

MECHANICAL SYMBOLS LIST

EQUIPMENT SYMBOL		CONTROLS AND SENSORS	
	POINT OF NEW CONNECTION TO EXISTING		THERMOSTAT
			HUMIDISTAT
AIR DEVICES			
	CEILING DIFFUSER SUPPLY		MANUAL ON/OFF SWITCH
	CEILING DIFFUSER RETURN		DUCT SMOKE DETECTOR
	SIDEWALL GRILLE-SUPPLY		CO2 DETECTOR
	SIDEWALL GRILLE-RETURN		TEMPERATURE SENSOR
DUCT ACCESSORIES			
	VOLUME DAMPER W/ ACCESS DOOR		ROUND DUCT CROSS SECTION
	FIRE DAMPER W/ ACCESS DOOR		RECTANGULAR DUCT CROSS SECTION
	MOTORIZED DAMPER W/ ACCESS DOOR		RETURN AIR RECTANGULAR DUCT CROSS SECTION
	BACK DRAFT DAMPER		

MECHANICAL ABBREVIATIONS		CODE COMPLIANCE
AFF	ABOVE FINISHED FLOOR	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 CONSTRUCTED TO PERMIT WORK NOT CONFORMING TO THESE CODES OR OTHERS APPLICABLE TO THESE PROJECT: a. 2018 INTERNATIONAL BUILDING CODE. b. 2018 INTERNATIONAL MECHANICAL CODE. c. 2018 INTERNATIONAL PLUMBING CODE. d. 2018 INTERNATIONAL FUEL/GAS CODE. e. 2009 INTERNATIONAL ENERGY CONSERVATION CODE.
AL	ACOUSTIC LINING	
BOB	BOTTOM OF BEAM	
BOD	BOTTOM OF DUCT	
BOE	BOTTOM OF EQUIPMENT	
CDS	CEILING DIFFUSER SUPPLY	
CDR	CEILING DIFFUSER RETURN	
CFM	CUBIC FEET OF AIR PER MINUTE	
DN	DOWN	
EG	EXHAUST GRILLE	
FC	FLEXIBLE CONNECTION	
FD/AD	FIRE DAMPER W/ACCESS DOOR	
RTU	ROOF TOP UNIT	
RG	RETURN GRILLE	
RA	RETURN AIR	
SEER	SEASONAL ENERGY EFFICIENCY RATIO	
SG	SUPPLY GRILLE	
SA	SUPPLY AIR	
VD	VOLUME DAMPER	
BD	BACKDRAFT DAMPER	
EF	EXHAUST FAN	
AC	AIR CONDITIONER	
ACCU	AIR COOLED CONDENSING UNIT	

MECHANICAL DRAWING LIST	
MO.1	MECHANICAL GENERAL NOTES, SYMBOLS LIST & ABBREVIATIONS
MO.2	MECHANICAL SPECIFICATIONS (1 OF 2)
MO.3	MECHANICAL SPECIFICATIONS (2 OF 2)
M1.1	MECHANICAL FIRST FLOOR PLAN
M1.2	MECHANICAL MEZZANINE FLOOR PLAN
M1.3	MECHANICAL ROOF PLAN
M2.1	MECHANICAL DETAILS (1 OF 3)
M2.2	MECHANICAL DETAILS (2 OF 3)
M2.3	MECHANICAL DETAILS (3 OF 3)
M3.1	MECHANICAL SCHEDULES

SOUTH CAROLINA BUILDING DEPARTMENT NOTES

- ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF 2018 IBC WITH SC MODIFICATION AND ALL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.
- THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
 - 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.
 - TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF THE 2018 IMC WITH SC MODIFICATION :
 - VENTILATION SYSTEM SERVING COMMERCIAL COOKING APPLIANCES – MC 506
 - REFRIGERATION SYSTEMS – MC 1108
 - THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
 - DUCT CONSTRUCTION AND INSTALLATION– MC603
 - AIR INTAKES, EXHAUSTS AND RELIEF – MC 401.5
 - GAS FIRED EQUIPMENT – INTERIM CHICAGO FUEL GAS CODE
 - MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
 - 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 MC 401.
 - 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.
 - MECHANICAL SYSTEMS SHALL BE COMMISSIONED PER IECC 2009 C503.2.2, C506.4.2, C506.4 FINAL COMMISSIONING REPORT SHALL BE DUE WITHIN 90 DAYS OF RECEIPT OF CERTIFICATE OF OCCUPANCY.
 - A COMMISSIONING PLAN SHALL BE DEVELOPED BY A LICENSED DESIGN PROFESSIONAL, MECHANICAL ENGINEER OR APPROVED AGENCY.
 - A PRELIMINARY REPORT OF COMMISSIONING TEST PROCEDURES AND RESULTS SHALL BE COMPLETED AND CERTIFIED BY THE LICENSED DESIGN PROFESSIONAL, ELECTRICAL ENGINEER, MECHANICAL ENGINEER OR APPROVED AGENCY AND PROVIDED TO THE BUILDING OWNER OR OWNER'S AUTHORIZED AGENT.
 - A FINAL REPORT OF TEST PROCEDURES AND RESULTS IDENTIFIED AS "FINAL COMMISSIONING REPORT" SHALL BE DELIVERED TO THE BUILDING OWNER OR OWNER'S AUTHORIZED AGENT. THE REPORT SHALL BE ORGANIZED WITH MECHANICAL SYSTEM AND SERVICE HOT WATER SYSTEM FINDINGS IN SEPARATE SECTIONS TO ALLOW INDEPENDENT REVIEW.
 - ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
 - SMOKE DETECTOR SHALL MEET UL268A.

GENERAL NOTES

- 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.
- 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.
- 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.
- THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- 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.
- DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.
- WHERE PENETRATIONS THROUGH FIRE RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.
- CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.
- PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. PROVIDE TEMPORARY DUCT CAPS AND/OR CONNECTIONS TO MINIMIZE SHUTDOWN TIME.
- 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. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75% OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER.
- PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.
- SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL (FIBERGLASS INSULATION IS NOT ACCEPTABLE).
- 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.
- 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.

- 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.
- 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.
- 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.
- MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- ALL EQUIPMENT SHALL BE PROVIDED WITH ONE YEAR WARRANTY PARTS AND LABOR AND FIVE YEARS ON COMPRESSORS. WARRANTY PERIOD BEGINS UPON PROJECT ACCEPTANCE
- ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- 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.
- 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.
- SUBMIT SHOP DRAWING OF ALL WORK WHICH MUST BE APPROVED BY THE ARCHITECT AND ENGINEER BEFORE WORK COMMENCES.
- ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- 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.
- INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS THE CONTRACTOR SHALL INCLUDE A HOLID HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- 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.
- 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.
- 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.
- 3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

SCOPE OF WORK

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

GENERAL HVAC NOTES

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

19. PROVIDE ACCESS DOORS IN DUCTWORK FOR THE OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL FANS, VALVES, AND MECHANICAL EQUIPMENT.
20. 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.
21. 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.
22. SEE SPECIFICATIONS FOR DUCTWORK GAUGES, BRACING, HANGERS, AND OTHER REQUIREMENTS.

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 ANCILLARY EQUIPMENT INCLUDING ALL ACCESSORIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. ALL PERTINENT MODELS, SIZES, ACCESSORIES AND CHOICES SHALL BE CLEARLY CHECKED, PRINTED OR OTHERWISE INDICATED ON THE SUBMITTALS.
- 1.3 RECORD DRAWINGS
 - A. UPON COMPLETION OF THE WORK, A RECORD DRAWING SHALL BE SUBMITTED TO THE OWNER DEPICTING ALL SUBSEQUENT CHANGES, ADDITIONS AND OR CORRECTIONS TO THE CONTRACT DRAWINGS AND OR CONTRACT SCOPE MADE DURING CONSTRUCTION. THIS DRAWING SHALL REPRESENT A COMPLETE RECORD OF THE WORK INSTALLED.
- 1.4 EQUIPMENT OPERATING INSTRUCTIONS
 - A. ON COMPLETION AND ACCEPTANCE OF WORK, THIS CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS, EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.
 - B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE-RING BINDERS WITH CLEAR ACETATE COVERS. THE CONTRACTOR SHALL 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
- 1.2 PENETRATION FIRESTOPPING
 - A. PENETRATIONS IN FIRE-RESISTANCE-RATED WALLS: F-RATINGS PER ASTM E 814 OR UL 1479.
 - B. PENETRATIONS IN HORIZONTAL ASSEMBLIES: F- AND T-RATINGS PER ASTM E 814 OR UL 1479:
 - C. PENETRATIONS IN SMOKE BARRIERS: L-RATINGS PER UL 1479.
 - D. W-RATINGS: PER UL 1479.
- 1.3 INSTALLATION
 - A. IDENTIFICATION: PREPRINTED METAL OR PLASTIC LABELS.
- 1.4 FIELD QUALITY CONTROL
 - A. INSPECTION OF INSTALLED FIRE-STOPPING: BY OWNER-ENGAGED AGENCY ACCORDING TO ASTM E 2174.
- 1.5 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

WHERE UL-CLASSIFIED SYSTEMS ARE INDICATED, THEY REFER TO SYSTEM NUMBERS IN UL'S "FIRE RESISTANCE DIRECTORY" UNDER PRODUCT CATEGORY XHEZ.

FOR THE FOLLOWING SYSTEMS:
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.

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. ALL NEW DUCTWORK WILL COMPLY WITH THE LATEST SMACNA GUIDELINES AND CONFORM WITH REQUIREMENTS OF THE LATEST HANDBOOKS PUBLISHED BY ASHRAE.
3. PROVIDE VOLUME DAMPER AT EACH TAP TO MAIN DUCT AND WHERE NECESSARY TO PROPERLY BALANCE SYSTEM.
4. SUPPLY AND RETURN DUCTWORK 20' FROM ALL HVAC UNITS SHALL BE LINED WITH 1.5" ACOUSTICAL LINING.
5. RE-INSULATE ALL DUCTWORK AND PIPING IN WHICH INSULATION HAS BEEN REMOVED OR DAMAGED WITH INSULATION EQUAL TO THE EXISTING INSULATION.
6. CONTRACTOR SHALL SUPPLY AND INSTALL ALL NECESSARY SUPPLY DIFFUSERS AND RETURN AIR REGISTERS WHERE INDICATED ON THE DRAWING. COORDINATE LOCATION OF DIFFUSERS AND REGISTERS WITH REFLECTED CEILING PLAN.
7. IN CORRIDORS WHERE CEILING SPEAKERS AND AIR DIFFUSERS ARE INDICATED BETWEEN THE SAME LIGHT FIXTURES, INSTALL BOTH DEVICES AT THE QUARTER POINTS BETWEEN THE FIXTURES.
8. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS 4'-0" (CENTER LINE) ABOVE THE FINISHED FLOOR. NOTIFY THE ENGINEER OF ANY ROOMS WHERE THE PRECEDING LOCATION CANNOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION.
9. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
10. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR DUCT LINING THICKNESS.
11. PROVIDE ALL 90-DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. ELBOWS IN DISHWASHER, KITCHEN, AND LAUNDRY EXHAUSTS SHALL BE OF UN-VANED SMOOTH RADIUS CONSTRUCTION WITH A RADIUS EQUAL TO 1-1/2 TIMES THE WIDTH OF THE DUCT. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
12. COORDINATE DIFFUSER, REGISTER, AND GRILL LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING, AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
13. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS, AND VALVING.
14. 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.
15. UNLESS OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE, WITH SPACE FOR INSULATION IF NEEDED.
16. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 5 FT.
17. 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.
18. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS FOR ALL SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPERS, COILS, AND OTHER ITEMS LOCATED IN THE DUCTWORK THAT REQUIRE SERVICE AND/OR INSPECTION.

SECTION 230517 – SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

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

END OF SECTION 230517

SECTION 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.
 - DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND 3.DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.
- 1.2 SUBMITTALS
 - A. SHOP DRAWINGS: SIGNED AND SEALED BY A PROFESSIONAL ENGINEER
- 1.3 QUALITY ASSURANCE
 - A. AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE – STEEL"
- 1.4 COMPONENTS
 - A. METAL PIPE HANGERS AND SUPPORTS: CARBON OR STAINLESS STEEL
 - B. FIBERGLASS PIPE HANGERS: -CLEVIS, CENTURY COMPOSITES, COOPER B-LINE
 - D. METAL FRAMING SYSTEMS: MFMA MANUFACTURER
 - E. FIBERGLASS STRUT SYSTEMS: COOPER B-LINE
 - F. THERMAL-HANGER SHIELD INSERTS:
 - G. FASTENER SYSTEMS: POWDER-ACTUATED FASTENERS OR MECHANICAL-EXPANSION ANCHORS
 - H. PIPE STANDS: COMPACT, LOW TYPE, SINGLE PIPE, HIGH TYPE, SINGLE PIPE, HIGH TYPE, MULTIPLE PIPES, CURB-MOUNTED TYPE
 - I. EQUIPMENT SUPPORTS.

END OF SECTION 230529

SEQUENCE OF OPERATIONS

- 1) **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 CLOSURES ON AN ALARM CONDITION.
 - a. TRANSFER FANS: FANS SHALL BE CONTROLLED BY A LOCAL WALL MOUNTED SWITCH.
- 2) **RUIS:** 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 75F ADJUSTABLE; WHEN ROOM TEMPERATURE DROPS BELOW SET POINT COMPRESSOR(S) SHALL DE-ENERGIZE AND FAN SHALL REMAIN ON.

SECTION 230548 – VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 COMPONENTS

A. VIBRATION ISOLATORS:

- ISOLATOR PADS: NEOPRENE, RUBBER, HERMETICALLY AND/OR SEALED COMPRESSED FIBERGLASS
- MOUNTS: DOUBLE-DEFLECTION TYPE.
- RESTRAINED MOUNTS: ALL DIRECTIONAL MOUNTINGS WITH SEISMIC RESTRAINT; CAST-DUCTILE-IRON HOUSING.
- SPRING ISOLATORS: FREESTANDING, LATERALLY STABLE, OPEN-SPRING TYPE.
- RESTRAINED SPRING ISOLATORS: FREESTANDING, STEEL, OPEN-SPRING TYPE WITH SEISMIC RESTRAINT.
- HOUSED SPRING MOUNTS: DUCTILE-IRON OR STEEL HOUSING, WITH INTEGRAL, VERTICALLY ADJUSTABLE SEISMIC SNUBBERS.
- ELASTOMERIC HANGERS: DOUBLE-DEFLECTION TYPE.
- SPRING HANGERS: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION.
- SPRING HANGERS WITH VERTICAL-LIMIT STOP: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION AND WITH VERTICAL-LIMIT STOP.
- PIPE RISER RESILIENT SUPPORT: ALL-DIRECTIONAL, ACOUSTICAL PIPE ANCHOR.
- RESILIENT PIPE GUIDES.

B. AIR-MOUNTING SYSTEMS:

- AIR MOUNTS: FREESTANDING, SINGLE OR MULTIPLE, COMPRESSED-AIR BELLOWES.
- RESTRAINED AIR MOUNTS: HOUSED COMPRESSED-AIR BELLOWES.

C. RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS: FACTORY-ASSEMBLED, FULLY ENCLOSED, INSULATED, AIR- AND WATERTIGHT CURB RAIL; WITH SPRING ISOLATORS MOUNTED ON ELASTOMERIC ISOLATION PADS, AND SNUBBER BUSHINGS.

D. VIBRATION ISOLATION EQUIPMENT BASES:

- STEEL BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS.
- INERTIA BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS READY FOR FIELD-APPLIED, CAST-IN-PLACE CONCRETE

1.2 FIELD QUALITY CONTROL

- A. TESTING: BY EITHER: OWNER-ENGAGED AGENCY, CONTRACTOR-ENGAGED AGENCY, OR CONTRACTOR.

PART-2 PRODUCTS

1.1 VIBRATION ISOLATORS & SEISMIC-RESTRAINT DEVICES

- A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- B. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

- ACE MOUNTINGS CO., INC.
- AMBER/BOOTH COMPANY, INC.
- CALIFORNIA DYNAMICS CORPORATION.
- HILTI, INC.
- ISOLATION TECHNOLOGY, INC.
- KINETICS NOISE CONTROL.
- LOOS & CO.; CABLEWARE DIVISION.
- MASON INDUSTRIES.
- TOLCO INCORPORATED: A BRAND OF NIBCO INC.
- UNISTRUT; TYCO INTERNATIONAL, LTD.

END OF SECTION 230548

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY

- A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:

- AIR SYSTEMS: CONSTANT AND VARIABLE VOLUME SYSTEMS.
- MOTORS.

1.2 QUALITY ASSURANCE

- A. THE CONTRACTOR SHALL PROCURE THE SERVICES OF A TESTING, ADJUSTING AND BALANCING (TAB) SPECIALIST WHO SPECIALIZES IN HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS. THE TAB AGENT SHALL HAVE THE FOLLOWING QUALIFICATIONS: AABC, NEBB OR TABB CERTIFIED.

1.3 EXECUTION

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

SECTION 230713 – DUCT INSULATION

1.1 QUALITY ASSURANCE

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.

1.2 FIELD QUALITY CONTROL

- A. FIELD INSPECTIONS: BY OWNER-ENGAGED AGENCY.

1.3 INDOOR DUCT AND PLENUM INSULATION SCHEDULE:

- A. CONCEALED, RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-RETURN, OUTDOOR-AND EXHAUST-AIR DUCT AND AIR PLENUM INSULATION:
- B. FLEXIBLE ELASTOMERIC, MINERAL-FIBER BLANKET, MINERAL-FIBER BOARD OR POLYOLEFIN WITH MINIMUM INSTALLED THERMAL RESISTANCE AS FOLLOWS:
UNCONDITIONED SPACES WITHIN BUILDING: R-5
WITHIN BUILDING ENVELOPE ASSEMBLY: R-8 OUTSIDE OF BUILDING: R-8

1.4 ITEMS NOT INSULATED:

- FIBROUS-GLASS DUCTS.
- METAL DUCTS WITH DUCT LINER OR SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE ANDASHRAE/IESNA 90.1.
- FACTORY-INSULATED FLEXIBLE DUCTS.
- FACTORY-INSULATED PLENUMS AND CASINGS.
- FLEXIBLE CONNECTORS.
- VIBRATION-CONTROL DEVICES.
- FACTORY-INSULATED ACCESS PANELS AND DOORS.
- DUCTS THAT HAVE INTERNAL ACOUSTICAL LINING.

