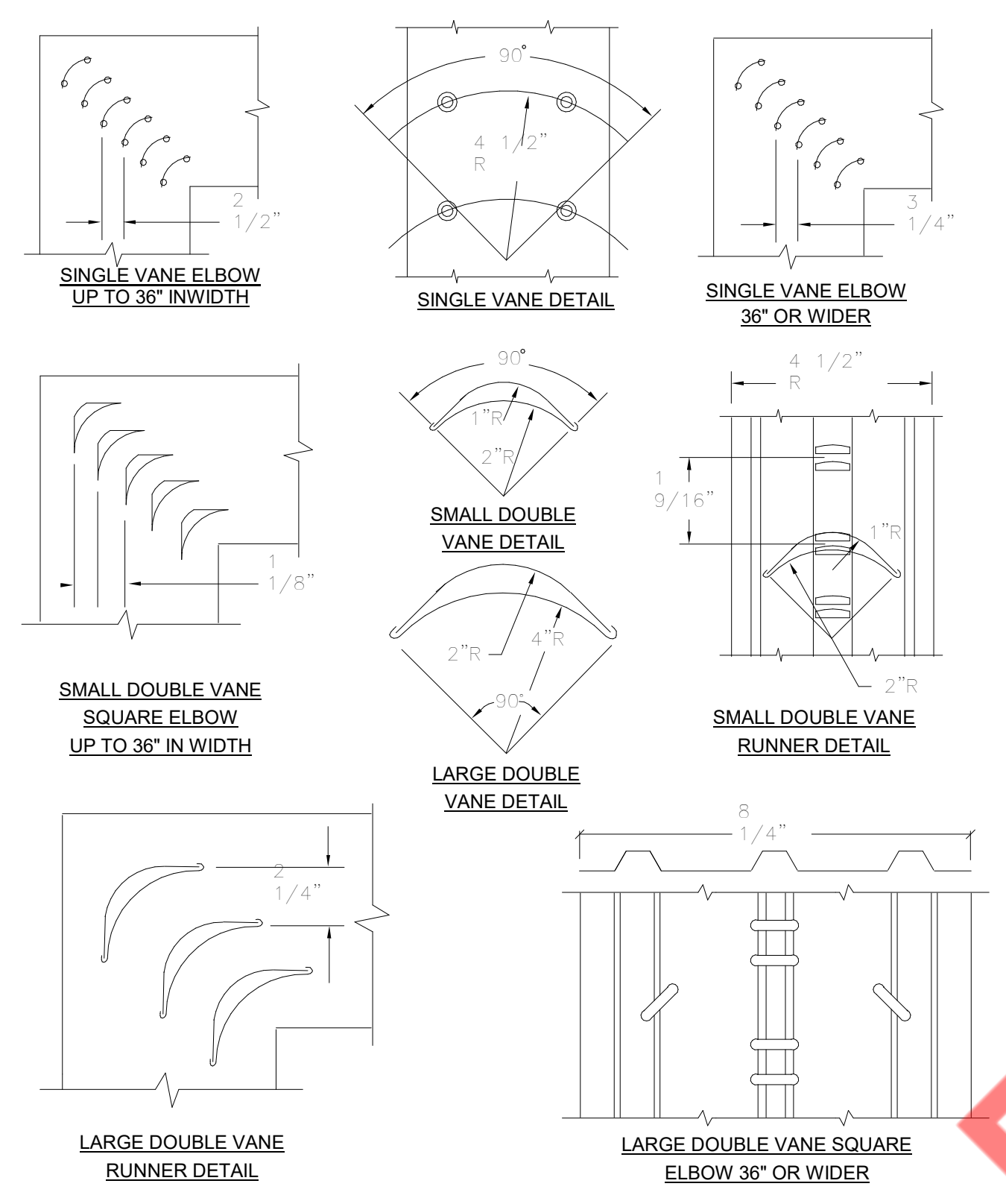
B.S.A. # 469-74-SM
EXPANSION BOLT



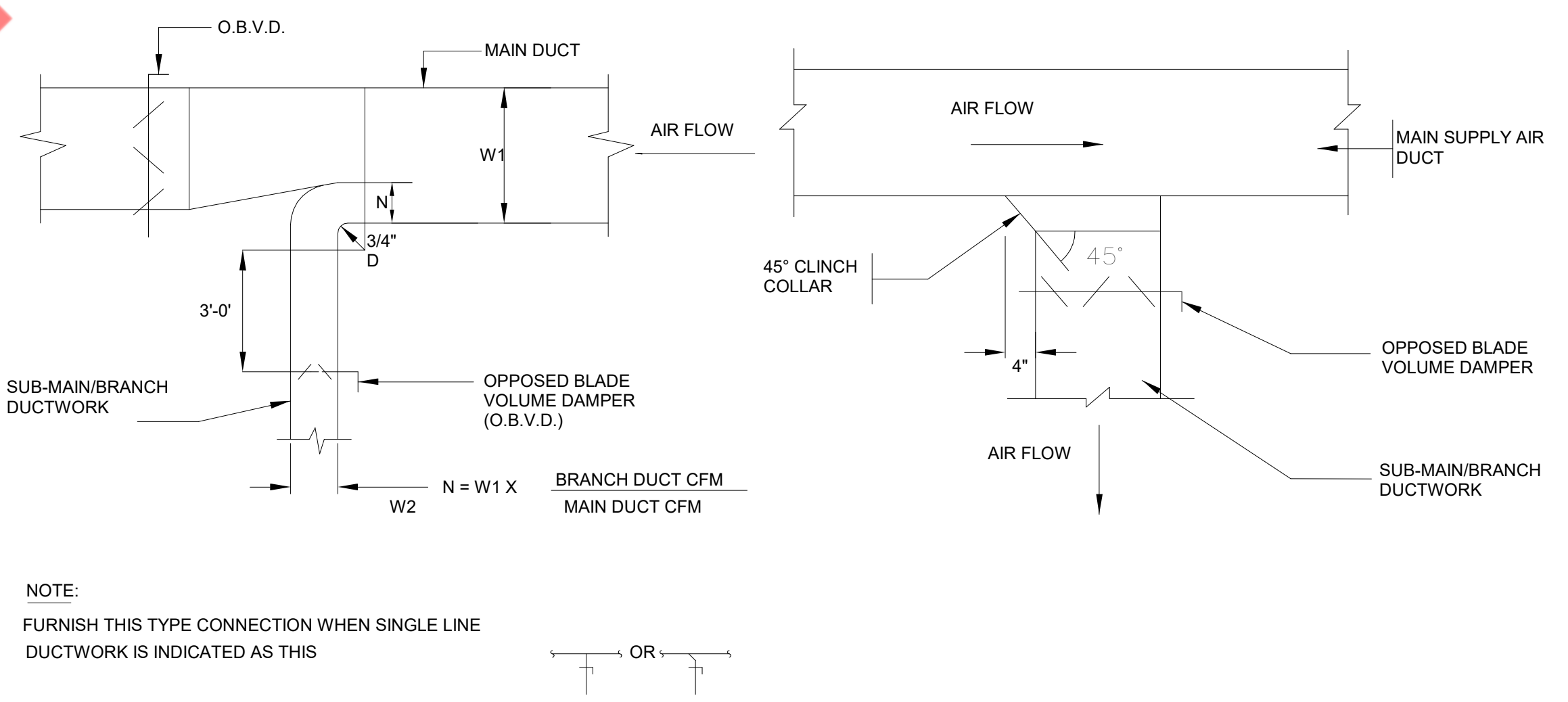
SLOT TO BE CUT IN EXISTING TERRACOTTA ARCH. WITH CARBORUNDUM SAW. APP. 1 1/4" LONG. (FOR SPLIT TEE TOGGLE)



1 DUCT HANGING DETAILS
M402 N.T.S



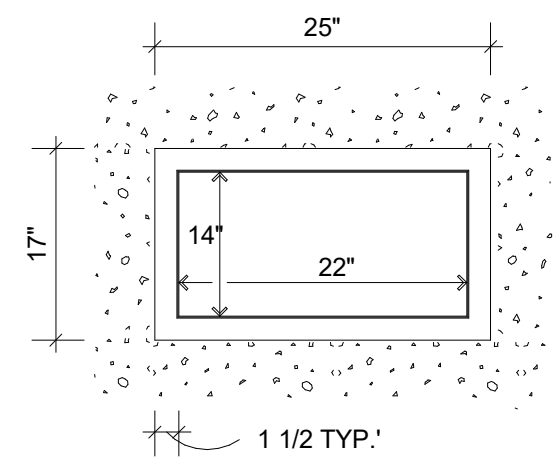
3 ACOUSTICAL TREATMENT DUCT LINING
M402 N.T.S



4 SUPPLY AIR DUCTWORK SUB-MAIN/BRANCH DUCT CONNECTION
M402 N.T.S

2 LOW VELOCITY DUCTWORK ELBOWS
M402 N.T.S

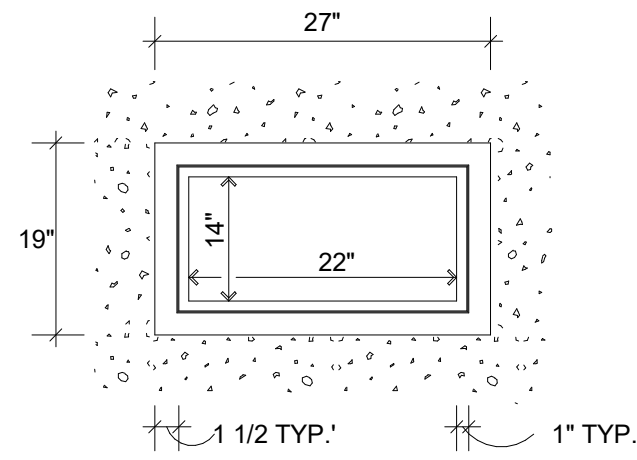
UNLINED DUCT



22X14 DUCT (SHEETMETAL)
25X17 SLAB OPENING

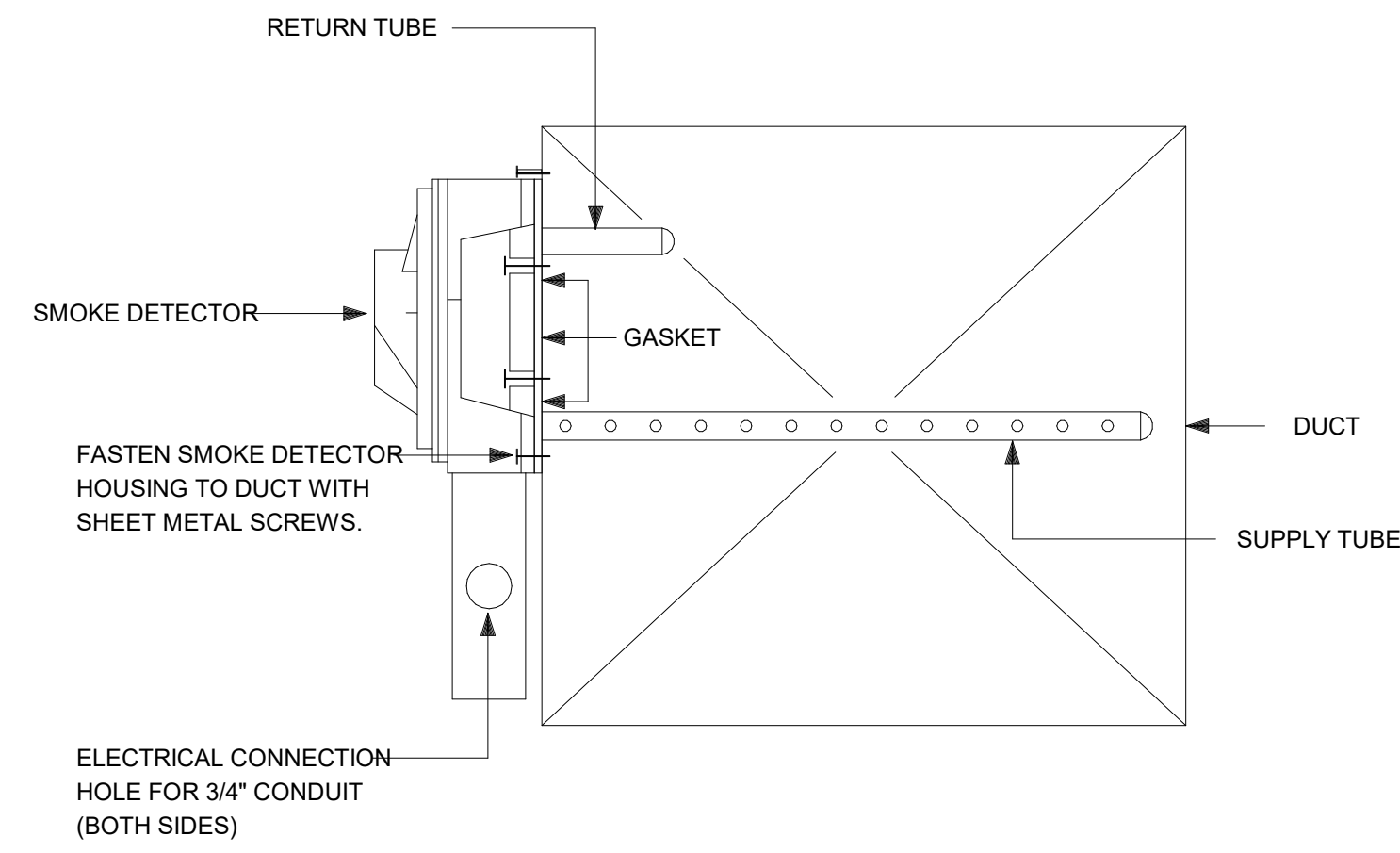
- SLAB OPENING = DUCT DIMENSION + 3"
- IF SPACE IS LIMITED, CAN BE DUCT DIMENSION + 1"
IF INSULATION IS NOT REQUIRED (CHECK WITH ENGINEER)

LINED DUCT

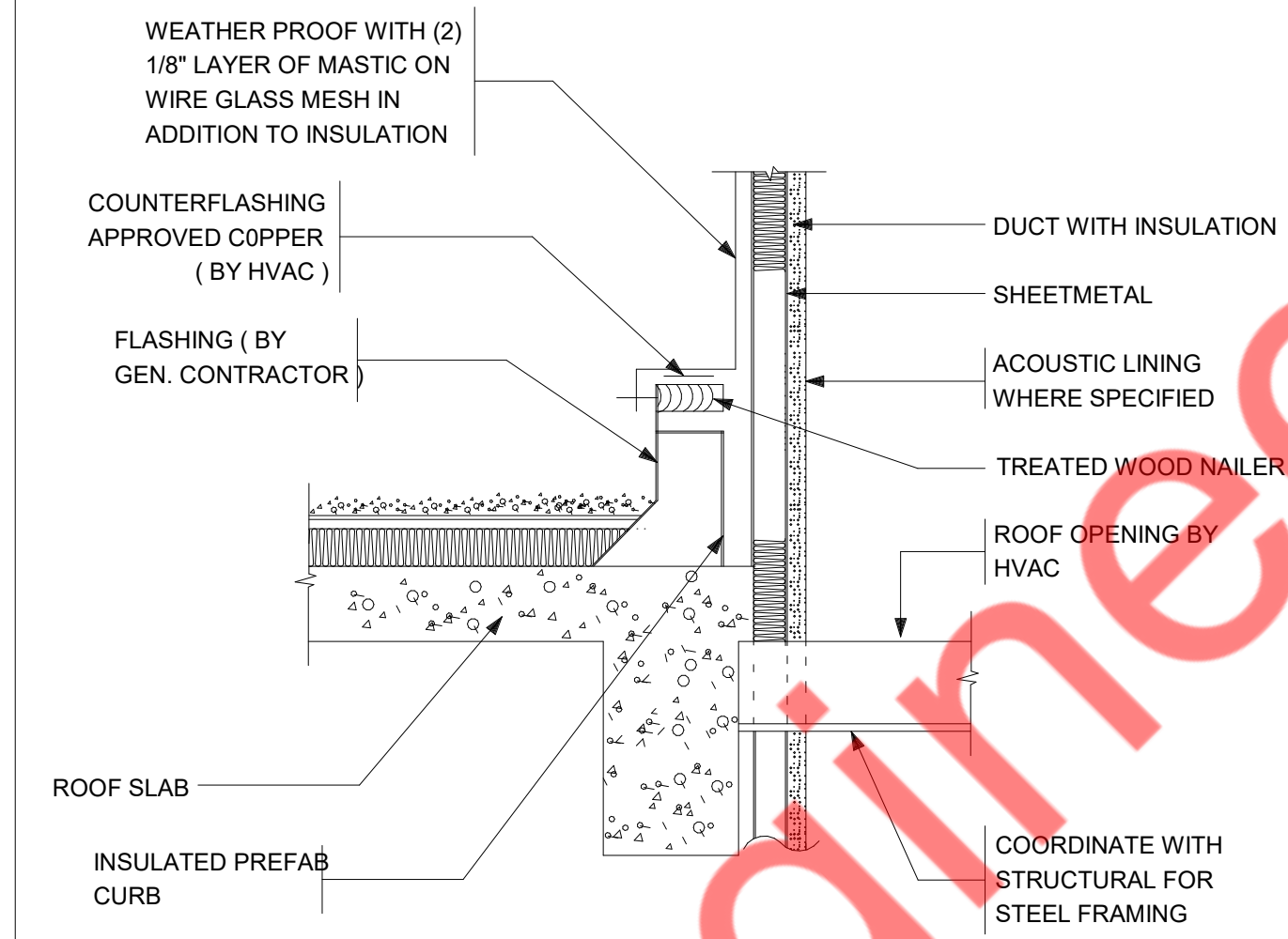


22X14 REQUIRED FREE AIRFLOW
24X16 DUCT (SHEETMETAL)
27X19 SLAB OPENING

- SLAB OPENING = FREE AIRFLOW DIMENSION + 5"
- IF SPACE IS LIMITED, CAN BE FREE AIRFLOW DIMENSION + 3"



2 SMOKE DETECTOR MOUNTING DETAIL
M403 N.T.S



3 DUCT PENETRATION THRU CONCRETE ROOF
M403 N.T.S

1 DUCT SIZE/SLAB OPENING CONVENTION
M403 N.T.S

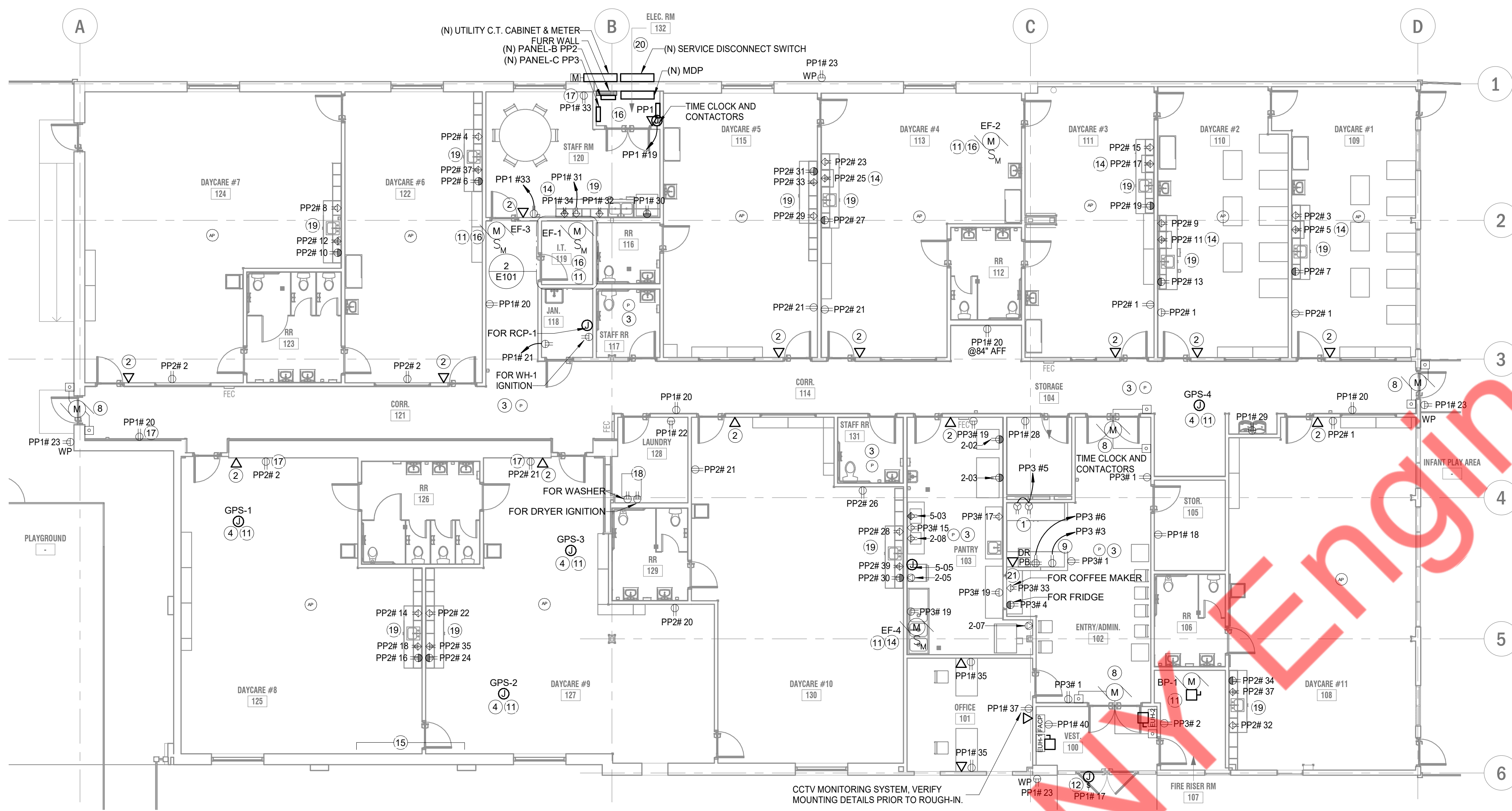
Property of NY Engineers

ELECTRICAL SYMBOLS LIST

GENERAL NOTES
(APPLY TO ALL "E" DRAWINGS)

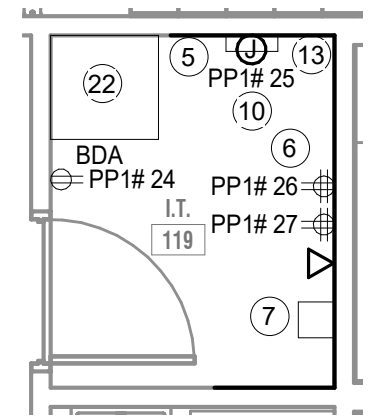
LIGHTING		POWER AND TELECOMMUNICATION		ELECTRICAL ABBREVIATIONS			
	LIGHTING FIXTURE, HALF SHADED FIXTURE OR "EM" INDICATES EMERGENCY FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY SERVICE, U.O.N.		JUNCTION BOX WITH BLANK COVER PLATE, CEILING MOUNTED.	A	AMPERES	EA	EACH
	LUMINAIRE TYPE : INDICATE BY UPPERCASE LETTER SEE LIGHTING FIXTURE SCHEDULE.		SPECIAL PURPOSE RECEPTACLE	A/C, AC	AIR CONDITIONING UNIT	EC	EMPTY CONDUIT/ ELECTRICAL CONTRACTOR
	CIRCUIT NUMBER : INDICATED BY NUMBER		DUPLEX RECEPTACLE	AF	AMPERE FRAME/AMP FUSE	EF	EXHAUS FAN
	SWITCHING INDICATED BY LOWER CASE LETTERS.		DOUBLE DUPLEX RECEPTACLE	AFF	ABOVE FINISHED FLOOR	EM	EMERGENCY
	EM DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.		CONTROLLED DUPLEX OR DOUBLE DUPLEX RECEPTACLE	AS	AMP SWITCH	EMT	ELECTRICAL METALLIC TUBING
	NL DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 HOURS UNSWITCHED CIRCUIT.		GFCI DUPLEX OR DOUBLE DUPLEX RECEPTACLE	AIC	AMPS INTERRUPTING CAPACITY	EQUIP	EQUIPMENT
	RECESSED		DUPLEX OR DOUBLE DUPLEX RECEPTACLE PROTECTED VIA GFCI BREAKER, PROVIDE LABELING AS REQUIRED BY NEC	AT	AMP TRIP	ER	EXISTING TO BE RELOCATED
	SAME AS ABOVE, EXCEPT WALLWASHER.		DUPLEX OR DOUBLE DUPLEX RECEPTACLE MOUNTED AT 8" ABOVE COUNTER UNO	ATS	AUTOMATIC TRANSFER SWITCH	ETR	EXISTING TO REMAIN
	STRIP LIGHTING FIXTURE AND OUTLET BOX.		CONTROLLED DUPLEX OR DOUBLE DUPLEX RECEPTACLE MOUNTED AT 8" ABOVE COUNTER UNO	AUTO	AUTOMATIC	EFW	ELECTRIFIED WORKSTATION FURNITURE
	CEILING/WALL MOUNTED EXIT SIGN WITH DIRECTIONAL ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S).		GFCI DUPLEX OR DOUBLE DUPLEX RECEPTACLE MOUNTED AT 8" ABOVE COUNTER UNO	AWG	AMERICAN WIRE GAUGE	EPH	ELECTRIC WATER HEATER
	EMERGENCY BATTERY UNIT		DUPLEX OR DOUBLE DUPLEX RECEPTACLE MOUNTED AT 8" ABOVE COUNTER UNO AND PROTECTED VIA GFCI BREAKER, PROVIDE LABELING AS REQUIRED BY NEC	C	CONDUIT	FA	FIRE ALARM
SWITCHES AND CONTROLS			COMBINATION RECEPTACLE AND DUAL USB DEVICE	C/B,CB	CIRCUIT BREAKER	FBO	FURNISHED BY OTHERS, INSTALLED & WIRED BY EC
	20A SPST SWITCH U.O.N. "a" DENOTES LIGHTING FIXTURE CONTROLLED.		CARD READER - GENERIC	CKT	CIRCUIT	FDR	FEEDER
	WALL BOX DIMMER SWITCH, LUTRON MAESTRO SERIES. "a" DENOTES LIGHTING FIXTURE CONTROLLED.		INERCOM MASTER STATION	CLG	CEILING	FIBO	FURNISHED & INSTALLED BY OTHERS, WIRED BY EC
	WALL MOUNTED OCCUPANCY SENSOR.		PUSH BUTTON - EMERGENCY SYSTEM OVERRIDE SWITCH (SOS)	COMM	COMMUNICATION	FIXT	FIXTURE
	WALL MOUNTED PHOTOCCELL MOUNTED IN NEMA 3R ENCLOSURE.		INETERCOM DOOR STATION	CT	CURRENT TRANSFORMR	FL	FLOOR
	CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE. (CORRIDOR/AUTO ON, ALL OTHERS/MANUAL ON).		PIEZO ALARM	CU	COPPER	FLUOR	FLUORESCENT
WIRING SYSTEMS			ELECTRIC DOOR LOCK, REFER TO PLANS FOR REQUIREMENTS	*C	DEGREE CELSIUS	G	GROUND
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 1#12 Ø, 1#12 N. & 1#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.		ELECTRIC STRIKE, REFER TO PLANS FOR REQUIREMENT	*F	DEGREE FAHRENHEIT	GFI	GROUND FAULT INTERRUPTER
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 2#12 Ø, 2#12 N. & 2#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.		MOTION SENSOR, REFER TO PLANS FOR REQUIREMENT	DIA	DIAMETER	GP	GENERAL PURPOSE
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANEL BOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 3#12 Ø, 3#12 N. & 3#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.		DOOR CONTACT, REFER TO PLANS FOR REQUIREMENT	DISC	DISCONNECT	HC	HUNG CEILING
	CONDUIT AND WIRE TO BUILDING GROUND.		GLASS BREAK, REFER TO PLANS FOR REQUIREMENT	DN	DOWN	HP	HORSEPOWER
	UNDERGROUND		KEYPAD, REFER TO PLANS FOR REQUIREMENT	DP	DISTRIBUTION PANEL	HWH	HOT WATER HEATER
	EXISTING		WIRELESS ACCESS POINT, PROVIDE DATA DEVICE IN CEILING COORDINATE CEILING TYPE WITH REFLECTED CEILING PLAN	DWH	DOMESTIC WATER HEATER	HZ	HERTZ
	NEW		SECURITY CAMERA - PROVIDE SINGLR GANG BOX WITH PLASTER RING AND 3/4" CONDUIT TO ABOVE THE ACCESSIBLE CELING.	DWG	DRAWING	IC	INTERRUPTING CAPACITY
ELECTRICAL DRAWING LIST			COMBINATION VOICE/DATA DEVICE	JB	JUNCTION BOX	PP	POWER PANEL
E001	ELECTRICAL SYMBOLS, ABBREVIATIONS & GENERAL NOTES		DATA ONLY DEVICE, REFER TO DEVICE NOTES	KCMIL	ONE THOUSAND CIRCULAR MILS	PVC	POLYVINYL CHLORIDE
E101	ELECTRICAL POWER PLAN		TECHNOLOGY DEVICE NOTES (APPLICABLE FOR ALL TYPES): • MOUNTED AT 18" AFF UON • PROVIDE SINGLE GANG BOX WITH PLASTER RING AND 3/4" CONDUIT TO ABOVE THE ACCESSIBLE CEILING UON • *C* INDICATES MOUNTED 8" ABOVE COUNTER • REFER TO SPECIFICATIONS FOR DEVICE AND COVERPLATE FINISHES	KV	KILOVOLT	PWR	POWER
E102	ELECTRICAL ROOF PLAN		MANUAL MOTOR SWITCH	KVA	KILOVOLT-AMPERES	R	REMOVE
E103	ELECTRICAL SECURITY PLAN		DISCONNECT SWITCH UNFUSED	KW	KILOWATTS	RE	RELOCATED EXISTING
E201	ELECTRICAL LIGHTING PLAN		INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.	LP	LIGHTING PANEL	REC	RECEPTACLE
E501	ELECTRICAL DETAILS (1 OF 3)		KEYED NOTE REFERENCE	LTG	LIGHTING	RGS	RIGID GALVANIZED STEEL
E502	ELECTRICAL DETAILS (2 OF 3)		DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP, DRAWING NUMBER INDICATED ON BOTTOM	MAX	MAXIMUM	RR	REMOVE & RELOCATE
E503	ELECTRICAL DETAILS (3 OF 3)		MOTORS AND CONTROLS	MC	MOTOR CONTROLLER	SECT	SECTION
E600	ELECTRICAL RISER DIAGRAM		AC INDOOR UNIT MOTOR AS NOTED WITH LIQUID TIGHT FLEXIBLE CONNECTION WITH JUNCTION BOX AND MOTOR SWITCH.	MCB	MAIN CIRCUIT BREAKER	SPDT	SINGLE POLE DOUBLE THROW
E601	ELECTRICAL PANEL SCHEDULE		DISCONNECT SWITCH UNFUSED	MER	MECHANICAL EQUIPMENT ROOM	SPST	SINGLE POLE SINGLE THROW
E701	ELECTRICAL SPECIFICATIONS (1 OF 2)		MANUAL MOTOR SWITCH	MIN	MINIMUM	SPEC	SPECIFICATION
E702	ELECTRICAL SPECIFICATIONS (2 OF 2)		INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.	MLO	MAIN LUGS ONLY	SW	SWITCH
E703	ELECTRICAL BDA SPECIFICATIONS		KEYED NOTE REFERENCE	MTD	MOUNTED	SWBD	SWITCHBOARD
E704	ELECTRICAL COMCHECK		DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP, DRAWING NUMBER INDICATED ON BOTTOM	MTS	MANUAL TRANSFER SWITCH	SYM	SYMMETRICAL
POWER DISTRIBUTION			INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.	N	NEUTRAL	SYS	SYSTEMS
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.	NE	NEW DEVICE TO REPLACE EXISTING	TELE	TELEPHONE
	BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.		DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.	NIC	NOT IN CONTRACT	TEMP	TEMPERATURE
	DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.		MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.	NL	NIGHT LIGHT	TXF	TOILET EXHAUST FAN
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.	NTS	NOT TO SCALE	TYP	TYPICAL
	DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.		DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.	OC	ON CENTER	U.O.N.	UNLESS OTHERWISE NOTED
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.	P	POLES	V	VOLT/VOLTAGE
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.	PB	PULLBOX	VA	VOLT AMPERE
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.	PC	PERSONAL COMPUTER	VAV	VARIABLE AIR VOLUME
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.	Ø	PHASE	VFD	VARIABLE FREQUENCY DRIVE
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.	PNL	PANEL	VP	VAPORPROOF
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.	W	WATT	WP	WEATHERPROOF
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.	W	WIRE	XFMR	TRANSFORMER
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.	WH	WALL HEATER	ZRT	ZONE REGISTER TERMINALS
	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.		DISTRIBUTION PANELBOARD, SURFACE OR FLUSH MOUNTED.	E	EXISTING	IG	ISOLATED GROUND

- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CURRENT VERSION OF THE NATIONAL ELECTRICAL CODE (NEC).
- CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK. NO ADDITIONAL COMPENSATION WILL BE CONSIDERED FOR FAILURE TO DO SO.
- CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, TEST REPORTS, AND CERTIFICATIONS FOR TEMPORARY AND FINAL CERTIFICATE OF OCCUPANCY.
- FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER IN ORDER TO MAINTAIN FIRE RATING. ALL PENETRATIONS SHALL BE SLEEVED AND SEALED WATERTIGHT.
- SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOLTS (HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AND BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK), NAILS, RAW PLUGS AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTURE, PROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS OF METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
- LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT INSTALLED: FURNISH FISH WIRE.
- VERIFY LOCATIONS OF OUTLETS AND SWITCHES IN FINISHED ROOMS WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISH. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS AND MECHANICAL EQUIPMENT. EQUIPMENT, VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILING AND THE LIKE, CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
- CONTRACTOR SHALL PROVIDE A WARRANTY ON ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
- ALL UNUSED MATERIALS AND DEBRIS SHALL BE LEGALLY REMOVED AND DISPOSED OF AWAY FROM THE PREMISES ON A DAILY BASIS.
- CONTRACTOR SHALL PATCH, PAINT, AND RESTORE EXISTING SURFACES DAMAGED DURING THE COURSE OF THIS CONSTRUCTION TO PRE-EXISTING CONDITIONS OR BETTER.
- MINIMUM SIZE OF CONDUIT SHALL BE 3/4", AND TYPE SHALL BE ELECTRICAL METALLIC TUBING (EMT), UNLESS OTHERWISE NOTED. PROVIDE NYLON DRAG LINE AND CONDUIT CAP FOR ALL EMPTY CONDUITS.
- CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
- PULL AND JUNCTION BOXES WHERE INDICATED ON THE DRAWINGS, SHALL BE CONSIDERED SHOWN AT THEIR APPROXIMATE LOCATION. THE CONTRACTOR SHALL LOCATE THEM AS FIELD CONDITIONS DICTATE. ADDITIONAL PULL AND JUNCTION BOXES NOT SHOWN ON DRAWINGS SHALL BE PROVIDED WHERE REQUIRED BY APPLICABLE CODE PROVISIONS OR WHERE CALLED FOR BY FIELD CONDITIONS. PULL AND JUNCTION BOXES SHALL BE SURFACE TYPE IN UNFINISHED AREAS AND INSTALLED CONCEALED IN FINISHED AREAS, AND ALL COVERS TO PULL & JUNCTION BOXES SHALL BE READILY ACCESSIBLE.
- SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
- FOR EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES AND SWITCH/RECEPTACLE OUTLETS, REFER TO ARCHITECTURAL REFLECTED CEILING AND POWER PLANS.
- ALL ELECTRICAL ACCESSORIES AND EQUIPMENT INSTALLED OUTSIDE OR EXPOSED TO WEATHER SHALL HAVE NEMA 3R ENCLOSURES AND SHALL BE TIGHTLY GASKETED FOR A COMPLETE RAIN TIGHT INSTALLATION. ALL BUILDING EXTERIOR MOUNTED RECEPTACLES SHALL BE GFCI RATED AND MOUNTED IN WEATHERPROOF ENCLOSURE.
- ALL ACCESS PANEL LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.
- ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTALLATION WITH THE GENERAL CONTRACTOR AND OTHER ASSOCIATED TRADES IN A TIMELY MANNER. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS AND CONDITIONS PRIOR TO CONSTRUCTION. REFER TO ALL GENERAL, MECHANICAL, AND ELECTRICAL, DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT.
- ALL CONDUITS AND EQUIPMENT TO BE CONCEALED IN FINISHED SPACES UNLESS OTHERWISE NOTED.
- ALL EQUIPMENT AND MATERIALS INSTALLED IN PLENUM CEILING SHALL BE APPROVED FOR THAT APPLICATION.
- OUTLET BOXES AND JUNCTION BOXES ON OPPOSITE SIDES OF FIRE-RATED WALLS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF NOT LESS THAN 24 INCHES, UNLESS FIRE-RATED BOXES OR PUTTY PADS ARE UTILIZED.
- COORDINATE ALL FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. CONFIRM PENETRATION LOCATIONS WITH THE ENGINEER AND OWNER BEFORE INSTALLATION.
- LIGHTING FIXTURES DESIGNATED AS EMERGENCY TYPE SHALL BE WIRED AHEAD OF ANY CONTROL DEVICES.
- NUMBER(S) SHOWN AT RECEPTACLES, JUNCTION BOXES AND EQUIPMENT INDICATES CIRCUIT NUMBERS IN PANELBOARD. PROVIDE WIRE AND CONDUIT TO INTERCONNECT EQUIPMENT AND DEVICES WITH SAME CIRCUIT NUMBERS AND RUN TO PANELBOARD.
- PROVIDE RACEWAY, BACK-BOXES, GROUNDING PROVISIONS AND 120V POWER AS NECESSARY FOR LOW VOLTAGE SYSTEMS (SECURITY, TELEPHONE DATA, CABLE TELEVISION, PAGING, INTERCOM, ETC. AS APPLICABLE TO PROJECT). REFER TO ASSOCIATED CONSULTANT'S DRAWING FOR EXACT REQUIREMENTS AND LOCATIONS OF DEVICES.
- PROVIDE HANDLE TIES TO ALLOW FOR SIMULTANEOUS DISCONNECTION OF CONDUCTORS IN ANY MULTI-BRANCH CIRCUITS WITH A SHARED NEUTRAL.



- ELECTRICAL POWER PLAN GENERAL NOTES:**
- LOCATE RECEPTACLE FOR UNDER CABINET REFRIGERATOR AT 18" AFF. E.C. TO COORDINATE EXACT LOCATION WITH OWNER/ARCHITECT IN FIELD.
 - ALL WALL MOUNTED RECEPTACLES AND TEL. DATA OUTLETS SHALL BE MOUNTED AT 18" A.F.F. UNLESS OTHERWISE NOTED.
 - ALL WIRING/CABLING AND OTHER TELCO/DATA DEVICES SHALL BE PROVIDED BY TELCO/DATA CONTRACTOR. GENERAL CONTRACTOR SHALL VERIFY THE LOCATIONS OF DEVICES AND PROVIDE ROUGH-INS. PROVIDE BACKBOX AND CONDUIT TO ABOVE CEILING IF PARTITION IS INSULATED. COORDINATE WITH ARCHITECTURAL DRAWINGS.
 - MAXIMUM VOLTAGE DROP FOR FEEDER AND BRANCH CIRCUIT CONDUCTORS COMBINED, SHALL NOT EXCEED A 5% VOLTAGE DROP.
 - PROVIDE SERVICE EQUIPMENT AIC MARKING PER NEC 110.24(A) AND 110.24 (B) FOR MODIFICATIONS IF REQUIRED.
 - ALL BRANCH CIRCUIT HOMERUNS, ASSIGN INDICATED ON THIS PLAN SHALL BE CIRCUITED TO THE PANEL & CIRCUIT NUMBER AS INDICATED.
 - REFER TO E001 FOR ELECTRICAL SYMBOLS, GENERAL NOTES & ABBREVIATIONS. E701 AND E702 FOR ELECTRICAL SPECIFICATIONS.
 - ALL RECEPTACLES IN PANTRY AREA SHALL BE "GFCI" IN ACCORDANCE WITH NEC ARTICLE 210.8 (B). PROVIDE GFI RATED BREAKER AT PANEL FOR KITCHEN EQUIPMENTS.
 - E.C. SHALL VERIFY THE EXACT ELECTRICAL REQUIREMENTS INCLUDING RECEPTACLES, CIRCUIT BREAKER, PANEL COORDINATION FOR ALL KITCHEN/PANTRY EQUIPMENT IN COORDINATION WITH EQUIPMENT SUPPLIER/MANUFACTURER/ARCHITECT/OWNER IN FIELD AND PROVIDE THE ELECTRICAL CONNECTION PER REQUIREMENT. BASE BID ACCORDINGLY.
 - ELECTRICAL CONTRACTOR TO INSTALL TAMPER RESISTANT RECEPTACLES WHERE REQUIRED PER NEC 406.12(C).
 - COORDINATE ALL ELECTRICAL DEVICES WITH MILLWORK. REFER TO ARCHITECTURAL DRAWINGS, NOTES AND ELEVATIONS.
 - RUN A DEDICATED NEUTRAL FOR EACH COMPUTER OR POWER AND DATA CIRCUIT SHOWN.
 - ALL CONDUIT AND CABLING TO BE INSTALLED IN CEILING SPACE OR WALLS. NO CONDUIT WILL BE ALLOWED IN SLAB.
 - CONFIRM ELECTRICAL REQUIREMENTS WITH APPROVED MECHANICAL SHOP DRAWINGS PRIOR TO ROUGH-IN.
 - BX CABLE MAY BE USED IN THE SAME WALL ONLY AND FOR INDIVIDUAL CABLE DROPS TO LUMINAIRES. IT MAY NOT BE USED TO FEED DEVICES IN DIFFERENT WALLS, AROUND CORNERS OR LOOPED OVER DOORS OR WALLS.
 - COORDINATE WITH GENERAL CONTRACTOR ALL CABLE AND CONDUIT PENETRATIONS THROUGH FIRE RATED WALLS. PRIOR TO ROUGH-IN OF HOLE, CONFIRM THE FIRE STOPPING SYSTEM BEING EMPLOYED AND ROUGH-IN ACCORDINGLY.
 - ALL RECEPTACLES MOUNTED TOGETHER ARE TO BE GANGED 5.9" ON CENTER.
 - ALL CABLE NOT COMPLETELY ENCLOSED IN NON-COMBUSTIBLE CONDUIT THE CEILING PLENUM SHALL BE FT6 RATED.
 - ALL DATA OUTLETS TO BE TERMINATED AND TESTED BY OTHERS. LEAVE ONE (1) 40" COIL AT ALL DATA LOCATIONS.
 - MOUNT VANITY RECEPTACLES HORIZONTALLY, 5.9" ABOVE TOP OF BACKSPASH.
 - PROVIDE ALL CONDUIT, DEVICE BOXES AND ELECTRIC WIRING FOR AUTOMATIC DOOR OPERATORS. CONFIRM DEVICE LOCATION AND MOUNTING REQUIREMENTS PRIOR TO INSTALLATION.
 - MAXIMUM LENGTH OF 98' BETWEEN PULL POINTS OR PULL BOXES.
 - ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL ALL CABLING AND DEVICE BOXES FOR INTRUSION ALARM AND DOOR ACCESS CONTROL. LEAVE 10' COIL IN DAYCARE SERVICE ROOM. OWNER TO SUPPLY SECURITY AND ACCESS CONTROL DEVICES. ALL CABLE LOCATED IN EXCHANGE PLENUMS AND NOT COMPLETELY ENCLOSED IN CONDUIT SHALL BE FT6 RATED.

1 ELECTRICAL POWER PLAN
1/8" = 1'-0"



2 ENLARGED IT ROOM
1/4" = 1'-0"

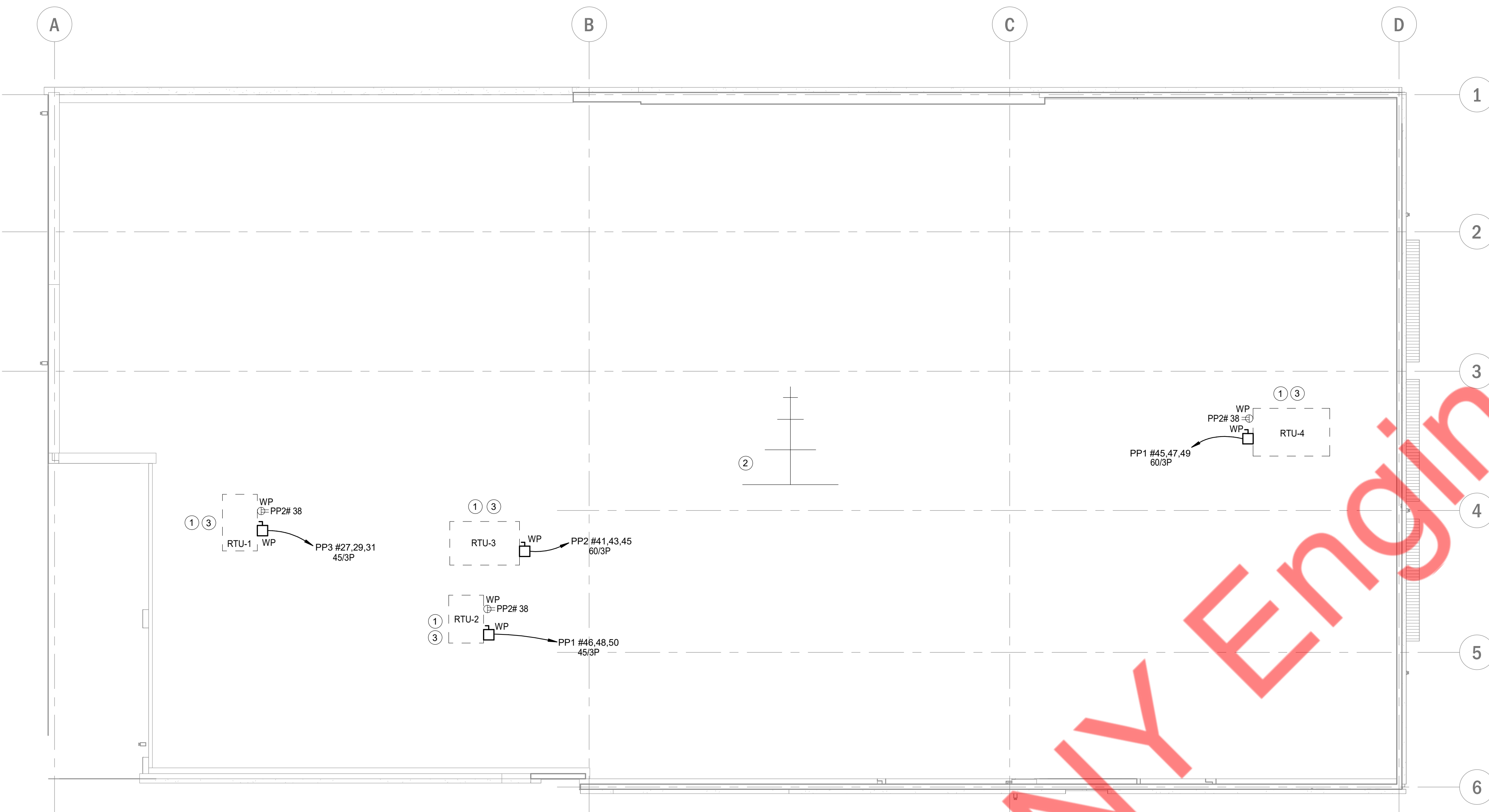
KITCHEN EQUIPMENT CONNECTION SCHEDULE

TAG	DESCRIPTION	VOLTAGE	PHASE	AMPS	PANEL	CIRCUIT	WIRING
2-02	COMMERCIAL REFRIGERATOR	120V	1	10.5 A	PP3	8	(2)#12,(1)#12GND-3/4"C
2-03	COMMERCIAL FRIDGE	120V	1	10.5 A	PP3	7	(2)#12,(1)#12GND-3/4"C
2-05	DISHWASHER	208V	3	40.0 A	PP3	10,12,14	(3)#6,(1)#10GND-1"C
2-07	ELECTRIC CONVECTION OVEN	208V	3	40.0 A	PP3	9,11,13	(3)#6,(1)#10GND-1"C
2-08	CONVEYOR TOASTER	120V	1	12.5 A	PP3	16	(2)#12,(1)#12GND-3/4"C
5-03	MICROWAVE OVEN	120V	1	10.0 A	PP3	18	(2)#12,(1)#12GND-3/4"C
5-05	CONDENSATE HOOD	208V	1	10.0 A	PP3	20,22	(3)#12,(1)#12GND-3/4"C

NOTE:
EC TO VERIFY ALL EQUIPMENT CONNECTIONS AND SPECIFICATIONS WITH MANUFACTURER CUT SHEETS PRIOR TO ROUGH-IN.

KITCHEN NOTES:
ALL RECEPTACLES IN KITCHEN TO BE GFCI PER NEC 210.8. VERIFY THAT ALL GFCI DEVICES ARE ACCESSIBLE PER NEC. IF THE BREAKER IS NOTED AS SERVING THE GFCI PROTECTION, SUBSTITUTION FOR PROTECTION CAN BE SUBMITTED BY THE EC FOR REVIEW AND APPROVAL. DEVICE MUST MEET ALL CODE REQUIREMENTS AND BE COORDINATED WITH THE A.H.U. VERIFY FINAL LOCATIONS OF EXTERNAL GFCI PROTECTION IN THE FIELD AND WITH THE OWNER.

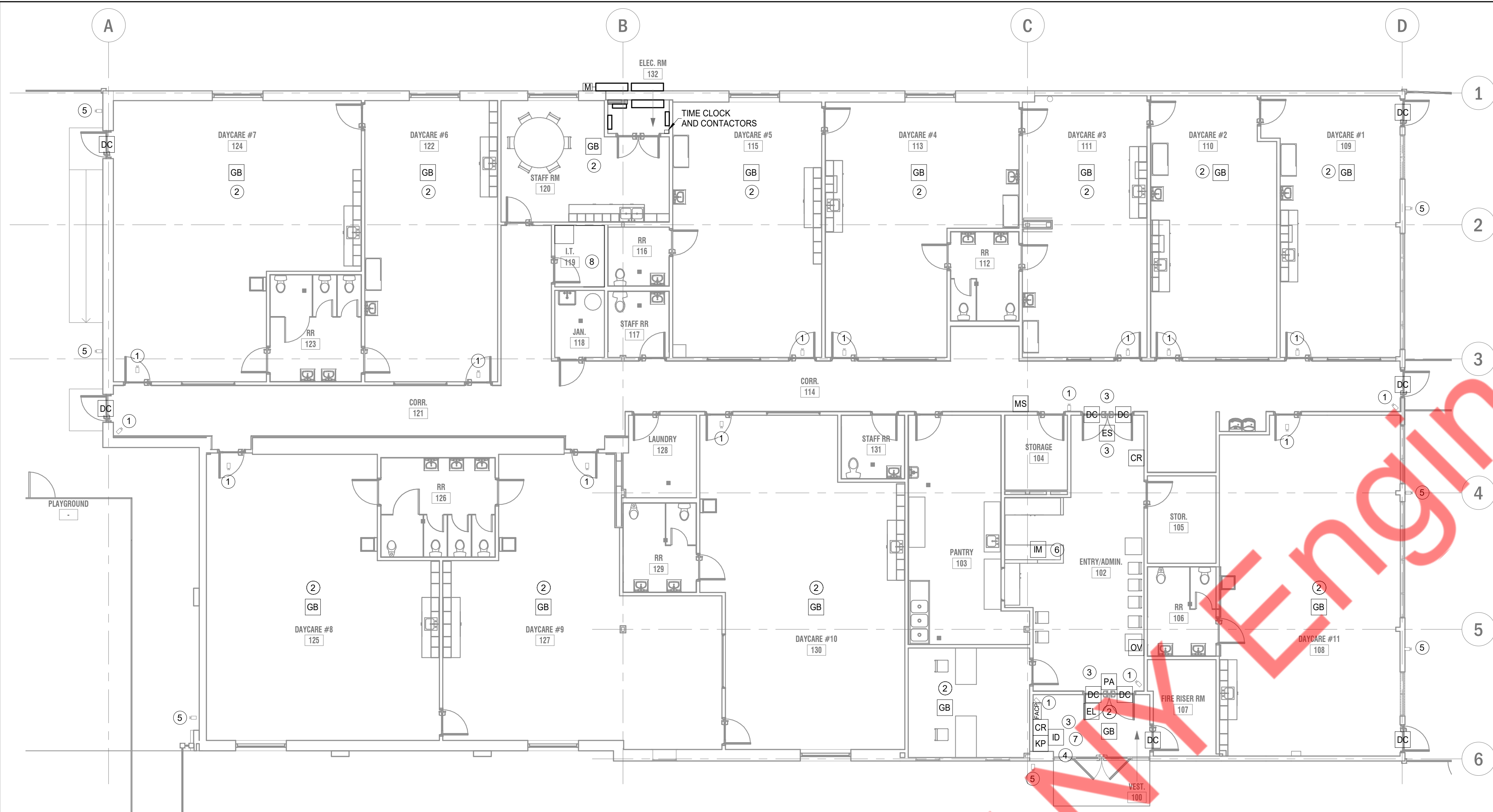
- ELECTRICAL POWER PLAN KEYED NOTES**
- E.C. TO PROVIDE TAMPER RESISTANT COMBINATION USB/RECEPTACLE OUTLET ABOVE COUNTER FOR FUTURE IPAD CONNECTIONS. COORDINATE MOUNTING HEIGHTS AND LOCATION WITH ARCHITECTURAL MILLWORK AND ELEVATIONS. PROVIDE DEDICATED NEUTRAL AND GROUND WIRE FOR EACH RECEPTACLE. RECEPTACLE TO BE EQUAL TO LEVITON CAT. NO. T5632-SW.
 - PROVIDE WALL MOUNTED PHONE AT 60" AFF. EXACT HEIGHT TO BE CONFIRMED ON SITE.
 - PROVIDE PA SPEAKERS AS PER SPECIFICATIONS. ALL PA SPEAKERS ARE TO HAVE CAT6 HOME RUN BACK TO THE IT RACK IN I.T. 119.
 - E.C. SHALL COORDINATE EXACT LOCATION OF MECHANICAL EQUIPMENT AS PER THE MECHANICAL DRAWING WITH MECHANICAL CONTRACTOR ON FIELD. PROVIDE ELECTRICAL CONNECTIONS AS PER THE MANUFACTURERS RECOMMENDATION. BASE BID ACCORDINGLY.
 - ELECTRICAL BACKBOARD TO BE 3/4" FIRERATED PLYWOOD G1S WITH LONGEST EDGE MOUNTED VERTICALLY. ALL PLYWOOD TO BE PAINTED WITH INTUMESCENT PAINT. PROVIDE WITH #6 GND.
 - SUPPLY AND INSTALL 12U WALL MOUNTED 19" DATA RACK. MOUNT FOURPLEX RECEPTACLES AND DATA AT 59" AFF.
 - SUPPLY AND INSTALL FOUR (4) 2" CONDUITS FROM IT RACK TO THE MAIN DEMARC. VERIFY LOCATION IN FIELD. ONE CONDUIT TO HAVE 50 PAIR CAT 6 COPPER CABLE. ONE CONDUIT TO HAVE A 12 STRAND MULTIMODE FIBER CABLE. THE OTHER TWO (2) CONDUITS TO BE SPARE.
 - SUPPLY AND INSTALL DOOR OPERATOR AND PUSH BUTTONS. DOOR OPERATOR TO BE INTERLOCKED WITH ACCESS CONTROL SYSTEM. PROVIDE ALL ELECTRICAL CONDUIT, WIRING AND SERVICES REQUIRED FOR AUTOMATIC DOOR OPENERS.
 - INTERCOM MASTER SYSTEM RECEPTACLE.
 - SECURITY BACKBOARD COMPLETE WITH A DEDICATED 120V 20A CIRCUIT COMPLETE WITH MANUAL LOCK ON BREAKER WHICH IS HARDWIRED INTO SECURITY CABINET AS PER SECURITY SHOP DRAWINGS.
 - REFER TO SHEET E601 FOR MECHANICAL AND PLUMBING EQUIPMENT CONNECTION SCHEDULE AND ADDITIONAL INFORMATION.
 - PROVIDE JUNCTION BOX, SWITCH, AND WHIP FOR STORE SIGN. ADDITIONAL JUNCTION BOXES, CONDUIT AND WIRING MAY BE REQUIRED FOR A COMPLETE INSTALLATION OF SIGN. COORDINATE ALL REQUIREMENTS WITH SIGN VENDOR. SIGN SHALL BE ON/OFF WITH PHOTOCCELL.
 - E.C. SHALL COORDINATE LOCATION OF DEMARCATION POINT WITH THE TELEPHONE COMPANY. VERIFY LOCATION IN FIELD.
 - COORDINATE MICROWAVE RECEPTACLE MOUNTING HEIGHT WITH EQUIPMENT IN FIELD.
 - E.C. SHALL REMOVE EXISTING ELECTRICAL PANEL, MOUNTED AT WALL AT THIS LOCATION. ALSO, E.C. SHALL REMOVE ITS ASSOCIATED CONDUIT AND OTHER ENTITIES ASSOCIATED TO IT.
 - E.C. SHALL REMOVE ALL THE EXISTING ELECTRICAL WORKS INCLUDING EXISTING SERVICE EQUIPMENTS/ELECTRICAL PANELS/WIREWAY/CONDUIT/WIRE, ETC AVAILABLE IN THE PROJECT SPACE.
 - E.C. SHALL VERIFY THE THICKNESS OF FURR WALL AT THE OUTLET LOCATION. RELOCATE THE OUTLET IN COORDINATION WITH ENGINEER IF WALL THICKNESS IS FOUND INSUFFICIENT TO INSTALL THE OUTLETS.
 - VERIFY RECEPTACLE NEMA TYPE IN FIELD WITH DRYER PRIOR TO PURCHASING.
 - E.C. SHALL REFER ARCHITECT ELEVATION PLANS OF PANTRY FOR EXACT MOUNTING DETAILS AND OUTLETS PLACEMENT AS PER THE FURNITURE LAYOUT ON THE FIELD.
 - E.C. SHALL COORDINATE WITH UTILITY FOR EXACT ARRANGEMENT OF SERVICE ELECTRICAL EQUIPMENT INCLUDING C.T. CABINET & METER/SERVICE DISCONNECT SWITCH ON FIELD. PROVIDE CONNECTIONS ACCORDINGLY. REFER SHEET NO. E600 - ELECTRICAL RISER DIAGRAM FOR MORE DETAILS.
 - E.C. SHALL COORDINATE EXACT LOCATION/MOUNTING DETAIL/POWER REQUIREMENT OF COFFEE MAKER ON THE FIELD WITH ARCHITECT/OWNER IN FIELD, PROVIDE ELECTRICAL CONNECTIONS ACCORDINGLY.
 - E.C. TO VERIFY REQUIREMENT OF BDA/EMERGENCY RESPONDER FOR THE PROJECT SPACE WITH LOCAL FIRE CODE OFFICIAL.



