

MECHANICAL SYMBOLS LIST		MECHANICAL ABBREVIATIONS	
	EQUIPMENT SYMBOL	AC	AIR CONDITIONING UNIT
	RISER SYMBOL	ACC	AIR COOLED CONDENSING UNIT
AIR DEVICES			
	CEILING DIFFUSER SUPPLY	AL	ACOUSTIC LINING
	CEILING DIFFUSER RETURN	AD	ACCESS DOOR
	SIDEWALL SUPPLY GRILLE	GD	GRAVITY DAMPER
	SIDEWALL RETURN GRILLE	CFM	CUBIC FEET OF AIR PER MINUTE
DUCT ACCESSORIES			
	FIRE DAMPER W/ ACCESS DOOR	COP	COEFFICIENT OF PERFORMANCE
	MOTORIZED DAMPER W/ ACCESS DOOR	CP	CONDENSATE PUMP
	VOLUME DAMPER W/ ACCESS DOOR	CD	CONDENSATE DRAIN PIPE
	DUCT HEATER W/ ACCESS DOOR	DN	DOWN
	FIRE SMOKE DAMPER W ACCESS PANEL	DXF	DRYER EXHAUST FAN
	NEW CONDENSATE PIPING	EDH	ELECTRIC DUCT HEATER
	NEW REFRIGERANT PIPING	EER	ENERGY EFFICIENCY RATIO
HVAC PIPING			
	NEW CONDENSATE PIPING	EUH	ELECTRIC UNIT HEATER
	NEW REFRIGERANT PIPING	EG	EXHAUST GRILLE
CONTROLS AND SENSORS			
	THERMOSTAT	EN	ENERGY ANALYSIS
	TEMPERATURE SENSOR	FC	FLEXIBLE CONNECTION
	MANUAL ON/OFF SWITCH	FD/AD	FIRE DAMPER W/ACCESS DOOR
	SMOKE DETECTOR	FD	FIRE DAMPER W/FUSIBLE LINK
DUCTWORK			
	AIR DUCT W/ 1.5" ACOUSTICAL LINING	FSD	FIRE SMOKE DAMPER
	FLEXIBLE DUCT	GXF	GENERAL EXHAUST FAN
	FLEXIBLE CONNECTION	HSPP	HEATING SEASONAL PERFORMANCE FACTOR
	RECTANGULAR DUCT (WIDTH X DEPTH)	IEER	INTEGRATED ENERGY EFFICIENCY RATIO
	ROUND DUCT (DIAMETER)	QAI	OUTSIDE AIR INTAKE RISER
	ROUND DUCT CROSS SECTION	QAF	OUTSIDE AIR INTAKE FAN
	SUPPLY AIR RECTANGULAR DUCT CROSS SECTION	REF	REFRIGERANT PIPING
	RETURN AIR RECTANGULAR DUCT CROSS SECTION	RG	RETURN GRILLE

ENERGY CODE COMPLIANCE STATEMENT

TO THE BEST OF MY PROFESSIONAL KNOWLEDGE AND JUDGEMENT, THESE PLANS AND SPECIFICATION ARE IN COMPLIANCE WITH THE 2018 VIRGINIA ENERGY CONSERVATION CODE.

MECHANICAL DRAWING LIST		
1	M-001	MECHANICAL GENERAL NOTES, SYMBOLS LIST & ABBREVIATIONS
2	M-002	MECHANICAL SPECIFICATIONS (1 OF 2)
3	M-003	MECHANICAL SPECIFICATIONS (2 OF 2)
4	M-100	MECHANICAL FLOOR PLAN
5	M-101	MECHANICAL ROOF PLAN
6	M-300	MECHANICAL DETAILS (1 OF 2)
7	M-301	MECHANICAL DETAILS (2 OF 2)
8	M-600	MECHANICAL SCHEDULE

VIRGINIA BUILDING DEPARTMENT NOTES	
ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF 2018 VIRGINIA BUILDING CODE, AND ALL RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.	
1.	ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
2.	VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018 VIRGINIA MECHANICAL CODE, CHAPTER 4.
3.	AS PER C408.2.5 OF VIRGINIA ENERGY CONSERVATION CODE, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT, WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE, RECORD DRAWINGS OF THE ACTUAL INSTALLATION BE PROVIDED TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
4.	AS PER C408.3.2 OF VIRGINIA ENERGY CONSERVATION CODE, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT AN OPERATING MANUAL AND A MAINTAINED MANUAL BE PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
5.	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 VIRGINIA CONSTRUCTION CODE, REQUIREMENTS AS OUTLINES IN SECTION.
6.	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.
7.	TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018 CHAPTER 4 AND CHAPTER 5: A. MECHANICAL VENTILATION – SECTION 403.
8.	THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD: A. STANDARDS OF HEATING – SECTION 309.1 OF 2018 VIRGINIA MECHANICAL CODE. B. DUCT CONSTRUCTION AND INSTALLATION—SECTION 603 OF 2018 VIRGINIA MECHANICAL CODE. C. AIR INTAKES, EXHAUSTS AND RELIEF—SECTIONS 401.4, 401.5, 501.3 OF 2018 VIRGINIA MECHANICAL CODE. D. AIR FILTERS –SECTION 605 OF 2018 VIRGINIA MECHANICAL CODE. E. MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS FOR AIR DISTRIBUTION SYSTEMS –SECTION 513 OF 2018 VIRGINIA MECHANICAL CODE.
9.	MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
10.	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 VIRGINIA MECHANICAL CODE, CHAPTER 4 – SECTION 403.3.
11.	SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THE REQUIREMENTS OF SECTION 606 OF 2018 VIRGINIA MECHANICAL CODE TO CLOSE DAMPERS AND AUTOMATICALLY STOP THE FAN.
12.	REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION.
13.	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.

SCOPE OF WORK

1. 3-QTY OF RTUs to be installed AT THE SAME EXISTING ROOF TOP UNITS PLACES WITH CURB ADAPTORS, PROVIDE NEW DUCTWORK AND ACCESSORIES FOR COMPLETING THE HVAC SYSTEM.

2. PROVIDE EXHAUST FANS FOR REMOVING THE EXHAUST AIR FROM THE STUDIOS AND ALSO FROM THE RESTROOMS.

3. COORDINATE WITH GC ANY ADDITIONAL MECHANICAL WORK REQUIRED AND PLUMBING CONTRACTOR FOR PROVIDING CONDENSATE LINES FOR MECHANICAL EQUIPMENT.

NOTE TO CONTRACTOR

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 PLANS(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 THEREFOR. 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. THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

GENERAL NOTES

1. CONTRACTOR SHALL SURVEY THE AREA OF THIS WORK BEFORE SUBMITTING A BID AND SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY CONDITIONS WHICH WOULD PREVENT THE INSTALLATION OF THE WORK AS SHOWN ON DRAWINGS.

2. 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.

3. 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.

4. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND AT THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

5. 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 THEREFOR SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

6. 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.

7. DUCTWORK AND PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL MAKE ALLOWANCE IN PRICING FOR ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS.) EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED.

8. 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.

9. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.

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 FREE & MASON SERIES 3000 WITH CONE 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 THE 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 BUILDING SERVICE VALVES THAT RUN THROUGH THE SPACE, 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.

20. ALL EQUIPMENT SHALL BE PROVIDED WITH ONE YEAR WARRANTY PARTS AND LABOR AND FIVE YEARS ON COMPRESSORS. WARRANTY PERIOD BEGINS UPON PROJECT ACCEPTANCE.

21. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HIS WORK WITH ITS COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF THE SAME WHICH MAY BE DAMAGED, LOST, OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER.

23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FAILURE OF ANY DUCTWORK SYSTEM OR EQUIPMENT TO FUNCTION PROPERLY UPON COMPLETION OF HIS WORK UPON SAID SYSTEM OR EQUIPMENT.

24. SUBMIT SHOP DRAWING OF ALL WORK WHICH MUST BE APPROVED BY THE ARCHITECT AND ENGINEER BEFORE WORK COMMENCES.

25. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC) AND CONDITIONS.

26. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS THE CONTRACTOR SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

27. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

28. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

29. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS, THE SPECIFICATIONS OR ANY OTHER CONSTRUCTION DOCUMENT, THE ONE WITH THE MOST STRINGENT REQUIREMENT(S) SHALL APPLY.

DEFINITIONS:
"PROVIDE": TO SUPPLY, 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.

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 ELECTRICAL CODE AND ELECTRICAL DIVISION OF THE SPECIFICATION.

10. PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.

11. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS CONNECTED TO, AND WITHIN 50 FT. OF, ISOLATED EQUIPMENT (EXCEPT AT BASE ELBOW SUPPORTS AND ANCHOR POINTS) THROUGHOUT MECHANICAL EQUIPMENT ROOMS. DO THE SAME FOR SUPPORTS OF STEAM MAINS WITHIN 50 FT. OF BOILER OR PRESSURE-REDUCING VALVES.

12. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS OF STEAM MAINS WITHIN 50 FT. OF BOILERS AND PRESSURE-REDUCING VALVES.

13. MAINTAIN A MINIMUM 6"-8" CLEARANCE TO THE UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.

14. LOCATE ALL TEMPERATURE, PRESSURE, 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.

15. ALL MECHANICAL ROOM DOORS SHALL BE A MINIMUM OF 4'-0" WIDE.

16. 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.

17. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN THE DETAILS FOR PIPING, DUCTWORK AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.

18. 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.

19. MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM A METAL DECK.

20. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND REQUIRED TO PROVIDE A VIBRATION-FREE INSTALLATION.

21. 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 ORDERS 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.

22. ALL ROOF-MOUNTED EQUIPMENT CURBS FOR EQUIPMENT PROVIDED BY THE MECHANICAL CONTRACTOR SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR.

23. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.

24. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUIT, ETC. SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR APPROVED EQUAL.

25. ALL AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING UNIT AND ROOFTOP 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.

26. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.

27. REINFORCEMENT, DETAILING, AND PLACEMENT OF CONCRETE SHALL CONFORM TO ASTM 315 AND ACI 318. CONCRETE SHALL CONFORM TO ASTM C94. CONCRETE WORK SHALL CONFORM TO ACI 318 PART ENTITLED, "CONSTRUCTION REQUIREMENTS". COMPRESSIVE STRENGTH IN 28 DAYS SHALL BE 3,000 PSI. TOTAL AIR CONTENT OR EXTERIOR CONCRETE SHALL BE BETWEEN 5 AND 7 PERCENT BY VOLUME. SLUMP SHALL BE BETWEEN 3 AND 4 IN. CONCRETE SHALL BE CURED

FOR 7 DAY AFTER PLACEMENT.

28. CONCRETE HOUSEKEEPING PADS TO SUIT MECHANICAL EQUIPMENT SHALL BE SIZED AND LOCATED BY THE MECHANICAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 6 IN. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6 IN. ON EACH SIDE. CONCRETE HOUSEKEEPING PADS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO COORDINATE THE SIZE AND LOCATION OF CONCRETE HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR.

29. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.

30. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR SHALL BALANCE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TESTING, ADJUSTING, AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THE AABC STANDARDS.

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 DEFECTS IN EXISTING DUCTWORK. 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. PROVIDE R-6 ACOUSTICAL LINING FROM AC UNIT UP TO 20'.

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 IN THE DRAWINGS. 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 AND HUMIDISTAT 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 DISHWASHER, KITCHEN, AND LAUNDRY EXHAUSTS SHALL BE OF UNIFORM 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 GRILL LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.

13. FIELD-ERECTED AND FACTORY-ASSEMBLED AIR HANDLING UNITS SHALL BE ARRANGED FOR REMOVAL FROM THE UPSTREAM SIDE WITHOUT DISMANTLING SUPPORTS. PROVIDE GALVANIZED STRUCTURAL STEEL SUPPORTS FOR ALL COILS (EXCEPT THE LOWEST COIL) IN BANKS OVER TWO COILS HIGH TO PERMIT THE INDEPENDENT REMOVAL OF ANY COIL.

14. ALL AIR HANDLING UNITS SHALL OPERATE WITHOUT MOISTURE CARRYOVER.

15. LOCATE ALL MECHANICAL EQUIPMENT (SINGLE DUCT, DUAL DUCT, VARIABLE VOLUME, CONSTANT VOLUME, AND FAN-POWERED BOXES, FAN COIL UNITS, CABINET HEATERS, UNIT HEATERS, UNIT VENTILATORS, COILS, STEAM HUMIDIFIERS, ETC.) FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS, AND VALVING.

16. 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.

17. UNLESS OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE, WITH SPACE FOR INSULATION IF NEEDED.

18. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 5 FT.

19. 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.

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

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

22. 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.

23. 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.

24. TERMINATE GAS VENTS FOR UNIT HEATERS, WATER HEATERS, HIGH-PRESSURE PARTS WASHERS, HIGH-PRESSURE CLEANERS, AND OTHER GAS APPLIANCES A MINIMUM OF 30 IN. ABOVE THE ROOF WITH RAIN CAP (EDIT ANY APPLIANCES AND THE HEIGHT ABOVE THE ROOF TO MEET THE CODE AND SUIT PROJECT REQUIREMENTS).

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

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

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 ANOILIARY 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 GIVE 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.
- 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.
- 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 XHZ.

FOR THE FOLLOWING SYSTEMS:

- 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. MORTAR
 - e. SILICONE FOAM
 - f. PILLOWS/BAGS
 - g. INTUMESCENT WRAP STRIPS
 - h. INTUMESCENT COMPOSITE SHEET

1.6 MANUFACTURERS

- 1. HILTI CONSTRUCTION CHEMICAL, INC
- 2. TREMCO INC.
- 3. 3M FIRE PROTECTION PRODUCTS

END OF SECTION 078413

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.
- 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. INSTALL ESCUTCHEONS WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.

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.
- d. BARE PIPING AT CEILING 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 PERFORMANCE: 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 COMPONENTS.
- 3. DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.

END OF SECTION 230529

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-DEVELOPED INDEX OF 50 FOR INSULATION INSTALLED INDOOR, 75, AND SMOKE-DEVELOPED INDEX OF 150 FOR INSULATION INSTALLED OUTDOORS; ACCORDING TO ASTM E 84.

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: UNCONDITIONED SPACES WITHIN BUILDING: R-6 WITHIN BUILDING ENVELOPE ASSEMBLY: R-8 OUTSIDE OF BUILDING: R-8.
- 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 230713

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY

- A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:
 - 1. AIR SYSTEMS: CONSTANT-VOLUME.
 - 2. CONDENSING UNITS.
 - 3. HEAT-TRANSFER COILS.
 - 4. EXHAUST SYSTEMS - TOILET AND KITCHEN EXHAUST.

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 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 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 5 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-DEVELOPED INDEX OF 50 FOR INSULATION INSTALLED INDOOR, 75, AND SMOKE-DEVELOPED INDEX OF 150 FOR INSULATION INSTALLED OUTDOORS; ACCORDING TO ASTM E 84.

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: UNCONDITIONED SPACES WITHIN BUILDING: R-6 WITHIN BUILDING ENVELOPE ASSEMBLY: R-8 OUTSIDE OF BUILDING: R-8.
- 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 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 CLASSES ARE SPECIFIED BY THE DESIGNER, THE SMACNA 2-1/2 INCH 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 CONWELDING WITH 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 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 FITTINGS AND ALL TRANSITION PIECES FROM RECTANGULAR TO ROUND SHALL BE NO. 18 GAUGE ALL WELDED CONSTRUCTION.
 - 3. HORIZONTAL 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 215; AWG AS.2.
 - 6. ALL 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. SIDE INCHES	TRANSVERSE BRACING	JOINTS
22	UP TO 12	5 SLIP DRIVE SLIP, ONE BRACKET LOCK ON 8 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 AN AIRTIGHT PLUGGED TAPPING LOCATED AS FOLLOWS:

- 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.

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. DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS.
- C. SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
- D. DOUBLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
- E. SHEET METAL MATERIALS:
 - 1. GALVANIZED SHEET STEEL.
 - 2. PVC-COATED, GALVANIZED SHEET STEEL.
 - 3. CARBON-STEEL SHEETS.
 - 4. STAINLESS-STEEL SHEETS.
 - 5. ALUMINUM SHEETS.
 - 6. FACTORY-APPLIED ANTI-MICROBIAL COATING.

DUCT LINER:

- 1. FIBROUS-GLASS OR FLEXIBLE ELASTOMERIC DUCT LINER FOR INTERSTITIAL INSULATION.
- 2. PERFORATED INNER DUCT.
- 3. SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
- 4. DOUBLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.

- 1. FIBROUS-GLASS OR FLEXIBLE ELASTOMERIC DUCT LINER FOR INTERSTITIAL INSULATION.
- 2. PERFORATED INNER DUCT.

E. SHEET METAL MATERIALS:

- 1. GALVANIZED SHEET STEEL.
- 2. PVC-COATED, GALVANIZED SHEET STEEL.
- 3. CARBON-STEEL SHEETS.
- 4. STAINLESS-STEEL SHEETS.
- 5. ALUMINUM SHEETS.
- 6. FACTORY-APPLIED ANTI-MICROBIAL COATING.

DUCT LINER:

- 1. FIBROUS GLASS, TYPE I, FLEXIBLE.
 - a. WITH ANTI-MICROBIAL EROSION-RESISTANT COATING.
- 2. FLEXIBLE ELASTOMERIC.
- 3. NATURAL FIBER.

G. 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 SEISMIC-RESTRAINT DEVICES

- A. CHANNEL SUPPORT SYSTEM.
- B. STAINLESS-STEEL RESTRAINT CABLES.
- C. HANGER ROD STIFFENER: STEEL TUBE OR STEEL SLOTTED-SUPPORT-SYSTEM SLEEVE WITH INTERNALLY BOLTED CONNECTIONS OR REINFORCING STEEL ANGLE CLAMPED TO HANGER ROD.

1.4 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.

END OF SECTION 233113

DUCTWORK INSULATION

- A. INSULATE ALL DUCTWORK IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

INSULATION SCHEDULE - DUCTWORK

SERVICE	LOCATION	THICKNESS	TYPE	FINISH
SUPP/RET INTAKE	CONCEALED	1.5"	D-1	VAPORSEAL ALL EXPOSED
SUPP/RET SUPPLY	EXTERIOR	2"	D-3	VAPORSEAL ALL EXPOSED
	EXTERIOR	2"	D-2	VAPORSEAL ALL EXPOSED
	EXTERIOR	2"	D-3	VAPORSEAL ALL EXPOSED

B. REINSULATE ALL DUCTWORK AND PIPING WHICH IS EXISTING TO REMAIN AND WAS DAMAGED DURING CONSTRUCTION OR SHOWN OR REQUIRED TO BE RELOCATED. INSULATE WITH SAME MATERIAL AND THICKNESS.

C. NON-INSULATED DUCTWORK:

- 1) WHERE SOUND LINING IS OF MINIMUM THICKNESS SPECIFIED FOR INSULATION.
- 2) AIR CONDITIONING RETURN AIR DUCTWORK EXPOSED IN AIR CONDITIONED SPACES AND INSTALLED IN HUNG CEILINGS WHERE SPACES IMMEDIATELY ABOVE AND BELOW ARE BOTH AIR CONDITIONED.

D. MATERIAL:

- 1) TYPE D-1: MINIMUM 1-LB DENSITY FIBERGLASS BLANKET, MAXIMUM 0.28 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY-APPLIED FOIL-SKIRM-KRAFT FACING SIMILAR TO MANVILLE MICROLITE.
- 2) TYPE D-2: 3 LB. FIBERGLASS BOARD, THE MAXIMUM K FACTOR SHALL BE 0.23 AT 75 DEG F MEAN TEMPERATURE WITH A MINIMUM DENSITY OF 3 LB. THE INSULATION SHALL BE PROVIDED WITH A FACTORY-APPLIED ALL PURPOSE OR ALL SERVICE FACING. THE INSULATION SHALL BE EQUAL TO MANVILLE TYPE 814 SPIN-GLAS AP.
- 3) TYPE D-3: MINIMUM 6 LB FIBERGLASS BOARD, MAXIMUM 0.22 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY APPLIED ALL PURPOSE OR ALL SERVICE FACING. SIMILAR TO MANVILLE 817 SPIN-GLAS AP.

E. INSTALLATION:

- FIBERGLASS BLANKET: 2 IN. LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 IN. WIDE WITH MIN. 2 ROWS OF WELD PINS 12 IN. ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.
- FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 3 IN. WIDE TAPE TO MATCH FACING AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 IN. WIDE TAPE AT CORNERS, WELD PINS ON TOP, SIDES AND BOTTOM.

- 1) TYPE D-1: MINIMUM 1-LB DENSITY FIBERGLASS BLANKET, MAXIMUM 0.28 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY-APPLIED FIRE-RETARDANT FOIL-SKIRM-KRAFT FACING SIMILAR TO MANVILLE MICROLITE.
- 2) TYPE D-2: 3 LB. FIBERGLASS BOARD, THE MAXIMUM K FACTOR SHALL BE 0.23 AT 75 DEG F MEAN TEMPERATURE WITH A MINIMUM DENSITY OF 3 LB. THE INSULATION SHALL BE PROVIDED WITH A FACTORY-APPLIED ALL PURPOSE OR ALL SERVICE FACING. THE INSULATION SHALL BE EQUAL TO MANVILLE TYPE 814 SPIN-GLAS AP.
- 3) TYPE D-3: MINIMUM 6 LB FIBERGLASS BOARD, MAXIMUM 0.22 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY APPLIED ALL PURPOSE OR ALL SERVICE FACING. SIMILAR TO MANVILLE 817 SPIN-GLAS AP.

E. INSTALLATION:

- FIBERGLASS BLANKET: 2 IN. LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 IN. WIDE WITH MIN. 2 ROWS OF WELD PINS 12 IN. ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.
- F

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

1.1 PRODUCTS

A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND IN LOCATIONS INDICATED ON 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. METALAIRE, 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

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

VIBRATION ISOLATION

A. GENERAL:

- 1) PROVIDE ISOLATION FOR EQUIPMENT, PIPING AND DUCTWORK.
- 2) INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- 3) PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4".
- 4) ACCEPTABLE MANUFACTURERS:

a. MASON INDUSTRIES, INC.

b. VIBRATION ELIMINATOR CO.

c. KORFUND DYNAMICS CORP.

C. FLOOR MOUNTED EQUIPMENT HAVING INTERNAL ISOLATION:

- 2) PROVIDE 5/16 IN.-THICK NEOPRENE ACOUSTICAL BASE PADS OF RIB.

THERMOSTATIC CONTROLS

C403.4.1 THERMOSTATIC CONTROLS

THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE. WHERE HUMIDIFICATION OR DEHUMIDIFICATION OR BOTH IS PROVIDED, AT LEAST ONE HUMIDITY CONTROL DEVICE SHALL BE PROVIDED FOR EACH HUMIDITY CONTROL SYSTEM.

EXCEPTION: INDEPENDENT PERIMETER SYSTEMS THAT ARE DESIGNED TO OFFSET ONLY BUILDING ENVELOPE HEAT LOSSES, GAINS OR BOTH SERVING ONE OR MORE PERIMETER ZONES ALSO SERVED BY AN INTERIOR SYSTEM PROVIDED:

THE PERIMETER SYSTEM INCLUDES AT LEAST ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE HAVING EXTERIOR WALLS FACING ONLY ONE ORIENTATION (WITHIN +/-45 DEGREES) (0.8 RAD) FOR MORE THAN 50 CONTIGUOUS FEET (15 240 MM); AND

THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY THERMOSTATS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM.

C403.4.1.2 DEADBAND

WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM.

EXCEPTIONS:

THERMOSTATS REQUIRING MANUAL CHANGEOVER BETWEEN HEATING AND COOLING MODES.
OCCUPANCIES OR APPLICATIONS REQUIRING PRECISION IN INDOOR TEMPERATURE CONTROL AS APPROVED BY THE CODE OFFICIAL.

C403.4.1.3 SET POINT OVERLAP RESTRICTION

WHERE A ZONE HAS A SEPARATE HEATING AND A SEPARATE COOLING THERMOSTATIC CONTROL LOCATED WITHIN THE ZONE, A LIMIT SWITCH, MECHANICAL STOP OR DIRECT DIGITAL CONTROL SYSTEM WITH SOFTWARE PROGRAMMING SHALL BE PROVIDED WITH THE CAPABILITY TO PREVENT THE HEATING SET POINT FROM EXCEEDING THE COOLING SET POINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.4.1.2.

C403.4.2 OFF-HOUR CONTROLS

EACH ZONE SHALL BE PROVIDED WITH THERMOSTATIC SETBACK CONTROLS THAT ARE CONTROLLED BY EITHER AN AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL SYSTEM.

EXCEPTIONS:

ZONES THAT WILL BE OPERATED CONTINUOUSLY.
ZONES WITH A FULL HVAC LOAD DEMAND NOT EXCEEDING 6,800 BTU/H (2 KW) AND HAVING A READILY ACCESSIBLE MANUAL SHUTOFF SWITCH.

C403.4.2.1 THERMOSTATIC SETBACK CAPABILITIES

THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURES DOWN TO 55°F (13°C) OR UP TO 85°F (29°C).

C403.4.2.2 AUTOMATIC SETBACK AND SHUTDOWN CAPABILITIES

AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROLS SHALL BE CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK AND RETAINING THEIR PROGRAMMING AND TIME SETTING DURING A LOSS OF POWER FOR AT LEAST 10 HOURS. ADDITIONALLY, THE CONTROLS SHALL HAVE A MANUAL OVERRIDE THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO 2 HOURS; A MANUALLY OPERATED TIMER CAPABLE OF BEING ADJUSTED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

C403.4.2.3 AUTOMATIC AND OPTIMUM START CAPABILITIES (MANDATORY)

AUTOMATIC START CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM. THE CONTROLS SHALL BE CONFIGURED TO AUTOMATICALLY ADJUST THE DAILY START TIME OF THE HVAC SYSTEM IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.

SEQUENCE OF OPERATIONS

1) FIRE AND SMOKE DAMPER

a) SMOKE DETECTION/TEST/POWER FAILURE OPERATION

WHEN SMOKE IS DETECTED (VIA A SMOKE DETECTOR), DURING TESTING OR IF POWER FAILURE OCCURS, THE DAMPER WILL CLOSE AND REMAIN CLOSED. WHEN THE SMOKE SIGNAL CEASES (SMOKE DETECTOR RESET), THE TEST IS COMPLETED OR POWER IS RESTORED THE DAMPER WILL AUTOMATICALLY RESET TO THE OPEN POSITION. THE DAMPER AUTOMATICALLY RESETS IF NUISANCE ALARMS OCCUR AND THE SYSTEM IS RESET.

b) FIRE OPERATION

WHEN TEMPERATURES IN EXCESS OF 165°F/74°C (212°F/100°C, 250°F/121°C OR 350°F/177°C OPTIONAL) ARE DETECTED, THE DAMPER WILL CLOSE AND LOCK. AT NO TIME SHALL THE DAMPER BE DISENGAGED FROM THE ACTUATOR. UPON CESSATION OF THE FIRE CONDITIONS, THE DAMPER CAN BE REOPENED BY PRESSING THE RESET BUTTON LOCATED ON THE DAMPER ASSEMBLY.

2) FANS:

TURNED ON OR OFF THROUGH ON-OFF SWITCH AND SHALL OPERATE CONTINUOUSLY. WHERE THERE ARE DAMPERS (MOTORIZED OR FSD) IN THE DUCTWORK SYSTEM SERVED BY THE FAN, THEY SHALL BE INTERLOCKED WITH THE FAN TO OPEN WHEN THE FAN IS OPERATING ONLY. IF FSD IS INSTALLED IN THE SYSTEM, THE FAN SHALL SHUT DOWN WHENEVER THE FSD CLOSES ON AN ALARM CONDITION.

a. TRANSFER FANS: FANS SHALL BE CONTROLLED BY A LOCAL WALL MOUNTED SWITCH.

b. THERMOSTATICALLY CONTROLLED EXHAUST FANS: FANS SHALL BE CONTROLLED BY WALL MOUNTED LINE VOLTAGE THERMOSTAT. THERMOSTAT SHALL MAINTAIN 85°F AMBIENT TEMPERATURE. FAN SHALL RUN CONTINUOUSLY TO MAINTAIN 85°F.

c. OUTSIDE AIR FANS: FANS SHALL BE INTERCONNECTED WITH AC UNITS SERVED. FANS SHALL RUN WHENEVER EITHER BUILDING AIR HANDLER IS OPERATIONAL.

3) AC UNITS:

UNIT SHALL BE STARTED AND STOPPED BY WALL MOUNTED PROGRAMMABLE THERMOSTAT. DURING "ON" MODE UNIT THERMOSTAT SHALL ENERGIZE COMPRESSOR(S) AND SUPPLY FAN TO MAINTAIN ROOM SET POINT OF 75°F ADJUSTABLE. WHEN ROOM TEMPERATURE DROPS BELOW SET POINT COMPRESSOR(S) SHALL DE-ENERGIZE AND FAN SHALL REMAIN ON.

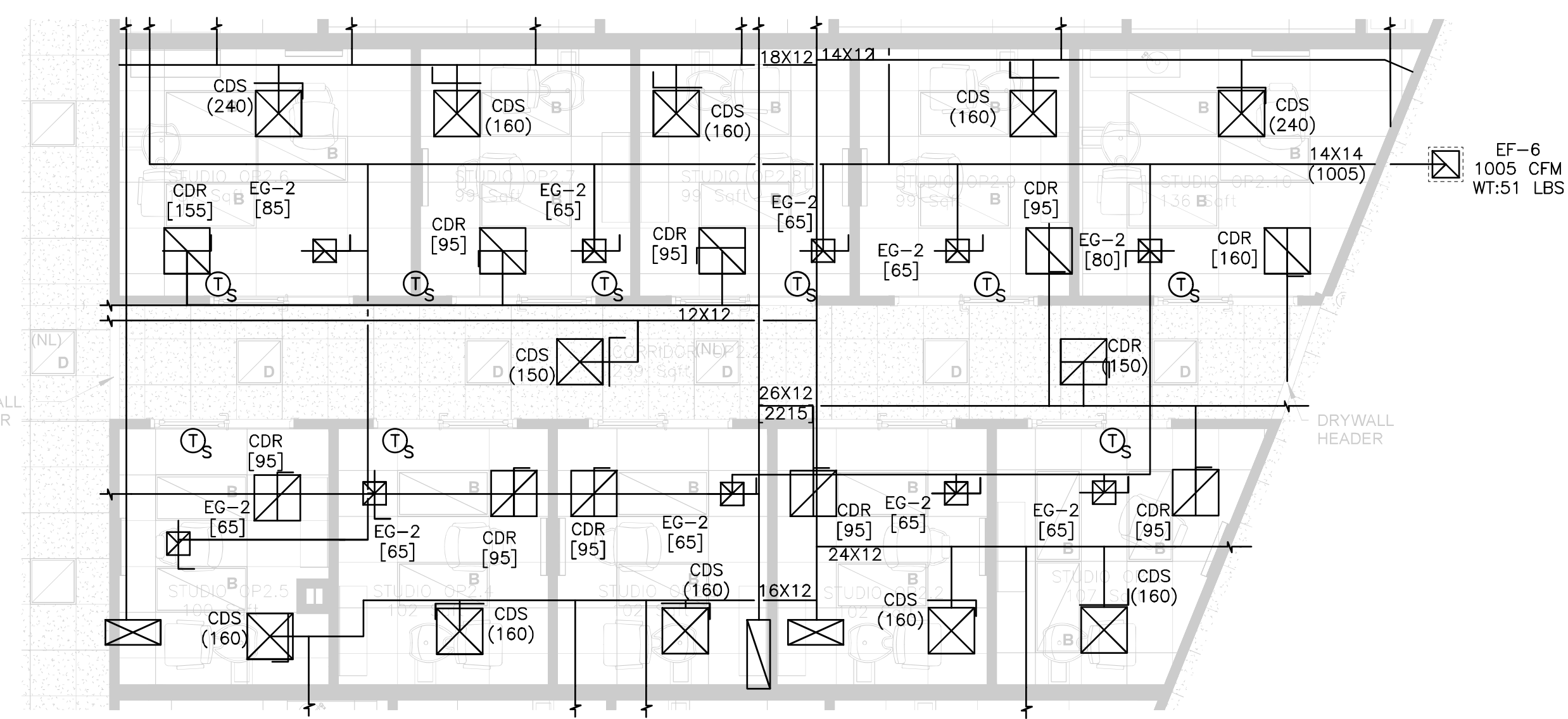
COMBINATION FIRE SMOKE DAMPER-INSTALLATION MATRIX			
TASK	MECHANICAL CONTRACTOR	ELECTRICAL CONTRACTOR	FIRE ALARM VENDOR
FURNISH & INSTALL DAMPER	X		
FURNISH & INSTALL DUCT/SMOKE DETECTOR	X		
INSTALL LINE VOLTAGE WIRING AND CONDUITS		X	
INSTALL FIRE ALARM CABLING			X
PROGRAMMING FIRE ALARM DEVICES			X
TESTING OF FIRE SMOKE DAMPER ASSEMBLY	X	X	X

NOTES:
1. THIS CHART IS PROVIDED AS A GUIDELINE. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO COORDINATE AMONG THE SUB CONTRACTORS TO ENSURE COMPLETE UNDERSTANDING OF THE SYSTEMS, INCLUDING HOW AND BY WHOM THEY SHALL BE INSTALLED.



01 MECHANICAL FLOOR PLAN
3/16" = 1'-0"

- GENERAL FLOOR PLAN NOTES:**
1. ALL WORK SHALL COMPLY WITH ALL LOCAL AND STATE CODES AND AUTHORITIES HAVING JURISDICTION.
 2. THE CONTRACTOR SHALL SECURE AND PAY FOR ALL REQUIRED PERMITS AND ARRANGE ALL REQUIRED INSPECTIONS.
 3. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS AND TRADES.
 4. THESE DRAWINGS, AS PREPARED, ARE DIAGRAMMATIC BUT SHALL BE FOLLOWED AS CLOSELY AS CONSTRUCTION OF THE PROJECT AND THE WORK OF THE TRADES WILL PERMIT. EQUIPMENT LOCATIONS INDICATED ARE APPROXIMATE. COORDINATE EXACT LOCATIONS AND REQUIRED CLEARANCES WITH EQUIPMENT SUPPLIER AND ALL TRADES PRIOR TO INSTALLATION.
 5. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL THE EQUIPMENT INDICATED WITHIN THE MECHANICAL DRAWINGS UNLESS OTHERWISE NOTED. ALL EQUIPMENT SHALL BE UL LISTED. VERIFY LOCATION AND DIMENSIONS IN THE FIELD PRIOR TO FABRICATION AND / OR INSTALLATION.
 6. DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
 7. ALL AC SUPPLY & RETURN METAL DUCT AND AIR DISTRIBUTION DEVICES SHALL BE INSULATED WITH R-6, 75 DENSITY FOIL-BACKED INSULATION WITH FIRE AND SMOKE RATING 25-50.
 8. ALL DUCTWORK SHALL BE FABRICATED, INSTALLED, SEALED, AND INSULATED PER THE LATEST ISSUE OF SMACNA LOW-VELOCITY DUCT MANUAL.
 9. THE CONTRACTOR SHALL COORDINATE DIFFUSER LOCATIONS ON SITE WITH THE MOST RECENT REFLECTED CEILING PLAN.
 10. THE CONTRACTOR IS TO MAKE ALL LOW-VOLTAGE WIRING CONNECTIONS FOR ALL HVAC EQUIPMENT INCLUDING TEMPERATURE CONTROLS, ROOF TOP UNITS, SMOKE DETECTORS AND CONTACTOR PANEL.
 11. PROVIDE AND INSTALL SMOKE DETECTORS IN EACH AIR CONDITIONING UNIT RETURN DUCT GREATER THAN 2000 CFM. CONTRACTOR SHALL PROVIDE INTERCONNECTION AND WIRE TO THE FIRE ALARM CONTROL PANEL IF REQUIRED. DUCT DETECTORS SHALL HAVE REMOTE TEST STATIONS LOCATED NEAR THE RESPECTIVE THERMOSTATS. VERIFY CODE REQUIREMENTS FOR DUCT DETECTORS IN BOTH THE SUPPLY AND RETURN AIR STREAM.
 12. THE ENTIRE INSTALLATION SHALL BE GUARANTEED FREE OF DEFECTS AND CONTRACTOR SHALL REPAIR AND / OR REPLACE ANY DEFECTIVE MATERIALS OR EQUIPMENT AT NO COST TO THE OWNER FOR A MINIMUM PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE BY ARCHITECT OR ENGINEER.
 13. ALL WORK SHALL BE SUBJECT TO THE ACCEPTANCE AND APPROVAL OF THE ARCHITECT AND OWNER. THE ARCHITECT SHALL BE NOTIFIED OF ANY AND ALL DISCREPANCIES BETWEEN FIELD CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. FAILURE OF PROPER NOTIFICATION DOES NOT RELIEVE THE CONTRACTOR. THE CONTRACTOR SHALL CORRECT ANY AND ALL WORK ARISING FROM SUCH FAILURE TO COORDINATE DISCREPANCIES TO THE SATISFACTION OF THE ARCHITECT WITHOUT ADDITIONAL COST TO THE OWNER.
 14. THE CONTRACTOR SHALL, UPON COMPLETION OF PROJECT, PERFORM A COMPLETE TEST AND BALANCE OF ALL EQUIPMENT. PROVIDE A WRITTEN REPORT TO THE ARCHITECT. ALL CAPACITIES MUST BE SET TO WITHIN ±10% OF AMOUNTS INDICATED ON THE FLOOR PLAN AND SCHEDULES.
 15. THE CONTRACTOR SHALL VERIFY EXACT LOCATION OF TRUSSES AND MODIFY DUCTWORK ACCORDINGLY.
 16. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/ BARRIERS AS PER LOCAL CODE. COORDINATE WITH ARCHITECTURAL DRAWING FOR FIRE RATING OF THE WALLS & ROOF.
 17. PROVIDE VOLUME DAMPER AT EACH SUPPLY, RETURN AND EXHAUST DUCTWORK BRANCH.
 18. PROVIDE CORD-OPERATED DAMPERS IN AN INACCESSIBLE CEILING.