1.5 PRODUCTS

- A. THE FOLLOWING INSULATION MANUFACTURERS WILL BE ACCEPTABLE:

- JOHNS-MANVILLE
- OWENS-CORNING

1.6 ACOUSTICAL TREATMENT

- WHERE SHOWN ON THE DRAWINGS, LOW PRESSURE DUCTWORK SHALL BE LINED WITH 1.5" THICK R-6 AS MANUFACTURED BY DUCTMATE. 1-1/2 POUND MINIMUM DENSITY, NEOPRENE COATED, FLEXIBLE FIBERGLASS DUCT LINER. LINING SHALL COMPLY WITH NFPA 90A AND SHALL HAVE A FLAME SPREAD CLASSIFICATION OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING NOT MORE THAN 50. DUCT SIZES WHERE LINING IS INDICATED ON PLANS ARE MINIMUM INSIDE CLEAR DIMENSIONS REQUIRED.

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:

- DUCTWORK SHALL BE TRANSVERSELY JOINTED BY CONNECTING SEAMS OF COMPANION ANGLES, FORMED FROM 1-1/2"x1-1/2"x1/8" GALVANIZED ANGLES, TACK-WELDED OR RIVETED TO THE DUCT. THE ANGLE FRAME SHALL BE CONTINUOUSLY FLANGED UP INTO UPRIGHT OF 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.
- RECTANGULAR FITTINGS AND ALL TRANSITION PIECES FROM RECTANGULAR TO ROUND SHALL BE NO. 16 GAUGE ALL WELDED CONSTRUCTION.
- HORIZONTAL DUCTS SHALL BE SUPPORTED ON NOT MORE THAN 6' CENTERS. VERTICAL RISERS SHALL BE SUPPORTED AT EACH FLOOR.
- 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.
- RECTANGULAR DUCTWORK 18 GAUGE AND HEAVIER, FILLER RODS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS FOR IRON AND STEEL GAS WELDING RODS, ASTM 215; AWG A5.2.
- 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 JOINTS AND CENTERS	BRACING
22	UP TO 12	S SLIP, DRIVE SLIP, ONE INCH CENTERS	POCKET LOCK ON 8
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:

- UPSTREAM OF EACH REHEAT COIL AND VAV BOX.
- DOWNSTREAM OF EACH REHEAT COIL AND VAV BOX.

- E. FLAT OVAL OR ROUND DUCTWORK MAY BE PROVIDED IN LIEU RECTANGULAR DUCTWORK WITH THE REINFORCEMENT FOR FLAT SIDES SAME AS SPECIFIED FOR THE RECTANGULAR DUCTWORK, AND AS PER SMACNA FLAT OVAL DUCT CONSTRUCTION STANDARDS SHOWN IN FIG. 3-6 AND AS SHOWN IN FIG. 3-1 AND 3-2 FOR ROUND DUCTWORK.

- F. ALL DUCTWORK SHALL BE SEALED TO CLASS "A" AND LEAK TESTED TO MEAT SMACNA CLASS 6 FOR RECTANGULAR AND CLASS 3 FOR ROUND DUCTS.

1.2 MATERIALS

- E. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
- F. SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
- G. SHEET METAL MATERIALS:

- GALVANIZED SHEET STEEL.
 - STAINLESS-STEEL SHEETS.
 - ALUMINUM SHEETS.
- H. FACTORY-APPLIED ANTI-MICROBIAL COATING.

D. DUCT LINER:

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

E. SEALANT MATERIALS:

- TWO-PART TAPE SEALING SYSTEM.
- WATER-BASED JOINT AND SEAM SEALANT.
- SOLVENT-BASED JOINT AND SEAM SEALANT.
- FLANGED JOINT SEALANT.
- FLANGE GASKETS.
- ROUND DUCT JOINT O-RING SEALS.

1.3 DUCT CLEANING

- A. CLEAN EXISTING DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.

- B. CLEAN THE FOLLOWING ITEMS:

- AIR OUTLETS AND INLETS.
- SUPPLY, RETURN, AND EXHAUST FANS.
- AIR-HANDLING UNITS.
- COILS AND RELATED COMPONENTS.
- RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
- SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
- DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

1.4 DUCT SCHEDULE

- A. ALL DUCTS SHALL BE GALVANIZED STEEL EXCEPT AS FOLLOWS:

- MOIST ENVIRONMENT DUCT MATERIAL: ALUMINUM.

END OF SECTION 233113

SECTION 233713 – DIFFUSERS, REGISTERS, AND GRILLES

1.1 PRODUCTS

- A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND 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

- C. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
- CARNES.
 - HART & COOLEY INC.
 - KRUEGER.
 - METALAIR, INC.
 - NAILOR INDUSTRIES INC.
 - RUSKIN
- D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED. END OF SECTION 233713

C403.4.1 THERMOSTATIC CONTROLS (MANDATORY)

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, NOT FEWER THAN 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 THAT BOTH OF THE FOLLOWING CONDITIONS ARE MET:

- THE PERIMETER SYSTEM INCLUDES NOT FEWER THAN 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).
- THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY THERMOSTATS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM.

C403.4.1.2 DEADBAND (MANDATORY)

THERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CONFIGURED TO PROVIDE A TEMPERATURE RANGE OR DEADBAND OF NOT LESS THAN 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS 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 SETPOINT OVERLAP RESTRICTION (MANDATORY)

THERE 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 CONFIGURED TO PREVENT THE HEATING SETPOINT FROM EXCEEDING THE COOLING SETPOINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.4.1.2.

C403.4.2 OFF-HOUR CONTROLS (MANDATORY)

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 MANUAL SHUTOFF SWITCH LOCATED WITH READY ACCESS.

C403.4.2.1 THERMOSTATIC SETBACK (MANDATORY)

THERMOSTATIC SETBACK CONTROLS SHALL BE CONFIGURED 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 (MANDATORY)

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 NOT FEWER THAN 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 CONFIGURED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

C403.4.2.3 AUTOMATIC START (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.

MECHANICAL GENERAL NOTES

- A. CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
- B. NEW DUCTWORK SHOWN ON PLAN ARE SCHEMATIC ONLY. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES FOR PIPING AND DUCTWORK ROUTING, OFFSET AND RUN PIPING, DUCTWORK INSIDE THE STRUCTURE IF REQUIRED. PROVIDE ANY EXTRA PIPING, DUCTWORK, FITTINGS, INSULATIONS AND OTHER ACCESSORIES IN ORDER TO COMPLETE THE INSTALLATION.
- C. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
- D. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
- E. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
- F. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
- G. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
- H. COORDINATE WITH ALL TRADES FOR MATERIALS IN RATED AND PLENUM SPACES.
- I. ALL SOURCE OF MECHANICAL INTAKE SHALL MAINTAIN 10 LINEAR FEET SEPARATION BETWEEN ANY SOURCE OF EXHAUST. CONTRACTOR IS RESPONSIBLE TO ADJUST DUCT LENGTH AS NEEDED.
- J. MOUNT DUCTWORK AS HIGH AS POSSIBLE.
- K. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
- L. MECHANICAL CONTRACTOR TO COORDINATE INSTALLATION OF WATER HEATER EXHAUST FLUE WITH PLUMBING CONTRACTOR.
- M. ALL EXPOSED ROUND DUCTWORK SHALL BE INTERNALLY LINED. ALL DUCTWORK DIMENSIONS ARE INSIDE CLEAR.
- N. NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
- O. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS.
- P. CONTRACTOR TO FIELD VERIFY EXISTING DUCTWORK, ASSOCIATED ACCESSORIES AND EXISTING HVAC EQUIPMENT. ALL EXISTING DUCTWORK, ASSOCIATED ACCESSORIES AND EXISTING HVAC EQUIPMENT TO BE DEMOLISHED.
- Q. PROVIDE MINIMUM R-8 INSULATION (EXTERNAL) FOR OUTSIDE AIR INTAKE DUCTS. PROVIDE MINIMUM R-5 INSULATION (INTERNAL) FOR EXPOSED DUCTS AND EXTERNAL FOR CONCEALED DUCTS) FOR SUPPLY & RETURN AIR DUCTS. PROVIDE ACOUSTIC INSULATION ON MAIN SUPPLY AND RETURN DUCTS UP TO 10 FT. FROM HVAC UNIT.
- R. ALL DUCTS RUNNING OUTSIDE THE BUILDING & EXPOSED TO THE AMBIENT SHALL HAVE WEATHERPROOF INSULATION.

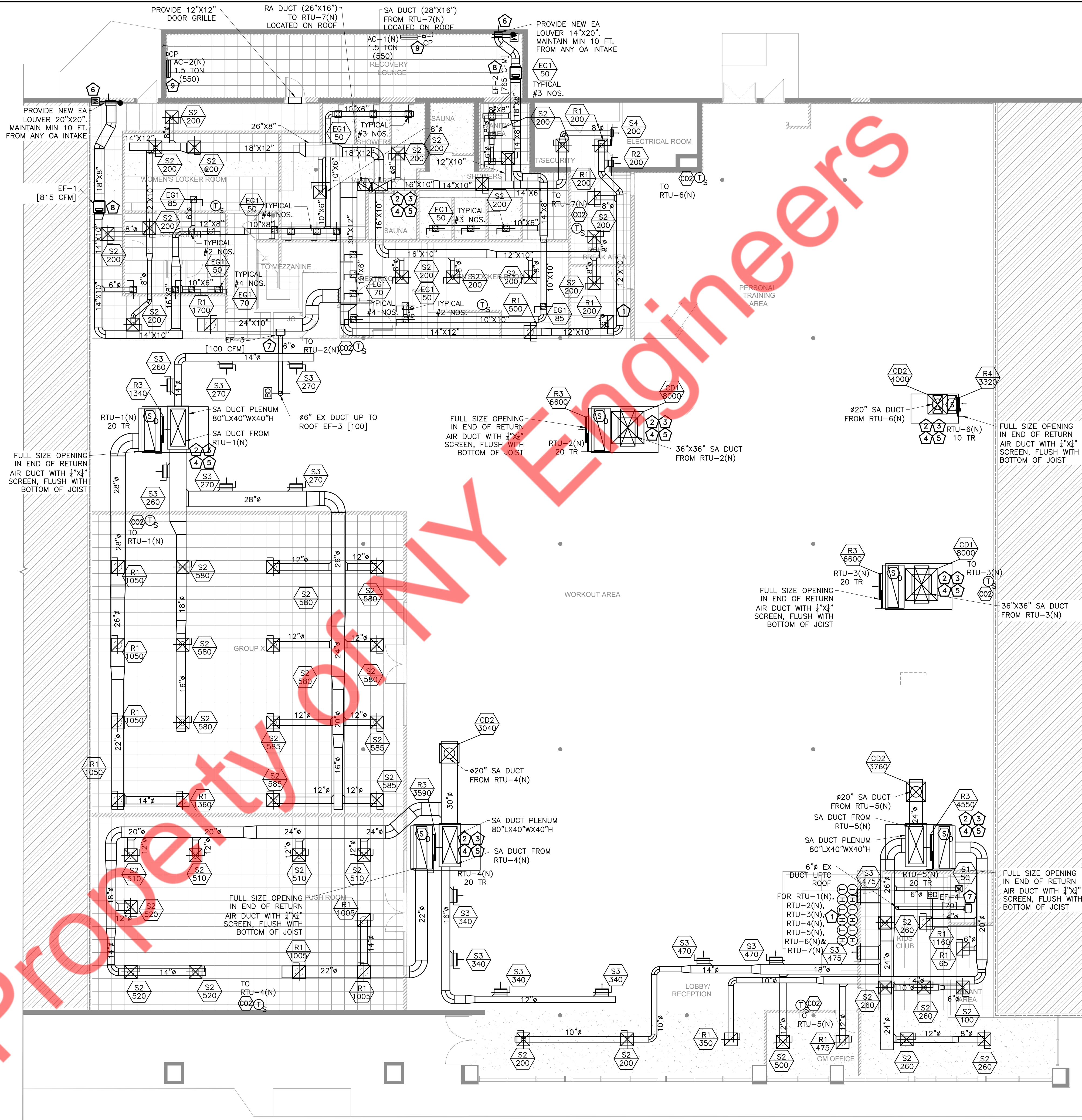
MECHANICAL PLAN KEY NOTES:

1. LOCATE ALL T-STATS NEAR FRONT DESK/MANAGER OFFICE. MECHANICAL CONTRACTOR TO COORDINATE T-STAT LOCATION WITH TENANT. INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT WITH RESPECTIVE RTU. PROVIDE INSULATION AT THE BACK.
2. EXTEND FULL SIZE SUPPLY & RETURN DUCTWORK FROM ROOFTOP UNITS TO SPACE. EXTEND AS SHOWN. ACOUSTICALLY LINE THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS.
3. SMOKE DETECTOR SHALL BE FURNISHED/INSTALLED BY MECHANICAL CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING RTU UNDER ALARM CONDITIONS. ALL WIRING SHALL BE IN CONDUIT PER N E C SMOKE DETECTOR SHALL BE SYSTEM SENSOR MODEL DH100ACDCLP OR EQUAL.
4. PROVIDE REMOTE TEMP SENSOR MOUNTED IN RETURN DUCT AND WIRE BACK TO T-STAT.
5. SUPPLY DIFFUSER LOCATED JUST BELOW ROOF BAR JOIST. PROVIDE VOLUME DAMPER IN SA AND RA DUCTS. PROVIDE MINIMUM OF 4'-0" RA DUCT WITH FULL SIZE OPENING WITH 1/4"x1/4" HARD WIRE SCREEN. COORDINATE LOCATION AND ELEVATION OF SUPPLY AND RETURN WITH THE FINAL LOCATION OF SUSPENDED LIGHTING FIXTURES. TYPICAL FOR ALL RTU'S. SEE DETAIL #5 ON SHEET M2.2 FOR MORE INFORMATION.
6. MD TO INTERLOCK WITH EXHAUST FANS.
7. CEILING MOUNTED EXHAUST FAN. INTERCONNECT EXHAUST FAN WITH LIGHTS IN THIS ROOM. REFER TO ELECTRICAL LIGHTING PLAN. FAN SHALL BE SUSPENDED FROM STRUCTURE ABOVE. VERIFY EXACT LOCATION OF STRUCTURAL MEMBERS PRIOR TO INSTALLATION.
8. CEILING MOUNTED EXHAUST AIR INLINE FAN. REFER TO ELECTRICAL LIGHTING PLAN. FAN SHALL BE SUSPENDED FROM STRUCTURE ABOVE. VERIFY EXACT LOCATION OF STRUCTURAL MEMBERS PRIOR TO INSTALLATION.
9. COORDINATE FINAL LOCATION OF EQUIPEMENT WITH ARCHITECT/OWNER. PROVIDE CONDENSATE DRAIN PUMP IF REQUIRED. ROUTE CONDENSATE DRAIN FROM AC-1(N) & AC-2(N) TO NEAREST PLUMBING DRAIN POINT WITH APPROVED MANNER. COORDINATE WITH PLUMBING CONTRACTOR.

CO2 SENSOR AND INSTALLATION NOTES

MODULATING OUTSIDE AIR DAMPER:

1. UNOCCUPIED MODE: REMAINS SHUT AT ALL TIMES DURING UNOCCUPIED MODE.
2. OCCUPIED MODE: ENERGIZED WHEN FAN IS RUNNING, CLOSED WHEN FAN IS NOT RUNNING. DAMPER SHALL MODULATE BASED ON SIGNAL FROM CO2 SENSORS TO MAINTAIN LEVEL AT OR BELOW 600 PPM ABOVE AMBIENT LEVEL. THE AMBIENT LEVEL CAN BE ASSUMED TO BE 400 PPM. RECOMMENDED LEVEL IS 400 PPM.
3. COMMERCIAL SENSOR UTILIZES A SIGNAL BEAM ABSORPTION INFRARED DIFFUSION SAMPLE METHOD FOR CO2 DETECTION. USING CO2 AS AN INDICATOR OF OCCUPANCY WILL ALLOW VENTILATION BASED ON ACTUAL OCCUPANCY WHILE MAINTAINING CODE MINIMUM VENTILATION.
4. SENSOR WILL MODULE OUTSIDE AIR QUANTITIES THROUGH ECONOMIZER DAMPER ACTUATOR AND WILL CONTROL AMOUNT BETWEEN 0 AND 100% OUTSIDE AIR.
5. SENSOR SHALL BE PROVIDED WITH ROOFTOP AIR CONDITIONING UNIT AND INSTALL PER MANUFACTURERS REQUIREMENTS.
6. CO2 SENSORS SHALL BE LOCATED WITHIN THE BREATHING ZONE BETWEEN 3' TO 6' ABOVE FINISHED FLOOR.