ELECTRICAL POWER PLAN GENERAL NOTES:

1. REFER TO SHEET E601 FOR MECHANICAL AND PLUMBING EQUIPMENT CONNECTION SCHEDULE AND ADDITIONAL INFORMATION.
2. E.C. TO VERIFY REQUIREMENT OF BDA/EMERGENCY RESPONDER FOR THE PROJECT SPACE WITH LOCAL FIRE CODE OFFICIAL AND IF REQUIRED COORDINATE LOCATION OF ANTENNA WITH DETAIL 1/E703.
3. EXISTING RTU'S SHALL REMAIN. E.C. SHALL VERIFY OPERABLE CONDITION ON EXISTING RTU'S AND THEIR ASSOCIATED DISCONNECT/WIRING/CONDUITS. REPLACE WITH NEW ONE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.

1 ELECTRICAL ROOF PLAN
1/8" = 1'-0"



1 ELECTRICAL SECURITY PLAN
1/8" = 1'-0"

SECURITY PLAN NOTES

GENERAL SHEET NOTES

COORDINATE ALL ROUGH-IN & WIRING REQUIREMENTS WITH TYCO SECURITY. TYCO CABLE SCHEDULE PROVIDED FOR REFERENCE. CONFIRM THE SECURITY SYSTEM PROVIDER FOR FINAL REQUIREMENTS.

TYCO CABLE REQUIREMENTS

1. BURGLAR ALARM:
 - A. DOOR CONTACTS, GLASS BREAK SENSORS AND KEYPADS - 22/4 (STATION Z) CABLE
 - B. FIRE ALARM PANEL TO BURGLAR ALARM PANEL (FOR UL CERTIFICATION) ARMORED 18/6 CABLE
2. ACCESS CONTROL SYSTEM:
 - A. CARD READER LOCATION - 22/6 SHIELDED CABLE
 - B. ELECTRIC STRIKE - 18/2 CABLE
 - C. DOOR POSITION CONTACT - 22/4 (STATION Z) CABLE
 - D. REQUEST TO EXIT MOTION SENSOR - 22/4 (STATION Z) CABLE
 - E. HANDICAP BUTTON - 22/4 (STATION Z) CABLE
 - F. PIEZO ALARM - 22/4 (STATION Z) CABLE
 - G. OVERRIDE BUTTON - 22/4 (STATION Z) CABLE
3. CCTV SYSTEM
 - A. CAMERA LOCATION - CAT6 CABLE (FOR IP CAMERAS)
4. INTERCOM:
 - A. MASTER STATION TO EACH DOOR STATION OR MASTER SUB-STATION - 18/2 CABLE

NOTE:

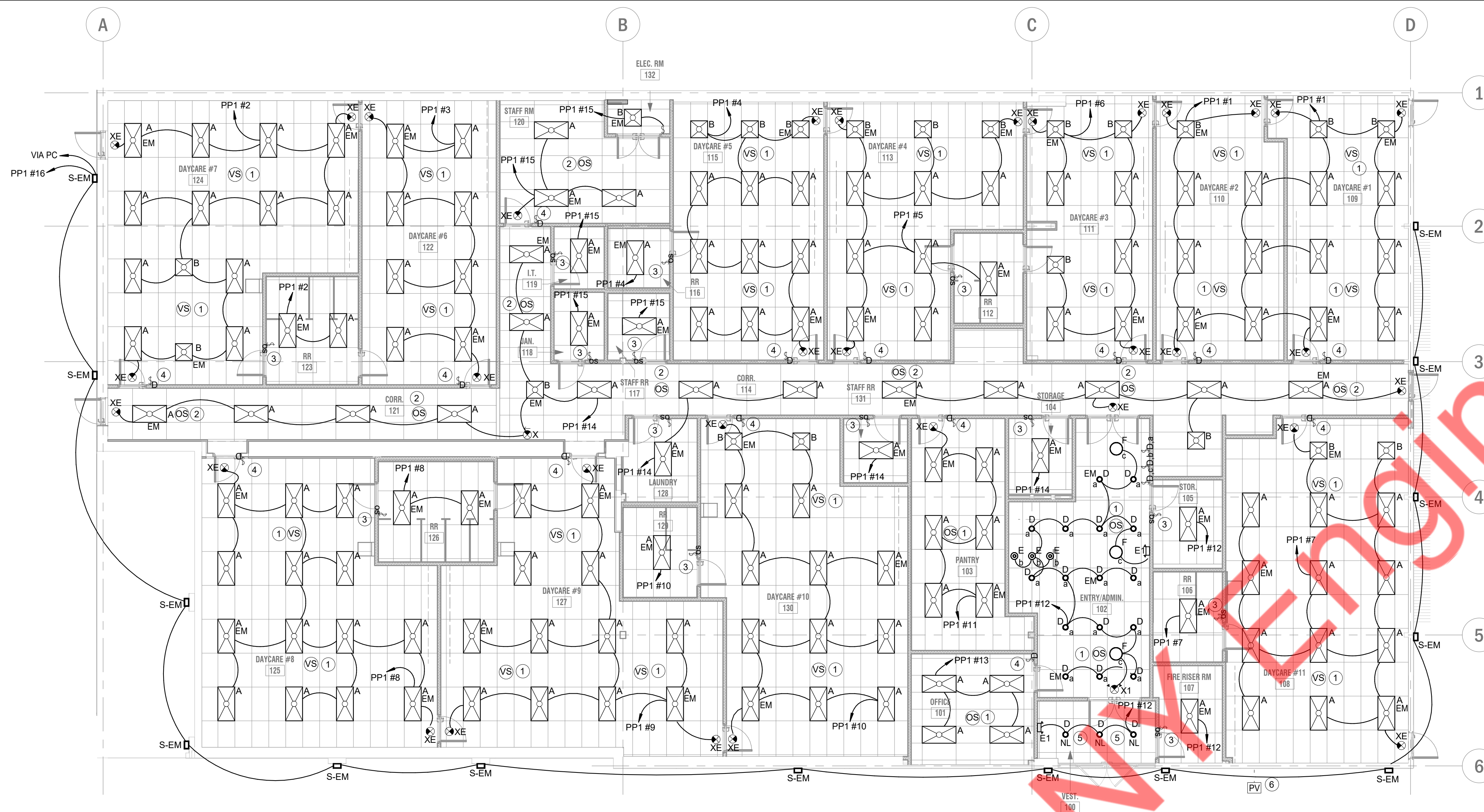
- ELECTRICIAN TO RUN CONDUIT TO AREAS THAT CANNOT HAVE CABLE RUN FREE AIR. AT MINIMUM ELECTRICAL CONTRACTOR TO PROVIDE OUTLET BOX IN WALL/CEILING AND CONDUIT TO CEILING SPACE. PROVIDE CONDUIT TO ACCESSIBLE CEILING LOCATION IF CONDUIT STUB IS LOCATED IN INACCESSIBLE CEILING LOCATION.

TYCO POWER/NETWORK REQUIREMENTS

1. BURGLAR ALARM:
 - A. FIRE MONITORING - DEDICATED CIRCUIT FOR POWER WITH DUPLEX RECEPTACLE FOR TRANSFORMER
 - B. BURGLAR ALARM MONITORING ONLY - DUPLEX RECEPTACLE FOR TRANSFORMER
2. ACCESS CONTROL SYSTEM:
 - A. HOSTED ACCESS CONTROL - ONE INTERNET CONNECTION VIA AN ACTIVE RJ45 JACK NEXT TO THE CONTROL PANEL AND TESTED TO managedaccess.tycois.ca
 - B. HOSTED ACCESS CONTROL - ONE DUPLEX RECEPTACLE NEAR THE CONTROL PANEL
 - C. TRADITIONAL ACCESS CONTROL - TWO DUPLEX RECEPTACLES NEAR THE CONTROL PANEL
 - D. ACCESS CONTROL (GENERAL) - RUTHERFORD 6 SERIES ELECTRIC STRIKES SET TO 12V SETTING
3. CCTV SYSTEM
 - A. IP SYSTEM - NETWORK DROP, STATIC IP ADDRESS, SUB-NET MASK AND DEFAULT GATEWAY FOR ENABLING REMOTE VIEWING VIA THE CUSTOMER'S NETWORK
 - B. IP SYSTEM - ONE DUPLEX RECEPTACLE NEAR THE NVR LOCATION
4. INTERCOM:
 - A. MASTER STATION AND MASTER SUB-STATION LOCATIONS - ONE DUPLEX RECEPTACLE

SECURITY NOTES

1. SUPPLY AND INSTALL OUTLET BOXES AND ALL CABLING FOR INTERIOR CCTV CAMERAS. DEVICES TO BE SUPPLIED AND INSTALLED BY SEPARATE CONTRACTOR. ALL CABLING FROM EACH CAMERA LOCATION TO RUN BACK TO I.T. CLOSET. COORDINATE EXACT LOCATION ON SITE AND WITH INSTALLER.
2. SUPPLY AND INSTALL OUTLET BOXES AND ALL CABLING FOR INTRUSION ALARM DEVICES. DEVICES TO BE SUPPLIED AND INSTALLED BY SEPARATE CONTRACTOR. ALL CABLING TO RUN BACK TO I.T. CLOSET.
3. PROVIDE OUTLET BOXES AND ALL CABLING FOR CARD ACCESS SYSTEM. DEVICES TO BE SUPPLIED AND INSTALLED BY SEPARATE CONTRACTOR. ALL CABLING TO RUN BACK TO I.T. CLOSET.
4. PROVIDE AND INSTALL ALL CABLING AND DEVICES FOR INTERCOM SYSTEM COMPLETE WITH 120/24VAC TRANSFORMER AND MAIN HEAD END COMPONENTS. ALL CABLING TO CONNECT BACK TO I.T. CLOSET.
5. SUPPLY AND INSTALL OUTLET BOXES AND CABLING FOR EXTERIOR CCTV CAMERAS. ALL DEVICES ARE SUPPLIED AND INSTALLED BY SEPARATE CONTRACTOR. COORDINATE ON SITE. ALL CABLING TO RUN BACK TO I.T. CLOSET. WALL MOUNT EXTERIOR CAMERAS TO BE MOUNTED AT 12' AFG.
6. INTERCOM MASTER STATION.
7. INTERCOM SUB-MASTER STATION.
8. SECURITY BACKBOARD.



ELECTRICAL LIGHTING PLAN GENERAL NOTES:

1. CONTRACTOR SHALL ADJUST THE EMERGENCY AND EXIT LIGHTING QUANTITIES/LOCATION AS REQUIRED TO MEET THE LOCAL AHJ REQUIREMENTS. BASE BID ACCORDINGLY.
2. ALL EMERGENCY, EXIT AND NIGHT LIGHTS SHALL BE CONNECTED TO THE NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROL FOR CONTINUOUS OPERATION.
3. CONTRACTOR SHALL PROVIDE THE LIGHTING CONTROLS AND ALL REQUIRED DEVICES/ACCESSORIES/WIRING AS PER IECC 2015 CODE REQUIREMENTS.
4. PROVIDE AN UN-SWITCH HOT LEG TO ALL EMERGENCY AND EXIT FIXTURES.
5. ACCESS/MAINTAINACE DOOR IN CEILING SHALL NOT BE BLOCKED BY ANY DUCTS, PIPES OR OTHER PERMANENT FOREIGN ITEMS.
6. MAXIMUM VOLTAGE DROP FOR FEEDER AND BRANCH CIRCUIT CONDUCTORS COMBINED, SHALL NOT EXCEED A 5% VOLTAGE DROP.
7. COORDINATE WITH OWNER FOR TIME SCHEDULE PROGRAM INTO LIGHTING CONTROL SYSTEM.
8. ALL LIGHTING FIXTURE TYPES AND LAYOUTS TO BE VERIFIED WITH ARCHITECT/OWNER FOR EXACT LOCATION AND MOUNTING HEIGHTS OF ALL LIGHTING FIXTURES SWITCHES AND JUNCTION BOXES, SEE ARCHITECTURAL DRAWINGS.
9. ALL LIGHTING FIXTURES WHICH ARE CONTROLLED BY A DIMMER SWITCH SHALL BE WIRED TO A CIRCUIT HAVING DEDICATED NEUTRAL WIRE.
10. CONTRACTOR SHALL COORDINATE WITH ARCHITECT/OWNER FOR DIMMING REQUIREMENTS. ALL THE LIGHT FIXTURE SHALL BE DIMMABLE WHICH ARE CONTROLLED THROUGH DIMMER.

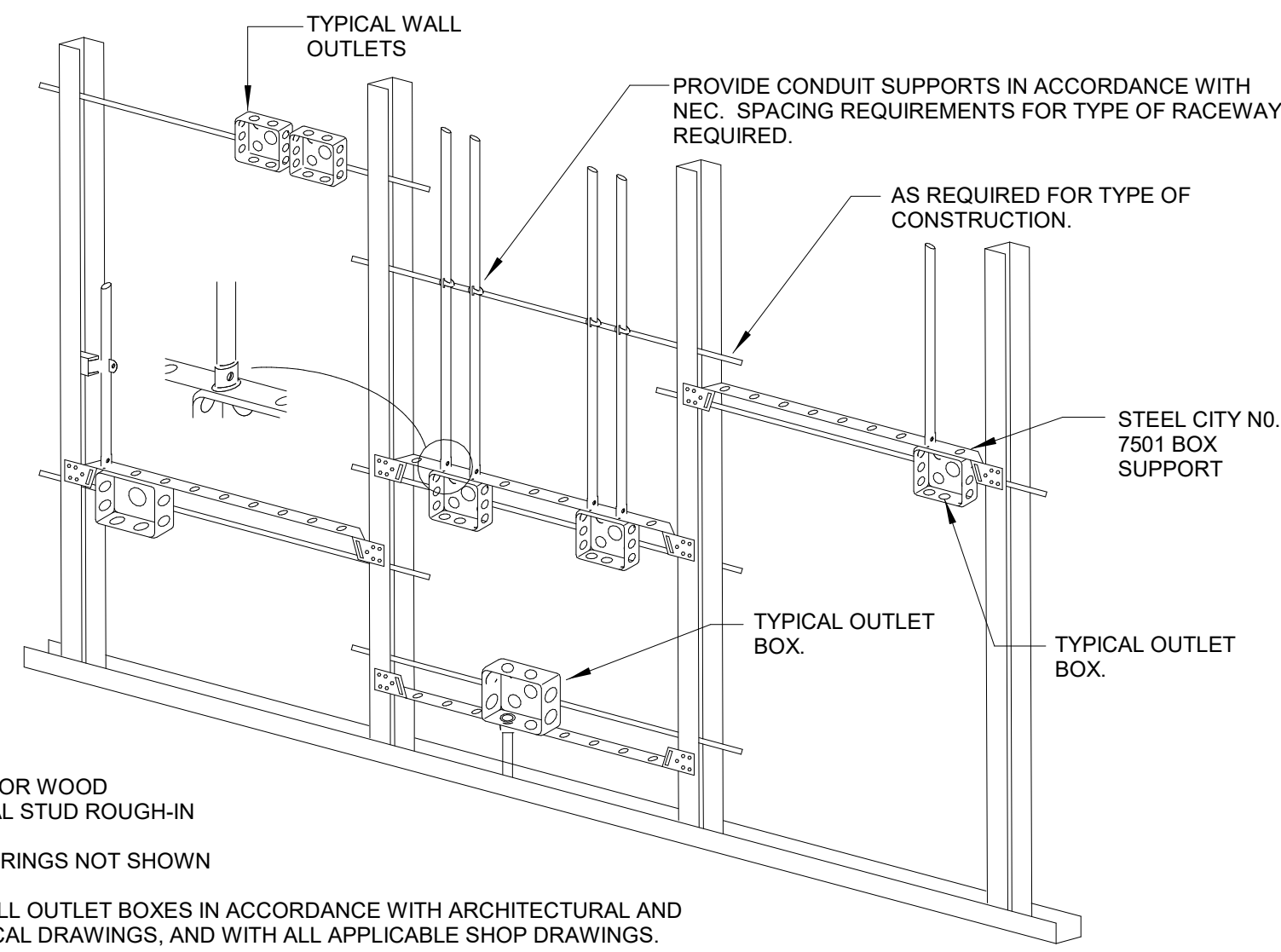
ELECTRICAL LIGHTING PLAN KEYED NOTES

1. SENSORS TO CONTROL LIGHTING IN ENCLOSED ROOM AND BE SLAVE TO THE SWITCH LOCATED IN THE SAME ROOM. SENSOR TO BE EQUAL TO WATTSTOPPER DUAL TECHNOLOGY DT-300 AN ISOLATED RELAY FOR MECHANICAL CONTROLS AND ALL NECESSARY POWER PACKS (TYPICAL FOR OFFICES, CLASSROOMS, AND WASHROOMS).
2. OCCUPANCY SENSORS TO CONTROL LIGHTING IN ENCLOSED ROOM AND TO BE EQUAL TO WATTSTOPPER DUAL TECHNOLOGY DT-300 AN ISOLATED RELAY FOR MECHANICAL CONTROLS AND ALL NECESSARY POWER PACKS (TYPICAL FOR OFFICES, CORRIDORS AND WASHROOMS).
3. MOTION SENSOR SWITCH TO BE EQUAL TO WATTSTOPPER DUAL TECHNOLOGY DQ-100-24 AN ISOLATED RELAY FOR MECHANICAL CONTROLS AND ALL NECESSARY POWER PACKS.
4. ALL DIMMERS ARE TO CONTROL AND DIM THE LUMINAIRES IN THE ENCLOSED ROOM. DIMMERS ARE TO BE MASTER TO THE VACANCY/OCCUPANCY SENSOR.
5. LIGHTING TO BE UNSWITCHED AND ON ALL THE TIME.
6. SUPPLY AND INSTALL PHOTOCCELL FOR CONTROL OF EXTERIOR LIGHTING FIXTURE. SHIELD PHOTOTCELL FROM ARTIFICIAL LIGHT SOURCES.

1 ELECTRICAL LIGHTING PLAN
1/8" = 1'-0"

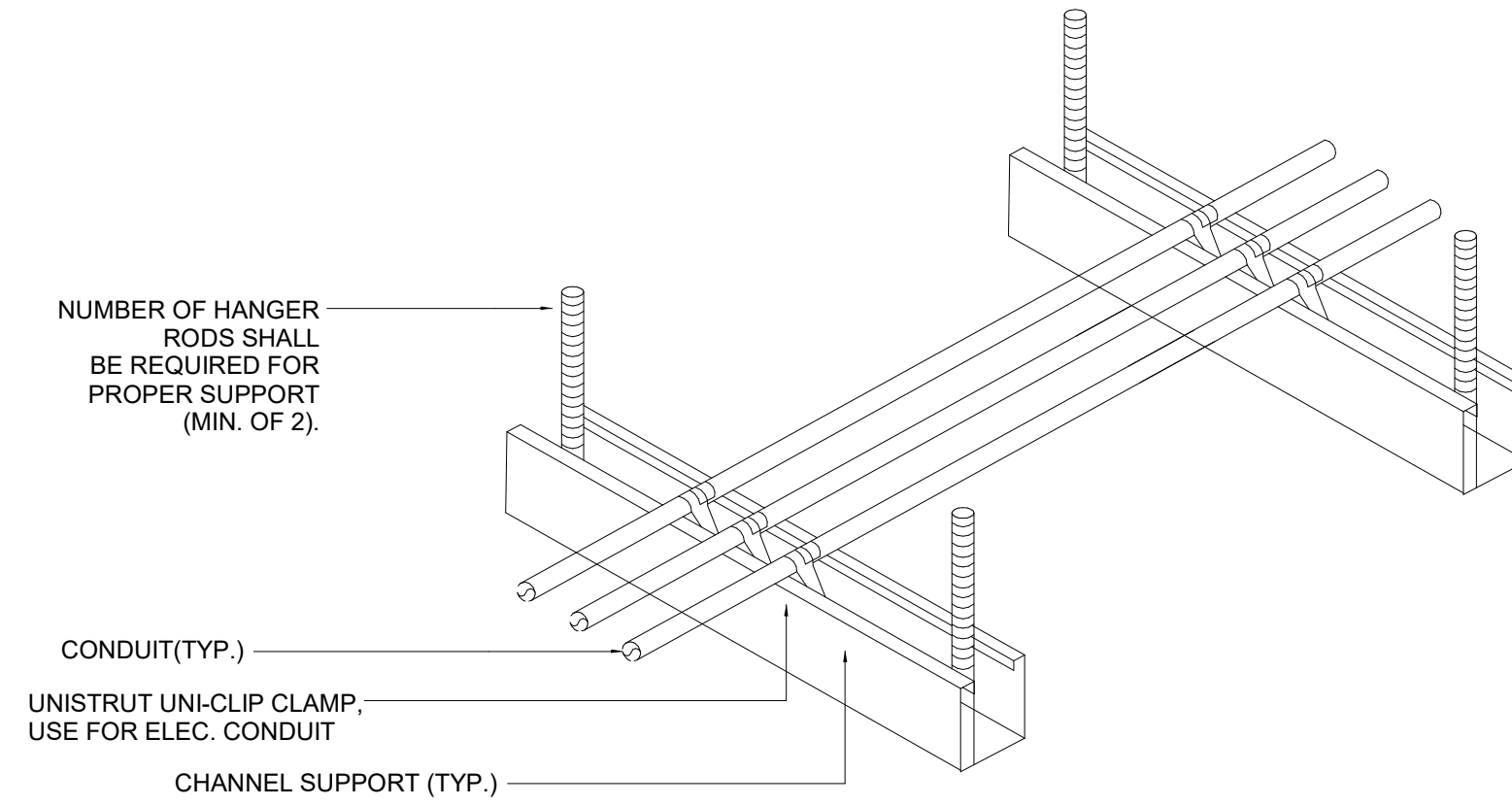
LIGHTING FIXTURE SCHEDULE								
TYPE	LAMP	WATTAGE	DESCRIPTION	MANUFACTURER	MODEL	VOLTAGE	QUANTITY	NOTES
A	LED	38W	2X4 RECESSED TROFFER, 0-10V DIMMING, 5040 LUMENS, 80 CRI, 4000K, PROVIDE EMERGENCY WITH 90-MINUTES BATTERY BACK-UP.	LITHONIA LIGHTING	2BLT4	120 V	145	E.C. TO PROVIDE BATTERY BACK-UP LIGHT FIXTURE WHEREVER MENTION AS "EM"
B	LED	27W	2X2 RECESSED TROFFER, 0-10V DIMMING, 3385 LUMENS, 80 CRI, 4000K, PROVIDE EMERGENCY WITH 90-MINUTES BATTERY BACK-UP.	LITHONIA LIGHTING	2BLT2	120 V	21	E.C. TO PROVIDE BATTERY BACK-UP LIGHT FIXTURE WHEREVER MENTION AS "EM"
D	LED	13.8W	6" LED DOWNLIGHT, 0-1V DIMMING, 900 LUMENS, 90 CRI, 4000K	HALO	HLB6-09-9FS-1E-MW-R	120 V	19	-
E	LED	24W	PENDANT LIGHT FIXTURE, 1875 LUMENS, 80+ CRI, 3000K	FARO BARCELONA	PAM 250, REF. 64162	120 V	3	-
E1	LED	2.4W	INDOOR WALL MOUNTED LIGHT FIXTURE WITH 90-MINUTES OF BATTERY BACK-UP	LITHONIA LIGHTING	ELM2L	120 V	2	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.
F	LED	6W	ROUND SURFACE LIGHT	LUMENWERX	SHELL ROUND	120 V	3	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.
S-EM	LED	15W	EXTERIOR WALL SCONCE	ACUITY BRANDBRANDS LIGHTING	WDGE2	120 V	14	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.
X	LED	5W	EXIT SIGN WITH WITH DIRECTIONAL SIGN	TBD	TBD	120V	1	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.
X1	LED	5W	EXIT SIGN WITH EMERGENCY LIGHTS	TBD	TBD	120V	1	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.
XE	LED	5W	EXIT SIGN	TBD	TBD	120V	33	E.C. TO CCORDINATE WITH ARCHITECT FOR EXACT SELECTION OF LIGHT FIXTURE.

NOTES:
 1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR QUANTITIES, FINISH TYPES, CEILING TYPES AND MOUNTING HEIGHTS.
 2. PROVIDE ALL ACCESSORIES FOR A COMPLETE INSTALLATION.
 3. FIXTURES NOTED WITH "EM" SHALL HAVE 90 MINUTE BATTERY BACK-UP. PROVIDE ALL NECESSARY COMPONENTS FOR COMPLETE SYSTEM AS REQUIRED BY MANUFACTURER.



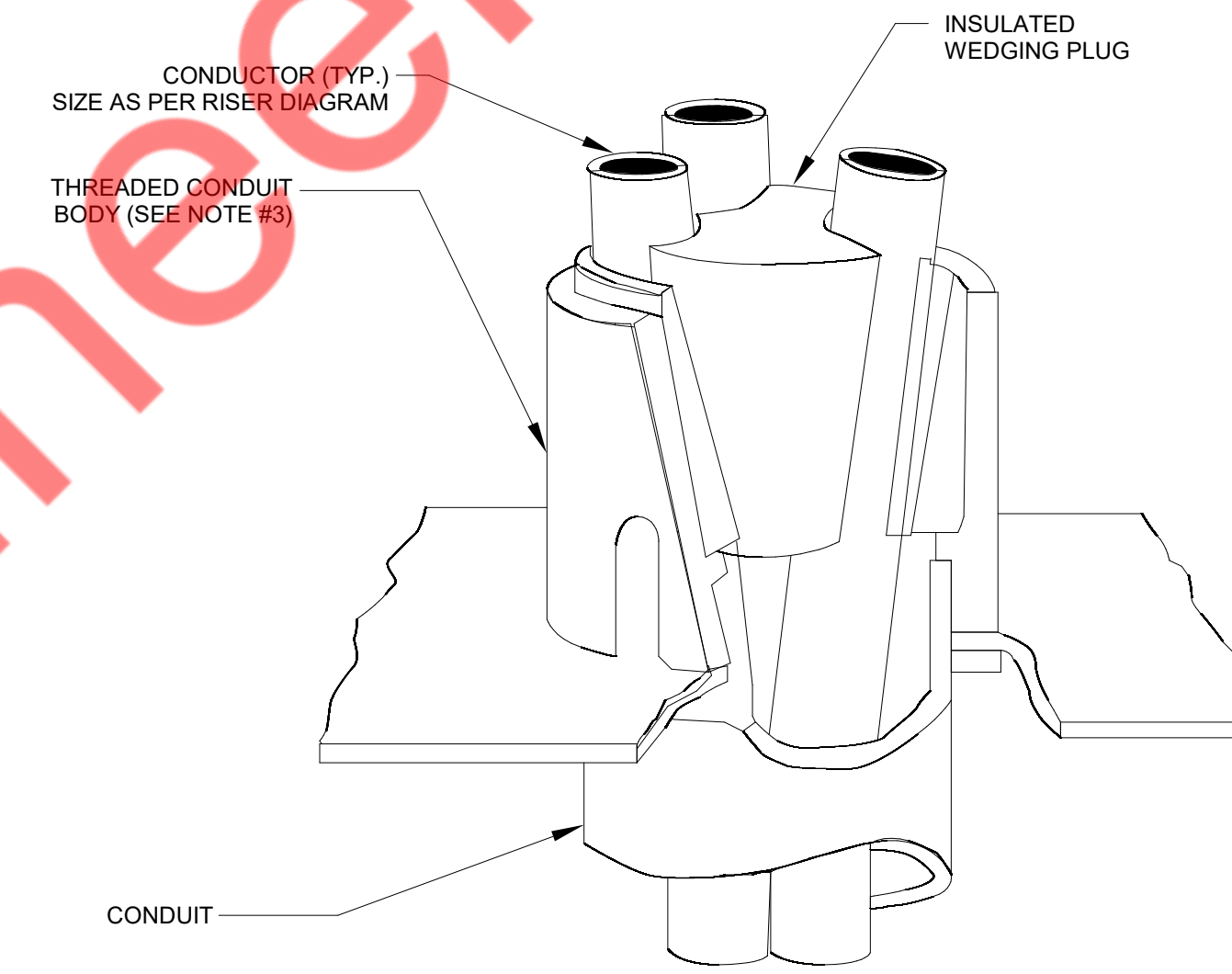
- NOTES:
1. TYPICAL FOR WOOD AND METAL STUD ROUGH-IN
 2. PLASTER RINGS NOT SHOWN
 3. LOCATE ALL OUTLET BOXES IN ACCORDANCE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS, AND WITH ALL APPLICABLE SHOP DRAWINGS.
 4. IN ACCORDANCE WITH UBC 4304 OUTLETS ON OPPOSITE SIDES OF WALLS OR PARTITIONS IN THE SAME STUD SPACE MUST BE SEPARATED BY A MIN. OF 24" HORIZONTAL DISTANCE.

NOTE:
THIS INFORMATION MAY NOT CONTAIN ALL DETAILS REQUIRED FOR CONSTRUCTION. APPROPRIATE MODIFICATION MAY BE REQUIRED TO ENSURE SUITABILITY OF THESE DRAWINGS FOR THE SPECIFIC APPLICATION. IT IS THE USER'S RESPONSIBILITY TO ENSURE INSTALLATION OF THE EQUIPMENT/SYSTEM IS IN ACCORDANCE WITH BUILDING/PROJECT SPECIFICATIONS, APPLICABLE CODES AND STANDARDS.



- NOTES:
1. ALL CONDUIT MAY BE COMBINED ON SAME SUPPORT CHANNEL WHERE PRACTICAL.
 2. SUPPORT CHANNEL LENGTH SHALL NOT BE DETERMINED UNTIL ALL PIPING, CONDUIT, ETC. TO BE SUPPORTED IS COORDINATED.
 3. SUPPORT CHANNEL SPACING SHALL BE NO MORE THAN 10'-0".
 4. UNISTRUT AND CONDUIT INSTALLATION MAY BE REVERSED.

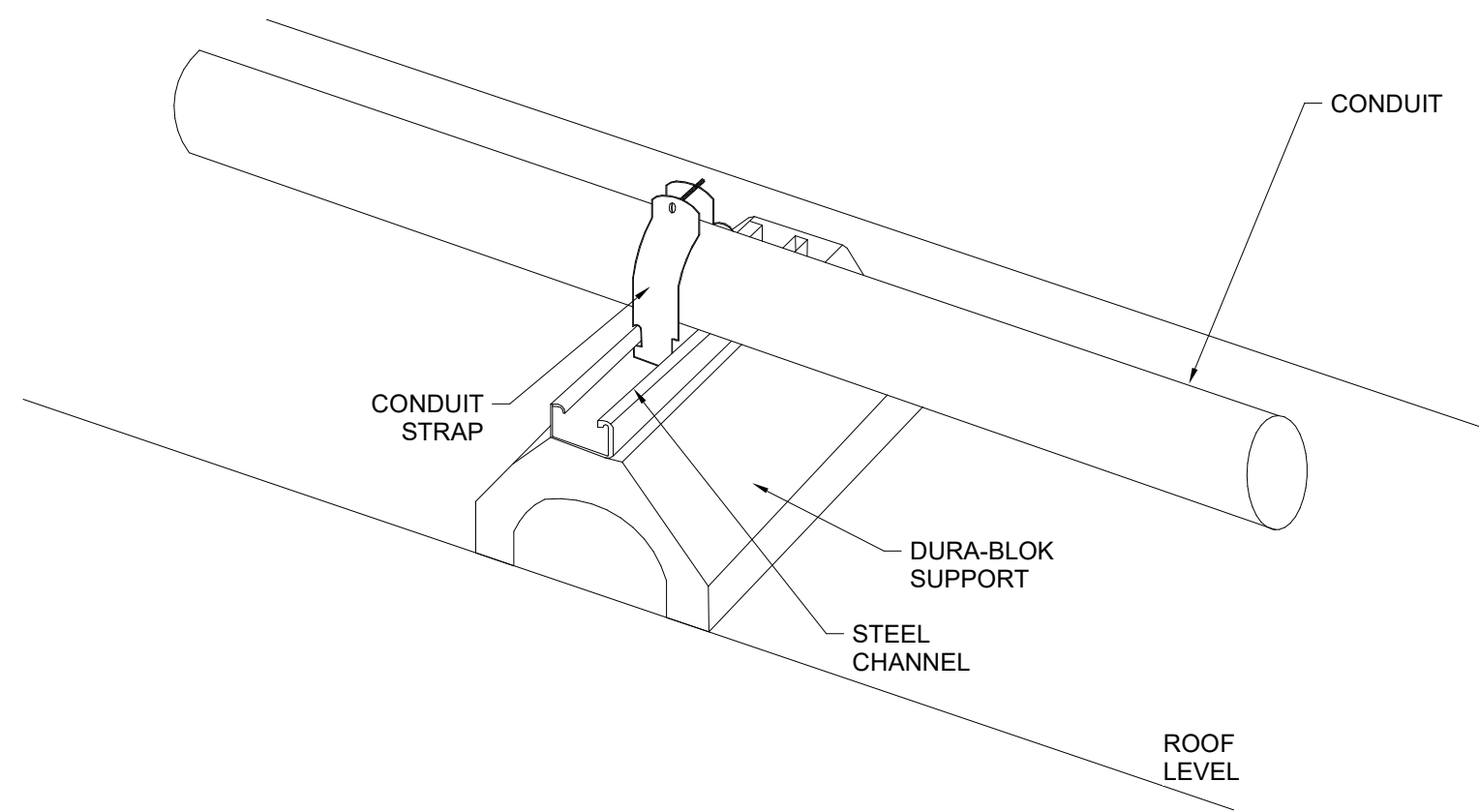
- NOTES:
1. ALL CONDUCTORS IN VERTICAL RACEWAYS SHALL BE SUPPORTED IN ACCORDANCE WITH ARTICLE 300.19 OF NEC. CABLE SUPPORTS SHALL BE LOCATED AT THE INTERVALS REQUIRED BY THE NEC.
 2. CABLE SUPPORT SYSTEM SHALL BE AS MANUFACTURED BY O-Z GEDNEY WITH POZI-GRIP "S-STYLE" WEDGING PLUG OR APPROVED EQUAL.
 3. FOR THREADLESS CONDUIT (RIGID, IMC OR EMT), ATTACH CONDUIT BODY TO MALE THREADS OF A SET SCREW OR COMPRESSION CONNECT, AS PERMITTED BY SPECIFICATIONS.
 4. PROVIDE PULL BOX AT EACH LOCATION OF CABLE SUPPORTS. PULL BOX SHALL BE SIZED AS PER CODE TO ACCOMMODATE ALL CONDUITS.



1
E501 N.T.S. DETAIL TYPICAL ROUGH-IN REQUIREMENTS

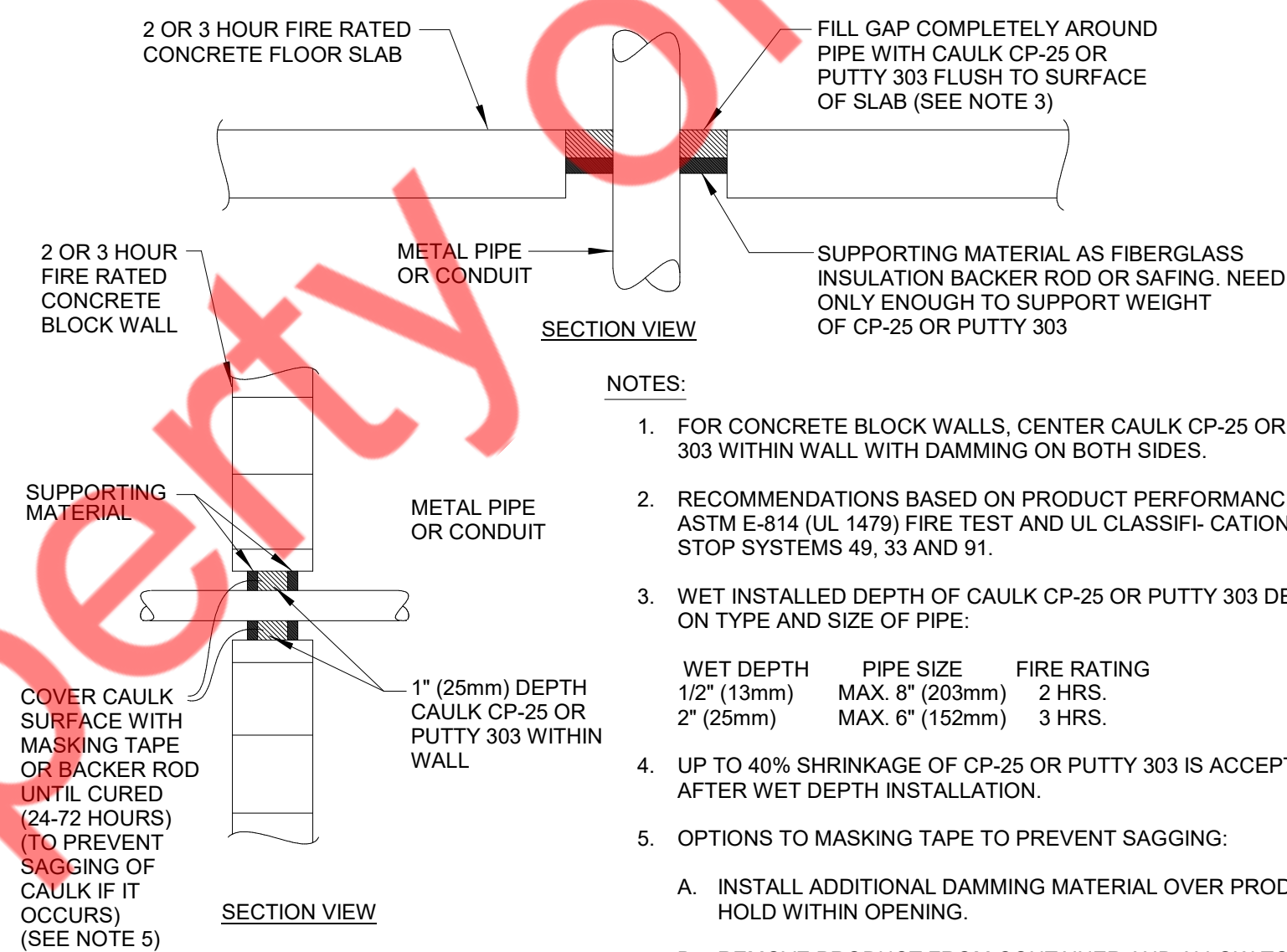
2
E501 N.T.S. CONDUIT SUPPORT DETAIL

3
E501 N.T.S. VERTICAL CABLE SUPPORT DETAIL



- NOTES:
1. ALL CONDUIT MAY BE COMBINED ON SAME SUPPORT CHANNEL WHERE PRACTICAL.
 2. SUPPORT CHANNEL LENGTH SHALL NOT BE DETERMINED UNTIL ALL PIPING, CONDUIT, ETC. TO BE SUPPORTED IS COORDINATED.
 3. SUPPORT CHANNEL SPACING SHALL BE NO MORE THAN 10'-0".

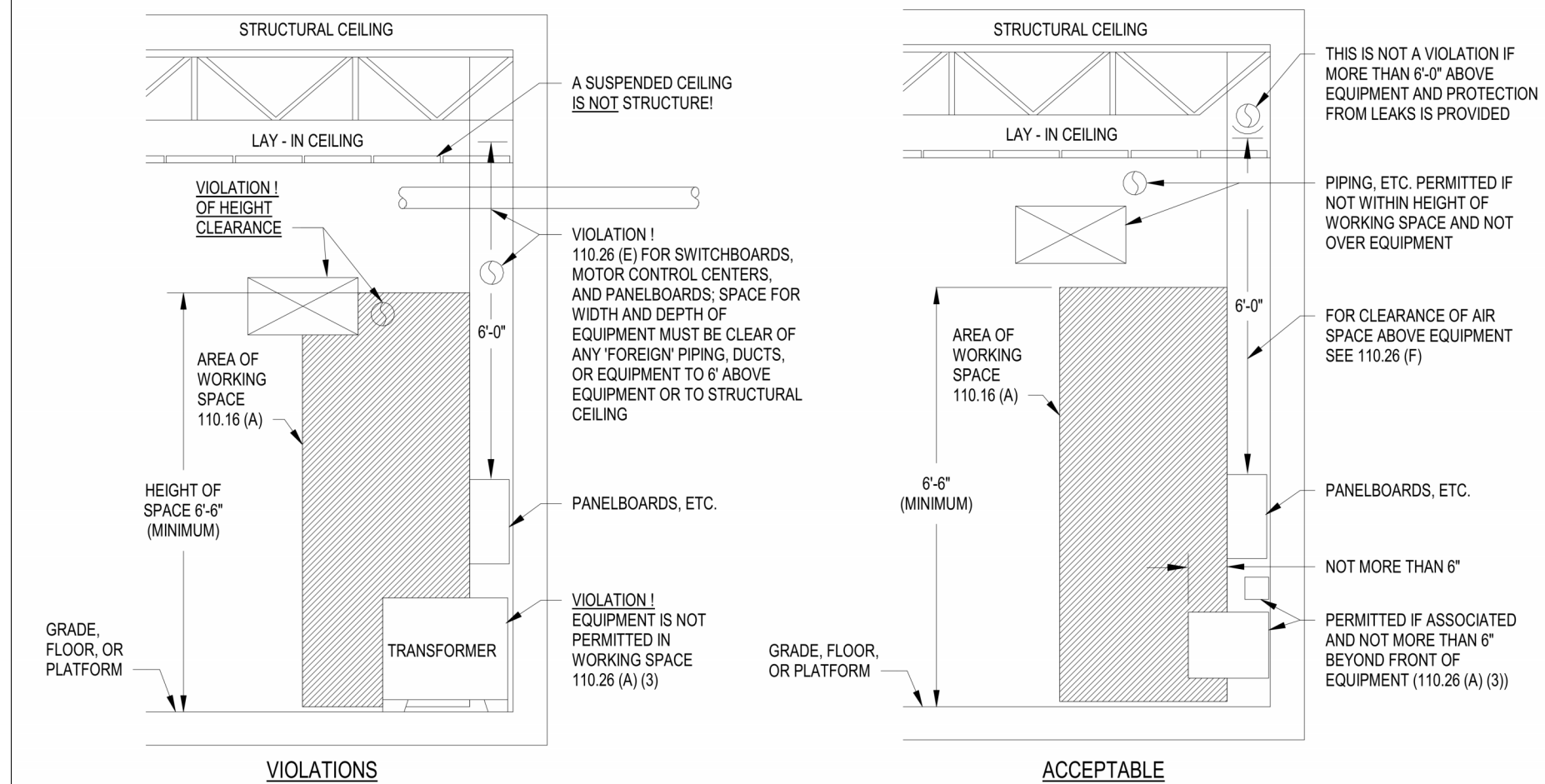
4
E501 N.T.S. CONDUIT SUPPORT DETAIL ON ROOF



- NOTES:
1. FOR CONCRETE BLOCK WALLS, CENTER CAULK CP-25 OR PUTTY 303 WITHIN WALL WITH DAMMING ON BOTH SIDES.
 2. RECOMMENDATIONS BASED ON PRODUCT PERFORMANCE PER ASTM E-814 (UL 1479) FIRE TEST AND UL CLASSIFICATION FIRE STOP SYSTEMS 49, 33 AND 91.
 3. WET INSTALLED DEPTH OF CAULK CP-25 OR PUTTY 303 DEPENDS ON TYPE AND SIZE OF PIPE:

WET DEPTH	PIPE SIZE	FIRE RATING
1/2" (13mm)	MAX. 8" (203mm)	2 HRS.
2" (25mm)	MAX. 6" (152mm)	3 HRS.
 4. UP TO 40% SHRINKAGE OF CP-25 OR PUTTY 303 IS ACCEPTABLE AFTER WET DEPTH INSTALLATION.
 5. OPTIONS TO MASKING TAPE TO PREVENT SAGGING:
 A. INSTALL ADDITIONAL DAMMING MATERIAL OVER PRODUCT TO HOLD WITHIN OPENING.
 B. REMOVE PRODUCT FROM CONTAINER AND ALLOW TO AIR CURE IN SMALL BATCHES FOR 12 HRS. THEN HAND FORM INTO OPENING.
 C. WHEN ANNULAR SPACE EXCEEDS 3/4" (19mm), A 28 AWG METAL COVER PLATE MUST BE MECHANICALLY SECURED ATOP THE 3M FIRE BARRIER APPLICATION, OR TIGHTLY PACK A NON COMBUSTIBLE DAMMING MATERIAL ATOP INSTALLED CAULK OR PUTTY.

5
E501 N.T.S. FIRE STOP DETAIL



6
E501 N.T.S. NEC 110.26 CLEARANCE REQUIREMENT DETAIL

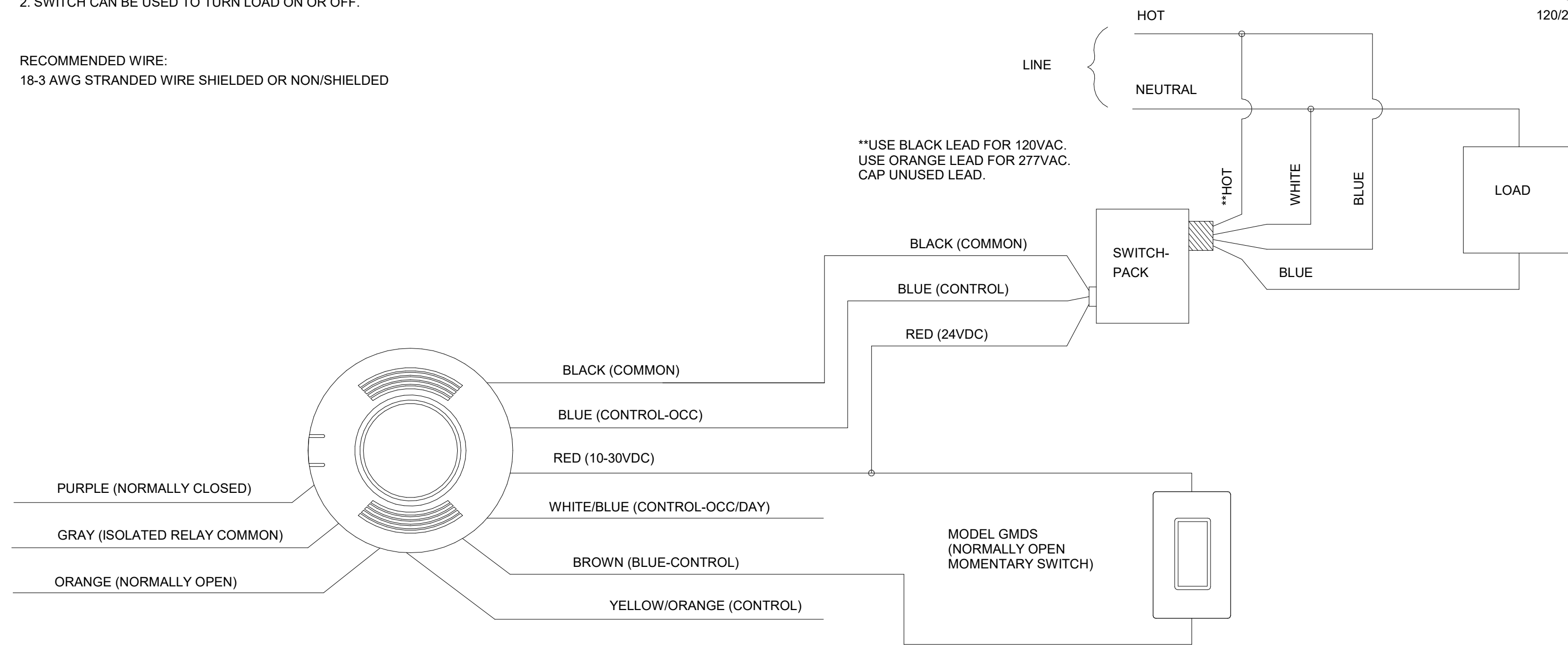
OAC AND VAC MANUAL MODE OPERATION:

1. SWITCHES ARE REQUIRED TO TURN LOAD ON.
2. LOAD TURNS OFF WHEN SENSOR TIMES OUT OR WITH SWITCH.

OAC AUTOMATIC MODE OPERATION:

1. WHEN SENSOR ACTIVATES LOAD TURNS ON.
2. SWITCH CAN BE USED TO TURN LOAD ON OR OFF.

RECOMMENDED WIRE:
18-3 AWG STRANDED WIRE SHIELDED OR NON-SHIELDED



NOTES

1. SP20-RD4 SWITCHPACK SHOWN. 120/277VAC 20AMP RATING.

MANUAL MODE OPERATION:

1. PUSHBUTTON PRESS IS REQUIRED TO TURN LOAD ON.
2. LOAD TURNS OFF WHEN SENSOR TIMES OUT OR BY PRESSING PUSH BUTTON.
3. IF DAYLIGHT SENSOR IS ENABLED AND LIGHT LEVEL IS ABOVE SETPOINT, LOAD WILL NOT TURN ON.