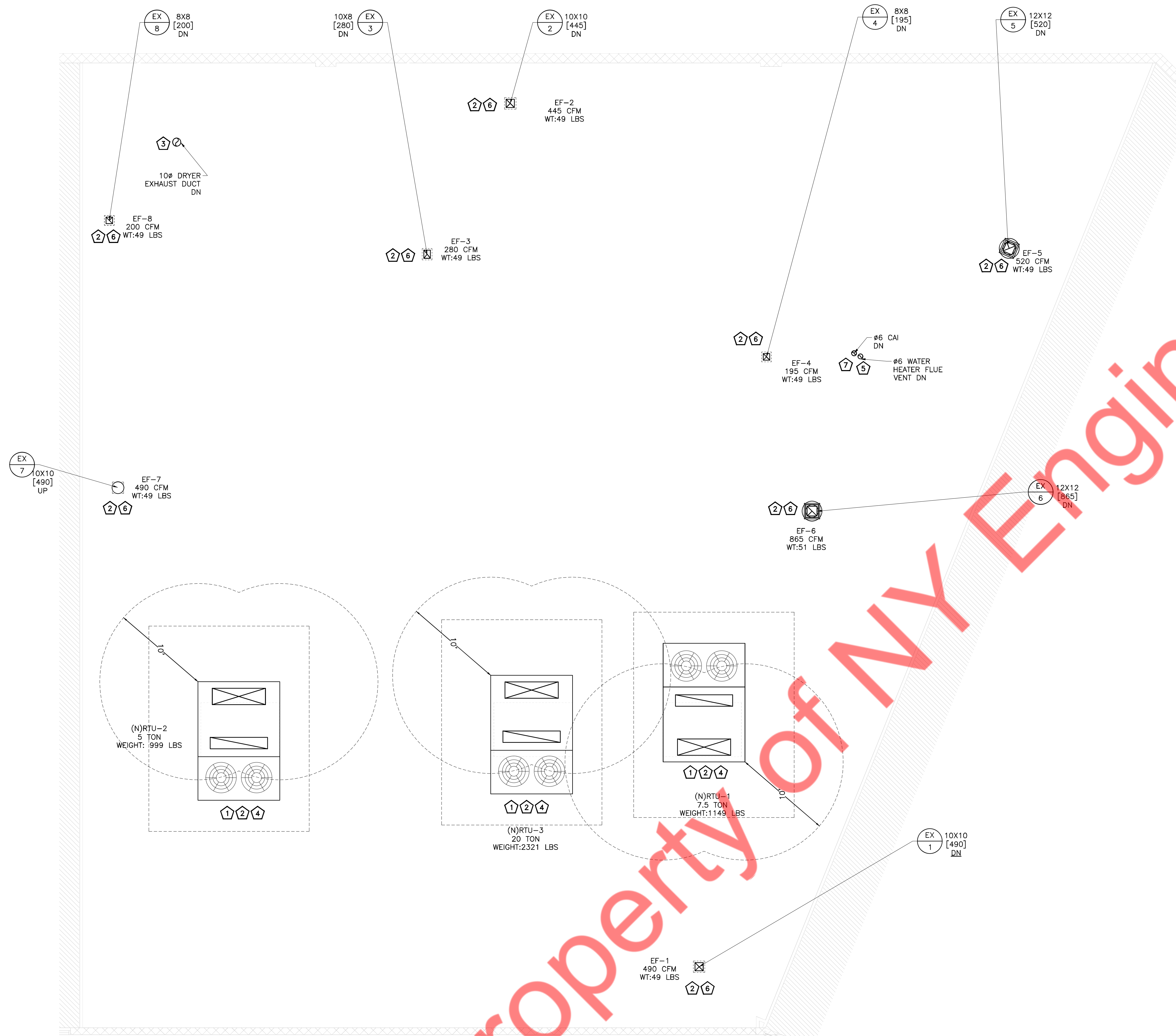


02 ALTERNATE MECHANICAL FLOOR PLAN
3/16" = 1'-0"

- HVAC NOTES:**
1. EACH STANDARD AND LARGE STUDIO TO HAVE 1 DIFFUSER AND 1 RETURN.
 2. EACH DOUBLE STUDIO TO HAVE 2 DIFFUSERS AND 1 AIR RETURN.
 3. HVAC DIFFUSERS TO BE LOCATED AWAY FROM STYLING STATION/CHAIR TO PREVENT DIRECT AIRFLOW ON CUSTOMER. DIFFUSER TO HAVE MANUAL CONTROL FOR ADJUSTING AIRFLOW.
 4. G.C. TO VERIFY AND COORDINATE ALL MECHANICAL SHAFT AND DUCT LOCATIONS.
 5. HALLWAY DIFFUSERS AND RETURN TO BE PAINTED BY G.C. HVAC CONTRACTOR TO DELIVER AFTER DRYWALL BEFORE GPO.
 6. ALL CONSTRUCTION MATERIAL SHALL BE FLEEM-BATED.
 7. PROVIDE HONEYWELL SMART ROOM SENSOR FOR EACH STUDIO AND CONNECT WITH RESPECTIVE HONEYWELL THERMOSTAT.
 8. ALL THE SUPPLY DIFFUSERS SHOULD BE EQUIPPED WITH BALANCING RADIAL DAMPERS AS SHOWN ON DIFFUSER DETAIL (04-200).

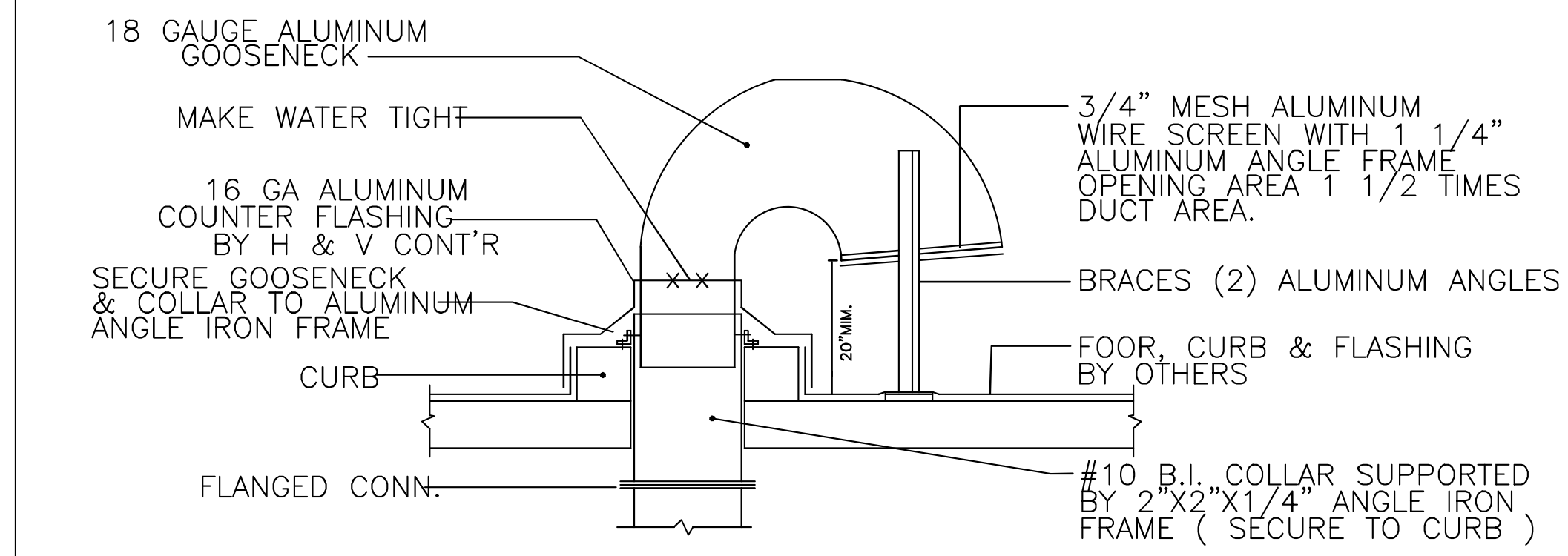
- RTU - SEQUENCE OF OPERATION**
1. A SINGLE HONEYWELL T10 PRO SMART THERMOSTAT WILL BE INSTALLED IN HALLWAYS AND CONNECTED TO EACH RTU.
 2. AT EACH STUDIO, A HONEYWELL SMART ROOM TEMPERATURE SENSOR WILL BE INSTALLED CLOSE TO THE LIGHT SWITCH.
 3. ACTIVE ROOMS FEATURE OCCUPIED MODE.
 4. ZONE TEMPERATURE IS DETERMINED BY THE AVERAGE OF SENSOR TEMPERATURE IN OCCUPIED ROOMS.
- UNOCCUPIED MODE:**
- a. IF NO ROOMS ARE OCCUPIED THERMOSTAT IS IN UNOCCUPIED MODE. THE RTU IS PROVIDED BY ZONE TEMPERATURE MEASURED BY THERMOSTAT OR ANY ONE OF THE STUDIO ROOM (USER EDITABLE).
 - b. THERMOSTAT IS INSTALLED OUTSIDE OF THE STUDIO OR UTILITY ROOMS.
 - c. ACTIVE "SELECT ROOM" FEATURE.
 - d. ZONE TEMPERATURE IS DETERMINED BY AVERAGE OF SENSOR AND OCCUPANCY FEATURE.
 - e. ALL SENSORS SHALL BE DOUBLEB.
 - f. INDIVIDUAL SENSORS CAN BE REMOVED FROM AVERAGING.

- DEMOLITION NOTES:**
1. REMOVE AND SCRAP THE EXISTING EXHAUST FAN SERVING THE SECOND FLOOR TOILETS, IN ITS ENTIRETY.
 2. EXISTING DUCTS, AIR TERMINALS TO BE REMOVED.
 3. BEFORE STARTING DEMOLITION, PROVIDE NECESSARY PROTECTIVE DEVICES WHERE REQUIRED.
 4. TAKE NECESSARY PRECAUTIONS TO PREVENT DUST AND DIRT MIGRATING TO OCCUPIED AREAS OF THE BUILDING. THIS INCLUDES BLANKING OFF ANY RETURN AIR GRILLES/ DUCTS IN THE WORK AREA.



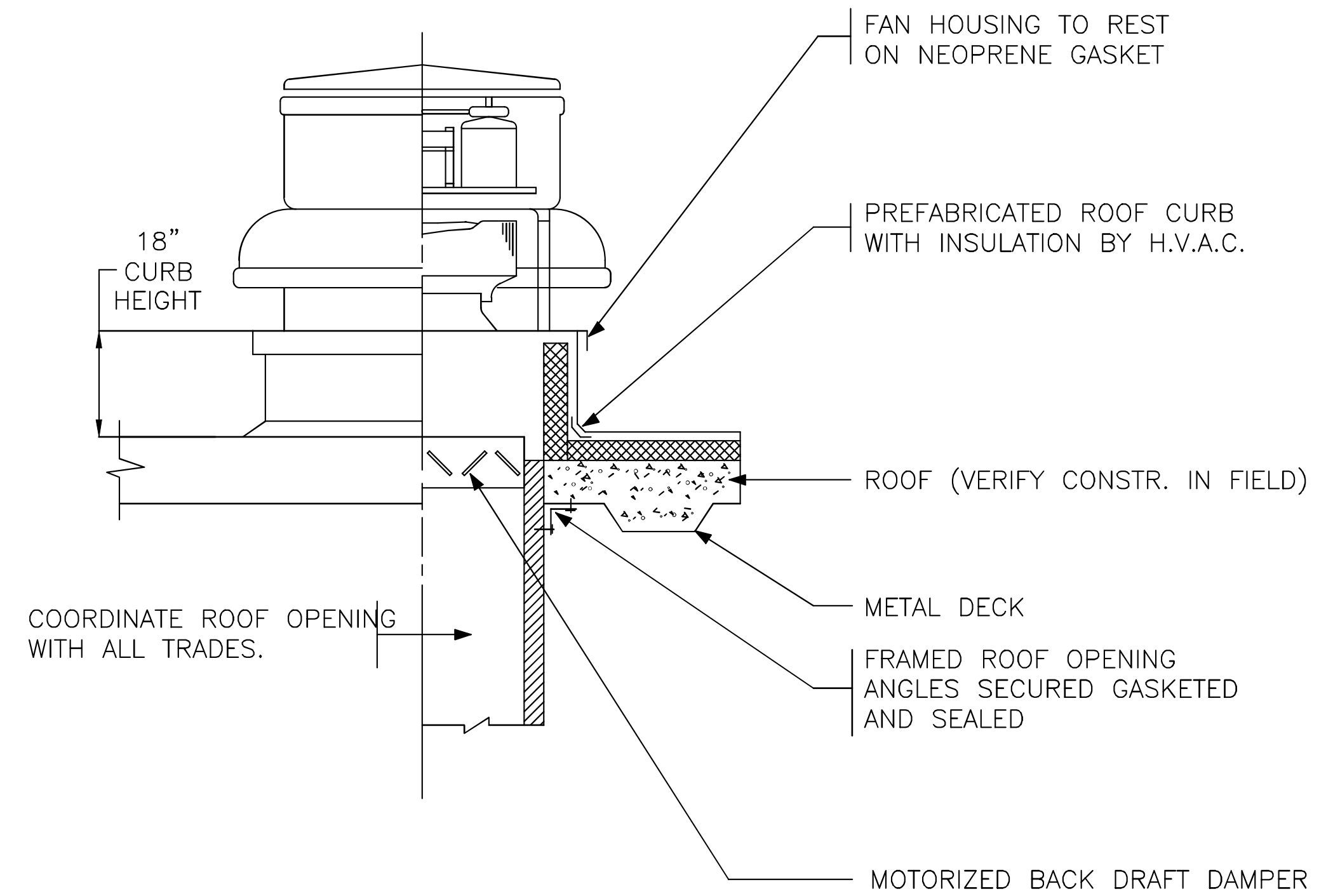
- GENERAL FLOOR PLAN NOTES:**
1. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND WITH A STRUCTURAL ENGINEER.
 2. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
 3. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
 4. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
 5. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
 6. COORDINATE ALL EQUIPMENT WITH STRUCTURAL.
 7. MAINTAIN ALL CODE AND MANUFACTURERS RECOMMENDED CLEARANCE AROUND ALL ROOF EQUIPMENT.
 8. PROVIDE WEATHER PROOF COATING FOR ALL EXTERIOR DUCTING.

- ROOF PLAN KEY NOTES:**
- 1 REMOVE EXISTING RTU AND INSTALL NEW RTU (#3 NOS.) ON THE EXISTING ROOF CURB. PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES.
 - 2 COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL DRAWINGS.
 - 3 DRYER VENT TO BE TERMINATED WITH MANUFACTURER TERMINATION CAPS.
 - 4 CONTRACTOR TO FIELD VERIFY THAT THE LOCATION OF ANY EXHAUST SOURCE SHOULD BE AT LEAST 10' AWAY FROM THE RTU'S OUTSIDE AIR INTAKE.
 - 5 #6 CAI TO BE TERMINATED WITH MANUFACTURER KIT AT ROOF 24" ABOVE FLOOR LEVEL. CAI TO BE SCHEDULE 40 CPVC PIPE.
 - 6 GENERAL EXHAUST SHALL TERMINATE 3 FEET FROM THE PROPERTY LINE, 3 FEET FROM THE OPERABLE OPENING INTO THE BUILDING AND 10 FEET FROM THE OUTSIDE AIR INTAKE OPENINGS.
 - 7 #6 COMBINED HOT WATER HEATER FLUE VENT. TERMINATE 3' ABOVE ANY HIGHEST CONSTRUCTION ON ROOF LEVEL WITHIN 10'. TERMINATE WITH MANUFACTURER KIT. USE SCHEDULE 40 CPVC PIPE.



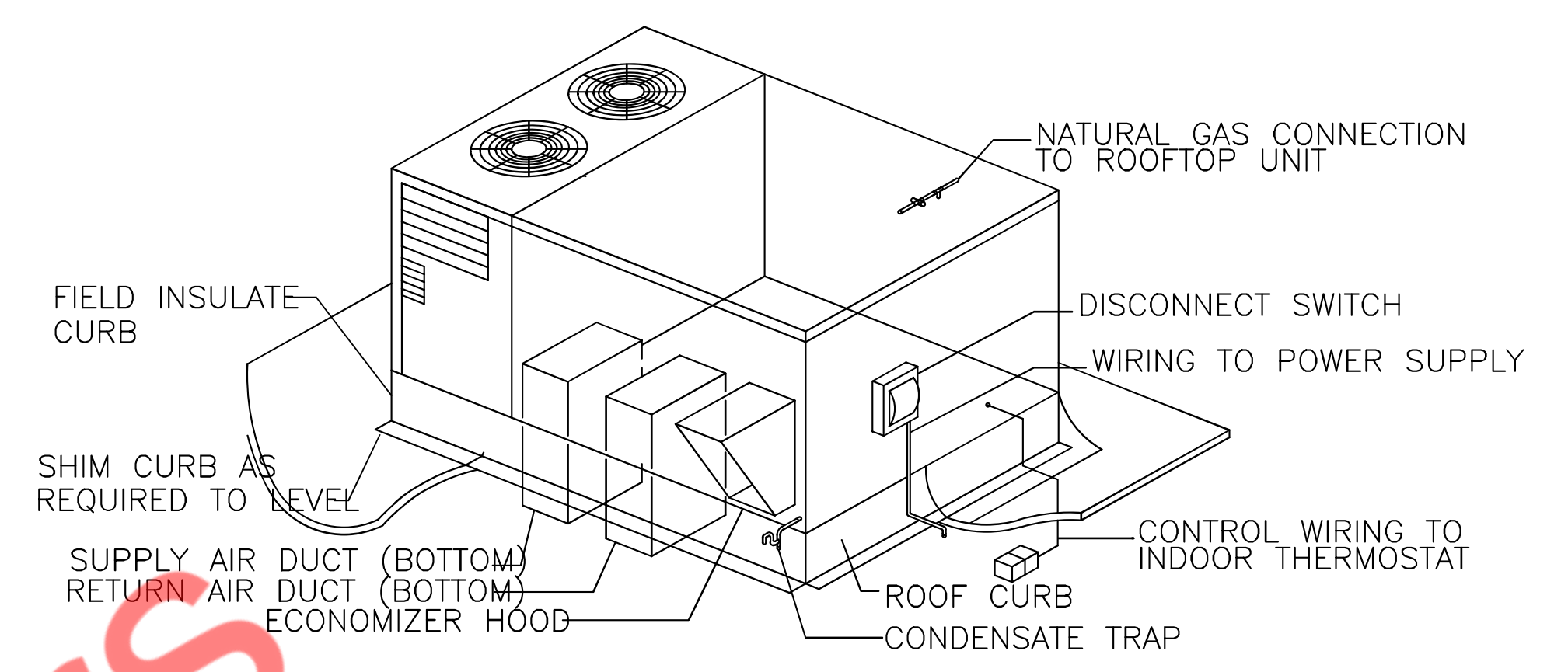
GOOSENECK DETAIL

SCALE: NONE



ROOF EXHAUST FAN DETAILS

SCALE: NONE



ROOF TOP UNIT SCHEMATIC DIAGRAM

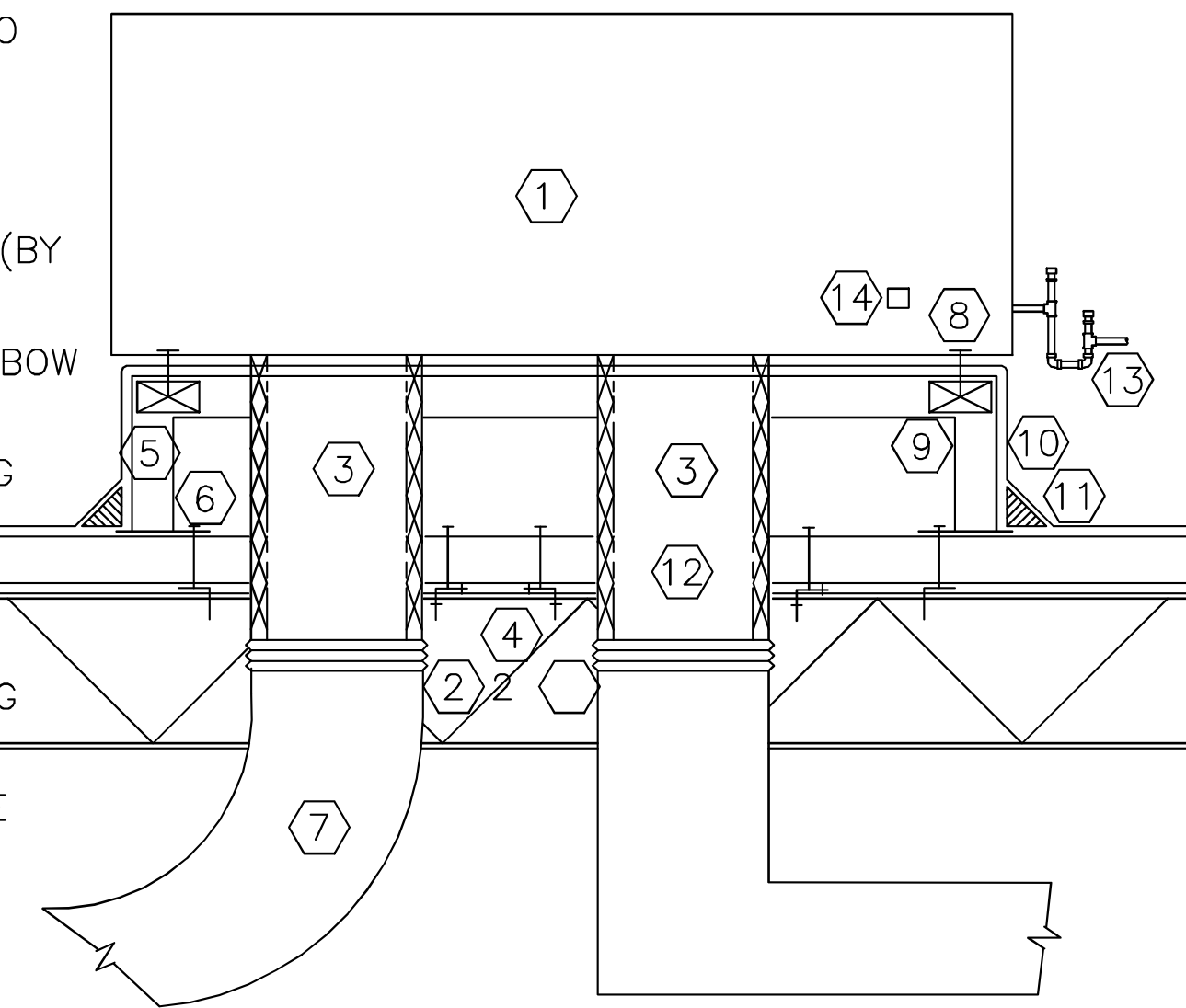
SCALE: NONE

KEYED NOTES:

- ROOFTOP AIR CONDITIONING UNIT LOCATE A MINIMUM OF 10'-0" FROM EDGE OF ROOF AND ROOF HATCH
- CANVAS FLEXIBLE CONNECTION
- 1" ACOUSTICALLY LINED DUCTS
- 4x4 ANGLE FASTENED TO ROOF DECK AND STRUCTURAL SYSTEM PROVIDE SUPPORTS AS REQUIRED
- FACTORY FABRICATED, INSULATED ROOF CURB (BY SAME MFG'R AS UNIT) FASTEN CURB TO DECK
- INSULATED RADIUS ELBOW
- SECURE TO CURB
- WOOD NAILER
- CURB TYPE AND FLASHING PER ROOFING MANUFACTURER'S REQUIREMENTS. FLASH UP OVER OVER WOOD NAILER.
- CANT STRIP
- ROOF DECK, CUT OPENING FOR DUCT PENETRATIONS ONLY
- CONDENSATE TRAP - SEE CONDENSATE DRAIN TRAP DETAIL
- HIGH WATER ALARM IN CONDENSATE DRAIN PAN. WIRE TO BREAK 24 VOLT CONTROL POWER IN THE CASE OF A HIGH WATER EVENT.

GENERAL NOTES:

- CONTRACTOR SHALL PROVIDE CURB TO MAINTAIN 10" MINIMUM ABOVE FINISHED ROOFING SYSTEM. PROVIDE ADDITIONAL BLOCKING AS REQUIRED TO ACCOMMODATE ROOF INSULATION THICKNESS. FINAL LOCATION AND STRUCTURAL VERIFICATION BY OTHERS.

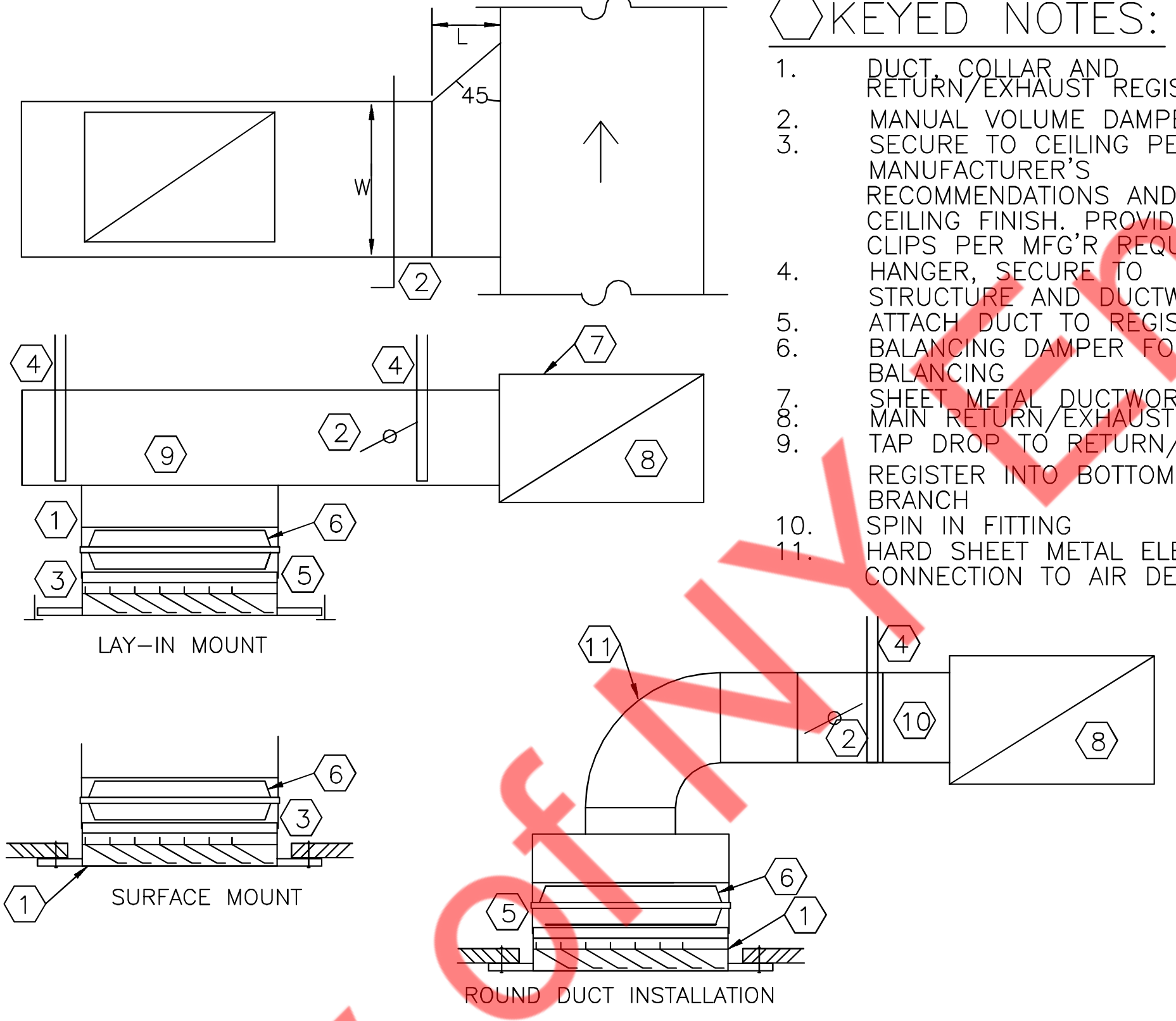


NOTICE TO PLANS EXAMINER:
REFER TO STRUCTURAL DRAWINGS FOR ALL ROOF SUPPORTS AND WIND LOAD CALCULATIONS IN COMPLIANCE WITH FBC 2017.

ROOF CURB & MOUNTING DETAILS

SCALE: NONE

L=1/4W, 4" MIN

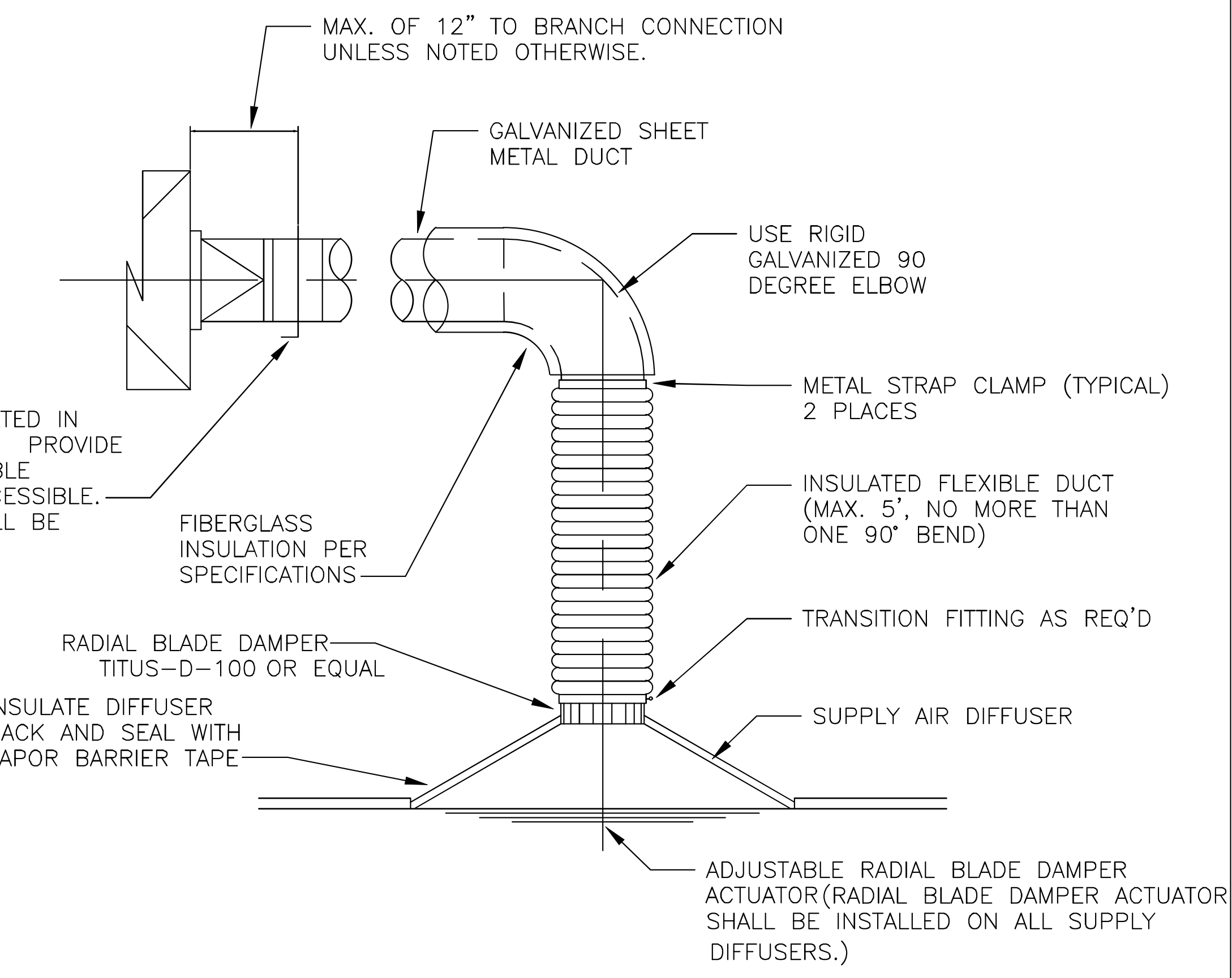


KEYED NOTES:

- DUCT COLLAR AND RETURN/EXHAUST REGISTER
- MANUAL VOLUME DAMPER
- SECURE TO CEILING PER MANUFACTURER'S RECOMMENDATIONS AND PER CEILING FINISH. PROVIDE GRID CLIPS PER MFG'R REQUIREMENTS
- HANGER, SECURE TO STRUCTURE AND DUCTWORK
- ATTACH DUCT TO REGISTER
- BALANCING DAMPER FOR FINAL BALANCING
- SHEET METAL DUCTWORK
- MAIN RETURN/EXHAUST DUCT
- TAP DROP TO RETURN/EXHAUST REGISTER INTO BOTTOM OF BRANCH
- SPIN IN FITTING
- HARD SHEET METAL ELBOW AT CONNECTION TO AIR DEVICE.

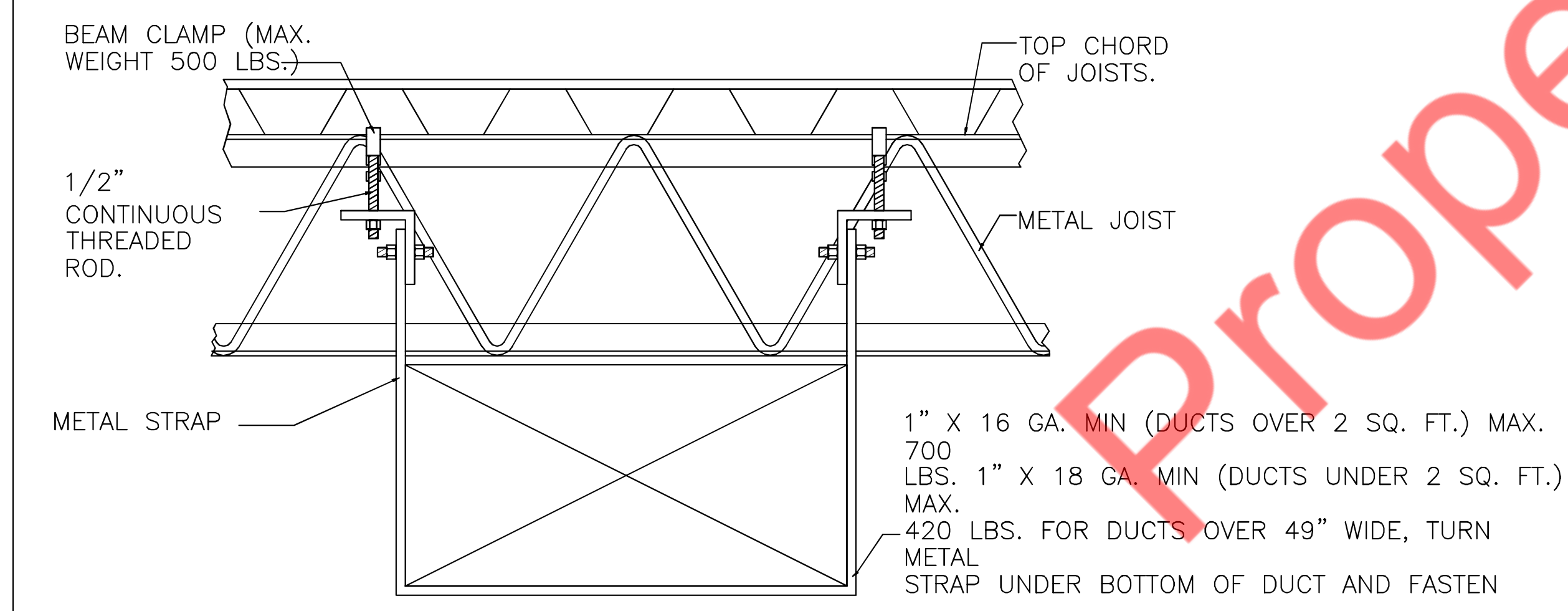
RETURN/EXHAUST REGISTER INSTALLATION

SCALE: NONE



SUPPLY DIFFUSER INSTALLATION

SCALE: NONE



DUCTWORK SUPPORT DETAIL NOT TO SCALE

MAX. SIDE INCHES	RECTANGULAR DUCTS MIN. GALV. SHT. GAUGE	ALUMINUM MIN. B & S GAUGE
THROUGH 12	26 (0.022 IN.)	24 (0.020 IN.)
13 THROUGH 30	24 (0.028 IN.)	22 (0.025 IN.)
31 THROUGH 54	24 (0.034 IN.)	20 (0.032 IN.)
55 THROUGH 84	20 (0.040 IN.)	18 (0.040 IN.)
OVER 84	18 (0.052 IN.)	16 (0.051 IN.)