MECHANICAL FIRST FLOOR PLAN

SCALE
1/8" = 1'-0"

MECHANICAL GENERAL NOTES

- A. CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
- B. NEW DUCTWORK SHOWN ON PLAN ARE SCHEMATIC ONLY. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES FOR PIPING AND DUCTWORK ROUTING. OFFSET AND RUN PIPING, DUCTWORK INSIDE THE STRUCTURE IF REQUIRED. PROVIDE ANY EXTRA PIPING, DUCTWORK, FITTINGS, INSULATIONS AND OTHER ACCESSORIES IN ORDER TO COMPLETE THE INSTALLATION.
- C. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
- D. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
- E. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
- F. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
- G. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
- H. COORDINATE WITH ALL TRADES FOR MATERIALS IN RATED AND PLENUM SPACES.
- I. ALL SOURCE OF MECHANICAL INTAKE SHALL MAINTAIN 10 LINEAR FEET SEPARATION BETWEEN ANY SOURCE OF EXHAUST. CONTRACTOR IS RESPONSIBLE TO ADJUST DUCT LENGTH AS NEEDED.
- J. MOUNT DUCTWORK AS HIGH AS POSSIBLE.
- K. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
- L. MECHANICAL CONTRACTOR TO COORDINATE INSTALLATION OF WATER HEATER EXHAUST FLUE WITH PLUMBING CONTRACTOR.
- M. ALL EXPOSED ROUND DUCTWORK SHALL BE INTERNALLY LINED. ALL DUCTWORK DIMENSIONS ARE INSIDE CLEAR.
- N. NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
- O. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS. CONTRACTOR TO FIELD VERIFY EXISTING DUCTWORK, ASSOCIATED ACCESSORIES AND EXISTING HVAC EQUIPMENT. ALL EXISTING DUCTWORK, ASSOCIATED ACCESSORIES AND EXISTING HVAC EQUIPMENT TO BE DEMOLISHED.
- Q. PROVIDE MINIMUM R-8 INSULATION (EXTERNAL) FOR OUTSIDE AIR INTAKE DUCTS. PROVIDE MINIMUM R-5 INSULATION (INTERNAL FOR EXPOSED DUCTS AND EXTERNAL FOR CONCEALED DUCTS) FOR SUPPLY & RETURN AIR DUCTS. PROVIDE ACOUSTIC INSULATION ON MAIN SUPPLY AND RETURN DUCTS UP TO 10 FT. FROM HVAC UNIT.
- R. ALL DUCTS RUNNING OUTSIDE THE BUILDING & EXPOSED TO THE AMBIENT SHALL HAVE WEATHERPROOF INSULATION.

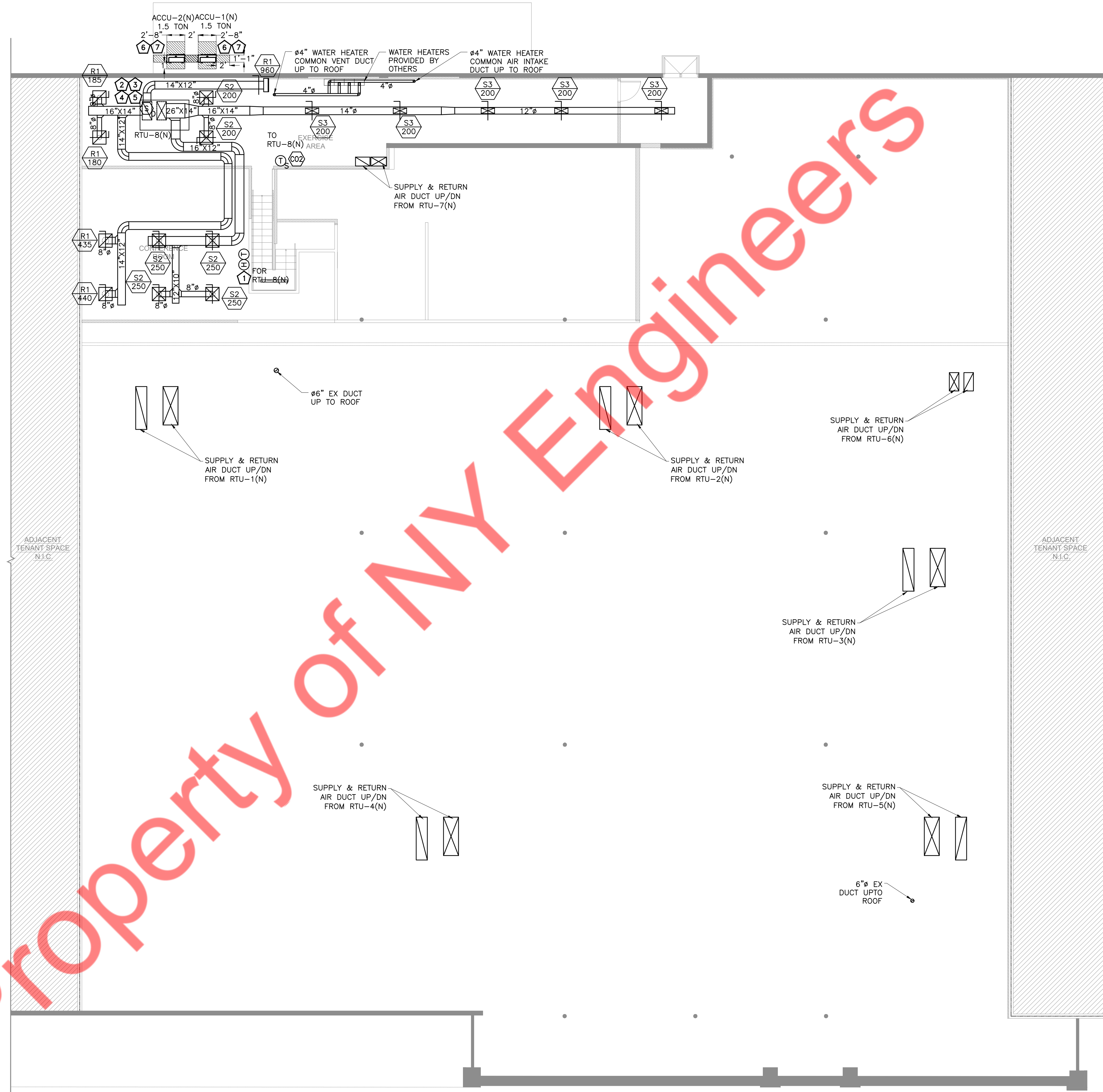
MECHANICAL PLAN KEY NOTES:

- 1. PROVIDE PROGRAMMABLE THERMOSTAT AND HUMIDISTAT WITH LOCKING COVER FOR NEW RTUS. CONFIRM FINAL LOCATION WITH ARCHITECT/OWNER. AVOID LOCATING NEAR OR ABOVE SOURCES OF HEAT. CONFIRM FINAL LOCATION WITH ARCHITECT/OWNER.
- 2. EXTEND FULL SIZE SUPPLY & RETURN DUCTWORK FROM ROOFTOP UNITS TO SPACE. EXTEND AS SHOWN. ACOUSTICALLY LINE THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS.
- 3. SMOKE DETECTOR SHALL BE FURNISHED/INSTALLED BY MECHANICAL CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING RTU UNDER ALARM CONDITIONS. ALL WIRING SHALL BE IN CONDUIT PER N E C SMOKE DETECTOR SHALL BE SYSTEM SENSOR MODEL DH100ACDCLP OR EQUAL.
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- 6. INSTALL OUTDOOR CONDENSING UNITS ON SETBACK ROOF OF THE BUILDING WITH ALL REQUIRED ACCESSORIES. COORDINATE EXACT LOCATION IN FIELD. PROVIDE NECESSARY SUPPORT AS REQUIRED. INSTALL OUTDOOR UNITS WITH THE HELP OF VIBRATION ISOLATORS.
- 7. COORDINATE FINAL LOCATION OF EQUIPMENT WITH OWNER/ARCHITECT.

CO2 SENSOR AND INSTALLATION NOTES

MODULATING OUTSIDE AIR DAMPER:

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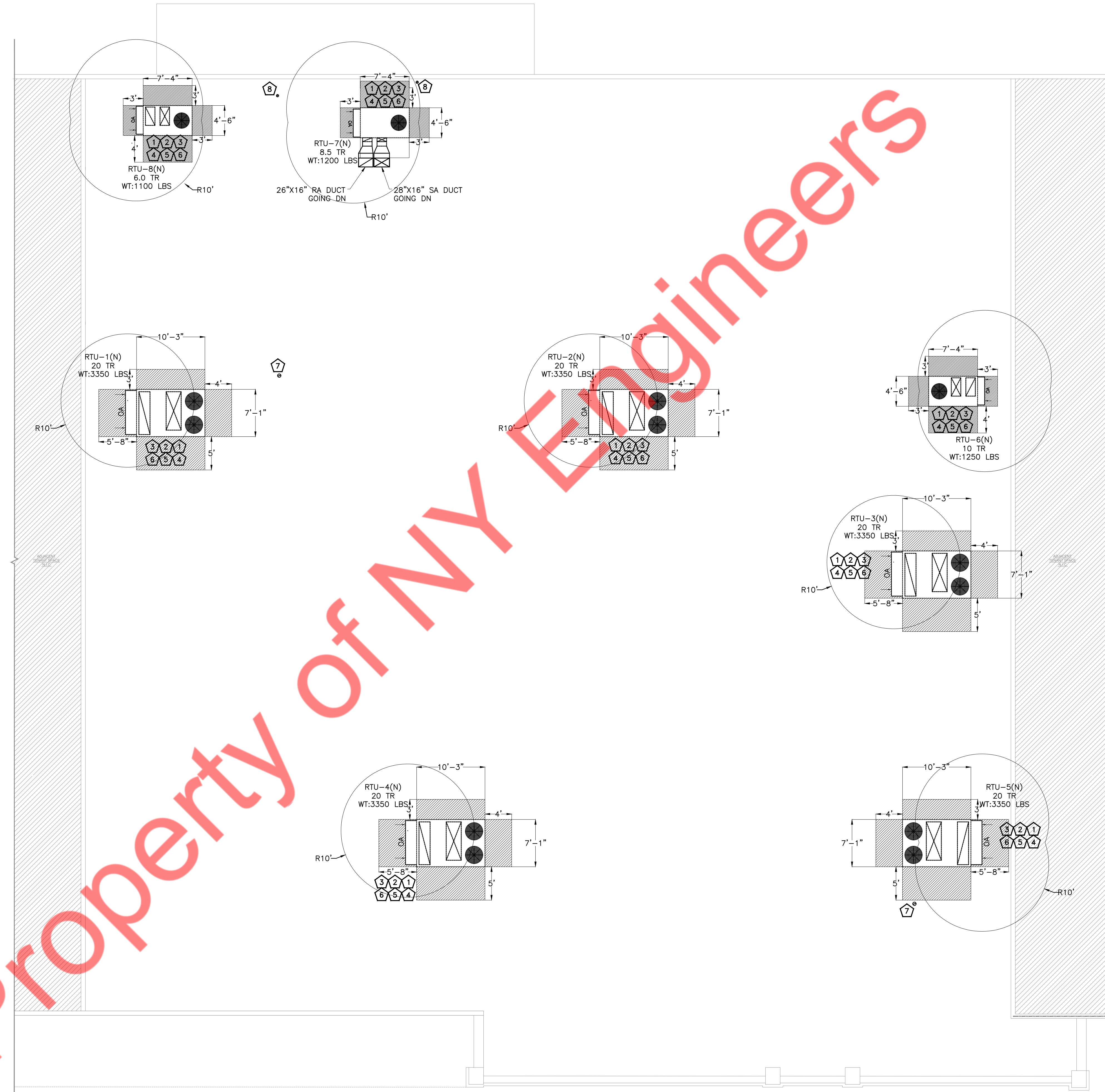


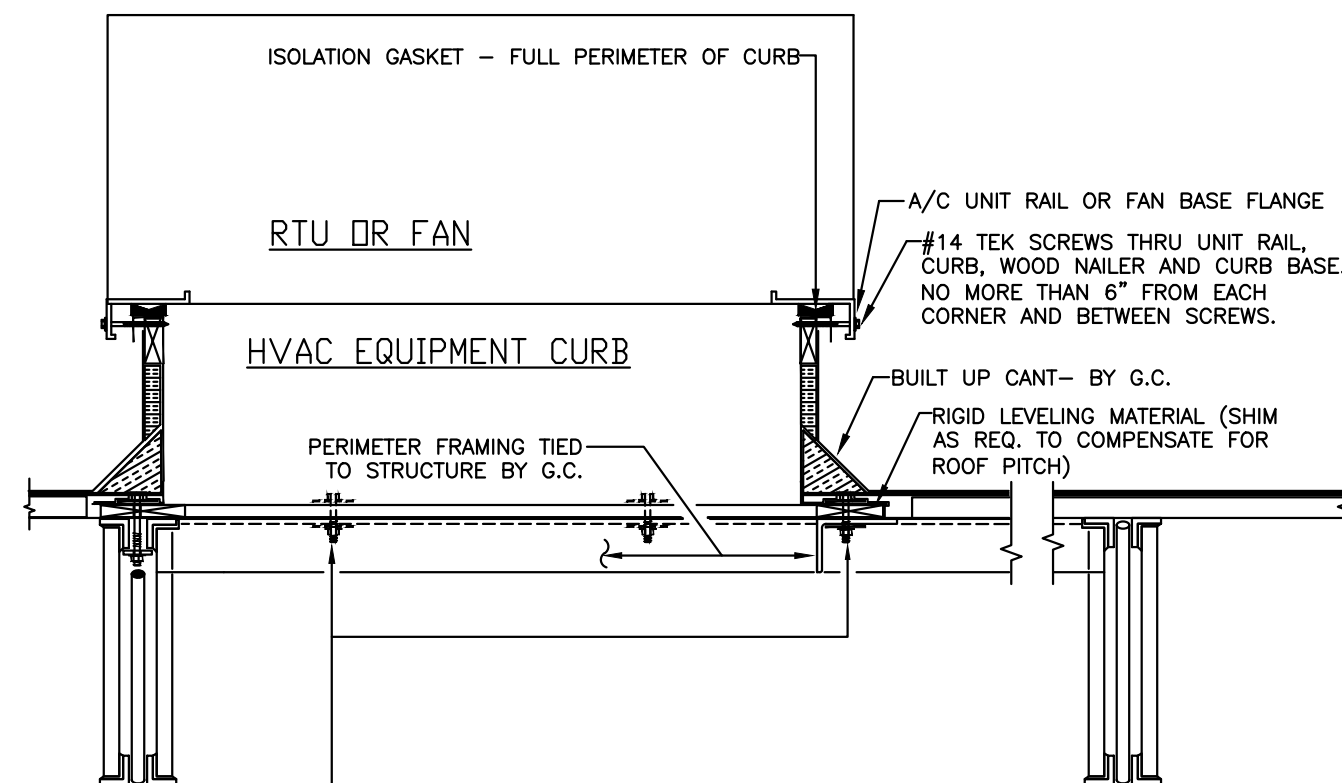
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MECHANICAL ROOF PLAN KEY NOTES:

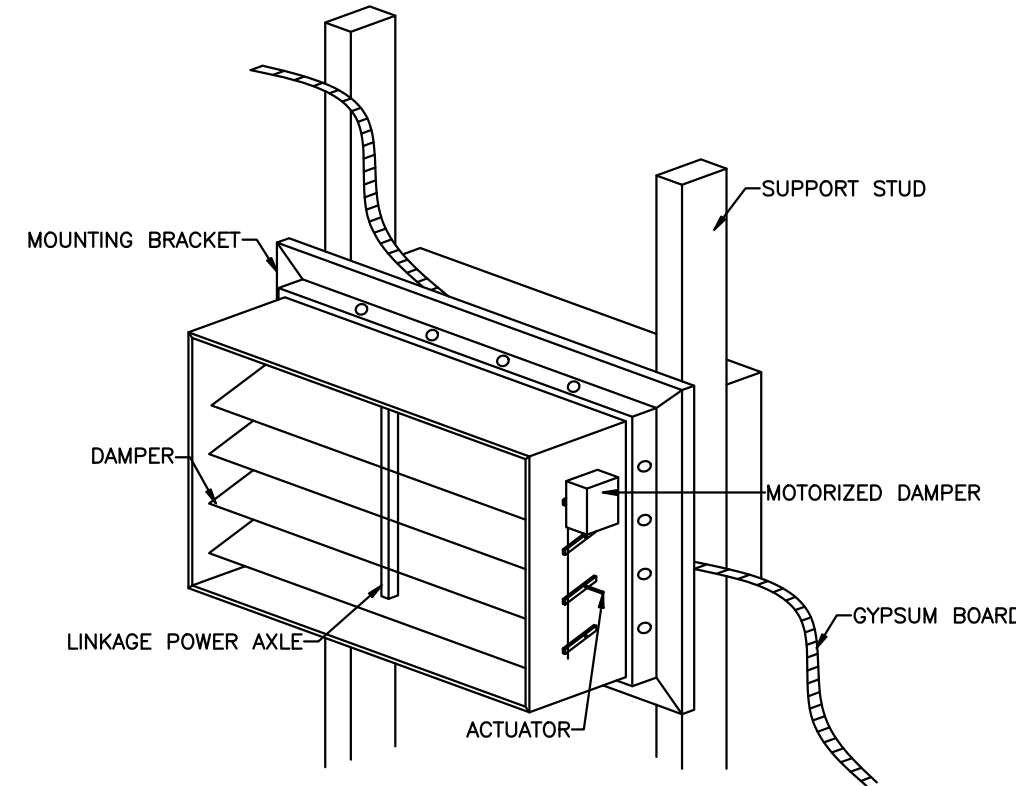
- 1 NEW ROOFTOP UNIT IS PROVIDED. PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES. MECHANICAL CONTRACTOR SHALL SCRIBE INTO UNIT POSITION OF OUTSIDE AIR DAMPER AND LABEL OUTSIDE AIR VOLUME AND PERCENT OF OUTSIDE AIR. TRANSITION AND CONNECT SUPPLY AND RETURN DUCTWORK FROM BELOW. COORDINATE ROUTING THROUGH STRUCTURAL TRUSSES AND OFFSET AS REQUIRED IN CURB SPACE.
- 2 COORDINATE/SUBMIT FINAL LOCATION OF MECHANICAL UNITS, SUPPORT DETAILS WITH STRUCTURAL DRAWINGS. TAKE STRUCTURAL ENGINEER'S APPROVAL ON RTUS WEIGHTS AND CALCULATIONS.
- 3 CONTRACTOR TO CONNECT CONDENSATE DRAIN FROM ALL RTUS TO NEAREST ROOF DRAIN OR DOWN SPOUTS.
- 4 RTUS MUST SIT ON PROPERLY SIZED CURB MINIMUM OF 14 INCHES ABOVE ROOF DECK, NO CURB ADAPTORS.
- 5 NO PENETRATIONS ARE ALLOWED ON THE SIDE OF CURBS. ALL KIND OF PENETRATIONS MUST FALL WITHIN MECHANICAL UNIT OR BY ROOF PENETRATION PERFORMED BY LL ROOFER. GC TO CO-ORDINATE/CONFIRM WITH LL ROOFER DETAILS.
- 6 GUARDS TO BE PROVIDED WHERE APPLIANCES, EQUIPMENT, FANS OR OTHER COMPONENTS THAT REQUIRE SERVICE AND ROOF HATCH OPENINGS ARE LOCATED WITHIN 10 FEET OF THE ROOF EDGE OR OPEN SIDE OF A WALKING SURFACE AND SUCH EDGE OR OPEN SIDE IS LOCATED 30 INCHES ABOVE THE FLOOR, ROOF OR GRADE BELOW. THE GUARD SHALL EXTEND NOT LESS THAN 30 INCHES BEYOND EACH END OF SUCH APPLIANCES, EQUIPMENT, FANS, COMPONENTS AND ROOF HATCH OPENINGS AND THE TOP OF THE GUARD SHALL BE LOCATED NOT LESS THAN 42 INCHES ABOVE THE ELEVATED SURFACE ADJACENT TO THE GUARD. THE GUARD SHALL BE CONSTRUCTED SO AS TO PREVENT THE PASSAGE OF A 21-INCH-DIAMETER SPHERE AND SHALL COMPLY WITH THE LOADING REQUIREMENTS FOR GUARDS SPECIFIED IN THE INTERNATIONAL BUILDING CODE.
- 7 6"Ø EXHAUST DUCT UP THROUGH ROOF WITH WITH GOOSENECK, WEATHER SKIRT, AND BIRD SCREEN. MAINTAIN A MINIMUM OF 10'-0" FROM ALL OUTSIDE AR INTAKES AND TERMINATE 36" ABOVE ROOF.
- 8 AIR INTAKE & VENTS FROM THE HOT WATER HEATERS BELOW. TERMINATE AT LEAST 36" ABOVE ROOF WITH ALL REQUIRED ACCESSORIES RECOMMENDED BY MANUFACTURER.