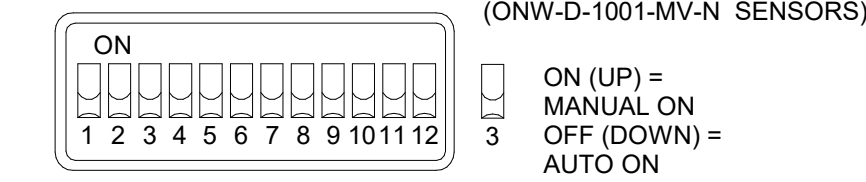
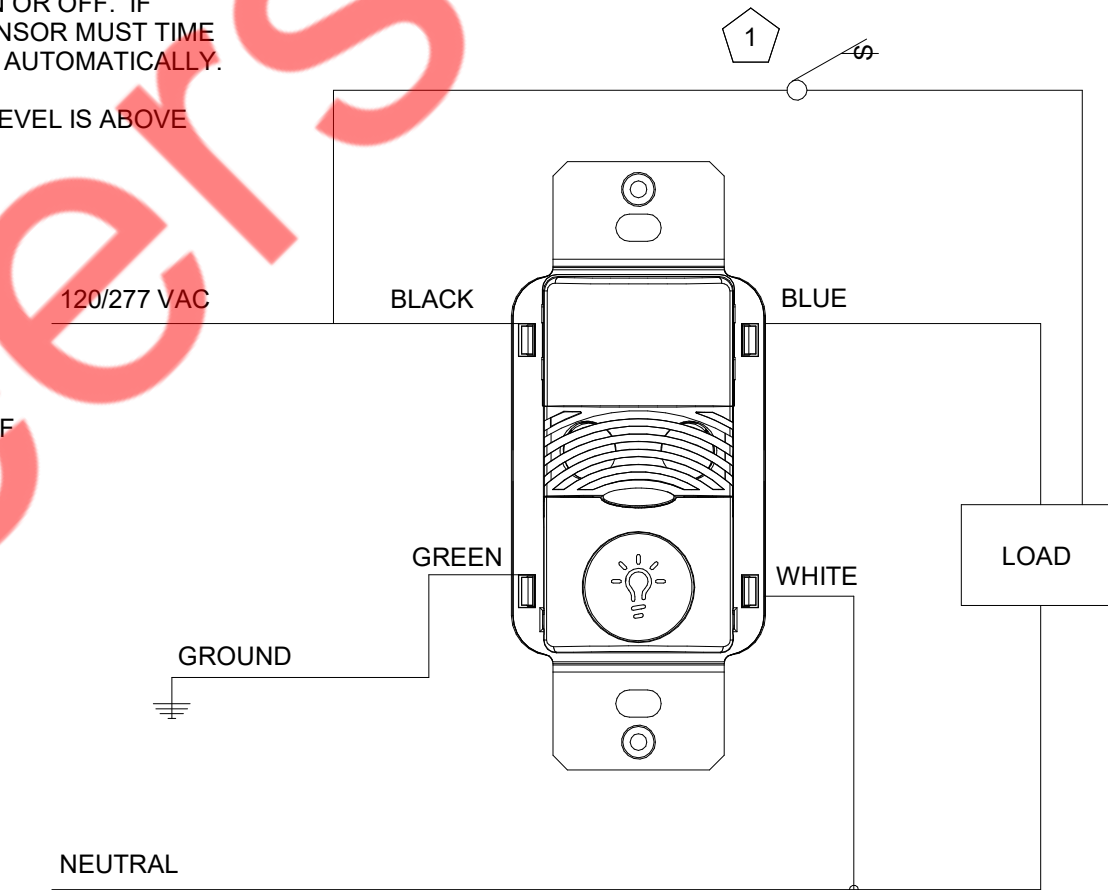
AUTOMATIC MODE OPERATION:

1. WHEN SENSOR ACTIVATES LOAD TURNS ON.
2. PUSHBUTTON CAN BE USED TO TURN LOAD ON OR OFF. IF PUSHBUTTON IS USED TO TURN LOAD OFF, SENSOR MUST TIME OUT FIRST, BEFORE LOAD CAN TURN BACK ON AUTOMATICALLY.
3. IF DAYLIGHT SENSOR IS ENABLED AND LIGHT LEVEL IS ABOVE SETPOINT, LOAD WILL NOT TURN ON.

SENSOR TYPES INCLUDE:

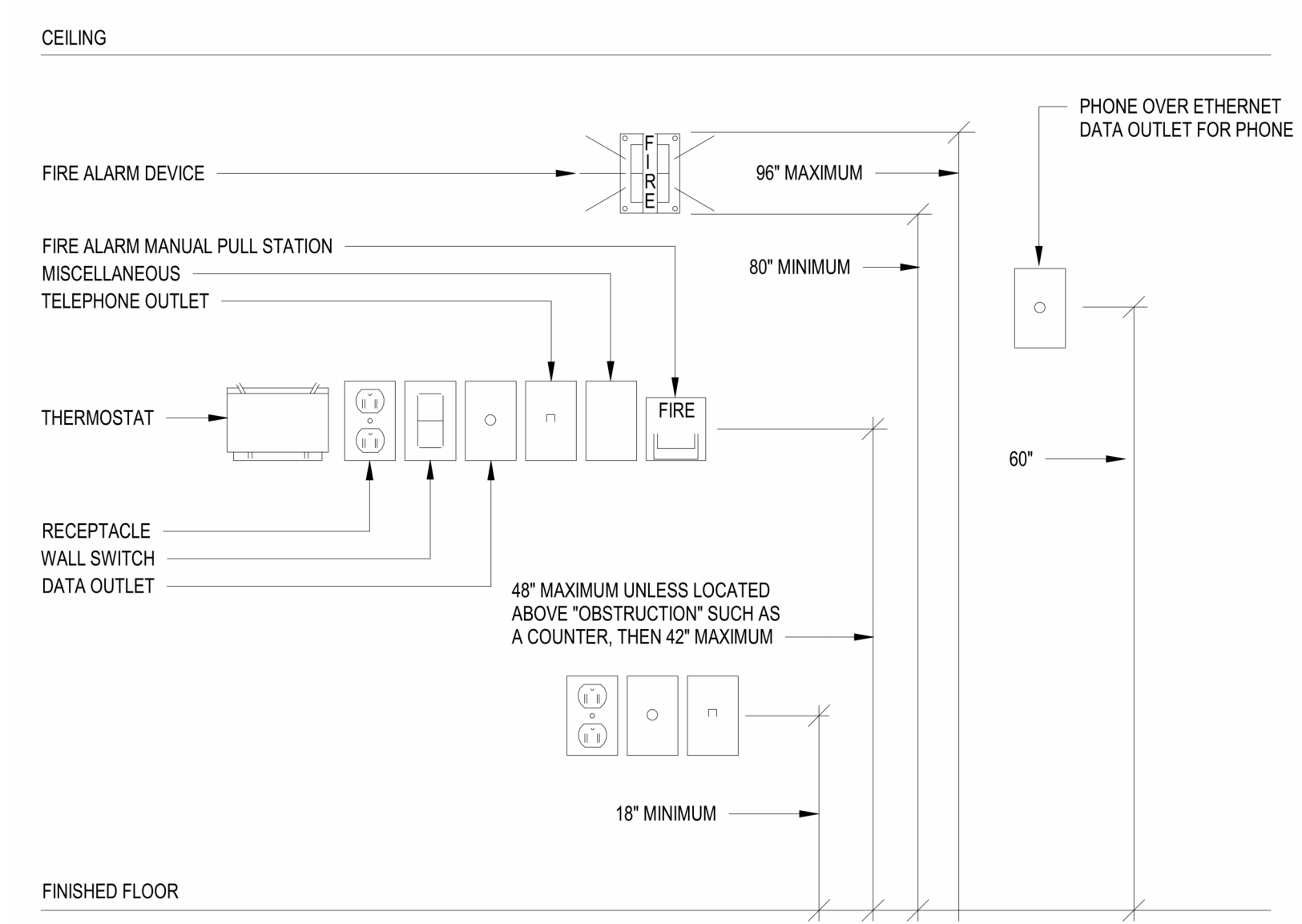
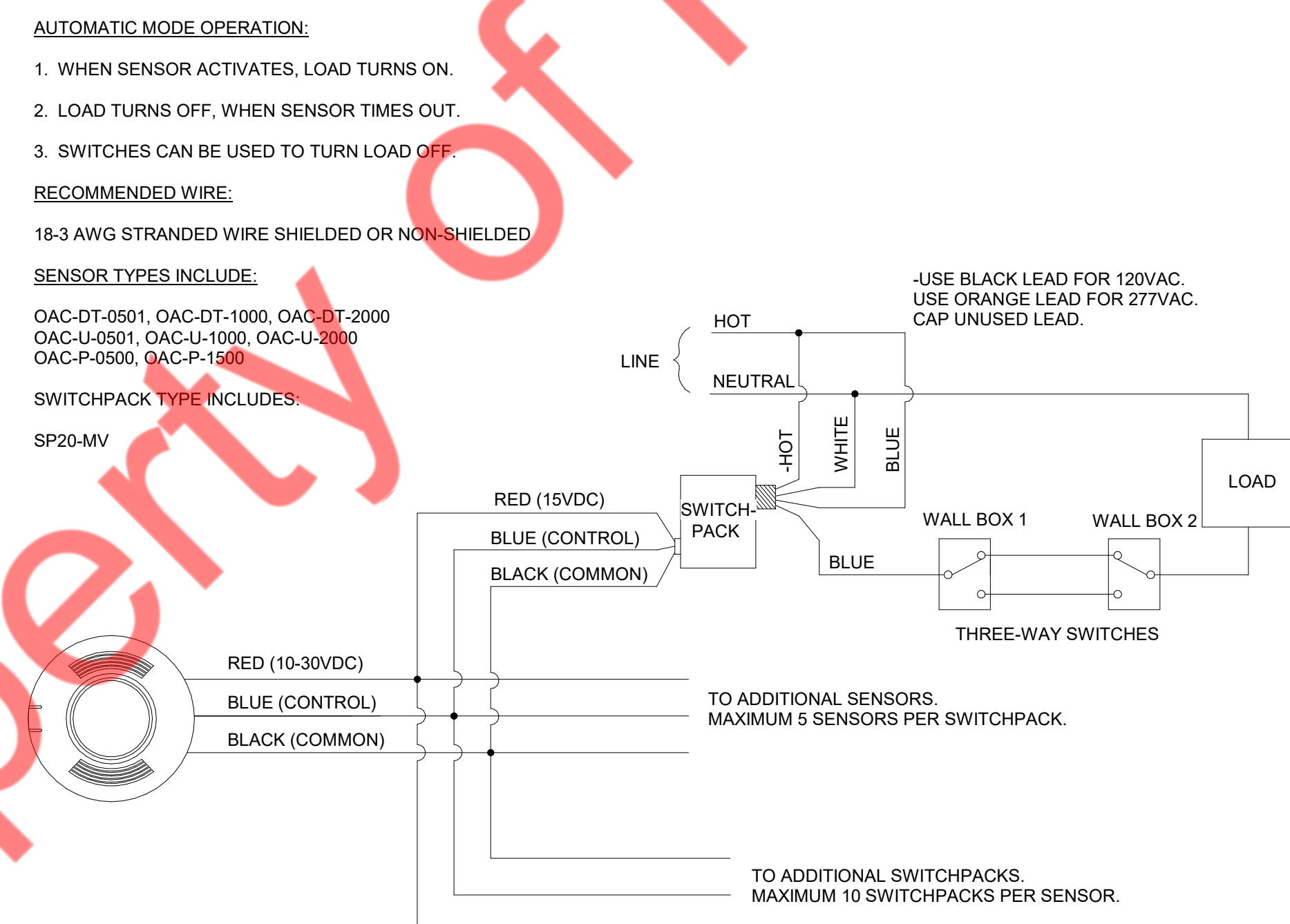
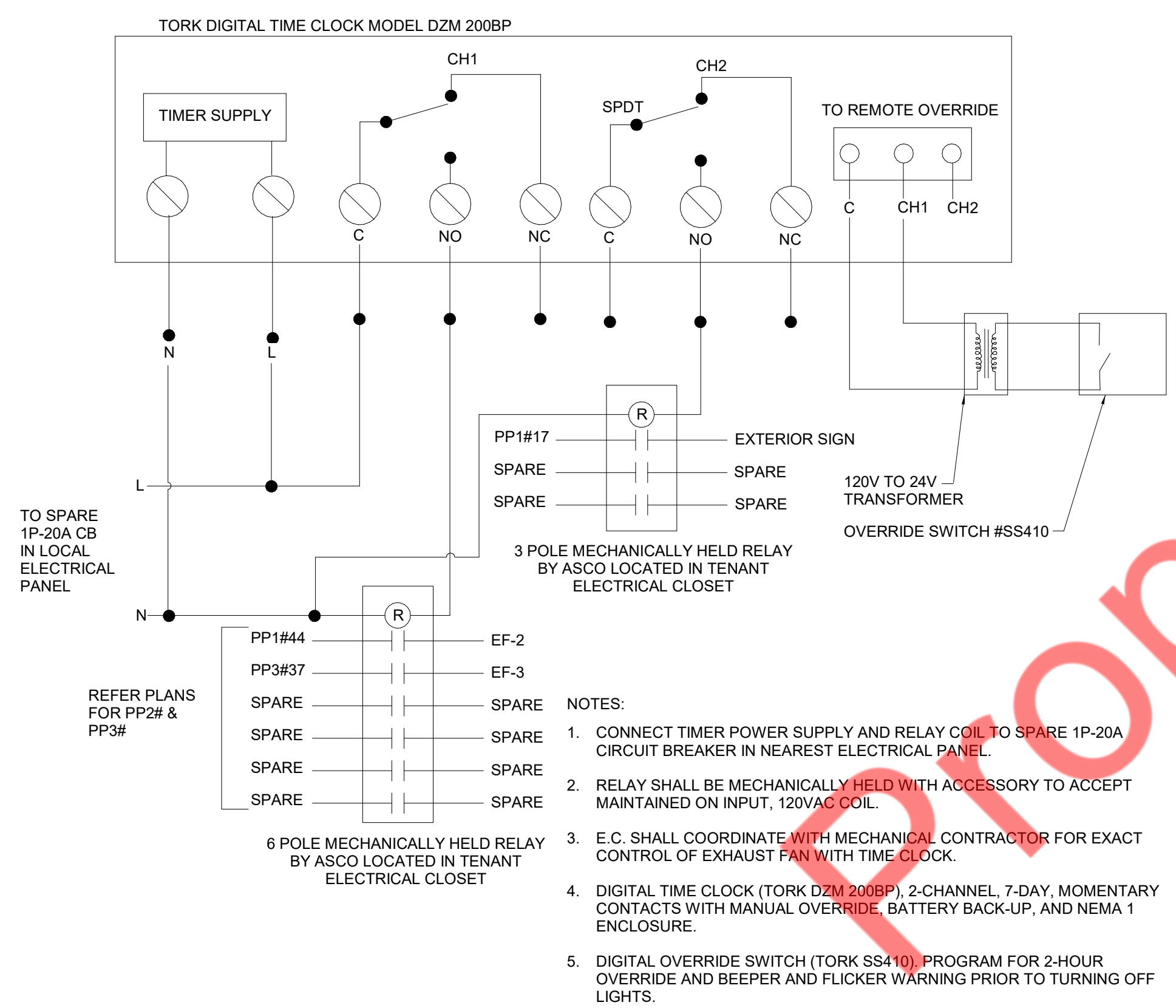
ONW-D-1001-MV-N

1. PROVIDE SENSING CONDUCTOR TAPPED AHEAD OF ANY SWITCHES WHERE SWITCH SERVES EMERGENCY FIXTURES.



1
E502 N.T.S
OCCUPANCY - AUTO ON/OFF. WIRING DIAGRAM - LOW VOLTAGE CEILING SENSOR

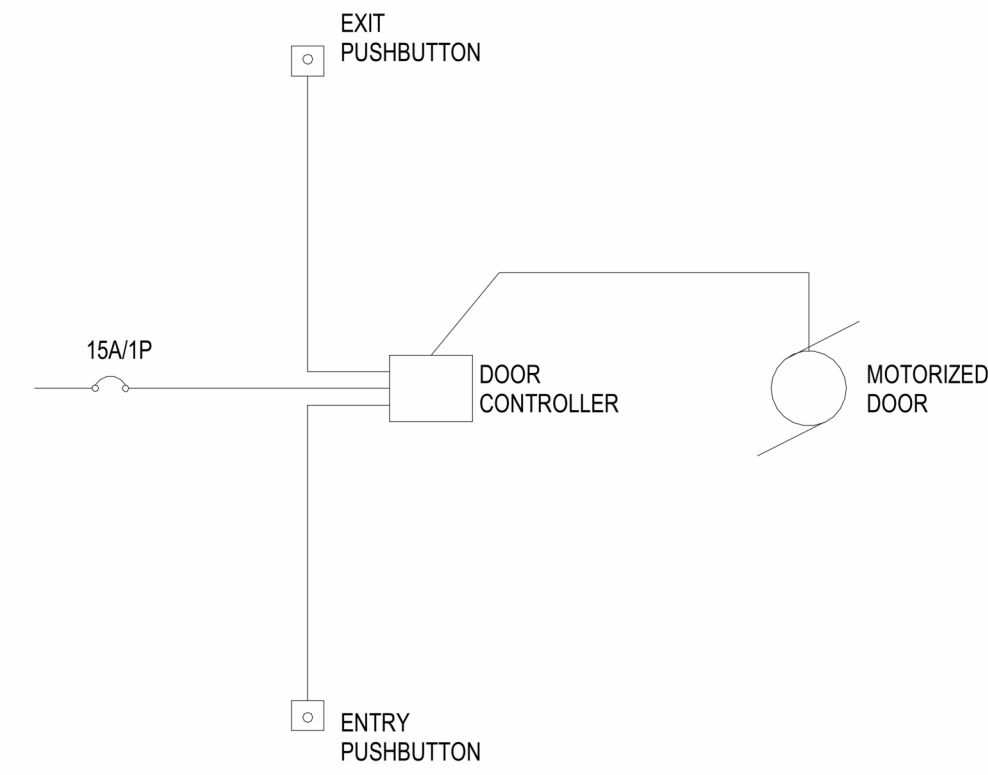
2
E502 N.T.S
OCCUPANCY/VACANCY-SINGLE LEVEL WIRING DIAGRAM-LOW VOLTAGE WALL SWITCH SENSOR (NEUTRAL CONNECTION)



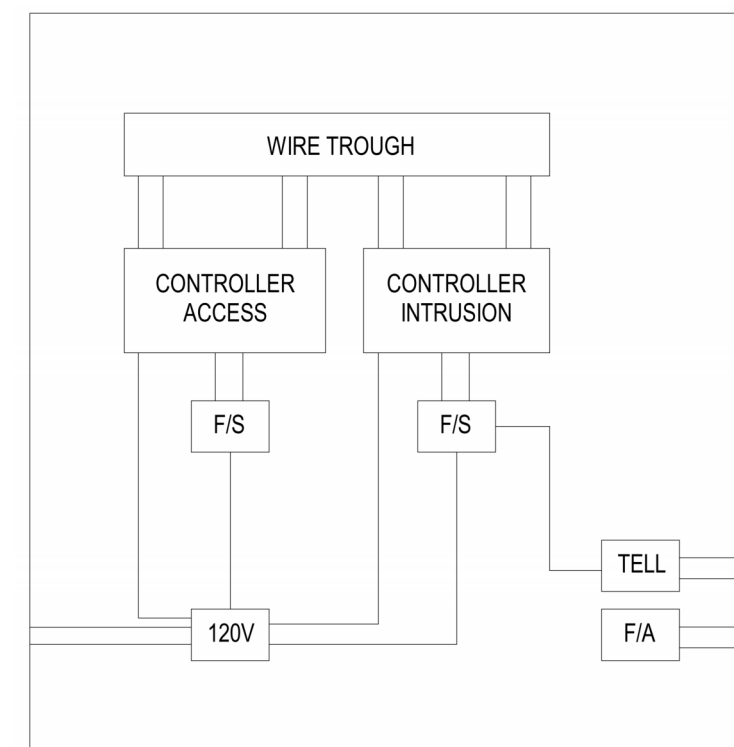
3
E502 N.T.S
AUTOMATIC LIGHTING CONTROL DETAIL (TIME CLOCK)

4
E502 N.T.S
WIRING DIAGRAM-LOW VOLTAGE CEILING SENSOR OCCUPANCY AUTO ON/OFF WITH LINE VOLTAGE OVERRIDE TO OFF THREE-WAY SWITCHING.

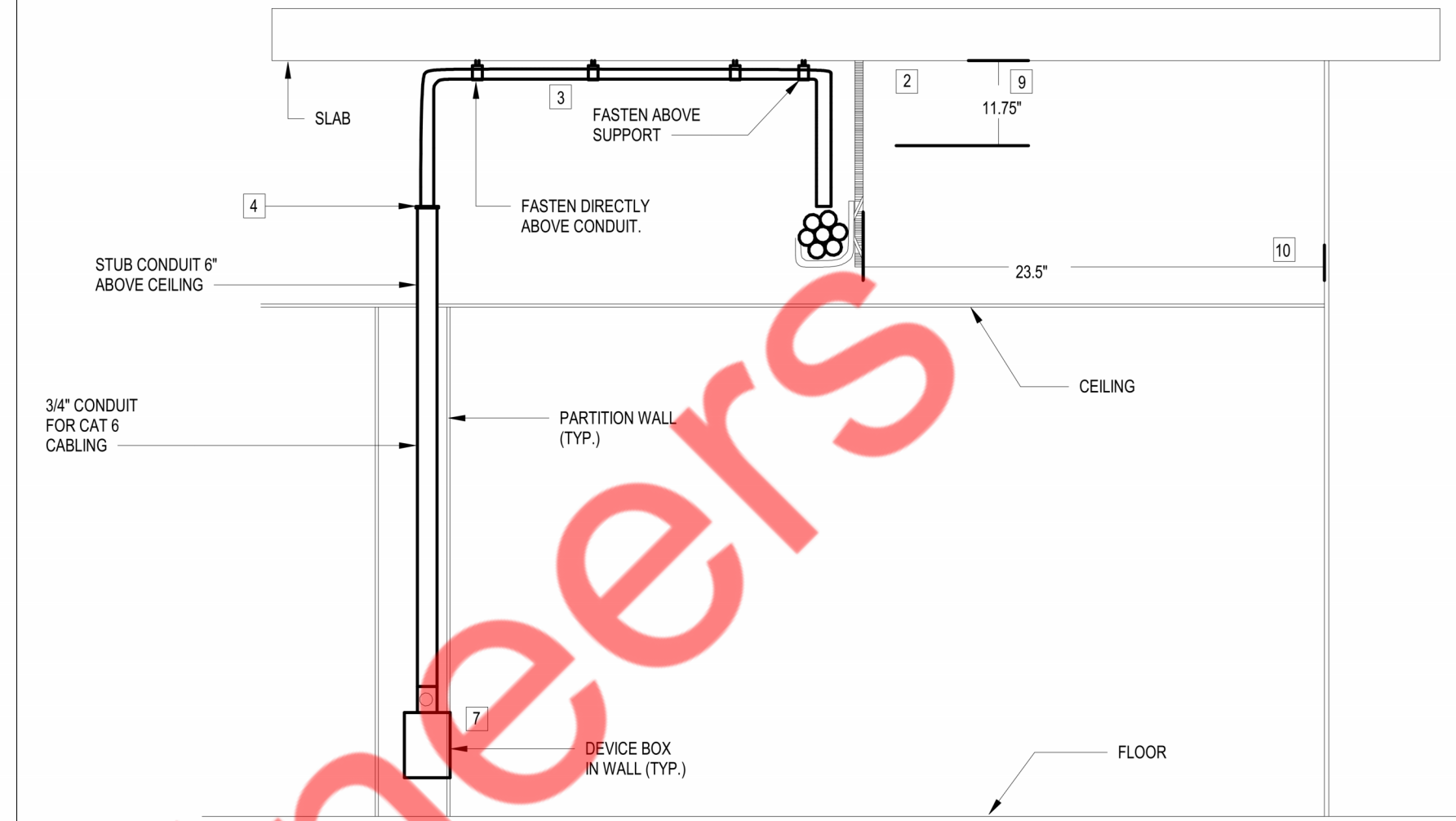
5
E502 N.T.S
TYPICAL MOUNTING HEIGHTS



NOTE:
 1) TYPICAL FOR TWO MAIN ENTRY INTERIOR DOORS (100 & 101).
 2) FOR INSIDE DOOR PROVIDE INTERLOCKING WITH MAGNET LOCKS.



REFERRAL NOTES:
 1. FIA = FIRE ALARM RELEASE RELAY ONLY REQUIRED IF ELECTRIC MAGNET HOLD OPENS ARE INCORPORATED INTO PROJECT.

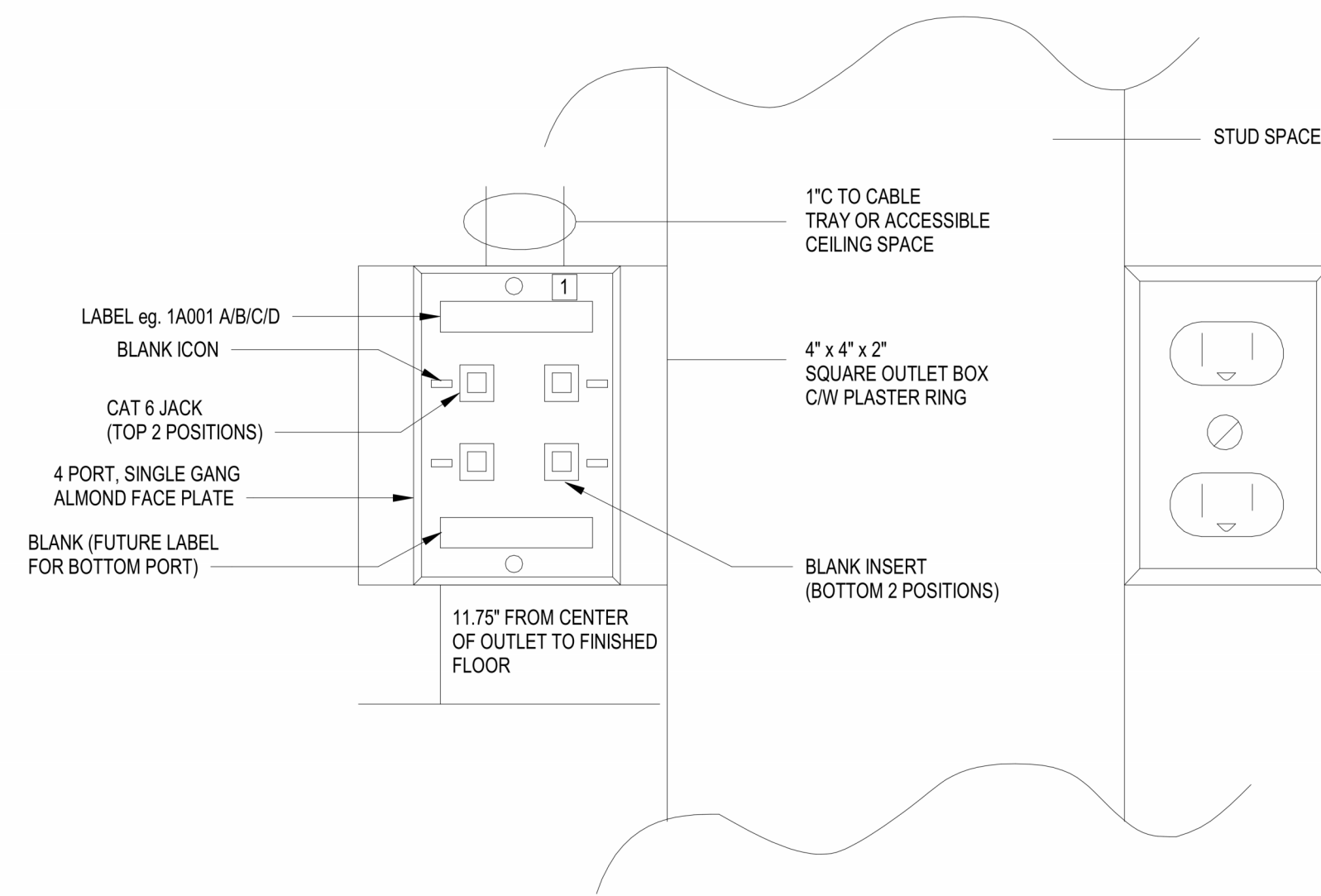


NOTES:
 1. MAINTAIN ADEQUATE CLEARANCES FROM EMI SOURCES. MINIMUM OF 12" FROM BALLASTS AND 24" FROM MOTORS. COMPLY WITH TIA/EIA 569 REQUIREMENTS.
 2. SUPPORT CABLING AT EVERY 5'.
 3. CABLE TO BE DIRECTLY SUPPORTED FROM SLAB USING J-HOOKS (MAXIMUM SPACING 40").
 4. PROVIDE PLASTIC BUSHINGS AT ENDS OF CONDUIT TO PROTECT AGAINST CABLE ABRASIONS.
 5. ALL CABLE NOT INSTALLED COMPLETELY IN CONDUIT AND LOCATED IN EXCHANGE PLENUMS SHALL BE FT6 RATED IN ACCORDANCE WITH ABC.
 6. WHEN INSTALLING CABLE SUPPORTS, MAINTAIN ADEQUATE CLEARANCES (MINIMUM 11.75") FROM HEAT SOURCES SUCH AS MECHANICAL HOT AIR DUCTS.
 7. IF COMMUNICATION OUTLET IS WITHIN 6" OF A POWER OUTLET, THEN BOND THE TWO OUTLETS.
 8. CABLE SUPPORT SHALL BE INSTALLED USING MANUFACTURER APPROVED SPLICING METHODS.
 9. MAINTAIN 11.75" CLEARANCE FROM THE TOP OF THE CABLE SUPPORT TO ALL CEILINGS, HEATING DUCTS, AND HEATING EQUIPMENT AND 6" FOR SHORT LENGTH OBSTRUCTIONS.
 10. MAINTAIN 23.5" CLEARANCE ON THE SIDE OF CABLE SUPPORTS MOUNTED ADJACENT TO ONE ANOTHER OR TO WALLS OR OTHER OBSTRUCTIONS.

1 HANDICAPPED DOOR CONTROL SCHEMATIC
 E503 N.T.S

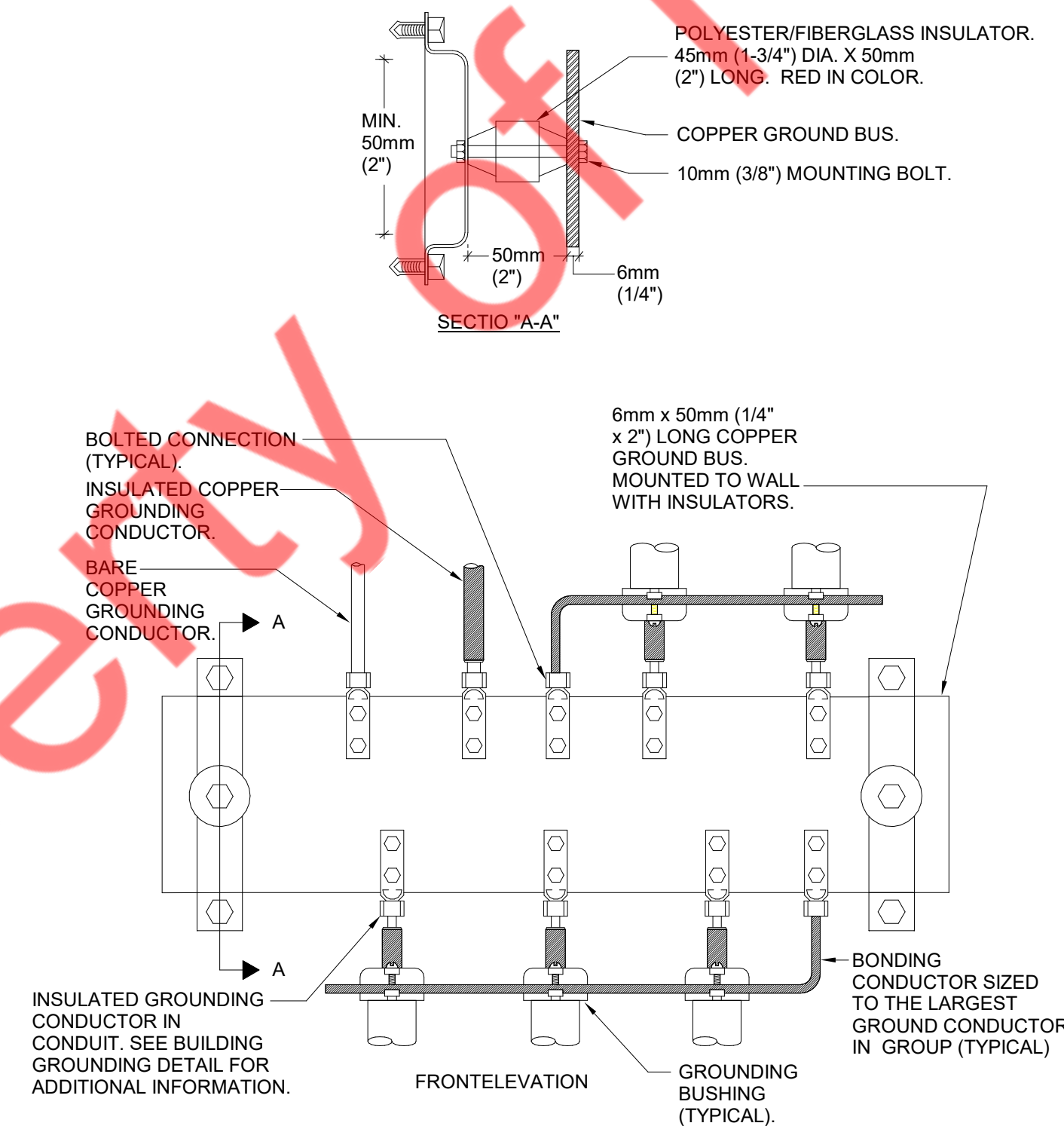
2 SECURITY BACKBOARD
 E503 N.T.S

3 COMMUNICATIONS CABLING AND CONDUIT
 E503 N.T.S



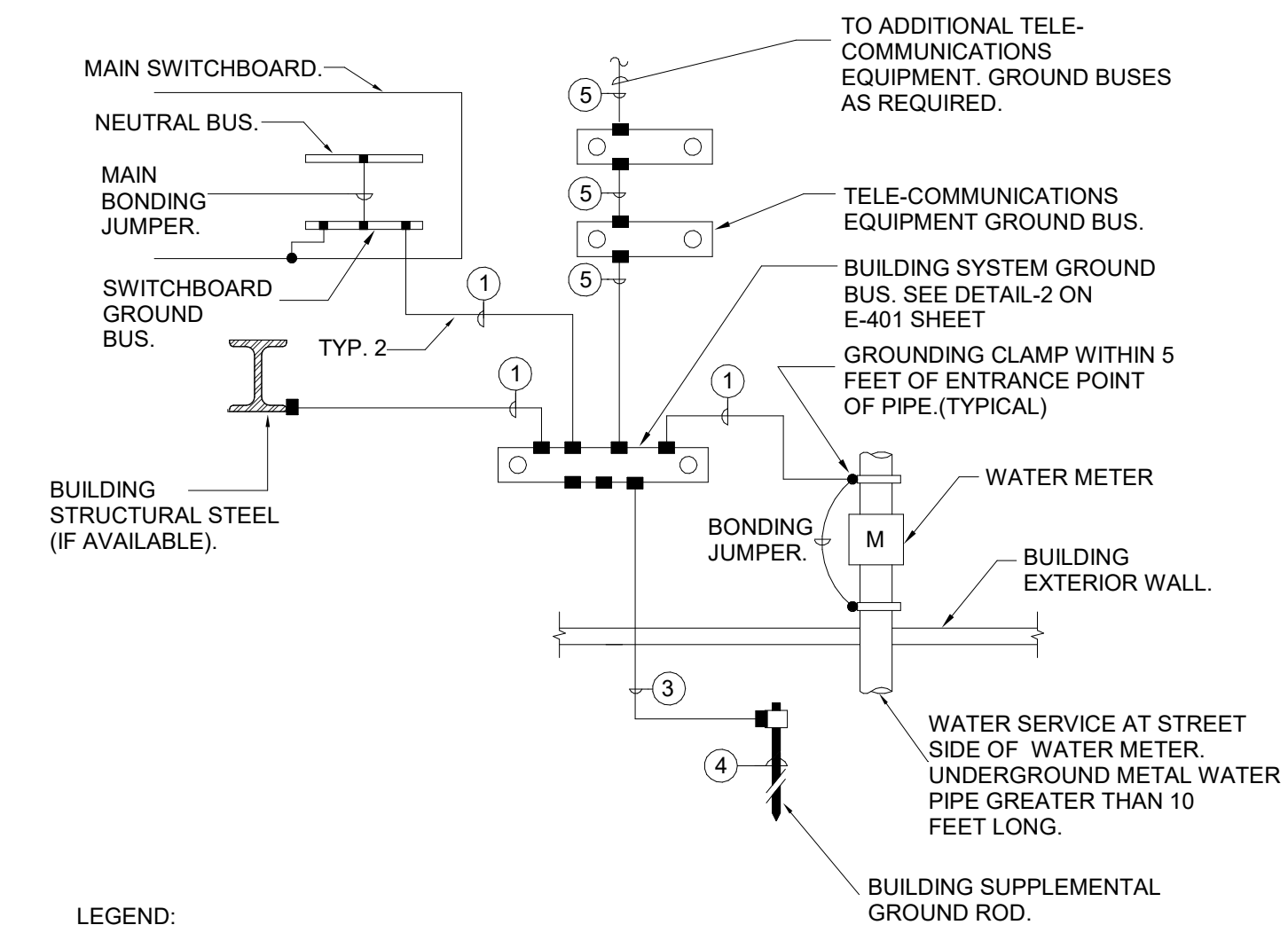
NOTES:
 1. LABEL AS FOLLOWS:
 FIRST TWO POSITIONS: COMMUNICATIONS ROOM - 1A
 NEXT TWO POSITIONS: OUTLET NUMBER AS 1A001 C/D
 REMAINING POSITION: PORT DESIGNATION - AB/C/D (TOP FLOOR)
 2. CORRESPONDING PORTS OF PATCH PANEL IN COMMUNICATIONS ROOM "1A" WILL BE LABELED 1A001A, 1A001B, 1A001C, 1A001D.
 3. CABLE ENDS ARE TO BE LABELED AS FOLLOWS:
 OUTLET: 1A001A, 1A001B, 1A001C, 1A001D.
 PATCH PANEL: 001A, 001B, 001C, 001D

4 TYPICAL DATA & ASSOCIATED OUTLET
 E503 N.T.S



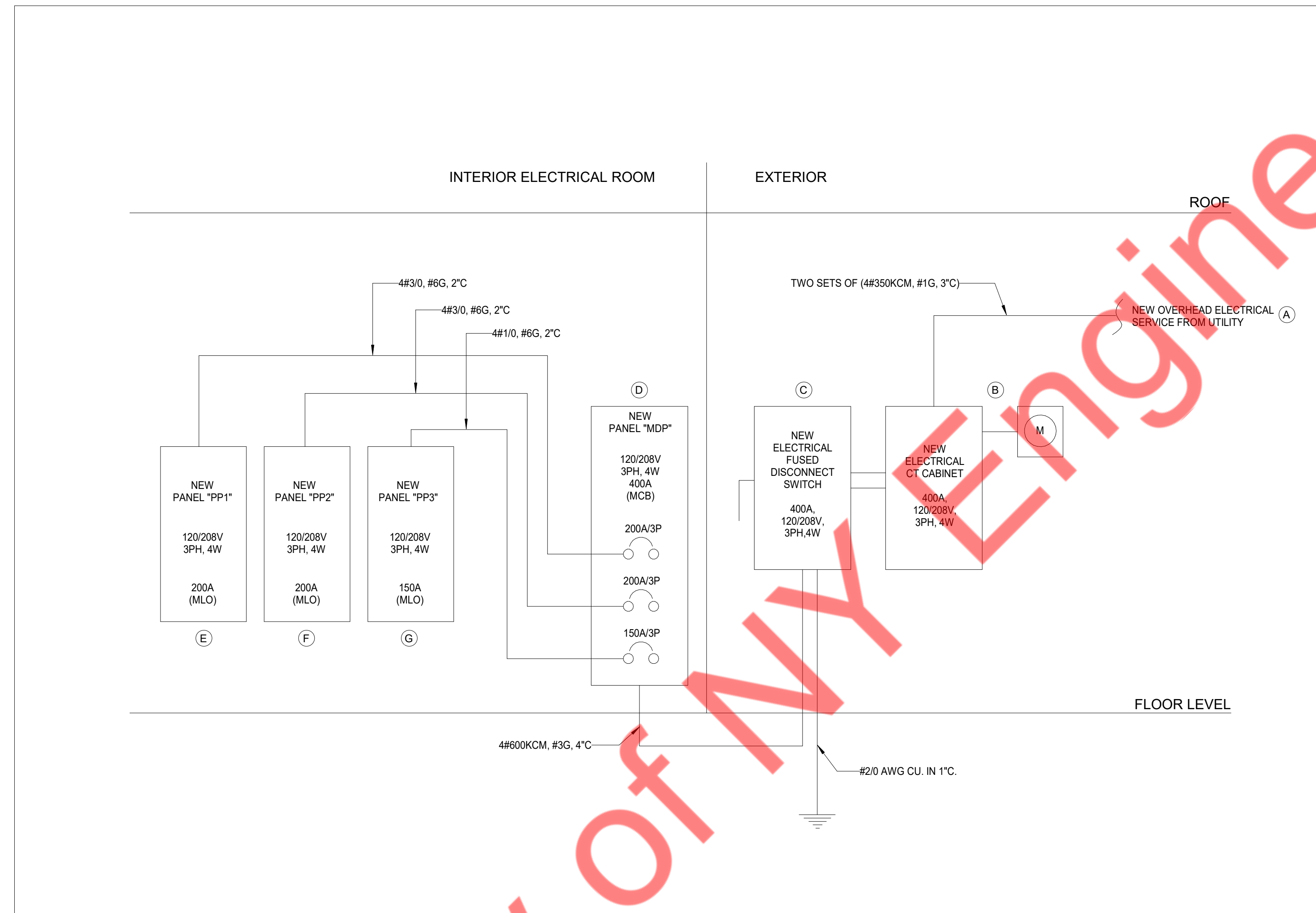
NOTES:
 1. REFER TO BUILDING GROUNDING ELECTRODE SYSTEM DETAIL FOR EXACT CONFIGURATION.

5 BUILDING ELECTRICAL SYSTEMS GROUND BUS
 E503 N.T.S



LEGEND:
 ● INDICATES BOLTED CONNECTION.
 ■ INDICATES EXOTHERMIC WELD CONNECTION, COMPATIBLE WITH MATERIALS BEING JOINED.
 ① INSULATED COPPER GROUNDING ELECTRODE CONDUCTOR IN CONDUIT SIZED AS PER NEC ARTICLE 250.66.
 ② INSULATED COPPER GROUNDING ELECTRODE CONDUCTOR ENCASED IN CONCRETE SIZED AS PER NEC ARTICLE 250.66.
 ③ 2/0 AWG BARE COPPER GROUND CONDUCTOR.
 ④ 3/4" x 10'-0" LONG COPPER-CLAD GROUND ROD DRIVEN WITH TOP 12" BELOW GRADE.
 ⑤ 2/0 AWG INSULATED COPPER GROUND CONDUCTOR IN 30mm CONDUIT.

6 BUILDING GROUNDING ELECTRODE SYSTEM
 E503 N.T.S



ELECTRICAL RISER DIAGRAM- KEY WORK NOTES:

- (A) NEW 400A, 120V, 3PH, 4-WIRE INCOMING ELECTRICAL SERVICE. E.C. SHALL FIELD VERIFY THE EXACT LOCATION OF INCOMING SERVICE WITH UTILITY ON FIELD.
- (B) NEW 400A, 120/208V, 3PH, 4-WIRE ELECTRICAL METER & CT CABINET FOR THE PROJECT SPACE. E.C. SHALL VERIFY THE EXACT LOCATION IN FIELD.
- (C) NEW 400A, 120/208V, 3PH, 4-WIRE ELECTRICAL FUSED DISCONNECT SWITCH FOR THE PROJECT SPACE. E.C. SHALL VERIFY THE EXACT LOCATION IN FIELD.
- (D) NEW 400A (MCB), 120/208V, 3PH, 4-WIRE MAIN DISTRIBUTION ELECTRICAL PANEL "MDP" FOR THE PROJECT SPACE LOCATED AT ELECTRICAL ROOM. E.C. SHALL VERIFY EXACT LOCATION IN FIELD.
- (E) NEW 200A(MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PP1". E.C. SHALL VERIFY THE EXACT LOCATION FOR NEW PANEL "PP1" ON FIELD. BASE BID ACCORDINGLY.
- (F) NEW 200A(MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PP2". E.C. SHALL VERIFY THE EXACT LOCATION FOR NEW PANEL "PP2" ON FIELD. BASE BID ACCORDINGLY.
- (G) NEW 150A(MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PP3". E.C. SHALL VERIFY THE EXACT LOCATION FOR NEW PANEL "PP3" ON FIELD. BASE BID ACCORDINGLY.

ELECTRICAL RISER DIAGRAM- GENERAL NOTES:

1. E.C. SHALL VERIFY INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION WITH UTILITY PRIOR TO COMMENCING ANY ELECTRICAL WORK. INSTALLATION SHALL MEET ALL APPLICABLE LOCAL, STATE AND NATIONAL BUILDING CODES AND NED REQUIREMENTS.
2. ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (ISC) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO COMMENCING ANY WORK.
3. ABOVE RISER DIAGRAM IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY THE EXACT DISTRIBUTION AND RATINGS OF ALL EQUIPMENTS/PANELS IN FIELD.
4. REFER TO SPECIFICATIONS AND NED FOR ELECTRICAL SYSTEM LABELLING REQUIREMENTS.
5. MAXIMUM VOLTAGE DROP ACROSS ELECTRICAL SYSTEM SHALL BE NO GREATER THAN 5% FROM UTILITY SERVICE POINT. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING INCREASED WIRE SIZES DUE TO FIELD CONDITIONS.
6. CONTRACTOR SHALL VERIFY ALL EXISTING EQUIPMENT PRIOR TO BIDDING. NOTIFY ENGINEER IN WRITING OF FIELD DISCREPANCIES PRIOR TO COMMENCING WORK. COORDINATE REQUIREMENTS WITH GENERAL CONTRACTOR.
7. PANELBOARDS SHALL BE FULLY RATED. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. SERIES RATED PANELS ARE ACCEPTABLE AS LONG AS SECTION NEC 240.86(B) AND (C) CAN BE DEMONSTRATED IN THE SUBMITTAL BY THE E.C. AND THE MANUFACTURER. AVAILABLE FAULT CURRENT MUST BE OBTAINED FROM THE UTILITY COMPANY. FOR SERIES RATED PANELS, E.C. SHALL ENSURE PRIOR TO SUBMITTING TO THE ENGINEER OF RECORD THAT NEC 240.86 IS MET OR THE SUBMITTAL WILL NOT BE REVIEWED. ANY SERIES RATED PANELS SHALL BE LABELED ACCORDING TO NEC 110.22 REQUIREMENTS.

PANEL: PP1

VOLTAGE: 120/208 Wye		MAINS TYPE MLO				MOUNTING: SURFACE									
PHASE: 3		MAINS RATING: 200 A				PANEL LOCATION: ELECTRICAL ROOM									
WIRE: 4		BUS: 225 A				SUPPLY FROM: NEW MDP									
CKT. NO.	TRIP AMP	POLE S	CIRCUIT DESCRIPTION	LOAD TYPE	WIRE SIZE	A	B	C	WIRE SIZE	LOAD TYPE	CIRCUIT DESCRIPTION	POLE S	TRIP AMP	CKT. NO.	
1	20	1	DAYCARE #1 & 2 LIGHT	L	2#12, #12G, 3/4"C	0.54	0.59		2#12, #12G, 3/4"C	L	DAYCARE #7 LIGHT	1	20	2	
3	20	1	DAYCARE #6 LIGHT	L	2#12, #12G, 3/4"C		0.30	0.46	2#12, #12G, 3/4"C	L	DAYCARE #5 LIGHT	1	20	4	
5	20	1	DAYCARE #4 LIGHT	L	2#12, #12G, 3/4"C			0.39	0.27	2#12, #12G, 3/4"C	L	DAYCARE #3 LIGHT	1	20	6
7	20	1	DAYCARE #11 LIGHT	L	2#12, #12G, 3/4"C	0.55	0.61			2#12, #12G, 3/4"C	L	DAYCARE #8 LIGHT	1	20	8
9	20	1	DAYCARE #9 LIGHT	L	2#12, #12G, 3/4"C		0.42	0.51		2#12, #12G, 3/4"C	L	DAYCARE #10 LIGHT	1	20	10
11	20	1	PANTRY LIGHT	L	2#12, #12G, 3/4"C			0.23	0.48	2#12, #12G, 3/4"C	L	ENTRY/ADMIN & VEST. LIGHT	1	20	12
13	20	1	OFFICE LIGHT	L	2#12, #12G, 3/4"C	0.15	0.70			2#12, #12G, 3/4"C	L	CORRIDOR LIGHT	1	20	14
15	20	1	STAFF RM LIGHT	L	2#12, #12G, 3/4"C		0.26	0.21		2#12, #12G, 3/4"C	L	EXTERIOR LIGHT	1	20	16
17	20	1	EXTERIOR SIGNAGE	O	2#12, #12G, 3/4"C			1.20	0.18	2#12, #12G, 3/4"C	R	STOR. 105 - CONVENIENCE	1	20	18
19	20	1	TIME CLOCK AND COTACTORS	O	2#12, #12G, 3/4"C	0.20	0.90			2#12, #12G, 3/4"C	R	CORRIDOR 121/114 RECEPTACLE	1	20	20
21	20	1	JAN. 118 RECEPTACLE	R	2#12, #12G, 3/4"C		0.18	0.18		2#12, #12G, 3/4"C	R	LAUNDRY 128 RECEPTACLE	1	20	22
23	20	1	EXTERIOR RECEPTACLE	R	2#12, #12G, 3/4"C			0.72	0.18	2#12, #12G, 3/4"C	R	I.T. RECEPTACLE	1	20	24
25	20	1	I.T. 119 - SECURITY RECEPTACLE	O	2#12, #12G, 3/4"C	1.00	1.00			2#12, #12G, 3/4"C	R	I.T. RACK RECEPTACLE	1	20	26
27	20	1	I.T. RACK RECEPTACLE	R	2#12, #12G, 3/4"C		1.00	0.18		2#12, #12G, 3/4"C	R	UTILITY & STORAGE 104...	1	20	28
29	20	1	CORR. 114 WATER FOUNTAIN	R	2#12, #12G, 3/4"C			0.18	1.00	2#12, #12G, 3/4"C	E	STAFF 120 REFRIGERATOR	1	20	30
31	20	1	STAFF RM 120 - ABOVE COUNTER	R	2#12, #12G, 3/4"C	0.50	0.50			2#12, #12G, 3/4"C	R	STAFF RM 120 - ABOVE COUNTER	1	20	32
33	20	1	STAFF RM 120 - CONVENIENCE	R	2#12, #12G, 3/4"C		0.36	1.20		2#12, #12G, 3/4"C	E	STAFF RM 120 - MICROWAVE	1	20	34
35	20	1	OFFICE 101 - COMPUTER	R	2#12, #12G, 3/4"C			0.36	1.00	2#12, #12G, 3/4"C	E	LAUNDRY 128 - WASHER	1	20	36
37	20	1	OFFICE 101 - CONVENIENCE	R	2#12, #12G, 3/4"C	0.18	0.18			2#12, #12G, 3/4"C	R	LAUNDRY 128 - DRYER IGNITION	1	20	38
39	20	1	EUH-1	H	2#12, #12G, 3/4"C		1.00	1.20		2#12, #12G, 3/4"C	O	FOR FACP PANEL	1	20	40
41	20	1	EUH-2	H	2#12, #12G, 3/4"C			1.00	0.20	2#12, #12G, 3/4"C	O	GPS-1,2,3 & 4	1	20	42
43	20	1	EF-1	M	2#12, #12G, 3/4"C	0.05	0.10			2#12, #12G, 3/4"C	M	EF-2	1	20	44
45	60	3	RTU-4	H	3#6, #10G, 3/4"C		5.52	3.60		3#6, #10G, 3/4"C	H	RTU-2	3	45	46
47	--	--	--	--	--			5.52	3.60	--	--	--	--	--	48
49	--	--	--	--	--	5.52	3.60			--	--	--	--	--	50
51	20	1	Spare	--	--		0.00	0.00		--	--	--	--	--	52
53	20	1	Spare	--	--			0.00	0.00	--	--	--	--	--	54
TOTAL CONNECTED LOAD (KVA):						16.87	16.58	16.49							
TOTAL CONNECTED AMPS:						140.70	138.32	137.43							
LOAD TYPE		LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTAL LOAD SUMMARY									
LIGHTING	L		6637 VA	125.00%	8296 VA	TOTAL CONNECTED LOAD: 49.95 KVA									
RECEPTACLE	R		6780 VA	100.00%	6780 VA	TOTAL ESTIMATED DEMAND LOAD: 50.48 KVA									
HVAC	H		29379 VA	100.00%	29379 VA	TOTAL CONNECTED CURRENT: 138.63 A									
MOTOR	M		150 VA	100.00%	150 VA	TOTAL ESTIMATED DEMAND CURRENT: 140.13 A									
KITCHEN/EQUIPMENTS	E		3200 VA	65.00%	2080 VA										
OTHER	O		3800 VA	100.00%	3800 VA										
NOTES:															

PANEL: PP3

VOLTAGE: 120/208 Wye		MAINS TYPE MLO				MOUNTING: SURFACE									
PHASE: 3		MAINS RATING: 150 A				PANEL LOCATION: ELECTRICAL ROOM									
WIRE: 4		BUS: 225 A				SUPPLY FROM: NEW MDP									
CKT. NO.	TRIP AMP	POLE S	CIRCUIT DESCRIPTION	LOAD TYPE	WIRE SIZE	A	B	C	WIRE SIZE	LOAD TYPE	CIRCUIT DESCRIPTION	POLE S	TRIP AMP	CKT. NO.	
1	20	1	ENTRY/ADMIN. 102 - CONVENIENCE	R	2#12, #12G, 3/4"C	0.54	0.18		2#12, #12G, 3/4"C	R	RISER ROOM 107 - CONVENIENCE	1	20	2	
3	20	1	ENTRY/ADMIN. 102 - INTERCOM	R	2#12, #12G, 3/4"C		0.20	0.18		2#12, #12G, 3/4"C	E	ENTRY/ADMIN. 102 - FRIDGE	1	20	4
5	20	1	ENTRY/ADMIN. 102 - USB	R	2#12, #12G, 3/4"C			0.36	0.36	2#12, #12G, 3/4"C	R	ENTRY/ADMIN. 102 - COMPUTER	1	20	6
7	20	1	ITEM 2-03 - COMMERCIAL FREEZER	E	2#12, #12G, 3/4"C	1.26	1.26			2#12, #12G, 3/4"C	R	ITEM 2-02 - COMMERCIAL REFR	1	20	8
9	40	3	ITEM 2-07 - CONVECTION OVEN	E	3#6, #10G, 3/4"C		4.17	4.51		3#4, #8G, 1"C	E	ITEM 2-05 - DISHWASHER	3	80	10
11	--	--	--	--	--			4.17	4.51	--	--	--	--	--	12
13	--	--	--	--	--	4.17	4.51			--	--	--	--	--	14
15	20	1	PANTRY 103 - GFI ABOVE COUNTER	R	2#12, #12G, 3/4"C		1.00	1.50		2#12, #12G, 3/4"C	E	ITEM 2-08 - CONVEYOR TOASTER	1	20	16
17	20	1	PANTRY 103 - GFI ABOVE COUNTER	R	2#12, #12G, 3/4"C			1.00	1.20	2#12, #12G, 3/4"C	E	ITEM 5-03 - MICROWAVE OVEN	1	20	18
19	20	1	PANTRY 103 - CONVENIENCE	R	2#12, #12G, 3/4"C	0.54	1.04			2#12, #12G, 3/4"C	E	ITEM 5-05 - CONDENSATE HOOD	2	20	20
21	20	1	EF-3	M	2#12, #12G, 3/4"C		0.50	1.04		--	--	--	--	--	22
23	20	1	W1-1	B	2#12, #12G, 3/4"C			0.18	0.10	2#12, #12G, 3/4"C	M	EF-4	1	20	24
25	20	1	RCP-1	M	2#12, #12G, 3/4"C	0.10	0.20			3#12, #12G, 3/4"C	O	BI-DIRECTIONAL AMPLIFIER	3	20	26
27	45	3	RTU-1	H	3#6, #10G, 3/4"C		3.60	0.20		--	--	--	--	--	28
29	--	--	--	--	--			3.60	0.20	--	--	--	--	--	30
31	--	--	--	--	--	3.60	0.00			--	--	--	--	--	32
33	20	1	ENTRY ADMIN - COFFEE MAKER	R	2#12, #12G, 3/4"C		0.20	0.00		--	--	--	--	--	34
35	20	1	Spare	--	--			0.00	0.00	--	--	--	--	--	36
37	20	1	Spare	--	--	0.00	0.00			--	--	--	--	--	38
39	20	1	Spare	--	--		0.00	0.00		--	--	--	--	--	40
41	20	1	Spare	--	--			0.00	0.00	--	--	--	--	--	42
TOTAL CONNECTED LOAD (KVA):						17.39	17.09	15.67							
TOTAL CONNECTED AMPS:						146.77	144.27	130.62							
LOAD TYPE		LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTAL LOAD SUMMARY									
LIGHTING	L		0 VA	0.00%	0 VA	TOTAL CONNECTED LOAD: 50.16 KVA									
RECEPTACLE	R		4560 VA	100.00%	4560 VA	TOTAL ESTIMATED DEMAND LOAD: 38.44 KVA									
HVAC	H		10807 VA	100.00%	10807 VA	TOTAL CONNECTED CURRENT: 139.24 A									
MOTOR	M		700 VA	100.00%	700 VA	TOTAL ESTIMATED DEMAND CURRENT: 106.70 A									
KITCHEN/EQUIPMENTS	E		33496 VA	65.00%	21772 VA										
OTHER	O		600 VA	100.00%	600 VA										
NOTES:															

NOTES:
 PANELBOARDS SHALL BE FULLY RATED. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. SERIES RATED PANELS ARE ACCEPTABLE AS LONG AS SECTION NEC 240.86(B) AND (C) CAN BE DEMONSTRATED IN THE SUBMITTAL BY THE E.C. AND THE MANUFACTURER. AVAILABLE FAULT CURRENT MUST BE OBTAINED FROM THE UTILITY COMPANY. FOR SERIES RATED PANELS, E.C. SHALL ENSURE PRIOR TO SUBMITTING TO THE ENGINEER OF RECORD THAT NEC 240.86 IS MET OR THE SUBMITTAL WILL NOT BE REVIEWED. ANY SERIES RATED PANELS SHALL BE LABELED ACCORDING TO NEC 110.22 REQUIREMENTS.