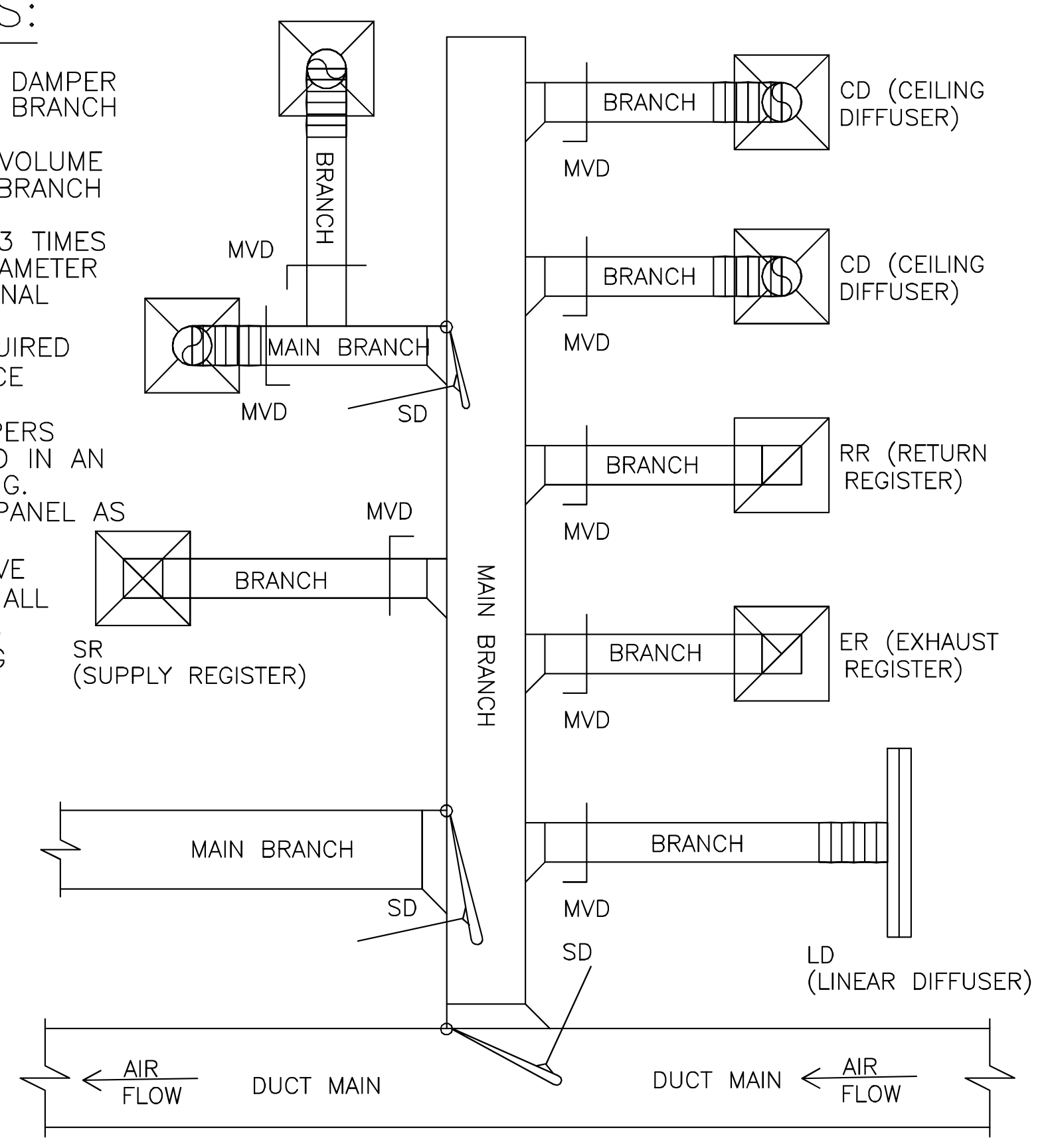
NOTE: DISTANCE BETWEEN DUCT HANGERS SHALL BE IN ACCORDANCE WITH THE RULES OF THE AGENCIES HAVING JURISDICTION.

DUCT SUPPORT DETAILS

SCALE: NONE

GENERAL NOTES:

- PROVIDE SPLITTER DAMPER (SD) AT ALL MAIN BRANCH TAKEOFFS
- PROVIDE MANUAL VOLUME DAMPERS AT ALL BRANCH TAKEOFFS
- PROVIDE MINIMUM 3 TIMES STRAIGHT INLET DIAMETER TO ALL VAV TERMINAL DEVICES
- DAMPER NOT REQUIRED AT TERMINAL DEVICE TAKEOFF
- ALL MANUAL DAMPERS SHALL BE LOCATED IN AN ACCESSIBLE CEILING. PROVIDE ACCESS PANEL AS REQUIRED
- PROVIDE REFLECTIVE TAPE MARKING TO ALL DAMPER LOCATIONS ABOVE THE CEILING

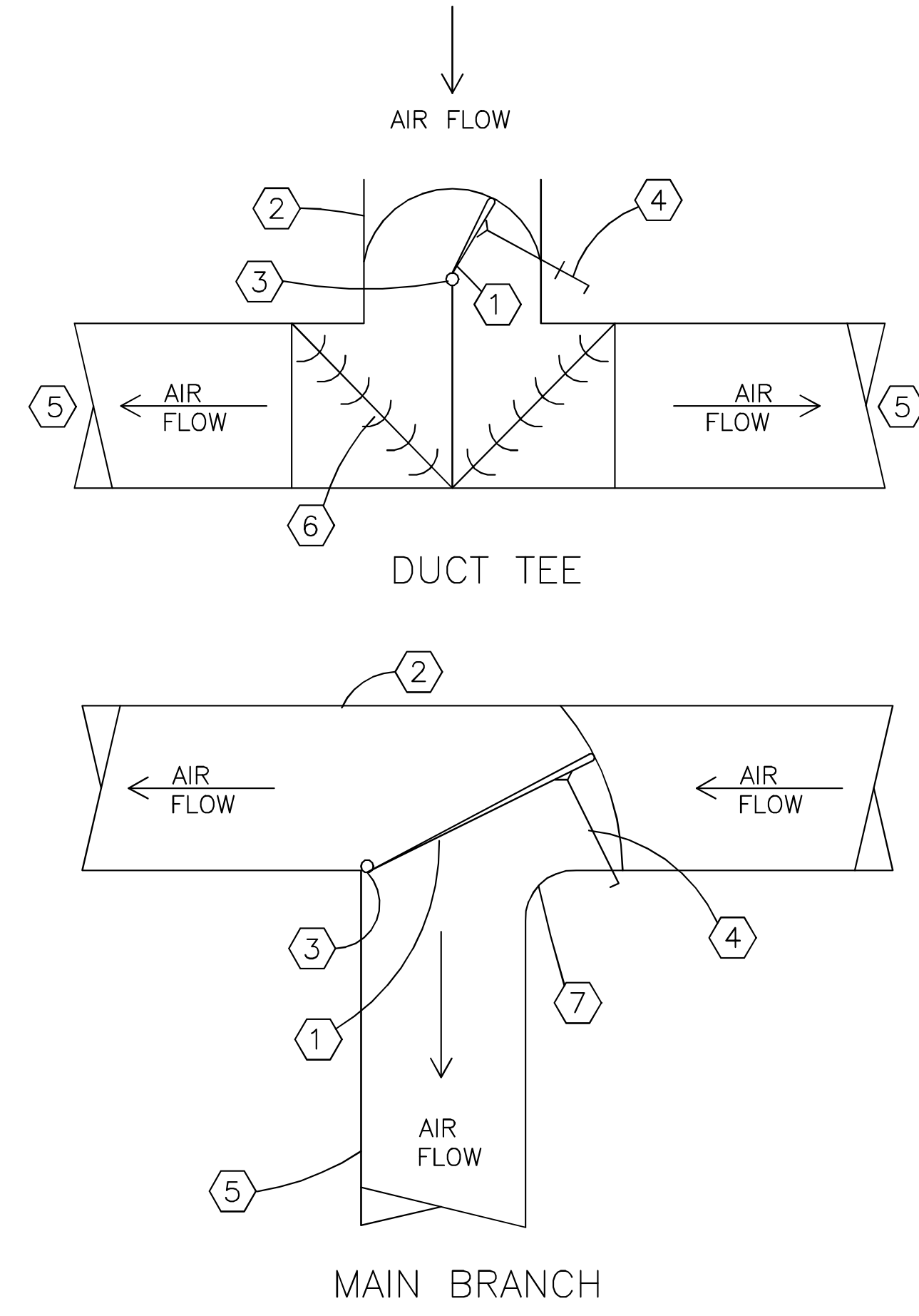


MANUAL DAMPER DETAIL

SCALE: NONE

KEYED NOTES:

- 20 GAUGE DOUBLE SHEET METAL AIR FOIL FULL DEPTH OF MAIN DUCT UP TO 12" WIDE BRANCHES 18 GAUGE ON WIDER BRANCHES
- MAIN DUCT
- GALVANIZED 3/16" ROD
- VENTLOCK NO. 600-3 DAMPER BLADE, BRACKET & LOCKING BALL JOINT WITH 1/4" GALVANIZED OPERATOR PAD
- BRANCH MAIN DUCT
- DOUBLE THICKNESS TURNING VANES (TYPICAL)
- 3" RADIUS MINIMUM

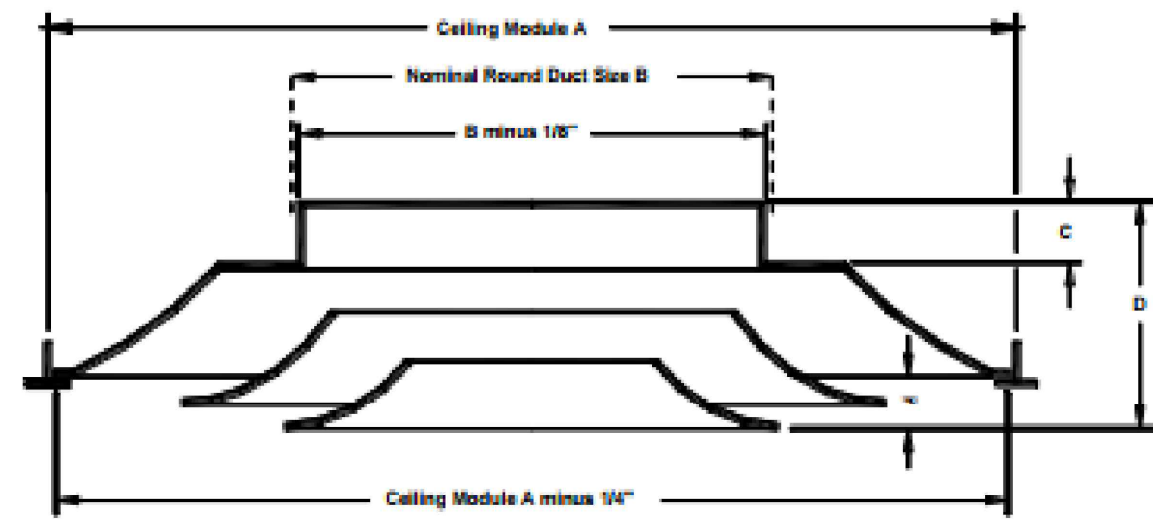


MAIN BRANCH

TMS-AA • Round Neck

Square Ceiling Diffusers
Aluminum • High Performance

Border Type 3 (Lay-In) Full Face.

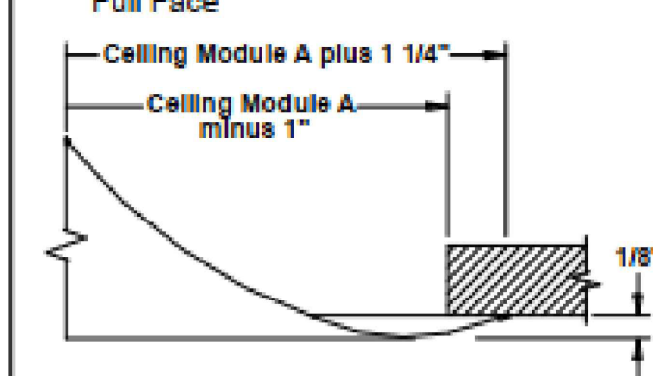


Ceiling Module A	Nominal Round Duct Size B	C	D	E
12 X 12	4, 5"	3 1/8"	5 3/8"	1 1/8"
12 X 12	6, 8"	1 1/8"	3 3/8"	1 1/8"
24 X 24	6, 8"	1 1/4"	5"	1 1/4"
24 X 24	10, 12, 14, 15"	1 3/8"	5 1/8"	1 1/4"

* Adapter provided for sizes 4 & 5

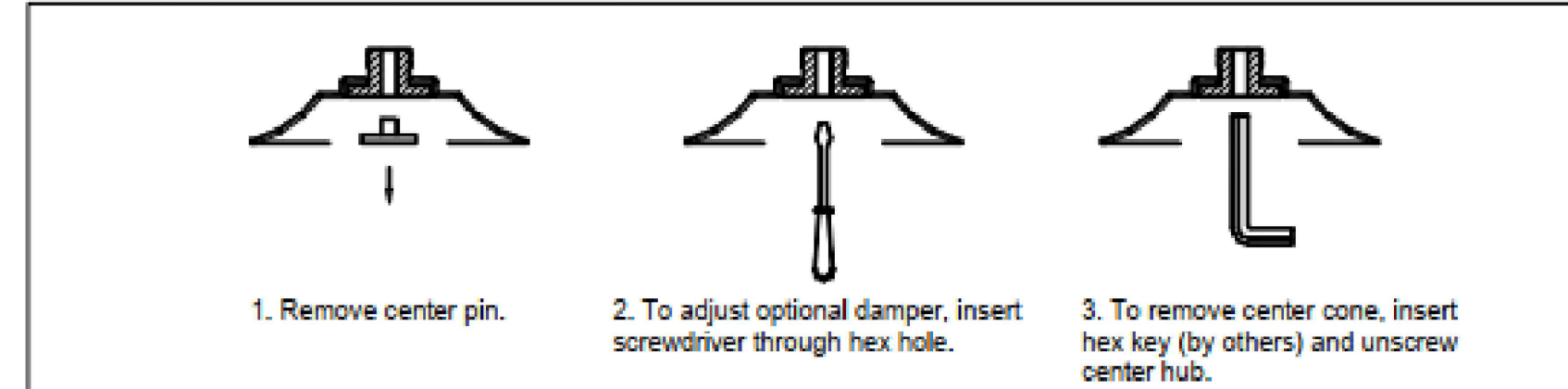
Other Available Border Types

Frame Type 1 (Surface Mount) Full Face



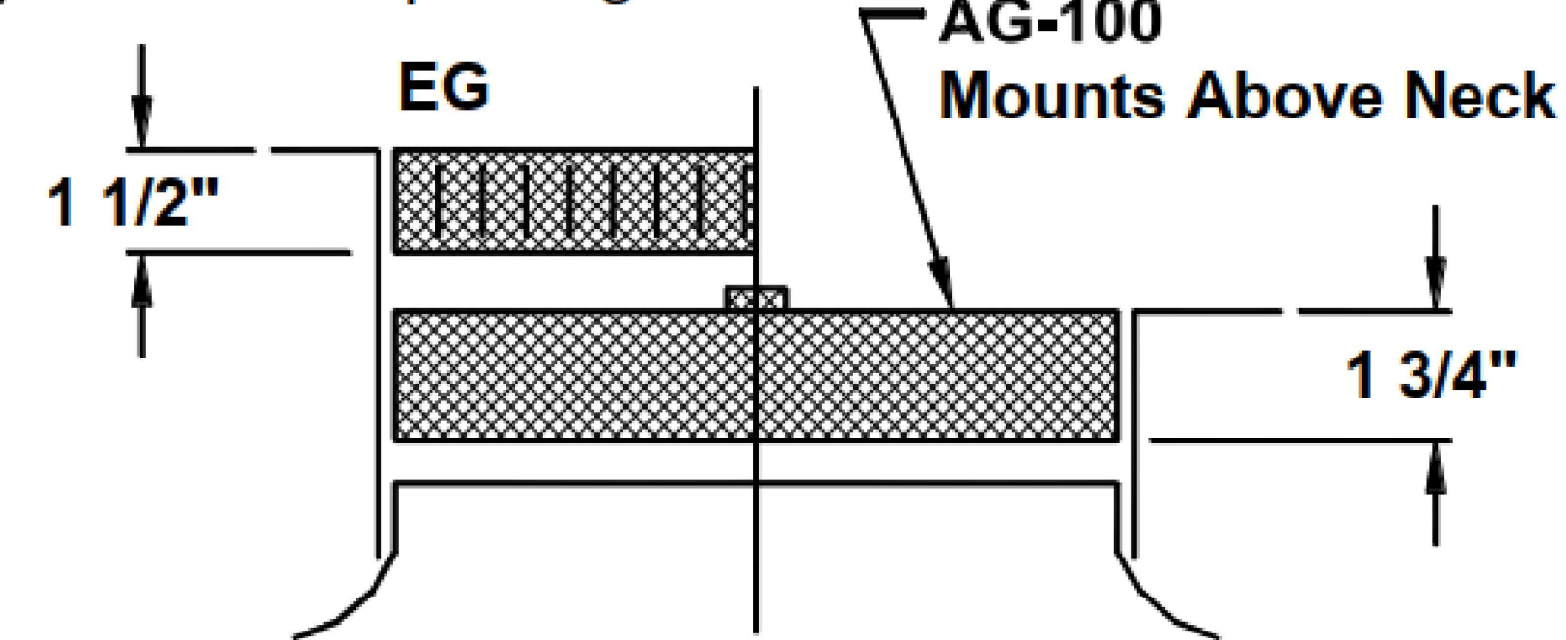
Ceiling Module	Face Size	Nominal Round Duct Sizes	Border Types
24 x 24	24 x 24	6, 8, 10, 12, 14, 15"	1, 2, 3, 4

Adjusting Optional Damper • Removing Center Cone



Model AG-100 Radial Sliding Blade Damper

Model EG Equalizing Grid



Model AG-100 damper is available in duct sizes 6, 8, 10, 12 and 14 inch duct sizes only.

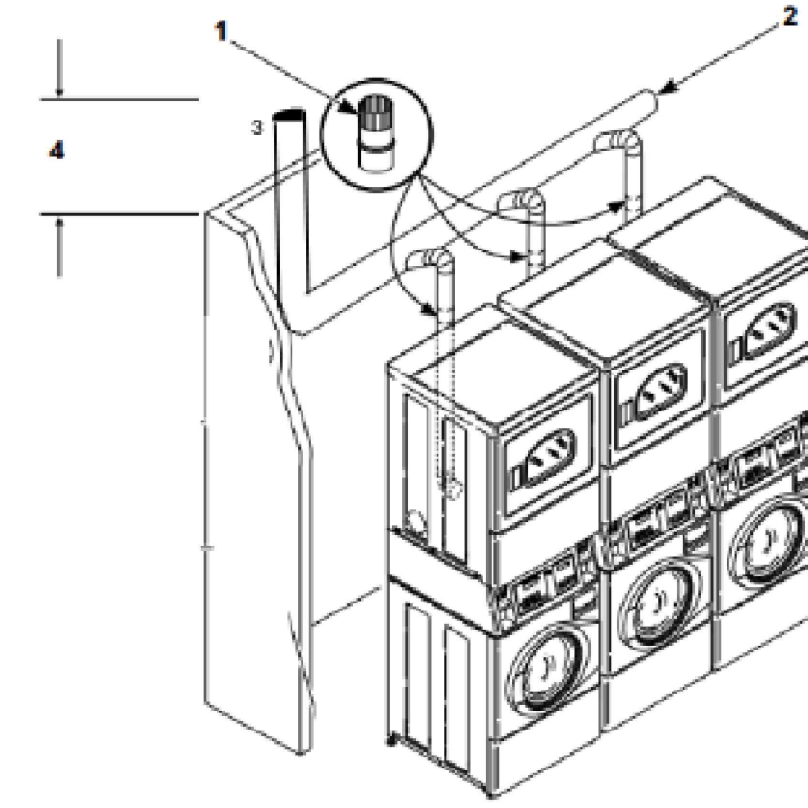
NOTE: ALL THE SUPPLY DIFFUSERS SHOULD BE EQUIPPED WITH BALANCING RADIAL DAMPERS

DIFFUSER SUBMITTAL DETAIL

SCALE: NONE

Multi-Dryer Installation Exhaust Requirements

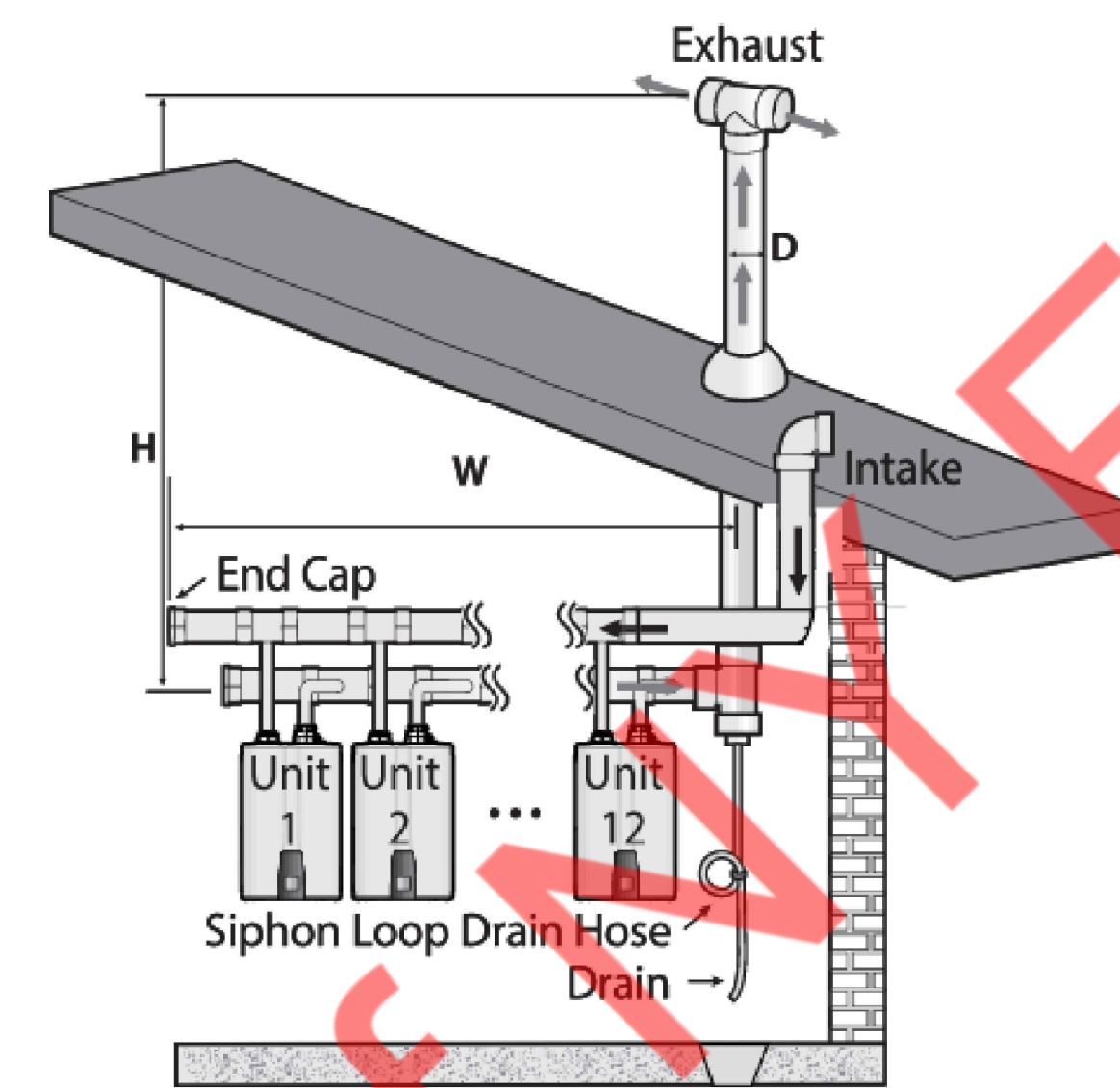
Figure 24 shows a typical example of a multiple dryer installation. Note how each dryer has its own exhaust system vented to the central exhaust duct.



1. 58786 Backdraft Damper (Available through your local authorized parts source)
2. Clean Out Cover (Must be provided). Inspect monthly.
3. Weather Hood or Sweep Elbow (No cap or screen)
4. 24 in. [610 mm] Minimum Clearance to Roof/Ground

DRYER-COMMON VENT ARRANGEMENT

SCALE: NONE

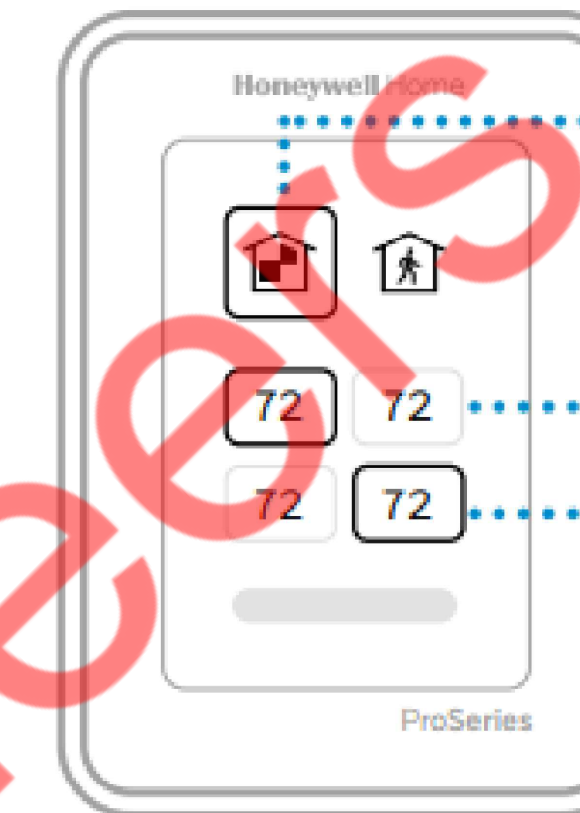


Common Vent Length Table
[Total Length (L) = W + H]

WATER HEATER - COMMON VENT ARRANGEMENT

SCALE: NONE

Honeywell Home
T10Pro Smart Thermostat



Selected Rooms
Rooms you manually select create an average temperature in your home.

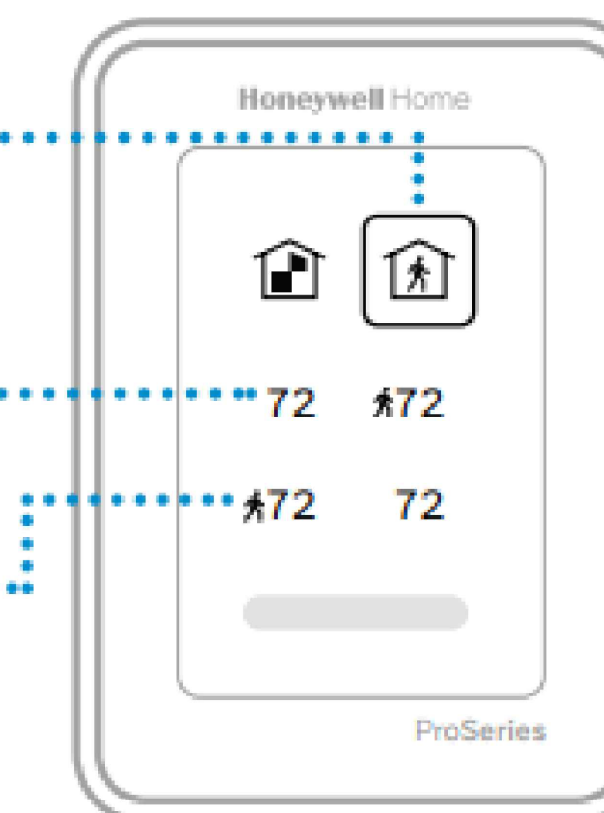
Unselected Room
Will not contribute to the average temperature.

Selected Room
Will contribute to the average temperature.

Active Rooms
Rooms with detected motion are automatically selected to create an average temperature in your home.

Room without Activity
No motion is detected. Will not contribute to the average temperature.

Room with Activity
Motion is detected. Will contribute to the average temperature.



THERMOSTAT DETAILS

SCALE: NONE

ROOF TOP UNIT SCHEDULE																						
UNIT ID	MANUFACTURER	AREA SERVED	NOMINAL TONS	SUPPLY FAN			GAS HEATING			COOLING				ELECTRICAL				EER	IEER / SEER	OPERATING WEIGHT (LBS)	MODEL NO.	REMARKS
				TOTAL CFM	OUTSIDE AIR CFM	EXTERNAL STATIC PRESSURE (IN. W.G.)	CAPACITY MBH INPUT	CAPACITY MBH OUTPUT	THERMAL EFFICIENCY (%)	TEMP RISE (°F)	TOTAL MBH	SENSIBLE MBH	AMBIENT DB (°F)	ENTERING DB / WB (°F)	VOLTS	PHASE	MCA(A)					
(N)RTU-1	TRANE	SEE PLAN	7.5	3000	595	1.0	200	162	81	49.54	94	71	95	81/66	208/230	3	42	50	12.1	16.6	1149	WITH FAN VFD & ECONOMIZER, RELIEF DAMPER
(N)RTU-2	TRANE	SEE PLAN	5	2000	625	0.8	107	84	81	48.4	63.49	47.33	95	86/71	208/230	3	26	40	11.9	14.2	999	
(N)RTU-3	TRANE	SEE PLAN	20	8000	2345	1.25	400	324	81	37.19	247.2	59.56	95	88/73	208/230	3	108	125	10.8	16.3	2321	

NOTES / ACCESSORIES -

- CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF RTU ON SITE.
- ALL EQUIPMENT MUST BE HIGH EFFICIENT, MEETING OR EXCEEDING THE CODE MINIMUM REQUIREMENTS.
- ELECTRICAL CONNECTION TO BE SINGLE POINT AND TO BE THROUGH THE SIDE OF THE UNIT.
- PROVIDE DISCONNECT SWITCH AND AN UNPOWERED GFCI RECEPTACLE.
- PROVIDE CURB ADAPTOR FOR INSTALLATION OF NEW RTUs ON THE EXISTING UNIT CURBS.
- CONDENSATE DRAIN WITH 2" DEEP VENTED TRAP DISCHARGE TO SPLASH BLOCK ON ROOF.
- CABINET WITH 1/2" FIBERGLASS INSULATION.
- UNIT SHALL BE COMPLETE WITH GAS HEATING SECTION, GAS REGULATOR TO RECEIVE (4.5-14)" GAS PRESSURE FROM MAIN.
- DIFFERENTIAL ENTHALPY WITH FIXED DRY-BULB TEMPERATURE ECONOMIZER WITH BAROMETRIC RELIEF / MOTORIZED OUTSIDE AIR DAMPER ASSEMBLY WITH HOOD. PROVIDE FDD.
- PROVIDE 8-WIRE, 24 VAC, AUTOMATIC CHANGEVER, 2-STAGE HEAT / COOL, REMOTELY PROGRAMMABLE THERMOSTAT.
- REMOTE SENSORS SHALL BE PROVIDED IN RETURN AIR DUCT AND WIRED BACK TO PROGRAMMABLE, 24-HOUR, 7 DAY, THERMOSTATS.
- ANTI SHORT CYCLE TIMER.
- THROWAWAY 2" FILTERS (MERV 11).
- WHERE REQUIRED, PROVIDE LOW AMBIENT COOLING CAPABILITY DOWN TO 0 DEGREES F.
- PROVIDE ALL COMPRESSORS WITH 5 YEAR WARRANTY.
- VFD SUPPLY FAN.
- PROVIDE HOT GAS REHEAT WITH ASSOCIATED CONTROLS AND SENSORS FOR DEHUMIDIFICATION CONTROL.
- PLUMBING CONTRACTOR TO COORDINATE EXACT GAS REQUIREMENTS OF RTU'S INSTALLED ON SITE.