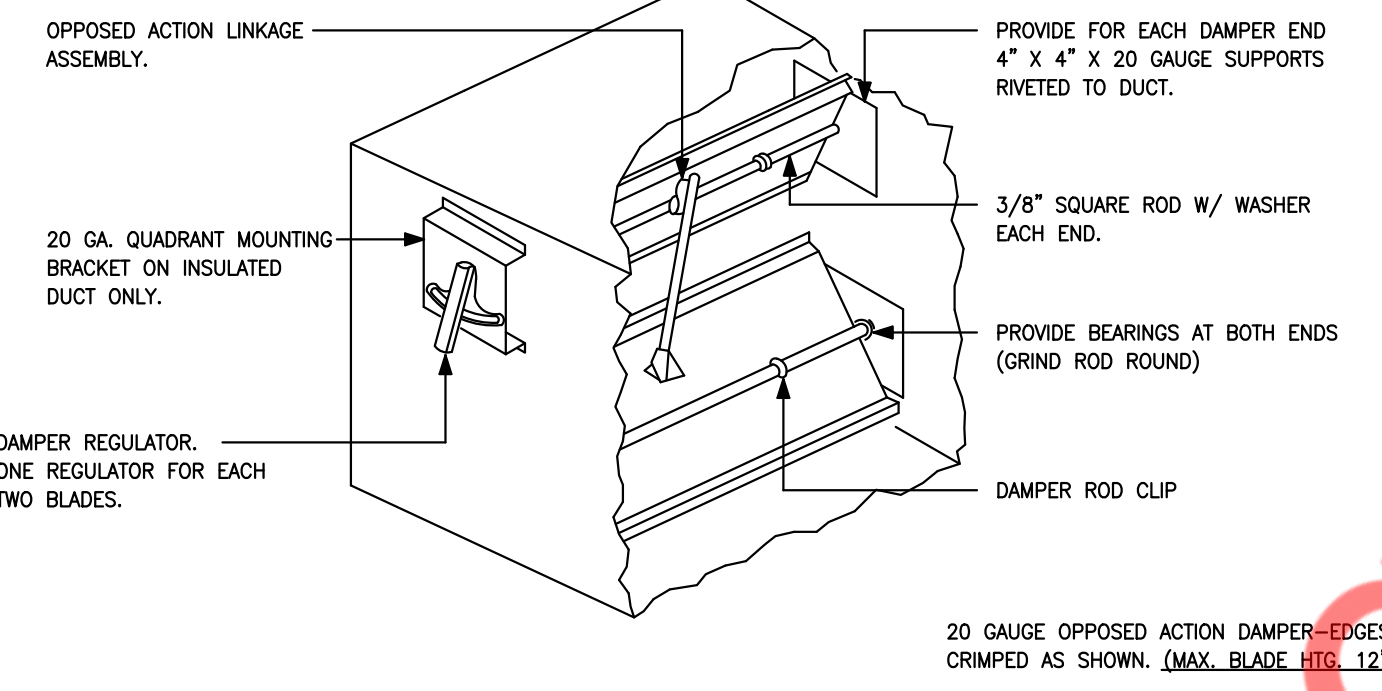


ACCEPTABLE FOR 170 MPH ZONE
VERIFY ON SITE WITH GENERAL CONTRACTOR

1 ROOF TOP UNIT INSTALLATION
M2.1 N.T.S.

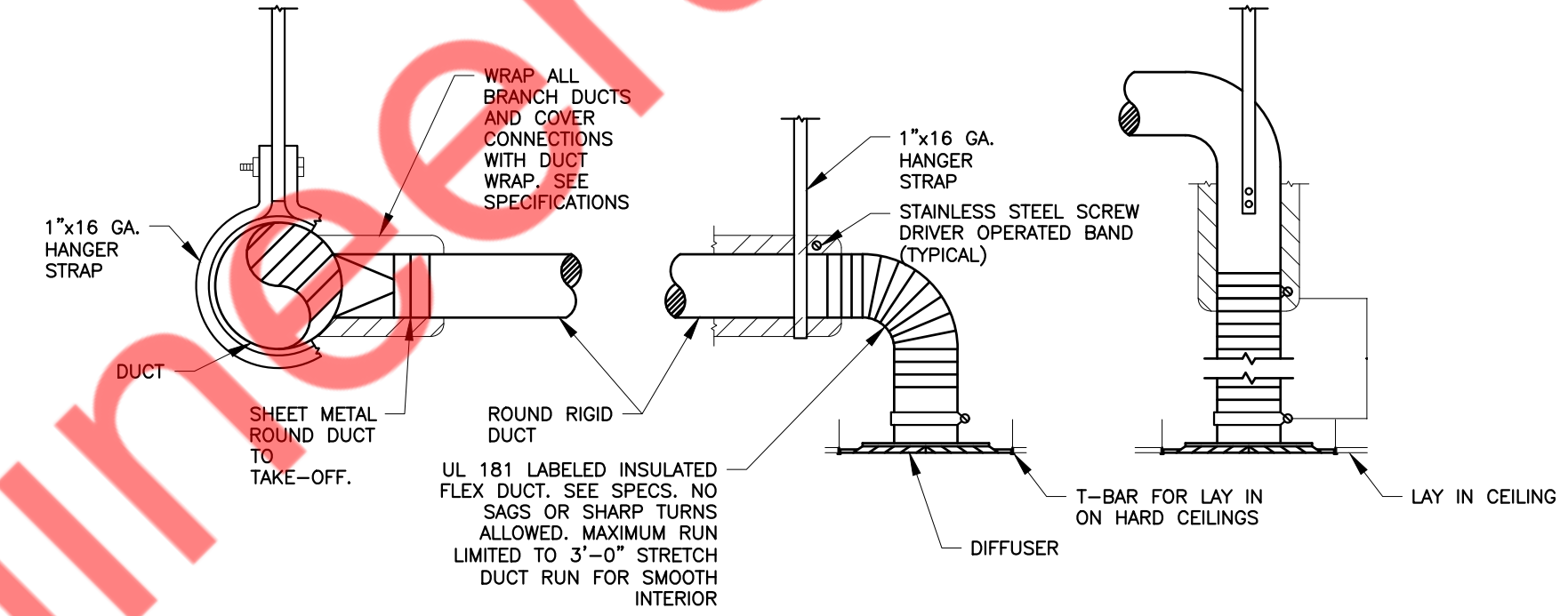


2 MOTORIZED DAMPER DETAIL
M2.1 N.T.S.

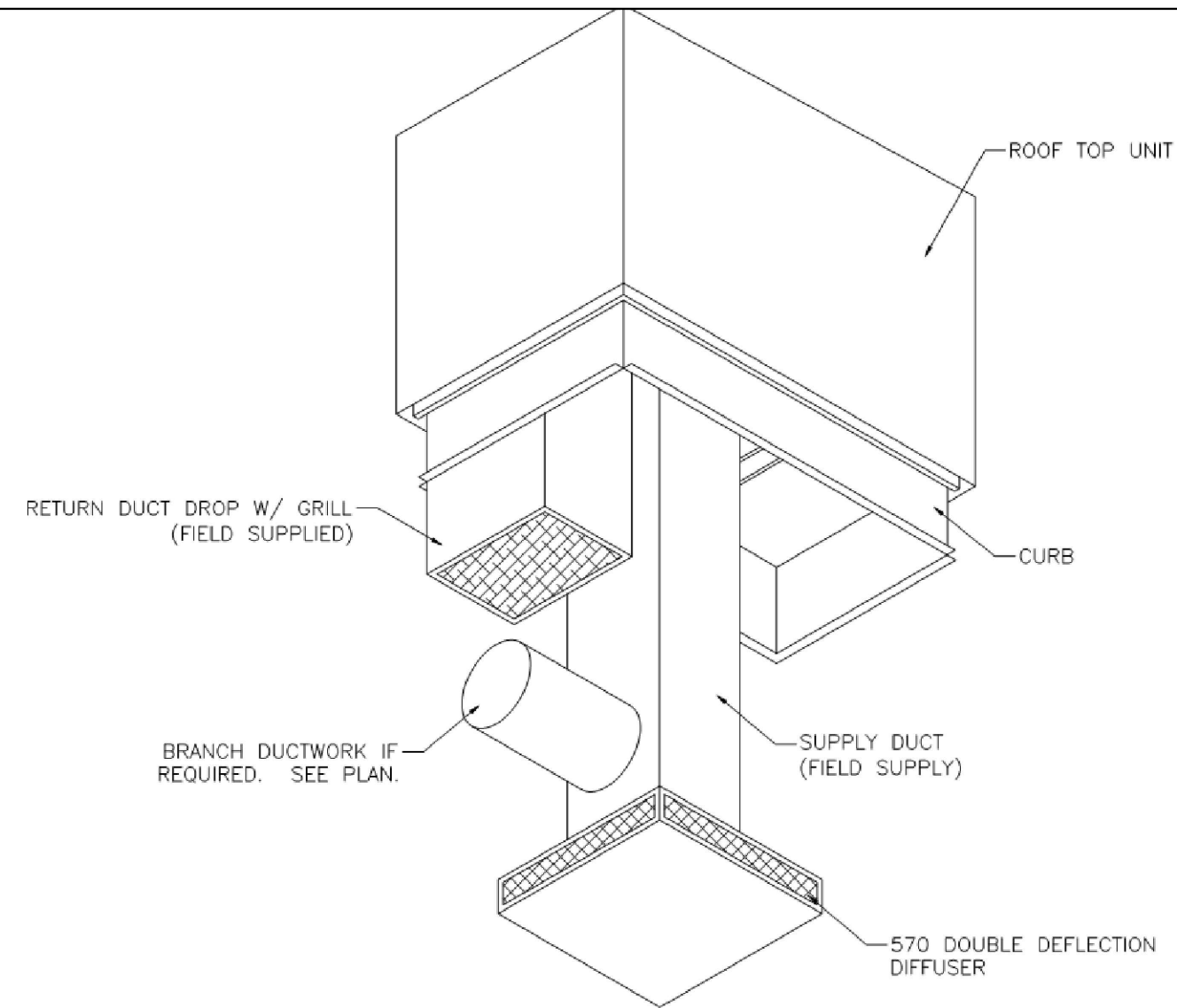


NOTE: 1. FOR DUCTS OVER 29" WIDE AND/OR OVER 12" HIGH.

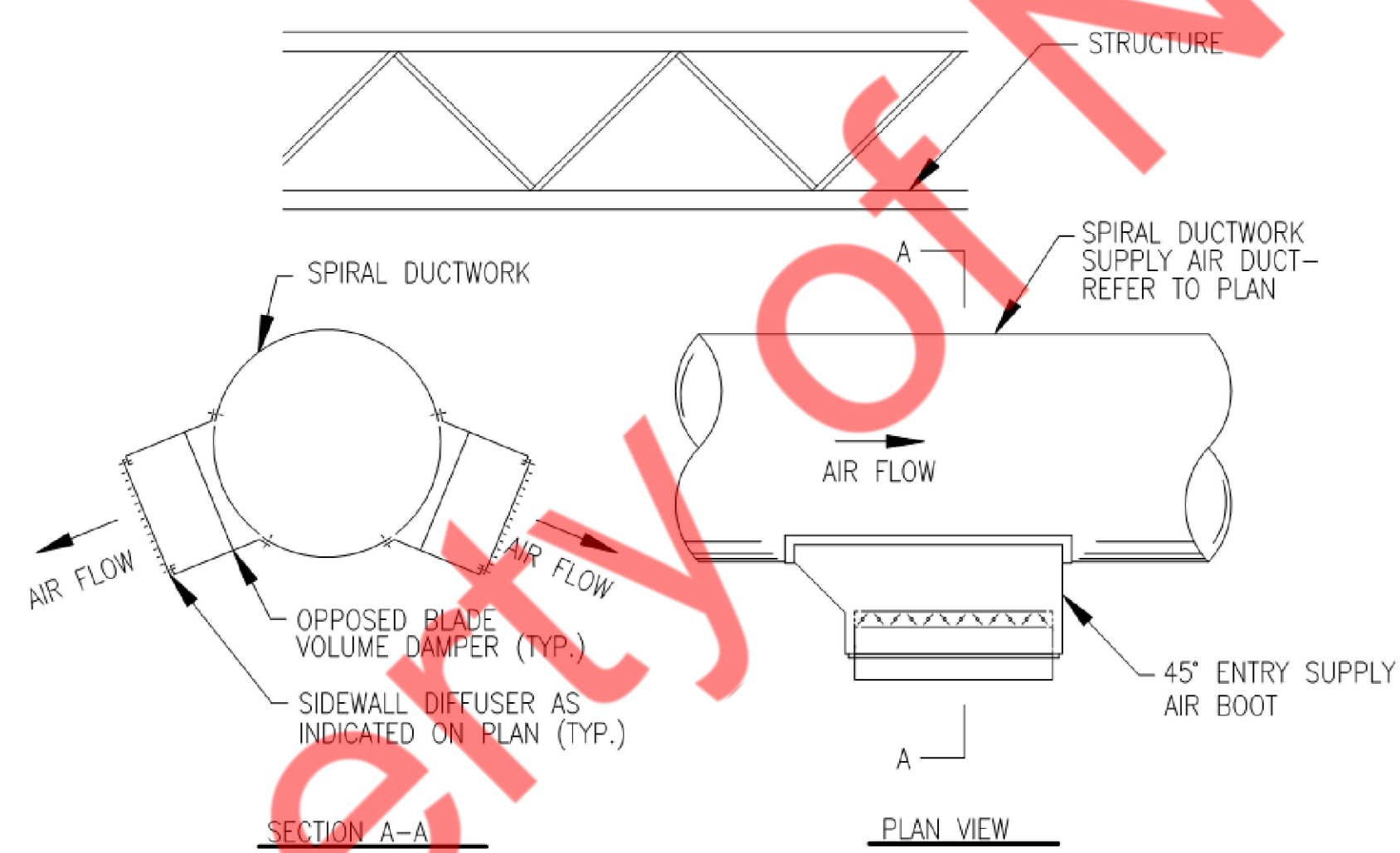
3 LOW PRESSURE BALANCING DAMPER
M2.1 N.T.S.