ELECTRICAL CONTRACTOR BIDDING NOTE:

COORDINATION REQUIRED WITH GC AND KITCHEN FOOD SERVICE VENDOR:

- EC SHALL PROVIDE ALL ROUGH-INS, ALL FINAL CONNECTIONS AND ALL INTER-WIRING AS REQUIRED.
- EC SHALL PROVIDE ALL SERVICE DISCONNECTS AS REQUIRED BY ELECTRICAL, MECHANICAL AND FOOD SERVICE PLANS.
- EC SHALL PROVIDE ALL FINAL AND INTER-WIRED CONNECTIONS TO AND BETWEEN ALL FOOD SERVICE EQUIPMENT AND OTHER ITEMS AS REQUIRED.
- EC SHALL PROVIDE WIRING TO ALL LIGHTS IN HOODS AND PROVIDE SWITCH FOR LIGHTS.
- EC SHALL PROVIDE SWITCHING, INTERCONNECTED WIRING AND ALL ASSOCIATED STARTERS FOR HOOD FANS AND CONTROLS.
- EC SHALL BE PRESENT AND ACTIVELY INVOLVED IN STARTUP OF ALL EQUIPMENT AS IT RELATES TO THEIR TRADE TO ENSURE CORRECT OPERATION, PREVENT DAMAGE AND REMEDY ISSUES AS THEY OCCUR.
- EC SHALL PARTICIPATE IN REGULARLY SCHEDULED (AS REQUIRED) FOOD SERVICE SPECIFIC COORDINATION MEETS AS SCHEDULED BY THE GC.
- EC SHALL BE RESPONSIBLE FOR ALL INTER-WIRING BETWEEN THE HOODS, SUPPLY FANS, CONTROL PANELS, ANSUL SYSTEMS, EMS (EMERGENCY MANAGEMENT), FAN CONTROLLER AND ALL ASSOCIATION BUILDING DEVICES SUCH AS STROBES, MONITORING STATIONS AND OTHER REQUIRED CONNECTIONS FOR LIGHTING, CONTROL AND FIRE SAFETY.
- EC SHALL MOUNT LIGHT FIXTURES AND PROVIDE ALL INTER-WIRING OF LIGHTING FIXTURES (PROVIDED BY FSEC TO ELECTRICIAN) WITH IN THE WALK-INS TO THE LIGHT SWITCH (INCLUDING PENETRATIONS AND SEALING PENETRATIONS) PROVIDED BY THE MANUFACTURER.
- IN THE EVENT THE EC'S SCOPE OF WORK IS NOT COMPLETE PRIOR TO THE KITCHEN VENDOR'S INSTALLATION OF FOOD SERVICE EQUIPMENT, THE EC SHALL BE ALLOWED TO TEMPORARILY RELOCATE THE FOOD SERVICE EQUIPMENT FOR PROPER WORKING ACCESS. THE ELECTRICIAN SHALL REPLACE THE FOOD SERVICE EQUIPMENT BACK TO THE ORIGINAL LOCATION ONCE THE ELECTRICIANS WORK IS COMPLETE. COORDINATE SCOPE OF WORK AND SCHEDULING WITH THE FOOD SERVICE CONTRACTOR TO AVOID SCHEDULING CONFLICTS. REFER TO KITCHEN VENDOR PLANS FOR REQUIRED ELECTRICAL CONNECTIONS.

ELECTRICAL CONTRACTOR BIDDING NOTE:

COORDINATION REQUIRED WITH GC, MC AND KITCHEN FOOD SERVICE VENDOR:

THE ELECTRICAL CONTRACTOR SHALL REFER TO KITCHEN VENDOR AND MECHANICAL PLANS FOR ADDITIONAL SCOPE OF WORK. SCOPE SHALL INCLUDE ALL WORK, LABOR AND MATERIALS FOR INTERCONNECTION BETWEEN ELECTRICAL PANELS, HOOD CONTROL PANELS, EXHAUST FANS, LIGHTING INTEGRAL TO KITCHEN EQUIPMENT, ETC. THIS WORK SHALL BE INCLUDED IN BASE BID. INCLUDE ALL CONDUIT, WIRING, LABOR AND MATERIALS FOR A COMPLETE AND FUNCTIONAL INSTALLATION. COORDINATE REQUIREMENTS WITH KITCHEN FOOD SERVICE VENDOR/CONTRACTOR AND MECHANICAL CONTRACTOR.

PANEL: PP2

VOLTAGE: 120/208 Wye		MAINS TYPE MLO				MOUNTING: SURFACE									
PHASE: 3		MAINS RATING: 200 A				PANEL LOCATION: ELECTRICAL ROOM									
WIRE: 4		BUS: 225 A				SUPPLY FROM: NEW MDP									
CKT. NO.	TRIP AMP	POLE S	CIRCUIT DESCRIPTION	LOAD TYPE	WIRE SIZE	A	B	C	WIRE SIZE	LOAD TYPE	CIRCUIT DESCRIPTION	POLE S	TRIP AMP	CKT. NO.	
1	20	1	DAYCARE #1 #2 #3 #11 - ...	R	2#12, #12G, 3/4"C	0.72	0.54		2#12, #12G, 3/4"C	R	DAYCARE #6 #7 #8 - CONVENIENCE	1	20	2	
3	20	1	DAYCARE #1 109 - ABOVE COUNTER	R	2#12, #12G, 3/4"C		0.18	0.18		2#12, #12G, 3/4"C	R	DAYCARE #6 122 - ABOVE COUNTER	1	20	4
5	20	1	DAYCARE #1 109 - MICROWAVE	E	2#12, #12G, 3/4"C			1.20	0.80	2#12, #12G, 3/4"C	E	DAYCARE #6 122 - FRIDGE	1	20	6
7	20	1	DAYCARE #1 109 - FRIDGE	E	2#12, #12G, 3/4"C	0.80	0.18			2#12, #12G, 3/4"C	R	DAYCARE #7 124 - ABOVE COUNTER	1	20	8
9	20	1	DAYCARE #2 110 - ABOVE COUNTER	R	2#12, #12G, 3/4"C		0.18	0.80		2#12, #12G, 3/4"C	E	DAYCARE #7 124 - FRIDGE	1	20	10
11	20	1	DAYCARE #2 110 - MICROWAVE	E	2#12, #12G, 3/4"C			1.20	0.18	2#12, #12G, 3/4"C	R	DAYCARE #7 124 - ABOVE COUNTER	1	20	12
13	20	1	DAYCARE #2 110 - FRIDGE	E	2#12, #12G, 3/4"C	0.80	0.18			2#12, #12G, 3/4"C	R	DAYCARE #8 125 - ABOVE COUNTER	1	20	14
15	20	1	DAYCARE #3 111 - ABOVE COUNTER	R	2#12, #12G, 3/4"C		0.18	0.80		2#12, #12G, 3/4"C	E	DAYCARE #8 125 - FRIDGE	1	20	16
17	20	1	DAYCARE #3 111 - MICROWAVE	E	2#12, #12G, 3/4"C			12.00	0.18	2#12, #12G, 3/4"C	R	DAYCARE #8 125 - ABOVE COUNTER	1	20	18
19	20	1	DAYCARE #3 111 - FRIDGE	E	2#12, #12G, 3/4"C	0.80	0.18			2#12, #12G, 3/4"C	R	DAYCARE #9 127 - CONVENIENCE	1	20	20
21	20	1	DAYCARE #4 #5 #9 #10 - ...	R	2#12, #12G, 3/4"C		0.72	0.18		2#12, #12G, 3/4"C	R	DAYCARE #9 127 - ABOVE COUNTER	1	20	22
23	20	1	DAYCARE #4 113 - ABOVE COUNTER	R	2#12, #12G, 3/4"C		0.18	0.80		2#12, #12G, 3/4"C	E	DAYCARE #9 127 - FRIDGE	1	20	24
25	20	1	DAYCARE #4 113 - MICROWAVE	E	2#12, #12G, 3/4"C	1.20	0.18			2#12, #12G, 3/4"C	R	DAYCARE #10 130 - CONVENIENCE	1	20	26
27	20	1	DAYCARE #4 113 - FRIDGE	E	2#12, #12G, 3/4"C		0.80	0.18		2#12, #12G, 3/4"C	R	DAYCARE #10 130 - ABOVE COUNTER	1	20	28
29	20	1	DAYCARE #5 115 - ABOVE COUNTER	R	2#12, #12G, 3/4"C			0.18	0.80	2#12, #12G, 3/4"C	E	DAYCARE #10 130 - FRIDGE	1	20	30
31	20	1	DAYCARE #5 115 - FRIDGE	E											

ELECTRICAL SPECIFICATIONS

1. GENERAL:

- A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.
- B. DRAWING ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN THEIR PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.
- C. BIDDERS, BEFORE SUBMITTING PROPOSALS, SHALL VISIT AND CAREFULLY EXAMINE THE AREA AFFECTED BY THIS WORK TO FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND THE DIFFICULTIES THAT WILL ATTEND THE EXECUTION OF THIS WORK. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE, AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT, OR MATERIALS, REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
- D. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWING MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.
- E. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES AND CHARGES IN MAKING UP THE WORK PROPOSAL.
- F. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.
- G. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
- H. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- I. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL, UNLESS OTHERWISE NOTED.
- J. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED.
- K. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE GROUP. ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- L. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- M. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- N. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- O. INSURANCE: PROVIDE IN ACCORDANCE WITH OWNER/BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- P. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATED OF INSPECTION AND APPROVAL.

2. GENERAL PROVISIONS FOR ELECTRICAL WORK:

- A. DEFINITIONS:
- "PROVIDE": TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
 - "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
 - "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
 - "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
 - "WIRING": RACEWAY, FITTINGS, WIRE, BOXES, AND RELATED ITEMS.
 - "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.
 - "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
 - "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.
- B. TEMPORARY LIGHT AND POWER: PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES AS HEREIN DESCRIBED. EXTEND SYSTEMS TO NEW CONSTRUCTION AS SOON AS PHYSICALLY POSSIBLE. MAINTAIN SYSTEM DURING WORKING HOURS. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS.
- C. QUALITY ASSURANCE
- QUALITY OF MATERIALS: ALL EQUIPMENT SHALL BE NEW SPECIFICATION GRADE, FREE FROM DEFECTS AND LISTED BY APPROVED TESTING AGENCY AND BEARING THEIR LABEL MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.
 - GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AS DEFINED IN PARAGRAPH 2.C.
 - HEIGHTS OF OUTLETS:
 - FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS FOR:
 - RECEPTACLES AND TELEPHONES: 1 FT-6 IN.
 - WALL SWITCHES: 4 FT-0 IN.
 - WALL FIXTURES: 7 FT-0 IN.
 - MOTOR CONTROLLERS: 5 FT-0 IN.
 - CLOCKS: 7 FT 6 IN
 - EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.
 - REFER TO ARCHITECTURAL AND/OR INTERIOR DESIGNER'S PLANS FOR DEVICE HEIGHTS IN NON BOH SPACES
- D. PRODUCT DELIVERY, STORAGE AND HANDLING
- MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.
 - ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS SHALL BE PERMITTED. CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.
- E. MATERIALS
- NAMEPLATES: PROVIDE BLACK LAMACOID SHEET WITH 3/4 IN WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.
 - CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.
 - INSERTS AND SUPPORTS:
 - INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.
 - SINGLE ROD: SIMILAR TO GRINNELL FIG. 281.
 - MULTI-ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.
 - CLIP FORM NAILS FLUSH WITH INSERTS.
 - MAXIMUM LOADING 75 PERCENT OF RATING.
 - SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY) CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR REVIEW.
 - GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.
 - WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.
- F. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES. AFTER FABRICATION, UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC BASED PRIMER FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. ZINC BASED PRIMER WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARKED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD-APPLIED ZINC BASED PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.
- G. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED: CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.
- H. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.
- I. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

3. SCOPE OF WORK:

- A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMING WITH THE 2017 NATIONAL ELECTRICAL CODE (NEC) AND ALL OTHER APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.
- B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLIED OR SPECIFIED HEREIN.
- C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR WORK AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OF ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER, DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDED THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.
- D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION, WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.
- E. CONTRACTOR SHALL PERFORM ALL CONTROLLED INSPECTIONS IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE-2015 EDITION. SECURE ALL REQUIRED PERMITS AND APPROVALS AND TRANSMIT SAME TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES.
- F. AREAS WITH NO ELECTRICAL WORK SHALL REMAIN AS IS. CONTRACTOR SHALL MAINTAIN CONTINUITY OF ALL ELECTRICAL SYSTEMS TO ALL AREAS NOT COVERED BY THIS RENOVATION AND SHALL PROVIDE 48 HOUR NOTICE TO LANDLORD OF ANY PLANNED POWER INTERRUPTIONS OR SIGNAL SYSTEM OUTAGES.
- G. SHOP DRAWINGS
- PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL PROVIDE COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.
 - INDICATE ON EACH SHOP DRAWINGS SUBMITTED:
 - PROJECT NAME AND LOCATION
 - NAME OF ARCHITECT AND ENGINEER
 - ITEM IDENTIFICATION
 - APPROVAL STAMP OF PRIME CONTRACTOR
 - SUBMISSIONS:
 - SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
 - SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER.
 - SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
 - SAFETY/DISCONNECT SWITCHES
 - FUSES
 - CIRCUIT BREAKERS
 - PANELBOARDS/LOAD CENTER (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS).
 - RACEWAYS
 - WIRE AND CABLE
 - WALL SWITCHES
 - INSERTION RECEPTACLES
 - MOMENTARY CONTACT SWITCHES
 - TIME SWITCHES
 - LIGHTING FIXTURES.
 - ASSIST AND PROVIDE ALL NECESSARY INFORMATION, DIAGRAMS, SKETCHES, ETC. TO THE HVAC CONTRACTOR, FOR THE PREPARATION OF COORDINATED SHOP DRAWINGS INDICATING ROUTING OF FEEDERS, CONTROL CONDUITS, RECESSED FIXTURES AND ADJACENT NEARBY PIPING AND DUCTWORK WHERE APPLICABLE, CERTIFIED BY ALL TRADES THAT COORDINATION HAS BEEN ESTABLISHED. SUBMIT FOUR(4) BOOKBOUND OPERATING AND SERVICE MANUALS WHICH SHALL INCLUDE COPIES OF ALL SHOP DRAWING. PROVIDE SHOP DRAWINGS FOR PANELS, FIXTURES, WIRING DEVICES, CONDUIT, CABLE, DISCONNECT SWITCH, RELAYS, CONTRACTORS, AND OTHER SYSTEMS AS DIRECTED BY THE ENGINEER.
- H. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS
- UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.
 - THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
 - THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
 - REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

6. LOW-VOLTAGE DISTRIBUTION EQUIPMENT:

- A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.
- B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.
- C. DISCONNECT SWITCHES SHALL BE FUSED OR NONFUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY, EXCEPT AS NOTED, AND HORSEPOWER RATED FOR MOTOR LOADS. TOGGLE TYPE SWITCHES SHALL BE NONFUSED, LOAD BREAK, HAVING RATINGS OF 20 AMP AT 600 VOLTS AND 30 AMP AT 240 VOLTS. TWO-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGBMAN NO. 6808F. THREE-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGBMAN NO. 7810F. KNIFE-BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK-MAKE, QUICK-BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED. SWITCHES SHALL BE SIMILAR TO GENERAL ELECTRIC OMR. ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.
- D. FUSES:
- CIRCUITS 0 TO 600 AMPERES SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMANN LOW-PEAK DUAL-ELEMENT TIME-DELAY LPN-RK (AMP/SP (250V) LPS-RK (AMP/SP (600V) OR LPJ (AMP/SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.
 - MOTOR CIRCUITS - ALL INDIVIDUAL MOTOR CIRCUITS WITH FULL LOAD AMPERE RATINGS (FLA) OF 400 AMPERES OR LESS SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMANN LOW-PEAK DUAL-ELEMENT TIME-DELAY LPN-RK (AMP/SP (250V) LPS-RK (AMP/SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.
 - ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER.
 - PROVIDE 1 SPACE MATCHING FUSE FOR EACH SET OF 3.
 - CIRCUIT BREAKERS: MOLDED CASE BREAKERS SHALL BE THERMAL-MAGNETIC, QUICK-MAKE/QUICK-BREAK, BOLT-ON TYPE, MANUALLY OPERATED WITH INSULATED TRIP-FREE HANDLE. MULTI-POLE TYPE BREAKERS SHALL CONTAIN INTERNAL TRIP BAR. TERMINALS SHALL BE SUITABLE FOR COPPER OR ALUMINUM CABLE. FURNISH AUXILIARY DEVICES WHERE REQUIRED FOR SHUNT TRIPPING, OPEN AND CLOSE MOTOR OPERATOR AND ALARM INDICATION. ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED. FRAMES, IC AND INTERCHANGEABLE TRIPS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
 - 120 VOLTS, 100-AMP FRAME: 10,000 AMPS, 1 POLE.
 - 120/240 VOLTS, 225-AMP FRAME: 22,000 AMPS MINIMUM

8. DISTRIBUTION PANELBOARDS, CIRCUIT BREAKER TYPE:

- A. THREE PHASE, 3 OR 4 WIRE, COPPER BUS BARS, WITH 2, 3, OR 4 WIRE BRANCHES, AS NOTED. CAPACITY OF PANEL AND CIRCUITS, AS NOTED BELOW. PANELBOARD TO HAVE GROUND BUS SAME SIZE AS PHASE BUSES.
- B. CABINETS: CODE GAUGE GALVANIZED SHEET STEEL PRIMED AND PAINTED WITH TRIM AND DOOR, TYPE AS NOTED, LAP AND RIVET CORNERS OR FORM AS APPROVED.
- C. TRIM: ONE PIECE FULL FINISH PRIMED AND PAINTED SHEET STEEL. TRIM SHALL BE MOUNTED WITH A CONTINUOUS PIANO HINGE CONFIGURED IN SUCH A MANNER THAT IT SHALL BE POSSIBLE TO GAIN FULL ACCESS TO CIRCUIT BREAKERS AND WIRING GUTTERS WITHOUT REMOVING THE TRIM. PROVIDE A MULTI-PIN CYLINDER LOCK (YALE, CORBIN OR EQUAL) TO LATCH THE TRIM. KEYS SHALL BE MILLED.
- D. HARDWARE: MULTI-PIN, CYLINDER LOCKS WITH MILLED KEYS. ALL PANELS SHALL BE KEYPED ALIKE, DOOR OVER 48" HIGH SHALL BE EQUIPPED WITH A CHAIN PLATE. ALL HANDLES, BUILT-IN LOCK AND 3-POINT CATCH FASTENING DOOR AT TOP, BOTTOM AND CENTER.
- E. HINGES: CONCEALED, CONTINUOUS PIANO HINGE AS DESCRIBED ABOVE.
- F. DIRECTORY HOLDER: MEAL FRAME WITH NONBREAKABLE TRANSPARENT COVER AND DIRECTORY CARD. ENTRIES TO BE TYPEWRITTEN BY ELECTRICAL CONTRACTOR. PROVIDE AN ENGRAVED LAMINATED NAMEPLATE ADJACENT TO EACH BRANCH BREAKER. MOUNT WITH SELF TAPPING MACHINE SCREWS.
- G. FURNISH MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING NOT PERMITTED. SECURE LUGS TO BUS BY STUD BOLTS.
- H. PANELBOARD CONSTRUCTION FOR BOLTED TYPE BREAKERS, MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, RMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. INDIVIDUAL CIRCUIT BREAKERS SHALL HAVE MINIMUM 100A FRAME, TRIPS SIZED AS SHOW ON THE PLANS.
- I. MINIMUM GUTTER SPACES: PANELS WITH 225 AMPERE MAINS, 5-1/2" MINIMUM. 400 AMPERES AND OVER, MINIMUM GUTTERS 8" FOR PANELS WITH THROUGH FEEDERS. INCREASE GUTTER WIDTH BY 2" MINIMUM AND PROVIDE A SHEET STEEL BARRIER BETWEEN THE PANEL GUTTER AND THE THROUGH FEEDER PORTION OF THE BACK BOX. BRANCH CIRCUIT BREAKERS SHALL BE MECHANICALLY INTERLOCKED WHEN SHOWN ON DRAWINGS.
- J. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARDS SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.
- K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLES AND TRIP RATINGS OF BRANCH CIRCUIT BREAKERS TO BE AS INDICATED ON DRAWINGS.
- L. PANELBOARD SHALL HAVE ENGRAVED WHITE CORE, BLACK LAMACOID NAMEPLATE SCREWED ONTO PANE TRIM WITH DESIGNATION LISTED (PANELBOARD NAME, VOLTAGE, RATING OR MAINS IN AMPS).

9. DISTRIBUTION PANELBOARDS, SWITCH AND FUSE:

- A. THREE PHASE, 3 OR 4 WIRE WITH COPPER BUS BARS. ALL THROUGH BUS SHALL BE INSULATED.
- B. NEMA CLASS 1 CONSTRUCTION TO ACCOMMODATE FUSIBLE, INDIVIDUALLY ENCLOSED SWITCHES, FRONT REMOVABLE, SWITCH AND DOOR INTERLOCKS, COVERS TO BE PAD-LOCKABLE.
- C. PANELBOARD SHALL BE CONSTRUCTED OF CODE-GAUGE STEEL, GRAY PINK OVER RUST INHIBITOR, FOR SURFACE MOUNTING. BOX AND PANEL FRAME SHALL BE FLANGED AND REINFORCED FOR RIGID SUPPORT OF INTERIOR AND ACCURATE ALIGNMENT OF INTERIOR WITH FRONT TRIMS TO BE FASTENED TO BACK BOX WITH SCREWS.
- D. ALL BRANCH SWITCHES SHALL HAVE INDIVIDUAL ENGRAVED LAMICOID NAMEPLATES (BLACK WITH WHITE CORE).
- E. DISTRIBUTION PANELBOARD CONSTRUCTION MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, REMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. APPLICATIONS.
- F. DISCONNECTS
- DISCONNECT SWITCHES SHALL CONFORM TO NEMA AND UL STANDARDS, AND SHALL BE HORSEPOWER RATED.
 - SWITCHING MECHANISM SHALL BE QUICK-MAKE, QUICK-BREAK, SINGLE THROW WITH EXTERNAL OPERATING HANDLE MECHANICALLY INTERLOCKED WITH ENCLOSURE COVER TO PROVIDE ACCESS TO INTERIOR WHEN DISCONNECT IS IN OFF POSITION ONLY. PROVIDE MEANS TO LOCK OPERATING HANDLE IN THE OPEN AND CLOSED POSITION. DESIGNATE ON THE ENCLOSURE THE OPEN AND CLOSED POSITION OF THE OPERATING HANDLE.
 - SWITCHES SHALL BE OF THE DOUBLE STATIONARY CONTACT TYPE.
 - SWITCHES SHALL BE EQUIPPED WITH REJECTION TYPE FUSE HOLDERS, FUSIBLE AS SHOWN ON THE DRAWINGS, PROVIDE COMPLETE WITH FUSES AS SCHEDULED.
- G. INSTALLATION
- DISTRIBUTION PANELBOARD SHALL BE MOUNTED TO STEEL CHANNEL (KINDORF) WHICH SHALL BE BOLTED TO THE WALL USING EXPANSION ANCHORS FOR LARGE PANELS.
- H. IDENTIFICATION
- PROVIDE NAMEPLATE AT EACH SWITCH IDENTIFYING THE LOAD SERVED.
 - NAMEPLATES SHALL BE MOUNTED ON THE FRONT COVER SECURED WITH SELF-TAPPING SCREWS OR NUTS AND BOLTS. NAMEPLATES SHALL BE LAMINATED PHENOLIC, BLACK WITH A MINIMUM OF 1/4" HIGH WHITE LETTERING.
- I. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARDS SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.
- J. POWER PANELBOARDS SHALL BE SIMILAR TO GENERAL ELECTRIC TYPE "OMR," AS MANUFACTURED BY ATLAS SWITCH COMPANY, ELECTRIC SWITCHBOARD COMPANY OR APPROVED EQUAL.
- K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLES AND TRIP RATINGS OF BRANCH CIRCUIT BREAKERS TO BE AS INDICATED ON DRAWINGS.
- L. PANELBOARD SHALL HAVE ENGRAVED WHITE CORE, BLACK LAMACOID NAMEPLATE SCREWED ONTO PANE TRIM WITH DESIGNATION LISTED (PANELBOARD NAME, VOLTAGE, RATING OR MAINS IN AMPS).
- M. MATERIALS
- RACEWAYS:
 - RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.
 - ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADED.
 - FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.
 - WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16 GAUGE STEEL WITH GROUND CONTINUITY. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.
 - SURFACE METAL RACEWAY: SIZE AS NOTED. BASE 0.04 IN., COVER 0.25 IN. MATERIAL SHALL BE STEEL. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.
 - FITTINGS AND ACCESSORIES:
 - RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.
 - ELECTROMETALLIC TUBING: COMPRESSION TYPE. GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER.
 - FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.
 - BUSHINGS: METALLIC INSULATED TYPE.

ELECTRICAL SPECIFICATIONS (CONT.)

3. BOXES:

- a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH DRYWALL AND FIXTURE STUDS WHERE REQUIRED. WITHOUT FIXTURE OR DEVICE, FURNISH BLANK COVER. OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.
- b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN NEW AND RENOVATED BOXES BETWEEN 120/208 VOLT AND 277/480 VOLT WIRING AND BETWEEN EMERGENCY AND NORMAL WIRING. FLOOR BOXES SHALL BE SUITABLE FOR CONDUIT AND DEVICES NOTED. RAISED OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH ABOVE FLOOR FITTING. TELEPHONE: BUSHED HOLE. POWER: DUPLEX RECEPTACLE OR OTHER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY. FLUSH OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH FLUSH FLOOR FITTING FOR TELEPHONE AND FLUSH DUAL FLAP COVER WITH DUPLEX RECEPTACLE FOR POWER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY.
- c. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.

PROVIDE RACEWAY SUPPORT UTILIZING CEILING TRAPEZE, STRAP HANGERS, OR WALL BRACKETS. PROVIDE U-BOLTS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND CONNECTED TO ACCEPTABLE SUPPORTS. PROVIDE RISER CLAMPS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND RESTING ON SLAB FOR THROUGH-THE-FLOOR SYSTEMS. UTILIZE AN ASSEMBLY SIMILAR TO HUBBELL FIRE RATED POKE-THROUGH-FLOOR BOX SYSTEM. FOR ABOVE FLOOR FITTINGS TELEPHONE SHALL BE BUSHED HOLE AND POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TELEPHONE COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTING TO RESTORE FIRE RATING OF FLOOR.

SECURE ALL RACEWAYS TO SUPPORTS WITH PIPE STRAPS OR U-BOLTS. SPACING OF SUPPORTS SHALL BE A MINIMUM OF 10 FT ON CENTER FOR METALLIC RACEWAY AND AS REQUIRED FOR NONMETALLIC RACEWAY. SPACING SHALL BE 5 FT ON CENTER FOR WIREWAYS AND PER CODE AND AS NOTED FOR OTHERS. MOUNT SUPPORTS TO STRUCTURE MASONRY WITH TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION SHIELDS OR INSERTS IN CONCRETE AND BRICK, MACHINE SCREWS ON METAL, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD, AND PAN THROUGH STRAPS IN METAL DECK. NAILS, RAWL PLUGS OR WOOD PLUGS SHALL NOT BE PERMITTED, WHERE REQUIRED BY STRUCTURE, FURNISH THROUGH BOLTS AND FISHPATES.

EXPPOSED RACEWAYS SHALL BE RUN PARALLEL WITH OR AT RIGHT ANGLES TO WALLS. PROVIDE CLEARANCE WITH WATER, STEAM OR OTHER PIPING (MINIMUM 3 IN. SEPARATION FROM STEAM AND HOT WATER PIPES, EXCEPT 1 IN. FROM PIPE COVER AT CROSSINGS AND 18 IN. FOR PARALLEL RUNS). FOR HUNG CEILING OUTLETS, RUN IN HUNG CEILING AND CONNECT TO CEILING SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE, RUN VERTICALLY ONLY.

MAINTAIN GROUNDING CONTINUITY OF INTERRUPTED METALLIC RACEWAYS WITH GROUND CONDUCTOR, AND IN FLEXIBLE CONDUIT FOR FEEDERS AND MOTOR TERMINAL CONNECTIONS.

EMPTY RACEWAYS OVER 10 FT LONG: PROVIDE FISH OR PULL WIRE, GALVANIZED OR NYLON ROPE.

RIGID STEEL CONDUIT SHALL BE PERMITTED FOR FEEDERS AND BRANCH CIRCUITS. PAINT MALE THREADS OF FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PIPE COMPOUND AND BUTT CONDUIT ENDS TOUGH UP MARRED SURFACES AND FIELD-CUT THREADS, ORC-COLD GALVANIZED. EMT SHALL BE PERMITTED FOR BRANCH CIRCUITS ONLY, IN DRY LOCATIONS, DRY WALLS, HUNG CEILINGS, HOLLOW BLOCK WALLS AND FURRED SPACES. EMT SHALL NOT BE PERMITTED IN RAISED FLOORS FLEXIBLE STEEL CONDUIT SHALL BE UTILIZED FOR SHORT CONNECTIONS WHERE RIGID CONDUIT IS IMPRACTICAL. FROM OUTLET BOX TO RECESSED LIGHTING FIXTURE: PROVIDE MINIMUM 4 FT AND MAXIMUM 6 FT LENGTHS. FOR FINAL CONNECTION TO MOTOR TERMINAL BOX, TRANSFORMER AND OTHER VIBRATING EQUIPMENT: PROVIDE WITH POLYVINYL SHEATHING AND GROUND CONDUCTOR. MINIMUM LENGTH: 18 IN. WITH SLACK. CONNECT GROUND CONDUCTOR TO ENCLOSURE OR RACEWAY AT EACH END. FOR EXPANSION JOINT CROSSINGS, CROSS AT RIGHT ANGLES AND ANCHOR ENDS.

CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREADS OF FIELD THREADED RACEWAYS WITH GRAPHITE-BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.

ALL COUPLINGS SHALL BE COMPRESSION TYPE. NO SET SCREW FITTINGS.

EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CLIP JOINT CENTERED IN EXPANSION JOINT. PROVIDE A LENGTH OF RUN IN ACCORDANCE MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.

4. RACEWAYS PASSING THROUGH FIRE-RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.
- A. PROVIDE CABLE SUPPORTS IN ACCORDANCE WITH NATIONAL ELECTRIC CODE, ARTICLE 300.19. CABLE SUPPORTS SHALL UTILIZE A ONE-PIECE PLUG WITH PIG-GRIP WEDGING PLUG AS MANUFACTURED BY OZGEDNEY. TYPE SF SHALL BE USED FOR ARMORED CABLE.
- INSTALL CABLE SUPPORTS AT THE TOP OF A VERTICAL RISE AND PROVIDE INTERMEDIATE ADDITIONAL SUPPORTS AS REQUIRED TO LIMIT SUPPORTED CONDUCTOR LENGTHS TO NOT GREATER THAN THOSE SPECIFIED IN TABLE 300.19(A).
- B. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.

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

D. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE-PARTITIONS ROOMS.

PERFORM CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE 25 OHMS.

11. WIRE AND CABLE:

- A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG EXCEPT AS NOTED.
- B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 100 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM. AT 265 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.
- C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 12 MINIMUM. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.
- D. INSULATION SHALL BE RUBBER AND THERMOPLASTIC MEETING ASTM AND IPCEA STANDARDS. TYPE THW OR THWN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. TYPE SFF-2 SHALL BE UTILIZED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG C. FOR UNGROUNDED ISOLATED BRANCH CIRCUITS PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW).
- E. ARMORED CABLE (BX) SHALL BE UTILIZED FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILINGS, AND BLOCK WALLS. WHEN USED IN LIEU OF WIRING IN CONDUIT, STATE IN PROPOSAL THAT PRICE IS BASED UPON THE USE OF HOSPITAL GRADE "BX".
- F. METAL-CLAD CABLE, NFPA 70 ARTICLE 330 TYPE MC:

- INTERLOCKED FLEXIBLE GALVANIZED STEEL ARMOR SHEATH, CONFORMING TO UL REQUIREMENTS FOR TYPE MC METAL CLAD CABLE.
- INSULATED COPPER CONDUCTORS, SUITABLE FOR 600 VOLTS, RATED 90°C, ONE OF THE TYPES LISTED IN NFPA 70 TABLE 310.13(A) OR OF A TYPE IDENTIFIED FOR USE IN TYPE MC CABLE.
- INTERNAL FULL SIZE COPPER GROUND CONDUCTOR WITH GREEN INSULATION.
- ACCEPTABLE COMPANIES: AFC CABLE SYSTEMS INC., SOUTHWIRE, GENERAL CABLE.
- CONNECTORS FOR MC CABLE: AFC FITTING INC.'S AFC SERIES, ARLINGTON INDUSTRIES INC.'S SADDLE GRIP, OR THOMAS & BETTS CO.'S TITE-BITE WITH ANTI-SHORT BUSHINGS.

G. COLOR CODING SHALL BE AS FOLLOWS:

120/208 VOLT SYSTEM:	277/480 VOLT SYSTEM:
BLACK FOR A PHASE	BROWN FOR A PHASE
RED FOR B PHASE	ORANGE FOR C PHASE
BLUE FOR C PHASE	YELLOW FOR C PHASE

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

WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION TO OVERLAP CONDUCTORS WITH 6 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.

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

I. TERMINATIONS, SPLICES AND TAPS UNDER 600 VOLTS: COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION-TYPE OF TWIST-ON SPRING-LOADED CONNECTORS AND CLEAR NYLON-INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. CABLE LUGS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTISEIZE COMPOUND ON TANG.

J. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF 120/208 AND 277/480 VOLT SYSTEMS, EXCEPT 480 VOLT MOTOR BRANCH CIRCUIT WIRING AND RELATED 120 VOLT CONTROL WIRING. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.

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

L. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS AND ALL MOTOR BRANCH CIRCUITS OVER 25 HP.

M. PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS. CORRECT OR REPLACE CABLE TESTING BELOW MANUFACTURER'S STANDARDS.

12. WIRING DEVICES:

A. WIRING DEVICES SHALL BE SPECIFICATION GRADE UNLESS OTHERWISE SPECIFIED. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS OTHERWISE NOTED. PROVIDE COMPLETE MATERIAL AND ACCESSORIES AS NOTED.

B. LOCAL WALL SWITCHES SHALL BE ROCKER TYPE, QUIET OPERATING, RATED 20 AMP, 120/277 VOLT, AC, SIMILAR TO LEVITON DECORA SERIES A5621 (SINGLE POLE), A5623 (3-WAY) AND A5624 (4-WAY).

C. STRAIGHT BLADE RECEPTACLES SHALL BE COMMERCIAL SPECIFICATION GRADE DUPLEX CONVENIENCE 125 VOLTS, 2 POLE, 3 WIRE, U GROUND SLOT, DECORA SERIES BY LEVITON, GROUNDED, EXCEPT AS NOTED.

- SINGLE GANG, RECESSED, DUPLEX RECEPTACLE: TAMPER RESISTANT, 2-POLE, 3-WIRE GROUNDING, 15A, 125V, NEMA 5-20R; LEVITON 689 SERIES (COLOR AS SPECIFIED BY ARCHITECT) FOR CHILD CARE FACILITIES.

- USB CHARGER/DUPLEX TAMPER-RESISTANT RECEPTACLE: TAMPER RESISTANT.

D. INSERTION RECEPTACLES SHALL BE HOSPITAL GRADE DUPLEX CONVENIENCE 125 VOLTS, 2 POLE, 3 WIRE, U GROUND SLOT, GROUNDED, EXCEPT AS NOTED.

- GROUND FAULT INTERRUPTER RECEPTACLES:

- 20 AMP DUPLEX FEED-THROUGH TYPE, SIMILAR TO NO. GF8300.

E. DEVICE PLATES: SEE ARCHITECT FOR TYPE. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.

F. COLORS: COORDINATE COLORS WITH ARCHITECT.

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

13. LIGHTING FIXTURES:

A. FIXTURES TO BE AS SPECIFIED BY ARCHITECT AND SHALL BE COMPLETELY FACTORY ASSEMBLED, WIRED AND EQUIPPED WITH ALL NECESSARY SOCKETS, BALLASTS, SUPPORTING HARDWARE AND ACCESSORIES. REFER TO DRAWINGS FOR INDIVIDUAL FIXTURE DESCRIPTIONS.

B. FIXTURE CATALOG NUMBERS USED TO ILLUSTRATE EQUIPMENT TYPE DO NOT NECESSARILY DENOTE REQUIRED MOUNTING EQUIPMENT OR ACCESSORIES. PROVIDE ACCESSORIES TO SUIT.

C. BALLAST: CLASS P, HIGH POWER FACTOR, LOWEST AVAILABLE NEMA RATED NOISE LEVEL, ETL AND CBM APPROVED, ENERGY SAVING TYPE, TRIGGER START FOR 24-INCH LAMPS AND RAPID START FOR 48-INCH, TWO LAMP BALLASTS; NO THREE LAMP BALLASTS. BALLASTS SHALL BE ADVANCE MAGNETEK, UNIVERSAL OR EQUAL.

D. LED DRIVERS SHALL BE ELECTRONIC TYPE, LABELED AS COMPLIANT WITH RADIO FREQUENCY INTERFERENCE (RFI) REQUIREMENTS OF FCC TITLE 47, PART 15 AND COMPLY WITH NEMA SSL 1 "ELECTRONIC DRIVERS FOR LED DEVICES, ARRAYS OR SYSTEMS". LED DRIVERS SHALL HAVE A SOUND RATING OF "A", HAVE A MINIMUM EFFICIENCY OF 85% AND BE RATED FOR A THD OF LESS THAN 20% AT ALL INPUT VOLTAGES.

E. DIMMABLE LED DRIVERS SHALL BE CAPABLE OF DIMMING WITHOUT LED STROBING OR FLICKER ACROSS THEIR FULL DIMMING RANGE. PROVIDE TYPE OF LED DRIVER AS PER LIGHTING FIXTURE SCHEDULE. DIMMABLE LED DRIVERS SHALL BE 0-10V WHERE NOT INDICATED.

F. CONTINUOUS ROW, TWO LAMP STRIP FIXTURES SHALL BE STAGGERED TYPE.

G. FLUORESCENT LIGHTING FIXTURES, INCLUDING GENERAL CONSTRUCTION, LAMPS AND BALLASTS SHALL CONFORM TO THE ENERGY EFFICIENCY REQUIREMENTS OF CONSOLIDATED EDISON CO. AND QUALITY FOR A UTILITY REBATE TO OWNER UNDER CON EDISON'S ENLIGHTENED ENERGY LIGHTING REBATE PROGRAM. CONTRACTOR SHALL COORDINATE REBATE PROGRAM WITH CON EDISON AND ARRANGE FOR CON EDISON TO PERFORM A SURVEY TO INVENTORY ALL EXISTING FIXTURES PRIOR TO DEMOLITION.

H. EXIT SIGNS SHALL BE PRECISION DIE-CAST ALUMINUM HOUSING WITH LASER-FORMED ACRYLIC LEGEND. EXIT SIGNS SHALL COMPLY WITH UL 924 AND BE MEA APPROVED FOR USE IN NEW YORK CITY. AC POWERED WITH PREMIUM LONG-LIFE NICKEL CADMIUM BATTERY WITH STANDARD UL LISTED 6-HOUR RUN TIME. PROVIDE WITH INTEGRAL AUTOMATIC CHARGER IN A SELF CONTAINED POWER PACK. LED INDICATOR WITH PUSH TO TEST SWITCH.

14. TELEPHONE CONDUIT SYSTEM:

A. PROVIDE COMPLETE SYSTEM OF: RACEWAYS AND ACCESSORIES, OUTLET BOXES, SLEEVES AND FISHWIRES.

B. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF TELEPHONE COMPANY.

C. OUTLETS SHALL BE:

- WALL: 4 IN. SQUARE WITH BUSHED COVER PLATE.
- PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.
- CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM OUTLET BOX TO BUSHED END THRU WALL 6" BELOW THE PLASTER CEILING.
- FACE RACEWAYS IN ROOMS SHALL HUBBELL HBL500, HBL750 OR HBL2000 SERIES OR AS ACCEPTABLE.

15. GROUNDING AND BONDING:

A. PROVIDE GROUNDING SYSTEM IN ACCORDANCE WITH (2017 NATIONAL ELECTRICAL CODE), AND THESE SPECIFICATIONS. THE WIRING SYSTEM SHALL BE INSTALLED AS REQUIRED TO PROVIDE A CONTINUOUSLY GROUNDING SYSTEM. WHERE FLEXIBLE CONDUIT IS USED FOR PART OF A CONDUIT RUN, EXCEPT LIGHTING BRANCH CIRCUITS, AN INSULATED GROUNDING CONDUCTOR SHALL BE PROVIDED IN THE CONDUIT AND CONNECTED TO GROUNDING BUSHINGS AT EACH END OF THE RUN.

B. USE EXOTHERMIC WELDING PROCESS FOR INACCESSIBLE CONNECTIONS.

C. EXTEND EXISTING SYSTEM GROUND TO INCLUDE ALL THE ELECTRICAL EQUIPMENT IN THE SCOPE OF WORK.

D. WHERE FLEXIBLE METALLIC CONDUIT IS USED AN INTERNAL BONDING CONDUCTOR SHALL BE INSTALLED.

E. IN ADDITION, FURNISH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR WHERE INDICATED ON DRAWINGS AND FOR THE FOLLOWING BRANCH CIRCUITS:

- CIRCUITS SERVING ANY WALL BOX DIMMER.
- CIRCUITS SERVING ANY ISOLATED GROUND RECEPTACLES. TERMINATE GROUND DIRECTLY AT AN EQUIPMENT GROUNDING CONDUCTOR TERMINAL OF THE SOURCE AT THE SOURCE, OR AS OTHER WISE NOTED ON DRAWINGS.
- CIRCUITS SERVING ANY DUPLEX OR SIMPLEX COMPUTER RECEPTACLES
- ANY CIRCUIT SERVED VIA AN ISOLATION TRANSFORMER OR COMPUTER POWER DISTRIBUTION UNIT.

16. PANELBOARDS:

A. PANELBOARDS SHALL BE OF THE DEAD FRONT TYPE MANUFACTURED IN CODE GAUGE AND SIZE BOXES FOR MOUNTING AS INDICATED ON PLANS COMPLETE WITH TRIM, DOORS AND LOCKS. ALL LOCKS SHALL BE KEYED ALIKE.

B. CIRCUIT BREAKERS SHALL BE OF THE BOLT-ON THERMAL MAGNETIC MOLDED CASE TYPE, AND SHALL HAVE THE TRIP RATINGS AND NUMBER OF POLES SHOWN IN SCHEDULES ON THE CONTRACT DRAWINGS. FOR BLANK (SPACE) COMPARTMENTS, PROVIDE FULL RATED BUS. MINIMUM GUTTER SPACES SHALL BE 5-3/4" SIDES, TOP AND BOTTOM. INCREASE FOR THROUGH FEEDERS. PROVIDE 2% COPPER GROUND BUS AND 100% COPPER NEUTRAL BUS AND INCREASE NEUTRAL BUS INDICATED.

C. LOCKING TABS SHALL BE PROVIDED ON ALL CIRCUIT BREAKERS SERVING EMERGENCY LIGHTING, FIRE ALARM SYSTEM, SECURITY SYSTEMS AND OTHER EMERGENCY OR CRITICAL EQUIPMENT AND AS NOTED ON THE CONTRACT DRAWINGS. A TOTAL OF 5 LOCKING TABS SHALL BE FURNISHED TO THE OWNER. SPARE

D. BUSES SHALL BE HARD DRAWN COPPER OF 98 PERCENT CONDUCTIVITY AND SHALL HAVE CROSS SECTIONAL AREAS LARGE ENOUGH TO LIMIT THE TEMPERATURE RISE, WHEN CARRYING FULL LOAD, TO 35 DEGREES C. ABOVE AN AMBIENT INSIDE THE ENCLOSURE OF 55 DEGREES C. AS DEFINED IN IEEE STANDARD RULES. MAIN BUS CAPACITY SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS.

E. ENCLOSURES SHALL BE SURFACE OR FLUSH AS INDICATED. TRIMS SHALL BE SECURED TO PANEL WITH MACHINE SCREWS. COVERS SHALL BE HINGED DOOR-IN-DOOR CONSTRUCTION WITH CYLINDER LOCKS AND CATCHES. LOCKS MUST BE COMPATIBLE WITH BUILDING STANDARD KEY SYSTEM AND WHEN NONE EXISTS, THEY SHALL BE SIMILAR TO A YALE NO. 911 KEY.

F. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARD SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.

G. ALL STANDARD PANELBOARDS SHALL BE A MINIMUM OF 20" WIDE AND 5 3/4" DEEP.

H. FURNISH ALL PANELBOARDS WITH FEED-THRU LUGS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

I. ALL NEW PANELBOARDS SHALL BE PROVIDED WITH AN ENGRAVED WHITE CORE LAMACOD NAMEPLATE, WITH 3/4 IN. WHITE LETTERING ON A BLACK BACKGROUND, WITH DESIGNATION LISTED (PANELBOARD NAME), FASTENED WITH EPOXY CEMENT OR OVAL HED CHROME PLATED MACHINE SCREWS.

J. THE CIRCUIT DIRECTORY SHALL BE TYPEWRITTEN AND PROVIDED INSIDE EACH PANEL DOOR TO INDICATE EQUIPMENT AND/OR AREA SERVED. DIRECTORY HOLDER SHALL BE METAL FRAME WITH CLEAR PLASTIC, TRANSPARENT COVER, THE TYPEWRITTEN LIST INDICATING CIRCUIT NUMBERS, OUTLETS SUPPLIED AND THEIR LOCATIONS SHALL BE PROVIDED.

K. TIE-BARS SHALL NOT BE USED TO CREATE MULTI-POLE CIRCUITS. MAXIMUM 42 CIRCUITS ALLOWED.

L. ONLY ONE WIRE SHALL BE INSTALLED UNDER EACH CIRCUIT BREAKER LUG.

M. SHORT CIRCUIT RATING OF PANELBOARDS SHALL NOT BE LESS THAN AS INDICATED ON THE CONTRACT DRAWINGS OR SPECIFIED HEREIN. WHERE NOT INDICATED OR SPECIFIED THE MINIMUM SHORT CIRCUIT RATING SHALL BE EQUAL TO THE INTERRUPTING CAPACITY OF THE LOWEST RATED CIRCUIT BREAKER IN THE PANELBOARD, BUT IN NO CASE LESS THAN 10,000 AMPERES R.M.S. SYMMETRICAL FOR 208Y/120 VOLT SYSTEM AND 14,000 AMPERES R.M.S. SYMMETRICAL FOR 480Y/277 VOLT SYSTEM. SERIES RATED PANELBOARDS SHALL BE USED TO ACHIEVE REQUIRED SHORT CIRCUIT RATINGS.

N. FOR ALL EXISTING PANELBOARDS, CONTRACTOR SHALL PROVIDE NEW CIRCUIT BREAKERS TO REPLACE EXISTING AS REQUIRED AS INDICATED ON DRAWINGS.

ELECTRICAL BDA SPECIFICATIONS

EMERGENCY RESPONDER RADIO SYSTEM (BDA SYSTEM)

A. RADIO COVERAGE

1. GENERAL BUILDING AREAS SHALL BE PROVIDED WITH 95 PERCENT FLOOR AREA RADIO COVERAGE.

B. SYSTEM DESIGN

1. MANUFACTURERS SUBJECT TO APPROVAL BASED ON LOCAL JURISDICTION EXISTING EQUIPMENT. VERIFY WITH JURISDICTION PRIOR TO COMMENCING DESIGN.
2. THE DISTRIBUTED ANTENNA SYSTEM MAY BE A RADIATING CABLE, FIXED ANTENNAS OR A COMBINATION OF BOTH.
3. THE SYSTEM MUST COMPLY WITH ALL APPLICABLE SECTIONS OF FCC RULES (APPENDIX A).
4. PERMANENT EXTERNAL FILTERS OR ATTACHMENTS SHALL NOT BE PERMITTED.
5. ASSEMBLY/INSTALLATION OF ALL COMPONENTS SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE.
6. SURVIVABILITY FROM ATTACK BY FIRE SHALL MEET NFPA 72.
7. ALL SYSTEM COMPONENTS SHALL BE INSTALLED, TESTED, INSPECTED, AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED INSTRUCTIONS.
8. THE SYSTEM DESIGN, AND INSTALLATION, SHALL NOT EXCEED THE FCC'S QET 65 STANDARDS.
9. THE SYSTEM SHALL BE NORMALLY POWERED ON AND CONTINUOUSLY PROVIDE PASSING OF REQUIRED FREQUENCIES.
10. SHALL BE COMPATIBLE WITH BOTH ANALOG AND DIGITAL COMMUNICATIONS, SIMULTANEOUSLY AT THE TIME OF INSTALLATION.
11. BDA (BI-DIRECTIONAL AMPLIFIER) SYSTEMS SHALL HAVE A LIGHTNING PROTECTIONS THAT COMPLIES WITH NFPA 780.
12. MAXIMUM PROPAGATION IS 15US (MICROSECONDS).

C. SIGNAL STRENGTH

1. A MINIMUM INBOUND (DOWNLINK) SIGNAL STRENGTH OF -95 DBM SHALL BE PROVIDED THROUGHOUT THE COVERAGE AREA.
2. A MINIMUM OUTBOUND (UPLINK) STRENGTH OF -95 DBM SHALL BE PROVIDED AT THE FIRE DEPARTMENT RECEIVERS.

D. PATHWAY SURVIVABILITY

1. SHALL HAVE A PATHWAY SURVIVABILITY OF LEVEL 1.
2. RADIATING CABLE SHALL BE REQUIRED TO BE INSTALLED IN METAL RACEWAY.
3. FEEDER AND RISER COAXIAL CABLES SHALL BE RATED AS PLENUM CABLES OR SHALL BE INSTALLED IN METAL RACEWAY.
 - A. FEEDER COAXIAL CABLES SHALL BE CONNECTED TO THE RISER COAXIAL CABLE USING HYBRID COUPLER DEVICES OF A VALUE DETERMINED BY THE OVERALL DESIGN.
 - B. RISER COAXIAL CABLES SHALL BE RATED AS RISER CABLES AND ROUTED THROUGH A 2-HOUR-RATED ENCLOSURE.
4. THE CONNECTION BETWEEN THE RISER AND FEEDER COAXIAL CABLES SHALL BE MADE WITHIN THE 2-HOUR-RATED ENCLOSURE, AND PASSAGE OF THE FEEDER CABLE IN AND OUT OF THE 2-HOUR-RATED ENCLOSURE SHALL BE FIRE-STOPPED TO 2-HOUR RATINGS.

E. SYSTEM RADIO FREQUENCIES

1. THE BDA SHALL BE CAPABLE OF TRANSMITTING ALL RADIO FREQUENCIES, ASSIGNED TO THE FIRE DEPARTMENT, AND BE CAPABLE OF USING ANY MODULATION TECHNOLOGY IN CURRENT USE BY THE FIRE DEPARTMENT.
2. CLASS B AMPLIFIER PASS BAND

THE DOWNLINK (FROM BFD) PASS BAND OF THE BDA SHALL HAVE A CENTER FREQUENCY OF 483.2 +/- 75KHZ. THE UPLINK (TO BFD) PASS BAND OF THE BDA SHALL HAVE A CENTER FREQUENCY OF 486.2 +/-75KHZ.

F. FREQUENCY CHANGES

1. THE BDA SYSTEM SHALL BE UPGRADABLE TO ALLOW FOR CHANGES OR ADDITIONS TO SYSTEM FREQUENCIES TO MAINTAIN RADIO SYSTEM COVERAGE AS IT WAS ORIGINALLY DESIGNED.