FAN SCHEDULE														
UNIT ID	MANUFACTURER	MODEL	CFM	TYPE	DRIVE	FAN RPM	WEIGHT	E.S.P.	MOTOR	VOLTS	PHASE	SERVICE	INTERLOCKED WITH	NOTES / ACCESSORIES
							(LBS)	(IN. W.G.)	HP					
EF-1 (N)	GREENHECK	G-098-A	490	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU-1	1,2,3,4,5,6,7
EF-2 (N)	GREENHECK	G-098-A	445	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU-2	1,2,3,4,5,6,7
EF-3 (N)	GREENHECK	G-100HP-A	280	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU-3	1,2,3,4,5,6,7
EF-4 (N)	GREENHECK	G-097-A	195	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU-3 & RTU-2	1,2,3,4,5,6,7
EF-5 (N)	GREENHECK	G-099-A	520	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU-3	1,2,3,4,5,6,7
EF-6 (N)	GREENHECK	G-100-A	865	ROOF	DIRECT	1725	51	1.0	1/3	208	1	SEE PLAN	RTU-3	1,2,3,4,5,6,7
EF-7 (N)	GREENHECK	G-098-A	490	ROOF	DIRECT	1725	49	1.0	1/4	208	1	SEE PLAN	RTU 3	1,2,3,4,5,6,7
EF-8 (N)	GREENHECK	G-097-A	200	ROOF	DIRECT	1725	49	0.9	1/4	208	1	SEE PLAN	-	1,2,3,4,5,6,7

NOTES / ACCESSORIES:

- VIBRATION ISOLATORS, CANVAS CONNECTION
- WEATHER PROOF DISCONNECT SWITCH
- SPEED CONTROL SWITCH
- THERMAL OVERLOAD PROTECTION
- MOTORIZED SHUTOFF DAMPER
- ROOF CURB
- AMCA SEAL & UL CERTIFIED

AIR BALANCE					
UNIT	AREA SERVED	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR
RTU-1 (N)	SEE PLAN	3000	595	2405	
RTU-2 (N)	SEE PLAN	2000	625	1375	
RTU-3 (N)	SEE PLAN	8000	2345	5655	
EF-1 (N)	SEE PLAN				490
EF-2 (N)	SEE PLAN				445
EF-3 (N)	SEE PLAN				280
EF-4 (N)	SEE PLAN				195
EF-5 (N)	SEE PLAN				520
EF-6 (N)	SEE PLAN				865
EF-7 (N)	SEE PLAN				490
EF-8 (N)	SEE PLAN				200
TOTAL CFM:		13000	3565	9435	3485
BUILDING PRESSURE:				80 CFM	POSITIVE

AIR TERMINALS SCHEDULE							
UNIT ID	MANUFACTURER	MODEL	SIZE	DESCRIPTION	CONSTRUCTION	FINISH	REMARKS
CDS	TITUS	TMS-AA-AG100	24x24	SQUARE FACE CEILING DIFFUSER FOR SUPPLY	ALUMINIUM	WHITE	1,2,3,4,5,6
CDR	TITUS	TMS	24x24	SQUARE FACE CEILING DIFFUSER FOR RETURN	ALUMINIUM	WHITE	1,2,3,4,5
EG-2	TITUS	TMS	12x12	SQUARE FACE CEILING DIFFUSER FOR EXHAUST	ALUMINIUM	WHITE	1,2,3,4,5

NOTES:

- MAXIMUM NOISE CRITERION RATING < 25 DBA.
- BAKED ENAMEL FINISH, COLOR TO BE SELECTED BY ARCHITECT.
- DIFFUSERS SHALL BE 4-WAY BLOW UNLESS OTHERWISE INDICATED ON PLANS.
- MOUNTING FRAME TYPE SHALL BE COORD. WITH CEILING / WALL CONSTRUCTION TYPE.
- NECK SIZE SHALL BE AS SCHEDULED.
- PROVIDE MANUAL RADIAL DAMPER AT EACH SUPPLY DIFFUSER.
- EACH SUPPLY DIFFUSER TO HAVE DAMPER AT DROP FROM TRUNK.
- EACH EXHAUST DIFFUSERS TO HAVE DAMPER CONTROLLED FROM STUDIO.
- CONTRACTOR TO REFER DAMPER INSTALLATION DETAIL PROVIDED ON M-300

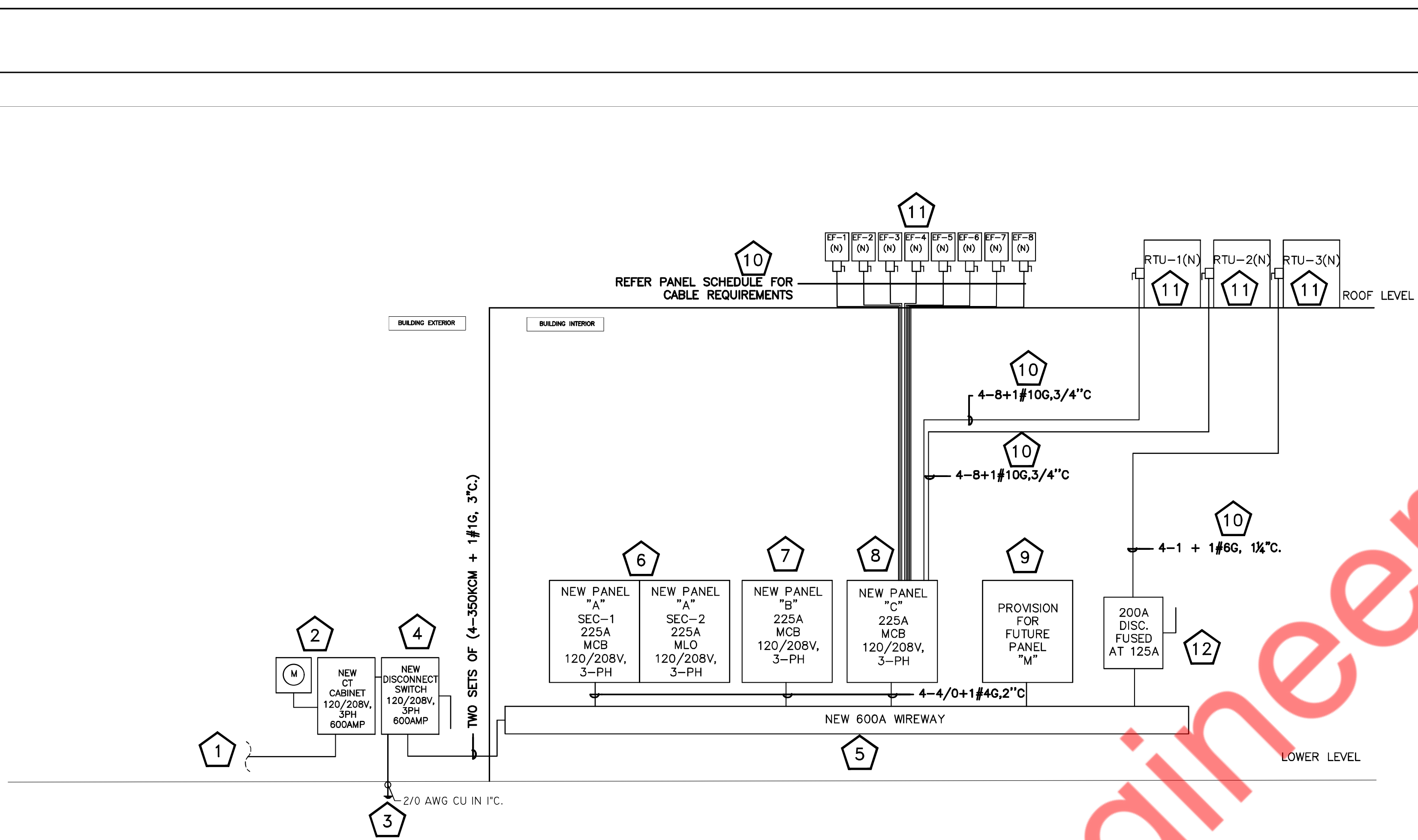
NECK SIZES:

- Up To 100 Cfm - 6" DIA
- 101 To 225 Cfm - 8" DIA
- 226 To 375 Cfm - 10" DIA
- 376 To 500 Cfm - 12" DIA
- 601 To 700 Cfm - 14" DIA

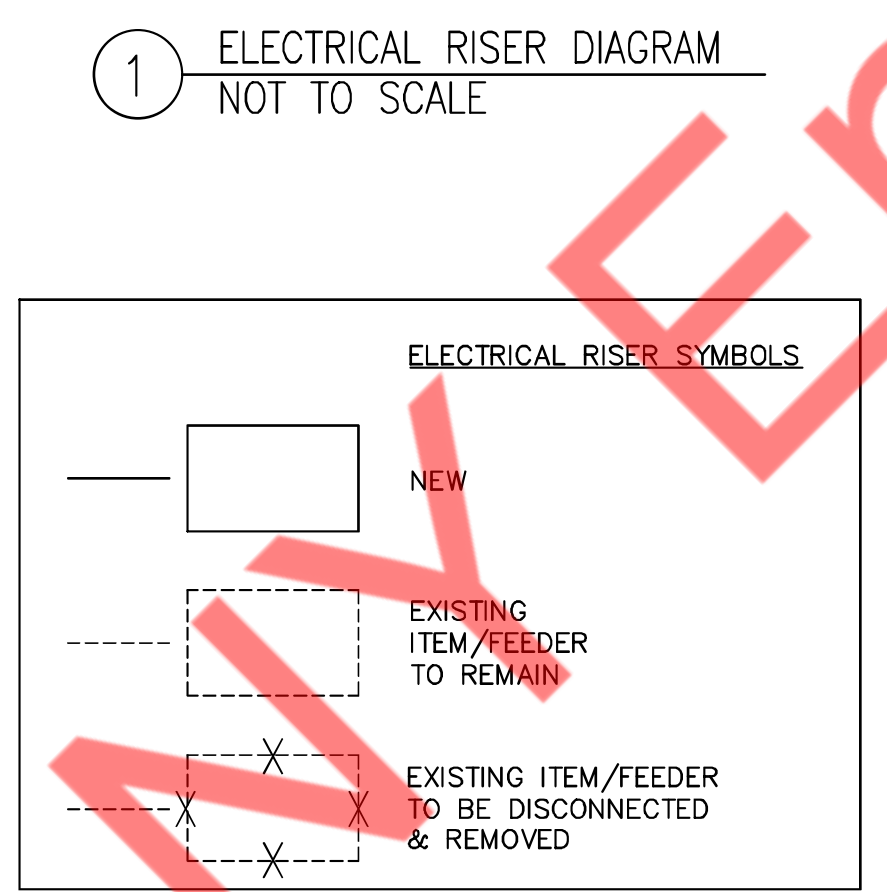
AIR BALANCE					
UNIT	AREA SERVED	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR
RTU-1 (N)	SEE PLAN	3000	595	2405	
RTU-2 (N)	SEE PLAN	2000	625	1375	
RTU-3 (N)	SEE PLAN	8000	2345	5655	
EF-1 (N)	SEE PLAN				490
EF-2 (N)	SEE PLAN				445
EF-3 (N)	SEE PLAN				280
EF-4 (N)	SEE PLAN				195
EF-5 (N)	SEE PLAN				520
EF-6 (N)	SEE PLAN				865
EF-7 (N)	SEE PLAN				490
EF-8 (N)	SEE PLAN				200
TOTAL CFM:		13000	3565	9435	3485
BUILDING PRESSURE:				80 CFM	POSITIVE

Property of NY Engineers

LEGEND	
LIGHTING	
	LUMINAIRE (REFER TO THE LUMINAIRE SCHEDULE) NOTE THAT OTHER SHAPES MAY ALSO BE USED TO REPRESENT LUMINAIRES
	LIGHTING FIXTURE AND OUTLET BOX. HALF SHADED FIXTURE OR "EM" INDICATES FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY SERVICE, U.O.N.
	LUMINAIRE TYPE : INDICATE BY UPPER CASE LETTER SEE LIGHTING EXTURE SCHEDULE.
	CIRCUIT NUMBER : INDICATED BY NUMBER
	SWITCHING INDICATED BY LOWER CASE LETTERS.
	SINGLE / DOUBLE SIDED EXIT SIGN WITH BATTERY BACK UP CONNECT AHEAD OF SWITCHING & CONFIGURE ARROWS TO INDICATE DIRECTION OF EGRESS TRAVEL
	COMBINATION OF EXIT SIGN AND EMERGENCY BUG-EYE FIXTURE.
SWITCHES RECEPTACLES AND CONTROLS	
	DIMMER SWITCH
	LIGHT SWITCH
	CABLE TV OUTLET
	OCCUPANCY SENSOR WITH DIMMER WALL SWITCH
	OCCUPANCY SENSOR SWITCH
	DUPLEX GENERAL RECEPTACLE - 120V- 15-20 AMP
	DUPLEX -120V-15-20 AMP. LOCATE 7" AFF HORIZ. UNO. REF. ARCH FOR MORE INFO
	QUAD - 120V -20 AMP - 24" AFF O.C. REF. ARCH FOR MORE INFO
	DEDICATED DUPLEX - 120V- 20 AMP - INSTALL ON WALL @ 7"
	GFI RECEPTACLE. 'X' REFERS TYPE OF RECEPTACLE AS SPECIFIED ABOVE.
	SPECIAL OUTLET. REFER TO MANUFACTURER SPECIFICATION PRIOR TO START OF WORK
	DATA OUTLET
	JUNCTION BOX
	30A/240V NON FUSED DISCONNECT SWITCH
	60A/240V NON FUSED DISCONNECT SWITCH
ELECTRICAL DRAWING LIST	
E-001	ELECTRICAL LEGEND, ABBREVIATIONS & RISER DIAGRAM
E-002	ELECTRICAL SPECIFICATIONS 1 of 2
E-003	ELECTRICAL SPECIFICATIONS 2 of 2
E-004	ELECTRICAL DETAILS
E-100	ELECTRICAL LIGHTING PLAN
E-200	ELECTRICAL POWER PLAN
E-201	ELECTRICAL POWER PLAN ROOF
E-300	ELECTRICAL PANEL SCHEDULES



- ELECTRICAL RISER GENERAL NOTES:**
- ELECTRICAL CONTRACTOR SHALL VERIFY FAULT CURRENT AVAILABLE WITH UTILITY COMPANY AND CALCULATE EXACT A.I.C. RATING IF REQUIRED.
 - RISER DIAGRAM IS SHOWN FOR REFERENCE ONLY. E.C. SHALL VERIFY INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION. REPORT IF ANY DISCREPANCY OBSERVED. COORDINATE FINAL CONFIGURATION OF EQUIPMENT WITH OWNER.
 - ELECTRICAL CONTRACTOR SHALL UPGRADE EXISTING ELECTRICAL SERVICE TO NEW AS REQUIRED OR SHALL VERIFY THE EXISTING ELECTRICAL SERVICE AND REUSE IF POSSIBLE BY APPLYING NEW ELECTRICAL SERVICE FOR REQUIRED DEFICIT AMPERAGE. SCOPE OF WORK TO BE COORDINATED WITH THE LANDLORD/OWNER/UTILITY COMPANY. BASE BID ACCORDINGLY.
 - COORDINATE FINAL CONFIGURATION OF EQUIPMENT WITH OWNER/UTILITY COMPANY.



- # ELECTRICAL RISER KEYED NOTES:**
- EXISTING ELECTRICAL SERVICE EQUIPMENT TO BE UPGRADED FROM 400A TO 600A FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR TO COORDINATE WITH UTILITY COMPANY/LANDLORD FOR EXACT POWER DISTRIBUTION.
 - NEW 600 AMPS, 120/208V, 3-PHASE, 4 WIRE ELECTRICAL CT CABINET AND METER FOR THE PROJECT SPACE TO BE REPLACED WITH EXISTING 400AMP ELECTRICAL CT CABINET AND METER. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY/OWNER FOR THE EXACT LOCATION IN FIELD.
 - E.C SHALL PROVIDE GROUNDING ELECTRODE CONDUCTOR AS PER NEC 250.66
 - NEW 600 AMPS, 120/208V, 3-PHASE, 4 WIRE DISCONNECT SWITCH FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH UTILITY/OWNER FOR THE EXACT LOCATION IN FIELD.
 - NEW 600A, 120/208V, 3-PHASE, 4-WIRE WAY. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
 - NEW 225A, 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "A". ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
 - NEW 225A, 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "B". ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
 - NEW 225A, 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "C". ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
 - PROVISION FOR FUTURE PANEL "M". E.C. SHALL PROVIDE POWER PROVISION FOR FUTURE PEDICURE AND MANICURE EQUIPMENTS. COORDINATE WITH THE ARCHITECT/OWNER FOR EXACT REQUIREMENTS AND SCOPE. BASE BID ACCORDINGLY.
 - ELECTRICAL CONTRACTOR SHALL PROVIDE NEW FEEDER TO EXHAUST FAN AND RTUS. CO-ORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATION. REFER PANEL SCHEDULE FOR CABLE RATINGS. BASE BID ACCORDINGLY.
 - ELECTRICAL CONTRACTOR SHALL PROVIDE NEW DISCONNECT TO MECHANICAL EQUIPMENTS IN CO-ORDINATION WITH MECHANICAL CONTRACTOR AS PER MECHANICAL DRAWINGS. BASE BID ACCORDINGLY.
 - NEW 200A, 120/208V, 3-PHASE DISCONNECT FUSED AT 125A FOR RTU-3. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.

ABBREVIATIONS	
A	AMPERES
A/C, AC	AIR CONDITIONING UNIT
AF	AMPERE FRAME/AMP FUSE
AC/UC	ABOVE/UNDER COUNTER MOUNTING
AFF	ABOVE FINISHED FLOOR
AS	AMP SWITCH
AIC	AMPS INTERRUPTING CAPACITY
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
C/B,CB	CIRCUIT BREAKER
CKT	CIRCUIT
CLG	CEILING
CU	COPPER
EM	EMERGENCY CIRCUIT
GFI	GROUND FAULT INTERRUPTER
WP	WEATHER PROOF
DP	DISTRIBUTION PANEL
DWG	DRAWING
J.B.	JUNCTION BOX
KCMIL	ONE THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT-AMPERES
KW	KILOWATTS
LTG	LIGHTING
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MTD	MOUNTED
N	NEUTRAL
NTS	NOT TO SCALE
EA	EACH
EC	EMPTY CONDUIT/ ELECTRICAL CONTRACTOR
EM	EMERGENCY
MC	METAL CLAD
FL	FLOOR
G	GROUND
GFI	GROUND FAULT INTERRUPTER
HP	HORSEPOWER
HZ	HERTZ
IC	INTERRUPTING CAPACITY
PP	POWER PANEL
PVC	POLYVINYL CHLORIDE
IG	ISOLATION GROUND
REC	RECEPTACLE
RGS	RIGID GALVANIZED STEEL
SECT	SECTION
SW	SWITCH
P	POLES
TYP	TYPICAL
U.O.N.	UNLESS OTHERWISE NOTED
V	VOLT/VOLTAGE
VA	VOLT AMPERE
WP	WEATHER PROOF
E	EXISTING
N.I.C.	NOT IN CONTRACT
TP	TAMPER PROOF

- GENERAL NOTES**
(APPLY TO ALL "E" DRAWINGS)
- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CURRENT VERSION OF THE NEC 2017, LOCAL JURISDICTION REQUIREMENTS, AND ALL GOVERNING LOCAL CODES, LAWS, AND REGULATIONS.
 - ELECTRICAL 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.
 - ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, TEST REPORTS, AND CERTIFICATIONS FOR TEMPORARY AND FINAL CERTIFICATE OF OCCUPANCY.
 - FIRE STOP ALL ELECTRICAL WORK PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER IN ORDER TO MAINTAIN FIRE RATING. ALL PENETRATIONS SHALL BE SLEEVED AND SEALED WATER/TIGHT.
 - SECURE ALL SUPPORTS TO THE BUILDING STRUCTURE IN COORDINATION WITH LANDLORD/OWNER.
 - LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT INSTALLED: FURNISH FISH WIRE.
 - ELECTRICAL 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.
 - ELECTRICAL CONTRACTOR SHALL PATCH, PAINT, AND RESTORE EXISTING SURFACES DAMAGED DURING THE COURSE OF THIS CONSTRUCTION TO PRE-EXISTING CONDITIONS OR BETTER.
 - ELECTRICAL CONTRACTOR SHALL USE MC CABLE FOR ALL STUDIO WIRING BRANCH CONNECTIONS IN COORDINATION WITH LOCAL AHJ.
 - 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.
 - ALL ELECTRICAL ACCESSORIES AND EQUIPMENT INSTALLED OUTSIDE OR EXPOSED TO WEATHER SHALL HAVE NEMA 3R ENCLOSURES AND SHALL BE TIGHTLY GASKETED FOR A COMPLETE PAINT/TIGHT INSTALLATION. ALL BUILDING EXTERIOR MOUNTED RECEPTACLES SHALL BE GFCI RATED AND MOUNTED IN WEATHERPROOF ENCLOSURE.
 - ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTALLATION OF NEW WORK WITH THE GENERAL CONTRACTOR AND OTHER ASSOCIATED TRADES IN A TIMELY MANNER. THE GENERAL 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 EQUIPMENT AND MATERIALS INSTALLED IN PLENUM CEILINGS SHALL BE APPROVED FOR THAT APPLICATION.
 - COORDINATE ALL FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. CONFIRM PENETRATION LOCATIONS WITH THE ENGINEER AND OWNER BEFORE INSTALLATION.
 - COORDINATE THE MOUNTING HEIGHT AND LOCATION OF RACEWAYS, COMMUNICATIONS OUTLETS, AND RECEPTACLES WITH THE ARCHITECTURAL CASEWORK DRAWINGS AND DETAILS. COORDINATE LOCATIONS OF LIGHT FIXTURES, SWITCHES, AND RELATED DEVICES WITH THE ARCHITECTURAL DRAWINGS AND DETAILS.
 - REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL LUMINAIRES AND SWITCHES, AND FOR ALL FINISHED CEILING HEIGHTS.
 - REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL ELECTRICAL DEVICES, AND FOR FINAL CEILING AND WALL HEIGHTS AND LAYOUTS.
 - LIGHTING FIXTURES PROVIDED WITH EMERGENCY BATTERY PACKS AND INDICATED WITH SWITCH CONTROL SHALL BE WIRED WITH BATTERY CHARGING/SENSING CIRCUIT WIRED AHEAD OF SWITCH CONTROL.
 - 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.

ELECTRICAL SPECIFICATIONS

1. GENERAL:

- A. 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 HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED, MAINTAIN HEADROOM AND SPACE CONDITIONS.
- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
- G. 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.
- H. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL, UNLESS OTHERWISE NOTED.
- I. 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.
- J. 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 BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- K. 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 THEREFOR SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- L. 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.
- M. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- N. INSURANCE: PROVIDE IN ACCORDANCE WITH OWNER/BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- O. 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.
 - GARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AS DEFINED IN PARAGRAPH 2.C.
 - CURRENT CHARACTERISTICS:
 - SERVICE: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.
 - DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.
- 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 LAMICOID 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. 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.

- G. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.
- H. 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) VIRGINIA AMENDMENTS, 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 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 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 THEREFOR. 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 VIRGINIA BUILDING CODE. 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.

4. SHOP DRAWINGS

- A. 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.
- B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED:
- PROJECT NAME AND LOCATION
 - NAME OF ARCHITECT AND ENGINEER
 - ITEM IDENTIFICATION

4) APPROVAL STAMP OF PRIME CONTRACTOR

C. 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.
- D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
- SAFETY/DISCONNECT SWITCHES
 - FUSES
 - CIRCUIT BREAKERS
 - PANELBOARDS/LOADCENTER (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS).
 - RACEWAYS
 - WIRE AND CABLE
 - WALL SWITCHES
 - INSERTION RECEPTACLES
 - MOMENTARY CONTACT SWITCHES
 - TIME SWITCHES
 - LIGHTING FIXTURES.

- E. 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.
5. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

- A. 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.
- 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. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
- C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
- D. 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 MAXIMUM RATINGS OF 20 AMP AT 600 VOLTS AND 30 AMP AT 240 VOLTS. TWO-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 8808F. THREE-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN 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 SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.

7. FUSES:

- A. CIRCUITS 0 TO 600 AMPERES SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN 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.
- B. MOTOR CIRCUITS - ALL INDIVIDUAL MOTOR CIRCUITS WITH FULL LOAD AMPERE RATINGS (FLA) OF 480 AMPERES OR LESS SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN 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.
- C. ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER.
- D. PROVIDE 1 SPACE MATCHING FUSE FOR EACH SET OF 3.

- E. 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, 4 OR 5 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 CHROME PLATED VAULT HANDLE, 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 FINISH 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, RMS 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 STRUCTURAL STEEL CHANNEL (KINDORF) WHICH SHALL BE BOLTED TO THE WALL USING EXPANSION ANCHORS FOR LARGE PANELS.

ELECTRICAL SPECIFICATIONS (CONT.)

- H. IDENTIFICATION
- 1) PROVIDE NAMEPLATE AT EACH SWITCH IDENTIFYING THE LOAD SERVED.
- 2) 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
- 1) RACEWAYS:
- a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.
- b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADED.
- c. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.
- d. WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16 GAUGE STEEL WITH GROUND CONTINUITY. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.
- e. 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.
- 2) FITTINGS AND ACCESSORIES:
- a. RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.
- b. ELECTROMETALLIC TUBING: COMPRESSION TYPE, GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER.
- c. FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.
- d. BUSHINGS: METALLIC INSULATED TYPE.
- 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 RAISED COVERS 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 265/460 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.
- N. 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 POKER-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 FISHPLATES.
- EXPOSED 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. PAINTED OR FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PIPE COMPOUND AND BUTT CONDUIT ENDS. TOUCH UP MARRED SURFACES AND FIELD-CUT THREADS, CRC-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 WITH MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.
- RACEWAYS PASSING THROUGH FIRE-RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.
- O. PROVIDE CABLE SUPPORTS IN ACCORDANCE WITH NATIONAL ELECTRIC CODE ARTICLE 300.19. CABLE SUPPORTS SHALL UTILIZE A ONE-PIECE PLIIC WITH POZI-GRIP WEDGING PLUG AS MANUFACTURED BY OZ-GEDNEY. 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).
- P. 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.
- Q. 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.
- R. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE-PARTITIONS ROOMS.
- S. 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.
10. WIRE AND CABLE:
- A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG EXCEPT AS NOTED.
- B. CONDUCTORS SHALL BE COPPER OR ALUMINIUM AS APPROVED, 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. PROVIDE STANDARD MC CABLE FOR ALL THE BRANCH CIRCUITS AS REQUIRED IN COORDINATION WITH LOCAL AHJ.
- F. COLOR CODING SHALL BE AS FOLLOWS:
- 120/208 VOLT SYSTEM:
BLACK FOR A PHASE
RED FOR B PHASE
BLUE 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 5 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.
- G. 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.
- H. 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 ANTISIZZE COMPOUND ON TANG.
- I. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.
11. 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. GROUND, EXCEPT AS NOTED.
- 1) 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).
- 2) USE CHARGER/ DUPLEX TAMPER-RESISTANT RECEPTACLE: TAMPER RESISTANT.
- D. DEVICE PLATES: SEE ARCHITECT FOR TYPE. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.
- E. COLORS: COORDINATE COLORS WITH ARCHITECT.
- F. MOUNTING ORIENTATION OF RECEPTACLES (HORIZONTAL OR VERTICAL): COORDINATE WITH ARCHITECT.
12. 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. CONTINUOUS ROW, TWO LAMP STRIP FIXTURES SHALL BE STAGGERED TYPE.
- D. 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 VIRGINIA. AC POWERED WITH BATTERY OF 90 MINUTES RUN TIME. PROVIDE WITH INTEGRAL AUTOMATIC CHARGER IN A SELF CONTAINED POWER PACK. LED INDICATOR WITH PUSH TO TEST SWITCH.
13. GROUNDING AND BONDING:
- A. EXTEND EXISTING SYSTEM GROUND TO INCLUDE ALL THE ELECTRICAL EQUIPMENT IN THE SCOPE OF WORK.
- B. WHERE FLEXIBLE METALLIC CONDUIT IS USED AN INTERNAL BONDING CONDUCTOR SHALL BE INSTALLED.
- C. IN ADDITION, FURNISH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR WHERE INDICATED ON DRAWINGS AND FOR THE FOLLOWING BRANCH CIRCUITS:
- 1) 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.
- 2) CIRCUITS SERVING ANY RECEPTACLES
- 3) ANY CIRCUIT SERVED VIA AN ISOLATION TRANSFORMER OR COMPUTER POWER DISTRIBUTION UNIT.
14. 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 25% 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 SPARE LOCKING TABS SHALL BE FURNISHED TO THE OWNER.
- 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. 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.
- J. TIE-BARS SHALL NOT BE USED TO CREATE MULTI-POLE CIRCUITS. MAXIMUM 42 CIRCUITS ALLOWED.
- K. ONLY ONE WIRE SHALL BE INSTALLED UNDER EACH CIRCUIT BREAKER LUG.
- L. 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.
- M. FOR ALL EXISTING PANELBOARDS, CONTRACTOR SHALL PROVIDE NEW CIRCUIT BREAKERS TO REPLACE EXISTING AS REQUIRED AS INDICATED ON DRAWINGS.
15. PROVIDE AN OPERATING MANUAL AND MAINTENANCE MANUAL TO THE BUILDING OWNER AS REQUIRED. THE MANUALS SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING:
- A. SUBMITTAL DATA STATING EQUIPMENT RATINGS AND SELECTED OPTIONS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.
- B. OPERATION MANUALS AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED.
- C. NAMES AND ADDRESSES OF AT LEAST ONE QUALIFIED SERVICE AGENCY.

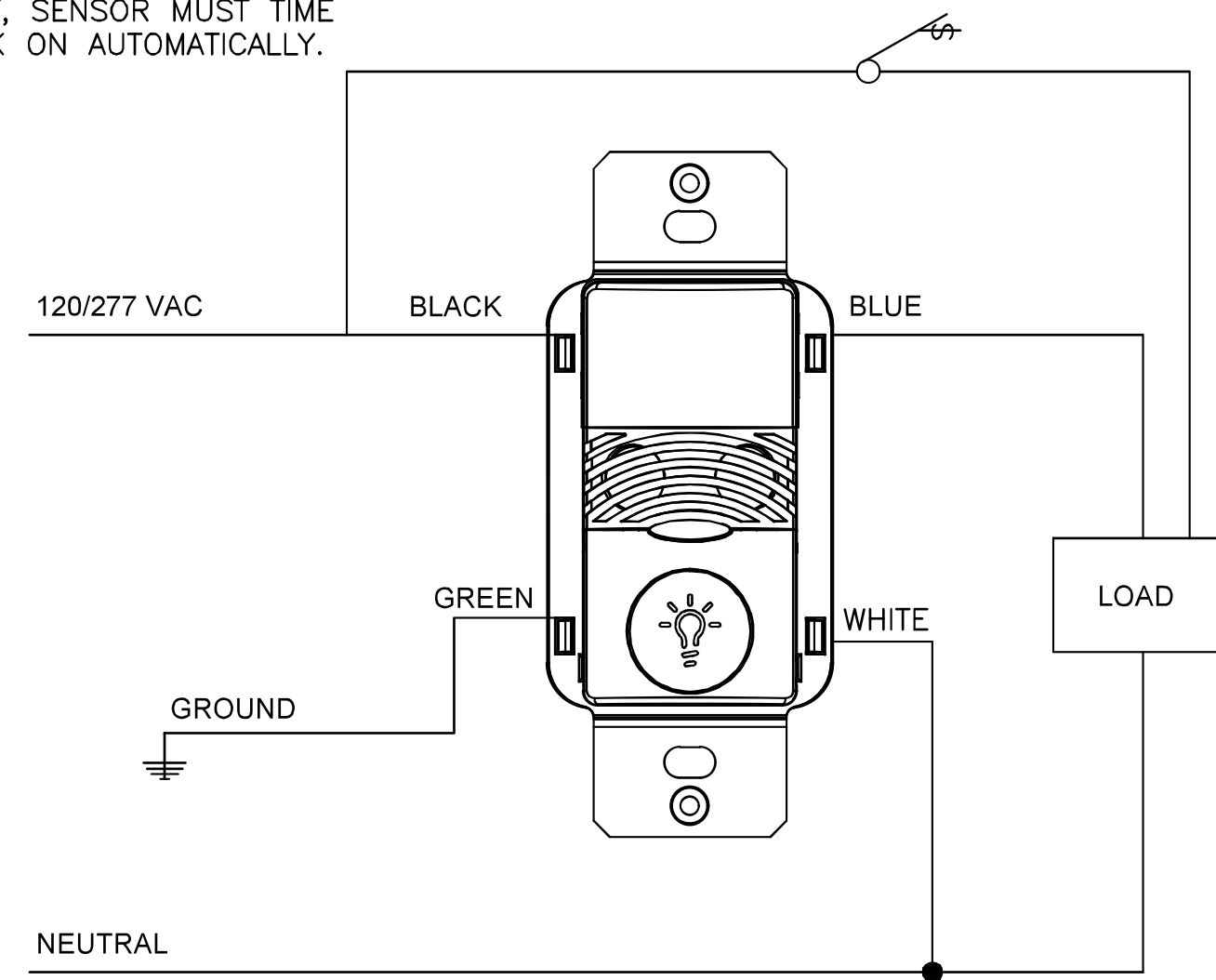
MANUAL MODE OPERATION:

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.

SENSOR TYPES INCLUDE:
HB011-BDX (LEVITRON)
OCCUPANCY WITH DIMMER SWITCH.



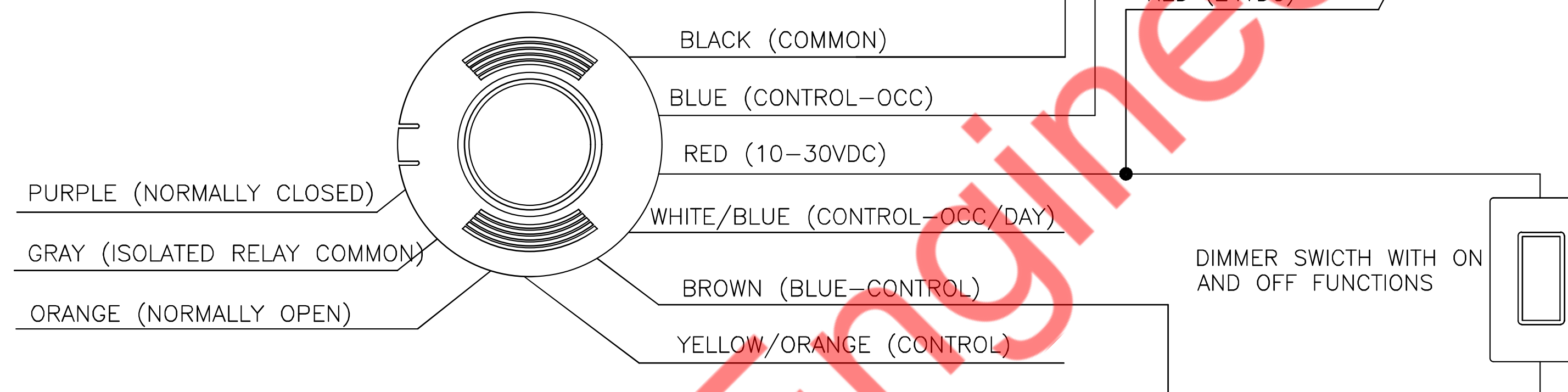
OAC AND VAC MANUAL MODE OPERATION:

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.