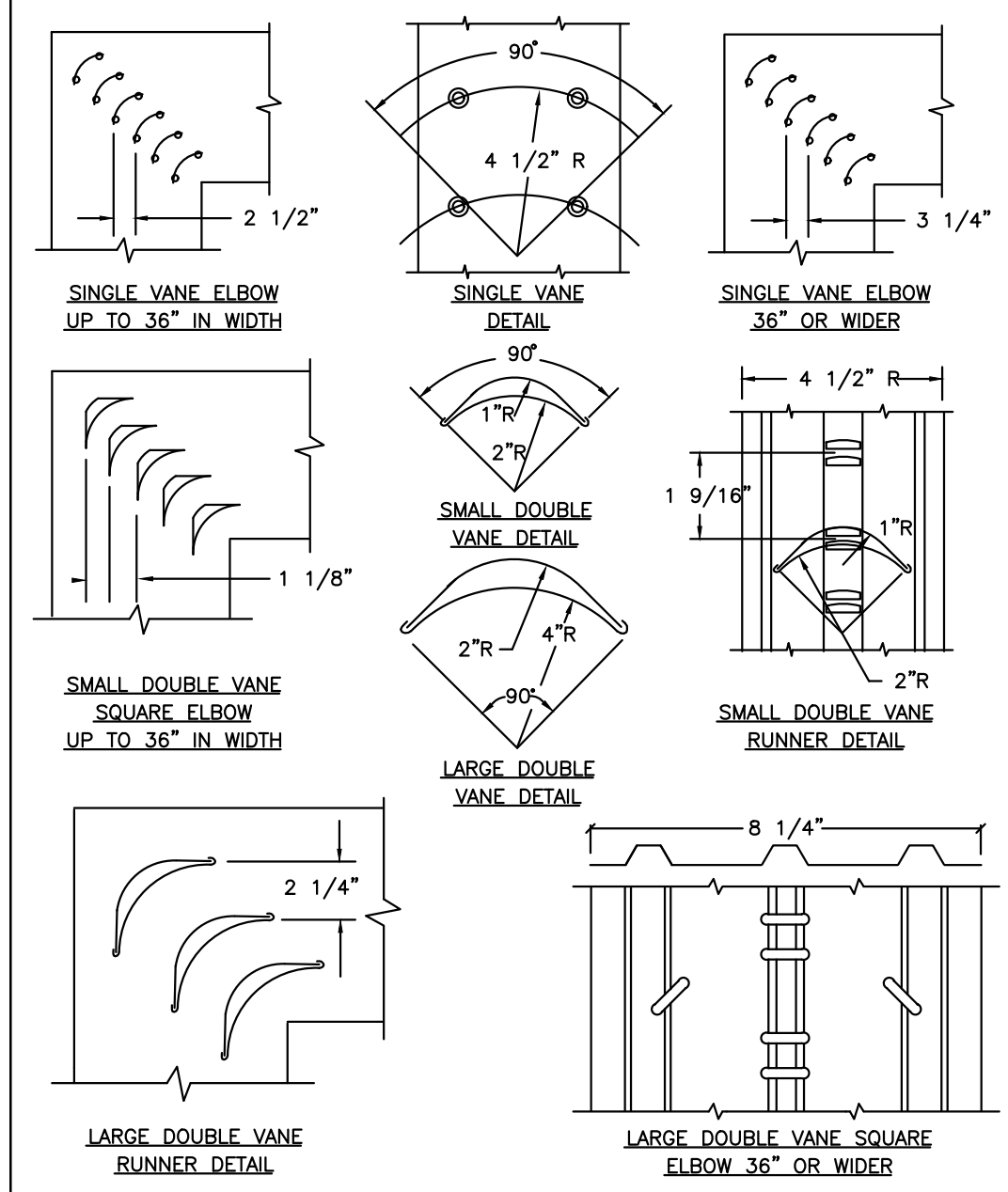
4 TYPICAL DIFFUSER CONNECTION DETAIL
M2.1 N.T.S.



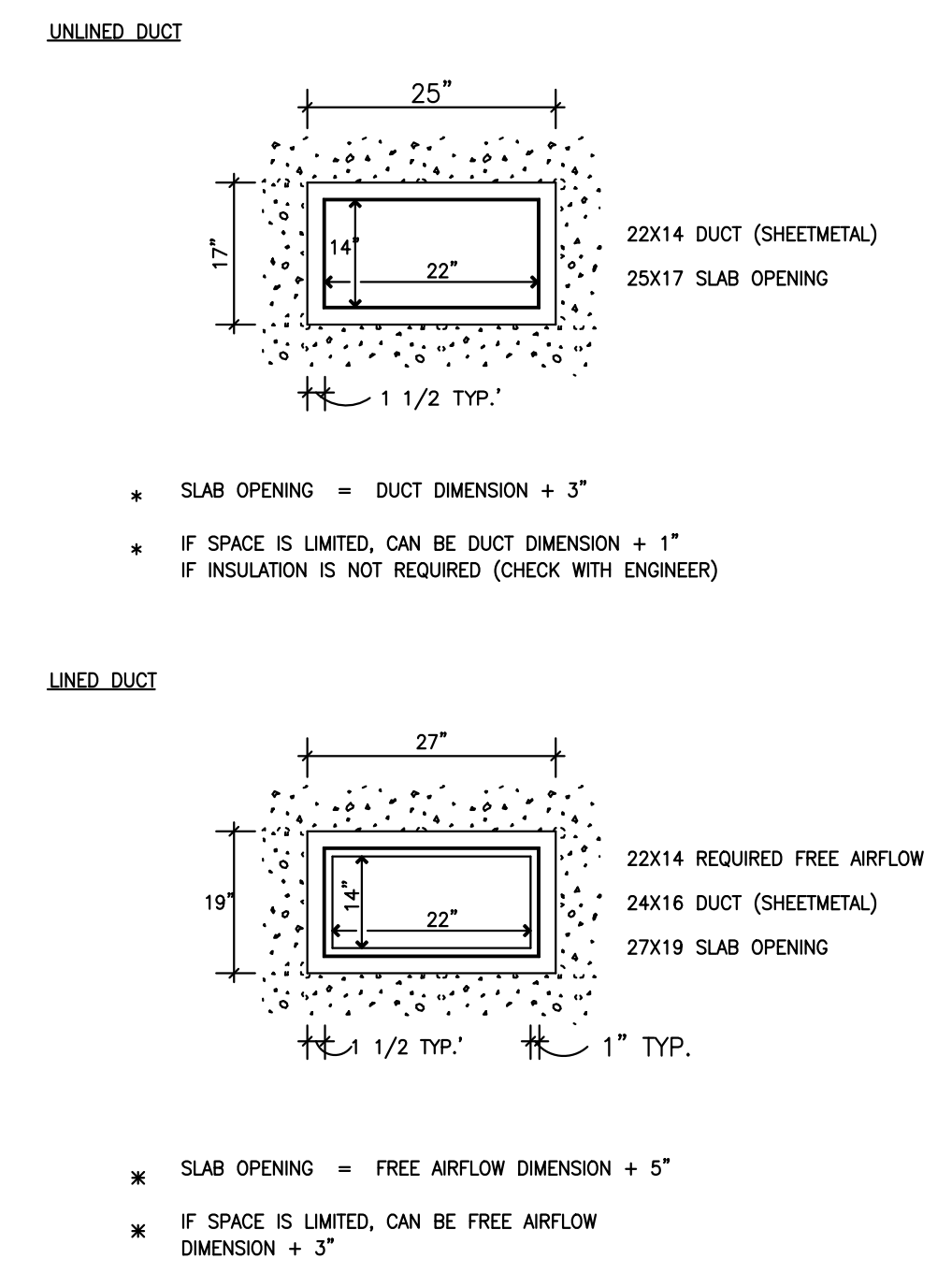
5 570 DIFFUSER DETAIL
M2.1 N.T.S.



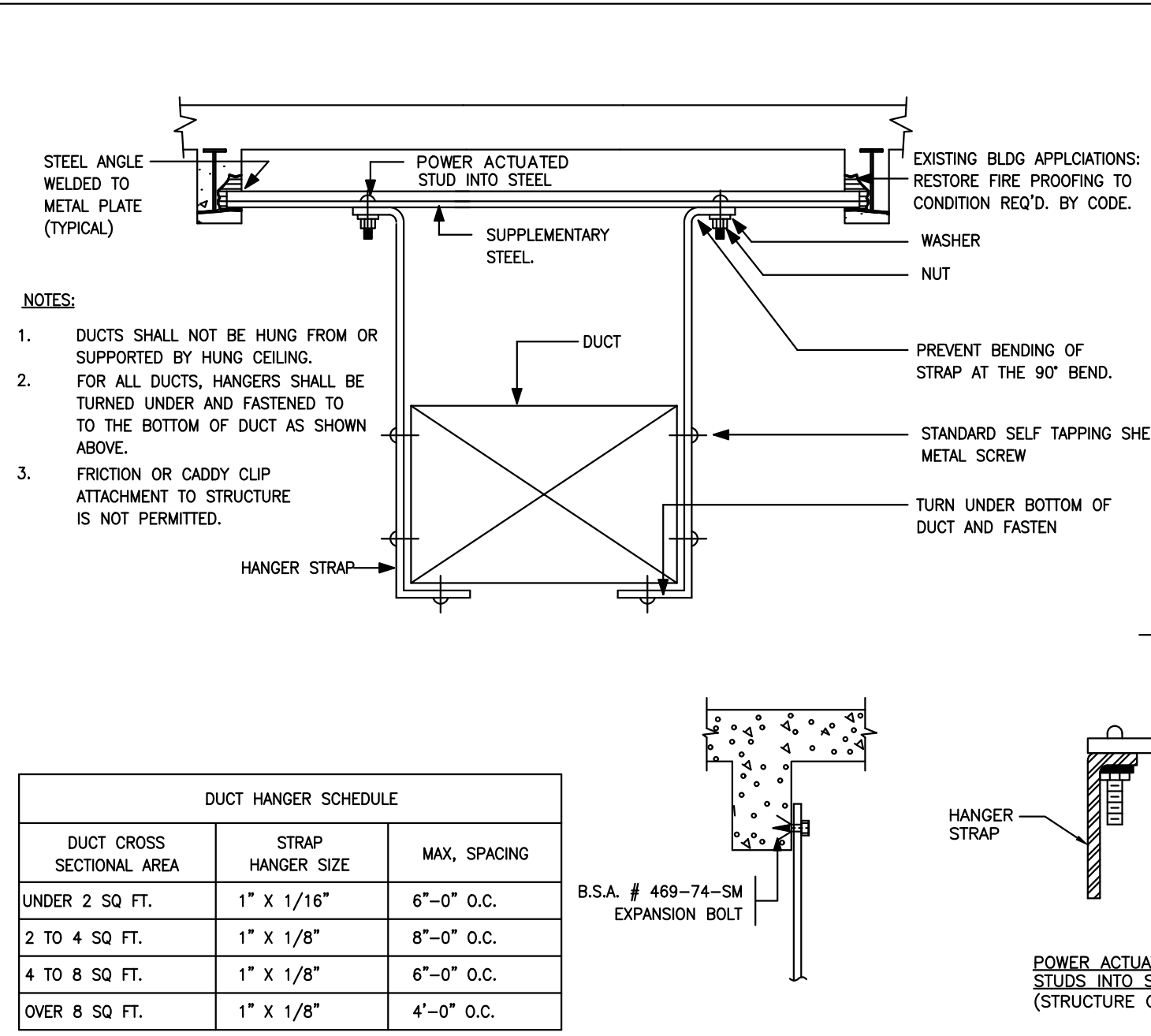
6 SIDE WALL DIFFUSER DETAIL
M2.1 N.T.S.



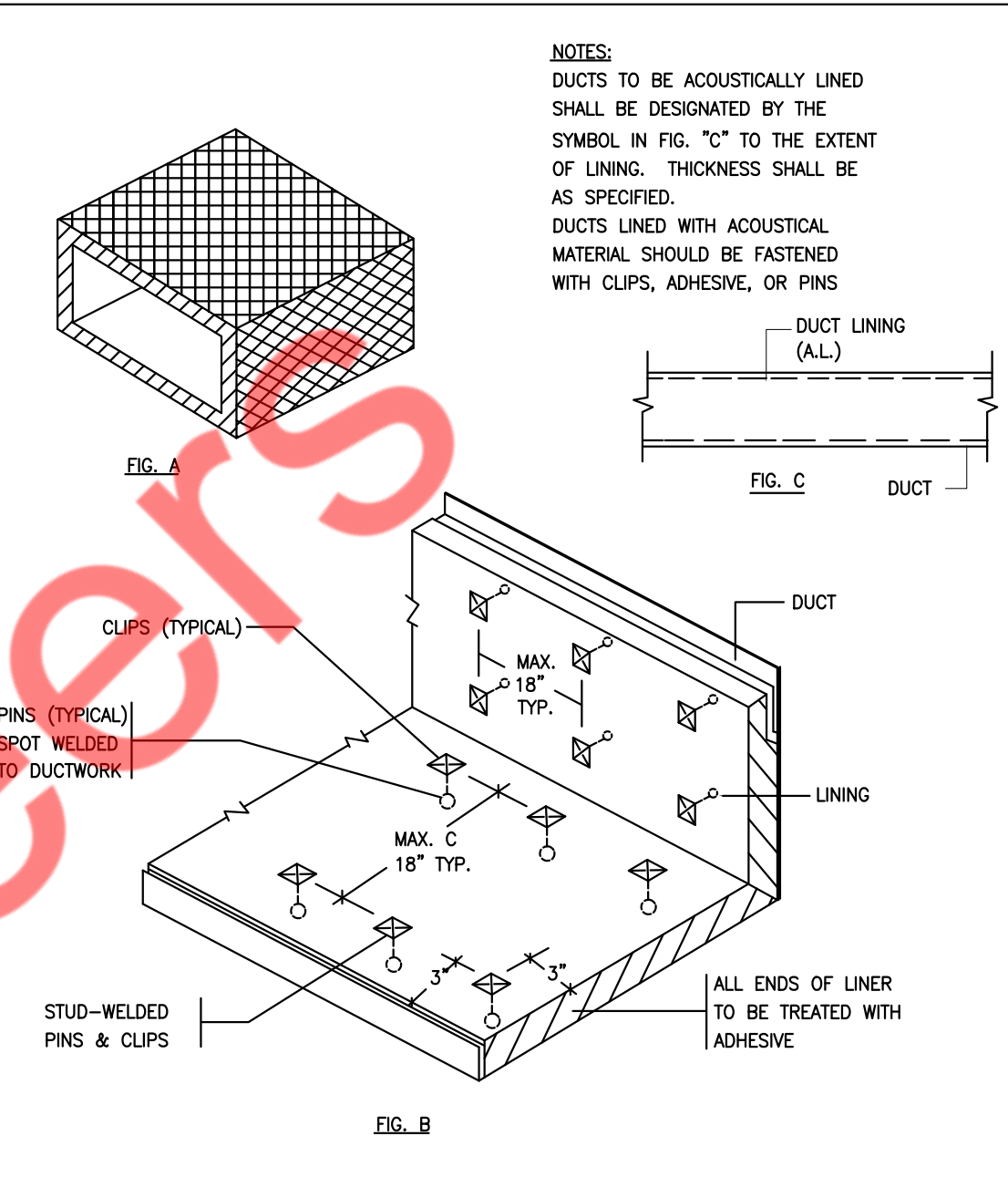
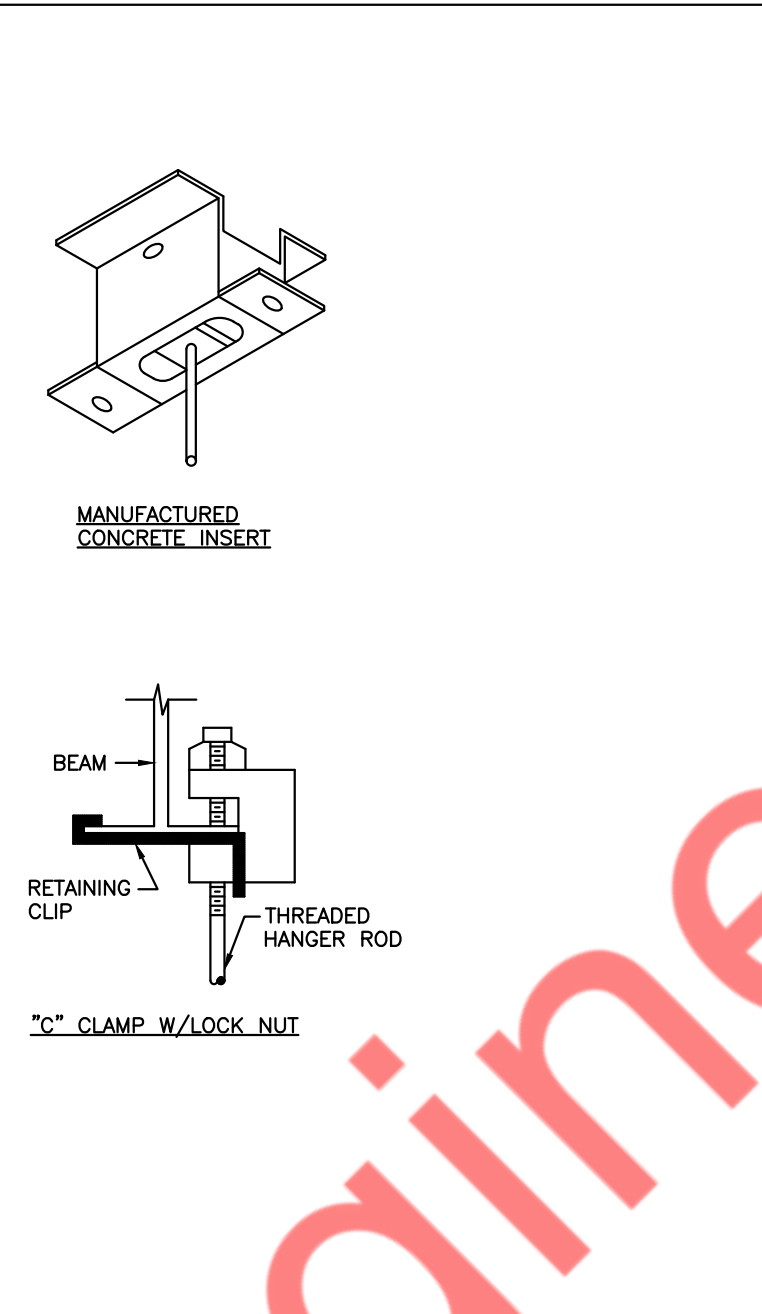
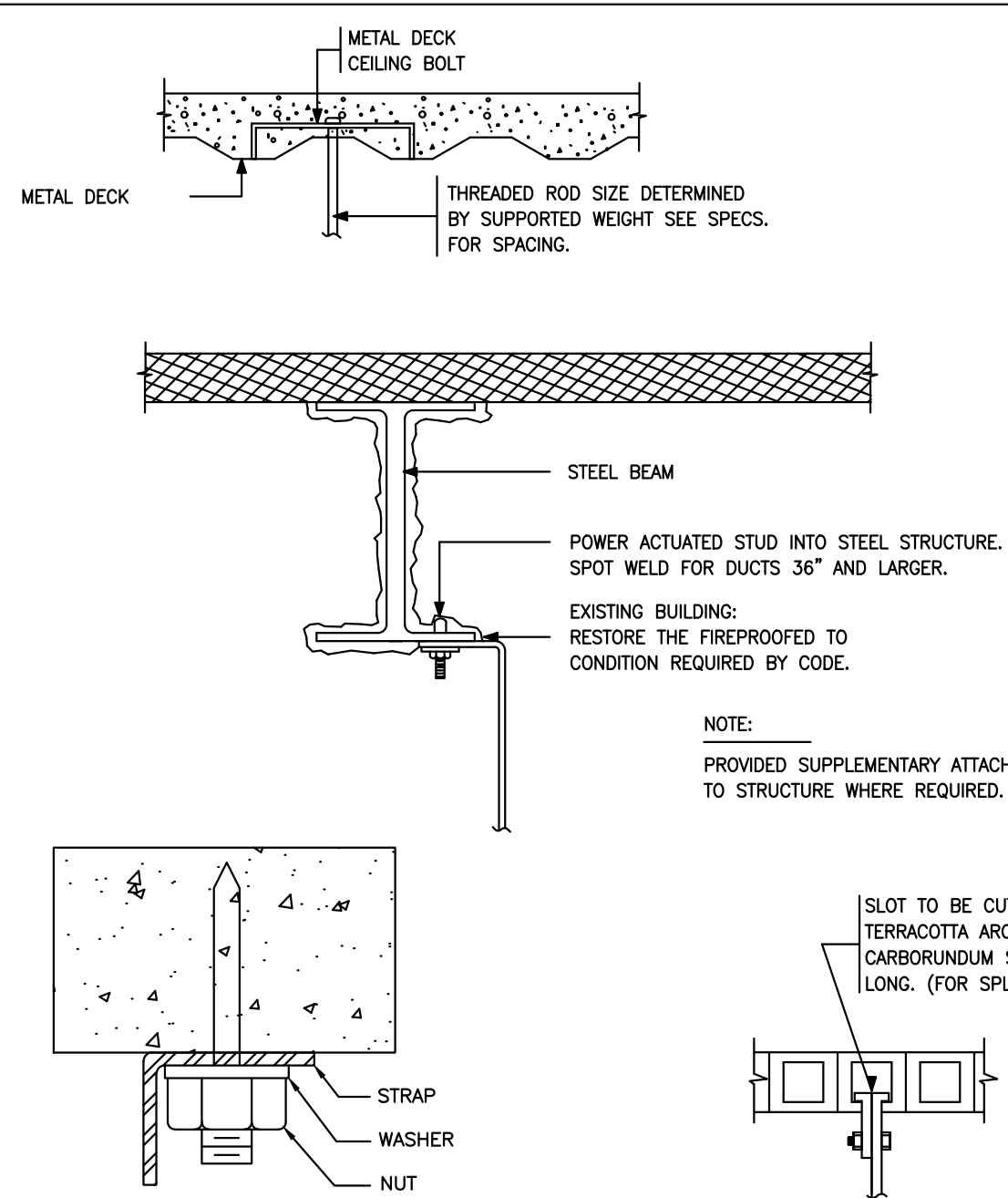
7 LOW VELOCITY DUCTWORK ELBOWS
M2.1 N.T.S.