G. RADIO SURVEY

1. THE GENERAL CONTRACTOR SHALL HAVE THE IN-BUILDING RADIO SYSTEM TESTED TO ENSURE THAT TWO-WAY RADIO COVERAGE ON EACH FLOOR OF THE BUILDING MEETS OR EXCEEDS THE REQUIRED SIGNAL STRENGTH.
2. EACH FLOOR OF THE BUILDING SHALL BE DIVIDED INTO A GRID OF APPROXIMATELY TWENTY (20) EQUAL AREAS. A MAXIMUM OF TWO (2) AREAS WILL BE ALLOWED TO FAIL THE TEST PER FLOOR. A SPOT LOCATED APPROXIMATELY IN THE CENTER OF A GRID AREA WILL BE SELECTED FOR THE TEST. ONCE THE SPOT HAS BEEN SELECTED, PROSPECTING FOR A BETTER SPOT WITHIN THE GRID AREA WILL NOT BE PERMITTED. FIELD STRENGTH TESTING INSTRUMENTS ARE TO BE CALIBRATED ANNUALLY AND OF THE FREQUENCY SELECTIVE TYPE INCORPORATING A FLEXIBLE ANTENNA SIMILAR TO THE ONES USED ON BFD HAND HELD TRANSCIVERS.
3. RF PLOTS INDICATING THE INITIAL ASSESSMENT OF RADIO COVERAGE AND THE ENHANCED COVERAGE SHALL BE SUBMITTED AT THE TIME OF ACCEPTANCE TESTING.
4. ALL COMPLIANCE TESTING TO BE DONE WITH 50 OHM LOADS IN PLACE OF THE DONOR ANTENNA TO AVOID INTERFERENCE.
5. UNATTENDED OPERATION OF THE BDA IS NOT PERMITTED UNTIL THE COMPLETION OF ACCEPTANCE TESTING.

H. POWER SUPPLIES

1. AT LEAST TWO INDEPENDENT AND RELIABLE POWER SUPPLIES SHALL BE PROVIDED FOR ALL RF EMITTING DEVICES AND ANY OTHER COMPONENTS OF THE SYSTEM.
2. THE PRIMARY POWER SOURCE SHALL BE SUPPLIED FROM A DEDICATED BRANCH CIRCUIT AND COMPLY WITH NFPA 72.
3. THE SECONDARY POWER SOURCE SHALL CONSIST OF A DEDICATED BRANCH CIRCUIT SUPPLIED BY THE BUILDING GENERATOR, OR BATTERY SYSTEM AND COMPLY WITH NFPA 72.

I. COMPONENT ENCLOSURES

1. ALL BDA COMPONENTS, RF FILTERS, AND BATTERY SYSTEM COMPONENTS SHALL BE CONTAINED IN A NEMA4- OR NEMA4X- TYPE ENCLOSURE(S).
2. THE CABINET SHALL BE LARGE ENOUGH TO DISSIPATE INTERNAL HEAT WITHOUT VENTING THE INSIDE OF THE CABINET TO THE OUTSIDE ATMOSPHERE. EXTERNAL OR EXPOSED RF FILTERS ARE UNACCEPTABLE.
3. THE CABINET SHALL BE PAINTED RED AND EQUIPPED WITH A LOCKING MECHANISM.
4. THE CABINET SHALL BE LABELED (IN BRIGHT YELLOW).

J. SYSTEM MONITORING

1. A SIGN WILL BE LOCATED AT THE DEDICATED MONITORING PANEL WITH THE NAME OF THE TELEPHONE NUMBER OF THE RADIO SERVICE PROVIDER INDICATING THAT THEY SHALL BE NOTIFIED OF ANY ALARM.
2. TROUBLE SIGNALS MUST BE IMMEDIATELY REPORTED TO THE RADIO SERVICE PROVIDER.
3. THE FIRE DEPARTMENT MUST BE NOTIFIED OF ANY FAILURES THAT EXCEED PAST THE TWO (2) HOUR TIME LIMIT.
4. THE BUILDING'S FIRE ALARM SYSTEM SHALL INCLUDE AUTOMATIC SUPERVISORY SIGNALS FOR MALFUNCTIONS OF THE BDA SYSTEM THAT ARE ANNUNCIATED BY THE FIRE ALARM SYSTEM IN ACCORDANCE WITH NFPA 72, AND SHALL COMPLY WITH THE FOLLOWING:
 - 1) MONITORING FOR INTEGRITY FOR THE SYSTEM SHALL COMPLY WITH THE NFPA 72, CHAPTER 10.
 - 2) SYSTEM SUPERVISORY SIGNALS SHALL INCLUDE THE FOLLOWING:
 - a) ANTENNA MALFUNCTION
 - b) ACTIVE RF EMITTING DEVICE FAILURE
 - c) LOW- BATTERY WHEN 70% OF THE 12-HOUR OPERATING CAPACITY HAS BEEN DEPLETED
 - d) SYSTEM COMPONENT FAILURE
 - 3) POWER SUPPLY SUPERVISORY SIGNALS SHALL INCLUDE THE FOLLOWING FOR EACH RF EMITTING DEICE AND SYSTEM COMPONENT:
 - a) LOSS OF NORMAL AC POWER
 - b) FAILURE OF BATTERY CHARGER
 - 4) THE COMMUNICATIONS LINK BETWEEN THE FIRE ALARM SYSTEM AND THE BDA MUST BE MONITORED FOR INTEGRITY.
5. A DEDICATED MONITORING PANEL SHALL BE PROVIDED WITHIN THE FIRE COMMAND CENTER TO ANNUNCIATE THE STATUS OF ALL RF EMITTING DEVICES AND SYSTEM COMPONENT LOCATIONS. THE MONITORING PANEL SHALL PROVIDE VISUAL AND LABELED INDICATIONS OF THE FOLLOWING FOR EACH SYSTEM COMPONENT AND RF EMITTING DEVICE:
 - a) NORMAL AC POWER
 - b) LOSS OF NORMAL AC POWER
 - c) BATTERY CHARGER FAILURE
 - d) LOW BATTERY CAPACITY (TO 70 PERCENT DEPLETION)
 - e) DONOR ANTENNA MALFUNCTION
 - f) ACTIVE RF EMITTING DEVICE MALFUNCTION
 - g) SYSTEM COMPONENT MALFUNCTION
6. THE COMMUNICATIONS LINK BETWEEN THE DEDICATED MONITORING PANEL AND THE TWO-WAY RADIO COMMUNICATIONS ENHANCEMENT SYSTEM MUST BE MONITORED FOR INTEGRITY.

K. ACCEPTANCE TESTING

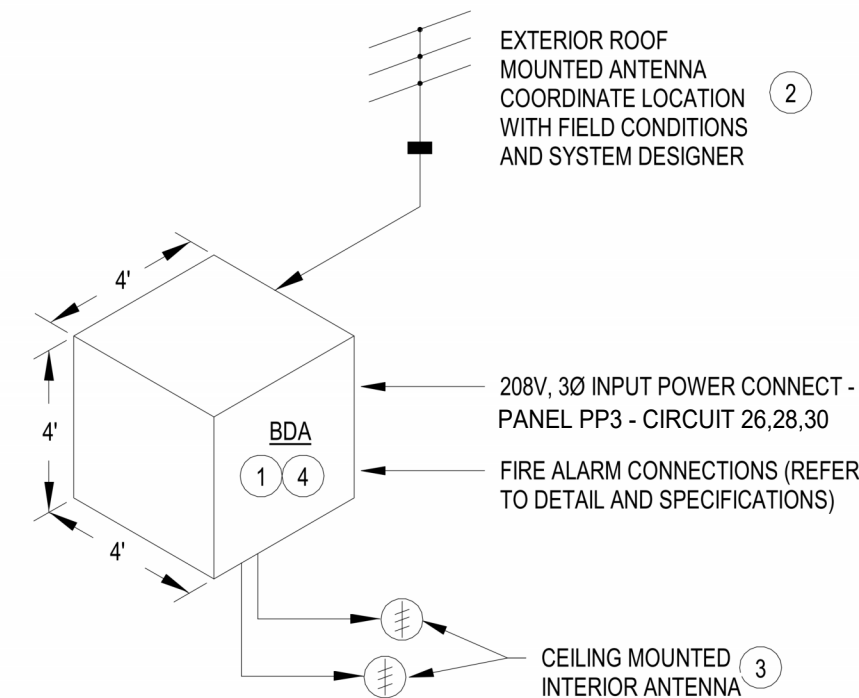
1. DELIVERED AUDIO QUALITY (DAQ) TESTING WILL BE CONDUCTED BY BFD RADIO PERSONNEL TO ENSURE THAT TWO-WAY RADIO COVERAGE, ON EACH FLOOR OF THE BUILDING, MEETS THE MINIMUM COVERAGE REQUIREMENTS. AT LEAST FIVE (5) BUSINESS DAYS' NOTICE IS REQUIRED PRIOR TO EH TEST BEING CONDUCTED.
2. IT IS THE BUILDING OWNER'S RESPONSIBILITY TO ENSURE THAT ACCEPTANCE TESTING OCCURS PRIOR TO FIRE ALARM SYSTEM TESTING FOR THE BUILDING.
3. AT THE TIME OF THIS TEST, THE FOLLOWING ARE ALSO REQUIRED:
 - A. THE APPROVED RADIO TECHNICIAN SHALL CLARIFY THAT THE IN-BUILDING RADIO SYSTEM WAS INSTALLED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT BFD IN-BUILDING RADIO SPECIFICATION.
 - B. AN APPROVED RADIO SERVICE COMPANY SHALL CERTIFY THAT A MAINTENANCE CONTRACT IS IN EFFECT THAT PROVIDES 24 HOUR BY 7-DAY RESPONSE WITHIN THE 2 HOURS OF NOTIFICATION OF A PROBLEM. THIS CONTRACT MUST BE FOR A PERIOD OF AT LEAST 1 YEAR.
 - C. RF SURVEY RESULTS, GAIN VALUES OF ALL AMPLIFIERS
 - D. SMALL SCALE DRAWINGS (11" X 17" MAXIMUM) OF THE STRUCTURE SHALL BE PROVIDED BY THE OWNER/ CONTRACTOR. THE PLANS SHALL SHOW EACH FLOOR DIVIDED INTO THE GRIDS. EACH GRID SHALL BE LABELED TO INDICATE THE DAQ RESULT FROM THE RF SURVEY.
 - E. AS BUILT DRAWINGS (IF NEEDED)
 - F. BDA MANUFACTURER, MODEL #, SERIAL #, FCC CERTIFICATION #
 - G. LINK BUDGET

L. TESTING PROCEDURES:

1. FOR TESTING SYSTEM SIGNAL STRENGTH AND QUALITY, THE TESTING SHALL BE BASED ON THE DAQ SYSTEM. A DAQ LEVEL BELOW 3.0 SHALL BE CONSIDERED A FAILED TEST FOR A GIVEN GRID CELL.
2. DELIVERED AUDIO QUALITY DEFINITIONS:

DAQ 1: UNUSABLE. SPEECH PRESENT BUT UNREADABLE
DAQ 2: UNDERSTANDABLE WITH CONSIDERABLE EFFORT. FREQUENT REPETITION DUE TO NOISE/DISTORTION
DAQ 3: UNDERSTANDABLE WITH SLIGHT EFFORT. OCCASIONAL REPETITION REQUIRED DUE TO NOISE/DISTORTION.

3. A NUMBER OF CELLS PER FLOOR SHALL BE SELECTED AT RANDOM. SIGNAL STRENGTH MEASUREMENTS SHALL BE TAKEN AT THE CENTER OF EACH CELL.
4. A MAXIMUM OF TWO GRID CELLS PER FLOOR WILL BE ALLOWED TO FAIL THE TEST. IN THE EVENT THAT THREE OF THE AREAS FAIL THE TEST, IN ORDER TO BE MORE STATISTICALLY ACCURATE, THE TESTING GRID RESOLUTION MAY BE DOUBLED. IF THE NUMBER OF GRID CELLS IS ADJUSTED, THE NUMBER OF FAILED CELLS PERMITTED SHALL BE ADJUSTED ACCORDINGLY TO MEET THE 95% COVERAGE REQUIREMENT.
5. BOTH INBOUND AND OUTBOUND SIGNALS SHALL BE MEASURED ON EACH AND EVERY FLOOR ABOVE AND BELOW GROUND INCLUDING STAIRWELLS, BASEMENTS, PENTHOUSE FACILITIES AND PARKING AREAS OF THE STRUCTURE.
6. MEASUREMENTS SHALL BE MADE WITH THE ANTENNA HELD IN A VERTICAL POSITION AT THREE (3) TO FOUR (4) FEET ABOVE THE FLOOR. (PORTABLE RADIO WORN ON THE BELT OR TURNOUT COAT POCKET).



DETAIL KEYNOTES

1. BDA TO BE LOCATED ON INTERIOR OF BUILDING. APPROXIMATE SYSTEM SIZING INFORMATION PROVIDED. CONFIRM SYSTEM DIMENSIONS WITH EQUIPMENT DESIGNER PRIOR TO ROUGH IN. COORDINATE SYSTEM MANUFACTURER WITH LOCAL JURISDICTION.
2. ROOF MOUNTED EXTERIOR ANTENNA. PROVIDE CONDUIT PATH FROM EXTERIOR ANTENNA LOCATION TO BDA LOCATED WITHIN THE BUILDING. REFER TO PLANS FOR PROPOSED BDA EQUIPMENT LOCATION.
3. PROVIDE A MINIMUM OF FIVE(5) INTERIOR ANTENNA PER FLOOR FOR APPROPRIATE SIGNAL COVERAGE. PROVIDE CONDUIT PATH FROM BDA TO INTERIOR ANTENNA. FINAL ANTENNA LAYOUT TO BE DESIGNED BY EQUIPMENT SUPPLIER, COORDINATE WITH BDA SYSTEM DESIGNER. EDIT THIS NOTE FOR EACH PROJECT
4. REFER TO SPECIFICATION FOR SYSTEM TESTING AND DESIGN REQUIREMENTS. THE EC SHALL PROVIDE SYSTEM AS REQUIRED BY THE AHJ. INCLUDE ALL REQUIRED INTERIOR AND EXTERIOR ANTENNAS, WIRING, CONDUIT, POWER AND ACCESSORIES/COMPONENTS FOR A FUNCTIONAL SYSTEM INSTALLATION. PROVIDE SEPERATE LINE ITEM COST FOR REVIEW BY OWNER AND ARCHITECT.
5. BDA UNIT SHALL BE LOCATED ON GROUND FLOOR. REFER TO PLANS FOR PROPOSED LOCATION. EDIT THIS NOTE FOR EACH PROJECT.

1 BI-DIRECTIONAL AMPLIFIER (ERRS) NONE

NOTE FOR CONTRACTOR:

BDA/EMERGENCY RESPONDER IS ONLY NEEDED WHEN PERMITTED BY LOCAL FIRE CODE OFFICIAL. COORDINATE WITH LOCAL FIRE CODE OFFICIAL AND VERIFY REQUIREMENT OF BDA/EMERGENCY RESPONDER FOR THE PROJECT SPACE.

PLUMBING DRAWING LIST

DWG.NO	DRAWING NAME
P001	PLUMBING NOTES AND LEGEND
P101	PLUMBING DOMESTIC WATER AND GAS PLAN
P102	PLUMBING SANITARY PLAN
P501	PLUMBING DETAILS (1 OF 2)
P502	PLUMBING DETAILS (2 OF 2)
P601	PLUMBING SCHEDULES
P701	PLUMBING SPECIFICATION
P901	PLUMBING ISOMETRIC DIAGRAMS(1 OF 2)
P901	PLUMBING ISOMETRIC DIAGRAMS(2 OF 2)

PLUMBING SYMBOLS LIST

	SANITARY PIPING
	VENT PIPING
	COLD WATER PIPING
	HOT WATER PIPING
	HOT WATER RETURN PIPING
	GAS PIPING
	P-TRAP
	PIPE UP
	PIPE DROP
	PLUGGED OUTLET/CLEANOUT
	SHUT-OFF VALVE
	CHECK VALVE
	SLEEVE
	GAS PLUG VALVE
	CHECK VALVE
	VACUUM BREAKER
	WATER HAMMER ARRESTOR
	AIR RELEASE VALVE
	SHOCK ABSORBER
	BALANCING VALVE
	PRESSURE RELIEF VALVE
	POINT OF NEW CONNECTION
	POINT OF DISCONNECTION

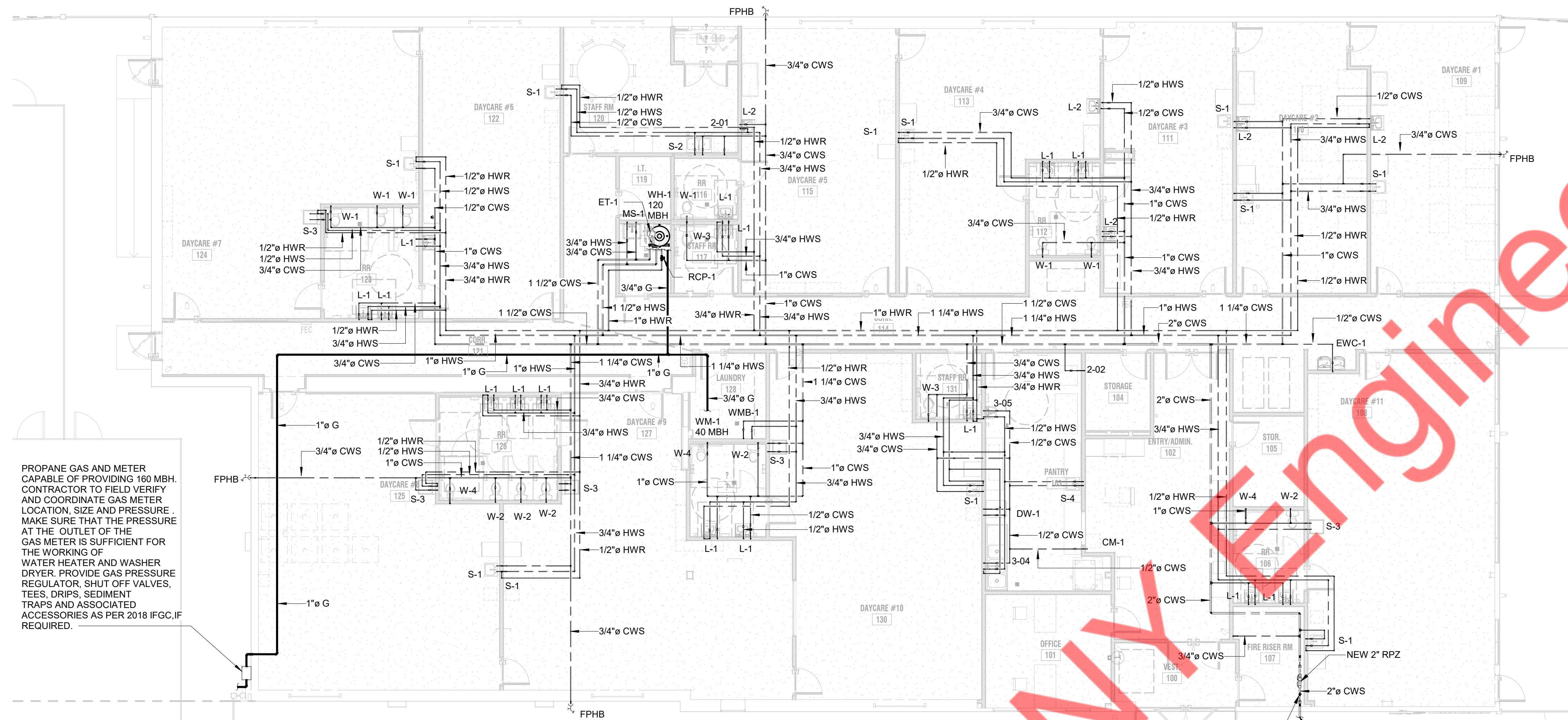
PLUMBING ABBREVIATIONS

AD	AREA DRAIN
AFF	ABOVE FINISH FLOOR
BFP	BACK FLOW PREVENTER
BT	BATH TUB
CO	CLEANOUT
CODP	CLEAN OUT DECK PLATE
CW	COLD WATER
DN	DOWN
DW	DISH WASHER
ET	EJECTOR DISCHARGE
EXIST.	EXISTING
FD	FLOOR DRAIN
G	GAS
GR	GAS RANGE
HW	HOT WATER
HWR	HOT WATER RETURN
HWHT	HOT WATER HEATER
KS	KITCHEN SINK
LAV	LAVATORY
OD	OVERFLOW DRAIN
PD	PUMP DISCHARGE
RD	ROOF DRAIN
S	SOIL
SAN	SANITARY
SH	SHOWER
SQ.FT	SQUARE FEET
TYP.	TYPICAL
TPF	TRAP PRIMER FEED
ST	STORM
V	VENT
W	WASTE
WC	WATER CLOSET
WM	WASHING MACHINE
NIC	NOT IN CONTRACT

GENERAL NOTE:

1. CW/HW PIPING TO BE PROVIDED WITH INSULATION AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 (REFER SHEET P701)
2. PROVIDE BRANCH PRV IF PRESSURE EXCEEDS 80 PSI.
3. CONTRACTOR TO FIELD VERIFY FEASIBILITY OF SLAB PENETRATION AS PER STRUCTURAL REQUIREMENT.
4. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.
5. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED. LOCATE IN FIELD IN COORDINATION WITH ARCHITECT.
6. PROVIDE ELECTRONIC TRAP PRIMER TO ALL FLOOR DRAINS INSTALLED IN MECHANICAL ROOMS & FLOW CONTROLLED TRAP PRIMER ALL OTHER FLOOR DRAINS.
7. ALL HOT & COLD WATER LINES & ALL DRAIN LINES UNDER SINKS SHALL HAVE A FLANGE SUPPLIED BY PLUMBING CONTRACTOR. FINISH TO MATCH FAUCETS AT ALL VANITIES & KITCHEN CABINETS.
8. SANITARY PIPING ROUTED FOR THE EXTERIOR SHALL BE PVC SDR-35 TYPE.

Property of NY Engineers



PROPANE GAS AND METER CAPABLE OF PROVIDING 160 MBH. CONTRACTOR TO FIELD VERIFY AND COORDINATE GAS METER LOCATION, SIZE AND PRESSURE. MAKE SURE THAT THE PRESSURE AT THE OUTLET OF THE GAS METER IS SUFFICIENT FOR THE WORKING OF WATER HEATER AND WASHER DRYER. PROVIDE GAS PRESSURE REGULATOR, SHUT OFF VALVES, TEES, DRIPS, SEDIMENT TRAPS AND ASSOCIATED ACCESSORIES AS PER 2018 IFGC, IF REQUIRED.

DOMESTIC WATER AND GAS PLUMBING PLAN

1 1/8" = 1'-0"

GAS PIPE SIZING PER TABLE 402.4(28), 2018 INTERNATIONAL FUEL GAS CODE.

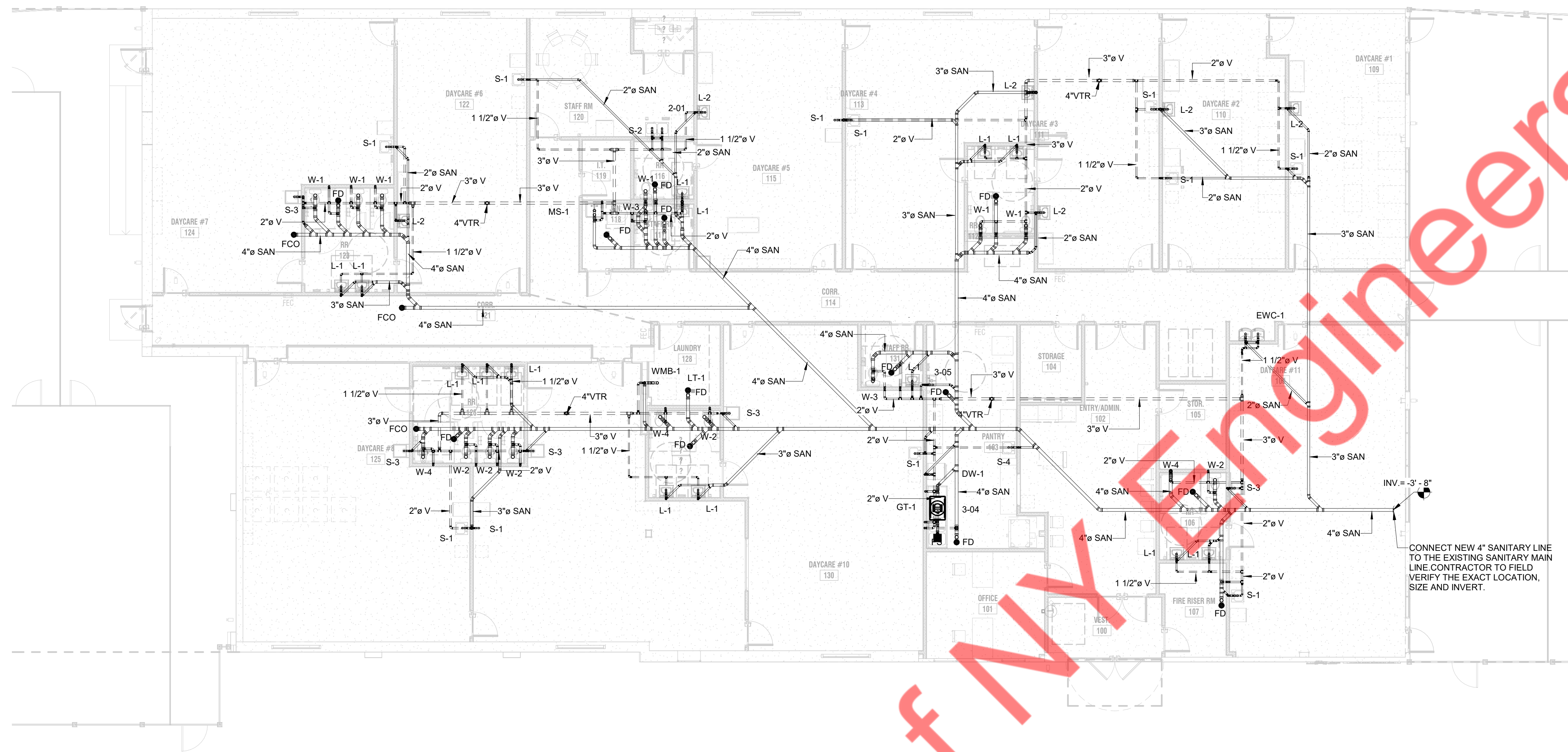
EQUIVALENT LENGTH OF PIPE = 35+15+50+15 = 115 + FITTINGS (+30%) = 149.5 FEET

GAS PIPING TO BE SCHEDULE 40 METALLIC PIPE W/125 CAST IRON SCREWED FITTINGS.

GAS EQUIPMENT LOAD	
EQUIPMENT	GAS LOAD (MBH)
WATER HEATER (WH-1)	120
WASHER DRYER (WM-1)	40
TOTAL	160 MBH

CONNECT NEW 2" DOMESTIC WATER LINE TO THE 2" MAIN WATER SERVICE. CONTRACTOR TO FIELD VERIFY EXACT PRESSURE, SIZE AND LOCATION. PROVIDE BOOSTER PUMP. REFER PLUMBING SCHEDULES FOR PUMP DETAILS.

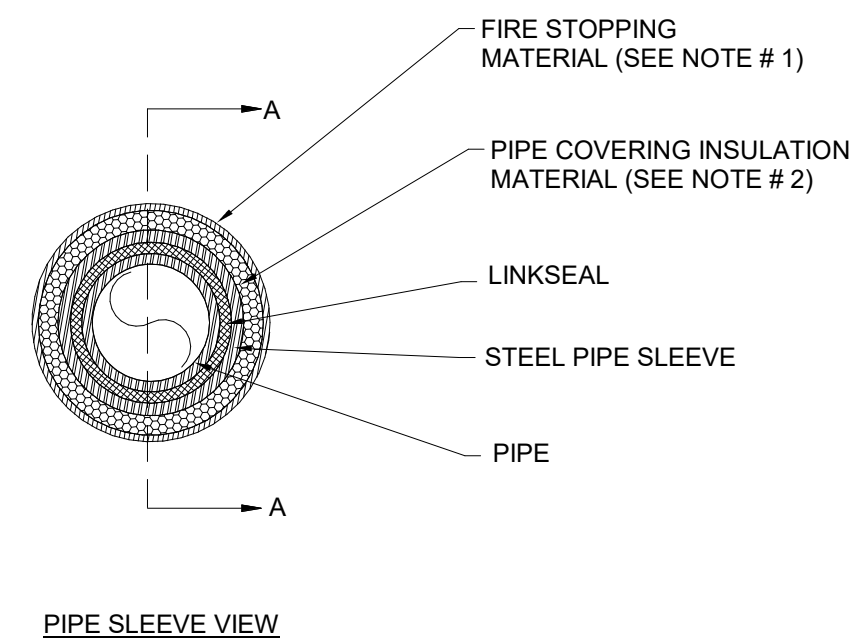
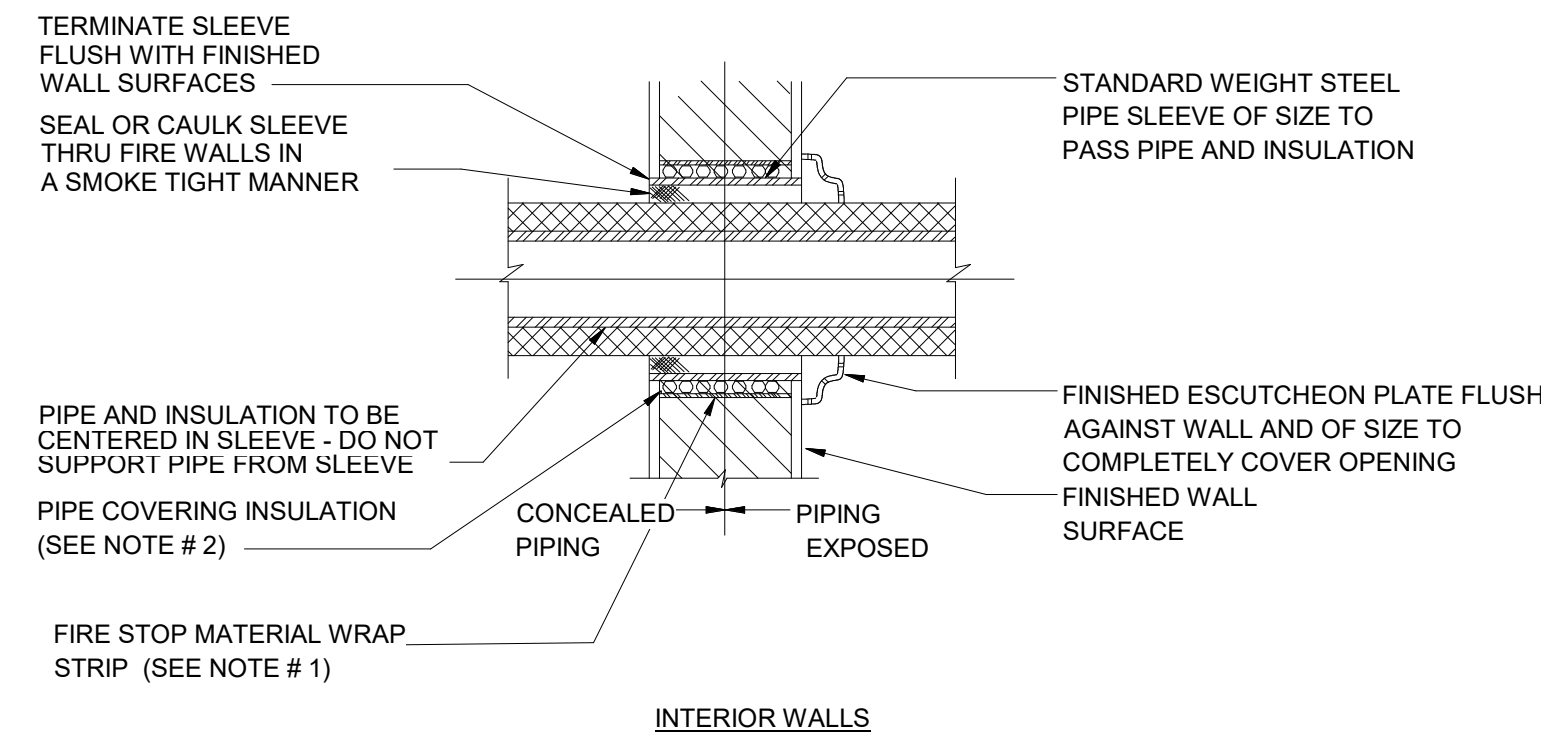
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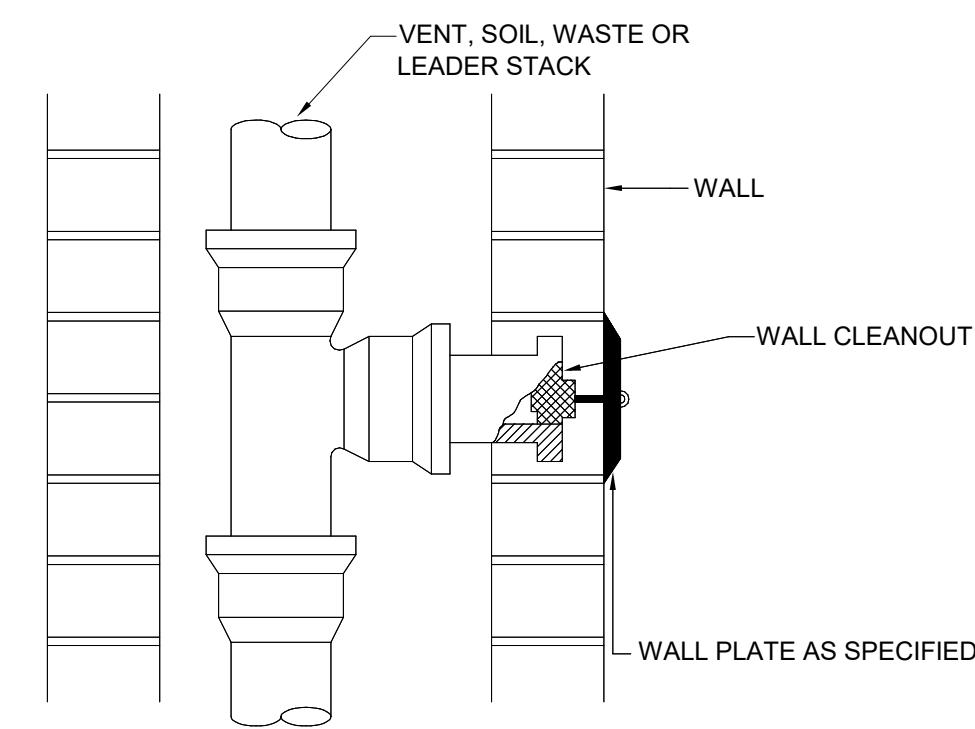
CONNECT NEW 4" SANITARY LINE TO THE EXISTING SANITARY MAIN LINE. CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION, SIZE AND INVERT.

1 SANITARY PLAN
1/8" = 1'-0"

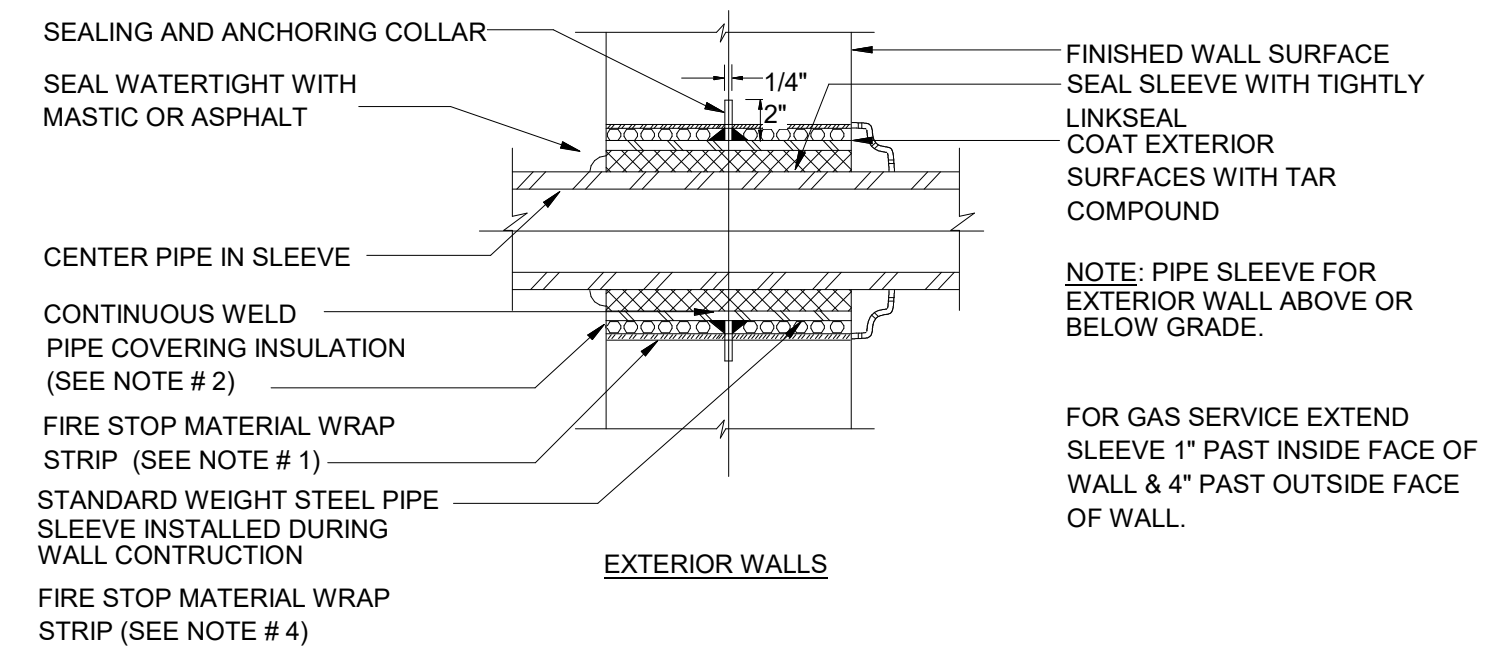
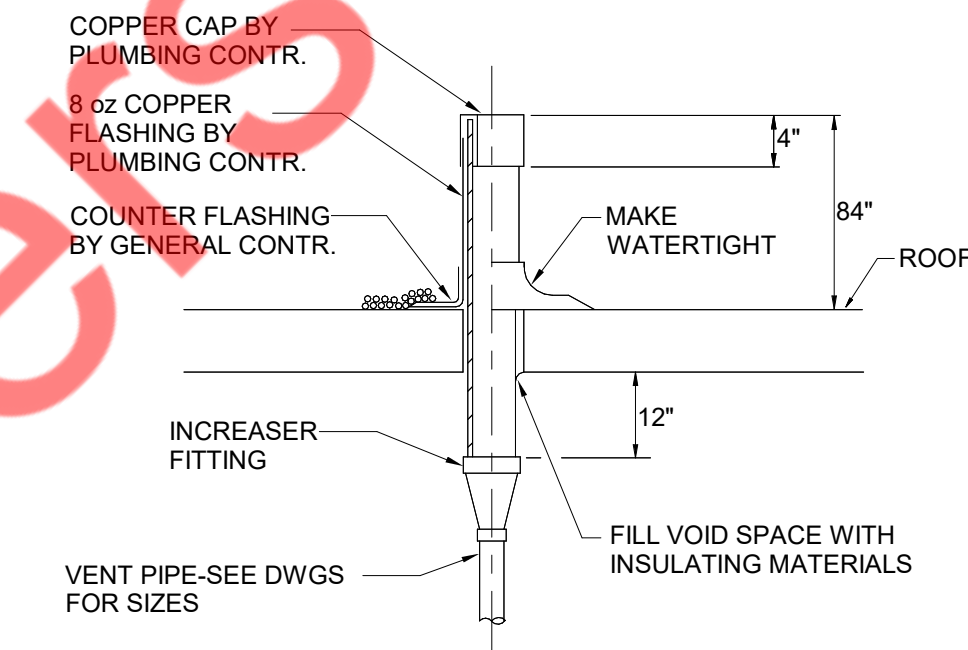
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- NOTES:**
- FIRESTOP MATERIAL WRAP STRIP SHALL BE 1/4" THICK INTUMESCENT ELASTOMERIC MATERIAL FACED ON ONE SIDE WITH ALUMINUM FOIL SUPPLIED IN 2 IN. WIDE STRIPS AND WRAP AROUND THE PIPE AS PER UL MATERIAL LISTED 3M COMPANY FS-195+ OR FILL CAVITY WITH CAULK OR SEALANT MIN. 1/4" DIA. CONTINUOUS BEAD APPLIED TO THE WRAP STRIP/WALL INTERFACE AND TO THE EXPOSED OF THE WRAP STRIP LAYER APPROX. 3/4" FROM WALL SURFACE. AS PER UL LISTED 3M COMPANY CP25WB+, IC 15WB+, FIRE DAM 150+CAULK.
 - PIPE COVERING INSULATION SHALL BE 2" THICK HOLLOW CYLINDRICAL HEAVY DENSITY GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKETED. AS PER UL CLASSIFICATION AND MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 OR LESS MAY BE USED



- NOTES:**
- MINIMUM SIZE OF VENT EXTENSION THROUGH ROOF TO BE 4".
 - CHANGE OF DIAMETER TO BE MADE AT LEAST 12" BELOW ROOF.
 - VENT PIPE TO EXTEND UP TO 7'-0" ABOVE ROOF IN ACCESSIBLE ATERTIGHT BY PROPER FLASHING.
 - ALL VENT RISERS SHALL BE OFFSET AS REQUIRED TO CLEAR ROOF STRUCTURE DUCTWORK OR MECH. ROOF TOP UNITS.
 - PLUMBING CONTRACTOR TO COORDINATE WITH OTHER TRADES.
 - ROOFING CONTRACTOR SHALL SUPPLY BOOT FLASHING FOR RUBBER ROOF SYSTEMS.

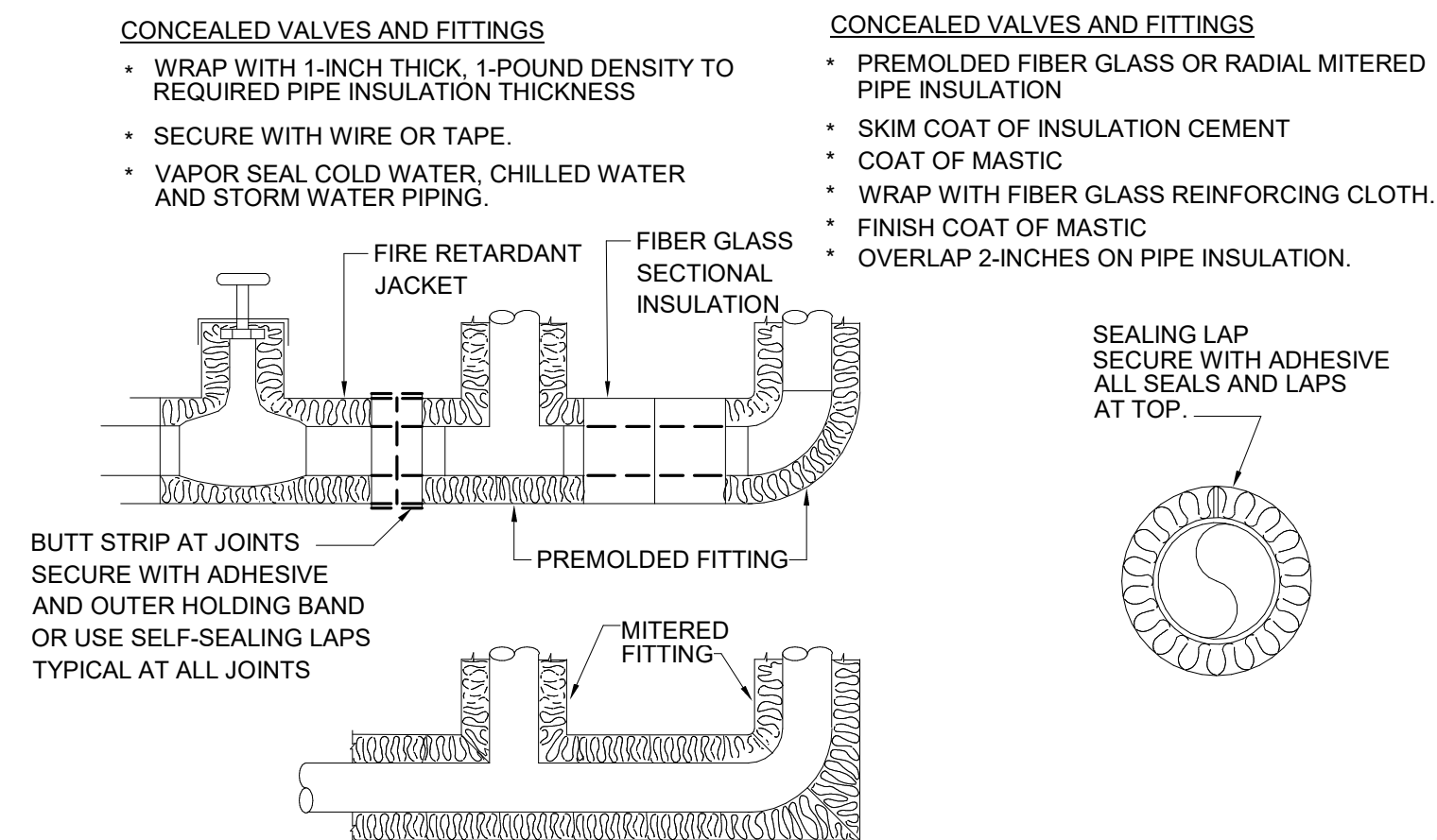


PIPE SLEEVE THRU WALL SECTION

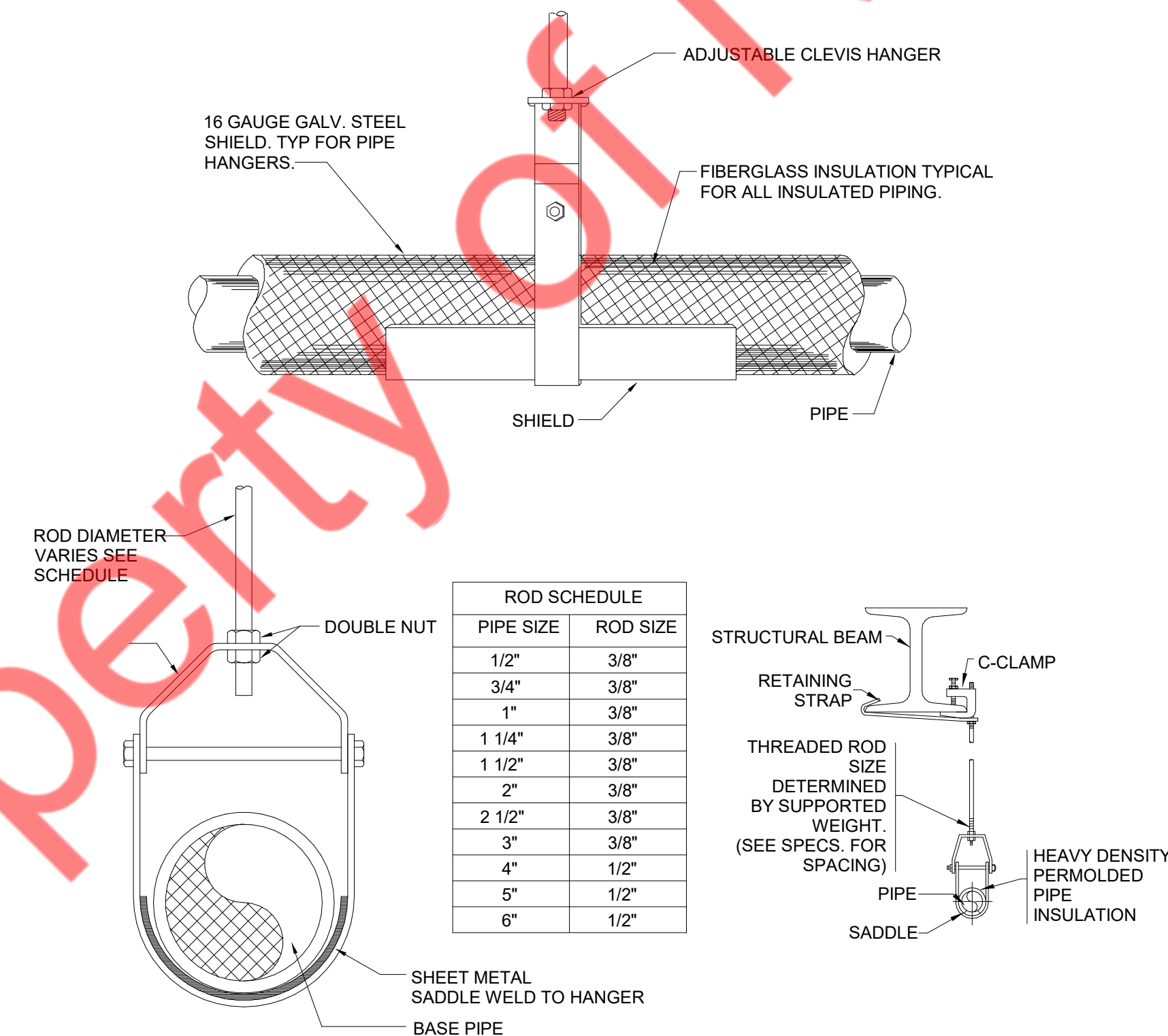
1 PIPE SLEEVE THRU WALL SECTION
P-501 N.T.S

2 WALL CLEANOUT DETAIL
P-501 N.T.S

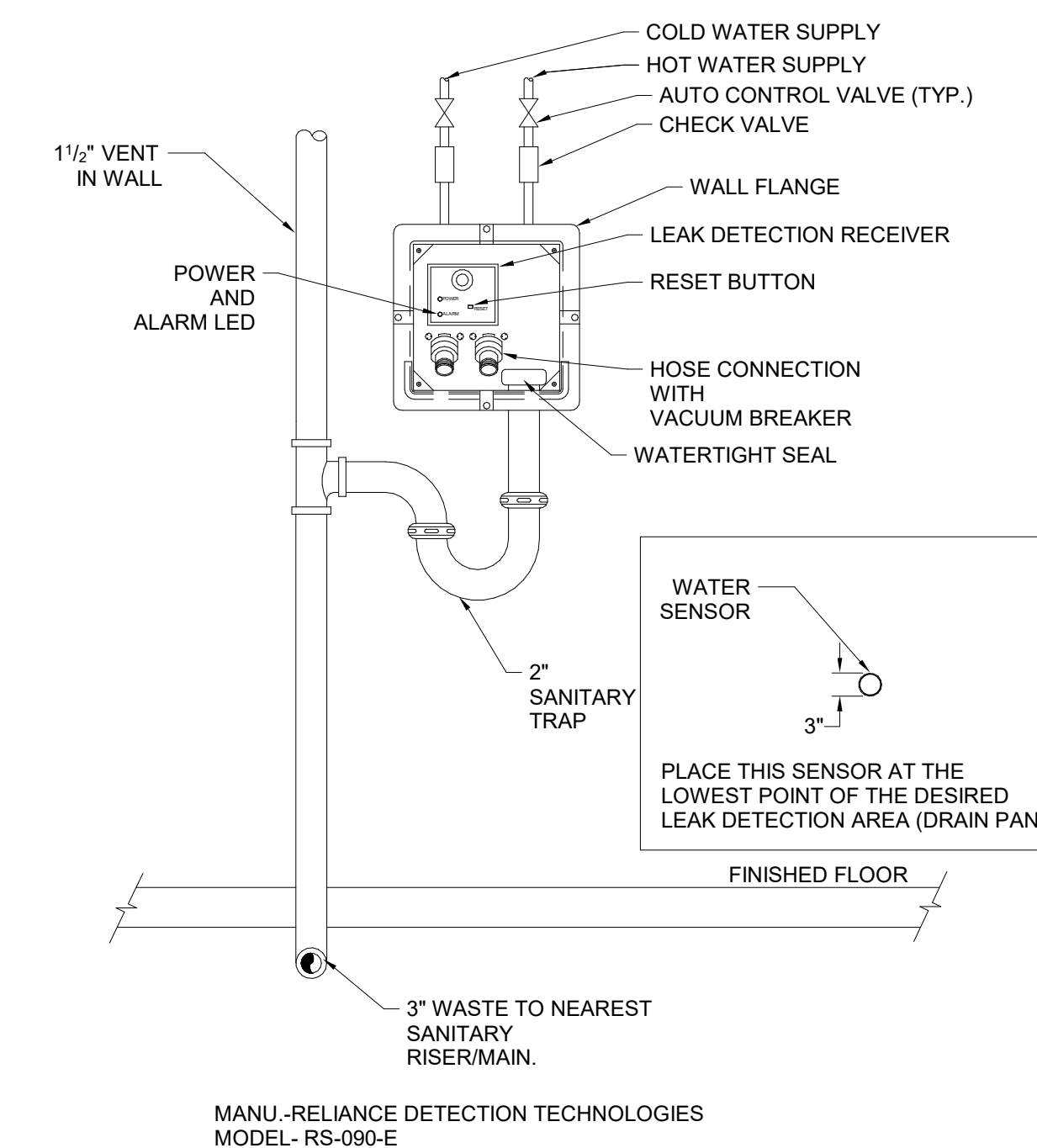
3 VENT INCREASER DETAIL
P-501 N.T.S



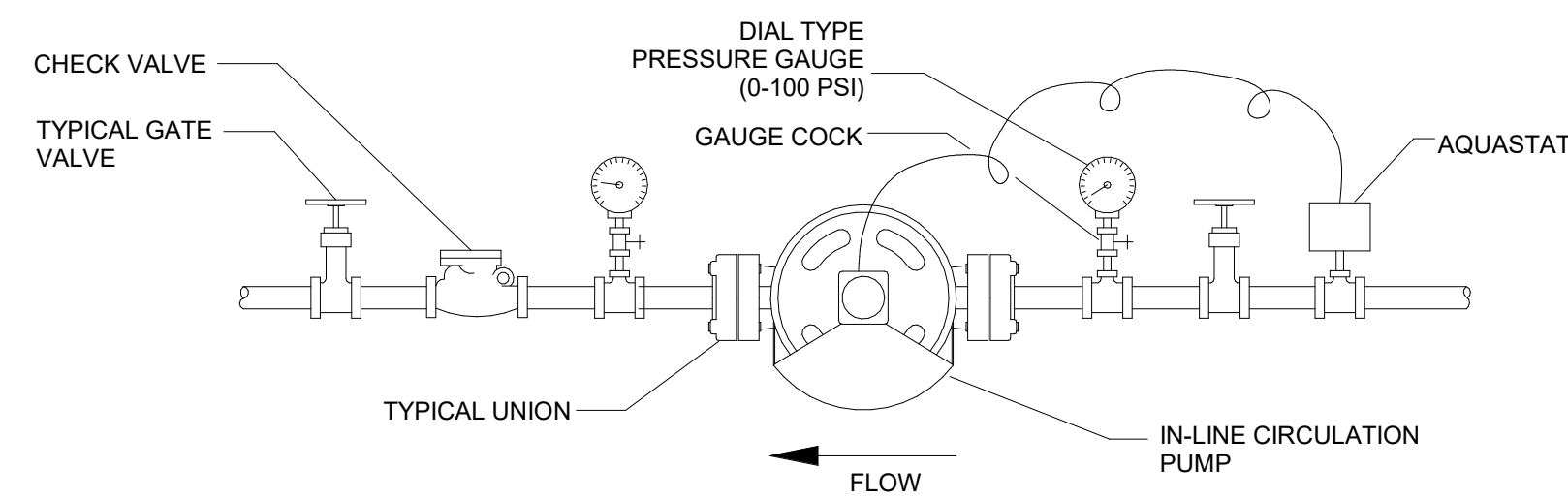
4 INSULATION OF PIPING, VALVES AND FITTINGS FOR EXPOSED AND CONCEALED LOCATIONS
P-501 N.T.S