5 OCCUPANCY/VACANCY-SINGLE LEVEL (NEUTRAL CONNECTION) WIRING DIAGRAM-LOW VOLTAGE WALL DIMMER SWITCH SENSOR
E-004 N.T.S

4 OCCUPANCY - AUTO ON/OFF. WIRING DIAGRAM - LOW VOLTAGE CEILING SENSOR
E-004 N.T.S

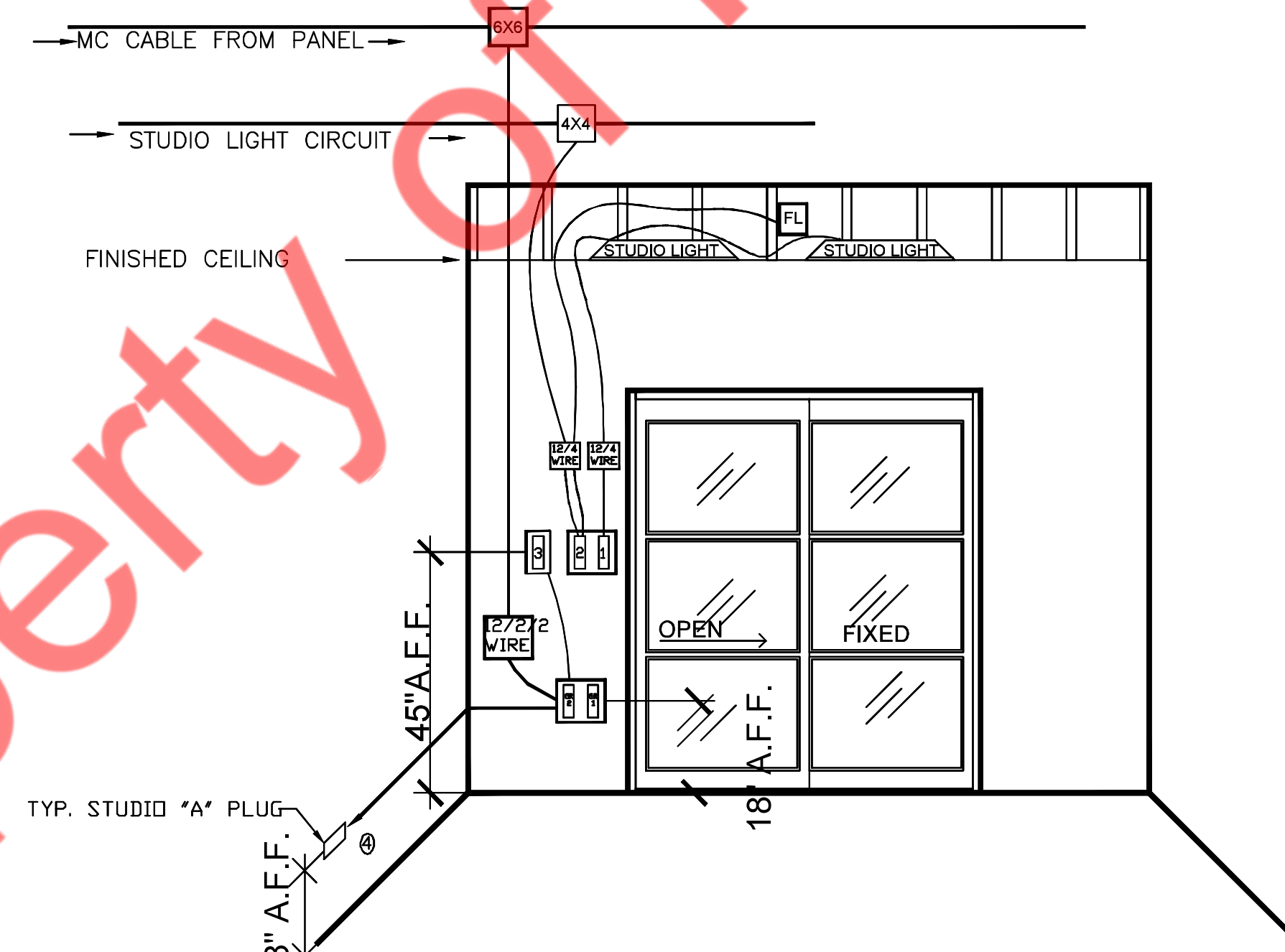
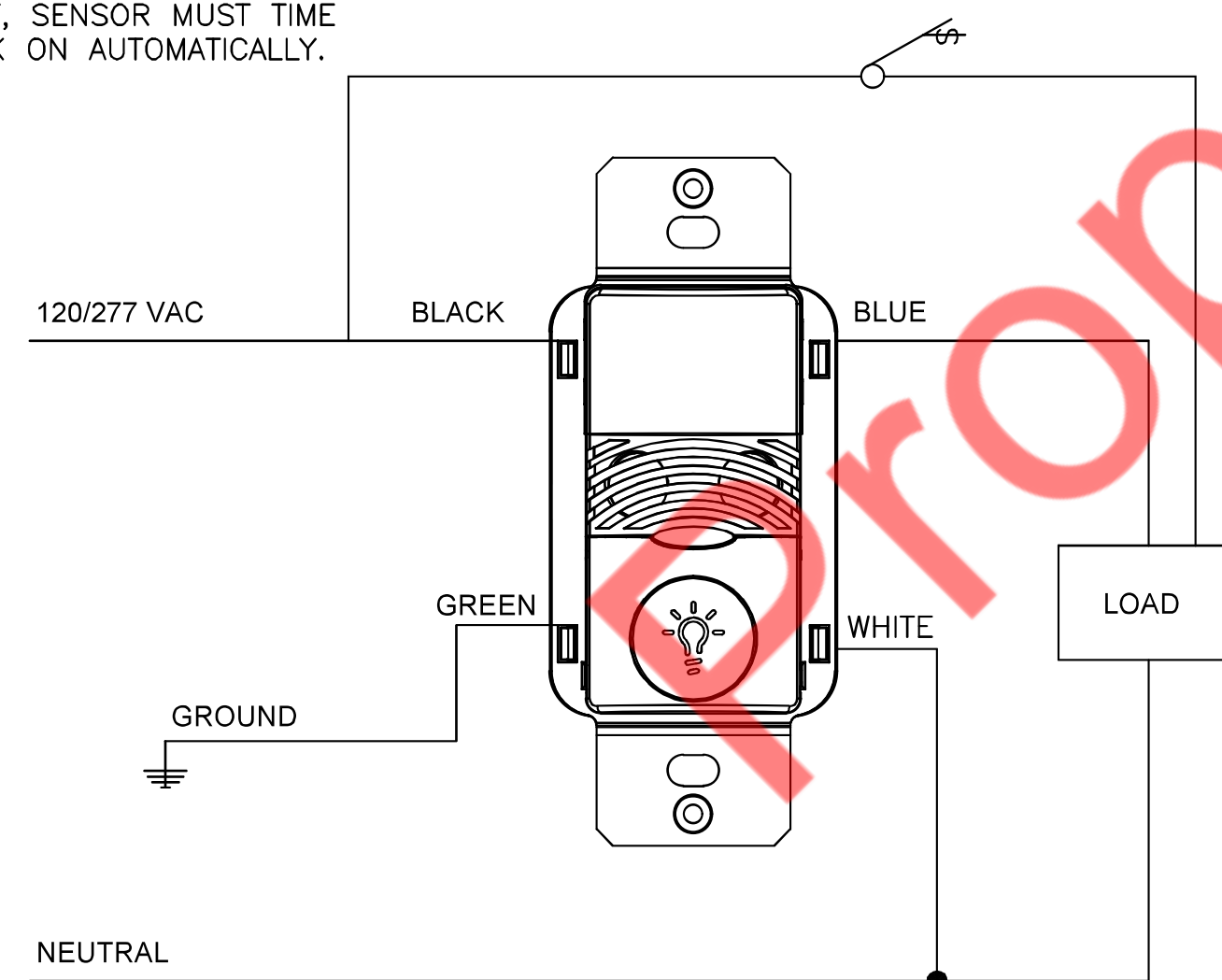
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3. IF DAYLIGHT SENSOR IS ENABLED AND LIGHT LEVEL IS ABOVE SETPOINT, LOAD WILL NOT TURN ON.

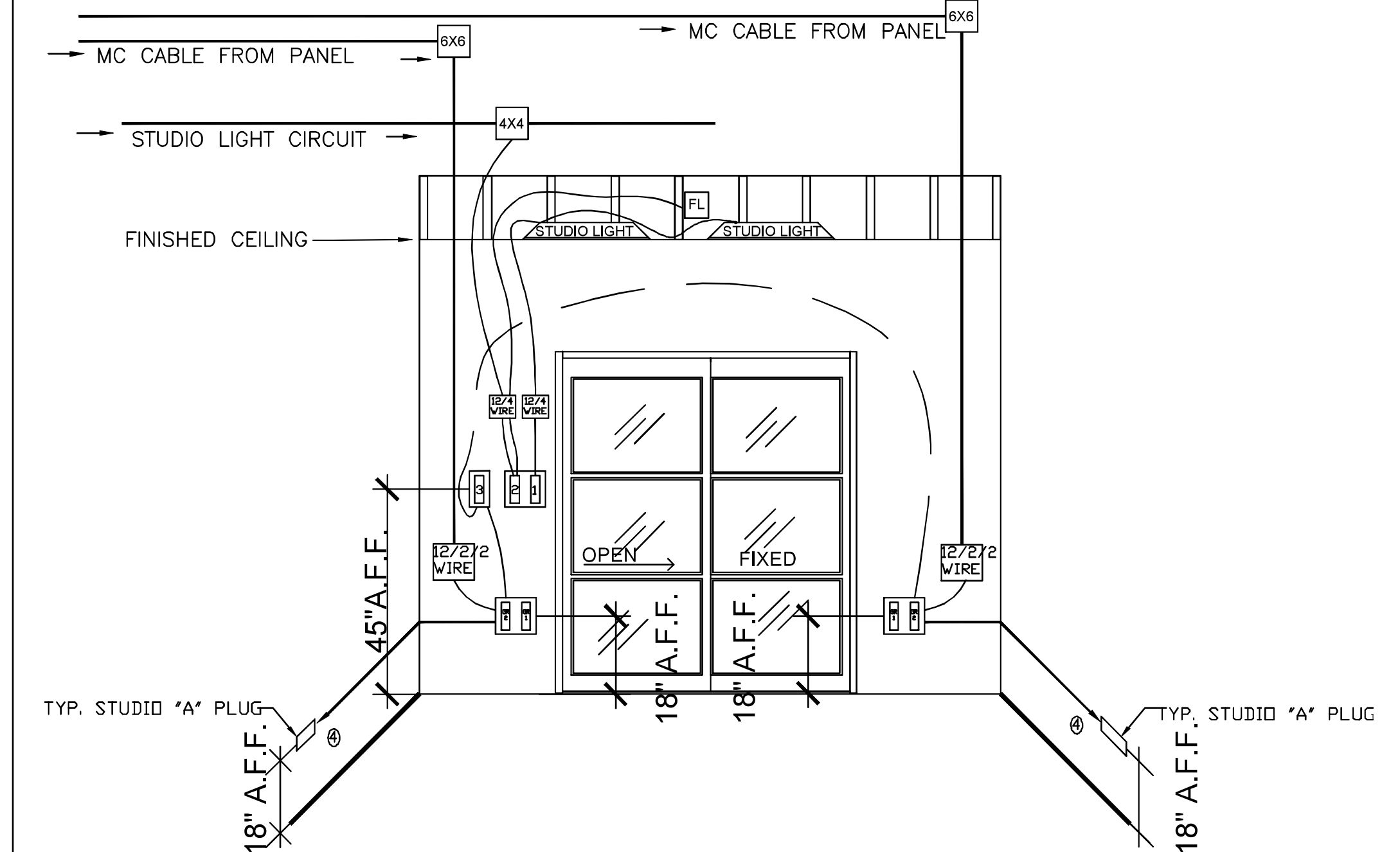
AUTOMATIC MODE OPERATION:

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.

SENSOR TYPES INCLUDE:
OCCUPANCY SWITCH.



1. MOTION/DIMMER TO OVERHEAD LIGHTS (12/4).
2. SWITCH TO THE FUTURE LIGHT BOX (FL) ABOVE DOOR (12/2).
3. OPTIONAL SWITCH FOR "E" PLUGS (DETERMINED IN OWNERS SPEC).
4. 12/2/2 WIRE TO WALL OUTLETS. BLACK WIRE TO "E" PLUGS ONLY. RED WIRE TO ALL "A" AND "B" PLUGS (FOR DOUBLE STUDIOS, TWO 12/2/2 WIRES).
5. VERIFY WITH OWNER SPEC.
6. VERIFY WITH SUPERINTENDENT ON OWNER SELECTIONS.



1. MOTION/DIMMER TO OVERHEAD LIGHTS (12/4).
2. SWITCH TO THE FUTURE LIGHT BOX (FL) ABOVE DOOR (12/2).
3. OPTIONAL SWITCH FOR "E" PLUGS (DETERMINED IN OWNERS SPEC).
4. 12/2/2 WIRE TO WALL OUTLETS. BLACK WIRE TO "E" PLUGS ONLY. RED WIRE TO ALL "A" AND "B" PLUGS (FOR DOUBLE STUDIOS, TWO 12/2/2 WIRES).
5. VERIFY WITH OWNER SPEC.
6. VERIFY WITH SUPERINTENDENT ON OWNER SELECTIONS.

3 OCCUPANCY/VACANCY-SINGLE LEVEL (NEUTRAL CONNECTION) WIRING DIAGRAM-LOW VOLTAGE WALL OCCUPANCY SWITCH SENSOR
E-004 N.T.S

2 TYPICAL 12/2/2 INSTALL-SINGLE SALON
E-004 N.T.S

1 TYPICAL 12/2/2 INSTALL-DOUBLE SALON
E-004 N.T.S

- ELECTRICAL GENERAL NOTES:**
- SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT FIXTURE LOCATIONS AND ORIENTATIONS.
 - REFER TO ARCHITECTURAL ELEVATIONS AND SECTIONS FOR ADDITIONAL LIGHTING FIXTURE MOUNTING DETAILS AND INFORMATION.
 - THIS LIGHTING PLAN IS FOR TENANT ONLY. EXTERIOR LIGHTING IS EXISTING AND CONNECTED TO "HOUSE" UTILITIES. COORDINATE EXACT SCOPE OF WORK WITH OWNER IF REQUIRED. BASE BID ACCORDINGLY.
 - VERIFY ALL MOUNTING HEIGHTS OF LIGHTS WITH ARCHITECT AND ENGINEER PRIOR TO ORDERING FIXTURES.
 - LIGHTING IN SINGLE CHAIR STUDIO AREA SHALL BE CONTROLLED BY WALL MOUNTED OCCUPANCY SENSOR WITH DIMMER SWITCH.
 - LIGHTING IN THE TWO CHAIR IS CONTROLLED BY CEILING OCCUPANCY SENSOR WITH WALL MOUNTED DIMMER SWITCH.
 - ALL THE POWER PACKS REQUIREMENT THE CEILING OCCUPANCY SENSOR SHALL BE COORDINATED WITH THE LIGHTING VENDOR AND PROVIDE AS REQUIRED ON SITE. BASE BID ACCORDINGLY.
 - CONTRACTOR SHALL COORDINATE LIGHTING VENDOR & UPDATE OCCUPANCY SENSOR QUANTITY & LOCATION AS PER SITE REQUIREMENT. BASE BID ACCORDINGLY.
 - FOR EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES AND SWITCH/RECEPTACLE OUTLETS, REFER TO ARCHITECTURAL REFLECTED CEILING AND POWER PLANS.
 - TIME CLOCK REQUIREMENT SHALL BE VERIFIED WITH THE OWNER IN COORDINATION WITH THE LIGHTING VENDOR. PROVIDE POWER CONNECTION TO THE TIMECLOCK CIRCUIT FROM THE PANEL AS REQUIRED. BASE BID ACCORDINGLY.
- ELECTRICAL LIGHTING KEYED NOTES:**
- PROVIDE 120V MANUAL SWITCH FOR HALLWAY LIGHTING CONTROLS VIA TIME CLOCK. COORDINATE EXACT SWITCH SELECTION WITH OWNER PRIOR TO ROUGH-IN.
 - CONNECT ALL EMERGENCY EGRESS AND EMERGENCY FIXTURES TO THE NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES.
 - ELECTRICAL CONTRACTOR SHALL PROVIDE OCCUPANCY SENSOR FOR ALL LIGHT FIXTURES IN THE CORRIDOR AREA VIA TIME CLOCK. COORDINATE EXACT REQUIREMENT WITH OWNER/SOLA SALON REPRESENTATIVE AND PROVIDE CONTROLS. AND PROVIDE CONTROLS. BASE BID ACCORDINGLY.

LIGHTING CONTROLS:

AREA	CONTROLS
STUDIO (SINGLE CHAIR)	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA WALL MOUNTED OCCUPANCY SENSOR ALONG WITH DIMMER SWITCH WITH ON OFF CAPABILITY.
STUDIO (DOUBLE CHAIR) STUDIO#047, STUDIO#008, STUDIO#020, STUDIO#26	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA CEILING MOUNTED OCCUPANCY SENSOR ALONG WITH DIMMER SWITCH WITH ON OFF CAPABILITY.
UNISEX BATHROOM	WALL MOUNTED OCCUPANCY SENSOR
HALLWAY	CEILING MOUNTED OCCUPANCY SENSOR WITH MANUAL WALL SWITCH VIA TIME CLOCK. FIXTURES DESIGNATED 'EM' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.

- LIGHTING CONTROLS NOTES:**
- AUTOMATIC LIGHTING CONTROLS:**
STUDIO: OCCUPANCY SENSOR SHALL BE CAPABLE OF TURNING OFF LIGHTS WITHIN 20 MINUTES OF ALL OCCUPANT LEAVING THE SPACE AND SHALL BE MANUAL TO OPERATE THEM PER REQUIRED BUSINESS HOURS.
HALLWAY: OCCUPANCY SENSOR SHALL BE CAPABLE OF TURNING OFF LIGHTS WITHIN 20 MINUTES OF ALL OCCUPANT LEAVING THE SPACE AND SHALL BE MANUAL VIA TIME CLOCK TO OPERATE THEM PER REQUIRED BUSINESS HOURS.
 - ALL ILLUMINATED EXIT SIGN TO HAVE A MAX WATTAGE OF 5 PER SIDE.
 - ALL EMERGENCY LIGHT SHALL BE CONNECTED AHEAD OF SWITCHING.

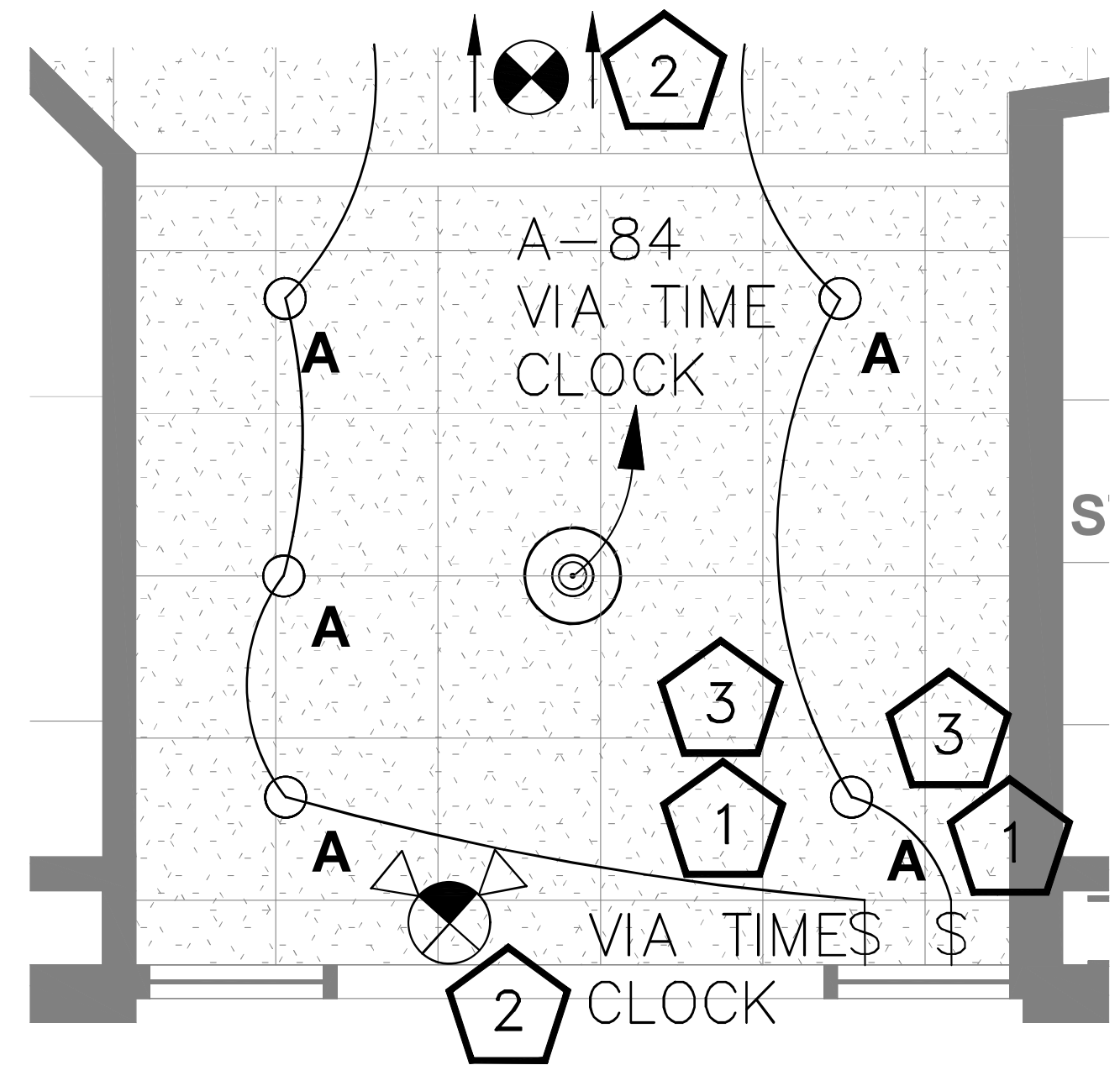
LIGHTING FIXTURE SCHEDULE:

TYPE	DESCRIPTION	MANUFACTURER	CATALOGUE#	VOLTAGE	LAMP WATTS
A	4" INSULATED CEILING AIR-TITE HOUSING WITH ADJUSTABLE SOCKET BRACKET LIGHT	EATON	H99ICAT	120	50
B	2X4 LED TROFFER, LENGTH 48", 4000K, DIMMABLE VIA 0-10V	COOPER	24AC-LD3-48-UNV-LB40-CDS-U	120	48
B	2X4 LED TROFFER, LENGTH 48", 4000K, DIMMABLE VIA 0-10V WITH 90 MINUTE EMERGENCY BATTERY BACK UP	COOPER	24AC-LD3-48-UNV-LB40-CDS-U EM	120	48
D	2X2 LED TROFFER, LENGTH 48", 4000K, DIMMABLE VIA 0-10V	COOPER	22AC-LD3-34-UNV-LB40-CDS-U	120	39
D	2X2 LED TROFFER, LENGTH 48", 4000K, DIMMABLE VIA 0-10V WITH 90 MINUTE EMERGENCY BATTERY BACK UP	COOPER	22AC-LD3-34-UNV-LB40-CDS-U EM	120	39
	CHANNELLET LIGHT	TBO	TBO	120	20

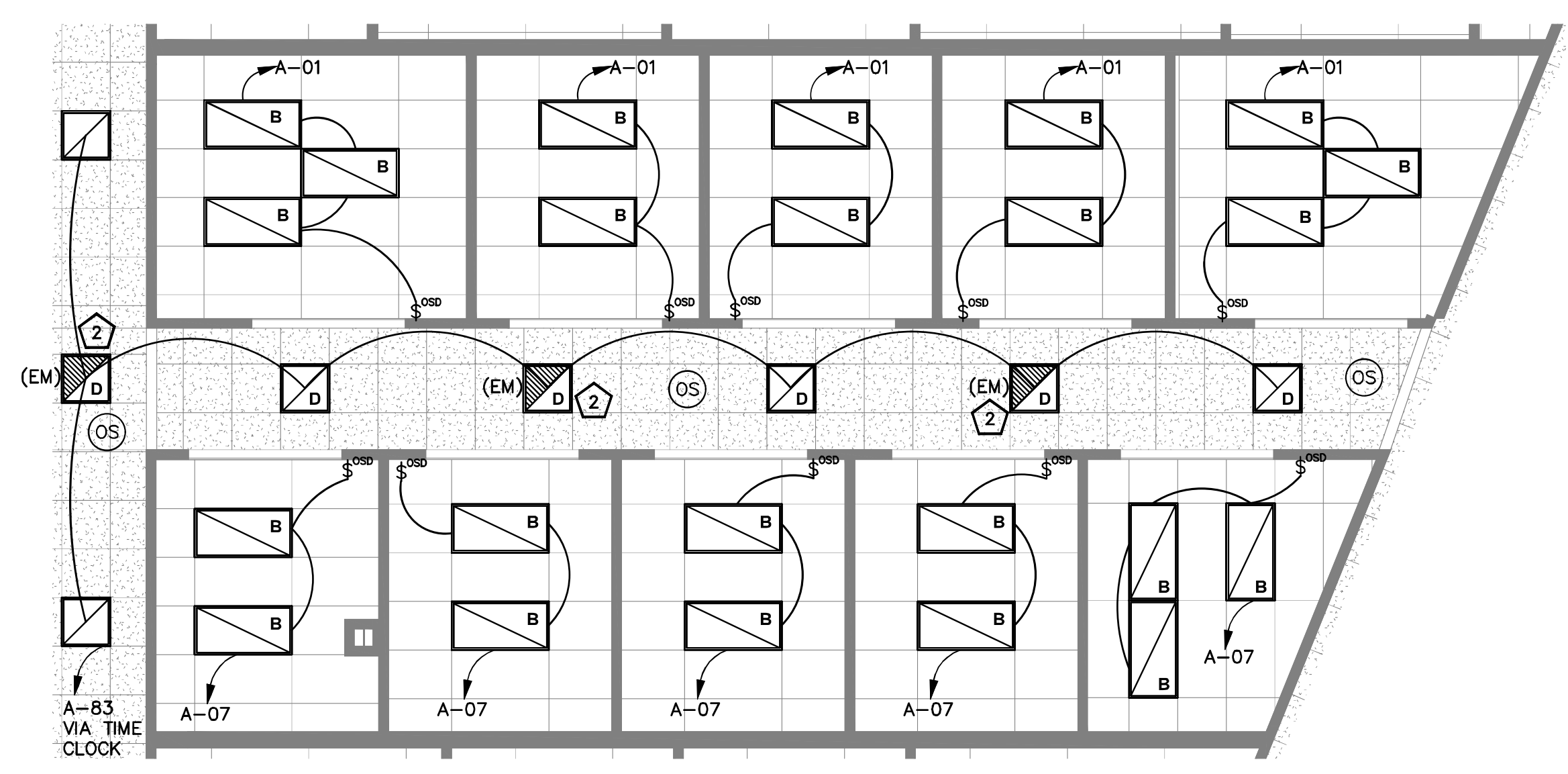
- LIGHT SCHEDULE GENERAL NOTES:**
- COORDINATE FINAL FIXTURE MAKE AND MODEL AND DIMMING WITH ARCHITECT.



01 ELECTRICAL LIGHTING PLAN
3/16" = 1'-0"



03 ENTRY ELECTRICAL LIGHTING PLAN
3/16" = 1'-0"



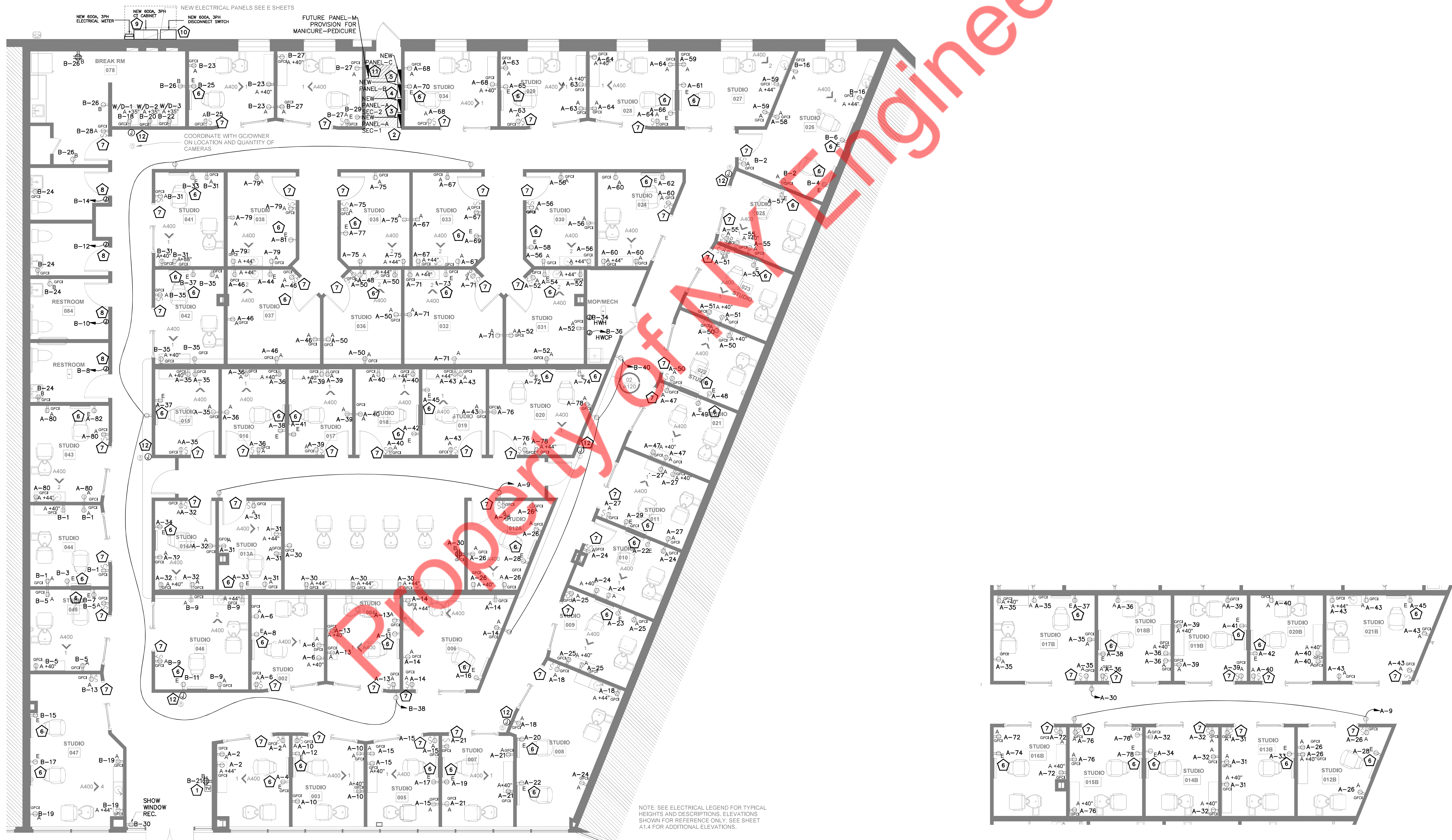
02 ALTERNATE ELECTRICAL LIGHTING PLAN
3/16" = 1'-0"

ELECTRICAL GENERAL NOTES:

- A. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT POSITION & HEIGHT REQUIREMENTS OF RECEPTACLES PER CODE.
- B. CIRCUITING WORK SHOWN ON DRAWINGS IS FOR SCHEMATIC GENERAL GRAPHIC REPRESENTATION ONLY. DETERMINE SPECIFICS IN FIELD (POINT-TO-POINT ROUTING, HOME-RUN LOCATIONS, METHODS OF CONCEALMENT, ETC.).
- C. REFER TO EQUIPMENT COORDINATION SCHEDULES FOR REQUIREMENTS ASSOCIATED WITH EQUIPMENT CIRCUITING, CONNECTIONS, ANCILLARY DEVICES AND EQUIPMENT, ETC. COORDINATE LOCATIONS AND REQUIREMENTS FOR ALL EQUIPMENT WITH RESPECTIVE EQUIPMENT SUPPLIERS AND INSTALLERS PRIOR TO ORDERING ANY RELATED MATERIALS OR COMMENCING WITH ANY RELATED ROUGH-IN WORK.
- D. INSTALL RECEPTACLES INDICATED ABOVE STOREFRONT WINDOWS WITHIN 18 INCHES OF THE TOP OF STOREFRONT WINDOWS, AND INSTALL COMPLIANT WITH NEC, INCLUDING ARTICLE 210.62.
- E. PROVIDE GFCI PROTECTION FOR ALL SINGLE-PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 50 AMPERES OR LESS AND THREE-PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 100 AMPERES OR LESS INSTALLED IN/FOR THE FOLLOWING LOCATIONS/APPLICATIONS: BATHROOMS, KITCHENS, ROOFTOPS, OUTDOORS, SINKS (WHERE RECEPTACLES ARE INSTALLED WITHIN 6 FEET FROM THE TOP INSIDE EDGE OF THE BOWL OF THE SINK), INDOOR WET LOCATIONS, VENDING MACHINES AND AREAS, ELECTRIC WATER COOLERS, LOCKER ROOMS WITH ASSOCIATED SHOWERING FACILITIES, AND GARAGES, SERVICE BAYS, AND SIMILAR AREAS OTHER THAN VEHICLE EXHIBITION HALLS AND SHOWROOMS. PROVIDE GFCI RECEPTACLES AT LOCATIONS THAT ARE AND WILL REMAIN READILY ACCESSIBLE. ELSEWHERE PROVIDE GFCI PROTECTION AT THE RESPECTIVE SOURCE CIRCUIT BREAKER.
- F. SEPARATE DEVICE BOXES BY A MINIMUM OF 6 INCHES WHERE INSTALLED BACK-TO-BACK WITHIN DEMISING WALLS TO MAINTAIN REQUIRED FIRE AND SOUND RATING (TYPICAL OF ALL DEVICE BOXES INSTALLED ON DEMISING WALLS). ADDITIONALLY, PROVIDE LISTED FIRE-RATED WRAPS AROUND ALL RECESSED OUTLET, DEVICE AND EQUIPMENT BOXES IN FIRE/SMOKE RATED WALLS, CEILINGS AND FLOORS TO MEET OR EXCEED THE RESPECTIVE FIRE/SMOKE RATING OF THE SURFACE.
- G. SEAL ALL PENETRATIONS THROUGH FIRE-RATED AND/OR SMOKE-RATED MEMBRANES (FLOORS, WALLS, CEILINGS, ETC.) USING SEALANT PRODUCTS THAT MEET OR EXCEED THE RATING OF THE RESPECTIVE MEMBRANE.
- H. INSTALL SWITCHES AND/OR RECEPTACLES GANGED WHEREVER POSSIBLE FOR INSTANCES WHERE THEY ARE SHOWN TOGETHER. THIS INCLUDES LOCATIONS ABOVE COUNTERS AND WORK SURFACES WHERE APPLICABLE.
- I. INSTALL WALL-MOUNTED SWITCHES, CONTROLS, RECEPTACLES, OUTLETS, ETC. AT LEAST 6 INCHES FROM WALL CORNERS.
- J. REVIEW DOCUMENTS OF OTHER TRADES, INCLUDING ARCHITECTURAL, PRIOR TO SUBMITTING A BID. PROVIDE ELECTRICAL WORK FOR EQUIPMENT, DEVICES, ETC. OF OTHER TRADES AS REQUIRED TO RENDER THEM FULLY OPERATIONAL.
- K. COORDINATE ALL SIGNAGE REQUIREMENTS WITH OWNER (INCLUDING OWNER'S PROJECT MANAGER), SIGNAGE SUPPLIERS AND INSTALLERS, AND ARCHITECT TO DETERMINE SPECIFICS REGARDING LOCATIONS, POWER, CONTROL, AND OTHER PERTINENT INFORMATION. PROVIDE POWER (ON DEDICATED CIRCUIT(S)) FOR SIGNAGE REQUIRING POWER CONNECTIONS. PROVIDE PHOTOCELL AND TIME-BASED CONTROL, CONFIGURED AS DIRECTED BY OWNER. PROVIDE ALL ELECTRICAL WORK, INCLUDING DISCONNECTING MEANS, COMPLIANT WITH ARTICLE 600 OF NFPA 70. COMPLY WITH LANDLORD REQUIREMENTS WHERE APPLICABLE.
- L. RECEPTACLE OUTLETS IN WET LOCATIONS MUST BE PROVIDED BY WEATHERPROOF COVERS PER NEC 406.8.
- M. SWITCHES IN DAMP OR WET LOCATIONS MUST BE PROVIDED BY WEATHERPROOF COVERS PER NEC 404.4.
- N. NON-LOCKING RECEPTACLES IN DAMP AND WET LOCATIONS SHALL BE LISTED WEATHER-RESISTANT IN ADDITION TO PROVISION OF THE REQUIRED TYPE OF COVERS PER NEC 406.8(A)&(B).
- O. RECEPTACLE OUTLETS INSTALLED IN WET LOCATIONS REQUIRE "N-USE" TYPE COVERS. THE COVERS MUST BE LISTED AND IDENTIFIED AS "EXTRA-DUTY" PER NEC 406.8(B)(1).
- P. GFCI DEVICES MUST BE READILY ACCESSIBLE PER NEC 210.8.
- Q. ALL THE EQUIPMENT CUTSHEETS SHALL BE VERIFIED PRIOR TO BID AND PROVIDE POWER REQUIREMENTS ACCORDINGLY. BASE BID ACCORDINGLY.
- R. ELECTRICAL CONTRACTOR SHALL PROVIDE GFI RECEPTACLE NEAR THE ENTRY DOOR AND LOOP THE OTHER CONVENIENCE RECEPTACLES AS SHOWN SUCH THAT THESE CONVENIENCE RECEPTACLES GET THE GFI CAPABILITY.