8 DUCT SIZE/SLAB OPENING CONVENTION
M2.1 N.T.S.

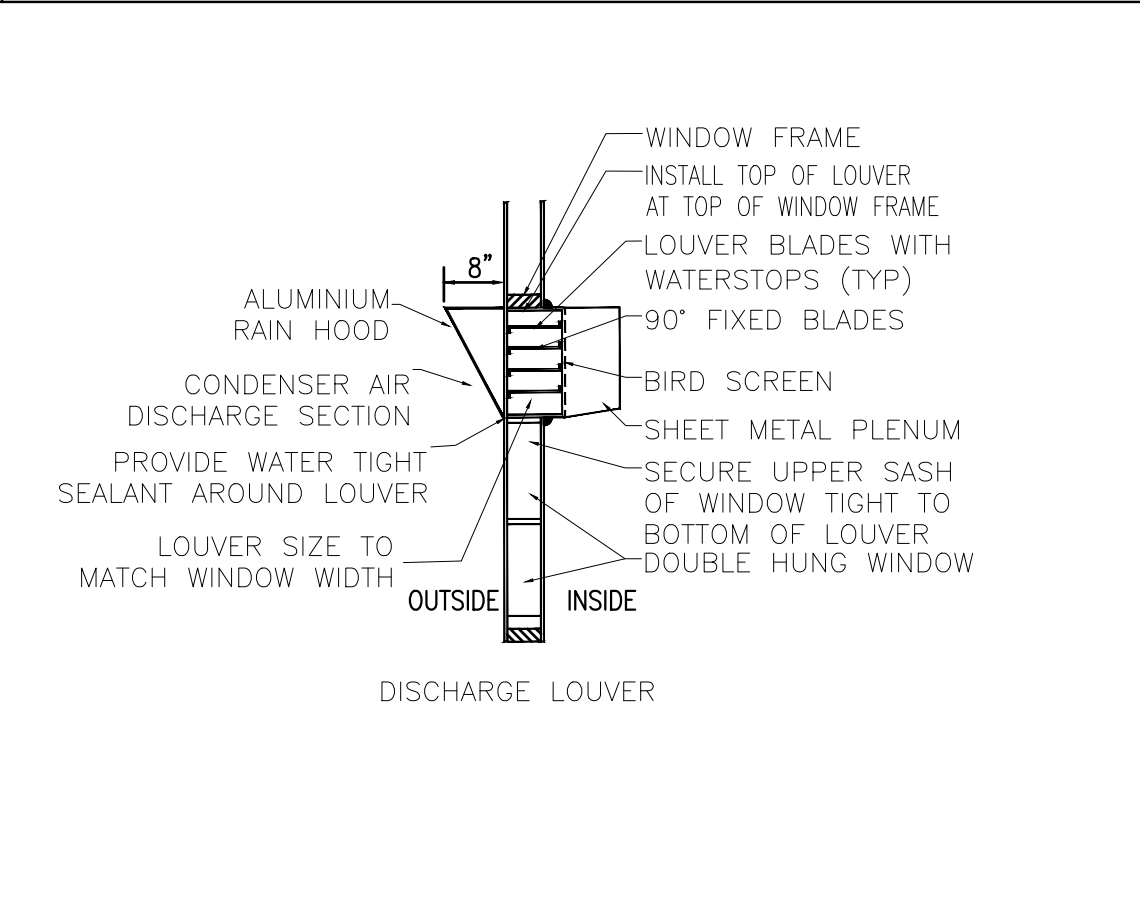
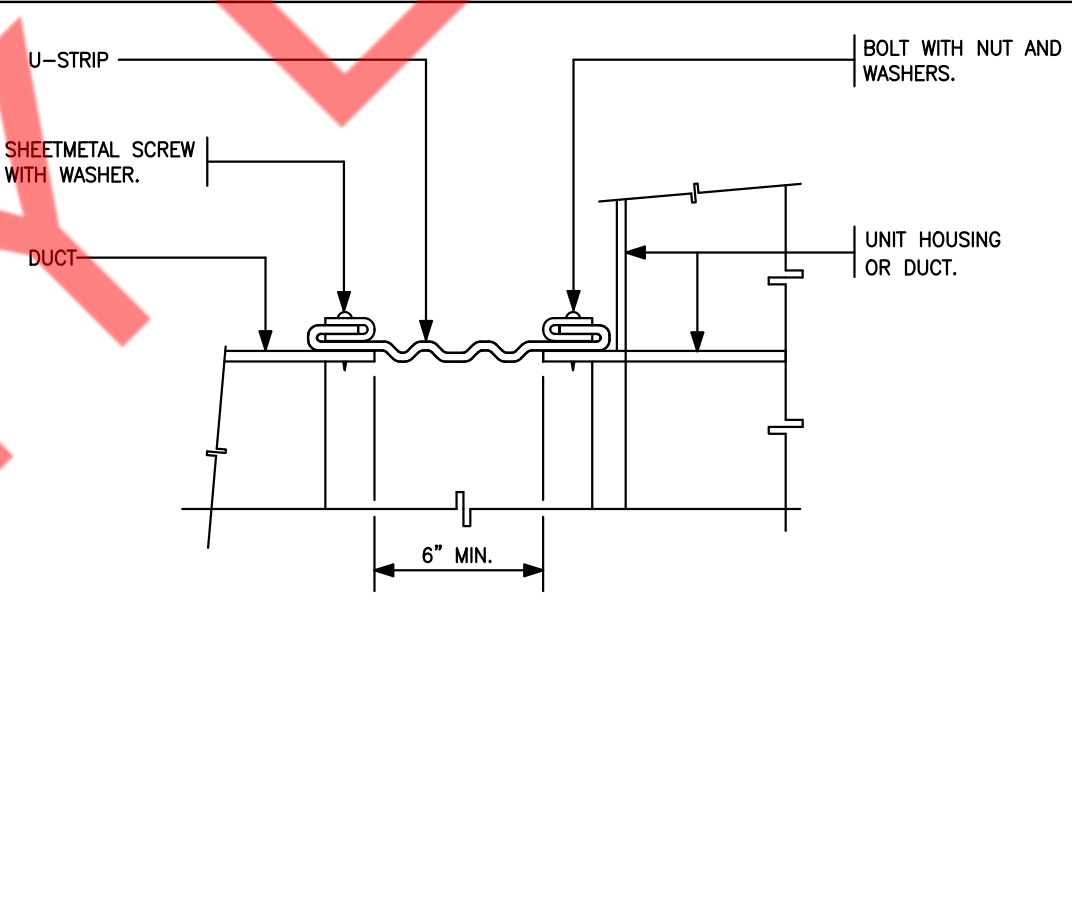
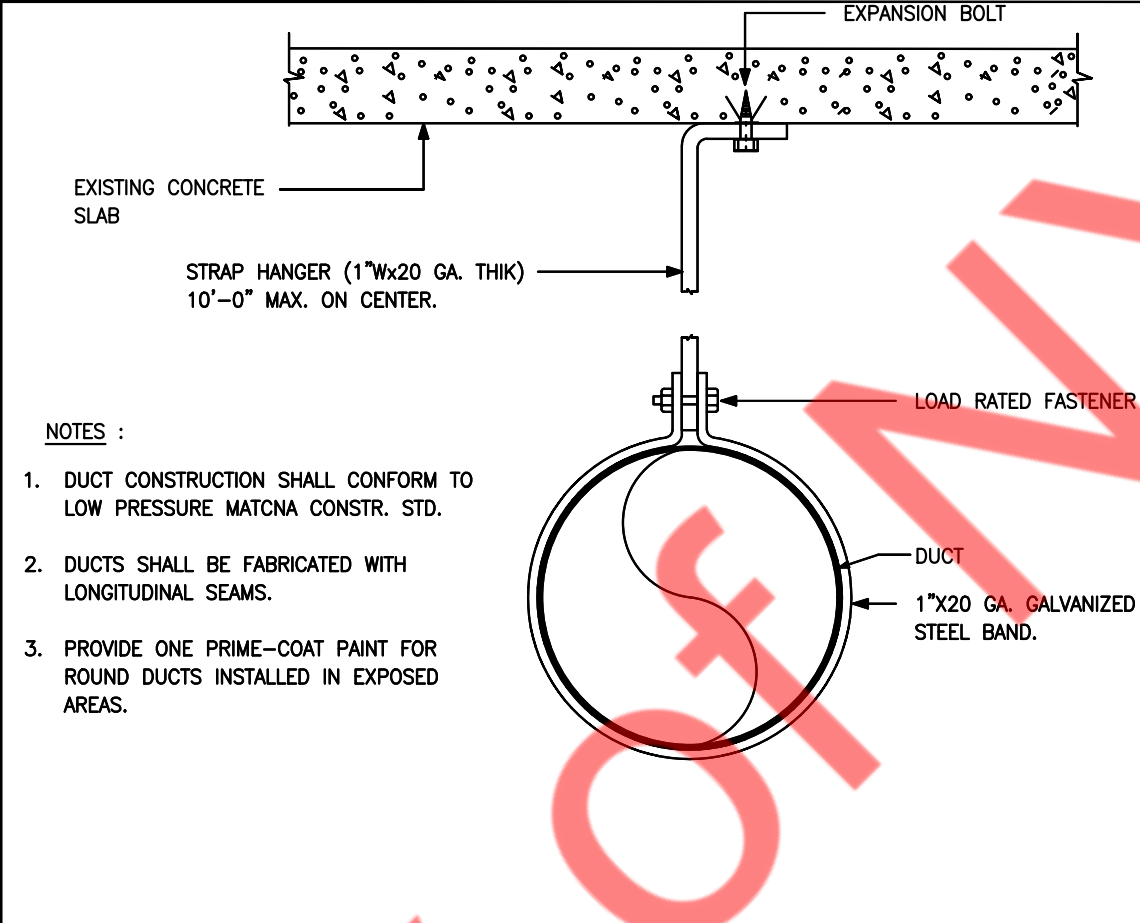
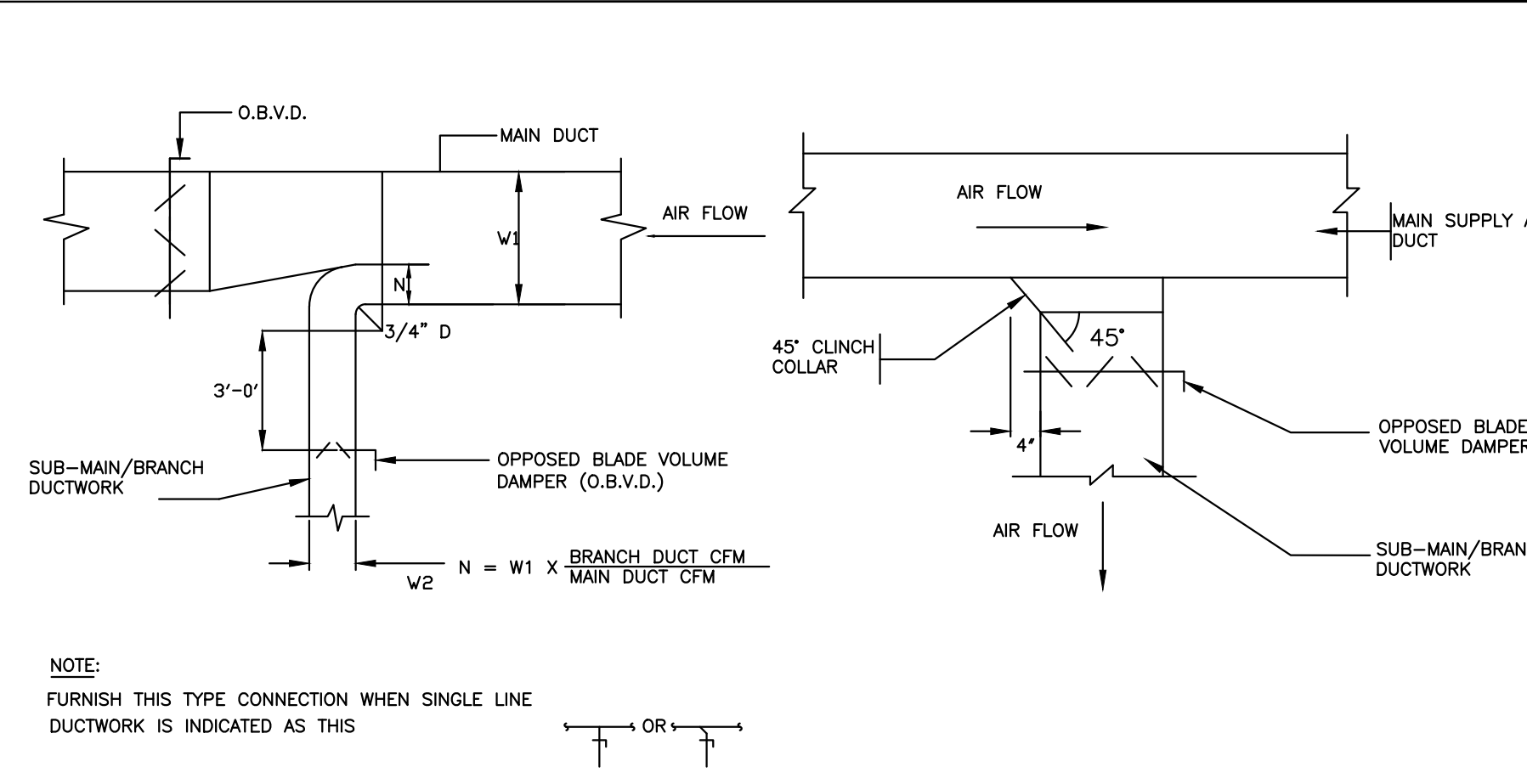


DUCT HANGER SCHEDULE		
DUCT CROSS SECTIONAL AREA	STRAP HANGER SIZE	MAX. SPACING
UNDER 2 SQ FT.	1" x 1/16"	6'-0" O.C.
2 TO 4 SQ FT.	1" x 1/8"	8'-0" O.C.
4 TO 8 SQ FT.	1" x 1/8"	6'-0" O.C.
OVER 8 SQ FT.	1" x 1/8"	4'-0" O.C.