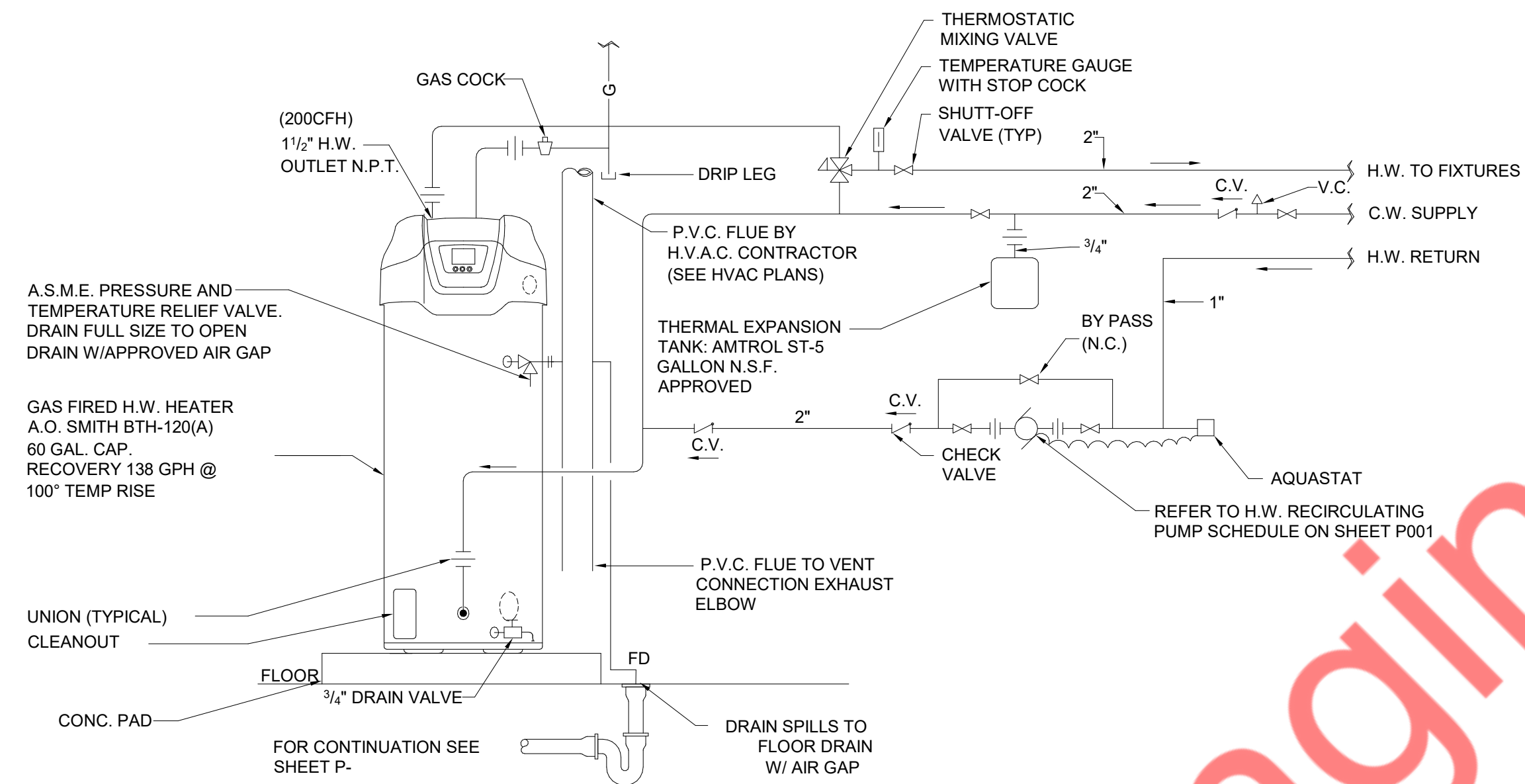
5 HANGER DETAIL
P-501 N.T.S



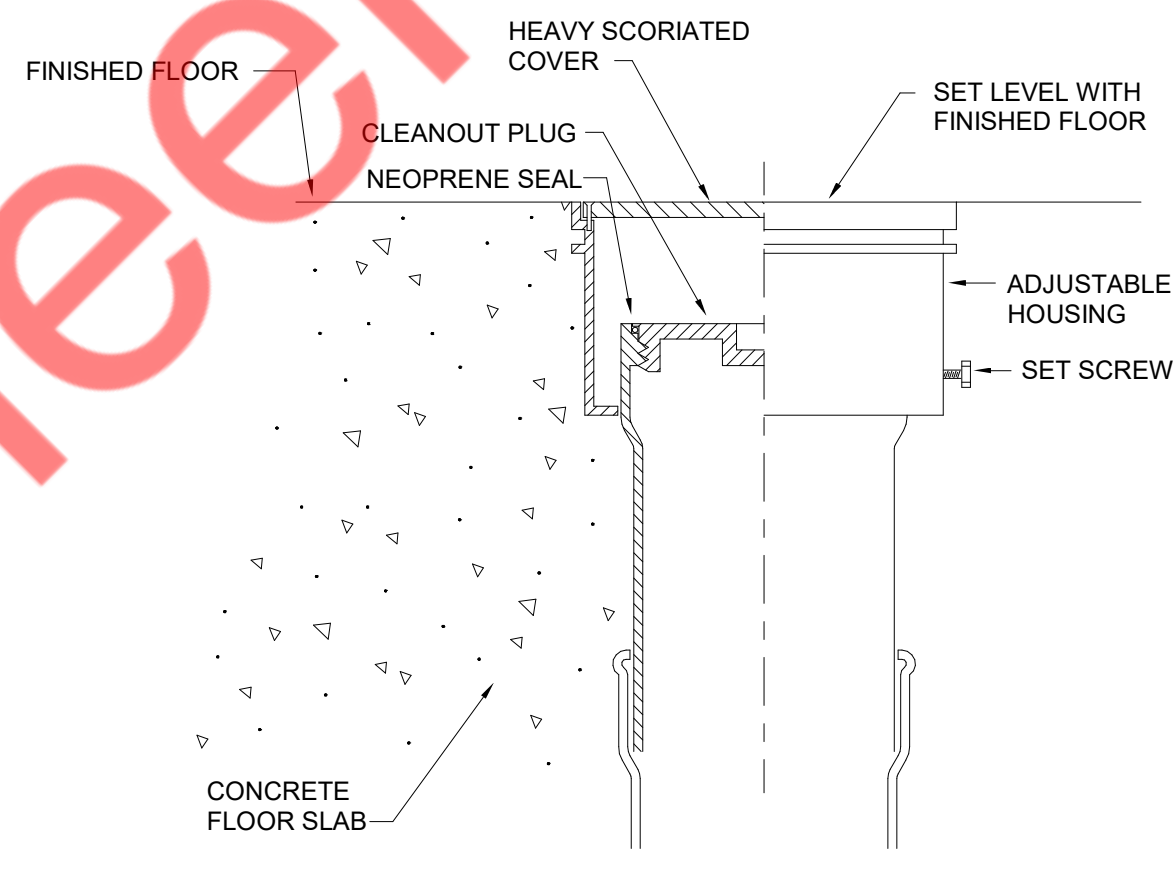
6 WASHER SUPPLY/ DRAIN BOX DETAIL
P-501 N.T.S



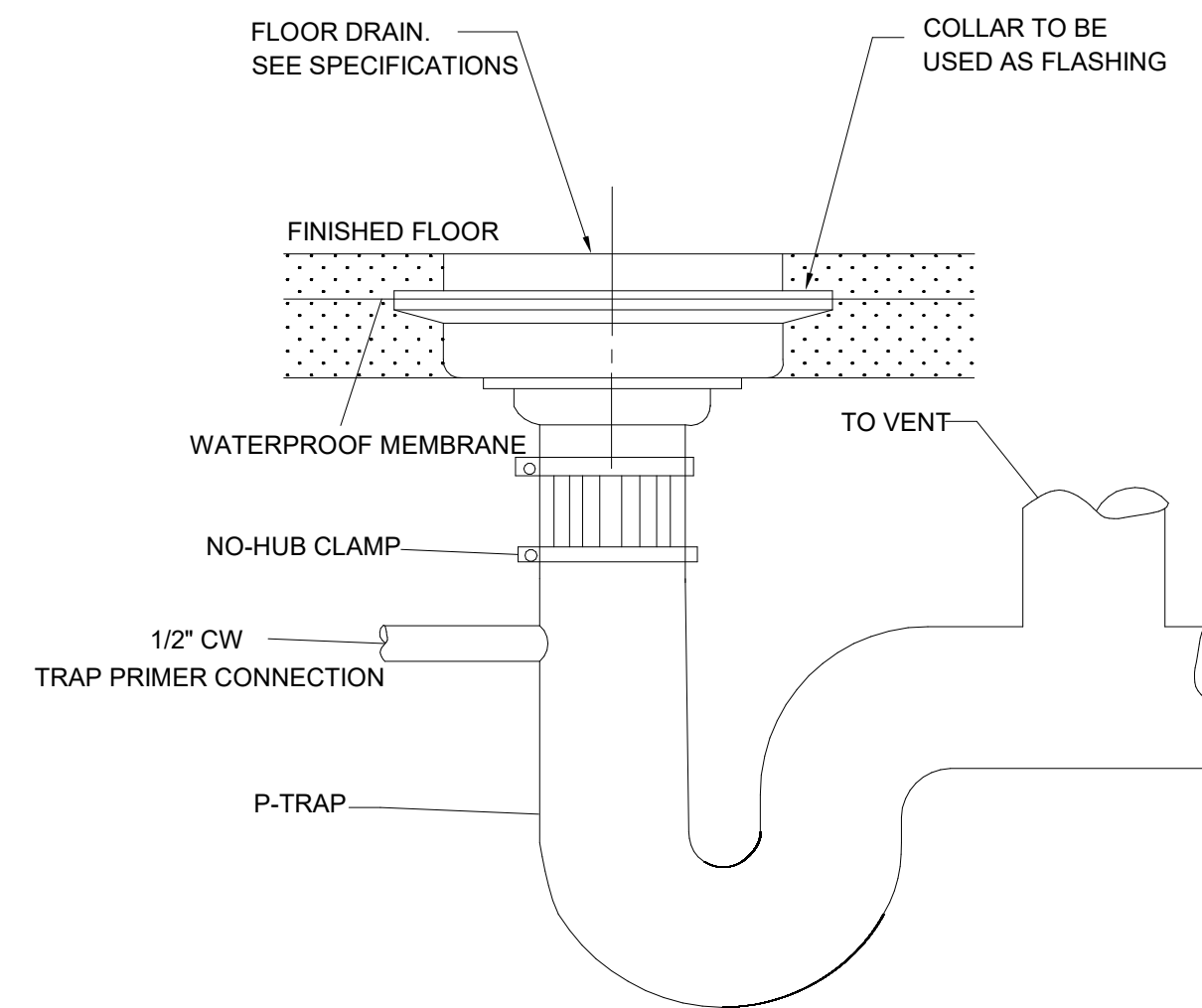
1 INLINE RECIRCULATING PUMP DETAIL
P-502 N.T.S



2 GAS FIRED STORAGE HOT WATER HEATER (FLOOR MOUNTED) DETAIL
P-502 N.T.S



3 FLOOR CLEANOUT DETAIL
P-502 N.T.S



4 FLOOR DRAIN DETAIL
P-502 N.T.S

PLUMBING FIXTURE AND EQUIPMENT SCHEDULE									
TAG	FIXTURE TYPE						MFR	MODEL No.	DESCRIPTION
		SAN	GW	VENT	HW	CW			
BV-1	THERMOSTATIC HOT WATER BALANCE VALVE	-	-	-	1/2"	-	CALEFFI	116441A(C)	THERMOSTATICALLY CONTROLLED ADJUSTABLE BALANCING VALVE SET TO 135 DEG F WITH INTEGRAL OUTLET THERMOMETER. LEAD FREE BRASS CONSTRUCTION. OTHER APPROVED MANUFACTURERS: BELL & GOSSETT, THERMOMEGATECH.
EWC-1	ELECTRIC WATER COOLER	1-1/2"	-	1-1/2"	-	1/2"	ELKAY	EZSTL8WSLK	BI-LEVEL, SELF-CONTAINED, WALL HUNG ELECTRIC REFRIGERATED WATER COOLER WITH SELF-CLOSING EASY-TOUCH CONTROLS ON FRONT AND BOTH RIGHT AND LEFT SIDE. ADA COMPLIANT. BOTTLE FILLING STATION OVER ADA SIDE. ANTIMICROBIAL SURFACES, FILTERED, AND NO LEAD DESIGN. CHILLING CAPACITY OF 50 DEG. F DRINKING WATER. BASED UPON 80 DEG. F INLET WATER AND 90 DEG. F AMBIENT. ELECTRICAL DATA: 370 RATED WATTS, 4.0 FLA, 115V, 1 PHASE, 60 HZ. OTHER APPROVED MANUFACTURERS: OASIS
FCO	FLOOR CLEANOUT	SEE PLANS	SEE PLANS	-	-	-	ZURN	Z1400	ADJUSTABLE CLEANOUT. IF FLOORS ARE TILED OR TERRAZZO PROVIDE WITH EITHER NICKEL BRONZE OR CHROME FINISH. IF FLOORS ARE CARPETED PROVIDE WITH RECESSED TOP. CLEANOUTS ARE TO BE FLUSH WITH FINISHED FLOOR. OTHER APPROVED MANUFACTURERS: J.R. SMITH, WADE
FD-1	FLOOR DRAIN	SEE PLANS	-	SEE PLANS	-	1/2"	J.R. SMITH	2005	FURNISH WITH DUCO CAST IRON BODY WITH TRAP PRIMER CONNECTION, 5" SECURE NICKEL BRONZE GRATE, AND OUTLET AS REQUIRED BY PIPING MATERIAL. COORDINATE WITH THE ARCHITECT FOR SQUARE OR ROUND TRAP TOP. OTHER APPROVED MANUFACTURERS: JOSAM, ZURN, WADE
FD-2	FLOOR DRAIN	SEE PLANS	-	SEE PLANS	-	-	J.R. SMITH	2110	FURNISH WITH DUCO CAST IRON BODY, SEDIMENT BUCKET, 8.5" DIA. SECURE CAST IRON GRATE, AND OUTLET AS REQUIRED BY PIPING MATERIAL. OTHER APPROVED MANUFACTURERS: JOSAM, ZURN, WADE
FPHB	NON-FREEZE HOSE BIBB	-	-	-	-	3/4"	J.R. SMITH	5509QT	NON-FREEZE HOSE BIBB WITH INTEGRAL VACUUM BREAKER AND STAINLESS STEEL RECESSED BOX WITH KEYPED LOCKING MECHANISM. CONTRACTOR TO ORDER PROPER LENGTH HYDRANT REQUIRED BASED ON WALL THICKNESS. COORDINATE BOX FACE FINISH WITH ARCHITECT. MOUNT AT 12"-16" A.F.F. OTHER APPROVED MANUFACTURERS: PRIER, WOODFORD, ZURN, WADE
L-1	LAVATORY (RESTROOM)	1-1/2"	-	1-1/2"	1/2"	1/2"	AMERICAN STANDARD	0355.012	"LUCERNE" WALL HUNG LAVATORY WITH FAUCET LEDGE. FAUCET HOLES ON 4" CENTERS, & WALL HANGER. FAUCET SHALL BE MOEN MODEL 8422F05, 0.5 GPM FLOW RATE, CHROME, 4" CENTERSET, 1/2" CONNECTIONS, AND 4" LEVER HANDLE FURNISH WITH CHROME STOPS, SUPPLIES AND A 1-1/4" WHEELCHAIR LAVATORY DRAIN WITH STAINLESS STEEL GRID AND P-TRAP. PROTECT TRAP AND SUPPLIES WITH A TRAP WRAP KIT 500R AS MANUFACTURED BY BROCAR PRODUCTS INC. LAVATORY MOUNTING HEIGHT SHALL BE AS DETAILED ON ARCHITECTURAL DRAWINGS. PROVIDE TMV-1 SET TO 105°F OUTLET TEMPERATURE. OTHER APPROVED LAVATORY MANUFACTURERS: KOHLER. OTHER APPROVED FAUCET MANUFACTURERS: AMERICAN STANDARD, DELTA.
L-2	LAVATORY (CLASSROOM)	1-1/2"	-	1-1/2"	1/2"	1/2"	AMERICAN STANDARD	0355.012	"LUCERNE" WALL HUNG LAVATORY WITH FAUCET LEDGE. FAUCET HOLES ON 4" CENTERS, & WALL HANGER. FAUCET SHALL BE MOEN MODEL 8400, 1.2 GPM FLOW RATE, CHROME, 4" CENTERSET, 1/2" CONNECTIONS, AND 4" LEVER HANDLE FURNISH WITH CHROME STOPS, SUPPLIES AND A 1-1/4" WHEELCHAIR LAVATORY DRAIN WITH STAINLESS STEEL GRID AND P-TRAP. PROTECT TRAP AND SUPPLIES WITH A WHITE VANDAL RESISTANT SHROUD COVER. LAVATORY MOUNTING HEIGHT SHALL BE AS DETAILED ON ARCHITECTURAL DRAWINGS. PROVIDE TMV-1 SET TO 105°F OUTLET TEMPERATURE. OTHER APPROVED LAVATORY MANUFACTURERS: KOHLER. OTHER APPROVED FAUCET MANUFACTURERS: AMERICAN STANDARD, DELTA.
LT-1	LAUNDRY TUB	1-1/2"	-	1-1/2"	1/2"	1/2"	FIAT	TAT1	HEAVY DUTY POLYETHYLENE, SINGLE BOWL, LAUNDRY TUB WITH LEGS, CHROME PLATED FAUCET (A1) WITH 4" CENTERSET, 4" WRIST BLADE HANDLES, 6-3/4" SWING SPOUT, AERATOR AND HOSE ADAPTOR, LAUNDRY TUB WITH LEGS, FAUCET, INTEGRAL DRAIN WITH PLUG, P-TRAP AND SUPPLY LINE INCLUDED PROVIDE TMV-1 SET TO 120°F OUTLET TEMPERATURE. CONTRACTOR TO PROVIDE PRESSURE VACUUM BREAKER CHICAGO FAUCETS MODEL E27JKCP FOR FAUCET OUTLET. OTHER APPROVED MANUFACTURERS: MUSTEE & SONS
MS-1	WALL HUNG MOP SINK	2"	-	1-1/2"	1/2"	1/2"	MUSTEE & SONS	16 UTILATUB	22" X 16-3/4" X 17-11/16" HIGH, ONE PIECE CO-POLYURE WALL HUNG MOP SINK. FAUCET SHALL BE PART 63.600A WITH BACK SUPPLIES ON 8" CENTERS AND A POLISHED CHROME FINISH AND VACUUM BREAKER. PROVIDE WITH PART 65.700 HOSE AND HOSE BRACKET AND PART 65.600 MOP HANGER. PROVIDE WITH WALL CARRIER AND ALL INSTALLATION HARDWARE.
S-1	SINK	1-1/2"	-	1-1/2"	1/2"	1/2"	ELKAY	LR2219	"LUSTERTONE", 19" x 22", 18 GAUGE-TYPE 304 STAINLESS STEEL SINGLE COMPARTMENT SINK WITH 3 FAUCET HOLES, 18" X 14" X 7-5/8" DEEP COMPARTMENT WITH A 3-1/2" DRAIN OPENING WITH GRID STRAINER. FAUCET SHALL BE CHICAGO FAUCETS MODEL 201-AGBAE35V-317AB, 1.5 GPM FLOW RATE, RIGID/SWING GOOSENECK SPOUT, 4" WRIST BLADE HANDLES, CONCEALED HOT/COLD WATER SUPPLIES. PROVIDE CHROME SUPPLIES, SERVICE STOPS AND 1-1/2" P-TRAP WITH CLEANOUT. PROVIDE TMV-1 SET TO 110°F OUTLET TEMPERATURE. OTHER APPROVED SINK BOWL MANUFACTURERS: JUST, AMERICAN STANDARD, OTHER APPROVED FAUCET MANUFACTURERS: MOEN, DELTA, ZURN
S-2	SINK (DOUBLE BOWL)	1-1/2"	-	1-1/2"	1/2"	1/2"	ELKAY	LRAD292255	"LUSTERTONE", 29" x 22" x 5-1/2", 18 GAUGE-TYPE 304 STAINLESS STEEL TWO COMPARTMENT SINK WITH 4 HOLES, 3-1/2" DRAIN OPENINGS WITH GRID STRAINER ON NON-DISPOSAL SIDE. FAUCET SHALL BE CHICAGO FAUCETS MODEL 200-AGBAE35-317AB, 1.5 GPM FLOW RATE, RIGID/SWING GOOSENECK SPOUT, 4" WRIST BLADE HANDLES, CONCEALED HOT/COLD WATER SUPPLIES, SEPARATE PULL OUT SPRAY ATTACHMENT, CHROME PLATED FINISH. PROVIDE CHROME SUPPLIES, SERVICE STOPS AND 1-1/2" P-TRAP WITH CLEANOUT. PROVIDE TMV-1 SET TO 110°F OUTLET TEMPERATURE. PROVIDE WITH INSINKERATOR LC-50 FOOD WASTE DISPOSAL, 120V/1PH, 1/2 HP. OTHER APPROVED SINK BOWL MANUFACTURERS: JUST, AMERICAN STANDARD, OTHER APPROVED FAUCET MANUFACTURERS: MOEN, DELTA, ZURN
S-3	SINK (ART SINK)	1-1/2"	-	1-1/2"	1/2"	1/2"	MUSTEE & SONS	18W UTILATUB	34" X 20" X 24" HIGH, ONE PIECE CO-POLYURE WALL HUNG MOP SINK. FAUCET SHALL BE PART 93.600, CHROME FINISH, 4" CENTER SET BRASS FAUCET, 7" SWING SPOUT WITH AERATOR, LEVEL HANDLES, REPLACEABLE SEATS AND STEMS.
S-4	SINK	1-1/2"	-	1-1/2"	1/2"	1/2"	ELKAY	PSR1716	"CELEBRITY", 17" x 16" x 7-1/8", 20 GAUGE-TYPE 304 STAINLESS STEEL SINGLE COMPARTMENT SINK WITH SINGLE FAUCET HOLE, 14" X 10" X 7" DEEP COMPARTMENT WITH A 3-1/2" DRAIN OPENING WITH GRID STRAINER. FAUCET SHALL BE JUST MODEL JPO-250, 2.0 GPM FLOW RATE, SWING 8-1/2" GOOSENECK SPOUT, SINGLE HANDLE HAND SPRAY HEAD, POLISHED CHROME FINISH, CONCEALED HOT/COLD WATER SUPPLIES. PROVIDE CHROME SUPPLIES, SERVICE STOPS AND 1-1/2" P-TRAP WITH CLEANOUT. PROVIDE TMV-1 SET TO 110°F OUTLET TEMPERATURE. OTHER APPROVED SINK BOWL MANUFACTURERS: JUST, AMERICAN STANDARD, OTHER APPROVED FAUCET MANUFACTURERS: DELTA MODEL 9152-DST
3-04	3-BAY SINK	2"	-	1-1/2"	3/4"	3/4"	ADVANCE TABCO	FE-3-2424-24L-X	-
3-05	HAND SINK	1-1/2"	-	1-1/2"	1/2"	1/2"	ADVANCE TABCO	7-PS-67	-
DW-1	DISHWASHER	1-1/2"	-	1-1/2"	1/2"	1/2"	CHAMPION	DH-2000	FLOOR MOUNTED, DOOR-TYPE DISHWASHING MACHINE, STAINLESS STEEL WASH AND RINSE ARMS MACHINE
SH-1	SHOWER (ADA)	2"	-	1-1/2"	1/2"	1/2"	CLARION	AN3636RBFSC	36" X 36" WHITE ROLL-IN ONE-PIECE SHOWER PAN AND SURROUND WITH OATEY 42150 SOLID BRASS DRAIN WITH NICKEL PLATED FINISH, ACRYLIC WHITE SHOWER SURROUND WITH CLARION GRAB BAR MODELS 5012, 5018, AND 5020, CLARION FOLDING SEAT MODEL 400-33.5"-SD, CLARION CURTAIN RODE MODEL CR-35 AND CURTAIN, CLARION SOAP DISH MODEL 660, BRADLEY "NAVIGATOR" THERMOSTATIC MIXING SHOWER VALVE MODEL 559-2005TMV, SINGLE HANDLE, BRASS CONSTRUCTION, ASME A112.2/CSA B125.2, ASSE 1016 CERTIFIED, FIELD SET TO 120 DEG F OUTLET TEMPERATURE. BRADLEY HANDHELD SHOWER HEAD MODEL B24 WITH 24" SLIDE BAR AND 60" FLEXIBLE STEEL HOSE, 1.5 GPM FLOW RATE.
TMV-1	THERMOSTATIC MIXING VALVE	-	-	-	3/8"	3/8"	CASH ACME	HG135	POINT OF USE ASSE 1070 RATED THERMOSTATIC MIXING VALVE, 3/8" COMPRESSION RINGS, LEAD FREE BRASS BODY, NICKEL PLATED, WALL SECUREMENT BRACKET. OUTLET TEMPERATURE AS INDICATED ON LAV AND SINK SCHEDULE. OTHER APPROVED MANUFACTURERS: BRADLEY CORP, LAWLER, WATTS, ACORN
WMB-1	WASHING MACHINE BOX	2"	-	1-1/2"	1/2"	1/2"	GUY GRAY	WB-200	20 GA. BOX WITH SINGLE LEVER VALVE, 1/2" NPT BRASS SWEAT CONNECTION AND 2" PVC DRAIN. MAKE FINAL CONNECTIONS TO MACHINE. UNIT SHALL BE 82043. OTHER APPROVED MANUFACTURERS: OATEY, IPS
W-1	FLOOR MOUNTED WATER CLOSET	4"	-	2"	-	1/2"	AMERICAN STANDARD	2315.228	"BABY DEVORO" ROUND FRONT, TANK TOILET, 1.28 GALLONS PER FLUSH, WITH ALL ASSOCIATED TRIM, FITTINGS AND HARDWARE. SEAT SHALL BE WHITE SOLID PLASTIC SEAT WITH STAINLESS STEEL POSTS, SLOW CLOSE, AND OPEN FRONT LESS COVER. PROVIDE WITH METAL FLOOR PLATE AND WAX RING. OTHER APPROVED MANUFACTURERS: KOHLER
W-2	FLOOR MOUNTED WATER CLOSET(ADA)	4"	-	2"	-	1/2"	AMERICAN STANDARD	2467.016	"CADET" RIGHT HEIGHT, PRESSURE ASSIST, 1.6 GALLONS PER FLUSH, ELONGATED FLUSH TANK TOILET WITH ALL ASSOCIATED TRIM, FITTINGS AND HARDWARE. SEAT SHALL BE WHITE SOLID PLASTIC SEAT WITH STAINLESS STEEL POSTS, SLOW CLOSE, AND OPEN FRONT LESS COVER. PROVIDE WITH METAL FLOOR PLATE AND WAX RING. OTHER APPROVED MANUFACTURERS: KOHLER
W-3	FLOOR MOUNTED WATER CLOSET	4"	-	2"	-	1/2"	AMERICAN STANDARD	221CA.004	"COLONY" ELONGATED, STANDARD HEIGHT TANK TOILET, 1.6 GALLONS PER FLUSH, WITH ALL ASSOCIATED TRIM, FITTINGS AND HARDWARE. SEAT SHALL BE WHITE SOLID PLASTIC SEAT WITH STAINLESS STEEL POSTS, SLOW CLOSE, AND OPEN FRONT LESS COVER. PROVIDE WITH METAL FLOOR PLATE AND WAX RING. OTHER APPROVED MANUFACTURERS: KOHLER
W-4	FLOOR MOUNTED WATER CLOSET	4"	-	2"	-	1"	AMERICAN STANDARD	3451.001	FLOOR MOUNT FLUSHOMETER VALVE TOILET, VITREOUS CHINA, 1.1-1.6 GPF, 10-14" RIM HEIGHT, 10" ROUGHING-IN. FLUSHOMETER VALVE, SLOAN REGAL 111 XL OR EQUIVALENT. SEAT: AMERICAN STANDARD 5901.100 HEAVYDUTY COMMERCIAL TOILET SEAT. PROVIDE WITH ALL ASSOCIATED TRIM ACCESSORIES AND HARDWARE.
CM-1	COFEE MAKER	-	-	-	-	1/2"	-	-	PROVIDE BACKFLOW PREVENTOR ON THE WATER SUPPLY
WCO	WALL CLEAN OUT	SEE PLANS	-	-	-	-	J.R. SMITH	4400 SERIES	THREADED CLEANOUT PLUG WITH FERRULE AND ROUND ACCESS COVER WITH EITHER NICKEL BRONZE OR CHROME FINISH. OTHER APPROVED MANUFACTURERS: JOSAM, ZURN, WADE
TP-1	TRAP PRIMER (UNDER-LAV SUPPLY TYPE)	-	-	-	-	1/2"	PPP INC	PRO1-ULP500	UNDER LAV SUPPLY TYPE TRAP PRIMER, ASSE 1018, FOR SERVICE OF A SINGLE FLOOR DRAIN. 1/2" COPPER TUBE TYPE "L" TO FLOOR DRAIN. INSTALLED AT A LAV IN EACH RESTROOM TO SERVE THE SINGLE FLOOR DRAIN IN THAT RESTROOM.
2-01	REFRIGERATOR & FREEZER	-	-	-	-	1/2"	FRIGIDAIRE	TOP FREEZER REFRIGERATOR	STARCK 3 WALL MOUNT, CONCEALED FLUSH TANK, 1.6 GPF, ELONGATED TOILET WITH ALL ASSOCIATED TRIM, FITTINGS AND HARDWARE FOR A COMPLETE INSTALLATION. MOUNTING HEIGHT SHALL BE STANDARD HEIGHT AS DETAILED ON ARCHITECTURAL DRAWINGS. FLUSH TANK SHALL BE GEBERT CONCEALED TANK MODEL 111.335.00.5 WITH GEBERT SIGMA10 DUAL FLUSH HANDS-FREE ACTUATOR WITH MANUAL OVERRIDE MODEL 115.891.SN.5, BRUSHED STAINLESS STEEL FINISH. PLUMBING CONTRACTOR SHALL PROVIDE TRANSFORMER AND 12 VDC WIRING FROM TRANSFORMER TO FLUSH SENSOR. SEAT SHALL BE KOHLER MODEL K-4650 WHITE SOLID PLASTIC SEAT WITH STAINLESS STEEL HARDWARE, OPEN FRONT WITH COVER.
2-02	REFRIGERATOR	-	-	-	-	1/2"	HABCO	SF46SA	FLOOR MOUNTED ELECTRIC REFRIGERATED RIGHT AND LEFT SIDE, ADA COMPLIANT, BOTTLE FILLING STATION OVER ADA SIDE, ANTIMICROBIAL SURFACES, FILTERED, AND NO LEAD DESIGN. CHILLING CAPACITY OF 50 DEG. F DRINKING WATER, BASED UPON 80 DEG. F INLET WATER AND 90 DEG. F AMBIENT. ELECTRICAL DATA: 370 RATED WATTS, 4.0 FLA, 115V, 1 PHASE, 60 HZ. OTHER APPROVED MANUFACTURERS: OASIS
WM-1	WASHING MACHINE	2"	-	1-1/2"	1/2"	1/2"	-	-	CHECK THE BURNER OF THE MODEL AND USE PROPER LP KIT ACCORDINGLY. INSTALLATION AS PER MANUFACTURER'S RECOMMENDATION.

NOTE: CONTRACTOR TO COORDINATE WITH ARCHITECTURAL DRAWINGS FOR ALL PLUMBING FIXTURES SPECIFICATIONS AND MOUNTING HEIGHT INSTALLATION.

EXPANSION TANK SCHEDULE							
TAG	LOCATION	SERVICE	CAPACITY (GALLONS)	MANUFACTURER & MODEL	DIMENSION (DIA X HEIGHT)	WEIGHT (LBS)	NO. OF EXPANSION TANK
ET-1	REFER FLOOR PLANS	HW	6.4	THERM-X-TROL ST-12 C	12" X 14"	42	1

REMARKS:
1. CONTRACTOR SHALL MEASURE THE PRESSURE IN THE SYSTEM AT THE POINT OF INSTALLATION AND ADJUST THE TANK CHARGE PRESSURE TO MATCH THE MEASURED PRESSURE IN THE SYSTEM.
2. TANK SHALL BE ASME RATED.
3. OTHER APPROVED MANUFACTURERS: ELBI, BELL AND GOSSETT, WATTS, ZURN, TACO.

RECIRCULATING PUMP SCHEDULE							
ITEM	QUANTITY	GPM	TOTAL HEAD(FT)	MOTOR HP	MANUFACTURER & MODEL NO	REMARKS	
HWCP-1	1	5	10	1/20	GRUNDFOS UP 26-64F	PROVIDE WITH GRUNDFOS AQUASTAT 595656 & GRUNDFOS PROGRAMMABLE TIMER 599388.	

THERMOSTATIC MIXING VALVE SCHEDULE							
ITEM	SERVING	SERVICE	CAPACITY RANGE (GPM) MIN. MAX.	TEMP. RANGE (°F) MIN. MAX.	MANUFACTURER & MODEL NO.	REMARKS	
MIXING VALVE	HAND SINK, LAVATORY	HOT WATER	0.5 20	120 200	WATTS MODEL LFMVM1	-LEAD FREE VAST COPPER SILICON ALLOY BODY -ASSE 1017 LISTED -CSA APPROVED	

HOT WATER HEATER SCHEDULE							
TAG No.	FIXTURES SERVING	RATED GALLONS	QUANTITY	RECOVERY CAP. (GPH@ RISE)	TYPE	INPUT RATING	MANUFACTURER & MODEL NO.
WH-1	2 COMP. SINK, MOP SINK, HAND SINK, LAVATORY.	60	1	138 GPH @ 100°F	GAS STORAGE WATER HEATER (PROPANE)	120,000 BTU/HR	A.O.SMITH- BTH-120(A)

REMARKS
-DIMENSIONS 27.75"DIA X 53.50" HEIGHT
-WATER HEATERS SHALL HAVE 150PSI WORKING PRESSURE.
-PROVIDE WITH TEMPERATURE & PRESSURE RELIEF VALVE.
-MAINTAIN CLEARANCE AS PER MANUFACTURER RECOMMENDATION.
-PROVIDE WITH DRAIN PAN.

BOOSTER PUMP SCHEDULE										
TAG No.	QUANTITY	SERVICE	GPM	TDH (FT)	HP	VOLT	PHASE	RPM	MANUFACTURER	MODEL NO.
DUPLEX BP-1	2	DOMESTIC WATER	40	30	1	208	3	1750	GOULDS	3656 9BF

GREASE TRAP SCHEDULE	
MARK	GT-1
LOCATION	KITCHEN
SERVICE	SINK AND DISHWASHER
GREASE VOLUME	LBS 439.5
FLOW RATE	GPM 50
DRAIN TIME	MIN 1
INSTALLATION TYPE	BURIED
DIMENSIONS (L X W X H)	IN 4
	IN 37 X 32-1/4 X 28-1/2
MATERIAL	POLYETHYLENE
BASIS OF DESIGN	MANUFACTURER: SCHIER
	MODEL: GB-50
REMARKS	1, 2

REMARKS:
1. INTEGRAL FLOW CONTROL VALVE TO MEET SCHEDULED FLOE RATE.
2. PROVIDE WITH PUMP OUT PORT ACCESSORY, SCHIER MODEL PP3.

BACKFLOW PREVENTORS/VACUUM BREAKERS SCHEDULE				
MARK	BFP-1	BFP-2	BFP-3	BFP-4
TYPE	REDUCED PRESSURE ZONE ASSEMBLY	SPILL RESISTANT VACUUM BREAKER ASSE 1056	DUAL CHECK	DUAL CHECK
LOCATION	FIRE RISER ROOM	-	STAFF RM / PANTRY	ENTRY/ADMIN
SERVICE	DOMESTIC WATER SERVICE	MOP SINK CHEMICAL DISPENSER, DISHWASHER SUPPLY	REFRIGERATOR	COFEE MAKER
ASSE NUMBER	-	1056	1024	1022
SIZE	IN 2	3/4	1/2	1/2
BASIS OF DESIGN	MANUFACTURER: WATTS	WATTS	WATTS	WATTS
	MODEL: LF009QT	LF008PCQT	LF7R	SD3
REMARK	-	-	-	-

BUILDING DEPARTMENT PLUMBING NOTES

ALL PLUMBING SYSTEMS (SANITARY, WASTE, VENT WATER DISTRIBUTION PIPING SYSTEMS) AND ASSOCIATED EQUIPMENT SHALL BE INSTALLED, OPERATED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF 2018 INTERNATIONAL PLUMBING CODE PENNSYLVANIA.

- INSTALLATION OF UNDERGROUND PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 2018 TABLE 702.2
- PROTECTION OF PIPING AND PLUMBING SYSTEM COMPONENTS AS PER SECTION PC 305
- TRENCHING, EXCAVATION AND BACKFILL AS PER SECTION PC 306
- RODENT PROOFING AS PER PER SECTION PC 304
- MATERIALS USED IN PLUMBING SYSTEMS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 303, PC 605, PC 702, PC 902, PC 1102.
- EQUIPMENT CONNECTIONS AND JOINING OF PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTERS 4, 5, 6, 7 AND 9.
- DEEP SEAL TRAPS FOR FLOOR DRAINS SHALL BE PROVIDED AS PER IPC 1002, AND CLEAN-OUTS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 708
- DRAINAGE PIPE CLEANOUTS AS PER SECTION PC 708.
- VERTICAL AND HORIZONTAL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS PER SECTION PC 308
- WATER SUPPLY SYSTEMS SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 6 SECTION PC 601-603, 604, 606, 607, 608, 610
- THE SANITARY DRAINAGE SYSTEM SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 7 SECTION PC 701, 704, 705, 706, 707, 708, 711.
- VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 9 SECTIONS PC 901 THROUGH PC 912 THROUGH PC 917
- GAS PIPING INSTALLATION SHALL IN ACCORDANCE WITH 2018 IFGC.

PLUMBING SPECIFICATIONS:

1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS

1.01 SCOPE

- PROVIDE ALL MATERIAL, TOOLS, SUPERVISION AND LABOR INCLUDING ALL MISCELLANEOUS AND INCIDENTAL ITEMS REQUIRED FOR COMPLETE AND OPERABLE PLUMBING INSTALLATIONS AS SHOWN OR DESCRIBED ON THE DRAWINGS AND IN THESE SPECIFICATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING AND NEW CONDITIONS AND MATERIALS WITHIN THE CONSTRUCTION AREA. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE OWNER'S SATISFACTION.
- OBTAIN ALL PERMITS, PAY ALL PERMIT FEES AND SCHEDULE ALL REQUIRED INSPECTIONS. COPIES OF ALL PERMITS AND INSPECTION CERTIFICATES SHALL BE FORWARDED TO THE OWNER FOR RECORD.
- THE GENERAL CONDITIONS OF THE CONTRACT AND ALL DIVISION 1 REQUIREMENTS APPLY TO THE WORK OF THIS SECTION.
- THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID TO DETERMINE CONDITIONS AND THE EXTENT OF THE WORK. BY COMMENCING WORK, THE CONTRACTOR ACKNOWLEDGES HIS CONFIRMATION OF ALL CONDITIONS AS ACCEPTABLE WITH REFERENCE TO HIS CONTRACT, SCOPE OF WORK AND BID PRICE SUCH THAT NO ADDITIONAL COMPENSATION SHALL BE FORTHCOMING FOR UNFORESEEN EXISTING CONDITIONS.
- IN ALL AREAS SUBJECT TO FREEZING CONDITIONS, THE CONTRACTOR SHALL PROVIDE FREEZE PROTECTION FOR ALL DOMESTIC WATER PIPING INSTALLED UNDER HIS CONTRACT.
- ALL ELECTRICAL REQUIREMENTS SHALL BE COORDINATED WITH THE CONTRACTOR FOR ELECTRICAL WORK. THIS CONTRACTOR IS RESPONSIBLE FOR ALL LOW VOLTAGE WIRING FOR EQUIPMENT INSTALLED UNDER HIS CONTRACT. THE CONTRACTOR FOR ELECTRICAL WORK IS RESPONSIBLE FOR LINE VOLTAGE POWER WIRING ONLY.
- COLOR AND FINISH SELECTIONS FOR ALL MATERIALS, INCLUDING PAINTING OF PIPING, SHALL BE AS DIRECTED AND/OR APPROVED BY THE ARCHITECT.
- MINOR DETAILS NOT SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER AND ACCEPTABLE CONSTRUCTION, INSTALLATION OR OPERATION OF ANY PART OF THE WORK AS DETERMINED BY THE ENGINEER SHALL BE INCLUDED AS IF SPECIFIED OR INDICATED ON THE DRAWINGS.
- THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIREMENTS FOR THE INSTALLATION, CONNECTION, EXTENSION OR MODIFICATION TO ALL UTILITY SERVICES WITH RESPECTIVE PROVIDERS INCLUDING PAYMENT OF ALL ASSOCIATED FEES.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL PAINTING ASSOCIATED WITH CUTTING AND PATCHING, ALL PAINTING IN AREAS WITH COMPLETE FINISH RENOVATIONS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.

1.02 SUBMITTALS

- SUBMITTAL REQUIREMENTS SHALL BE COORDINATED WITH THE ARCHITECT AND AUTHORITIES HAVING JURISDICTION, UNLESS OTHERWISE DIRECTED, CONTRACTOR SHALL PROVIDE SUBMITTALS AS LISTED BELOW.
 - PIPE AND FITTINGS
 - VALVES
 - HANGERS AND SUPPORTS
 - PLUMBING PIPING LAYOUT
 - TESTS
 - PLUMBING FIXTURES
 - WATER HEATERS & ACCESSORIES
 - MIXING VALVES
 - ALL SCHEDULED PLUMBING EQUIPMENT
- SUBMITTALS FROM SUPPLIERS OR MANUFACTURERS WHICH DO NOT BEAR THE STAMP OF THE SUBMITTING CONTRACTOR INDICATING THAT THE CONTRACTOR HAS REVIEWED THE SUBMITTAL FOR CONFORMANCE WITH THE PROJECT REQUIREMENTS WILL BE RETURNED REJECTED.
- THE ENGINEER'S REVIEW OF SUBMITTALS IS A COURTESY WHICH DOES NOT RELIEVE THE CONTRACTOR FROM CONFORMING WITH THE CONSTRUCTION DOCUMENTS, REGARDLESS OF THE ACTION INDICATED BY THE SHOP DRAWINGS STAMP.
- REVIEW OF SHOP DRAWINGS BY THE ENGINEER SHALL BE LIMITED TO THE INITIAL REVIEW AND A SECOND REVIEW OF ANY REQUIRED RESUBMITTED DATA. IF THE ENGINEER IS REQUIRED TO REVIEW SHOP DRAWINGS FOR A THIRD (OR MORE) SUBMISSION OF THE SAME ITEM, THE CONTRACTOR SHALL BE LIABLE FOR COMPENSATING THE ENGINEER FOR THESE SUBSEQUENT REVIEWS AS PER THE ENGINEER'S CURRENT HOURLY RATE SCHEDULE.
- SUBMIT PROOF OF APPROVAL AND/OR CONFIRMATION OF SATISFACTORY TEST RESULTS TO THE OWNER AND THE ARCHITECT.
- SUBMIT TO THE OWNER'S MAINTENANCE PERSONNEL OPERATION AND MAINTENANCE DATA FOR ALL SYSTEM COMPONENTS, SERVICING REQUIREMENTS, INSPECTION DATA, REPLACEMENT PART NUMBERS AND AVAILABILITY AND CONTACT INFORMATION FOR SERVICE/SUPPLY COMPANY.
- FOR ALL BELOW GRADE PIPING WHERE ACTUAL INSTALLATION DEVIATES FROM CONSTRUCTION DRAWINGS, THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS INDICATING BELOW GRADE PIPE LOCATIONS DIMENSIONED TO NEAREST COLUMN LINES.
- RECORD AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE OWNER/TENANT AFTER COMPLETION OF THE WORK SHOWING ANY ALTERATIONS, ADDITIONS AND/OR DELETIONS TO THE SYSTEM(S) INSTALLED.

1.03 SUBSTITUTIONS

- ALL EQUIPMENT SHALL BE PRODUCTS OF THE SPECIFIED MANUFACTURER OR MANUFACTURERS. ALL BIDS SHALL BE BASED ON THE SPECIFIED MANUFACTURER OR MANUFACTURERS EQUIPMENT. FOR SUBSTITUTIONS OF OTHER MANUFACTURER'S EQUIPMENT TO BE CONSIDERED, THE SUBSTITUTION MUST BE INDICATED PRIOR TO BIDDING WITH THE REASON FOR THE PROPOSED SUBSTITUTION IDENTIFIED, AND THE PROPOSED CREDIT TO THE OWNER INDICATED. THE ENGINEER SHALL DETERMINE THE ACCEPTABILITY OF ANY PROPOSED SUBSTITUTIONS.
- THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR COORDINATING THE WORK OF OTHER TRADES WHICH MAY BE AFFECTED BY SUBSTITUTIONS, INCLUDING ALL RELATED COSTS.
- DEFINITIONS
- FURNISH: TO PURCHASE, PROCURE, ACQUIRE AND DELIVER, COMPLETE WITH RELATED ACCESSORIES.
- INSTALL: TO ERECT, MOUNT AND CONNECT, COMPLETE WITH RELATED ACCESSORIES.
- PROVIDE: TO FURNISH AND INSTALL.
- PLUMBING CONTRACTOR, THE CONTRACTOR, THIS CONTRACTOR: THE CONTRACTOR FOR PLUMBING WORK WHICH IS SPECIFIED HEREIN AND SHOWN ON THESE DRAWINGS.
- REFER TO THE NATIONAL STANDARD PLUMBING CODE FOR ADDITIONAL DEFINITIONS.

1.06 DRAWINGS

- THE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO ILLUSTRATE THE GENERAL ARRANGEMENT AND ROUTING OF PIPING AND GENERAL LOCATIONS OF EQUIPMENT, PRECISE LOCATIONS OF EQUIPMENT, RISERS AND STACKS, AND ROUTING AND ELEVATION OF ALL PIPING SYSTEMS SHALL BE COORDINATED IN THE FIELD WITH THE ARCHITECT, ARCHITECTURAL DRAWINGS, THE WORK OF OTHER TRADES, EXISTING AND NEW BUILDING CONDITIONS AND/OR THE PREFERENCES OF THE OWNER/TENANT AS CONSTRUCTION PROCEEDS. ALL PIPING SHALL BE INSTALLED CONCEALED IN FINISHED SPACES, UNLESS NOTED OTHERWISE.
- PROVIDE ALL NECESSARY INCIDENTAL MATERIALS AND ACCESSORIES REQUIRED TO MAKE THE WORK COMPLETE IN ALL RESPECTS, EVEN IF NOT PARTICULARLY SHOWN OR SPECIFIED.
- REFER TO PLUMBING EQUIPMENT/FIXTURE SCHEDULE ON THE DRAWINGS FOR ALL FIXTURE AND EQUIPMENT SPECIFICATIONS.
- REFER TO FIXTURE CONNECTION SIZE SCHEDULE FOR ALL FIXTURE ROUGHING SIZE REQUIREMENTS.
- VERIFY ALL INDICATED CONDITIONS BEFORE STARTING WORK AND REPORT ANY DISCREPANCIES. THE DRAWINGS REFLECT CONDITIONS WHICH CAN BE REASONABLY INTERPRETED FROM THE EXISTING VISIBLE CONDITIONS OR FROM DRAWINGS AND INFORMATION FURNISHED BY THE OWNER.
- LOCATE ALL FIXTURES AND EQUIPMENT AS PER THE FINAL ARCHITECTURAL DRAWINGS.

1.07 PRODUCTS

A. DOMESTIC WATER PIPING:

- ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD-DRAWN COPPER TUBE.
- FITTINGS IN DOMESTIC WATER PIPING SHALL BE WROUGHT COPPER OR CAST BRASS.
- JOINTS SHALL BE MADE WITH LEAD-FREE SOLDER.
- THE ENTIRE DOMESTIC WATER DISTRIBUTION SYSTEM SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.
- COMPLY WITH NSF 61 FOR MATERIALS FOR WATER-SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.
- ALL DOMESTIC WATER PIPING ABOVE GRADE SHALL BE INSULATED WITH FIRE-RETARDANT, FACTORY-APPLIED VAPOR BARRIER INSULATION PIPING WITH FACTORY-APPLIED VAPOR BARRIER INSULATION REQUIREMENT SHOULD COMPLY WITH ENERGY CONSERVATION CODE 2018 SECTION C403.3.11 REFER BELOW TABLE.

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	MINIMUM PIPE INSULATION THICKNESS		NOMINAL PIPE OR TUBE SIZE (INCHES)				
	CONDUCTIVITY BTU-IN/(H-FT ² -°F)	MEAN RATING TEMPERATURE, °F	<1	<1 to <1-1/2	<1-1/2 to <4	<4 to <8	>8
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	0.5	0.5	0.5	0.5	0.5

- WATER-HEATING EQUIPMENT AND HOT WATER STORAGE TANKS SHALL MEET THE MINIMUM PERFORMANCE REQUIREMENTS GIVEN IN THE IECC 2015, SECTION C404.2, TABLE 404.2. THE EFFICIENCY SHALL BE VERIFIED THROUGH DATA FURNISHED BY THE MANUFACTURER OF THE EQUIPMENT OR THROUGH CERTIFICATION UNDER AN APPROVED CERTIFICATION PROGRAM.
- HW SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015 C404.5, THE HW PIPE LENGTH FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER FOLLOWING TABLE.

NOMINAL PIPE SIZE (INCHES)	MAXIMUM PIPING LENGTH	
	PUBLIC LAV	OTHER FIXTURE
1/2"	2'	43'
3/4"	0.5'	20'
1"	0.5'	13'
1-1/4"	0.5'	8'
1-1/2"	0.5'	6'
2" OR LARGER	0.5'	4'

- WATER DISTRIBUTION SYSTEM AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.7, HAVING ONE OR MORE RECIRCULATION PUMPS THAT PUMP WATER FROM A HEATED-WATER SUPPLY PIPE BACK TO THE HEATED-WATER SOURCE THROUGH A COLD-WATER SUPPLY PIPE SHALL BE A DEMAND RECIRCULATION WATER SYSTEM. PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:
 - THE CONTROL SHALL START THE PUMP UPON RECEIVING A SIGNAL FROM THE ACTION OF A USER OF A FIXTURE OR APPLIANCE, SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE FITTING OR APPLIANCE.
 - THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD-WATER PIPING TO 104°F (40°C).

- AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.6.1 HEATED-WATER CIRCULATION SYSTEMS SHALL BE PROVIDED WITH CIRCULATION PUMP. THE SYSTEM RETURN PIPE SHALL BE A DEDICATED RETURN PIPE OR A COLD WATER SUPPLY PIPE. CONTROLS FOR CIRCULATING HOT WATER SYSTEM PUMPS SHALL START THE PUMP BASED ON THE IDENTIFICATION OF A DEMAND FOR HOT WATER WITHIN THE OCCUPANCY. THE CONTROLS SHALL AUTOMATICALLY TURN OFF THE PUMP WHEN THE WATER IN THE CIRCULATION LOOP IS AT THE DESIRED TEMPERATURE AND WHEN THERE IS NO DEMAND FOR HOT WATER.

- HW SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER IECC 2018 C404.5.1. THE HW PIPE LENGTH FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER FOLLOWING TABLE.

B. SANITARY AND VENT PIPING:

- ABOVE GRADE PIPING SHALL BE HUBLESS CAST IRON PIPE WITH STAINLESS STEEL COUPLINGS AND ELASTOMERIC GASKETS WITH A MINIMUM 4 BANDS PER COUPLING.
- SLOPE OF DRAINAGE SYSTEM SHALL BE 1/8" PER FOOT OF RUN FOR PIPE OVER 3" (I.D.) AND 1/4" PER FOOT OF RUN FOR PIPE 3" AND SMALLER (I.D.). VENT PIPING SHALL BE PITCHED TO DRAIN.
- PVC OR OTHER COMBUSTIBLE PLASTIC PIPING SHALL NOT BE INSTALLED IN CEILING PLENUM SPACES.
- ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE (CISPI) AND BE LISTED BY NSF INTERNATIONAL.
- SEAL ALL JOINTS BETWEEN SEGMENTS OF INSULATION.
- PROVIDE SHIELDS BETWEEN HANGERS AND INSULATION.
- AS PER IECC 2018 C404.3 STORAGE TANK TYPE WATER HEATERS AND HOT WATER STORAGE TANKS THAT HAVE VERTICAL WATER PIPES CONNECTING TO THE INLET AND OUTLET OF THE TANK SHALL BE PROVIDED WITH INTEGRAL HEAT TRAPS AT THOSE INLETS AND OUTLETS OR SHALL HAVE PIPE CONFIGURED HEAT TRAPS IN THE PIPING CONNECTED TO THOSE INLETS AND OUTLETS.

C. HANGERS AND SUPPORTS:

- HANGERS SHALL BE STANDARD STEEL, MALLEABLE OR WROUGHT IRON, AS MANUFACTURED BY GRINNELL OR APPROVED EQUAL, SUITABLE FOR THE TYPE OF CONSTRUCTION. PIPING SHALL NOT BE HUNG FROM OTHER PIPE.
- SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.
- ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS.
- PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND STANDARDS AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
- UNLESS OTHERWISE INDICATED OR REQUIRED BY AUTHORITIES HAVING JURISDICTION, THE FOLLOWING SHALL BE PROVIDED WITH SEISMIC RESTRAINTS AS REQUIRED BY THE BOCA NATIONAL BUILDING CODE, SECTION 1610.6.4: ALL EQUIPMENT AND MACHINERY, ALL NEW PIPING 2-1/2" AND LARGER (1-1/4" AND LARGER INBOLTERMECHANICAL ROOMS) WITH HANGERS GREATER THAN 12" IN LENGTH FROM THE TOP OF PIPE TO THE STRUCTURE.
- SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPING MANUFACTURER.