ELECTRICAL POWER KEYED NOTES:

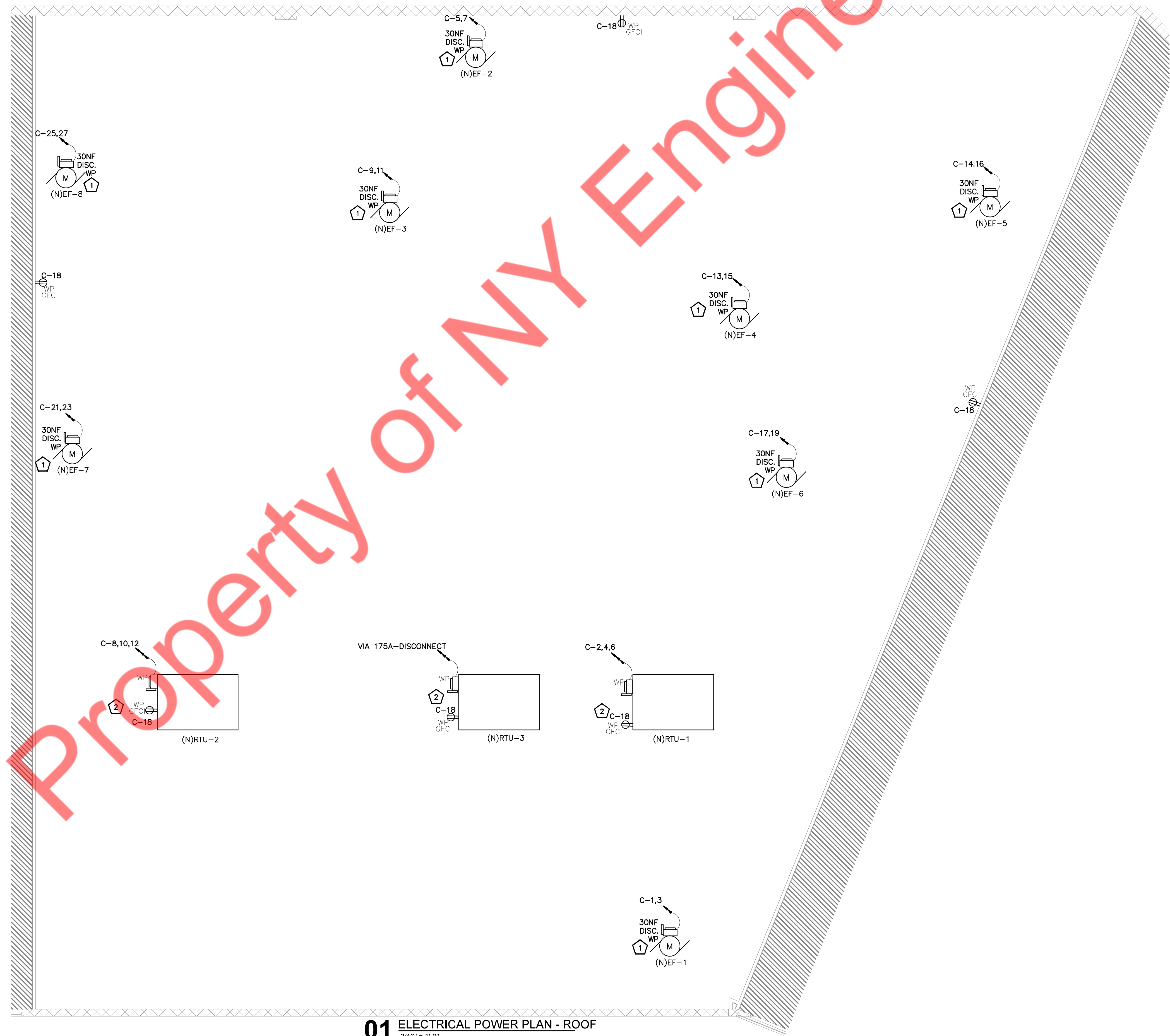
- 1 PROVIDE 120V RECEPTACLE AND TELEVISION OUTLET FOR WALL MOUNTED TELEVISION. COORDINATE LOCATION AND MOUNTING HEIGHT WITH OWNER/EQUIPMENT INSTALLER PRIOR TO ROUGH-IN.
- 2 NEW 225A, 120/208V, 3-PHASE ELECTRICAL PANEL "A", SEC-1". ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH ARCHITECT.
- 3 NEW 225A, 120/208V, 3-PHASE ELECTRICAL PANEL "A", SEC-2". ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH ARCHITECT.
- 4 NEW 225A, 120/208V, 3-PHASE ELECTRICAL PANEL "B". ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH ARCHITECT.
- 5 NEW 225A, 120/208V, 3-PHASE ELECTRICAL PANEL "C". ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH ARCHITECT.
- 6 E.C SHALL PROVIDE DEDICATED RECEPTACLE IN COORDINATION WITH THE EQUIPMENT MANUFACTURER. BASE BID ACCORDINGLY.
- 7 ELECTRICAL CONTRACTOR SHALL COORDINATE WITH OWNER/SOLA SALON REPRESENTATIVE FOR SWITCH REQUIREMENT, TO SWITCH DEDICATED RECEPTACLE ON/OFF AT THE ENTRY AS SHOWN. BASE BID ACCORDINGLY.
- 8 POWER PROVISION FOR HAND DRYER. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT POWER REQUIREMENTS IN COORDINATION WITH OWNER IN FIELD.
- 9 NEW 600 AMPS, 120/208V, 3-PHASE, 4 WIRE ELECTRICAL CT CABINET AND METER FOR THE PROJECT SPACE TO BE REPLACED WITH EXISTING 400AMP ELECTRICAL CT CABINET AND METER. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY/OWNER FOR THE EXACT LOCATION IN FIELD.
- 10 NEW 600 AMPS, 120/208V, 3-PHASE, 4 WIRE DISCONNECT SWITCH FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH UTILITY/OWNER FOR THE EXACT LOCATION IN FIELD.
- 11 NEW PANEL-M PROVISION FOR MANICURE & PEDICURE. ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH ARCHITECT.



01 ELECTRICAL POWER PLAN
3/16" = 1'-0"

02 ALTERNATE ELECTRICAL POWER PLAN
3/16" = 1'-0"

ELECTRICAL POWER PLAN GENERAL NOTES:	
1.	COORDINATE EXACT LOCATION OF EXHAUST FANS WITH MECHANICAL CONTRACTOR.
2.	REFER ELECTRICAL PANEL SCHEDULES AND RISER DIAGRAM FOR MORE DETAILS.
3.	ELECTRICAL CONTRACTOR SHALL PROVIDE WEATHER PROOF WITH GFI RECEPTACLE FOR MECHANICAL UNITS AS PER NEC 210.63.
4.	ELECTRICAL CONTRACTOR SHALL PROVIDE NECESSARY POWER CONNECTIONS TO INTERLOCK EXHAUST FANS WITH RTUS IN COORDINATION WITH THE MECHANICAL CONTRACTOR. BASE BID ACCORDINGLY.
ELECTRICAL POWER PLAN KEYED WORK NOTES:	
1	EXHAUST FANS FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR AND PROVIDE POWER, DISCONNECT/SWITCHING CONTROLS ALONG WITH NECESSARY WIRING AS REQUIRED FOR COMPLETE OPERATION OF EXHAUST FANS. BASE BID ACCORDINGLY.
2	ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR AND MECHANICAL DRAWINGS FOR THE EXACT LOCATION BEFORE COMMENCING ANY WORK. ELECTRICAL CONTRACTOR SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR RTU-UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN AND PROVIDE AS REQUIRED. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES. BASE BID ACCORDINGLY.



01 ELECTRICAL POWER PLAN - ROOF
3/16" = 1'-0"

PLUMBING LEGEND	
SYMBOL	DESCRIPTION
---	SANITARY WASTE
----	SANITARY SEWER (UNDERFLOOR)
----	EXISTING SANITARY SEWER (UNDERFLOOR)
----	VENT PIPING
----	COLD WATER
----	HOT WATER
----	RECIRCULATING HOT WATER
○	GAS PIPE LINE
●	CHECK VALVE / BALL VALVE
□	BALANCING VALVE
○	FLOOR DRAIN
○	PIPE UP OR DOWN
○	PIPE UP
○	GAS PLUG VALVE
○	SHUT-OFF VALVE
○	ANGLE VALVE
○	SLEEVE
○	CLEANOUT
○	HOT WATER RETICULATION PUMP
○	PRESSURE REDUCING VALVE
○	POINT OF NEW CONNECTION

PLUMBING ABBREVIATIONS

CO	CLEANOUT
COOP	CLEAN OUT DECK PLATE
CW	COLD WATER
HW	HOT WATER
HWR	HOT WATER RETURN
SAN	SANITARY
W	WASTE
LAV	LAVATORY
WC	WATER CLOSET
TYP.	TYPICAL
DN	DOWN
EXIST.	EXISTING
AFF	ABOVE FINISH FLOOR
FD	FLOOR DRAIN
LAV	LAVATORY
SO. FT.	SQUARE FEET
BFP	BACK FLOW PREVENTER
WD	WASHER DRYER
HWHT	HOT WATER HEATER
SV	SHUTOFF VALVE

PLUMBING DRAWING LIST

P001	PLUMBING NOTES, ABBREVIATIONS AND SPECIFICATIONS
P101	PLUMBING WATER SUPPLY PLAN
P102	PLUMBING SANITARY PLAN
P103	PLUMBING GAS PLAN
P104	PLUMBING ROOF PLAN
P501	PLUMBING DETAILS
P601	PLUMBING SCHEDULE
P602	PLUMBING RISER DIAGRAM (1 OF 2)
P603	PLUMBING RISER DIAGRAM (2 OF 2)

CODE COMPLIANCE

ALL WORK AND MATERIAL SHALL BE PERFORMED AND INSTALLED IN COMPLIANCE WITH THE FOLLOWING CODES AS ADOPTED AND AMENDED BY THE INSPECTING AUTHORITY. NOTHING IN THESE DRAWINGS IS TO BE CONSIDERED TO PERMIT WORK NOT CONFORMING TO THESE CODES OR OTHERS APPLICABLE TO THESE PROJECTS:

- VIRGINIA BUILDING CODE 2018 (INTERNATIONAL BUILDING CODE 2018).
- VIRGINIA MECHANICAL CODE 2018 (INTERNATIONAL MECHANICAL CODE 2018).
- VIRGINIA PLUMBING CODE 2018 (INTERNATIONAL PLUMBING CODE 2018).
- VIRGINIA FUEL GAS CODE 2018 (INTERNATIONAL FUEL GAS CODE 2018).
- VIRGINIA ENERGY CONSERVATION CODE 2018.

PLUMBING SPECIFICATIONS:

1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS

1.01 SCOPE

A. PROVIDE ALL MATERIAL, TOOLS, SUPERVISION AND LABOR INCLUDING ALL INCIDENTAL ITEMS AND REPAIRS FOR ALL PLUMBING AND OPERABLE PLUMBING INSTALLATIONS AS SHOWN OR DESCRIBED ON THE DRAWINGS AND IN THESE SPECIFICATIONS.

B. 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.

C. PLUMBER TO 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.

D. THE GENERAL CONDITIONS OF THE CONTRACT AND ALL DIVISION 1 REQUIREMENTS APPLY TO THE WORK OF THIS SECTION.

E. 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 THE 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.

F. IN ALL AREAS SUBJECT TO FREEZING CONDITIONS, THE CONTRACTOR SHALL PROVIDE PROTECTION FOR ALL DOMESTIC WATER PIPING INSTALLED UNDER HIS CONTRACT.

G. 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.

H. COLOR AND FINISH SELECTIONS FOR ALL MATERIALS, INCLUDING PAINTING OF PIPING, SHALL BE AS DIRECTED AND/OR APPROVED BY THE ARCHITECT.

I. 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.

J. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REVISIONS TO THE INSTALLATION, CONNECTION, EXTENSION OR MODIFICATION TO ALL UTILITY SERVICES WITH RESPECTIVE PROVIDERS INCLUDING PAYMENT OF ALL ASSOCIATED FEES.

K. PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL PAINTING ASSOCIATED WITH CUTTING AND PATCHING. ALL NEW AND EXISTING SPACE AFFECTED BY PLUMBING WORK PAINTING IN AREAS WITH COMPLETE FINISH RENOVATIONS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.

1.02 SUBMITTALS

A. SUBMITTAL REQUIREMENTS SHALL BE COORDINATED WITH THE ARCHITECT AND AUTHORITIES HAVING JURISDICTION, UNLESS OTHERWISE DIRECTED. PLUMBING CONTRACTOR SHALL PROVIDE SUBMITTALS AS LISTED BELOW.

- PIPE AND FITTINGS
- VALVES
- HANGERS AND SUPPORTS
- PLUMBING PIPING LAYOUT
- TESTS
- PLUMBING FIXTURES
- WATER HEATERS & ACCESSORIES
- FLOOR DRAINS
- MIXING VALVES
- ALL SCHEDULED PLUMBING EQUIPMENT

B. SUBMITTALS FROM SUPPLIERS OR MANUFACTURERS WHICH DO NOT BEAR THE STAMP OF THE SUBMITTING CONTRACTOR INDICATING THAT THE PLUMBING CONTRACTOR HAS REVIEWED THE SUBMITTAL FOR CONFORMANCE WITH THE PROJECT REQUIREMENTS WILL BE RETURNED REJECTED.

C. 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.

D. PLUMBING CONTRACTOR TO SUBMIT ALL REQUIRED SATISFACTORY TEST RESULTS TO OWNER AND ARCHITECT IN ORDER TO GET OCCUPANCY CERTIFICATE.

E. GENERAL CONTRACTOR TO 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.

F. 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.

G. 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

A. ALL EQUIPMENT SHALL BE PRODUCTS OF THE SPECIFIED MANUFACTURER OR MANUFACTURERS. ALL BIDS SHALL BE BASED ON THE SPECIFIED MANUFACTURER OR MANUFACTURER'S 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.

B. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR COORDINATING THE WORK OF OTHER TRADES WHICH MAY BE AFFECTED BY SUBSTITUTIONS, INCLUDING ALL RELATED COSTS.

1.04 DEFINITIONS

A. FURNISH: TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE B. INSTALL: TO SET IN PLACE AND CONNECT, COMPLETE WITH RELATED ACCESSORIES.

C. PROVIDE: TO FURNISH AND INSTALL.

D. PLUMBING CONTRACTOR, PLUMBER: THE CONTRACTOR FOR PLUMBING WORK WHICH IS SPECIFIED HEREIN AND SHOWN ON THESE DRAWINGS.

E. REFER TO THE VIRGINIA PLUMBING CODE, 2018 EDITION (ADOPTS THE INTERNATIONAL PLUMBING CODE 2018) FOR ADDITIONAL DEFINITIONS.

1.04 DRAWINGS

A. 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.

B. PROVIDE ALL NECESSARY INCIDENTAL MATERIALS AND ACCESSORIES REQUIRED TO MAKE THE WORK COMPLETE IN ALL RESPECTS, EVEN IF NOT PARTICULARLY SHOWN OR SPECIFIED.

C. REFER TO PLUMBING EQUIPMENT/FIXTURE SCHEDULE ON THE DRAWINGS FOR ALL FIXTURE AND EQUIPMENT SPECIFICATIONS.

D. REFER TO FIXTURE CONNECTION SIZE SCHEDULE FOR ALL FIXTURE ROUGHING SIZE REQUIREMENTS.

E. 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.

F. LOCATE ALL FIXTURES AND EQUIPMENT AS PER THE FINAL ARCHITECTURAL DRAWINGS.

1.05 PRODUCTS

A. SANITARY AND VENT PIPING:

1. ABOVE GRADE/ UNDERGROUND PIPING SHALL BE CAST IRON MATERIAL AS PER SECTION 702 OF VFC 2018.

2. 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.

3. COMBUSTIBLE PLASTIC PIPING SHALL NOT BE INSTALLED IN CEILING PLENUM SPACES.

4. 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.

B. DOMESTIC WATER PIPING:

1. ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD-DRAWN COPPER TUBE, PEX TYPE A, CPVC AS PER TABLE 605.3, 2018 VIRGINIA PLUMBING CODE.

2. FITTINGS IN DOMESTIC WATER PIPING SHALL BE AS PER TABLE 605.5, 2018 VIRGINIA PLUMBING CODE.

3. JOINTS SHALL BE MADE AS PER 2018 VFC SECTION 605.23.

4. THE NEW DOMESTIC WATER DISTRIBUTION SYSTEM WHICH IS UNDER SCOPE SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.

5. COMPLY WITH NSF 61 FOR MATERIALS FOR WATER-SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.

6. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C403.11.3, PIPING FROM A WATER HEATER TO THE TERMINATION OF HEATED WATER FIXTURE SUPPLY PIPE SHALL BE INSULATED IN ACCORDANCE WITH TABLE OF MINIMUM PIPE INSULATION THICKNESS.

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	MINIMUM PIPE INSULATION THICKNESS		NOMINAL PIPE OR TUBE SIZE (INCHES)			
	CONDUCTIVITY BTU IN./ (H.FT².F)	MEAN RATING TEMPERATURE °F	<1	1 to 1½	1½ to 4	>4
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	1.0	1.0, 1.0

7. WATER DISTRIBUTION SYSTEM AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C403.11.3, PIPING FROM ONE OR MORE RECIRCULATING 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.
- AS PER ASHRAE 90.1 2007 EDITION, 7.4.4.3 TEMPERATURE CONTROL MEANS SHALL BE PROVIDED TO LIMIT THE MAXIMUM TEMPERATURE OF WATER DELIVERED FROM LAVATORY FAUCET IN PUBLIC RESTROOM AND SHAMPOO AND HAND SINK TO 110°F.

8. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C404.6.1 HEATED-WATER CIRCULATION SYSTEMS SHALL BE PROVIDED WITH A CIRCUITING 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.

C. MIXING VALVES

1. VALVE BODY SHALL BE MADE OF CAST BRASS. THE INTERNAL COMPONENTS SHALL BE MADE OF BRASS OR STAINLESS STEEL.

2. TYPES A, C & D VALVES: VALVE SHUTS OFF IN FULL COLD POSITION AND MUST PASS THROUGH COLD RANGE BEFORE DELIVERING WARM AND/OR HOT WATER. MAXIMUM TEMPERATURE LIMIT SHALL BE SET FIXTURE TYPE. IF ONE SUPPLY SHOULD FAIL, THE OTHER WILL AUTOMATICALLY AND INSTANTLY SHUT DOWN. DELIVERY CAPACITY IS 50GPM @ 45 PSIG DIFFERENTIAL.

3. TYPES OF VALVES: TYPE A- THERMOSTATICALLY OPERATED BY MEANS OF B-METALLIC STRIP, OR EXPANSION BELLOW; TYPE B- SINGLE HANDLE MECHANICAL MIXER, OR INDIVIDUAL HOT AND COLD CONTROL VALVES; TYPE C- PRESSURE BALANCING SHOWER VALVE/PISTON OPERATED MIXING VALVE; TYPE D- BALANCED PRESSURE OPERATION WITH INTEGRAL DIAL THERMOMETER INDICATING DELIVERED WATER TEMPERATURE.

D. HOT WATER RE-CIRCULATING PUMP

1. IN-LINE PUMP: SINGLE STAGE VOLUTE TYPE PUMP SHALL BE MADE OF CAST IRON OR FORGED LEAD-FREE BRONZE IMPELLER.

2. THE PUMP SHALL HAVE A GROUND AND POLISHED STEEL SHAFT WITH A HARDENED INTEGRAL THRUST COLLAR. THE SHAFT SHALL BE SUPPORTED BY TWO HORIZONTAL SLEEVE BEARINGS DESIGNED TO CIRCULATE OIL. THE PUMPS ARE TO BE EQUIPPED WITH A MECHANICAL SEAL WITH CARBON SEAL FACE ROTATING AGAINST CERAMIC SEAT. THE MOTOR SHALL BE NON-OVERLOADING AT ANY POINT ON PUMP CURVE.

3. DIRECT CONNECT PUMP TO ELECTRIC MOTOR WITH FLEXIBLE COUPLING. THE MOTOR SHALL BE OF THE DRIP-PROOF, SLEEVE- BEARING, QUIET OPERATING, RUBBER-MOUNTED CONSTRUCTION. EQUIPMENT MOTOR WITH BUILT-IN THERMAL OVERLOAD PROTECTION.

4. INSTALL IN-LINE CIRCULATING PUMPS BETWEEN PIPE FLANGES IN PIPING SYSTEMS. INSTALL OVERHEAD PIPE SUPPORTS, BOTH SIDES OF IN-LINE PUMPS, INSTALLED IN HORIZONTAL PIPING RUNS.

5. PROVIDE DRAIN VALVE ON HOT WATER RETURN LINE AFTER RE-CIRCULATION PUMP TO BLEED AIR.

E. GAS PIPING:

1. ALL GAS PIPING WORK SHALL COMPLY WITH VIRGINIA FUEL GAS CODE 2018 AND LOCAL UTILITY GAS REQUIREMENTS.

2. FURNISH AND INSTALL ALL NECESSARY GAS PIPING TO ALL EQUIPMENT REQUIRING GAS SUPPLY INCLUDING RECONNECTION TO EXISTING ACTIVE GAS BURNING EQUIPMENT

3. PROVIDE A LUBRICATED GAS VALVE AT ALL CONNECTIONS TO EQUIPMENT.

4. ALL GAS PIPING AND INSTALLATION SHALL BE IN ACCORDANCE WITH RULES AND REGULATIONS OF LOCAL UTILITY GAS COMPANY AND OTHER AUTHORITIES HAVING JURISDICTION.

5. PROVIDE ADEQUATE SUPPORT FOR ALL PIPING.

6. GAS PIPING SHALL BE STEEL SCHEDULE 40 THREADED PIPE CONFORMING TO ANSI B36.10, 10M, OR ASTM A 106.

7. FITTINGS SHALL BE MALLEABLE IRON.

8. VALVES SHALL BE NORDSTROM IRON PLUG VALVES FIG. 142.

9. PIPING UNDERGROUND BENEATH BUILDING SHALL COMPLY WITH VIRGINIA FUEL GAS CODE 2018 EDITION.

F. HANGERS AND SUPPORTS:

1. 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.

2. SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.

3. ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS..

4. SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPING MANUFACTURER.

G. VALVES:

1. 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.

2. ALL FIXTURES WITH THE EXCEPTION OF FLUSHOMETER-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.

3. ALL PLUMBING FIXTURES AND EQUIPMENT TO HAVE SHUT-OFF VALVES ON SUPPLY LINES.

4. ALL BRANCH LINES TO HAVE SHUT-OFF VALVES.

5. ALL VALVES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS WHERE REQUIRED FOR VALVE ACCESS.

6. PROVIDE GLOBE VALVES FOR THROTTLING/BALANCING OF THE HOT WATER CIRCULATING SYSTEM.

H. SLEEVES AND ESCUTCHEONS:

1. 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 THERMOFIBER SAFING INSULATION SHALL BE INSTALLED BETWEEN PIPE AND SLEEVE.

2. PIPE ESCUTCHEON PLATES SHALL BE INSTALLED WHERE EXPOSED PIPING PASSES THROUGH WALLS, CEILING, AND FLOORS AND SHALL BE MINIMUM 20 GAGE STEEL. PROVIDE CHROME PLATED ESCUTCHEON PLATES IN FINISHED AREAS.

I. DOMESTIC WATER HEATER (GAS FIRED)

1. TANKLESS GAS FIRED WATER HEATER WITH TOTAL APPLICATION FLOW OF 35.2 GPM CAPACITY AND NO. OF UNITS WILL BE 6 NO.

2. BURNER SHALL BE ALUMINIZED STEEL OR CAST IRON, ADJUSTABLE, OR SELF-ADJUSTING AIR-GAS MIXTURE CONTROL.

3. INSTALL THE WORK OF THIS SECTION IN ACCORDANCE WITH NFPA 4, NFPA 211, AND THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, UNLESS OTHERWISE SPECIFIED.

4. THE OUTER JACKET SHALL BE STEEL WITH BAKED ENAMEL/ACRYLIC FINISH AND SHALL BE PROVIDED WITH ACCESS DOOR FOR SERVICING CONTROLS AND BURNER

5. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING

J. DRAINAGE ACCESSORIES

1. GENERAL:

a. INSTALL THE WORK OF THIS SECTION IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, UNLESS OTHERWISE SPECIFIED.

b. SECURE EXTERNAL COMPONENTS IN PLACE WITH VANDAL RESISTANT FASTENERS THROUGH WALLS WHICH CANNOT BE REMOVED WITHOUT SPECIAL TOOLS.

2. DEVICES:

a. CLEANOUT & CLEANOUT PLUG

• THREADED PIPE FITTING OR CAST IRON FERRULE WITH GAS TIGHT CLEANOUT PLUG

• PLUG SHOULD BE CAST BRASS OR BRONZE, WITH THREADED END, AND RAISED OR COUNTERSUNK HEAD.

• LUBRICATE THREADS OF CLEANOUT PLUG WITH ANTI-SEIZE LUBRICANT BEFORE FINAL INSTALLATION.

b. CLEANOUT WALL PLATE

• IT SHOULD BE ROUND, STAINLESS STEEL OR POLISHED CHROME PLATED BRONZE COVER PLATE WITH STAINLESS STEEL VANDAL RESISTANT FASTENER TO SECURE TO CLEANOUT PLUG.

c. CLEANOUT DECK PLATE

• IT SHOULD BE STANDARD DUTY FLOOR CLEANOUT FITTING WITH COATED CAST IRON BODY, ROUND, POLISHED NICKEL BRONZE SCORATED TOP SECURED TO CLEANOUT PLUG WITH STAINLESS STEEL VANDAL RESISTANT FASTENER. THREADED HEIGHT ADJUSTMENT, CAST IRON HEAD, GAS TIGHT CLEANOUT PLUG, AND CONNECTION TO MATCH PIPING OPTION SELECTED.

d. FRESH AIR INTAKE

• PIPE MATERIAL SHOULD BE SAME AS DRAINAGE SYSTEM AT POINT OF CONNECTION

• GRILLE FREE AREA SHOULD BE AT LEAST EQUAL TO CROSS-SECTION AREA OF PIPE TO WHICH CONNECTION MADE AND MADE OF POLISHED NICKEL BRONZE, WITH REMOVABLE GRATE, EITHER PERFORATED OR BAR TYPE. GRATE ATTACHED TO GRILLE BODY WITH VANDAL RESISTANT FASTENER.

K. INSTALL PIPING TO CONSERVE BUILDING SPACE. DO NOT INTERFERE WITH USE OF BUILDING SPACE AND THE WORK OF OTHER TRADES. ALL PIPING IN CEILING SHALL BE INSTALLED TIGHT TO THE STRUCTURE ABOVE.

L. VERIFY EXACT LOCATIONS OF ALL EXISTING UTILITIES.

M. 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 50'-0" IN LENGTH.

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

O. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL. REMOVE PROTECTIVE COATINGS PRIOR TO INSTALLATION.

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

Q. VENT PENETRATIONS THROUGH THE ROOF SHALL BE FLASHED.

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

S. PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.

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

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

V. PLUMBING CONTRACTOR TO CONFIRM WITH ARCHITECT AND OWNER ALL FIXTURES REQUIRING VACUUM BREAKERS SHALL BE EQUIPPED WITH INTEGRAL VACUUM BREAKERS PROVIDED WITH FFE.

W. ANY PENETRATIONS THROUGH FIRE RATED PARTITIONS, FLOORS OR CEILING SHALL BE STEEL SLEEVED AND SEALED WITH 3M BRAND UL RATED FIRE RATED CAULK OR APPROVED EQUAL.

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

Y. AT ALL INDIRECT WASTE DRAINS, MAINTAIN AIR GAP AS REQUIRED BY CODE.

Z. INSTALL SLEEVES FOR ALL PIPES WHICH PASS THROUGH WALLS, FLOORS AND CEILING. WHERE PIPES ARE TO BE INSULATED THE SLEEVES 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.

AA. PROVIDE WATER HAMMER ARRESTERS ON SUPPLY PIPING TO ALL FLUSHOMETER VALVES AND QUICK-CLOSING VALVES.

AB. UNLESS OTHERWISE INDICATED, TRAPS SEALS AT ALL FLOOR DRAINING DEVICES.

AC. MAINTAIN ALL REQUIRED AND RECOMMENDED CLEARANCES FOR ALL PLUMBING SYSTEM COMPONENTS AND EQUIPMENT.

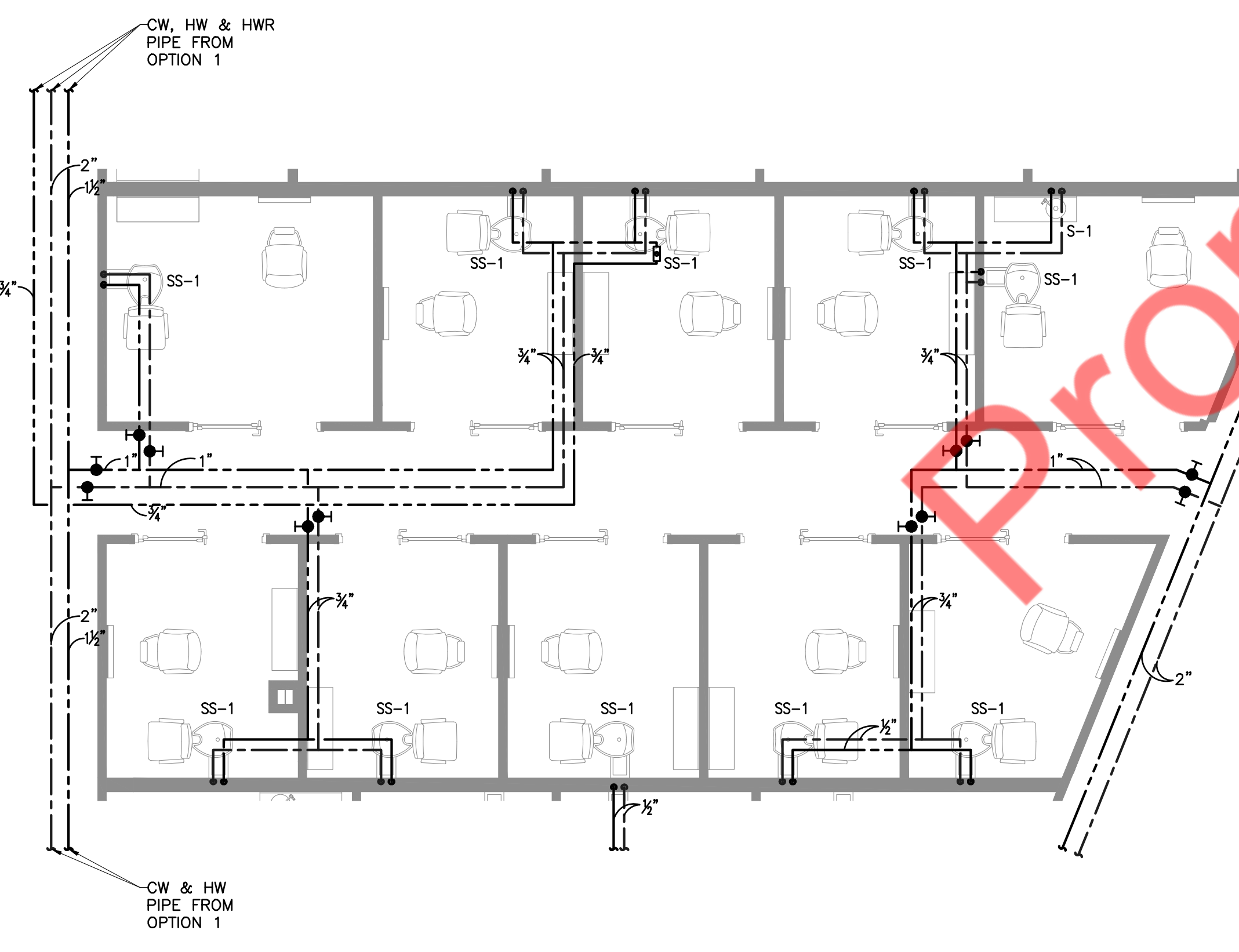
AD. MAINTAIN MINIMUM 10'-0" CLEARANCE BETWEEN ALL PLUMBING V.T.R.S AND ALL OUTDOOR AIR INTAKES. OFFSET AND STACKS SHALL

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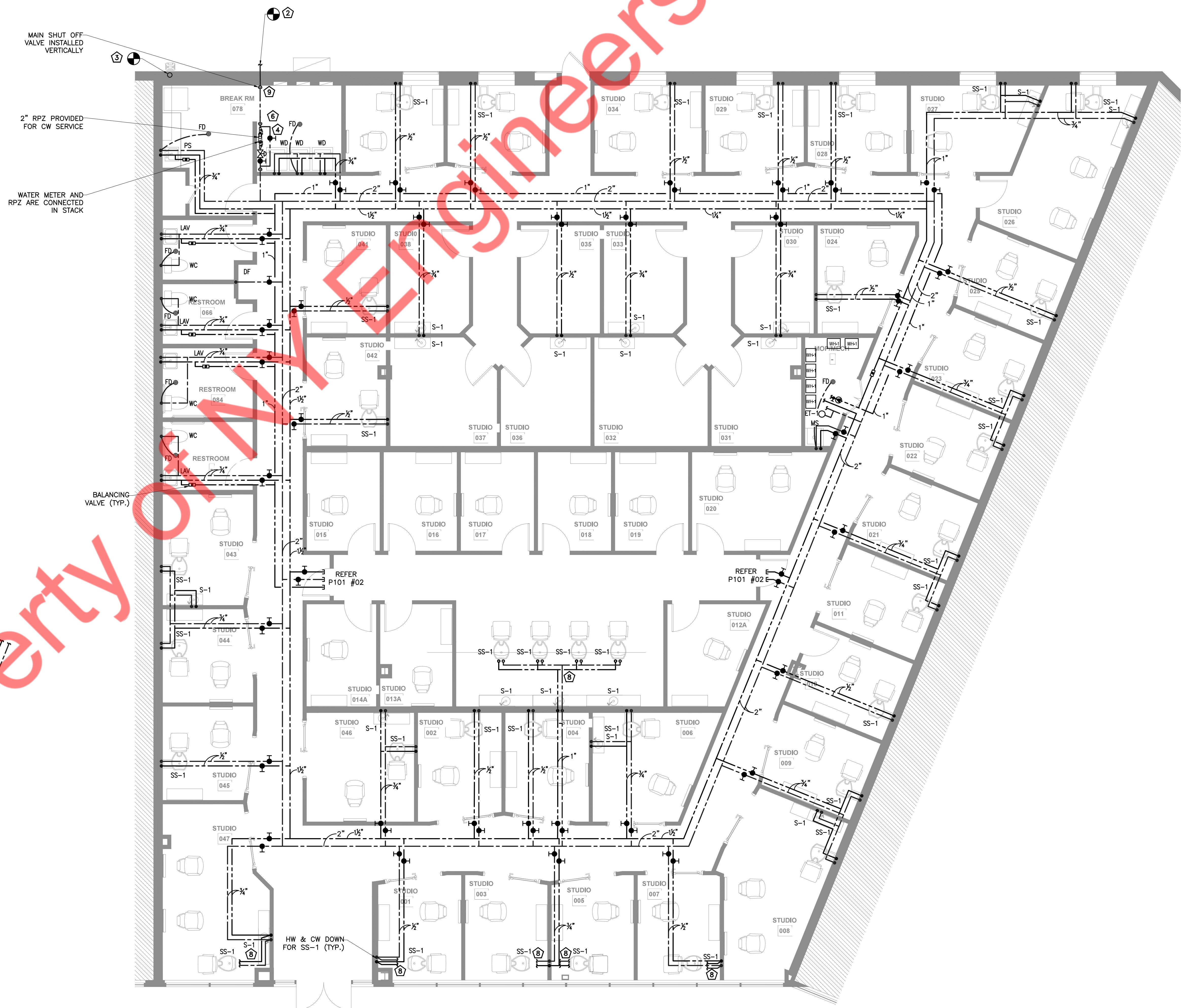
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- E. THE PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL ALL THE EQUIPMENT INDICATED WITHIN THESE DRAWINGS UNLESS OTHERWISE NOTED. VERIFY LOCATION AND DIMENSIONS IN THE FIELD PRIOR TO FABRICATION AND / OR INSTALLATION.
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02 PLUMBING WATER SUPPLY ALTERNATE PLAN
3/16" = 1'-0"



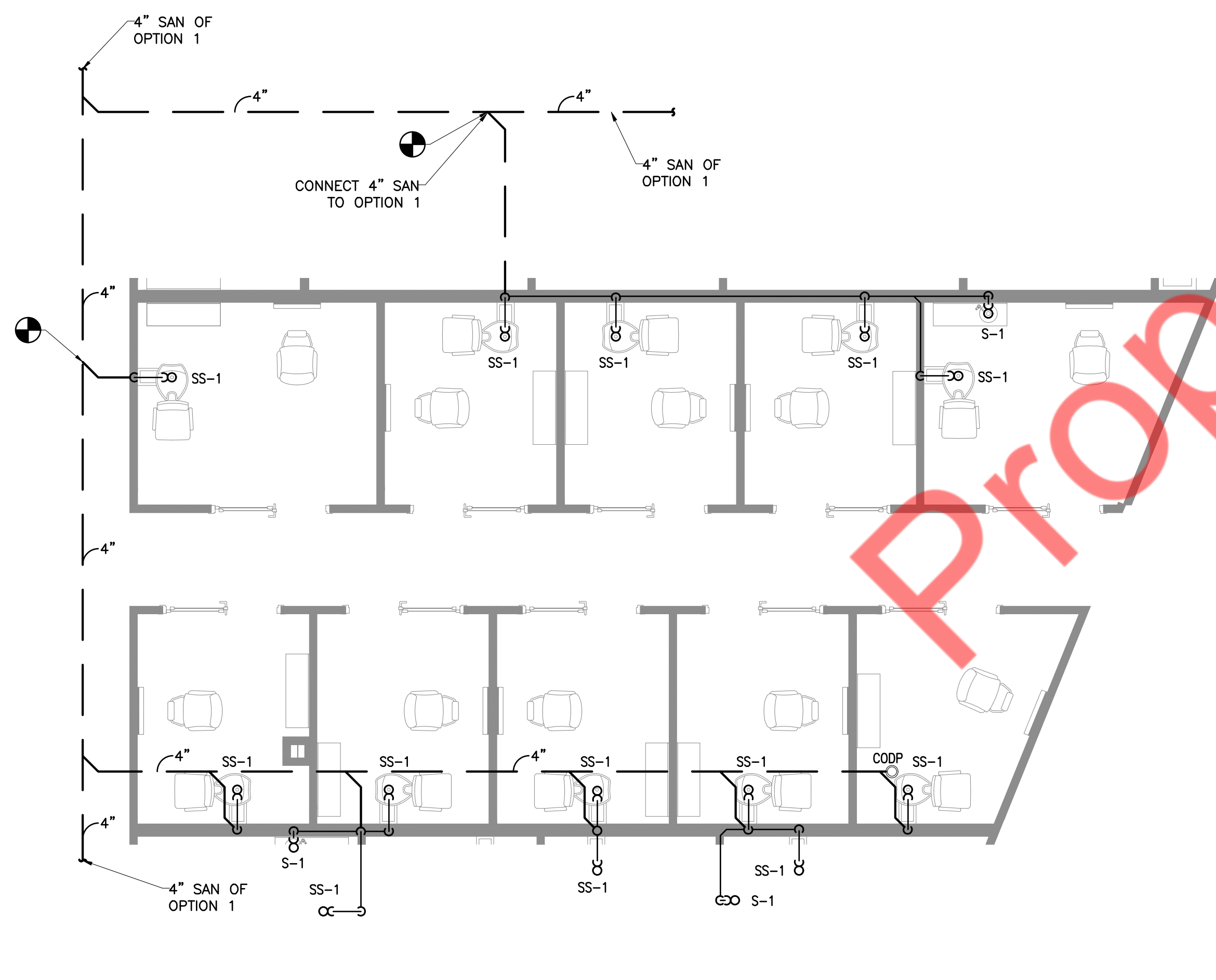
01 PLUMBING WATER SUPPLY PLAN
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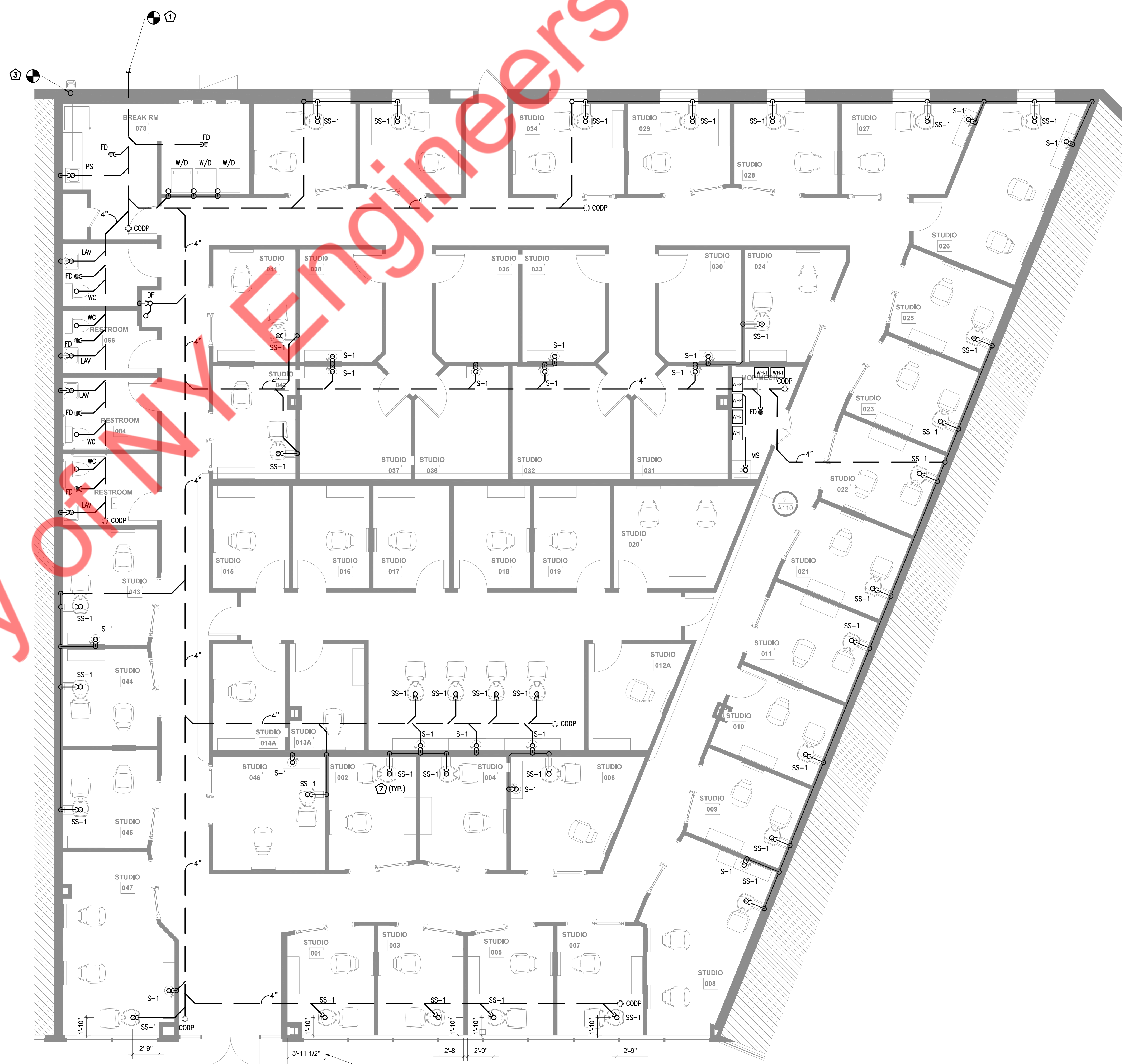
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02 PLUMBING SANITARY ALTERNATE PLAN
3/16" = 1'-0"



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- 9. PROVIDE INSULATION FOR WATER PIPING NEAR EXTERIOR WALL TO AVOID FREEZING.