1 DUCT HANGING DETAILS
M2.2 N.T.S

2 ACOUSTICAL TREATMENT DUCT LINING
M2.2 N.T.S

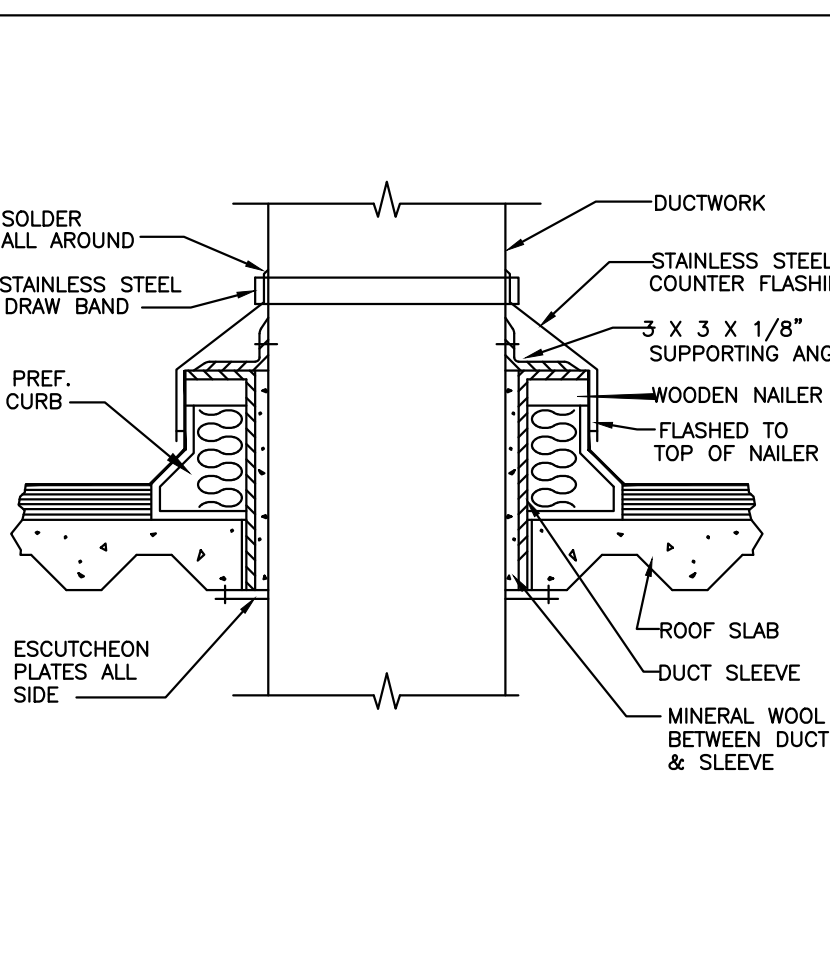
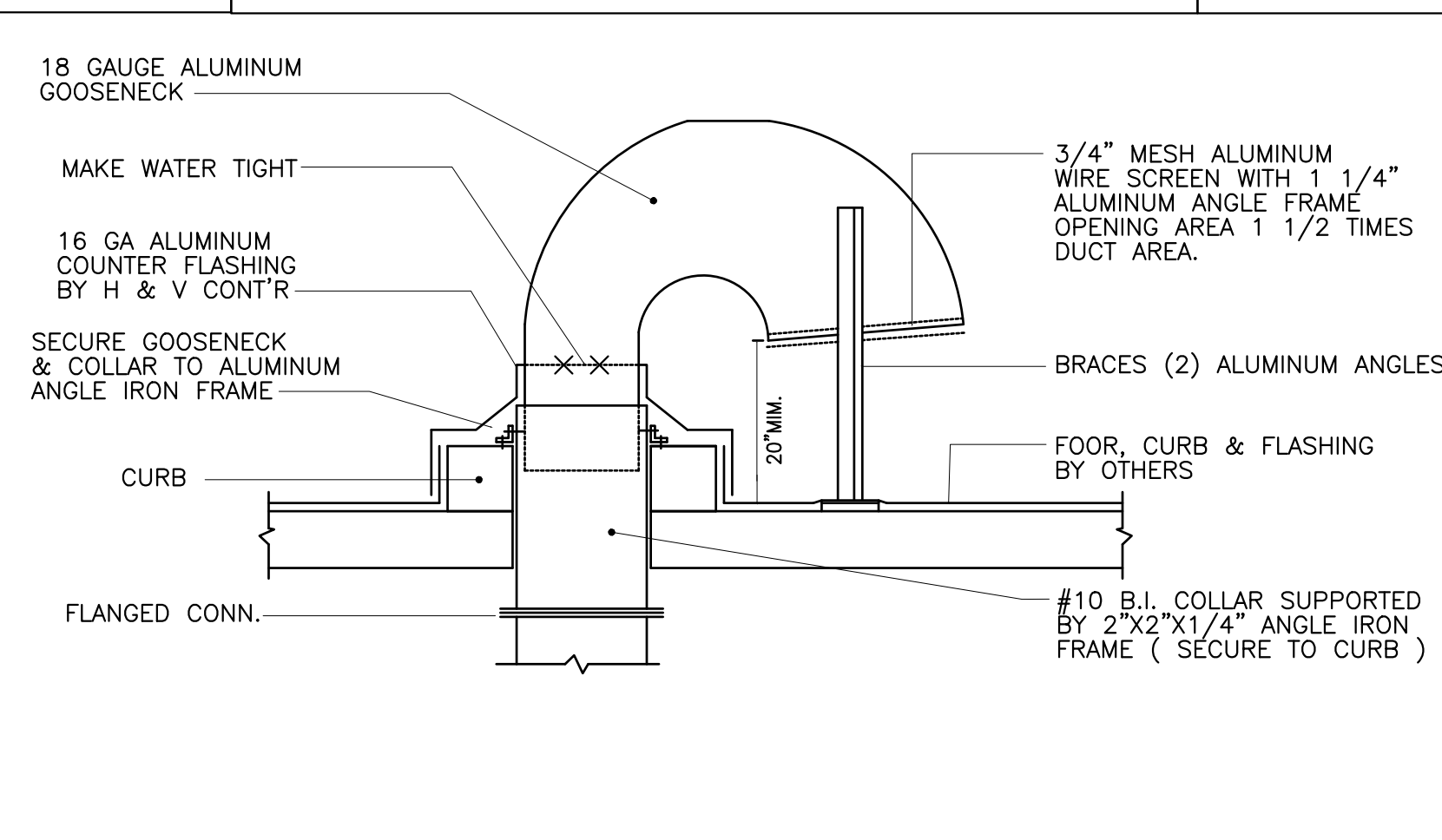
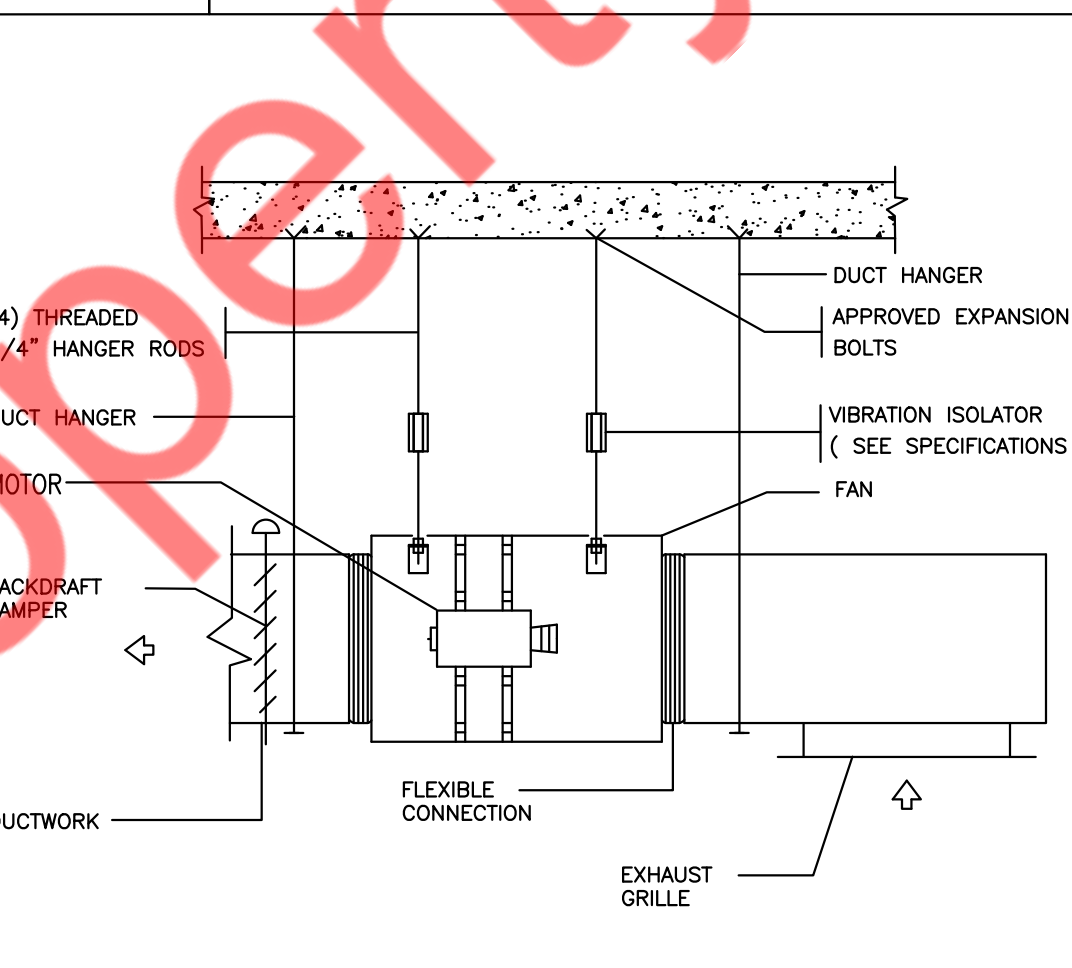
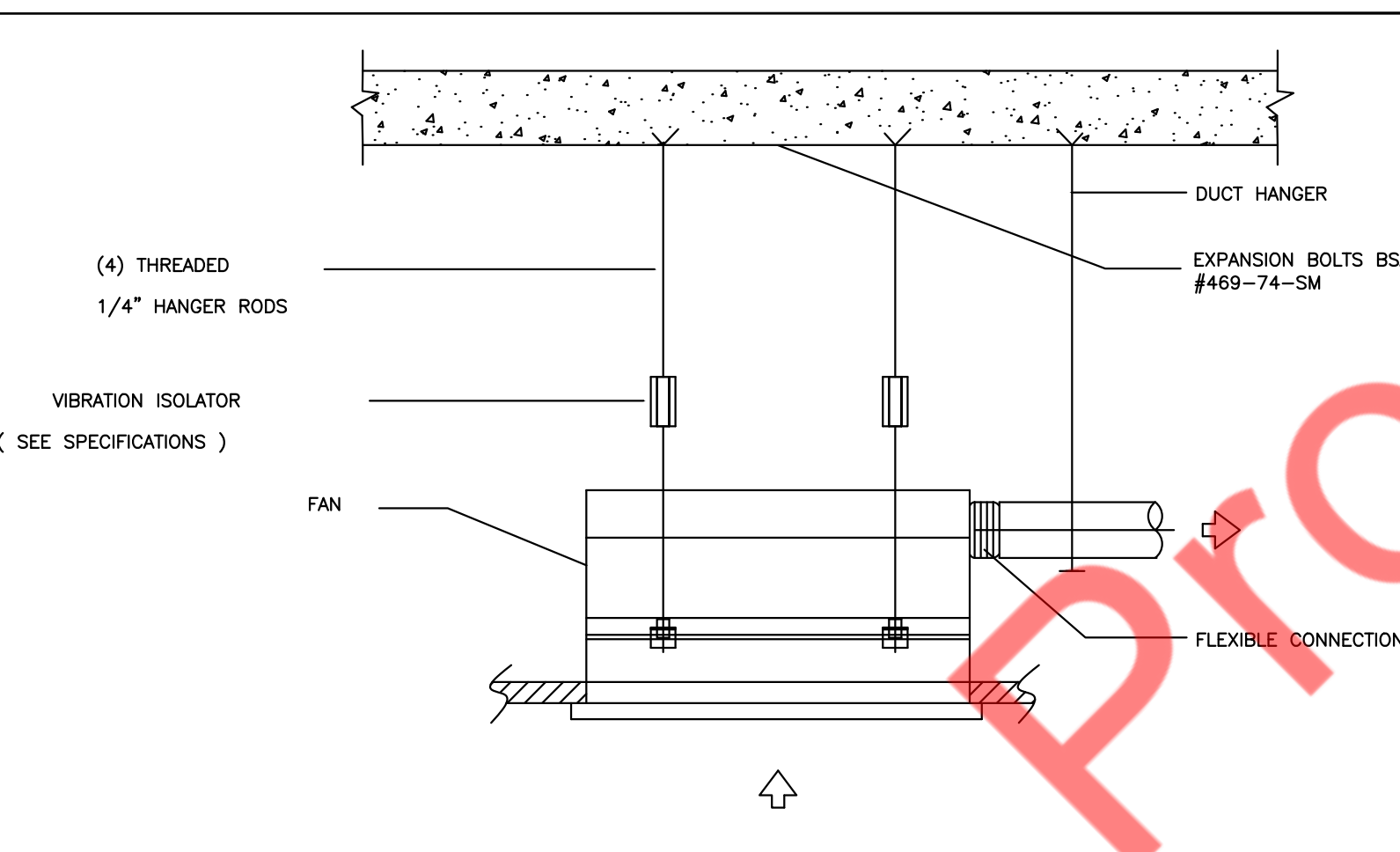


3 SUPPLY AIR DUCTWORK SUB-MAIN/BRANCH DUCT CONNECTION
M2.2 N.T.S

4 METHOD OF HANGING DUCTWORK
M2.2 N.T.S

5 FLEXIBLE CONNECTION (DUCT-EQUIPMENT)
M2.2 N.T.S

6 LOUVER DETAIL
M2.2 N.T.S

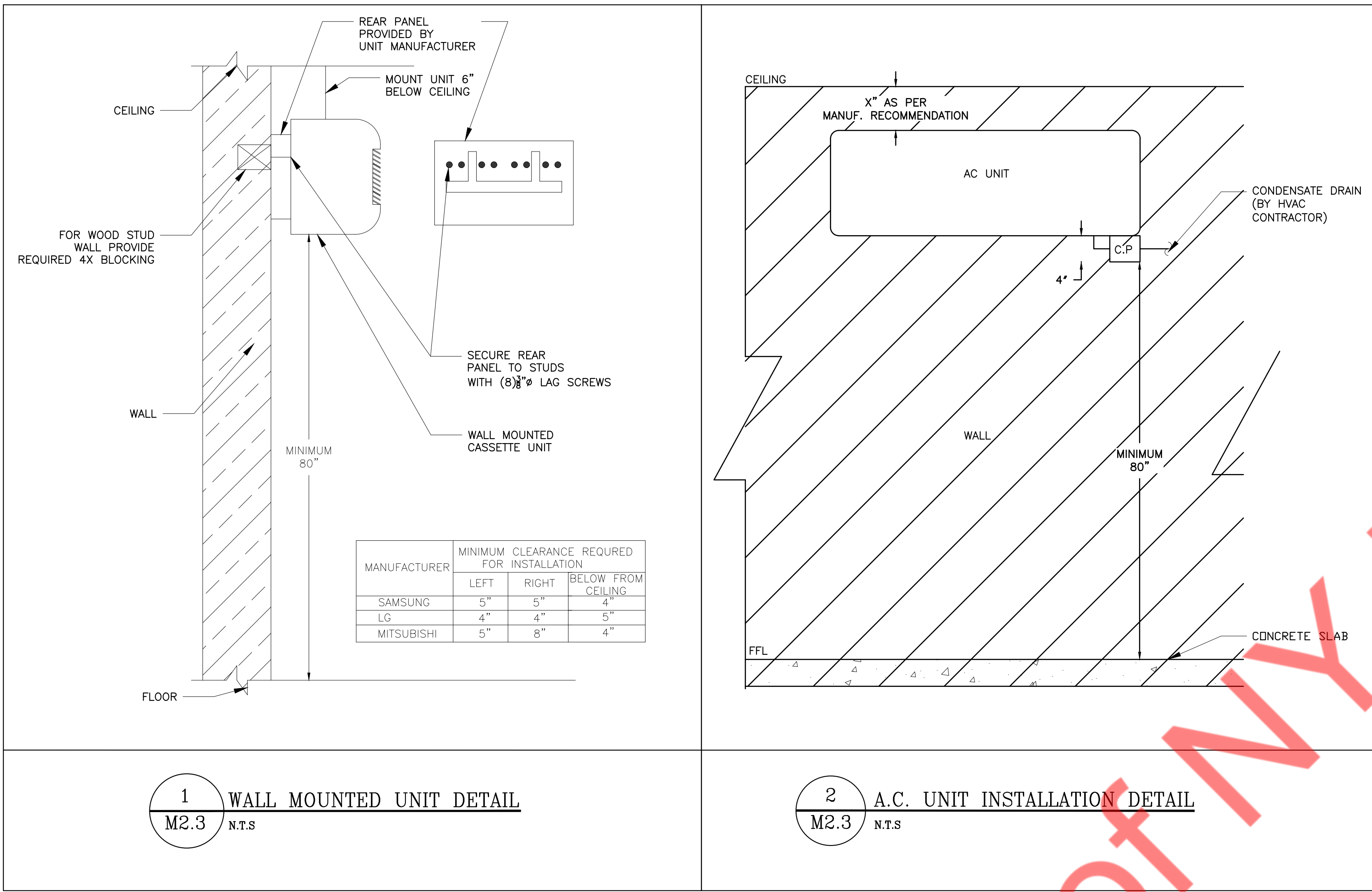


7 CEILING FAN HANGING SUPPORT DETAIL
M2.2 N.T.S

8 IN-LINE FAN HANGING SUPPORT DETAIL
M2.2 N.T.S

9 TYPICAL DETAIL OF ROOF GOOSENECK
M2.2 N.T.S

10 DUCT PENETRATION THROUGH ROOF
M2.2 N.T.S



1 WALL MOUNTED UNIT DETAIL
M2.3 N.T.S

2 A.C. UNIT INSTALLATION DETAIL
M2.3 N.T.S

Property of M.Y. Engineers

NEW ROOF TOP UNIT SCHEDULE - HEAT PUMP WITH AUXILIARY ELECTRIC HEAT																						
UNIT ID	MANUFACTURER	MODEL	AREA SERVED	NOMINAL TONS	SUPPLY FAN			HEATING CAPACITY	HEATER CAPACITY (KW)	COOLING CAPACITY				ELECTRICAL				EER/COP	OPERATING WEIGHT (LBS.)	REMARKS		
					SUPPLY CFM	OUTSIDE AIR CFM	MAX. ESP (IN. OF W.G.)			TOTAL	SENSIBLE	AMBIENT TEMP.	ENTERING TEMP.	STAGES	VOLTS	PHASE	MCA (A)				MCB (A)	
RTU-1 (N)	TRANE	WSD240E3RN	SEE PLAN	20	8000	1400	1.0	210.0	27-36	267.8	189.7	95	80/67	2	208-230	3	210	225	9.7/3.2	3350	NEW	
RTU-2 (N)	TRANE	WSD240E3RN	SEE PLAN	20	8000	1400	1.0	210.0	27-36	267.8	189.7	95	80/67	2	208-230	3	210	225	9.7/3.2	3350	NEW	
RTU-3 (N)	TRANE	WSD240E3RN	SEE PLAN	20	8000	1400	1.0	210.0	27-36	267.8	189.7	95	80/67	2	208-230	3	210	225	9.7/3.2	3350	NEW	
RTU-4 (N)	TRANE	WSD240E3RN	SEE PLAN	20	8000	1400	1.0	210.0	27-36	267.8	189.7	95	80/67	2	208-230	3	210	225	9.7/3.2	3350	NEW	
RTU-5 (N)	TRANE	WSD240E3RN	SEE PLAN	20	8000	1400	1.0	210.0	27-36	267.8	189.7	95	80/67	2	208-230	3	210	225	9.7/3.2	3350	NEW	
RTU-6 (N)	TRANE	WSC120H3RJ	SEE PLAN	10	4000	680	1.0	106.0	13.5-18	118.1	97.0	95	80/67	1	208-230	3	101	110	11.0/3.40	1250	NEW	
RTU-7 (N)	TRANE	WSC102H3RJ	SEE PLAN	8.5	3400	400	1.0	67.2	13.5-18	103.2	83.4	95	80/67	1	208-230	3	92	100	11.0/3.40	1200	NEW	
RTU-8 (N)	TRANE	WSC072H3RC	SEE PLAN	6	2400	200	1.0	51.7	6.8-9.0	78.0	56.7	95	80/67	1	208-230	3	59	70	11.4/3.50	1100	NEW	