D. VALVES:

- PROVIDE GATE VALVES, BUTTERFLY OR BALL VALVES FOR SHUT-OFF DUTY ON MAIN AND BRANCH SUPPLY LINES. FOR ALL PIPE RUNS 2" AND SMALLER, PROVIDE BALL FOR ALL PIPE RUNS LARGER THAN 2" AND SMALLER THAN 4", PROVIDE GATE VALVES. PIPING 4" AND LARGER, PROVIDE BUTTERFLY VALVES FOR SHUT-OFF DUTY.
- ALL FIXTURES WITH THE EXCEPTION OF FLUSHMETER-EQUIPPED WATER CLOSETS AND URINALS SHALL HAVE STOP VALVES TO CONTROL SUPPLY TO THE FIXTURE. WHERE SUPPLIES ARE EXPOSED PROVIDE CHROME-PLATED STOPS WITH CHROME-PLATED ESCUTCHEONS ON PIPING PENETRATIONS.
- ALL PLUMBING FIXTURES AND EQUIPMENT TO HAVE SHUT-OFF VALVES ON SUPPLY LINES.
- ALL BRANCH LINES TO HAVE SHUT-OFF VALVES.
- ALL VALVES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS WHERE REQUIRED FOR VALVE ACCESS.
- PROVIDE GLOBE VALVES FOR THROTTLING/BALANCING OF THE HOT WATER CIRCULATING SYSTEM.

E. SLEEVES AND ESCUTCHEONS:

- SLEEVES THROUGH STRUCTURAL CONCRETE MEMBERS AND SLEEVES FOR WALLS BELOW GRADE AND FLOORS ON GRADE SHALL BE STANDARD WEIGHT GALVANIZED SCHEDULE 40 STEEL PIPE. SLEEVES THROUGH OTHER THAN STRUCTURAL COMPONENTS OF THE BUILDING SHALL BE 20 GAGE GALVANIZED SHEET METAL WITH LOCK SEAM JOINTS. USE THERMAFIBER SAFING INSULATION SHALL BE INSTALLED BETWEEN PIPE AND SLEEVE.
- PIPE ESCUTCHEON PLATES SHALL BE INSTALLED WHERE EXPOSED PIPING PASSES THROUGH WALLS, CEILINGS, AND FLOORS AND SHALL BE MINIMUM 20 GAGE STEEL. PROVIDE CHROME PLATED ESCUTCHEON PLATES IN FINISHED AREAS.

F. DRAINAGE ACCESSORIES F:

- GENERAL:
 - INSTALL THE WORK OF THIS SECTION IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, UNLESS OTHERWISE SPECIFIED.
 - SECURE EXTERNAL COMPONENTS IN PLACE WITH VANDAL RESISTANT FASTENERS OR DEVICES WHICH CANNOT BE REMOVED WITHOUT SPECIAL TOOLS.
- INSTALL PIPING TO CONSERVE BUILDING SPACE. DO NOT INTERFERE WITH USE OF BUILDING SPACE AND THE WORK OF OTHER TRADES. ALL PIPING RUN IN CEILING SHALL BE INSTALLED TIGHT TO THE STRUCTURE ABOVE.

- INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE JOINTS OR CONNECTED EQUIPMENT. PROVIDE PIPE ANCHORS, GUIDES AND EXPANSION JOINTS OR LOOPS IN ALL HOT WATER AND HOT WATER CIRCULATING MAIN SUPPLY PIPING AND SEGMENTS OF SUCH PIPE THAT EXCEED 30'-0" IN LENGTH.

- IN ALL AREAS WITH FINISHED SURFACES, SYSTEM PIPING AND I. COMPONENTS SHALL BE CONCEALED ABOVE OR WITHIN FINISHED SURFACES.

- REDUCTIONS IN PIPE SIZES SHALL BE MADE WITH ONE-PIECE REDUCING FITTINGS. BUSHINGS ARE NOT ACCEPTABLE. USE FLANGED FITTINGS AT THE BASE OF RISERS.

- VENT PENETRATIONS THROUGH THE ROOF SHALL BE FLASHED.

- IF WATER PRESSURE EXCEEDS 80 PSI, A WATER PRESSURE REDUCING VALVE SHALL BE INSTALLED IN WATER PIPING AT CONNECTION TO MAIN.

- PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.

- PIPE BACKFLOW PREVENTER DRAINS TO FLOOR DRAIN OR OTHER APPROVED INDIRECT WASTE SOURCE.

- PROVIDE ACCESS DOORS/PANELS FOR SERVICE AND ACCESS TO ALL VALVES AND OTHER SYSTEM COMPONENTS ENCLOSED IN WALLS AND CEILINGS. ACCESS DOORS SHALL BE FURNISHED BY THIS CONTRACTOR, INSTALLED BY THE GENERAL CONTRACTOR.

- ALL FIXTURES REQUIRING VACUUM BREAKERS SHALL BE EQUIPPED WITH INTEGRAL VACUUM BREAKERS.

- ANY PENETRATIONS THROUGH FIRE RATED PARTITIONS, FLOORS, OR CEILINGS SHALL BE STEEL SLEEVE AND SEALED WITH 3M BRAND UL RATED FIRE BARRIER CAULK OR APPROVED EQUAL.

- WHEN THE WATER PIPING SYSTEM IS COMPLETE, THOROUGHLY R. FLUSH ALL DIRT, SEDIMENT, SOLDER, ETC., OUT OF THE SYSTEM, REMOVING ALL STRAINERS, VALVE STEM SEATS, ETC., REQUIRED TO ACCOMPLISH THE FLUSHING.

- AT ALL INDIRECT WASTE DRAINS, MAINTAIN AIR GAP AS REQUIRED BY CODE. INSTALL SLEEVES FOR ALL PIPES WHICH PASS THROUGH WALLS.

- FLOORS, AND CEILINGS, WHERE PIPES ARE TO BE INSULATED, THE SLEEVE SHALL BE LARGE ENOUGH TO ACCOMMODATE INSULATION. SLEEVES SHALL BE FLUSH WITH FINISHED SURFACES AT BOTH ENDS. ON FINISHED SURFACES IN EXPOSED AREAS PROVIDE ESCUTCHEONS COMPATIBLE WITH FINISH.

- PROVIDE WATER HAMMER ARRESTERS ON SUPPLY PIPING TO ALL FLUSHMETER VALVES AND QUICK-CLOSING VALVES.
- MAINTAIN ALL REQUIRED AND RECOMMENDED CLEARANCES FOR ALL PLUMBING SYSTEM COMPONENTS AND EQUIPMENT.

2. INSTALLATION

2.01 GENERAL

- ALL WORK WHICH REQUIRES DISRUPTION OF THE ROOFING SHALL BE DONE BY A CONTRACTOR CERTIFIED BY THE ROOFING MANUFACTURER AS REQUIRED TO MAINTAIN ANY EXISTING ROOF WARRANTIES.
- EXTERIOR INSTALLATIONS TO BE WEATHER PROOF IN ALL RESPECTS.
- EXTERIOR MATERIALS AND EQUIPMENT SHALL BE PAINTED TO PREVENT CORROSION. COLOR PER ARCHITECT.
- COORDINATE THE PLUMBING WORK WITH ALL OTHER AFFECTED TRADES AND THE CONSTRUCTION SCHEDULE.
- REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN AND FERROUS END PIPE.
- REMOVE SCALE AND FOREIGN MATERIAL, FROM INSIDE AND OUTSIDE, BEFORE ASSEMBLY.
- PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES AND UNIONS.
- COORDINATION WITH THE WORK OF OTHER TRADES IS REQUIRED. PROVIDE OFFSETS IN PIPING SYSTEMS OR MINOR DEVIATIONS TO THE INDICATED PIPE ROUTING IN ORDER TO COORDINATE THE PLUMBING WORK WITH THE WORK OF ALL OTHER TRADES AND THE GENERAL BUILDING CONDITIONS.
- NO DOMESTIC WATER PIPING SHALL BE INSTALLED IN UNHEATED SPACES.

- PRIOR TO DISCONNECTING AND CONNECTING NEW WORK TO EXISTING SYSTEMS, THE PLUMBING CONTRACTOR SHALL NOTIFY THE PROPERTY MANAGER AND OFFER A PROPOSED SCHEDULE OF WORK. ESB WILL AUTHORIZE CONNECTIONS AND COORDINATE NECESSARY SHUT DOWNS AND DRAIN DOWNS AS REQUIRED. SHUT DOWNS AND DRAIN DOWNS MAY BE PERFORMED BY THE PLUMBING CONTRACTOR ONLY AFTER RECEIVING ESB AUTHORIZATION, AND SHOULD BE PERFORMED UNDER SUPERVISION OF ESB PERSONNEL. THREE (3) DAYS ADVANCE NOTICE TO THE PROPERTY MANAGER IS REQUIRED.

- THE PLUMBING CONTRACTOR IS ADVISED THAT DUE TO THE NATURE OF THE OPERATIONS AND TENANT REQUIREMENTS, CONNECTIONS TO EXISTING SYSTEMS MAY HAVE TO BE MADE AFTER REGULAR WORKING HOURS. THE PROPERTY MANAGER WILL ADVISE THE PLUMBING CONTRACTOR OF THE TIME CONSTRAINTS UPON RECEIPT AND APPROVAL OF THE PLUMBING CONTRACTOR'S REQUEST FOR SHUT DOWN AND CONNECTION TO EXISTING SYSTEMS.

- WHEN CONNECTING TO EXISTING STACKS AND RISERS, PROVISION IS TO BE MADE FOR FUTURE CONNECTIONS BY PROVIDING CAPPED AND VALVED OUTLETS ON DOMESTIC WATER RISERS AND PLUGGED OUTLETS ON THE SANITARY AND VENT STACKS.

2.02 ABOVE GRADE

- INSTALL PLUMBING PIPING IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PIPING COMPLIES WITH REQUIREMENTS AND SERVES INTENDED PURPOSES.

- ROUTE PIPING IN AN ORDERLY MANNER, PLUMB AND PARALLEL TO BUILDING STRUCTURE. MAINTAIN GRADIENT. SLOPE PIPING AND ARRANGE SYSTEMS TO DRAIN. IN DOMESTIC WATER SYSTEMS, PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES AND ALL LOW POINTS IN PIPING.

- USE EXISTING CONNECTIONS AT MAINS WHERE AVAILABLE FOR NEW BRANCH PIPING. LOCATE ALL RISERS AND PIPING BEFORE CONSTRUCTION COMMENCES AND TAKE CARE NOT TO DAMAGE SAME. ANY DAMAGE OCCURRING TO THE EXISTING PIPING WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

2.03 INSULATION

- COVER ALL HOT WATER AND HOT WATER RECIRCULATION PIPE WITH 1" THICK FOR PIPE SIZE UP TO 1 1/4" AND 1 1/2" THICK FOR PIPE SIZE 1 1/2" AND GREATER WITH MANVILLE MICRO-LOK AP-T PLUS FIBERGLASS INSULATION. COVER ALL COLD WATER PIPE WITH 1/2" THICK FOR PIPE SIZE UP TO 1 1/4" AND 1" THICK FOR PIPE SIZE 1 1/2" AND GREATER WITH 1" MANVILLE MICRO-LOK AP-T PLUS FIBERGLASS INSULATION. FITTINGS AND VALVES SHALL BE INSULATED WITH MANVILLE ZESTON 2000 PLUS INSULATED FITTING COVERS. INSTALL ALL INSULATION AS PER MANUFACTURERS RECOMMENDATIONS. ALL INSULATION MATERIAL SHALL COMPLY WITH THE NEW YORK CITY BUILDING CODE REQUIREMENT OF A FLAME SPREAD RATING NOT TO EXCEED 25 AND A SMOKE DEVELOPED RATING NOT TO EXCEED 50. ALL PIPE INSULATION SHALL COMPLY WITH 2018 INTERNATIONAL ENERGY CONSERVATION CODE.

3. TESTING

- AT THE COMPLETION OF THE PLUMBING WORK, COMPLETELY TEST THE ENTIRE INSTALLATION OF ALL SYSTEMS FOR PROPER OPERATION AND COMPLIANCE WITH APPLICABLE CODES AND LOCAL REQUIREMENTS. CORRECT ALL DEFICIENCIES FOUND.
- TESTING OF THE INSTALLED SYSTEMS SHALL BE MADE BY THE CONTRACTOR IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER.
- THE CONTRACTOR SHALL NOT COVER UP OR PERMANENTLY CONCEAL PIPING, DEVICES OR ANY PORTION OF NEWLY CONSTRUCTED PLUMBING SYSTEM(S) UNTIL SUCH SYSTEM, OR PORTION OF THE SYSTEM, HAS BEEN TESTED IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER AND INSPECTED BY THE LOCAL INSPECTOR AND APPROVED IN WRITING, EXCEPT PIPING PASSING THROUGH FLOORS, WALLS, PARTITIONS, OR BEAMS, FOR DISTANCES EQUAL TO THE THICKNESS OF SUCH FLOOR, WALL, PARTITION OR BEAM.
- THIS CONTRACTOR SHALL NOTIFY THE VARIOUS DEPARTMENTS, BUREAUS AND INDIVIDUALS AT LEAST TWO WEEKS IN ADVANCE OF THE TIME THAT THE TESTS ARE TO BE CONDUCTED.

- ALL DEFECTIVE PARTS SHALL BE REPLACED OR CORRECTED BY THIS CONTRACTOR AND AN EXTRA TEST OR TESTS SHALL BE MADE UNTIL THE OPERATION IS SATISFACTORY. ALL ARRANGEMENTS AND EXPENSES NECESSARY TO CONDUCT ALL TESTS REQUIRED BY THESE SPECIFICATIONS AND THE VARIOUS AGENCIES HAVING JURISDICTION OVER THE WORK INSTALLED UNDER THIS CONTRACT SHALL BE MADE BY THIS CONTRACTOR. NO EXTRA COMPENSATION WILL BE ALLOWED FOR THESE TESTS, THE COST THEREOF BEING INCLUDED IN THE LUMP SUM BID FOR THIS CONTRACT.
- WHERE ANY EVIDENCE OF STOPPAGE IS FOUND IN PIPING OR EQUIPMENT, THIS CONTRACTOR SHALL DISCONNECT, CLEAN, REPAIR AND RECONNECT ALL OBSTRUCTED PIPING OR EQUIPMENT AND SHALL ALSO PAY FOR ALL NECESSARY CUTTING AND REPAIRS TO ADJOINING WORK.

- ALL PIPING AND EQUIPMENT SHALL BE THOROUGHLY CLEANED INSIDE AND OUT, OF DIRT, CUTTINGS, OILS AND OTHER FOREIGN SUBSTANCES AND SHALL BE LEFT CLEAN.

- ALL REQUIRED TESTS SHALL BE WITNESSED BY LOCAL AUTHORITIES AND THE OWNER'S REPRESENTATIVE.

- ALL EQUIPMENT WILL BE FACTORY TESTED.

- CONTRACTOR SHALL IDENTIFY TO THE OWNER'S REPRESENTATIVE ANY LEAKS OR DAMAGE THAT OCCURS AS A RESULT OF SYSTEM TESTING. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO LIMIT ANY POTENTIAL DAMAGE. CORRECTIVE ACTION REQUIRED AS A RESULT OF TESTING SHALL BE PERFORMED IMMEDIATELY AND AT THE CONTRACTOR'S EXPENSE.

- REPORT IN WRITING TO AUTHORITIES HAVING JURISDICTION, THE ARCHITECT AND THE OWNER THE RESULTS OF ALL TESTING.

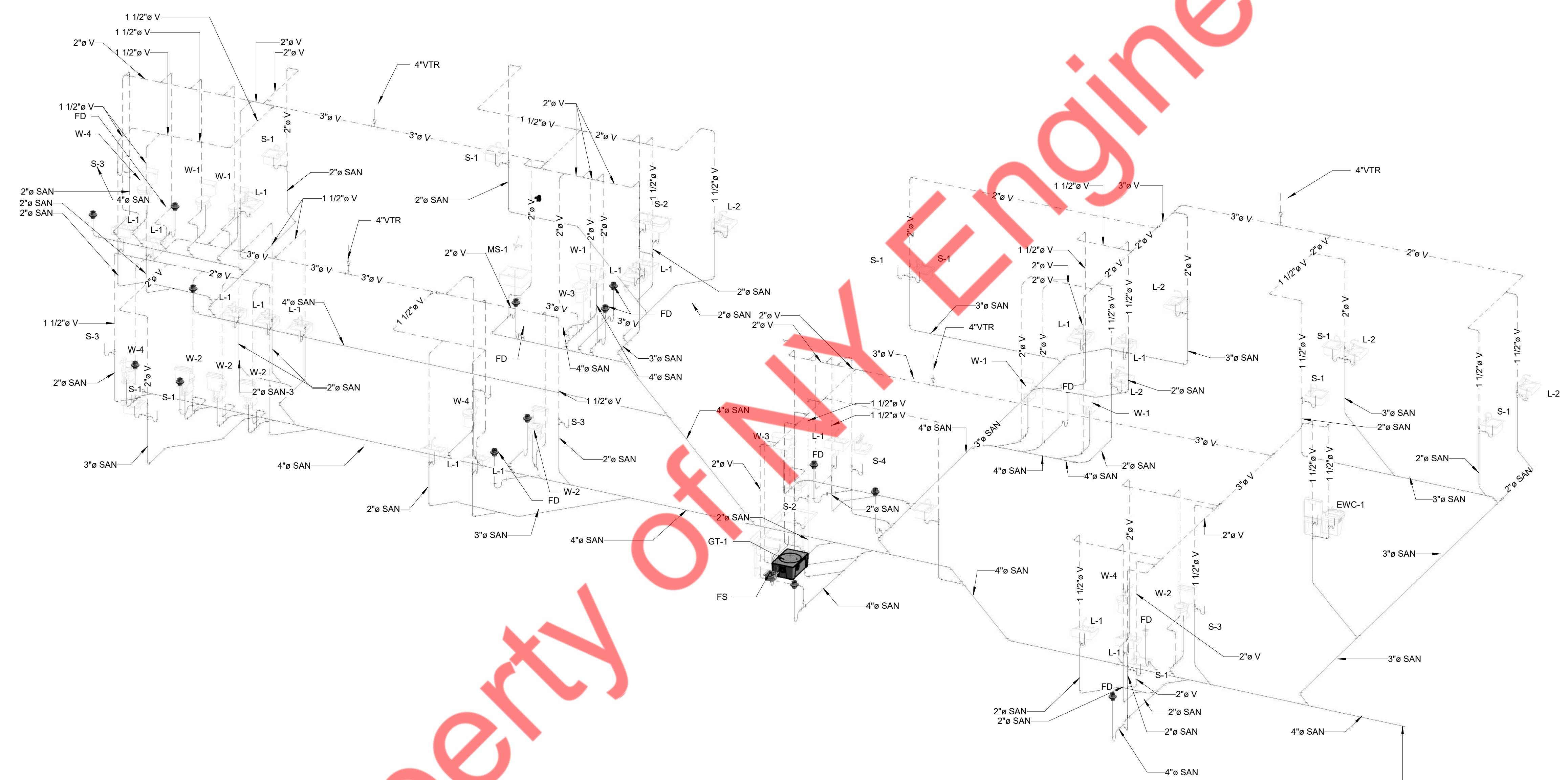
- TESTING REQUIREMENTS
 - TEST ALL DOMESTIC WATER PIPING HYDROSTATICALLY TO 125 PSIG.
 - HYDROSTATIC TEST PRESSURES SHALL REMAIN CONSTANT WITH NO VARIATION FOR 120 MINUTES.
 - TESTS SHALL BE WITNESSED BY THE BUILDING ENGINEER.
 - THE PLUMBING CONTRACTOR WILL BE HELD RESPONSIBLE FOR ALL DAMAGE DUE TO TEST FAILURES AND LEAKAGE IN THE TEST AREA AND ADJACENT TENANT OR ESB SPACES.

- REFILL ENTIRE POTABLE HOT AND COLD WATER SUPPLY SYSTEM WITH CHLORINE SOLUTION (WITH OLIN CHEMICAL CORP.) AT A STRENGTH TO MEET STANDARDS OF THE DEPARTMENT OF HEALTH, AND FOR A PERIOD OF RETENTION AS STIPULATED.

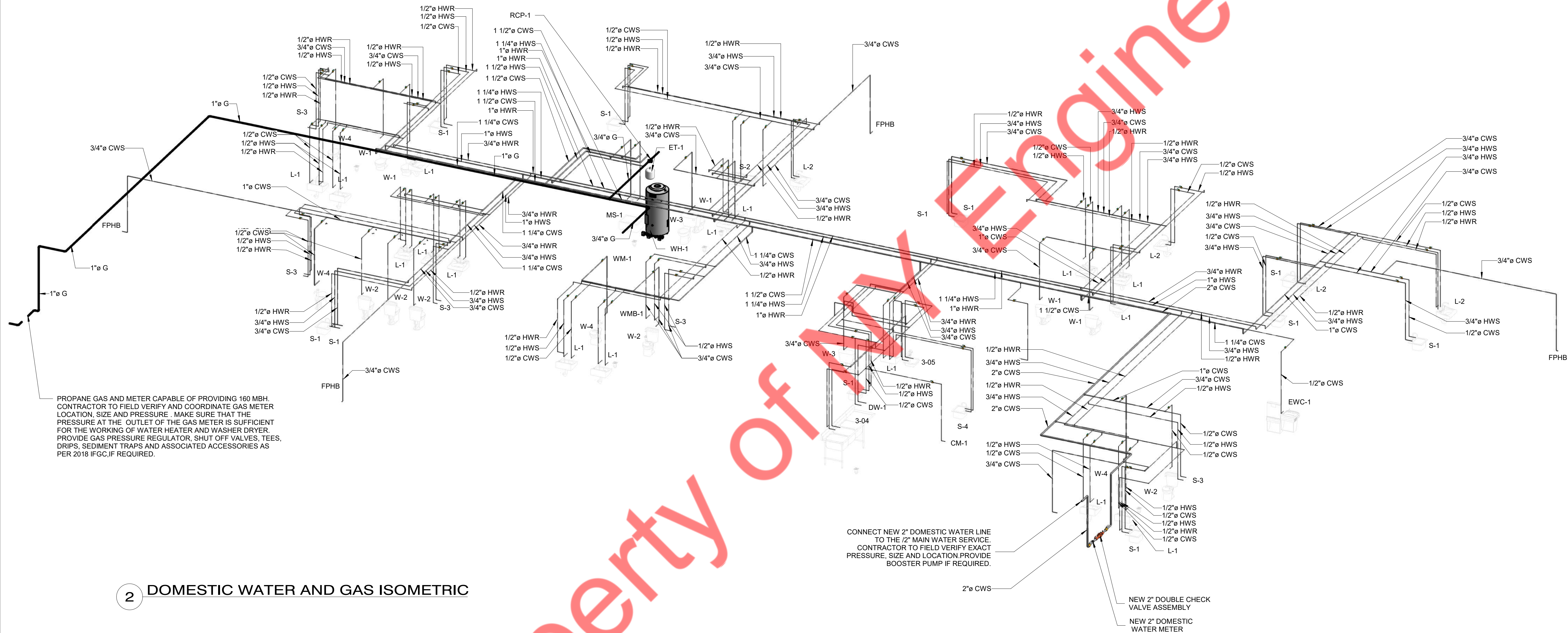
- THOROUGHLY FLUSH PIPING SYSTEM WITH FRESH WATER IMMEDIATELY PRIOR TO FINAL ACCEPTANCE.

- WARRANTY
 - EQUIPMENT, MATERIALS AND WORKMANSHIP FURNISHED UNDER THIS CONTRACT SHALL BE GUARANTEED BY THE CONTRACTOR FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER. THE CONTRACTOR SHALL KEEP THE WORK IN GOOD REPAIR FOR ONE YEAR AFTER THE DATE OF FINAL APPROVAL. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, PROMPTLY CORRECT AND REPAIR ANY AND ALL BREAKS, FAILURES OR WEAR DUE TO FAULTY MATERIALS, WORKMANSHIP OR EQUIPMENT. ALL SETTLEMENTS OF SURFACES THAT MAY OCCUR WITHIN THAT PERIOD SHALL ALSO BE PROMPTLY REPAIRED.

2 SANITARY/VENT ISOMETRIC



CONNECT NEW 4" SANITARY LINE TO THE EXISTING SANITARY MAIN LINE. CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION, SIZE AND INVERT.



PROpane GAS AND METER CAPABLE OF PROVIDING 160 MBH. CONTRACTOR TO FIELD VERIFY AND COORDINATE GAS METER LOCATION, SIZE AND PRESSURE. MAKE SURE THAT THE PRESSURE AT THE OUTLET OF THE GAS METER IS SUFFICIENT FOR THE WORKING OF WATER HEATER AND WASHER DRYER. PROVIDE GAS PRESSURE REGULATOR, SHUT OFF VALVES, TEES, DRIPS, SEDIMENT TRAPS AND ASSOCIATED ACCESSORIES AS PER 2018 IFGC, IF REQUIRED.

CONNECT NEW 2\"/>

NEW 2\"/>

2 DOMESTIC WATER AND GAS ISOMETRIC

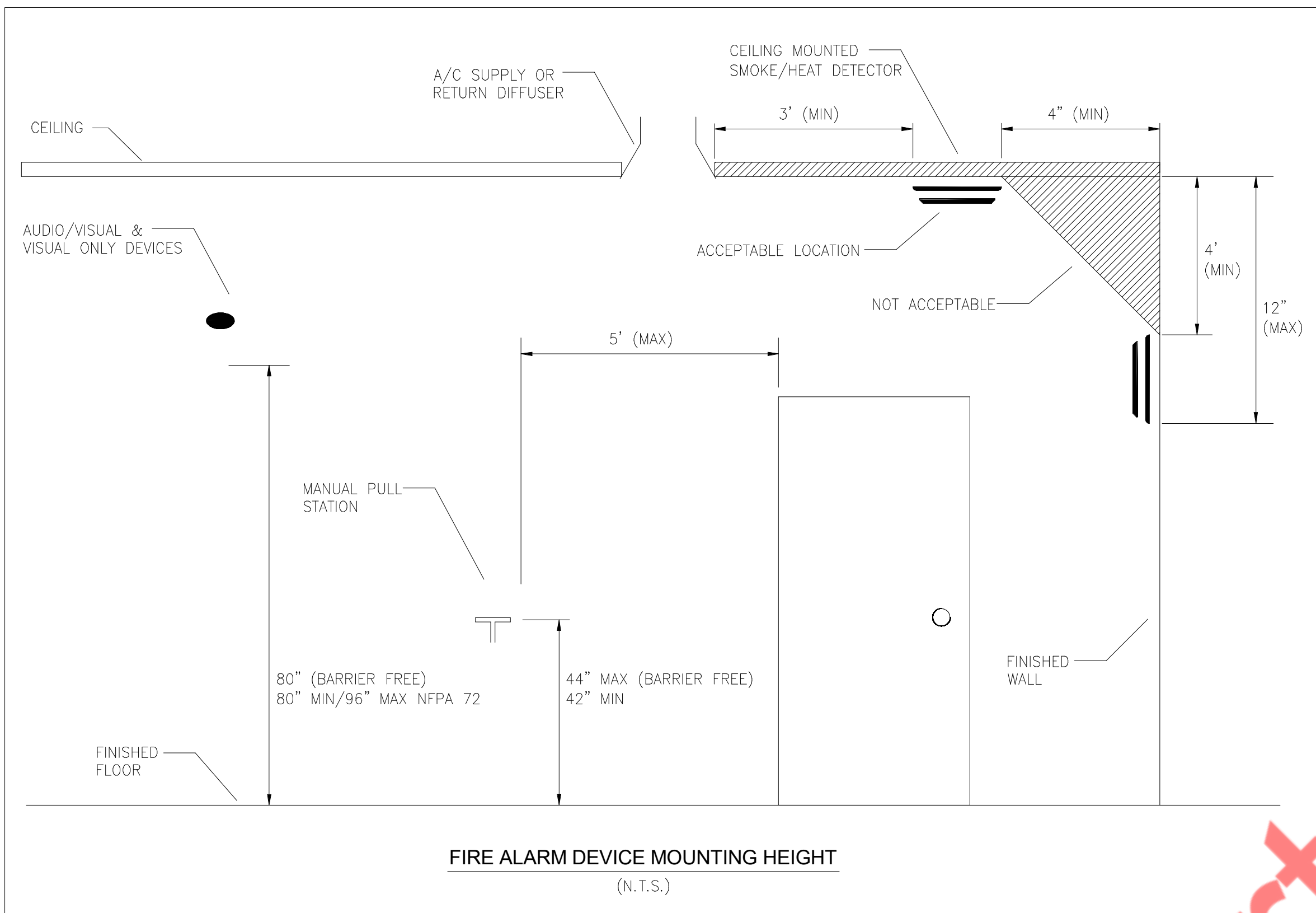
Property of **Engineers**

FIRE ALARM SYMBOL LIST

SYMBOLS	DESCRIPTION
	FIRE ALARM CONTROL PANEL
	SMOKE DETECTOR CEILING MOUNTED
	SMOKE/CARBON MONOXIDE DETECTOR COMBINATION DEVICE
	FIRE ALARM VISUAL ONLY ALARM SIGNAL, CEILING MOUNTED/SUSPENDED
	FIRE ALARM VISUAL ONLY ALARM SIGNAL, WALL MOUNTED AT 80" AFF
	MANUAL FIRE ALARM PULL STATION
	FIRE ALARM HORN/SSTROBE ALARM SIGNAL, WALL MOUNTED AT 80" AFF

FIRE ALARM GENERAL NOTES:

- THE ELECTRICAL CONTRACTOR SHALL FURNISH, INSTALL AND PLACE IN OPERATING CONDITION, A COMPLETE FIRE ALARM SYSTEM AS SPECIFIED IN THIS SECTION, TO INCLUDE THE FURNISHING OF ALL LABOR, EQUIPMENT, MATERIALS AND THE PERFORMANCE OF ALL OPERATIONS ASSOCIATED WITH THE INSTALLATION OF THE FIRE ALARM SYSTEM, AS SHOWN ON THE CONTRACT DRAWINGS AND HEREIN SPECIFIED.
- THE COMPLETE SYSTEM INSTALLATION SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE NATIONAL FIRE SAFETY CODE, THE (ADA) AMERICAN DISABILITIES ACT, THE NATIONAL ELECTRICAL CODE, REQUIREMENTS, AND ALL THE REQUIREMENTS OF THE LOCAL FIRE DEPARTMENT.
- THE REQUIREMENTS OF THE GENERAL CONDITIONS AND THE SUPPLEMENTARY CONDITIONS OF THE CONTRACT DOCUMENTS SHALL APPLY TO ALL WORK SPECIFIED IN THIS SECTION.
- THE WORK COVERED UNDER THIS SECTION OF THE CONTRACT SPECIFICATIONS SHALL BE COORDINATED WITH ALL OTHER WORK SPECIFIED IN THE OTHER SECTIONS OF THE CONTRACT SPECIFICATIONS.
- THE FIRE ALARM SYSTEM DESCRIBED HEREIN AND AS SHOWN ON THE PLANS, SHALL BE WIRED, CONNECTED, TESTED AND LEFT IN FIRST CLASS OPERATING CONDITION. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE PROPER CONTROL EQUIPMENT, CONTROL INTERFACE ANNUNCIATORS, ALARM INITIATING DEVICES, ALARM NOTIFICATION APPLIANCES, WIRING, TERMINATIONS, ELECTRICAL BOXES, AND ALL OTHER NECESSARY MATERIALS FOR A COMPLETE OPERATING SYSTEM.



FIRE ALARM DEVICE MOUNTING HEIGHT
(N.T.S.)

FIRE ALARM DRAWING LIST

FA001	FIRE ALARM SYMBOLS AND GENERAL NOTES
FA101	FIRE ALARM PLAN
FA201	FIRE ALARM RISER DIAGRAM

FIRE ALARM SPECIFICATIONS

A. FIRE ALARM OPERATION:

- UPON ACTIVATION OF ANY MANUAL PULL STATION THE FOLLOWING SHALL OCCUR:
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE FIRE COMMAND STATION ALONG WITH A HARD COPY OF ALL EVENTS AND A FLASHING FIRE SIGNAL.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE MECHANICAL CONTROL CENTER.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM DEVICE TYPE AND LOCATION AT THE FIRE SAFETY DIRECTOR'S LOCATION.
 - FLASH ALL VISUAL SIGNALS (STROBES) AND SOUND STANDARD EVACUATION ALARM SIGNAL ON THE FLOOR OF INCIDENCE AND THE FLOOR ABOVE.
 - SOUND STANDARD INQUIRY TONE ON ALL FLOORS OTHER THAN THE ALARM FLOOR AND THE FLOOR ABOVE.
 - SEND THE APPROPRIATE SIGNAL TO THE CENTRAL STATION.
- THE ACTIVATION OF ANY DUCT SMOKE DETECTOR OR AIR CONDITIONING AREA SMOKE DETECTORS SHALL CAUSE THE FOLLOWING TO OCCUR:
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE FIRE COMMAND STATION ALONG WITH A HARD COPY OF ALL EVENTS AND A FLASHING FIRE SIGNAL.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE MECHANICAL CONTROL CENTER.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM DEVICE TYPE AND LOCATION AT THE FIRE SAFETY DIRECTOR'S LOCATION.
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 - SOUND STANDARD INQUIRY TONE ON ALL FLOORS OTHER THAN THE ALARM FLOOR AND THE FLOOR ABOVE.
 - SEND THE APPROPRIATE SIGNAL TO THE CENTRAL STATION.
- THE ACTIVATION OF ANY OTHER AUTOMATIC ALARM INITIATING DEVICE (IE. WATER FLOW, AREA SMOKE DETECTOR AND/OR HEAT DETECTOR) SHALL CAUSE THE FOLLOWING TO OCCUR:
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE FIRE COMMAND STATION ALONG WITH A HARD COPY OF ALL EVENTS AND A FLASHING FIRE SIGNAL.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE MECHANICAL CONTROL CENTER.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM DEVICE TYPE AND LOCATION AT THE FIRE SAFETY DIRECTOR'S LOCATION.
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 - SOUND STANDARD INQUIRY TONE ON ALL FLOORS OTHER THAN THE ALARM FLOOR AND THE FLOOR ABOVE.
 - SEND THE APPROPRIATE SIGNAL TO THE CENTRAL STATION.

- RELEASE ALL FAIL-SAFE STAIR RE-ENTRY DOORS, ALL FAIL-SAFE ELECTRIC LOCKING DEVICES, AND ALL ELECTRICALLY HELD OPEN FIRE OR SMOKE DOORS IN THE PATH OF EGRESS.
- STOP THE AIR SUPPLY INTO AND RETURN AIR FROM THE FLOOR OF INCIDENCE ASSOCIATED FAU.

- THE ACTIVATION OF ANY OTHER AUTOMATIC ALARM INITIATING DEVICE (IE. WATER FLOW, AREA SMOKE DETECTOR AND/OR HEAT DETECTOR) SHALL CAUSE THE FOLLOWING TO OCCUR:
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE FIRE COMMAND STATION ALONG WITH A HARD COPY OF ALL EVENTS AND A FLASHING FIRE SIGNAL.
 - AUDIBLE AND VISUAL ANNUNCIATION OF ALARM TYPE AND LOCATION AT THE MECHANICAL CONTROL CENTER.
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- STOP THE AIR SUPPLY INTO AND RETURN AIR FROM THE FLOOR OF INCIDENCE ASSOCIATED FAU.

- ACTIVATION OF AN ELEVATOR SMOKE DETECTOR SHALL, IN ADDITION TO 20-2g, INITIATE ELEVATOR RECALL.

- TENANT FIRE PROTECTION SUB-SYSTEMS SHALL BE MONITORED BY THE BUILDING CLASS 'E' FIRE ALARM SYSTEM AND UPON ALARM ACTIVATION SHALL, IN ADDITION TO THE SPECIFIC SUB-SYSTEM FUNCTIONS, PERFORM THE SAME FUNCTIONS AS DESCRIBED IN 10 THROUGH 11.

- WHEN LOCATED WITHIN THE ROOM SERVED, LOCAL SUPPLEMENTARY AIR CONDITIONING UNIT DUCT SMOKE DETECTORS SHALL STOP THE ASSOCIATED UNIT SYSTEM AND INDICATE AUDIBLE AND VISUAL SIGNALS AT THE FIRE COMMAND STATION.

- RELEASE ALL FAIL-SAFE STAIR RE-ENTRY DOORS, ALL FAIL-SAFE ELECTRIC LOCKING DEVICES, AND ALL ELECTRICALLY HELD OPEN FIRE OR SMOKE DOORS IN THE PATH OF EGRESS.
- STOP THE AIR SUPPLY INTO AND RETURN AIR FROM THE FLOOR OF INCIDENCE ASSOCIATED FAU.

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5. ELECTRIC WIRING AND POWER SUPPLIES

ELECTRICAL WRING AND COMPONENTS SHALL CONFORM TO THE FOLLOWING STANDARDS:

INSTALLATION OF CONDUIT, WIRE, SLEEVES, OUTLET BOXES, INSULATING BUSHINGS, SYSTEM CABINETS, TERMINAL BOXES, PULL BOXES, JUNCTION BOXES, INSERTS, ANCHORS, SYSTEM DEVICES AND SIMILAR ELEMENTS, SHALL BE IN ACCORDANCE WITH THE APPROPRIATE REQUIREMENTS OF THESE SPECIFICATIONS AND IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF LATEST ADAPTED NEC CODE FOR SIGNALING SYSTEMS, AND ALL AUTHORITIES HAVING JURISDICTION.

COMPONENTS SHALL BE LISTED OR APPROVED BY BSAMEA AND UNDERWRITERS LABORATORIES, INC. (UL), OR FACTORY MUTUAL (FM). ALL LIFE SAFETY SYSTEM WIRING AND SYSTEM OPERATION SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF LOCAL OFFICIALS, WHOSE APPROVAL ON THE COMPLETED SYSTEM IS REQUIRED.

ALL CABLE USED SHALL BE No. 16 AWG MINIMUM, MULTICONDUCTOR CABLE SHALL BE PROVIDED WITH A MINIMUM OF 10% SPARE PAIRS.

ALL CABLING SHALL COMPLY WITH UL-1424 AND UL910. ADDITIONALLY, CABLING SHALL CONFORM TO THE FOLLOWING:

- A MINIMUM TEMPERATURE RATING OF 200° C.
- A MINIMUM AVERAGE INSULATION THICKNESS OF 15 MILS.
- A MINIMUM AVERAGE JACKET THICKNESS OF 25 MILS.
- THE COLOR OF THE CABLE SHALL BE RED.
- THE CABLE SHALL BE A TYPE FPLP (PLENUM TYPE).
- THE CABLE SHALL BE VISIBLY MARKED EXTERNALLY THAT IT MEETS THE ABOVE REQUIREMENTS AND IS LISTED BY UL.
- THE CABLE SHALL HAVE THE FOLLOWING MARKINGS:

COMPANY NAME
"TYPE FPLP"
SIZE (AWG)
TEMPERATURE RATING
THE UL REGISTER MARK

6. AUTOMATIC SMOKE DETECTORS

PRODUCTS OF COMBUSTION DETECTORS SHALL OPERATE ON THE IONIZATION PRINCIPLE TO DETECT THE PRESENCE OF COMBUSTION GASES, FIRE AND SMOKE. IT SHALL BE OF THE TWO (2) CHAMBER DESIGN. THE FIRST, OR REFERENCE CHAMBER, SHALL COMPENSATE AGAINST SENSITIVITY CHARGES DUE TO TEMPERATURE, BAROMETRIC PRESSURE AND HUMIDITY VARIATIONS. THE SECOND, OR SENSING CHAMBER, SHALL BE OPEN TO THE OUTSIDE ELEMENTS. THE DETECTOR SHALL CONTAIN NO HOT FILAMENT TUBES OR MOVING PARTS, AND SHALL PLUG INTO A BASE HAVING AN LED ALARM INDICATING LAMP. THE DETECTOR SHALL NOT REQUIRE REPLACEMENT OR ADJUSTMENT AFTER A FIRE ALARM HAS BEEN GIVEN. THE DETECTOR SENSITIVITY SHALL BE INDIVIDUALLY ADJUSTABLE. AUTOMATIC SMOKE DETECTORS SHALL OPERATE ON THE PHOTO-ELECTRONIC PRINCIPLE. SET TO RESPOND TO A PREDETERMINED SMOKE DENSITY, A NOMINAL 1.5% LIGHT OBSCURATION PER FOOT IS CONSIDERED MAXIMUM DETECTED WITH A SOLID STATE LIGHT EMITTING DIODE AND A HIGH-SPEED LIGHT SENSING PHOTO-DIODE WITHIN A LIGHT SENSING CHAMBER. COMPONENTS SHALL BE LONG-LIFE, SOLID STATE, WITH A DESIGN LIFE IN EXCESS OF 40 YEARS. THIS INCLUDES THE POWER ON/ALARM LED, WHICH IS PULSED UNDER NORMAL CONDITIONS AND CONSTANT IN ALARM.

DUCT TYPE DETECTORS SHALL BE PRODUCT-OF-COMBUSTION DETECTORS WITH IONIZATION PRINCIPLES. IN ADDITION, THIS DEVICE SHALL BE PROVIDED WITH FULL LENGTH SAMPLING TUBES IN LOCATIONS AS DIRECTED BY THE HVAC SECTION OF THE SPECIFICATIONS. THIS DEVICE SHALL BE A FULL ADDRESSABLE UNIT USING ANALOG AND/OR INTELLIGENT TECHNOLOGY. INCLUDE IN SHOP DRAWING SUBMISSION THE METHODS AND EXPECTED LEVELS FOR TESTING THE DEVICE SENSITIVITY AND REQUIRED VELOCITY, WITH VERIFICATION OF THE STATED VALUES INCLUDED IN THE SYSTEM SITE APPROVAL AND TESTING PROCEDURE. THE DUCT TYPE SMOKE DETECTORS SHALL BE EQUIPPED WITH AUXILIARY CONTACTS FOR REMOTE INDICATION.

ALL DEVICES THAT ARE RECESSED OR SEMI-RECESSED INTO TWO-HOUR FIRE-RATED PARTITIONS SHALL:

- PENETRATE INTO THE PARTITION A MAXIMUM OF 2-1/2 INCHES.
- ALLOW A MAXIMUM PENETRATION OF 25 SQUARE INCHES PER 10 SQUARE FEET.
- ALL STROBES, SPEAKERS, SPEAKER/STROBES, SMOKE DETECTORS, DUCT, AREA, OR HEAT SHALL BE BASE BUILDING STANDARD, COMPATIBLE WITH THE EXISTING CLASS "E" SYSTEM. DUCT TYPE SMOKE DETECTORS SHALL BE CAPABLE OF BEING INTERFACED WITH THE H.V.A.C. EQUIPMENT AND ASSOCIATED DUCT WORK.
- ALL EQUIPMENT AND WIRING SHALL BE BSAMEA APPROVED.
- ALL ELECTRICAL LOCKING SYSTEMS (IF ANY) INTERFACED WITH MEANS OF EGRESS MUST FAIL-SAFE ON POWER FAILURE. PROVIDE CONNECTION TO THE CLASS 'E' SYSTEM'S DOOR RELEASE CIRCUIT. ALL COMPONENTS SHALL BE BSAMEA APPROVED.

C. FIRE ALARM INSTALLATION PROCEDURE:

- FURNISH AND INSTALL ALL NEW LIFE SAFETY DEVICES AND ASSOCIATED CABLING AND CONDUIT. CONDUIT SHALL FURNISHED AS REQUIRED BY CODE (U.O.N.)
- COORDINATE AND PAY FOR ALL REQUIRED MODIFICATIONS AND CONNECTIONS TO THE EXISTING FIRE ALARM SYSTEM WHICH INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:
 - HARDWARE MODIFICATIONS TO FIRE COMMAND STATION DISPLAY PANEL.
 - MODIFICATIONS TO SYSTEM SOFTWARE.

ADDITIONS TO THE EXISTING REMOTE DATA GATHERING PANELS TO INCORPORATE NEW PANELS OR DEVICES.

ADDITIONAL POWER FROM FUSED CUT-OUTS TO SERVE ADDITIONAL SYSTEM OR SUB-SYSTEM PANELS.

PAY ALL REQUIRED FEES TO THE EXISTING FIRE ALARM SYSTEM VENDOR TO MAKE ALL FINAL CONNECTIONS AND REVISE THE LIFE SAFETY RISER DIAGRAM FOR FILING TO INCORPORATE THE ASSOCIATED SYSTEM MODIFICATIONS.

ALL RELOCATED OR NEW EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE ELECTRICAL AND BUILDING CODES AND THE REQUIREMENTS SET FORTH BY THE NEW AMERICANS WITH DISABILITIES ACT (A.D.A.), WHICH INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

STROBE LIGHTS PLACED 80 INCHES ABOVE THE FLOOR OR 6 INCHES BELOW THE CEILING, WHICH EVER IS LOWER.

AUDIBLE DEVICES TAPPED AT WATTAGE SETTINGS WHICH ALLOW FOR SOUND PRESSURE LEVELS OF THE UNIT TO EXCEED THE LEVEL IN THE ROOM BY 15DBA OR THE 60 SECOND MAXIMUM LEVEL OF THE ROOM BY 5 DBA, WHICH EVER IS HIGHER, BUT NOT TO EXCEED 120 DBA.

SPEAKERS, STROBES, SMOKE DETECTORS, WARDEN STATIONS AND PULL STATIONS SHALL BE ALTERNATELY WIRED ON TWO SEPARATE CLASS "A" SIGNAL CIRCUITS AND THESE CIRCUITS MUST BE INSTALLED IN SEPARATE CONDUIT IN ORDER TO PROVIDE RELIABLE ALARM SIGNALS SO THAT LOSS OF A PORTION OF THE WIRING ON A FLOOR SHALL NOT DISABLE THE ENTIRE ALARM CAPABILITY OF THAT FLOOR.

RECONNECT ALL EXISTING BASE BUILDING LIFE SAFETY DEVICES WHICH HAVE BEEN RELOCATED OR TEMPORARILY REMOVED DURING CONSTRUCTION. COORDINATE CHANGES IN LOCATION WITH ARCHITECT AND LEAVE IN AN OPERATIONAL STATE AND IN ACCORDANCE WITH ALL GOVERNING CODES, INCLUDING A.D.A.

SURVEY ALL SPACES PRIOR TO BID SUBMISSION, AND INCLUDE IN THE BID PROPOSAL, THE REPLACEMENT OF ALL LIFE SAFETY DEVICES WHICH WERE INTENDED TO BE REUSED, AND HAVE BEEN DESTROYED OR LOST DURING DEMOLITION.

PROVIDE RIGID CONDUIT FOR BOTH POWER AND DATA CABLING ASSOCIATED WITH ALL SUB-SYSTEMS AND AS REQUIRED BY CODE. INCLUDE ALL REWAYES AS SHOWN ON THE PLANS AND AS DESCRIBED IN THE SPECIFICATIONS. PROVIDE CONDUIT FOR ALL FIRE ALARM CABLING WHICH IS EITHER RUN BELOW 8'-0" OR ROUTED WHERE SUBJECT TO DAMAGE.

SEPARATELY ZONE LIFE SAFETY DEVICES AND CONNECT TO THE FIRE ALARM CLASS "E" SYSTEM SO THAT THE SYSTEM OPERATION AS DESCRIBED ABOVE IS PERFORMED IN CONFORMANCE WITH THE BUILDING CODE.

FUSED CUT-OUTS SHALL BE TAPPED AHEAD OF THE MAIN OF A 120 VOLT PANEL (SUBMIT LOCATION TO ENGINEER/ARCHITECT FOR REVIEW), AND BE MOUNTED IN AN ACCESSIBLE LOCATION ADJACENT TO THE PANEL FROM WHICH IT IS FED. ALL FUSED CUT-OUTS (FCO'S) SHALL BE LOCKABLE WITH SOLID COPPER NEUTRAL BARS AND CONTAIN LPN FUSES AS REQUIRED. LABEL ALL FCO'S.

SHOP DRAWINGS AND SAMPLES
SHOP DRAWINGS AND MANUFACTURER'S DATA SHEETS SHALL BE SUBMITTED FOR APPROVAL FOR THE FOLLOWING ITEMS:

MANUFACTURER'S DRAWINGS, SHOWING ALL EQUIPMENT TERMINALS, WIRING DIAGRAMS, INSTALLATION INSTRUCTIONS AND OTHER PERTINENT INFORMATION FOR ALL ITEMS BEING FURNISHED.

CATALOGUE CUTS OF EQUIPMENT AND SENSORS FURNISHED IN THIS SECTION, INCLUDING (BUT NOT LIMITED TO) THE FOLLOWING:

SMOKE DETECTORS - SPACE MOUNTED.

SMOKE DETECTORS - DUCT MOUNTED.

HEAT DETECTORS (HEAT ACTUATED DEVICES).

VOICE ALARM AND COMMUNICATION SYSTEM EQUIPMENT.

MANUAL FIRE ALARM STATIONS.

FLASHING "FIRE" STROBE LIGHTS.

SPEAKERS AND HORNS.

A WRITTEN DESCRIPTION OF THE SYSTEM OPERATION FOR EACH ALARM AND/OR TROUBLE SIGNAL. WRITTEN DESCRIPTION CAN BE PRESENTED IN THE FORM OF A MATRIX.

SUBMIT SAMPLES, AS DIRECTED, FOR APPROVAL.

SUBMIT A PARAGRAPH-BY-PARAGRAPH LETTER OF COMPLIANCE (OF THIS SPECIFICATION) FOR THE LIFE SAFETY SYSTEM, IDENTIFYING COMPLIANCE OR NON-COMPLIANCE AND REASONS FOR NON-COMPLIANCE.

WIRE AND CABLE FOR POWER, SPRINKLER AND MOTOR CONTROL SHALL BE COPPER AND HAVE CURRENT CARRYING CAPACITY PER CODE REQUIREMENTS AND SHALL CONFORM TO THE STANDARDS OF THE UNDERWRITERS LABORATORIES, INC. CONDUCTOR SIZES SHALL NOT BE LESS THAN No.12 AWG FOR POWER WORK AND No.14 AWG FOR SPRINKLER AND MOTOR CONTROL UNLESS OTHERWISE INDICATED OR SPECIFIED. VOLTAGE RATING OF CONDUCTORS SHALL BE 600 VOLTS. PLENUM RATED CABLE SHALL BE USED FOR ALL SIZES OF WIRE, UNLESS OTHERWISE NOTED ON PLANS.

MANUAL PULL STATIONS

PROVIDE ADDRESSABLE PULL STATIONS WHICH CONTAIN ELECTRONICS THAT COMMUNICATE THE STATION'S STATUS (ALARM, NORMAL) TO THE CONTROL PANEL OVER ONE TWISTED PAIR. THE ADDRESS WILL SET ON THE STATION. THEY WILL BE MANUFACTURED FROM HIGH IMPACT RED LEXAN. STATION WILL MECHANICALLY LATCH UPON OPERATION AND REMAIN SO UNTIL MANUALLY RESET BY OPENING WITH A KEY COMMON TO ALL SYSTEM LOCKS. PULL STATIONS WILL BE DOUBLE ACTION AND AS IDENTIFIED BY A SCHEDULE ON THE PRINTS.

THE FRONT OF THE STATION IS TO BE HINGED TO A BACKPLATE ASSEMBLY AND MUST BE OPENED WITH A KEY TO RESET THE STATION. THE KEY SHALL BE COMMON WITH THE CONTROL PANELS. STATIONS WHICH USE ALLEN WRENCHES OR SPECIAL TOOLS TO RESET WILL NOT BE ACCEPTED. THE STATION SHALL CONSIST OF HIGH IMPACT LEXAN PLASTIC, RED IN COLOR.

THE ADDRESSABLE MANUAL STATION SHALL BE CAPABLE OF FIELD PROGRAMMING OF ITS "ADDRESSABLE" LOCATION ON AN ADDRESSABLE INITIATING CIRCUIT.

THERE SHALL BE NO LIMIT TO THE NUMBER OF STATIONS, DETECTORS OR ZONE ADAPTER MODULES, WHICH MAY BE ACTIVATED OR "IN ALARM" SIMULTANEOUSLY.

THE ADDRESSABLE MANUAL STATION SHALL BE UNDERWRITER'S LABORATORIES INC. LISTED.

PROVIDE PROTECTIVE COVERS, EQUAL TO STOPPER II, WHERE REQUIRED BY THE AHJ.

WARRANTY:

THE CONTRACTOR SHALL WARRANT THE COMPLETE FIRE ALARM SYSTEM WIRING AND EQUIPMENT TO BE FREE FROM INHERENT MECHANICAL AND ELECTRICAL DEFECTS FOR A PERIOD OF (3) THREE YEARS FROM THE DATE OF THE COMPLETION AND CERTIFIED TEST OR FROM THE DATE OF FIRST BENEFICIAL USE.

THE EQUIPMENT MANUFACTURE SHALL MAKE AVAILABLE TO THE OWNER A MAINTENANCE CONTRACT PROPOSAL TO PROVIDE A MINIMUM OF TWO (2) INSPECTIONS AND TEST PER YEAR IN COMPLIANCE WITH NFPA-72H GUIDELINES.

SUBMITTALS

PROVIDE COMPLETE SETS OF DOCUMENTATION TO INCLUDE THE FOLLOWING:

A COMPLETE POINT TO POINT RISER DIAGRAM OF THE FIRE ALARM SYSTEM SHOWING ALL DEVICES AND EQUIPMENT AND SIZE, TYPE AND NUMBERS OF ALL CONDUCTORS.

BATTERY STANDBY AND POWER SUPPLY CALCULATIONS SHOWING TOTAL POWER REQUIRED TO MEET THE SPECIFIED SYSTEM REQUIREMENTS INCLUDING SPARE CAPACITY ALLOWANCES. CALCULATIONS SHALL INCLUDE A COMPLETE LIST OF CURRENT REQUIREMENTS DURING NORMAL, SUPERVISORY, TROUBLE AND ALARM CONDITIONS. CALCULATIONS SHALL ALSO DEMONSTRATE PROPER CONSIDERATION OF CURRENT REQUIREMENTS, WIRE SIZE, WIRE LENGTH AND VOLTAGE DROP CHARACTERISTICS.