NATURAL GAS PIPING SYSTEM

PROVIDE A COMPLETE GAS PIPING SYSTEM TO SERVE GAS EQUIPMENT FURNISHED BY OTHERS, AS NOTED ON THE DRAWINGS. PROVIDE EITHER THREADED STEEL OR MALLEABLE IRON PIPE WITH MALLEABLE FITTINGS OR WELDED STEEL. PROVIDE ALL UNIONS, SHUT-OFF VALVES AND DIRT LEGS REQUIRED BY VFCC 2018 AND GOVERNING LOCAL CODES AND AT EACH GAS APPLIANCE CONNECTION. PROVIDE ALL TESTS, METERS, INSPECTIONS, HANGERS AND EQUIPMENT CONNECTIONS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.

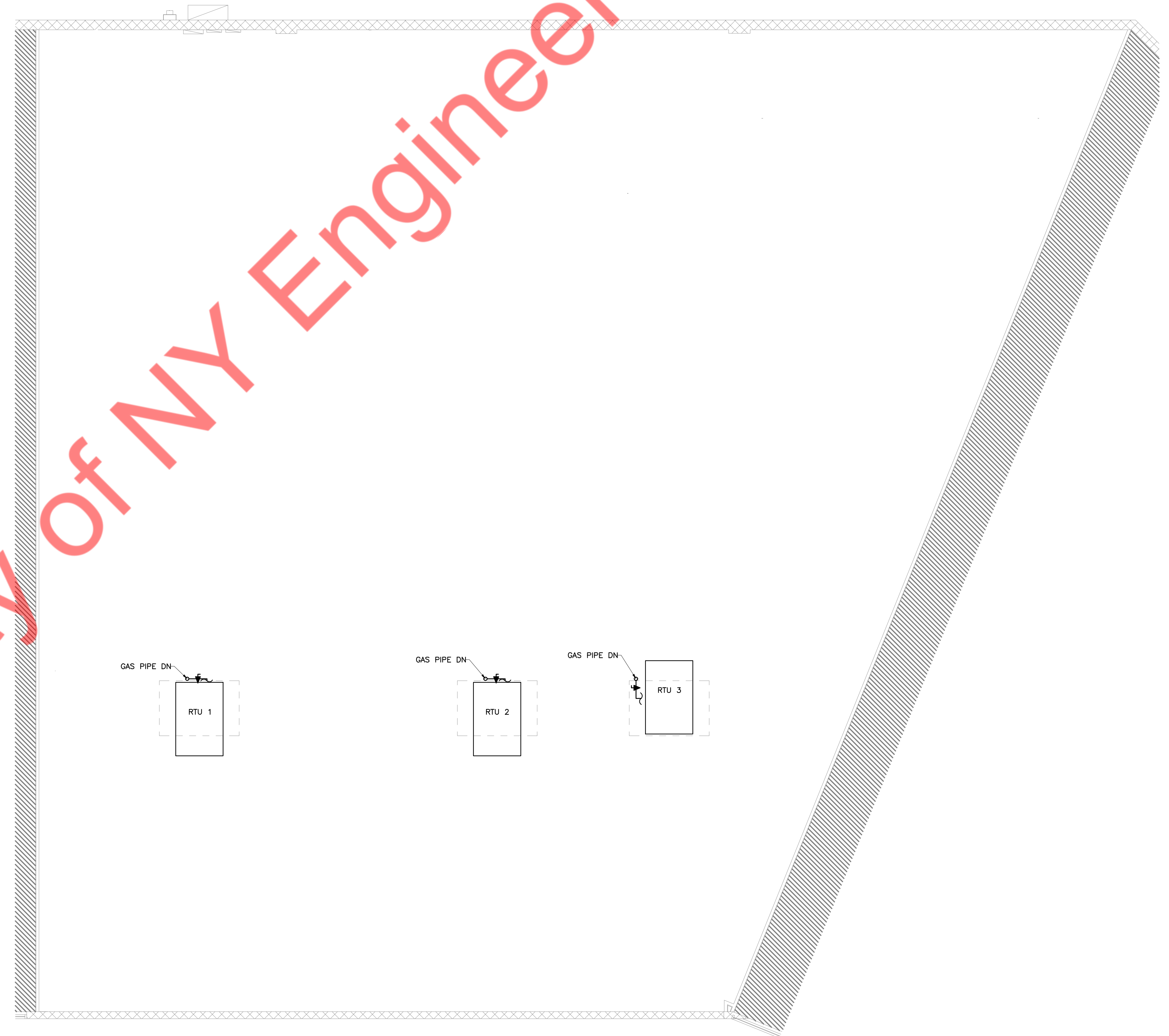
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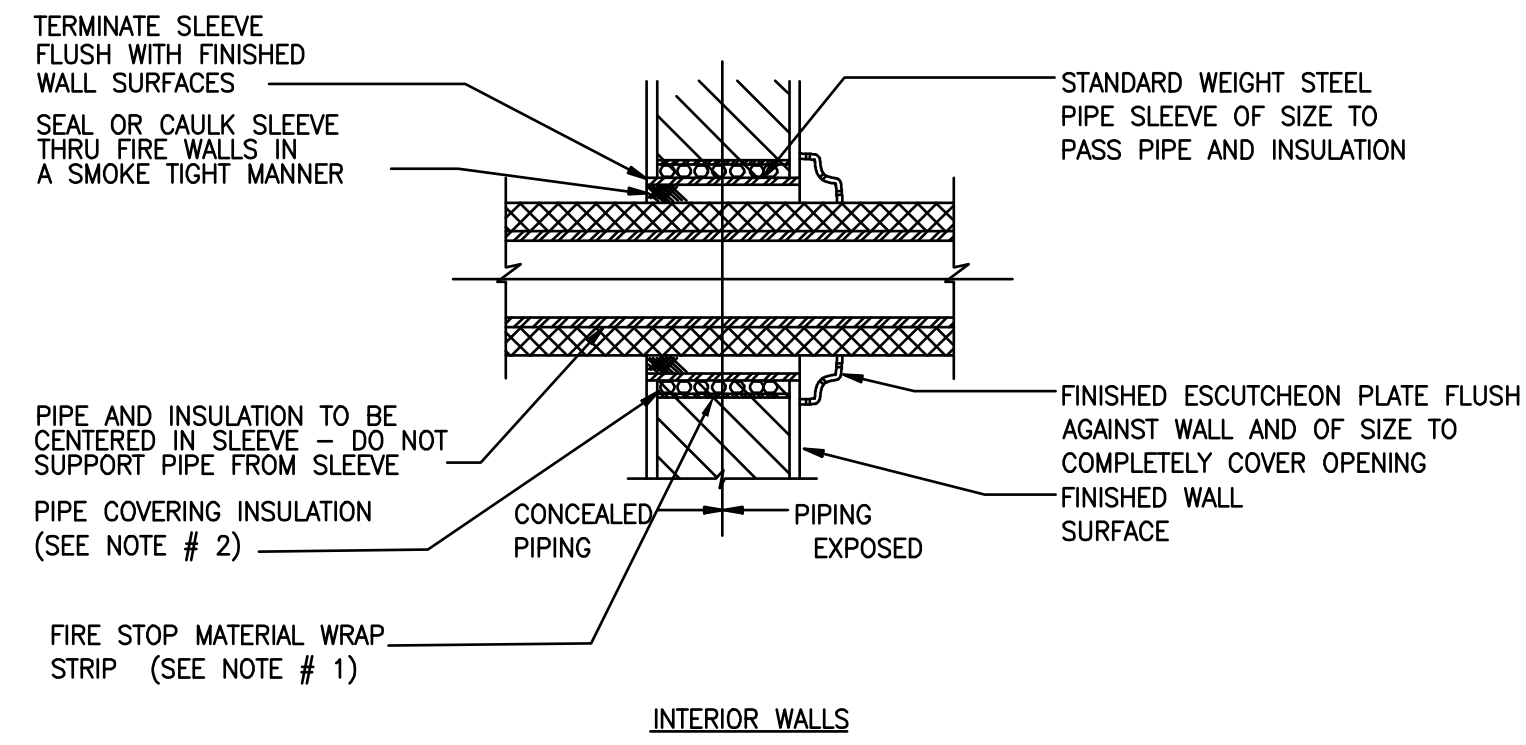
- 1. GAS PIPING TO BE SCHEDULE 40 STEEL PIPE W/125 CAST IRON SCREWD FITTINGS.
- 2. GAS SYSTEM TO BE INSTALLED BY QUALIFIED LICENSED CONTRACTOR.
- 3. VERIFY ALL EQUIPMENT BTUS'S PRIOR TO INSTALLATION. ADJUST PIPE SIZE ACCORDING TO VIRGINIA FUEL GAS CODE 2018, TABLE 402.4(4).
- 4. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING GAS METER LOCATION, PRESSURE AND CAPACITY. UPGRADE IF REQUIRED.
- 5. CONTRACTOR SHALL VERIFY ACTUAL GAS PRESSURE AND LONGEST LENGTH OF RUN FROM METER TO FARTHEST APPLIANCE PRIOR TO INSTALLATION AND NOTIFY ENGINEER IF CONDITIONS DIFFER FROM THOSE SHOWN ON THE PLAN.



GENERAL NOTES:

- A. ALL WORK SHALL COMPLY WITH ALL LOCAL AND STATE CODES AND AUTHORITIES HAVING JURISDICTION.
- B. THE PLUMBING CONTRACTOR SHALL SECURE AND PAY FOR ALL REQUIRED PERMITS AND ARRANGE ALL REQUIRED INSPECTIONS.
- C. THE PLUMBING CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS AND TRADES.
- D. THESE DRAWINGS, AS PREPARED, ARE DIAGRAMMATIC BUT SHALL BE FOLLOWED AS CLOSELY AS CONSTRUCTION OF THE PROJECT AND THE WORK OF THE TRADES WILL PERMIT. EQUIPMENT LOCATIONS INDICATED ARE APPROXIMATE. COORDINATE EXACT LOCATIONS AND REQUIRED CLEARANCES WITH EQUIPMENT SUPPLIER AND ALL TRADES PRIOR TO INSTALLATION.
- E. THE PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL ALL THE EQUIPMENT INDICATED WITHIN THESE DRAWINGS UNLESS OTHERWISE NOTED. VERIFY LOCATION AND DIMENSIONS IN THE FIELD PRIOR TO FABRICATION AND / OR INSTALLATION.
- F. THE ENTIRE INSTALLATION SHALL BE GUARANTEED FREE OF DEFECTS AND CONTRACTOR SHALL REPAIR AND / OR REPLACE ANY DEFECTIVE MATERIALS OR EQUIPMENT AT NO COST TO THE OWNER FOR A MINIMUM PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE BY ARCHITECT OR ENGINEER.
- G. ALL WORK SHALL BE SUBJECT TO THE ACCEPTANCE AND APPROVAL OF THE ARCHITECT AND OWNER. THE ARCHITECT SHALL BE NOTIFIED OF ANY AND ALL DISCREPANCIES BETWEEN FIELD CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. FAILURE OF PROPER NOTIFICATION DOES NOT RELIEVE THE CONTRACTOR. THE CONTRACTOR SHALL CORRECT ANY AND ALL WORK ARISING FROM SUCH FAILURE TO COORDINATE DISCREPANCIES TO THE SATISFACTION OF THE ARCHITECT WITHOUT ADDITIONAL COST TO THE OWNER.
- H. ALL PIPING TO BE CONCEALED IN HUNG CEILINGS, CHASES AND FURRED SPACES.
- I. REFER TO EQUIPMENT SCHEDULE AND EQUIPMENT SPECIFICATIONS FOR EXACT LOCATIONS OF PLUMBING CONNECTIONS.
- J. THE PLUMBING CONTRACTOR SHALL VERIFY DEPTH, SIZE, LOCATION OF ALL EXISTING UTILITIES IN FIELD PRIOR TO STARTING WORK.
- K. THE PLUMBING CONTRACTOR SHALL PROVIDE AND INSTALL ALL PIPE HANGERS, AND SUPPORTS IN ACCORDANCE WITH THE LOCAL APPLICABLE CODES.
- L. THE PLUMBING CONTRACTOR TO PROVIDE TRAP PRIMERS, DEEP SEAL TRAP OR TRAP SEAL ON ALL FLOOR DRAINS AS PER VIRGINIA PLUMBING CODE 2018. CONFIRM TRAP PRIMER DEVICE LOCATION WITH CLIENT.
- M. ALL PENETRATIONS REQUIRED FOR PLUMBING EQUIPMENT AND PIPING THROUGH ANY WALL SHALL BE PROPERLY SEALED OFF TO MAINTAIN THE INTEGRITY OF THE STRUCTURE.
- N. ALL SHUT OFF AND ISOLATION VALVES SHALL BE BALL TYPE. ALL BALL VALVES SHALL BE INSTALLED VERTICALLY.
- O. PROVIDE AN INDIVIDUAL BALL VALVE AND BACK CHECK VALVE TO EACH INDIVIDUAL PIECE OF EQUIPMENT.
- P. PROVIDE AERATORS ON ALL SINKS AND LAVATORIES THROUGHOUT THE FACILITY.
- Q. COORDINATE WITH ARCHITECTURE FOR FINAL EQUIPMENT CUTSHEET AND PROVIDE ALL REQUIRED PLUMBING SERVICES AS PER MANUFACTURE REQUIREMENT.
- R. EACH BIDDER SHALL VISIT THE SITE AND BECOME INFORMED AS TO THE CONDITION OF THE PREMISES AND THE EXTENT AND CHARACTER OF WORK REQUIRED. NO ADDITIONAL COMPENSATION WILL BE APPROVED DUE TO THE FIELD CONDITIONS.
- S. PROVIDE PLUMBING SERVICE PROVISION FOR FUTURE RECLURE AND MANICURE EQUIPMENTS AS REQUIRED. COORDINATE WITH THE ARCHITECT/OWNER FOR EXACT REQUIREMENTS AND SCOPE. BASE BID ACCORDINGLY



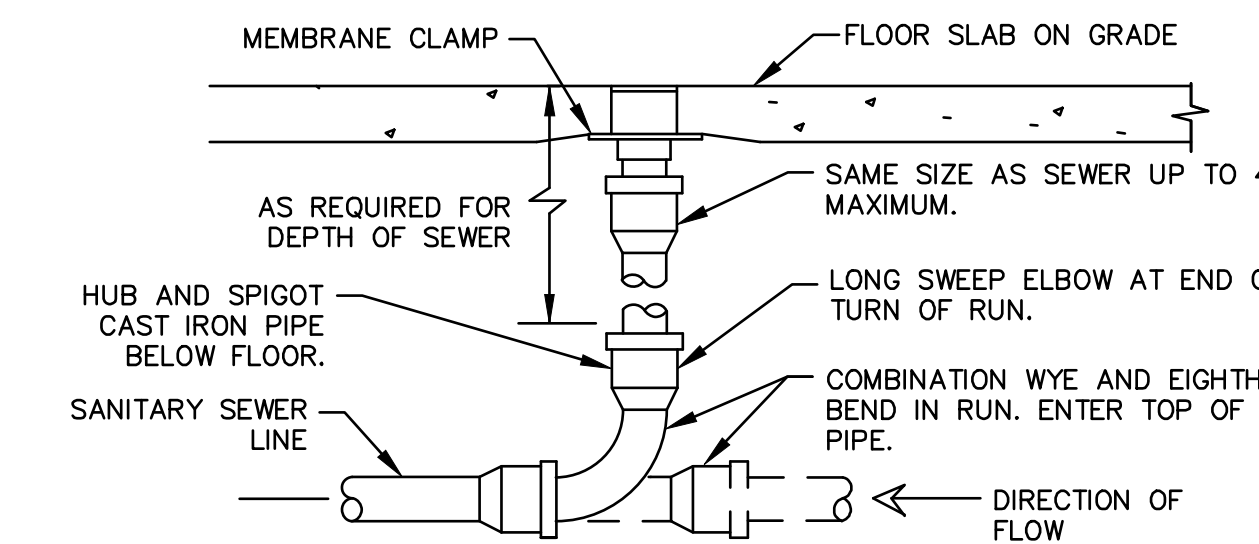


1 PIPE SLEEVE THRU WALL SECTION
P-501 N.T.S.

PIPE SLEEVE VIEW
NOT TO SCALE

NOTES:

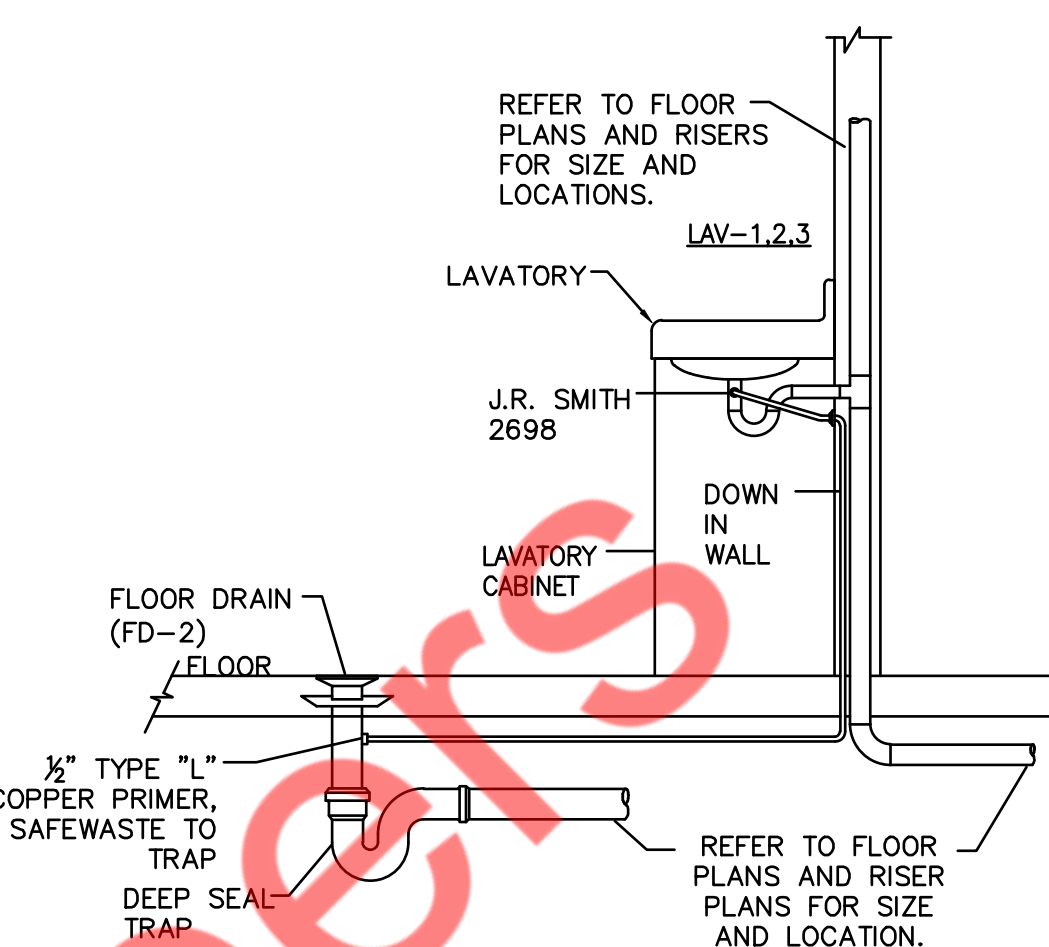
- FIRE STOP MATERIAL WRAP STRIP SHALL BE 1/4" THICK INTUMESCENT ELASTOMERIC MATERIAL FACED ON ONE SIDE WITH ALUMINUM FOIL SUPPLIED IN 2 IN. WIDE STRIPS AND WRAP AROUND THE PIPE AS PER UL MATERIAL LISTED 3M COMPANY FS-195+ OR FILL CAVITY WITH CAULK OR SEALANT MIN. 1/4" DIA. CONTINUOUS BEAD APPLIED TO 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.



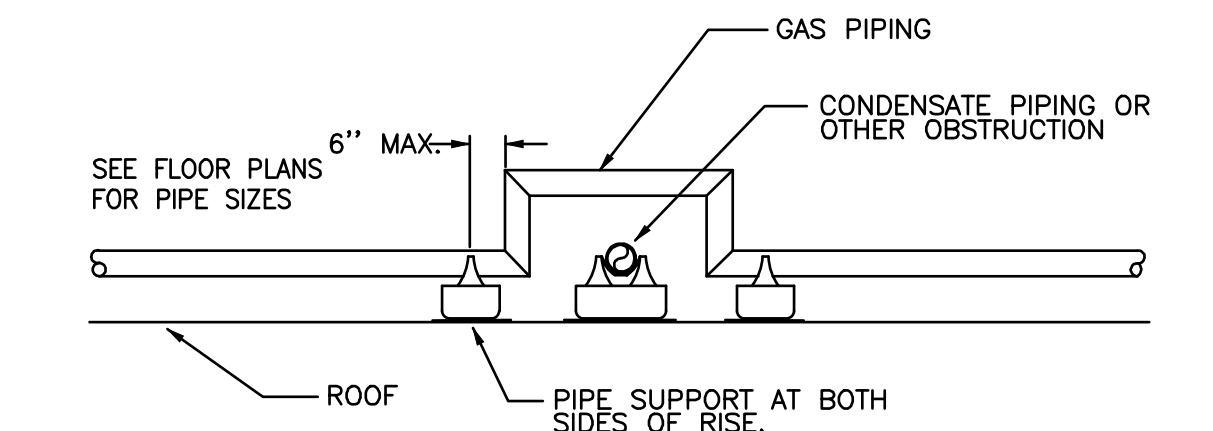
2 FLOOR CLEANOUT DETAIL
P-501 N.T.S.

COMMENTS:

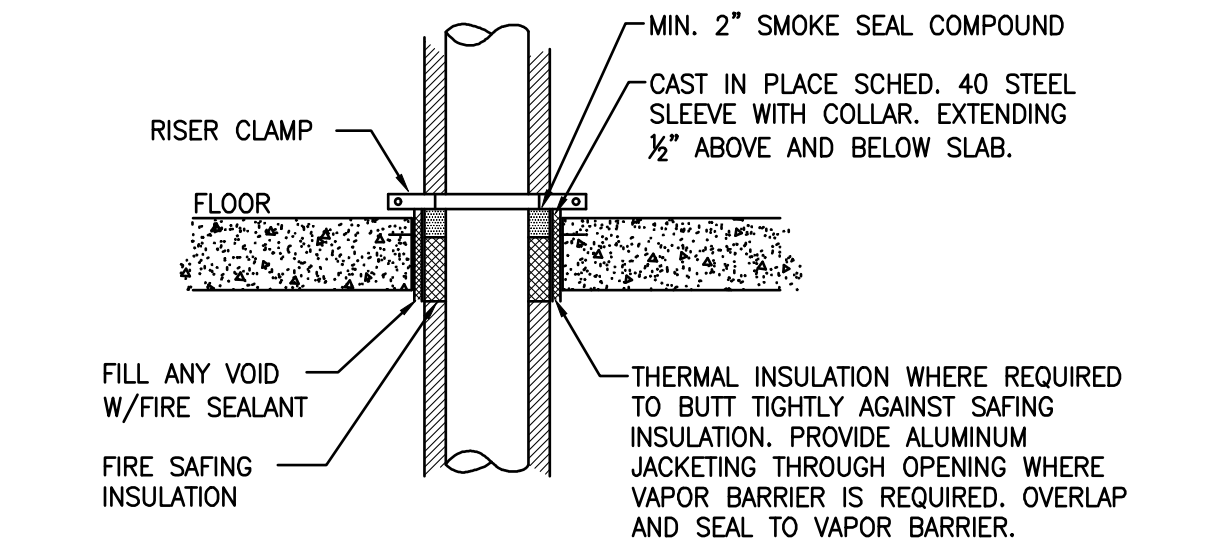
- LOCATE AT BUILDING EXIT, AT ENDS OF RUNS, AT TURNS OF PIPE GREATER THAN 45 DEGREES, AT 50' INTERVALS ON STRAIGHT RUNS, AND/OR WHERE SHOWN ON PLANS. PROVIDE CLEANOUT TOP WITH VARIATIONS SUITABLE FOR FLOOR COVERING (CARPET MARKER, RECESSED FOR TILE, SCORIALIZED FOR UNFINISHED FLOORS). PROVIDE GASKETED PLUG IN CAST IRON BODY. USE TEFLON JOINT COMPOUND ON PLUG THREADS. CLEAN THE TOP OF EXPOSED FCO AFTER INSTALLATION.
- ROUND SECURED GASKETED NICKEL BRONZE ADJUSTABLE TOP WITH "CO" CAST IN COVER. PROVIDE CLEANOUT TOP WITH VARIATIONS SUITABLE FOR FLOOR COVERING (CARPET MARKER, RECESSED FOR TILE, SCORIALIZED FOR UNFINISHED FLOORS). PROVIDE GASKETED PLUG IN CAST IRON BODY. USE TEFLON JOINT COMPOUND ON PLUG THREADS. CLEAN THE TOP OF EXPOSED FCO AFTER INSTALLATION.



3 FLOOR DRAIN TRAP PRIMER DETAIL
P-501 N.T.S.

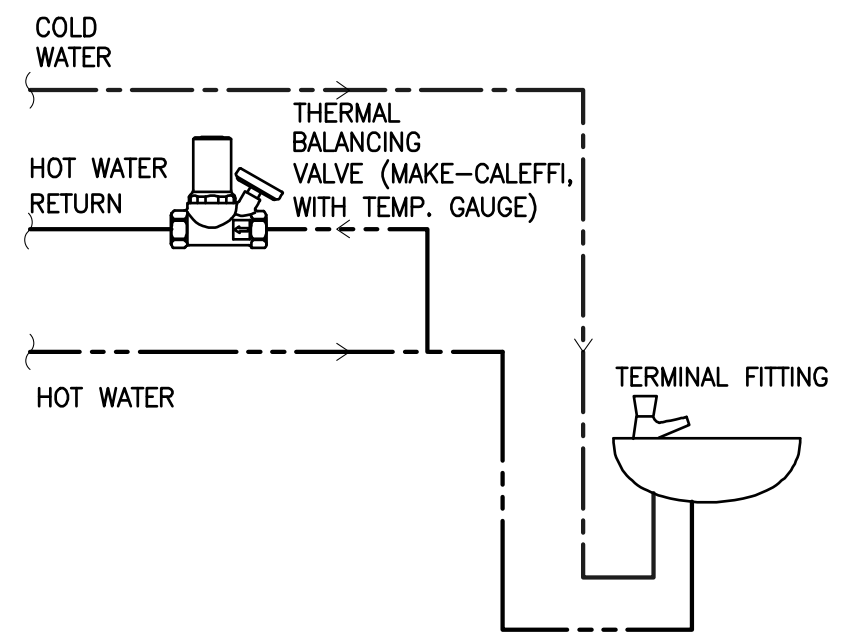


4 GAS PIPING AT OBSTRUCTION DETAIL
P-501 N.T.S.

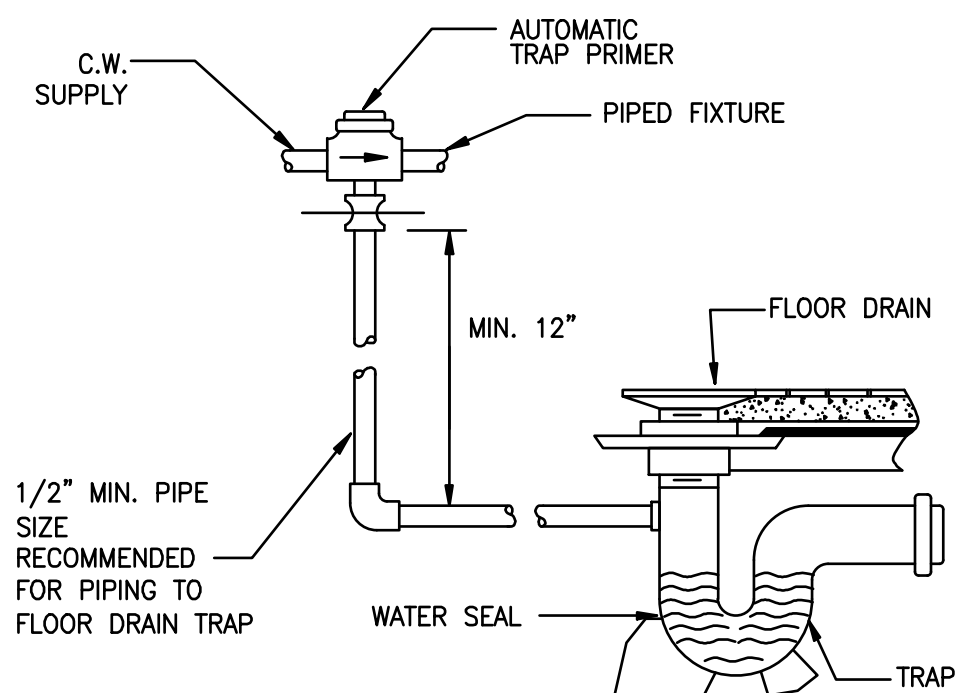


- NOTES:
- SLEEVES TO BE SIZED AS REQUIRED FOR OVERALL PIPE DIAMETER, (INCLUDING INSULATION, WHERE APPLICABLE)
 - PIPE CLAMPS FOR COPPER PIPING SHALL BE COPPER PLATED.

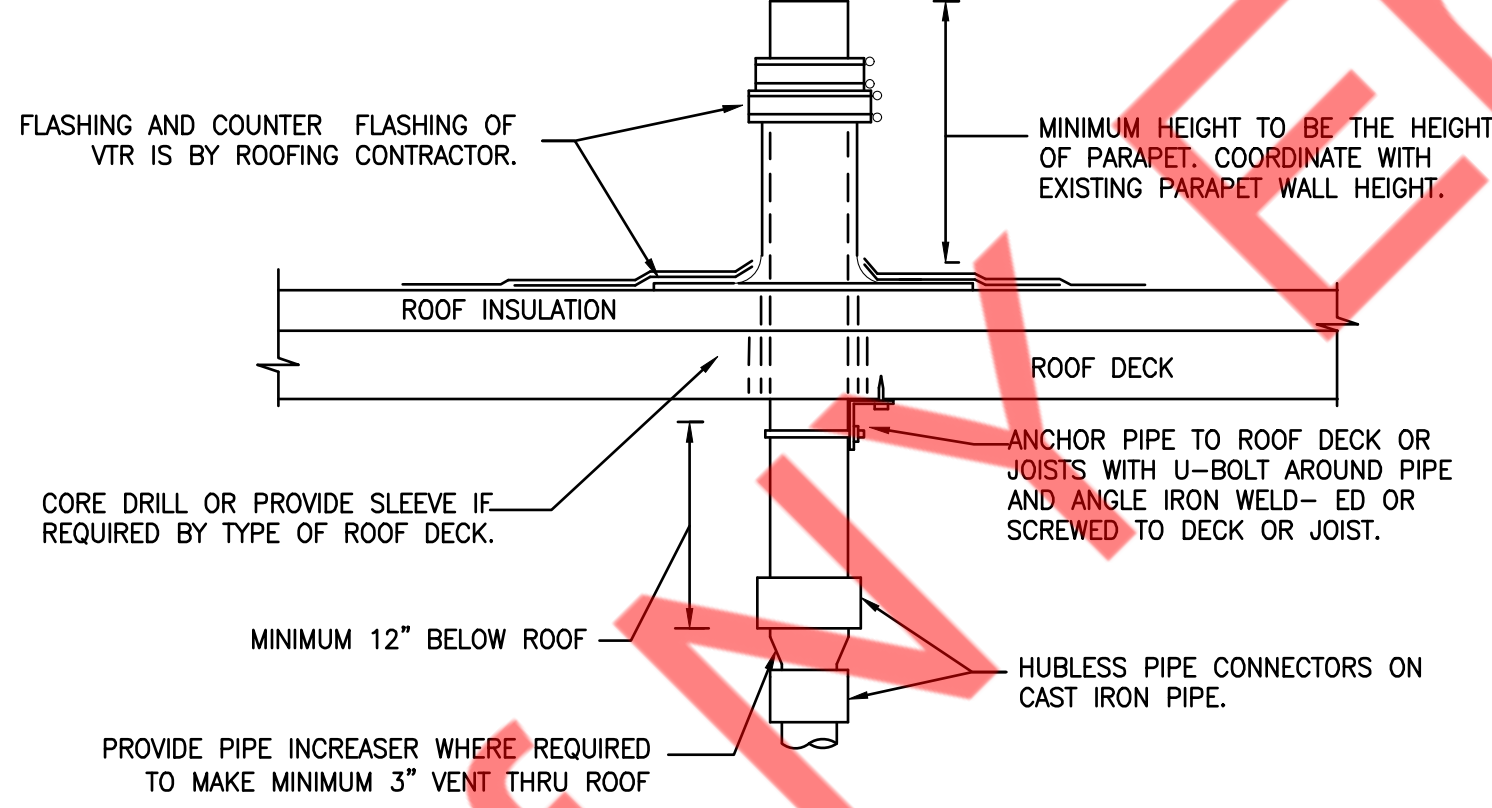
5 FLOOR PENETRATION DETAIL
P-501 N.T.S.