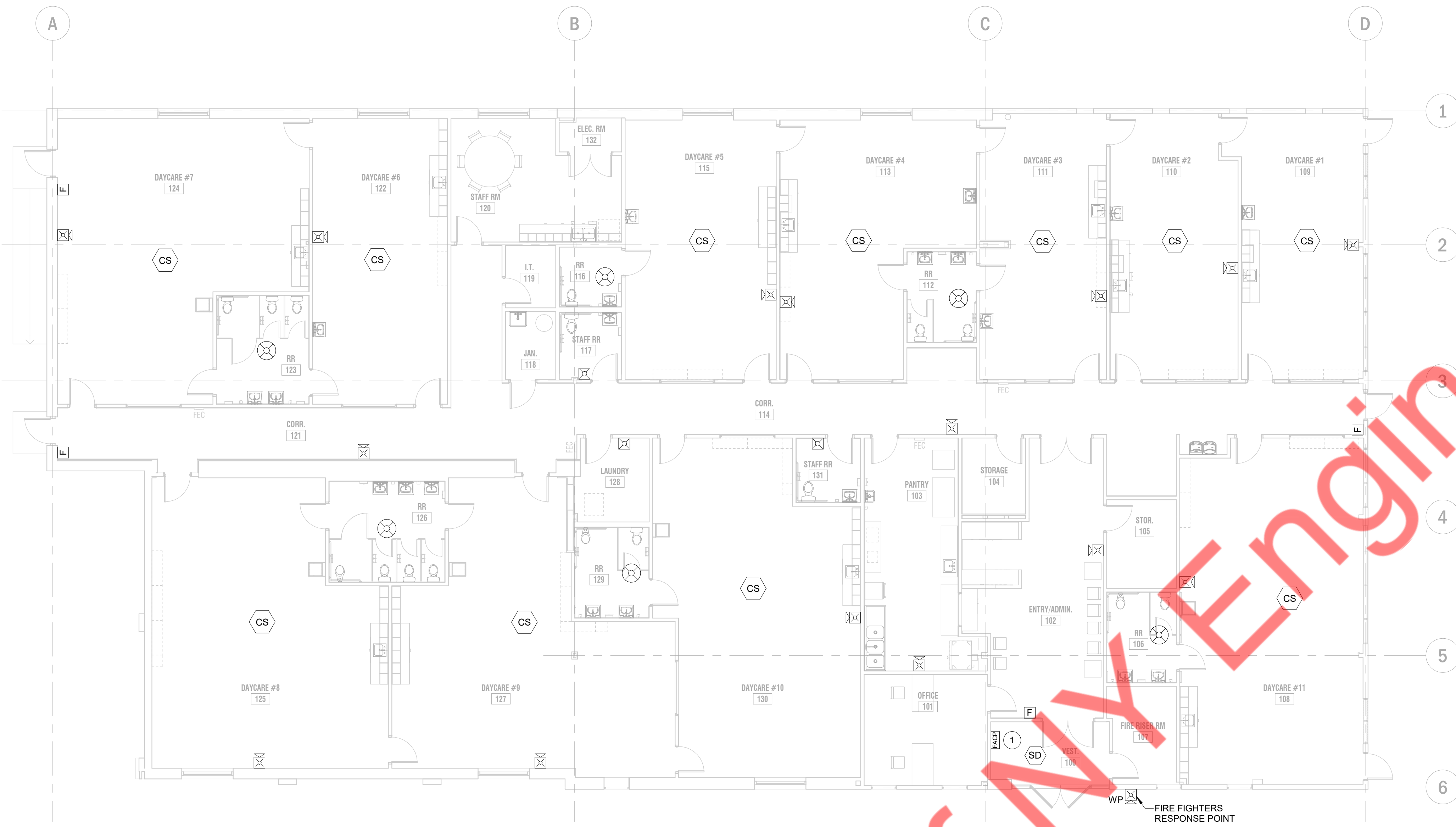
MANUFACTURER'S ORIGINAL CATALOG DATA SHEETS SHALL BE SUPPLIED FOR ALL OF THE EQUIPMENT TO BE SUPPLIED. ALL EQUIPMENT SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER AND NO EQUIPMENT SHALL BE ORDERED WITHOUT PRIOR APPROVAL.

LARGE SCALE DRAWINGS OF THE MAIN CONTROL PANEL AND EACH REMOTE PANEL DEPICTING OVERALL MECHANICAL DIMENSIONS, LAYOUT INCLUDING FUTURE ALLOWANCES, AND FIELD WIRING IN FULL DETAIL.

DOCUMENTATION OF THE SUPPLIER'S QUALIFICATIONS INDICATING YEARS IN BUSINESS SERVICE POLICIES, WARRANTY DEFINITIONS, AND A LIST OF SIMILAR INSTALLATIONS IN THE LOCAL MUNICIPALITY.

PROVIDE A COMPLETE DETAILED DESCRIPTION OF THE SYSTEM OPERATION.

ADDRESSES FOR ALL FIELD DEVICES SHALL BE SHOWN ON FLOOR PLANS SUPPLIED WITH THIS SUBMITTAL.



FIRE ALARM PLAN NOTES

GENERAL SHEET NOTES

1. LOCATIONS OF DEVICES SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC ONLY AND ARE TO SHOW INTENT OR REQUIREMENT FOR DEVICES IN ACCORDANCE WITH CODES AND CLIENT REQUIREMENTS. FINAL LOCATIONS OF DEVICES IS DEPENDENT ON SITE CONDITIONS. ANY QUESTIONABLE LOCATIONS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION FOR REVIEW PRIOR TO INSTALLATION.
2. STROBES SHALL BE SYNCHRONIZED.
3. FIRE ALARM/SECURITY INTERFACE TO ACTIVATE ON GENERAL ALARM.
4. PROVIDE AND INSTALL FIRE STOPPING AT ALL CONDUIT AND CABLE TRAY PENETRATIONS THROUGH FIRE WALLS. (TYPICAL THROUGHOUT).
5. PROVIDE AND INSTALL FIRE ALARM BOOSTER PANELS AS REQUIRED.
6. HORNS AND STROBES SHALL BE ON SEPARATE CIRCUITS.
7. ALL HORNS SHALL HAVE MULTIPLE SOUND LEVEL SETTINGS (E.G. LOW, MEDIUM, HIGH).
8. ALL HORNS LOCATED IN CLASSROOMS SHALL BE SET AT LOWEST SOUND LEVEL.
9. ALL HORNS LOCATED WITHIN CORRIDORS SHALL REMAIN AT THE FACTORY DEFAULT SETTING UNLESS SOUND LEVELS ARE DEEMED TOO HIGH OR TOO LOW AT WHICH POINT THE SOUND LEVELS WILL BE ADJUSTED ACCORDINGLY.
10. ALL FIRE ALARM PULL STATIONS TO BE DUAL ACTION FIRE ALARM PULL STATIONS.

FIRE ALARM PAIN KEYED NOTES

1. SUPPLY AND INSTALL A PASSIVE GRAPHIC ADJACENT TO THE FIRE ALARM CONTROL PANEL. PASSIVE GRAPHIC SHALL CONTAIN THE FOLLOWING INFORMATION: TITLE AND NORTH ARROW, OUTLINE OF BUILDING, LOCATION OF FACP, "YOU ARE HERE" LOCATION.

1 FIRE ALARM PLAN
1/8" = 1'-0"

Property of MY ENGINEERING

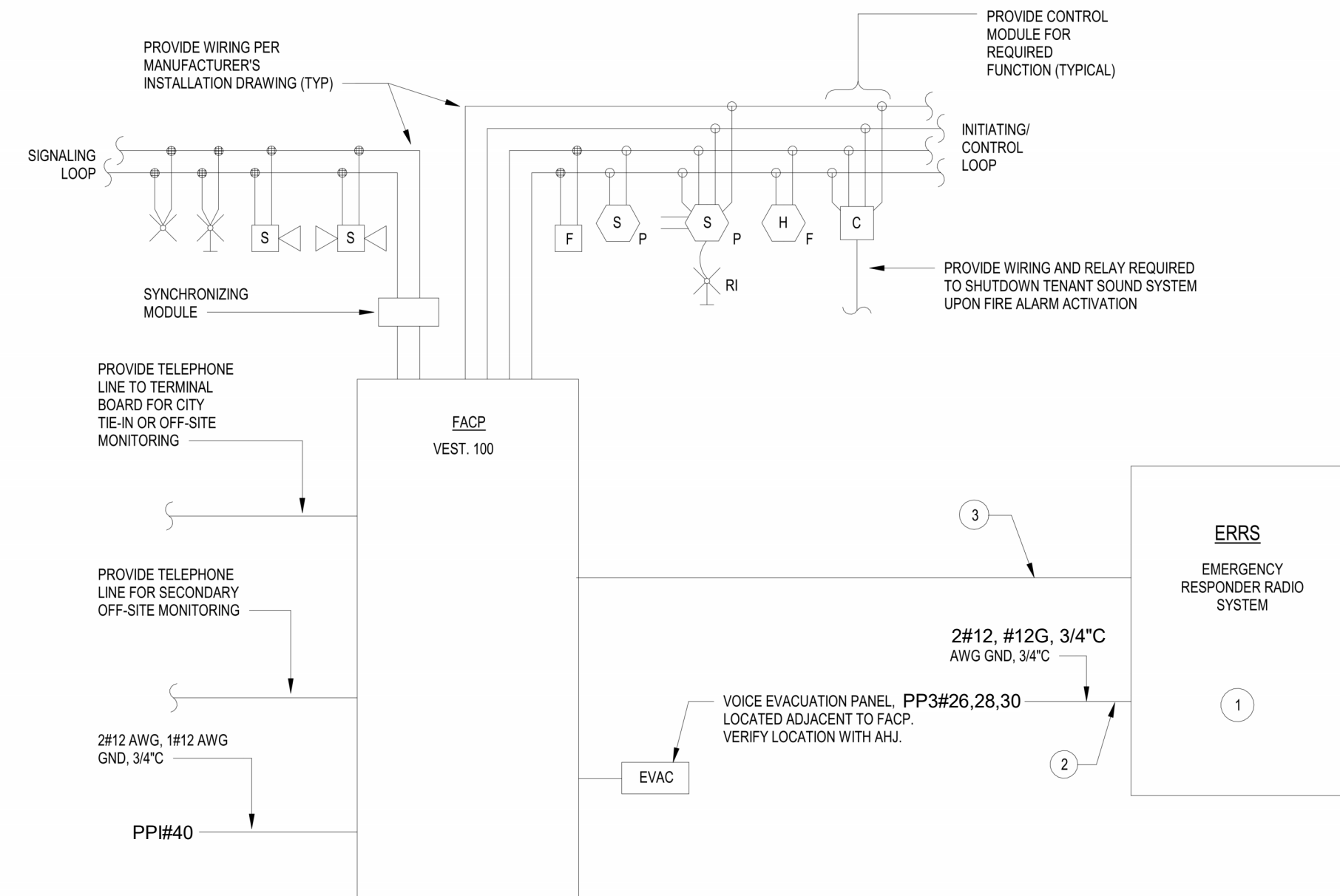
- FIRE ALARM GENERAL NOTES:**
1. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS WITH SINGLE LINE RISER DIAGRAM SHOWING ALL EQUIPMENT, CONNECTIONS, NUMBER, VOLTAGE DROP & BATTERY CALCS, AND SIZE OF ALL CONDUCTORS.
 2. PROVIDE NEW ADDRESSABLE FIRE ALARM SYSTEM.
 3. ALL EQUIPMENT AND DEVICES USED SHALL BE BY APPROVED MANUFACTURERS AND SHALL BE LISTED FOR THEIR USE.
 4. PROVIDE SUFFICIENT CAPACITY FOR FUTURE DEVICES.
 5. PROVIDE CLASS A WIRING FOR ALL NOTIFICATION CIRCUITS AND CLASS B WIRING FOR ALL INITIATION CIRCUITS.
 6. RADIO ENHANCED COMMUNICATIONS MAY BE REQUIRED DEPENDING ON FINAL INSPECTION REVIEW.
 7. REFER TO PLAN FOR EXACT QUANTITIES AND LOCATION OF ALL DEVICES.
 8. ALL FIRE ALARM WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF NFPA, STATE, AND LOCAL BUILDING CODES AND THE AMERICANS WITH DISABILITIES ACT (ADA).

- FIRE ALARM DESIGN CRITERIA:**
- FURNISH AND INSTALL FIRE ALARM CONTROL SYSTEM THAT CAN DO THE FOLLOWING:
- DETECT FIRE, SMOKE, AND WATER FLOW
 - INITIATING AN ALARM OF FIRE
 - INITIATING OTHER ACTION AS ARRANGED
- FIRE ALARM CIRCUITS SHALL CONSIST OF VISUAL AND/OR AUDIBLE WARNING. UPON ACTIVATION, SYSTEM SHALL DEACTIVATE DESIGNATED KITCHEN EQUIPMENT AND SEND SIGNAL TO EACH LIGHTING CONTROL UNIT. SYSTEM SHALL ALSO INCLUDE MANUAL ACTIVATION.
- SYSTEM SHALL BE ABLE TO TRANSMIT REQUIRE DATA TO LOCAL FIRE DEPARTMENT AND SHALL FUNCTION IN OVERRIDE MANUAL MODE BY OFFICIALS FOR MANDATORY ROUTINE INSPECTION.
- SYSTEM SHALL BE EQUIPPED WITH THE POSITIVE ALARM SEQUENCE (PAS) FEATURE.
- IN ADDITION TO NFPA STANDARDS, FIRE ALARM SYSTEM SHALL CONTAIN A ONE-WAY PRIVATE RADIO ALARM SYSTEM AND TWO-WAY RADIO FREQUENCY MULTIPLEX SYSTEM.

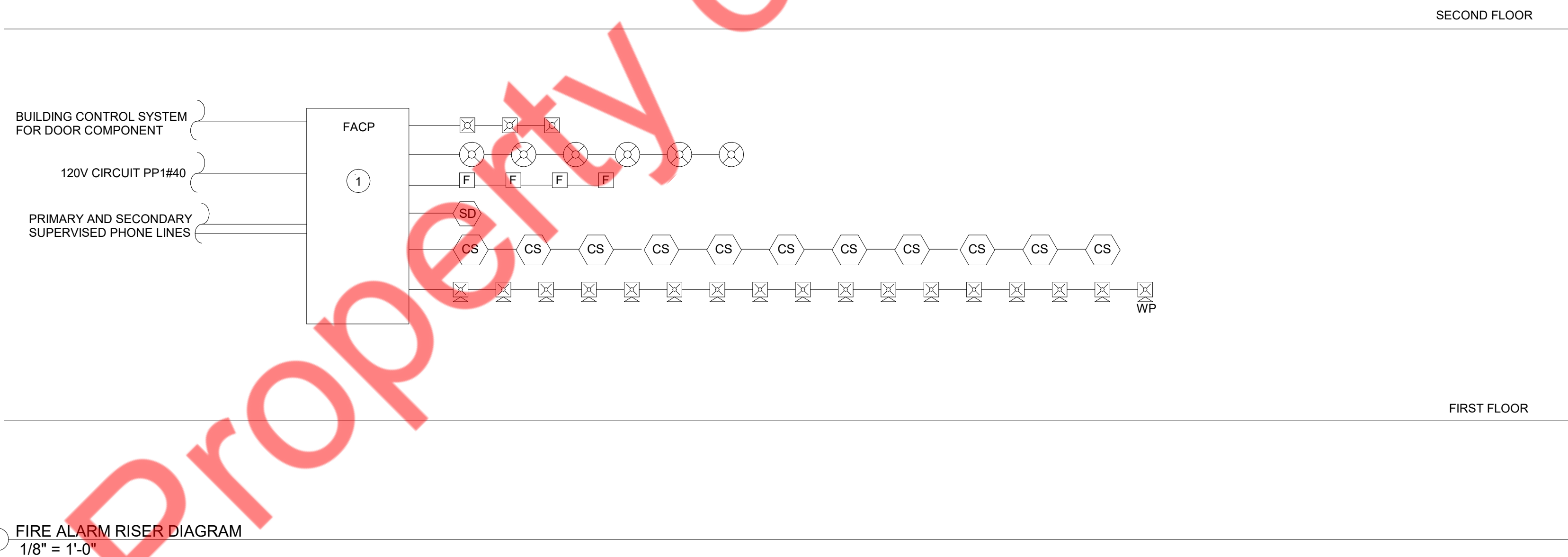
- FIRE ALARM PLAN KEYED NOTES:**
- ① FIRE ALARM CONTROL PANEL. CONTRACTOR SHALL COORDINATE WITH BASE BUILDING/OWNER FOR MORE DETAILS.

NOTE FOR CONTRACTOR:

BDA/EMERGENCY RESPONDER IS ONLY NEEDED WHEN PERMITTED BY LOCAL FIRE CODE OFFICIAL. COORDINATE WITH LOCAL FIRE CODE OFFICIAL AND VEIRFY REQUIREMENT OF BDA/EMERGENCY RESPONDER FOR THE PROJECT SPACE.



- DETAIL NOTES**
1. THIS DIAGRAM REPRESENTS A TYPICAL SYSTEM AND IS NOT INTENDED FOR INSTALLATION. SYSTEM SUPPLIER SHALL PROVIDE INSTALLATION DRAWINGS AND SCHEMATIC WIRING DIAGRAMS. EXACT SYSTEM REQUIREMENTS SHALL BE COORDINATED WITH THE SYSTEM SUPPLIER. SYSTEM INSTALLER SHALL BE NICET CERTIFIED, IF REQUIRED BY LOCAL AUTHORITY HAVING JURISDICTION.
 2. SYSTEM SUPPLIER SHALL SUPERVISE INSTALLATION, PROGRAM AND TEST SYSTEM AND INSTRUCT OWNER ON SYSTEM OPERATION.
 3. ALL FIRE ALARM WIRING SHALL BE PLENUM RATED, EXPOSED FIRE ALARM WIRING, 1/2\"/>
- DETAIL KEYNOTES**
1. PROVIDE ALL COMPONENTS FOR A FULLY OPERATION TWO-WAY COMMUNICATION ERRS FOR FIRST RESPONDERS PER IFC 510 AND IBC 915.1.
 2. PROVIDE 208V-30, 30A POWER FROM CIRCUIT NOTED. LABEL AND IDENTIFY BRANCH CIRCUITS. ALL BREAKERS SHALL BE LOCKABLE AND RED.
 3. FIRE ALARM SYSTEM SHALL MONITOR THE ERRS AS REQUIRED BY NFPA 72.



① FIRE ALARM RISER DIAGRAM
1/8" = 1'-0"

SPRINKLER LEGEND

- EX SP — EXISTING SPRINKLER RISER PIPING TO REMAIN
- SP — NEW SPRINKLER PIPING
- CONCEALED SPRINKLER HEAD (NEW)
- ⊥ SPRINKLER CAPPED OUTLET
- ⊥ PIPE THRU RATED WALL

SPACING BETWEEN SPRINKLER HEADS

LIGHT HAZARD: 15' MAX.
 ORDINARY HAZARD: 15' MAX
 NOTE: MAXIMUM DISTANCE BETWEEN SPRINKLER HEADS & WALLS IS 1/2 THE DISTANCE BETWEEN HEADS.

PROTECTION AREA OF SPRINKLER HEADS

LIGHT HAZARD : 225 SQ. FT.
 ORDINARY HAZARD : 130 SQ. FT.

DESIGN CRITERIA SUMMARY:

HYDRAULIC CALCULATIONS FOR SCHOOL AREA BASED ON THE FOLLOWING:

OCCUPANCY: ORDINARY I
 MINIMUM DESIGN DENSITY: 0.15 GPM/SQ. FT.
 DESIGN AREA OF APPLICATION: 1500 SQ. FT.

OCCUPANCY: LIGHT
 MINIMUM DESIGN DENSITY: 0.1 GPM/SQ. FT.
 DESIGN AREA OF APPLICATION: 1500 SQ. FT.

GENERAL NOTES:

1. FOR SPRINKLER WORK ONLY.
2. ALL SPRINKLER HEADS MEET DESIGN CRITERIA PER COVERAGE.
3. PROVIDE FREEZE PROTECTION FOR ALL SPRINKLER PIPING AND EQUIPMENTS SUBJECT TO TEMPERATURE BELOW 40°F.

PERFORMANCE SPECIFICATION CRITERIA:

SPRINKLER PLANS AS SHOWN ARE FOR BIDDING PURPOSES ONLY. SPRINKLER CONTRACTOR IS TO OBTAIN CURRENT HYDRANT FLOW TEST DATA AND PROVIDE HYDRAULIC CALCULATIONS FOR SYSTEM PIPE SIZING IN ACCORDANCE WITH NFPA 13. CONTRACTOR IS TO SUBMIT SHOP DRAWINGS INDICATING HYDRAULIC CALCULATIONS, PIPING LAYOUT AND SIZING. ALL WORK IS TO BE DONE IN ACCORDANCE WITH ALL STATE, LOCAL, GOVERNING AND APPLICABLE CODES.

SPRINKLER DRAWING LIST

DWG NO.	DRAWING NAME
FP001	FIRE PROTECTION NOTES AND LEGENDS
FP002	FIRE PROTECTION SPECIFICATIONS
FP101	FIRE PROTECTION PLAN
FP501	FIRE PROTECTION DETAILS

SPRINKLER GENERAL NOTES

1. ALL SPRINKLER WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF N.F.P.A.-13-2016 AND ALL LOCAL AUTHORITIES.
2. ALL SPRINKLER WORK SHALL COMPLY WITH BUILDING STANDARDS AND REQUIREMENTS.
3. ALL SPRINKLER HEADS SHALL BE INSTALLED AT CENTER OF TILE IF CEILING IS PROVIDED.
4. GENERAL CONTRACTOR SHALL COORDINATE FINAL FURNITURE/EQUIPMENT HEIGHT ELEVATIONS AND LOCATIONS WITH SPRINKLER INSTALLATION. ENGINEER SHALL BE NOTIFIED WHEN FURNITURE/EQUIPMENT IS LESS THAN 18" TO UNDERSIDE OF CEILING.
5. THE SPRINKLER SYSTEMS ARE TO BE HYDROSTATIC TESTED FOR A (2) HOUR MINIMUM AT 200 PSI. PRESSURE AND ARE TO BE WITNESSED BY AUTHORIZED BUILDING PERSONNEL. COORDINATE ALL TESTING WITH BUILDING MANAGER.
6. PIPES SIZES SHOWN ARE BASED ON DESIGN PIPING LAYOUTS ONLY. ACTUAL PIPE SIZES SHALL BE DETERMINED BY CONTRACTORS HYDRAULIC CALCULATIONS BASED ON HIS INSTALLATION DRAWINGS. CONTRACTOR SHALL ALLOW FOR THIS AND INCLUDE THIS IN HIS CONTRACT PRICE.
7. DRAWING INDICATES SPRINKLER SYSTEM DESIGN ONLY. CONTRACTOR RESPONSIBLE FOR OFFSETS, DROPS AND RISES FOR COORDINATION WITH OTHER TRADES.
8. G.C. SHALL BE RESPONSIBLE FOR ALL FINAL TESTS AND INSPECTIONS OF COMPLETED WORK REQUIRED BY THE BUILDING MANAGEMENT PRIOR TO OCCUPANCY OF SPACE.
9. ALL SPRINKLER WORK SHALL BE TESTED AND MADE OPERATIONAL PRIOR TO CARPET AND FURNITURE INSTALLATION. G.C. SHALL REPAIR AND/OR REPLACE ALL FINISHES DAMAGED BY DEFECTIVE SPRINKLER WORK AT HIS EXPENSE.
10. ALL BURNING, CUTTING, SOLDERING AND WELDING SHALL BE COORDINATED WITH BUILDING FIRE SYSTEMS WITH BUILDING MANAGEMENT, AS REQUIRED.
11. G.C. SHALL BE RESPONSIBLE FOR OBTAINING PERMITS AND APPROVALS REQUIRED BY BUILDING INSPECTOR AND FIRE MARSHALL IN CONJUNCTION WITH CHANGES TO EXISTING SPRINKLER SYSTEM.
12. REFER TO ENGINEERING DRAWINGS FOR SPRINKLER HEADS, LIGHT SENSORS AND FIRE DETECTION DEVICES.
13. ALL WORK TO BE DONE DURING THE HOURS DESIGNATED BY OWNER.
14. UPON COMPLETION OF ALL SPRINKLER WORK, CONTRACTOR SHALL TEST AND INSPECT ENTIRE SPRINKLER SYSTEM. ENTIRE SYSTEM SHALL BE FULLY OPERATIONAL AND APPROVED IN COMPLIANCE WITH ALL AHJ.
15. UPON SUCCESSFUL COMPLETION OF ALL TESTING, CONTRACTOR SHALL PRIME AND PAINT ALL EXPOSED SPRINKLER PIPING. COLOR AND FINISH SHALL BE AS PER ARCHITECT.
16. CONTRACTOR SHALL INCLUDE IN HIS BID THE COST TO PROVIDE (5) FIVE ADDITIONAL SPRINKLERS INSTALLED. EXACT LOCATIONS OF THESE SPRINKLER HEADS SHALL BE DETERMINED IN FIELD.
17. FOR SPRINKLER WORK DONE IN ACCORDANCE WITH THE REQUIREMENTS OF N.F.P.A.-13-2016, HYDROSTATIC TESTS IN ACCORDANCE WITH REFERENCE STANDARD NFPA 13-2016, AS MODIFIED FOR TOWN OF SOUDERTON, PENNSYLVANIA, ARE NECESSARY.
18. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES AND SHALL INSTALL NEW WORK TO CLEAR DUCTWORK AND LIGHTING FIXTURES.
19. ALL SPRINKLER WORK SHALL COMPLY WITH BUILDING STANDARDS AND REQUIREMENTS.
20. DRAWING INDICATES SPRINKLER SYSTEM DESIGN ONLY. CONTRACTOR RESPONSIBLE FOR OFFSETS, DROPS AND RISES FOR COORDINATION WITH OTHER TRADES.
21. PIPES SIZES SHOWN ARE BASED ON SCHEDULE OF PIPE SIZE PIPING LAYOUTS ONLY. ACTUAL PIPE SIZES SHALL BE DETERMINED BY CONTRACTORS HYDRAULIC CALCULATIONS BASED ON HIS INSTALLATION DRAWINGS. CONTRACTOR SHALL ALLOW FOR THIS AND INCLUDE THIS IN HIS CONTRACT PRICE.
22. PROVIDE AUXILIARY DRAINS AT TRAPPED SECTIONS OF PIPING AS REQUIRED BY NFPA.
23. GENERAL CONTRACTOR SHALL COORDINATE FINAL FURNITURE/ EQUIPMENT HEIGHT ELEVATIONS AND LOCATIONS WITH SPRINKLER INSTALLATION. ENGINEER SHALL BE NOTIFIED WHEN FURNITURE/EQUIPMENT IS LESS THAN 18" TO UNDERSIDE OF CEILING PRIOR TO INSTALLATION.
24. COMPOSITE DRAWINGS
 CONTRACTOR SHALL BE GIVEN A SEPIA TRANSPARENCIES TO IMPOSE THEIR WORK FOR A COORDINATED ALLOCATION OF SPACE. PROCEDURE SHALL INCLUDE HVAC CONTRACTOR TO INDICATE DUCT WORK, PIPING, STRUCTURAL AND ARCHITECTURAL DETAILS. SEPIAS SHALL BE GIVEN TO PLUMBING, SPRINKLER AND ELECTRICAL TRADES WHO WILL DRAW HIS WORK ON DRAWINGS. HVAC CONTRACTORS SHALL HOLD A COORDINATION MEETING WITH ALL CONTRACTORS TO ELIMINATE INTERFERENCE OR CONFLICTS IN INSTALLING WORK. IF UNABLE TO EACH AGREEMENT ISSUE, ARCHITECT SHALL MAKE BINDING DECISION.
25. CONTRACTOR SHALL COORDINATE SPRINKLER MAIN AND BRANCHES WITH NEW CONSTRUCTION TO AVOID CONFLICTS WITH CEILING HEIGHTS, DUCTWORK, LIGHTING FIXTURES, BEAMS. CONTRACTOR TO ADJUST PIPING ACCORDINGLY TO ACCOMMODATE NEW CONSTRUCTION.

BUILDING DEPARTMENT SPRINKLER NOTES

1. THE INSTALLATION, COMPONENTS, SIZING, SPACING, CLEARANCES, POSITION AND TYPE OF SYSTEMS SHALL CONFORM TO THE 2018 PENNSYLVANIA BUILDING CODE (IBC 2018) SECTION 903.
2. ONLY APPROVED MATERIALS SHALL BE USED AS PER 2018 PENNSYLVANIA FIRE CODE (IFC 2018), SECTION 104.9.
3. DIRECT CONNECTION OF SPRINKLERS TO THE PUBLIC WATER SYSTEM SHALL CONFORM TO 2018 PENNSYLVANIA BUILDING CODE (IBC 2018) SECTION 903.3.5
4. SPRINKLER SHALL BE PROTECTED AGAINST FREEZING AND INJURY AS PER NFPA 13-2016 CHAPTER 8 SECTION 8.6.
5. THE OCCUPANCY OF THE AREAS TO BE SPRINKLERED IN ACCORDANCE WITH 2018 PENNSYLVANIA BUILDING CODE (IBC 2018), SECTION 903.2.
6. PIPING, FITTINGS, SPECIFICATIONS, PIPE SCHEDULES, SYSTEM TEST PIPES, PROTECTION AGAINST CORROSION, DAMAGE, VALVES, HANGERS, SPRINKLERS GUARDS AND SHIELDS SHALL BE AS PER WITH 2018 PENNSYLVANIA BUILDING CODE, SECTION 903.2.
7. STOCK OF EXTRA SPRINKLERS WILL BE FURNISHED AS PER NFPA 13-2016 SECTION 16.2.7 (REQUIRED FOR EACH TEMPERATURE RATING).
8. SPRINKLER ALARM SHALL BE IN ACCORDANCE WITH 2018 PENNSYLVANIA BUILDING CODE (IBC 2018), SECTION 907.
9. SPACING, LOCATION AND POSITION OF SPRINKLER WILL BE AS PER 2018 PENNSYLVANIA BUILDING CODE, SECTION 903.3.
10. ALL BLIND SPACES EXCEEDING 6" IN WIDTH OR DEPTH WHICH CONTAIN COMBUSTIBLE MATERIAL WILL BE SPRINKLERED.
11. ALL PIPE PASSING THROUGH WALLS WILL COMPLY WITH SECTION 2018 PENNSYLVANIA BUILDING CODE, SECTION 714.
12. THERE IS NO HIGH PILED STORAGE AS DEFINED IN 2018 PENNSYLVANIA FIRE CODE (IFC 2018), SECTION 3201.
13. DISTANCE OF SPRINKLERS FROM HEAT SOURCE SHALL BE AS PER NFPA 13-2016 SECTION 8.3.2.5.
14. THIS APPLICATION IS NOT FILED AS A RESULT OF ACTION BY THE FIRE COMMISSIONER AS AUTHORIZED BY BS & A TO MODIFY THE CERTIFICATE OF OCCUPANCY NOR IS SUCH ACTION PENDING.
15. ALL VALVES SHALL BE IDENTIFIED AS REQUIRED BY NFPA 13-2016, SECTION 7.6.3.
16. A ONE PIECE REDUCING FITTING OF GOOD DESIGN SHOULD BE USED WHEREVER A CHANGE IS MADE IN THE SIZE OF PIPE, AS PER NFPA 13-2016 SECTION 6.4.7.
17. ALL VALVES ON CONNECTIONS TO WATER SUPPLIES TO SPRINKLER SHALL BE APPROVED O.S. & Y. OR APPROVED INDICATOR TYPE.
18. DRAIN VALVES AND TEST VALVES SHALL BE APPROVED TYPE AS PER NFPA-13-2016 SECTION 6.6.3.
19. HANGERS SHOULD BE SUPPORTED BY WROUGHT IRON U TYPE OR APPROVED ADJUSTABLE HANGERS. HANGERS SHALL BE OF THE TYPE APPROVED FOR USE WITH THE PIPE OR TUBE INVOLVED, AS PER NFPA-13-2016 SECTION 9.1.
20. TEMPERATURE RATING SHALL COMPLY WITH NFPA-13-2016 SECTION 8.3.2.
21. 18" MINIMUM CLEARANCE TO BELOW SPRINKLER DEFLECTOR AS PER NFPA-13-2016 SECTION 8.5.6
24. MINIMUM BRANCH PIPE SIZE TO BE ONE INCH (1").
25. THIS APPLICATION IS MADE ONLY FOR WORK INDICATED ON THE SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.
26. WET SPRINKLER SYSTEM SUBJECTED TO FREEZING SHOULD COMPLY WITH NFPA 13-2016 SEC. 8.16.4.
27. INSPECTION AND TESTS OF SPRINKLERS SHALL BE CONDUCTED AS PER 2018 PENNSYLVANIA BUILDING CODE (IBC 2018), SECTION 904.4.

SPRINKLER SCHEDULE

SYMBOL	NAME	COVERAGE	AREA	METAL	TEMPERATURE (°F)	K-FACTOR	NPT	MFG	MODEL NO./SIN	REMARK
●	CONCEALED PENDENT	STANDARD	CEILING	BRASS	165	5.6	1/2"	TYCO	SERIES RF-II TY3531	FM APPROVED

- NOTE: 1. COORDINATE ALL SPRINKLER COLOR FINISHES WITH ARCHITECT.
 2. ALL SPRINKLER SHOULD BE UL/FM APPROVED

SPRINKLER SPECIFICATIONS

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. THE SPRINKLER CONTRACTOR SHALL BE A LICENSED, AUTHORIZED INSTALLER OF SPRINKLER SYSTEMS AND SHALL HAVE HAD A MINIMUM OF FIVE YEARS EXPERIENCE IN THE INSTALLATION OF SPRINKLER SYSTEMS IN THE TOWN OF SOUDERTON, PA.
- B. BEFORE SUBMITTING HIS BID, THE SPRINKLER CONTRACTOR SHALL VISIT THE SITE AND SHALL FULLY FAMILIARIZE HIMSELF WITH AND BECOME FAMILIAR WITH THE DIFFICULTIES THAT WILL ATTEND THE EXECUTION OF THIS WORK. CONTRACTOR SHALL PERFORM THIS PRIOR TO SUBMITTING HIS PROPOSAL. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE, AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
- C. UPON REVIEW OF THE DRAWINGS AND SPECIFICATIONS, PRIOR TO SUBMITTING HIS PROPOSAL, THE SPRINKLER CONTRACTOR SHALL INFORM ARCHITECT AND/OR ENGINEER OF ANY DISCREPANCIES OR REQUEST CLARIFICATION IN WRITING, IF NECESSARY, CONCERNING THE INTENT OF THE PLANS AND SPECIFICATIONS TO PROVIDE A COMPLETE SPRINKLER SYSTEM INSTALLATION. LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS SHOULD SUCH PROCEDURE NOT BE FOLLOWED.
- D. THE SCHEDULING OF THE SPRINKLER WORK SHALL BE COORDINATED WITH BUILDING MANAGEMENT, WITH OTHER CONTRACTORS AND WITH THE ENGINEER.
- E. NECESSARY SHUT-DOWNS OF BASE BUILDING SPRINKLER SYSTEM MUST BE COORDINATED WITH BUILDING MANAGEMENT. SHUT-DOWNS OF BASE BUILDING SYSTEMS SHALL TAKE PLACE AFTER OR BEFORE NORMAL BUSINESS HOURS AND SHALL BE CONSIDERED OVERTIME WORK. THE CONTRACTOR MUST GIVE BUILDING MANAGEMENT AND LOCAL FIRE DEPARTMENT 48 HOURS NOTICE PRIOR TO SHUT-DOWN OF SPRINKLER, OR OTHER SYSTEMS.

1.02 WORK INCLUDED

- A. WORK SHALL INCLUDE ALL SPRINKLER WORK FURNISHED AND INSTALLED AS INDICATED ON THE PLANS AND AS SPECIFIED HEREIN.
- ALL WORK SHALL COMPLY WITH REQUIREMENTS OF THE 2018 PENNSYLVANIA BUILDING CODE (IBC 2018), N.F.P.A. STANDARD 13-2016, PENNSYLVANIA FIRE CODE 2018 (IFC 2018), LOCAL FIRE DEPARTMENT AND OWNERS INSURANCE RATING ORGANIZATION.
 - THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION OF WORK. SCALED DIMENSIONS SHALL NOT BE USED. ANY DIMENSIONS NOT SHOWN SHALL BE OBTAINED FROM FIELD MEASUREMENTS.
 - PROVIDE COMPUTER GENERATED HYDRAULIC CALCULATIONS IN ACCORDANCE WITH LOCAL BUILDING DEPARTMENT AND NFPA STANDARDS.
- 1.03 SHOP DRAWINGS AND SUBMITTALS
- A. THE CONTRACTOR SHALL SUBMIT, FOR APPROVAL, FULLY COORDINATED SHOP DRAWINGS, CAPACITY, DATA, AND CATALOG CUTS OF THE FOLLOWING:
- PIPE AND FITTINGS
 - VALVES
 - HANGERS AND SUPPORTS
 - SPRINKLER PIPING LAYOUT
 - TESTS
 - SPRINKLER HEADS
 - HYDRAULIC CALCULATIONS
 - SIAMESE CONNECTION
- A. THE SPRINKLER SYSTEM SHALL BE HYDRAULICALLY DESIGNED. CONTRACTOR SHALL SUBMIT CALCULATIONS WITH SHOP DRAWINGS. CALCULATIONS SHALL BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS OF NFPA 13-2016, PENNSYLVANIA FIRE CODE 2018 (IFC 2018), AND 2018 PENNSYLVANIA BUILDING CODE (IBC 2018).

1.04 BUILDING DEPARTMENT FILING, PERMITS AND CERTIFICATES

- A. THE SPRINKLER CONTRACTOR SHALL FILE ALL REQUIRED DRAWINGS AND HYDRAULIC CALCULATIONS WITH THE BUILDING DEPARTMENT AND BE RESPONSIBLE FOR OBTAINING FINAL APPROVAL.
- B. ARRANGE FOR INSPECTION AND TESTS OF ANY AND ALL PARTS OF THE WORK AS REQUIRED BY AUTHORITIES HAVING JURISDICTION AND PAY ALL CHARGES FOR SAME.

1.05 INSPECTION AND TESTING

- A. THE SPRINKLER SYSTEM SHALL BE INSPECTED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2018 PENNSYLVANIA BUILDING CODE (IBC 2018) WITH FIRE DEPARTMENT INSPECTOR.
- B. THE SPRINKLER SYSTEM SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE TEST FOR A PERIOD OF TWO HOURS AT A PRESSURE OF AT LEAST 200 PSIG OR 50 PSI IN EXCESS OF THE MAXIMUM PRESSURE TO BE MAINTAINED WHEN THE MAXIMUM PRESSURE IN THE SYSTEM IS IN EXCESS OF 150 PSI AS PER NFPA.
- C. THE BUILDING DEPARTMENT SHALL BE NOTIFIED THAT THE SYSTEM IS READY FOR REINSPECTION AND TESTING. THE BUILDING DEPARTMENT INSPECTOR SHALL WITNESS THE TEST. FINAL APPROVAL OF THE SPRINKLER SYSTEM SHALL BE OBTAINED FROM BUILDING DEPARTMENT, AND FIRE DEPARTMENT.

PART 2 - MATERIALS

2.01 GENERAL

- A. THE SPRINKLER SYSTEM SHALL BE COMPLETE WITH ALL PIPE, FITTINGS, VALVES, DRAINAGE SYSTEM AND VALVES, HANGERS AND SUPPORTS, ALSO, MISCELLANEOUS WORK ITEMS, SUCH AS, SIGNS AS REQUIRED, VALVE TAGS, ETC., AND ALL OTHER RELATED EQUIPMENT, APPARATUS AND MATERIAL ITEMS NECESSARY FOR COMPLETE, APPROVED TYPE SYSTEM, READY FOR FUTURE EXTENSION.
- B. ALL PIPE, FITTINGS, HANGERS, SUPPORTS, SPRINKLER HEADS, ETC., SHALL CONFORM TO THE 2018 PENNSYLVANIA BUILDING CODE (IBC 2018) AND NATIONAL FIRE PROTECTION ASSOCIATION'S REQUIREMENTS AS TO TYPES OF MATERIALS, ARRANGEMENT, SIZES AND INSTALLATION. PIPING PENETRATING FIRE RATED PARTITIONS SHALL HAVE OPENING SEALED WITH U.L. APPROVED FIREPROOF SEALANT.

2.02 SPRINKLER PIPING

- A. ALL SPRINKLER PIPING SHALL BE SCHEDULE 40, IN ACCORDANCE WITH NFPA 13-2016. PIPE SHALL BE UL/FM APPROVED.
- B. STEEL PIPE SHALL BE BETHLEHEM STEEL CO., ALLIED TUBE, BERGER INDUSTRIES OR APPROVED.

- C. AS PER NFPA 13-2016 PIPE OR TUBE USED IN SPRINKLER SYSTEMS SHALL BE OF THE MATERIALS SPECIFIED IN TABLE 6.3.1.1 OR SHALL BE IN ACCORDANCE WITH 6.3.1.1.
- D. AS PER NFPA 13-2016, FITTINGS USED IN SPRINKLER SYSTEMS SHALL BE OF THE MATERIALS LISTED IN TABLE 6.4. OR SHALL BE IN ACCORDANCE WITH 6.4. FITTING SHALL BE UL/FM APPROVED. CONTRACTOR.

2.03 CUTTING AND PATCHING

- DO ALL CUTTING AND CORE DRILLING NECESSARY FOR THE INSTALLATION OF SPRINKLER WORK. ACCURATELY LAYOUT WORK FOR WHICH CUTTING IS REQUIRED. PATCH AND RESTORE ANY DAMAGE WORK TO LIKE NEW CONDITION.

- FOR REPLACEMENT OF THE WORK REMOVED, MATCH EXISTING IN NATURE, CONSTRUCTION AND FINISH.

- MAINTAIN THE PREMISES FREE FROM ACCUMULATION OF WASTE MATERIAL OR RUBBISH COVERED BY THE WORK. REMOVE ALL SURPLUS MATERIALS, TOOLS ETC. AND LEAVE PREMISES CLEAN.

2.04 FIRE STOPPING

- INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURERS PUBLISHED DIRECTIONS AND PER FIRE TESTED DESIGNS THAT HAVE BEEN ACCEPTED BY THE APPROPRIATE CODE AUTHORITY HAVING JURISDICTION.

2.05 PHASING

- PHASING SHALL BE COORDINATED BETWEEN THE SPRINKLER CONTRACTOR AND GENERAL CONTRACTOR. SPRINKLER INSTALLATION SHALL BE PHASED IN A MANNER WHICH WILL ALLOW FULL OCCUPANCY OF THE EXISTING FACILITY WHILE THE INSTALLATION IS IN PROGRESS.

2.06 ALTERNATES/SUBSTITUTIONS

- CONTRACTOR SHALL STATE IN THEIR PROPOSAL ANY CONTRACTOR PROPOSED SUBSTITUTIONS OF THE MATERIALS OR METHODS OF INSTALLATION FROM THAT SPECIFIED. THESE ALTERATIONS SHALL BE LISTED ON THE PROPOSAL AS CONTRACTOR ALTERNATIVE.

2.07 LEAK DAMAGE

- THE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE DURING THE INSTALLATION AND TESTING PERIODS OF THE SPRINKLER SYSTEM FOR ANY LOSS OR DAMAGE TO THE WORK OF OTHERS, TO THE BUILDING, ITS CONTENTS ETC. CAUSED BY LEAKS IN THE EQUIPMENT, BY UNPLUGGED OR DISCONNECTED PIPES, FITTINGS ETC. OR BY OVERFLOW, AND SHALL PAY FOR THE NECESSARY REPLACEMENTS OR REPAIRS TO THE WORK OF OTHERS, DAMAGED BY SUCH LEAKAGE.

2.08 INSERTS, HANGERS, ETC.

- A. ALL SPRINKLER PIPING SHALL BE SUBSTANTIALLY SUPPORTED AND SHALL COMPLY WITH THE STANDARDS FOR THE NATIONAL FIRE PROTECTION ASSOCIATION FOR THE INSTALLATION OF SPRINKLER SYSTEMS AND AS REQUIRED BY THE 2018 PENNSYLVANIA BUILDING CODE.

- B. HANGERS AND THEIR COMPONENTS SHALL BE FERROUS. HANGERS SHALL BE ADJUSTABLE FLAT IRON TYPE OF CLEVIS TYPE.

- C. SPRINKLER PIPING OR HANGERS SHALL NOT BE USED TO SUPPORT NON-SYSTEM COMPONENTS.

- D. SPRINKLER PIPING SHALL BE SUBSTANTIALLY SUPPORTED FROM THE BUILDING STRUCTURE WHICH MUST SUPPORT THE ADDED LOAD OF THE WATER-FILLED PIPE PLUS A MINIMUM OF 250 LBS. APPLIED AT THE POINT OF HANGING. CONTRACTOR SHALL SUBMIT DETAIL OF SUPPORT FOR REVIEW AND APPROVAL.

- E. SPRINKLER PIPING SHALL BE SUPPORTED INDEPENDENTLY OF THE CEILING SHEATHING.

- F. WHEN SPRINKLER PIPING IS INSTALLED BELOW DUCTWORK, PIPING SHALL BE SUBSTANTIALLY SUPPORTED FROM THE BUILDING STRUCTURE, NOT FROM THE DUCTWORK.

- G. MAXIMUM DISTANCE BETWEEN HANGERS SHALL NOT EXCEED 12 FT. FOR 1 AND 1-1/4" SIZES NOR 15' FOR SIZES 1-1/2" AND LARGER.

- H. EXPANSION SHIELDS FOR SUPPORTING PIPES UNDER CONCRETE CONSTRUCTION MAY BE USED IN A HORIZONTAL POSITION IN THE SIDES OF BEAMS IN CONCRETE HAVING GRAVEL OR CRUSHED STONE AGGREGATE. EXPANSION SHIELDS MAY BE USED IN THE VERTICAL POSITION TO SUPPORT PIPES 4" OR LESS IN DIAMETER.

2.09 ESCUTCHEONS

- PROVIDE ESCUTCHEONS ON ALL EXPOSED PIPING PASSING THROUGH WALLS, PARTITIONS, FLOORS AND CEILINGS. ESCUTCHEON SHALL BE HELD IN PLACE BY INTERNAL TENSION OR SET SCREW.

2.10 AS-BUILT DRAWINGS

- PREPARE AND SUBMIT "AS BUILT" DRAWINGS AT THE COMPLETION OF THE PROJECT.

2.11 SPRINKLER HEADS

- A. SPRINKLERS SHALL BE RATED FOR ORDINARY TEMPERATURES (135/165 DEG. F) EXCEPT AS REQUIRED NEAR HEATERS OR LOCATIONS WHERE ELEVATED TEMPERATURES MAY NORMALLY BE EXPECTED OR AS OTHERWISE INDICATED ON THE CONTRACT DRAWINGS.

- B. SPRINKLER HEADS SHALL BE BY TYCO SPRINKLER CO., INC. MANUFACTURE OR APPROVED EQUAL, UL AND FM APPROVED, AS FOLLOWS:

- SPRINKLER HEADS IN FINISHED CEILINGS WITH CONCEALED PIPING SHALL BE AUTOMATIC TYCO MODEL TY3531.

- PROVIDE SPARE SPRINKLER EMERGENCY CABINETS CONFORMING TO NFPA 13-2016.

- SPRINKLER EMERGENCY CABINETS SHALL BE OF TYCO SPRINKLER CO., INC. OR APPROVED EQUAL, UL AND FM APPROVED.

- CABINET SHALL BE CONSTRUCTED OF 22 GAUGE STEEL WITH PRIME COAT AND MANUFACTURER'S BAKED ENAMEL FINISH IN COLOR SELECTED BY THE ARCHITECT.

- CABINET SHALL CONTAIN A MINIMUM OF 6 SPRINKLER HEADS OF EACH TYPE EMPLOYED.

2.12 PRESSURE GAUGE

- A. ASHCROFT SERIES 1079, OR APPROVED OTHER, 4-1/2" DIAMETER, 0-200 P.S.I. RANGE, 20 P.S.I. INTERVALS.

PART 3 - EXECUTION

3.01 GUARANTEE

- A. GUARANTEE FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER, ALL MATERIALS, APPARATUS AND WORKMANSHIP WHETHER FURNISHED BY HIMSELF OR BY HIS SUBCONTRACTORS AND HE SHALL REPLACE OR REPAIR IN A MANNER APPROVED BY THE ARCHITECTS, WITHOUT COST TO THE OWNER, ANY PART OR PARTS OF THE WORK WHICH MAY PROVE DEFECTIVE OR UNSATISFACTORY WITH IN THE PERIOD OF THE GUARANTEE.

3.02 INSTALLATION

A. PIPING

- INSTALL PIPING AS SHOWN ON THE CONTRACT DRAWINGS AND STRAIGHT AND DIRECT AS POSSIBLE, FORMING RIGHT ANGLES OR PARALLEL LINES WITH BUILDING WALLS, NEATLY SPACED, WITH RISERS PLUMB AND TRUE.

- SPRINKLER PIPING SHALL BE INSTALLED SO THAT THE SYSTEM CAN BE DRAINED.

- PIPE SHALL BE REMOVED BY REAMING.

- BEFORE INSTALLING PIPE, THOROUGHLY CLEAN THE INSIDE FREE OF CUTTING AND FOREIGN MATTER. CUT ALL PIPE SQUARE AND SMOOTH AND MAKE UP ALL JOINTS TO REQUIRED LIMITS.

B. PIPE JOINTS

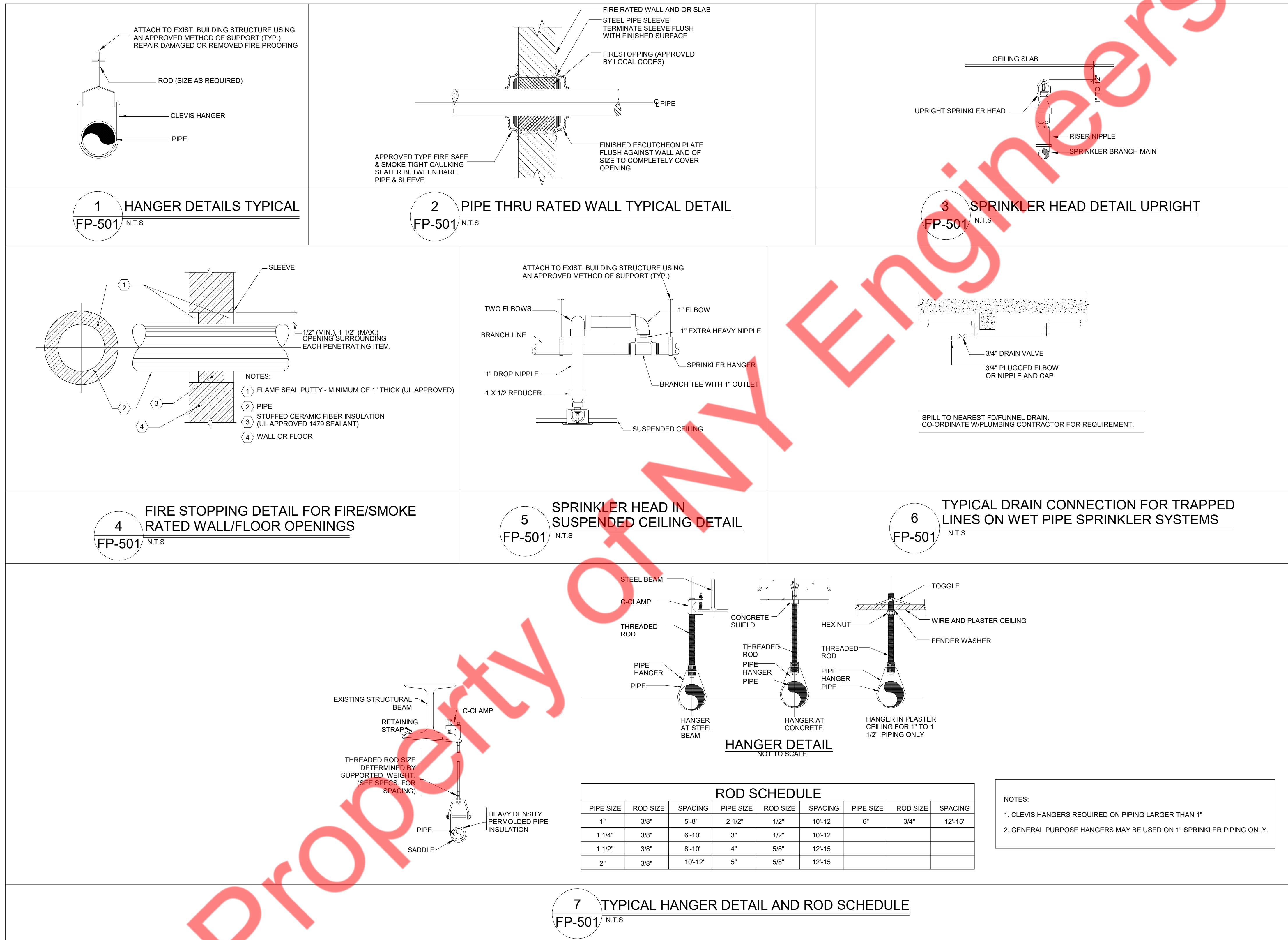
- THREADED JOINTS SHALL BE MADE UP OF TIGHT USING PIPE JOINT TEFLON COMPOUND OR TAPE, APPLIED ON THE MALE THREADS ONLY.



FIRE PROTECTION GENERAL NOTES:

1. THE SPRINKLER SYSTEM SHALL BE DESIGNED TO MEET THE BUILDING CODE AND NFPA-13-2016 REQUIREMENTS. THE BRIGHTPATH KIDS SPRINKLER SYSTEM SHALL BE DESIGNED AS A SEPARATE ZONE WITH DEDICATED FLOOR CONTROL FLOW ASSEMBLY.
2. ALL CONSTRUCTION INCLUDING EQUIPMENT AND PIPING SHOULD COMPLY WITH RETURN AIR PLENUM STANDARDS.
3. ALL SPRINKLER HEADS IN AREA OF WORK TO BE FULLY COORDINATED WITH ALL CEILING ELEMENTS NEW AND EXISTING IN ADDITION TO WORK FROM OTHER TRADES. CONTRACTOR TO VERIFY PIPE LAYOUT INCLUDING PIPE ROUTING, SIZE, AND SPRINKLER HEAD LOCATIONS.
4. CONTRACTOR TO PROVIDE SPRINKLER HYDRAULIC CALCULATIONS BASED ON HYDRANT FLOW TEST NO OLDER THAN ONE YEAR IN ADDITION TO SHOP DRAWINGS FOR REVIEW AND APPROVAL.

① FIRE PROTECTION PLAN
1/8" = 1'-0"



ROD SCHEDULE

PIPE SIZE	ROD SIZE	SPACING	PIPE SIZE	ROD SIZE	SPACING	PIPE SIZE	ROD SIZE	SPACING
1"	3/8"	5'-8"	2 1/2"	1/2"	10'-12"	6"	3/4"	12'-15"
1 1/4"	3/8"	6'-10"	3"	1/2"	10'-12"			
1 1/2"	3/8"	8'-10"	4"	5/8"	12'-15"			
2"	3/8"	10'-12"	5"	5/8"	12'-15"			

NOTES:
 1. CLEVIS HANGERS REQUIRED ON PIPING LARGER THAN 1"
 2. GENERAL PURPOSE HANGERS MAY BE USED ON 1" SPRINKLER PIPING ONLY.