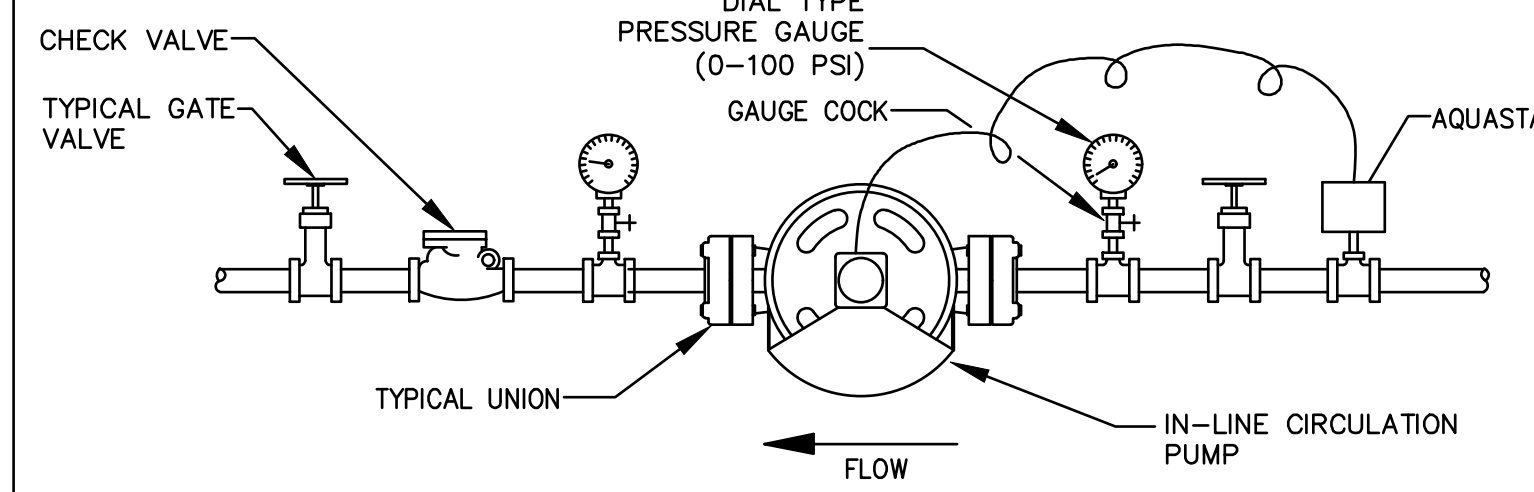
6 BALANCING VALVE PIPING DETAIL
P-501 N.T.S.



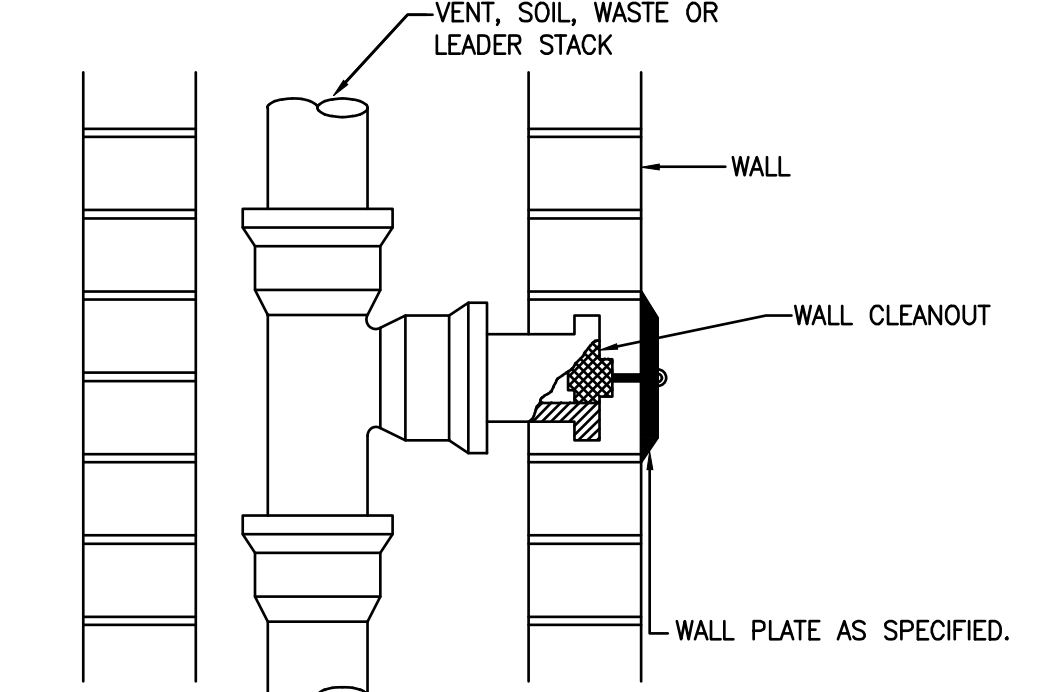
7 FLOW CONTROLLED TRAP PRIMER DETAIL
P-501 N.T.S.



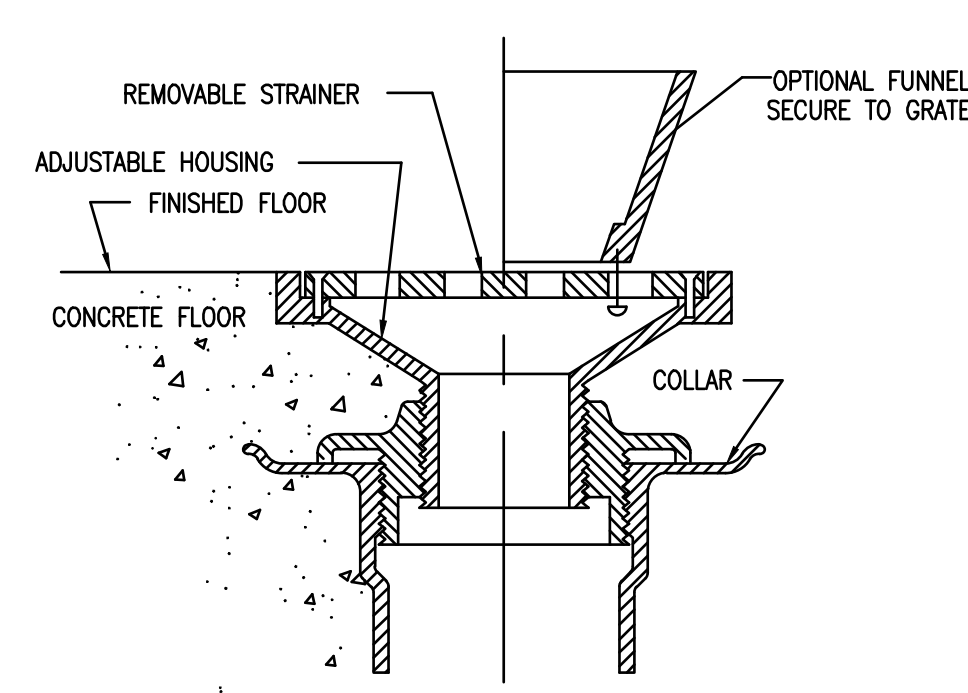
8 VENT THROUGH ROOF (VTR) DETAILS
P-501 N.T.S.



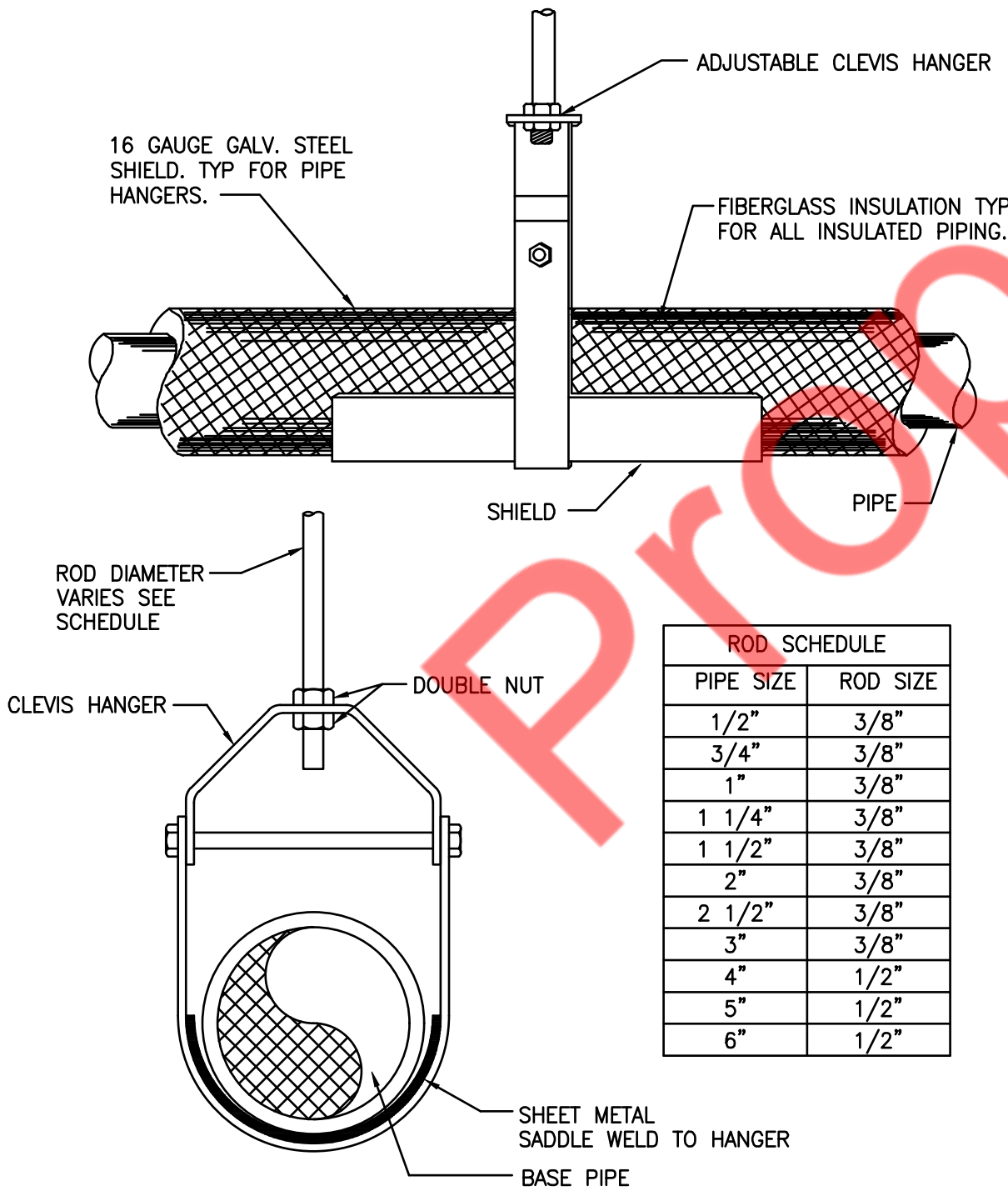
9 INLINE RECIRCULATING PUMP DETAIL
P-501 N.T.S.



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



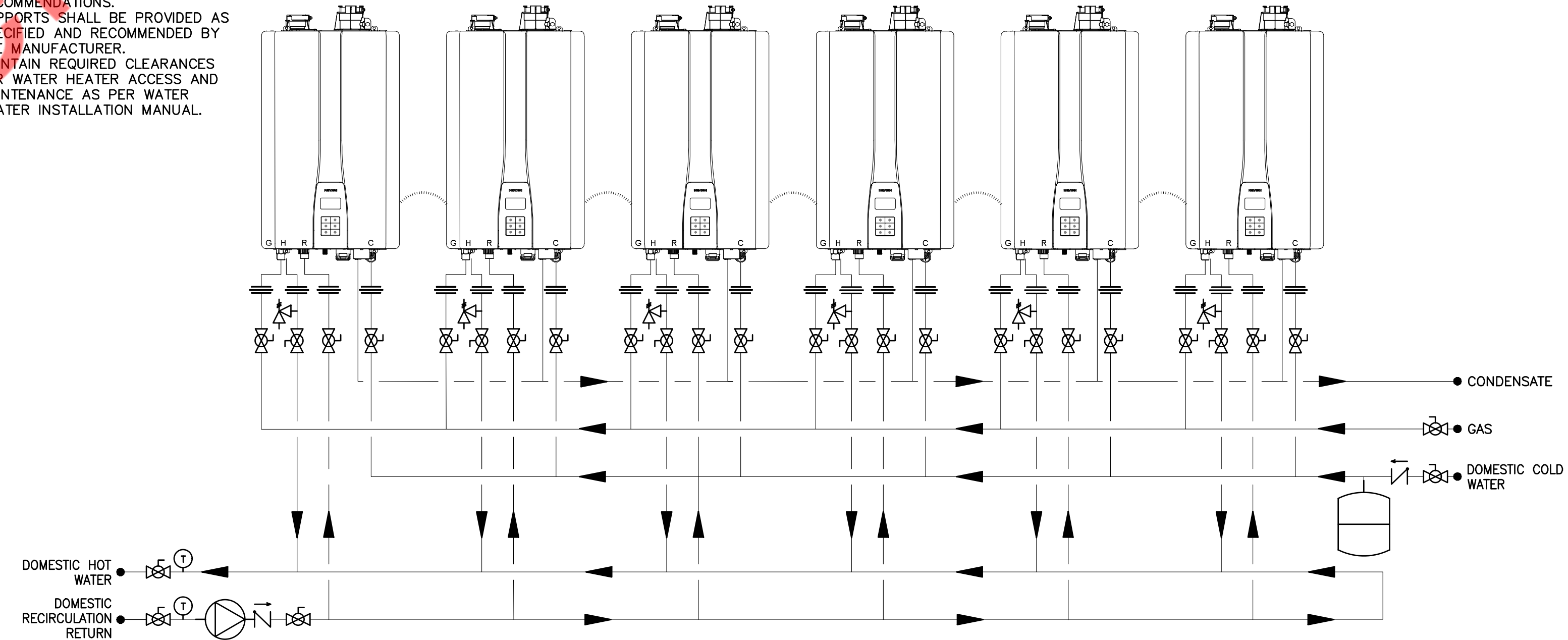
11 FLOOR DRAIN DETAIL
P-501 N.T.S.



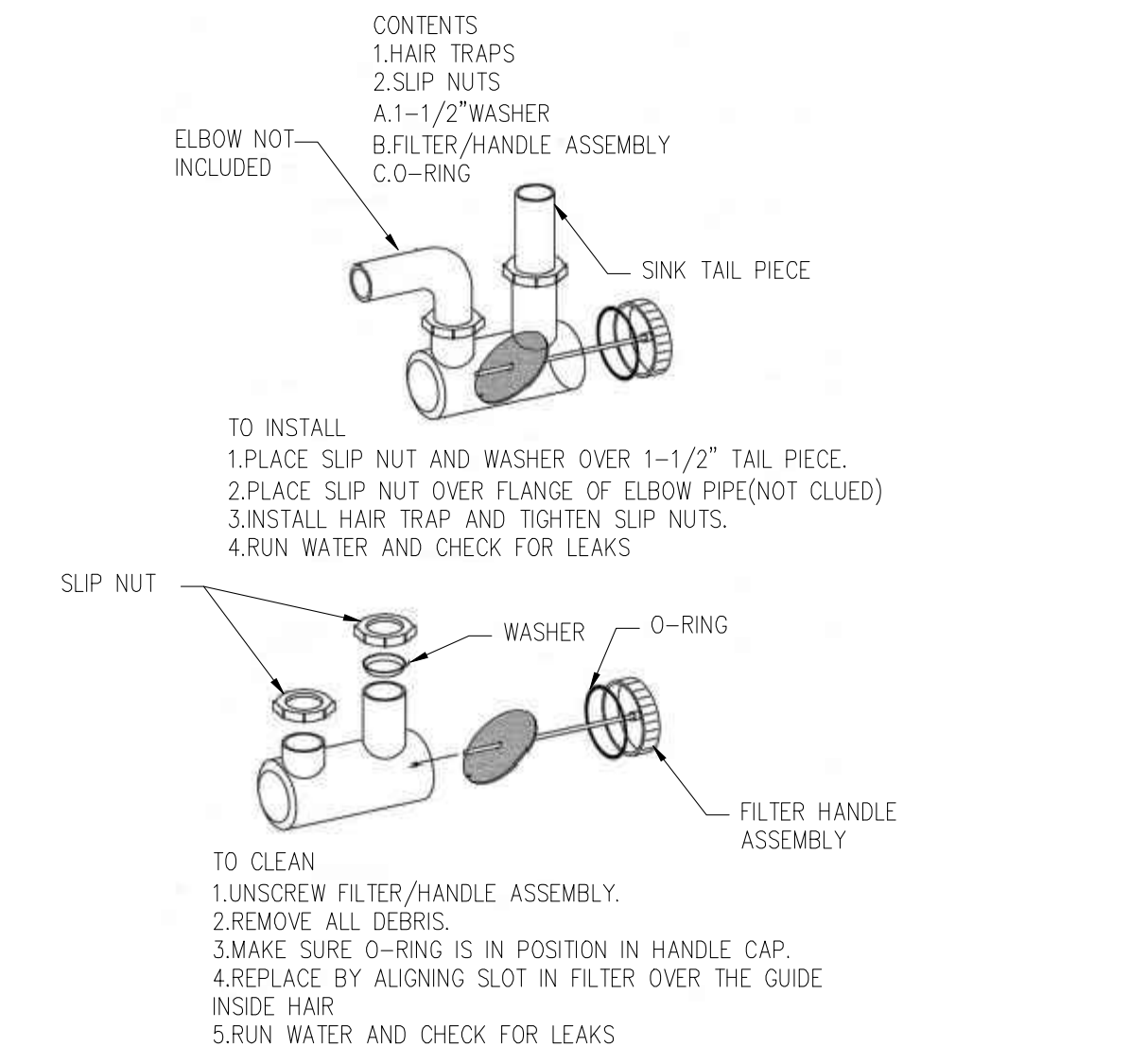
12 HANGER DETAIL
P-501 N.T.S.

NOTES:

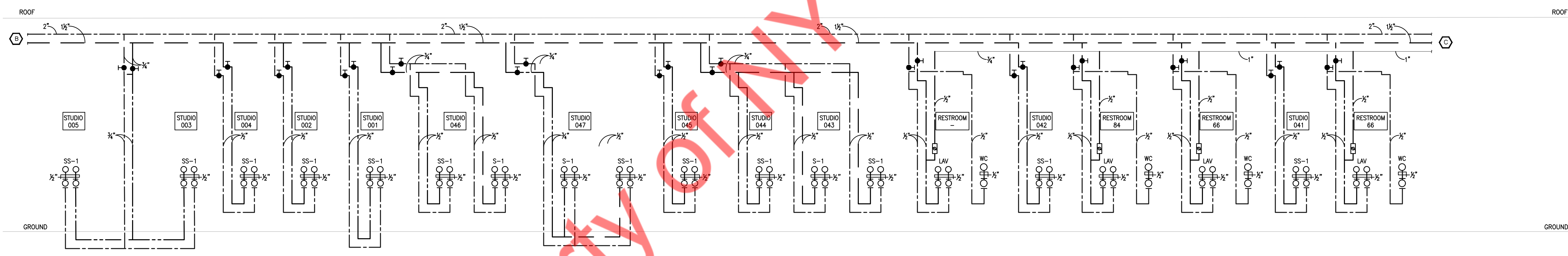
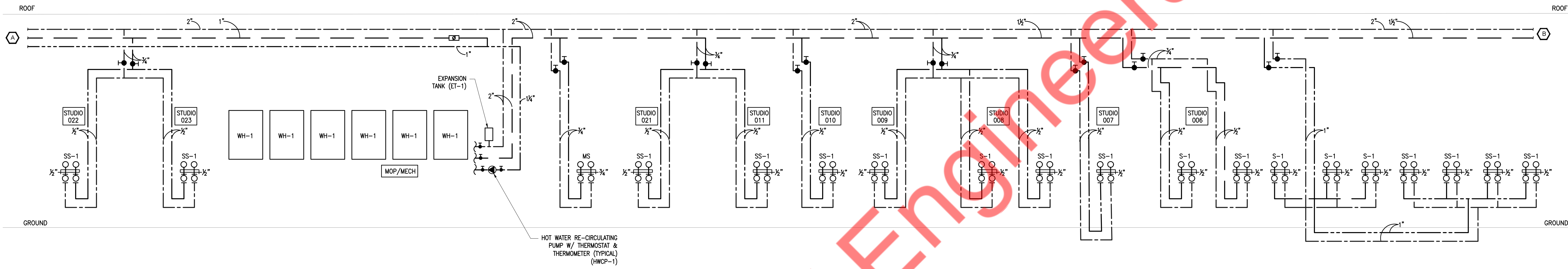
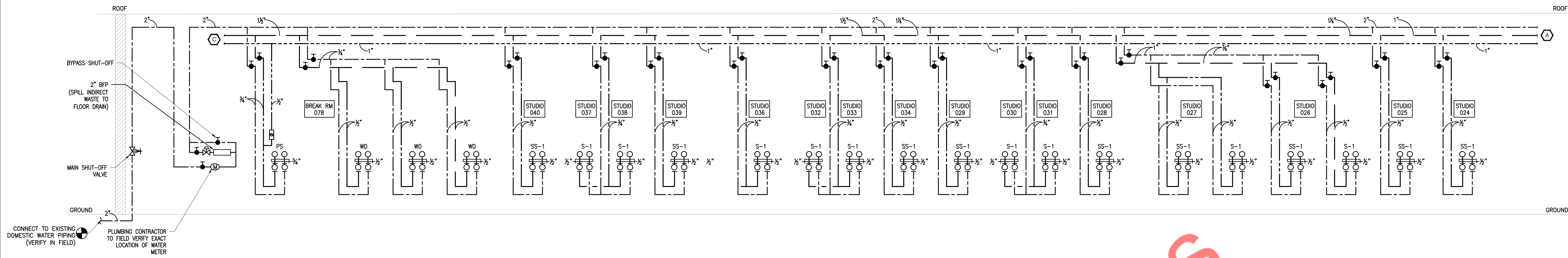
- PROVIDE CONDENSATE NEUTRALIZER FOR THE WATER HEATER DRAIN. PLUMBING CONTRACTOR TO COORDINATE WITH HVAC CONTRACTOR FOR WATER HEATER EXHAUST REQUIREMENTS.
- PROVIDE ALL REQUIRED ACCESSORIES AS PER MANUFACTURER'S RECOMMENDATIONS.
- SUPPORTS SHALL BE PROVIDED AS SPECIFIED AND RECOMMENDED BY THE MANUFACTURER.
- MAINTAIN REQUIRED CLEARANCES FOR WATER HEATER ACCESS AND MAINTENANCE AS PER WATER HEATER INSTALLATION MANUAL.



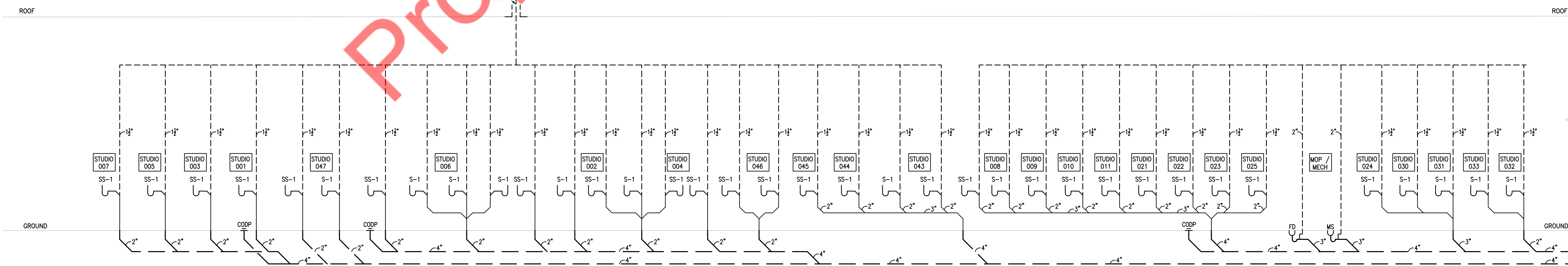
13 GAS FIRED INSTANTANEOUS WATER HEATER INSTALLATION
P-501 N.T.S.



14 HAIR TRAP
P-501 N.T.S.

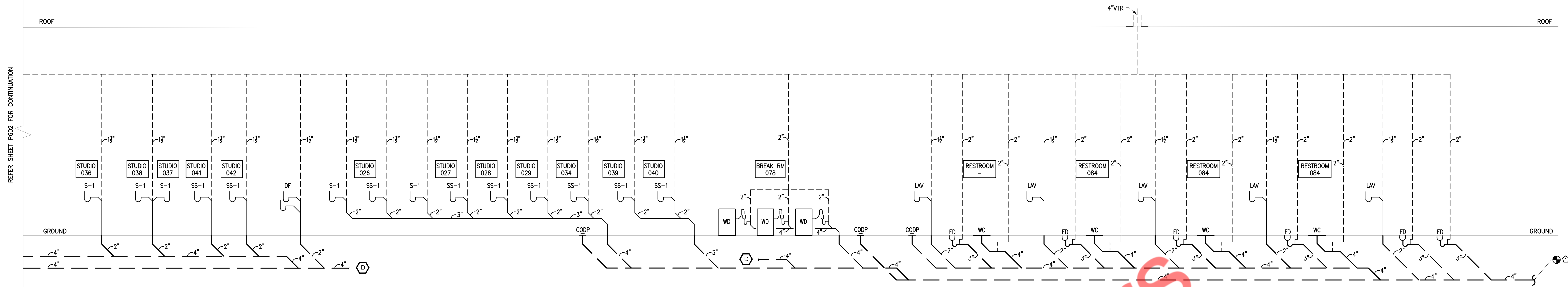


01 PLUMBING WATER RISER DIAGRAM
NTS

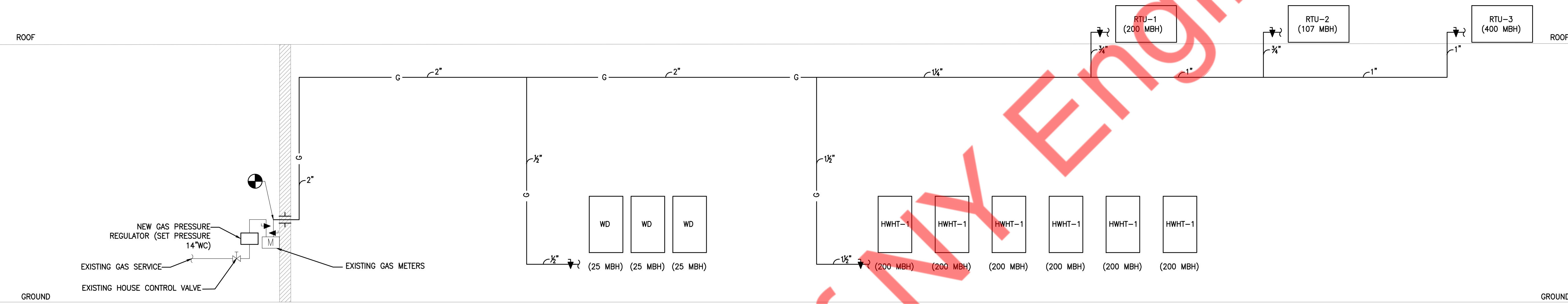


02 PLUMBING SANITARY RISER DIAGRAM (1 OF 2)
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REFER SHEET P603 FOR CONTINUATION



01 PLUMBING SANITARY RISER DIAGRAM (2 OF 2)
NTS



NATURAL GAS PIPING SYSTEM

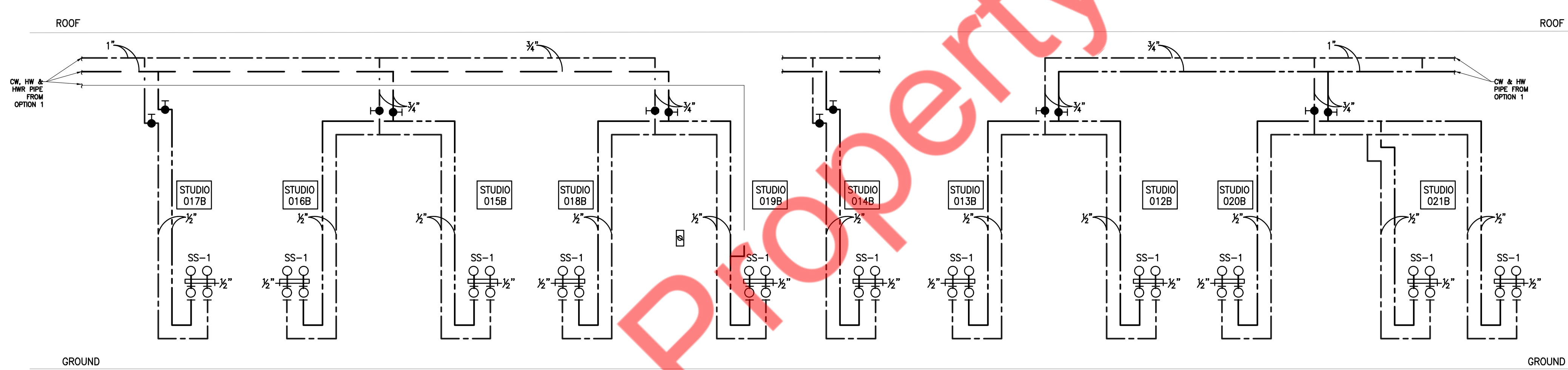
PROVIDE A COMPLETE GAS PIPING SYSTEM TO SERVE GAS EQUIPMENT FURNISHED BY OTHERS, AS NOTED ON THE DRAWINGS. PROVIDE EITHER THREADED STEEL OR MALLEABLE IRON PIPE WITH MALLEABLE FITTINGS OR WELDED STEEL. PROVIDE ALL UNIONS, SHUT-OFF VALVES AND DIRT LESS REQUIRED BY VFGC 2018 AND GOVERNING LOCAL CODES AND AT EACH GAS APPLIANCE CONNECTION. PROVIDE ALL TESTS, METERS, INSPECTIONS, HANGERS AND EQUIPMENT CONNECTIONS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.

NOTES:

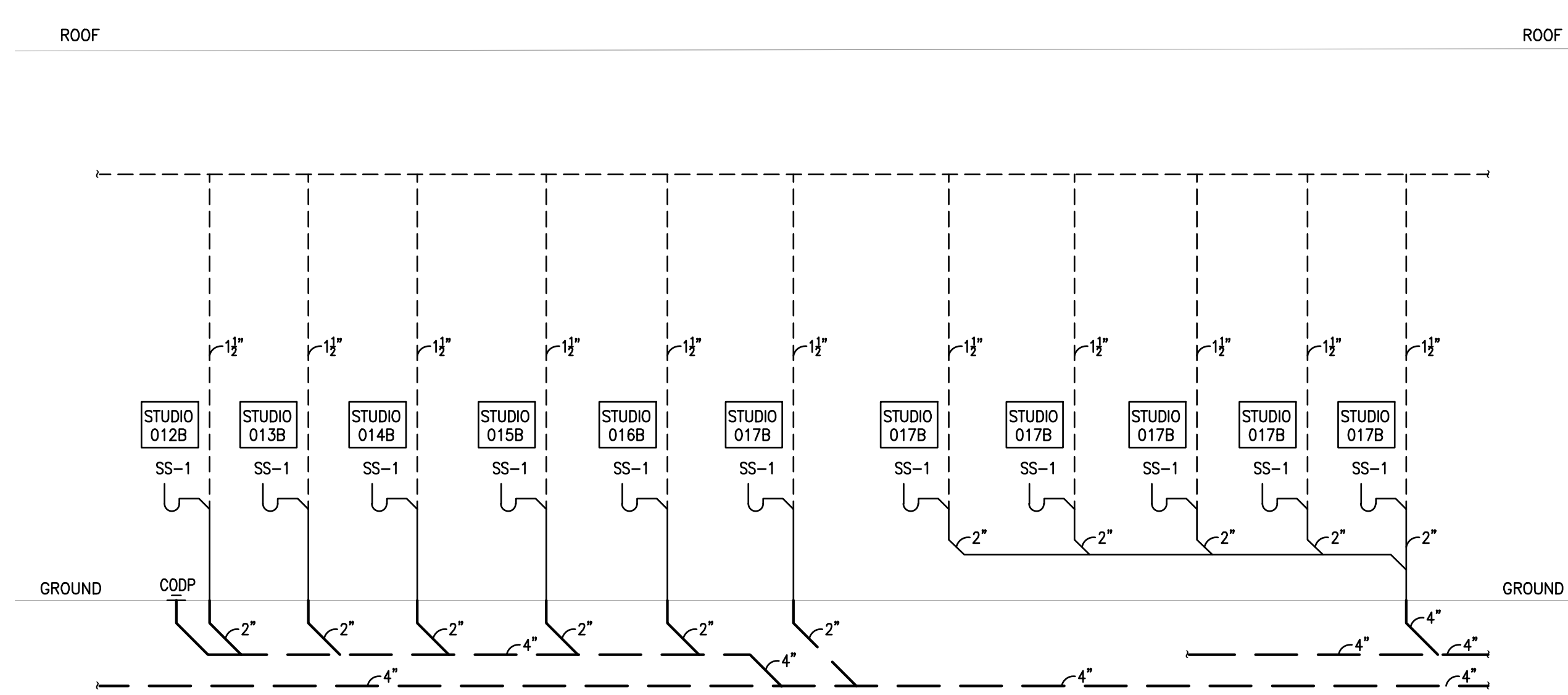
1. GAS PIPING TO BE SCHEDULE 40 STEEL PIPE W/125 CAST IRON SCREWED FITTINGS.
2. GAS SYSTEM TO BE INSTALLED BY QUALIFIED LICENSED CONTRACTOR.
3. VERIFY ALL EQUIPMENT BTUS PRIOR TO INSTALLATION. ADJUST PIPE SIZE ACCORDING TO VIRGINIA FUEL GAS CODE 2018, TABLE 402.4(4).
4. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING GAS METER LOCATION, PRESSURE AND CAPACITY. UPGRADE IF REQUIRED.
5. CONTRACTOR SHALL VERIFY ACTUAL GAS PRESSURE AND LONGEST LENGTH OF RUN FROM METER TO FARTHEST APPLIANCE PRIOR TO INSTALLATION AND NOTIFY ENGINEER IF CONDITIONS DIFFER FROM THOSE SHOWN ON THE PLAN.

GAS PIPE SIZING PER TABLE 402.4(4) - VIRGINIA FUEL GAS CODE (VFGC 2018)
GAS INLET PRESSURE - LESS THAN 2 PSI.
PRESSURE DROP - 6 IN. W.C.
SPECIFIC GRAVITY - 0.60
EQUIVALENT LENGTH OF PIPE = 200 FT

02 GAS RISER DIAGRAM
NTS



03 ALTERNATE PLUMBING WATER SUPPLY RISER DIAGRAM
NTS



04 ALTERNATE PLUMBING SANITARY RISER DIAGRAM
NTS