- NOTES:**
- ALL EQUIPMENT MUST BE STANDARD EFFICIENCY, MEETING OR EXCEEDING THE BRANDS MINIMUM REQUIREMENTS.
 - ELECTRICAL CONNECTION TO BE SINGLE POINT AND TO BE THROUGH THE BOTTOM OF THE UNIT
 - PROVIDE UNIT MOUNTED NON - FUSED DISCONNECT SWITCH AND AN UNPOWERED GFCI RECEPTACLE.
 - 14" ROOF CURB - CONTRACTOR SHALL FIELD INSULATE. SHIP ASAP AHEAD OF THE UNIT.
 - CONDENSATE DRAIN WITH 2" DEEP VENTED TRAP DISCHARGE TO SPLASH BLOCK ON ROOF.
 - CABINET WITH 1/2" FIBERGLASS INSULATION.
 - PROVIDE LOW LEAK ECONOMISER WITH BAROMETRIC RELIEF WITH FDD (FAULT DETECTION DIAGNOSTICS) & DEMAND CONTROL VENTILATION (CO2).
 - PROVIDE 8-WIRE, 24 VAC, AUTOMATIC CHANGEVER, 2-STAGE HEAT / COOL, REMOTELY PROGRAMMABLE THERMOSTAT
 - REMOTE SENSORS SHALL BE PROVIDED IN SPACE WIRED BACK TO PROGRAMMABLE, 24 HOUR, 7 DAY, THERMOSTATS.
 - ANTI SHORT CYCLE TIMER.
 - THROWAWAY 2" FILTERS (MERV 8).
 - WHERE REQUIRED, PROVIDE LOW AMBIENT COOLING CAPABILITY DOWN TO 0 DEGREES F.
 - PROVIDE ALL COMPRESSORS WITH 5 YEAR WARRANTY.
 - ALL UNIT TO BE EQUIPPED WITH VFD.
 - UNIT SHALL HAVE BUILT-IN SEQUENCE TO MODULATE BOTH FAN SPEED & COMPRESSOR / HEATERS IN ORDER TO SATISFY LOAD REQUIREMENTS.
 - RTU'S SHOULD BE PROVIDED WITH 100% MODULATING ENTHALPHY ECONOMIZER WITH WEATHER HOOD. PROVIDE FDD.
 - PROVIDE RELIEF DAMPER WITH RELIEF HOOD.
 - AIR ECONOMIZERS TO MEET THE REQUIREMENTS FOR DESIGN CAPACITY, CONTROL SIGNAL, VENTILATION CONTROLS, HIGH-LIMIT SHUT-OFF, INTEGRATED ECONOMIZER CONTROL, AND PROVIDE A MEANS TO RELIEVE EXCESS OUTSIDE AIR DURING OPERATION.
 - RETURN AIR SMOKE DETECTOR - UNIT MOUNTED
 - PROVIDE POWER EXHAUST FOR RTU-1(N) TO RTU-6(N)

MECHANICAL FAN SCHEDULE												
TAG	QUANTITY	FLOW RATE CFM	STATIC PRESSURE		ELECTRIC DATA			MAXIMUM LOUDNESS DBA	BASIS OF DESIGN		WEIGHT LBS	REMARK
			EXTERNAL IN W.G.	SPEED RPM	HP	V/PH/Hz	MANUFACTURER		MODEL			
EF-1	1	815	0.75	1268	1/2	115/60/1	54	GREENHECK	SQ-120-VG	55	2,3,4,5,6	
EF-2	1	765	0.75	1251	1/2	115/60/1	54	GREENHECK	SQ-120-VG	55	2,3,4,5,6	
EF-3	1	100	0.5	960	0.29 AMPS	115/60/1	41	GREENHECK	SP-A90-130-VG	41	1,3,4,5	
EF-4	1	70	0.3	900	0.17 AMPS	115/60/1	28	GREENHECK	SP-A90	12	1,3,4,5	

- NOTES:**
- INTERCONNECT WITH LIGHTS IN ROOM. REFER TO ELECTRICAL LIGHTING PLAN.
 - PROVIDE TIME CLOCK.
 - PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
 - PROVIDE ACCESS DOOR TO SERVICE UNIT IF IN HARD CEILING.
 - INSTALL AS PER MANUFACTURERS RECOMMENDATION.
 - HIGH EFFICIENCY MOTOR WITH THERMAL OVERLOAD PROTECTION.

AIR TERMINAL DEVICES SCHEDULE					
TAG	SIZE (IN.)	DESCRIPTION	BASIS OF DESIGN		NOTES
			MANUFACTURER	MODEL	
S1	12X12	SUPPLY AIR DIFFUSER	TITUS	TDC-AA	1,2,3,4,5,6,7
S2	24X24	SUPPLY AIR DIFFUSER	TITUS	TDC-AA	1,2,3,4,5,6,7
S3	24X10	DOUBLE DEFLECTION DUCT MOUNTED GRILLE	TITUS	5300FL	1,2,3,4,5,6,7,8
S4	12X10	DOUBLE DEFLECTION WALL MOUNTED GRILLE	TITUS	300FL	1,2,3,4,5,6,7,8
CD1	60X60	CONCENTRIC DIFFUSER	RUSKIN	SOD-80	1,2,3,4,5
CD2	36X36	CONCENTRIC DIFFUSER	RUSKIN	SOD-36	1,2,3,4,5
R1	24X24	RETURN AIR DIFFUSER	TITUS	350FS	1,2,3,4,5,6,7
R2	12X10	DOUBLE DEFLECTION WALL MOUNTED GRILLE	TITUS	350FS	1,2,3,4,5,6,7,8
R3	48X48	DOUBLE DEFLECTION DUCT MOUNTED GRILLE	TITUS	350FL	1,2,3,4,5,6,7,8
R4	24X24	DOUBLE DEFLECTION DUCT MOUNTED GRILLE	TITUS	350FL	1,2,3,4,5,6,7,8
EG1	12X12	PERFORATED FACE EXHAUST DIFFUSER	TITUS	PAR	1,2,3,4,5,6,7

- NOTES:-**
- PROVIDE STANDARD WHITE FINISH FOR ALL AIR DEVICES UNLESS NOTED OTHERWISE ON PLAN.
 - PAINT ALL SURFACES VISIBLE THROUGH FACE OF RETURN AIR GRILLE FLAT BLACK. THIS SHALL INCLUDE PIPING, CONDUIT, DUCT WORK AND STRUCTURAL MEMBERS.
 - PROVIDE FRAME FOR MOUNTING AIR DEVICE IN LAY-IN GRID CEILING UNLESS REFLECTED CEILING PLAN INDICATES HARD CEILING. IN AREAS WITH HARD CEILINGS, PROVIDE FRAMES FOR SURFACE MOUNTING.
 - UNLESS OTHERWISE NOTED, BRANCH DUCTS SERVING AIR DEVICES SHALL BE SAME SIZE AS NECK OF AIR DEVICE.
 - COORDINATE FINAL COLOR/FINISH WITH ARCHITECT/OWNER.
 - AIR DEVICE SHALL BE OF GALVANIZED FINISH WHEN INSTALLED ON EXPOSED DUCT WORK.
 - MAXIMUM NOISE CRITERION RATING < 35 DBA.
 - PROVIDE MODEL ASD-AIR SCOOP DEVICE.
- FOR ROUND NECK DIFFUSERS: NECK SIZES SHALL BE:-
- 15" DIA: 901-1100 CFM
 - 14" DIA: 601-900 CFM
 - 12" DIA: 376-600 CFM
 - 10" DIA: 226-375 CFM
 - 8" DIA: 101-225 CFM
 - 6" DIA: 0-100 CFM

VENTILATION CALCULATION											
ROOM NAME	AREA (SQ.FT.)	NUMBER OF PEOPLE/1000sq.ft AS PER 2018 IMC	NUMBER OF PEOPLE AS PER 2018 IMC	NUMBER OF CHAIR	FINAL PEOPLE NO.	MIN OUTSIDE AIR AS PER IMC 2018		REQ. OA (CFM)	PROVIDED OA (CFM)	EXHAUST AIRFLOW RATE AS PER IMC 2018 (CFM/SQ.FT OR /FIXT.)	PROVIDED EXHAUST (CFM)
						CFM/PEOPLE	CFM/SQ.FT				
LOBBY / RECEPTION	311	30	10	0	3	7.5	0.06	42	50	0	0
GM OFFICE	138	5	1	3	3	5	0.06	24	30	0	0
KIDS CLUB	558	20	12	5	5	7.5	0.18	138	140	0	0
INFANT AREA	92	20	2	2	2	7.5	0.18	32	35	0	0
TOILET	48	0	0	0	0	0	0	0	0	70	0
PUSH ROOM	1412	10	15	25	25	20	0.06	585	590	0	0
GROUP X	2209	10	23	25	50	20	0.06	1133	1140	0	0
WORKOUT AREA	10243	10	103	120	220	20	0.06	5015	5020	0	0
PERSONAL TRAINING	1256	10	13	15	30	20	0.06	676	680	0	0
ELECTRICAL ROOM	121	5	1	0	0	5	0.06	8	10	0	0
IT / SECURITY ROOM	85	4	1	1	1	5	0.06	11	15	0	0
BREAKROOM	132	50	7	5	5	5	0.06	33	35	0	0
OFFICE	102	5	1	1	2	5	0.06	17	20	0	0
MENS LOCKER ROOM	323	50	17	17	19	5	0.06	115	115	0	0
VANITY & SHOWER AREA	321	0	0	0	0	0	0	0	0	765	0
SAUNA ROOM	70	0	0	0	0	0	0	0	0	0	0
RESTROOM-1	195	0	0	0	0	0	0	0	0	0	0
WOMENS LOCKER ROOM	283	50	15	18	18	5	0.06	107	110	0	0
VANITY & SHOWER AREA	369	0	0	0	0	0	0	0	0	815	0
RESTROOM-2	189	0	0	0	0	0	0	0	0	0	0
SAUNA ROOM	55	0	0	0	0	0	0	0	0	0	0
HALLWAY	473	30	15	0	0	7.5	0.06	29	30	0	0
RECOVERY LOUNGE	549	5	3	0	5	5	0.06	58	60	0	0
ELECTRICAL ROOM-2	656	5	4	0	0	5	0.06	40	40	0	0
OFFICE	340	5	2	2	2	5	0.06	31	35	0	0
CONFERENCE ROOM	357	50	18	20	20	5	0.06	122	125	0	0
JANITOR ROOM	50	-	-	-	-	-	-	-	-	100	100
Total		20937						8280			1750

CONDENSING UNITS (OUTDOOR) SCHEDULE																	
TAG	LOCATION	INDOOR UNITS	CAP. (TON)	MAX. COOLING CAP. (MBH)	UNIT DIMENSIONS	WEIGHT (LBS)	PIPING DIAMETER		ELECTRICAL			COP	HSPF	EER	SEER	MAKE	MODEL
							LIQ.	GAS	PH./V/Hz	MCA (A)	MOC (A)						
ACCU-1 (N)	SEE PLAN	AC-1 (N)	1.5	18	14X32X22	80	1/4	1/2	1/208-230/60	15	20	3.3	10.6	11.2	19.0	CARRIER	38MHRBQ18AA3 (OR EQUIVALENT)
ACCU-2 (N)	SEE PLAN	AC-2 (N)	1.5	18	14X32X22	80	1/4	1/2	1/208-230/60	15	20	3.3	10.6	11.2	19.0	CARRIER	38MHRBQ18AA3 (OR EQUIVALENT)

- NOTES:-**
- PROVIDE LOW AMBIENT CONTROL FOR CONDENSING UNIT OPERATION DOWN TO -4°F.
 - ALL CONDENSING UNITS TO BE MOUNTED WITH VIBRATION ISOLATORS.
 - OUTDOOR REFRIGERANT LINES TO BE WRAPPED IN UV RESISTANT, FIRE RATED, AND ANTI-MICROBIAL INSULATION PROTECTION BASED ON AIREX-FLEX GUARD OR EQUAL.
 - REFRIGERANT LINES PENETRATION THROUGH BUILDING EXTERIOR SEALED BY AIREX TITAN FS OR SS MODEL SERIES DEPENDING UPON WALL CONSTRUCTION.
 - OUTDOOR CONDENSING UNITS TO BE LOCATED WITH PROPER CLEARANCES AND MUST PREVENT RE-CIRCULATION OF AIR. COORDINATE WITH MANUFACTURER AND ARCHITECT.

INDOOR UNIT SCHEDULE												MAKE : CARRIER	
TAG	AREA SERVED	TYPE	TON	TOTAL COOLING CAP. (MBH)	NOMINAL HEATING CAP. (MBH)	SUPPLY AIRFLOW (CFM)	ELECTRICAL DATA		DIMENSIONS (DxWxH) (IN.)	REFRIGERANT PIPE SIZE (IN.)		WEIGHT (LBS.)	MODEL NO.
							PH./VOLT/Hz	MCA (A)		LIQ.	SUCTION		
AC-1 (N)	SEE PLAN	HIWALL	1.5	18	19 (HEAT PUMP)	550	1/208/60	0.2	13X38X9	1/4	1/2	32	40MHHQ183 (OR EQUIVALENT)
AC-2 (N)	SEE PLAN	HIWALL	1.5	18	19 (HEAT PUMP)	550	1/208/60	0.2	13X38X9	1/4	1/2	32	40MHHQ183 (OR EQUIVALENT)

- NOTES:-**
- SUPPLY AIR CFM BASED ON HIGH SPEED.
 - REFRIGERANT R410A SHALL BE PROVIDED.
 - PROVIDE ALL ASSOCIATED ACCESSORIES.
 - ALL REFRIGERANT PIPING TO BE SIZED PER MANUFACTURERS RECOMMENDATIONS.
 - SEE FLOOR PLAN FOR QUANTITIES.
 - CONTRACTOR SHALL PROVIDE A LONG LINE SET FOR REFRIGERANT PIPING IN THE EVENT THAT TOTAL REFRIGERANT LENGTH EXCEEDS THE MANUFACTURER'S STANDARD RECOMMENDED LENGTH.
 - PROVIDE CONDENSATE DRAIN PUMP FOR AC-1(N)&AC-2(N). IF REQUIRED.

ELECTRICAL SYMBOLS LEGEND

SYMBOL	DESCRIPTION
⊕	ELECTRICAL JUNCTION BOX
⊕	DUPLEX RECEPTACLE, 3 WIRE GROUND TYPE, 20A
⊕WP	DUPLEX RECEPTACLE, WEATHERPROOF, 20A
⊕	QUADRAPLEX WALL RECEPTACLE, 20A
⊕	240V RECEPTACLE
⊕	DEDICATED RECEPTACLE
⊕	SIGNAL VIA COAXIAL CABLE
⊕	DATA OUTLET-CATAGORY 5
⊕	TELEPHONE OUTLET
⊕	TELE/DATA COMBO
⊕	ELECTRICAL DISCONNECT SWITCH. CONFIRM # OF POLES & SIZE WITH MANUFACTURER OF EQUIPMENT BEING SERVED PRIOR TO PULLING WIRE.
⊕	COAXIAL CABLE FOR TELEVISION - VERIFY MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS
⊕	PROVIDE RECEPTACLE FOR SECURITY CAMERA - VERIFY RECEPTACLE REQUIREMENTS WITH TENANT
⊕	DUCT MOUNTED SMOKE DETECTOR

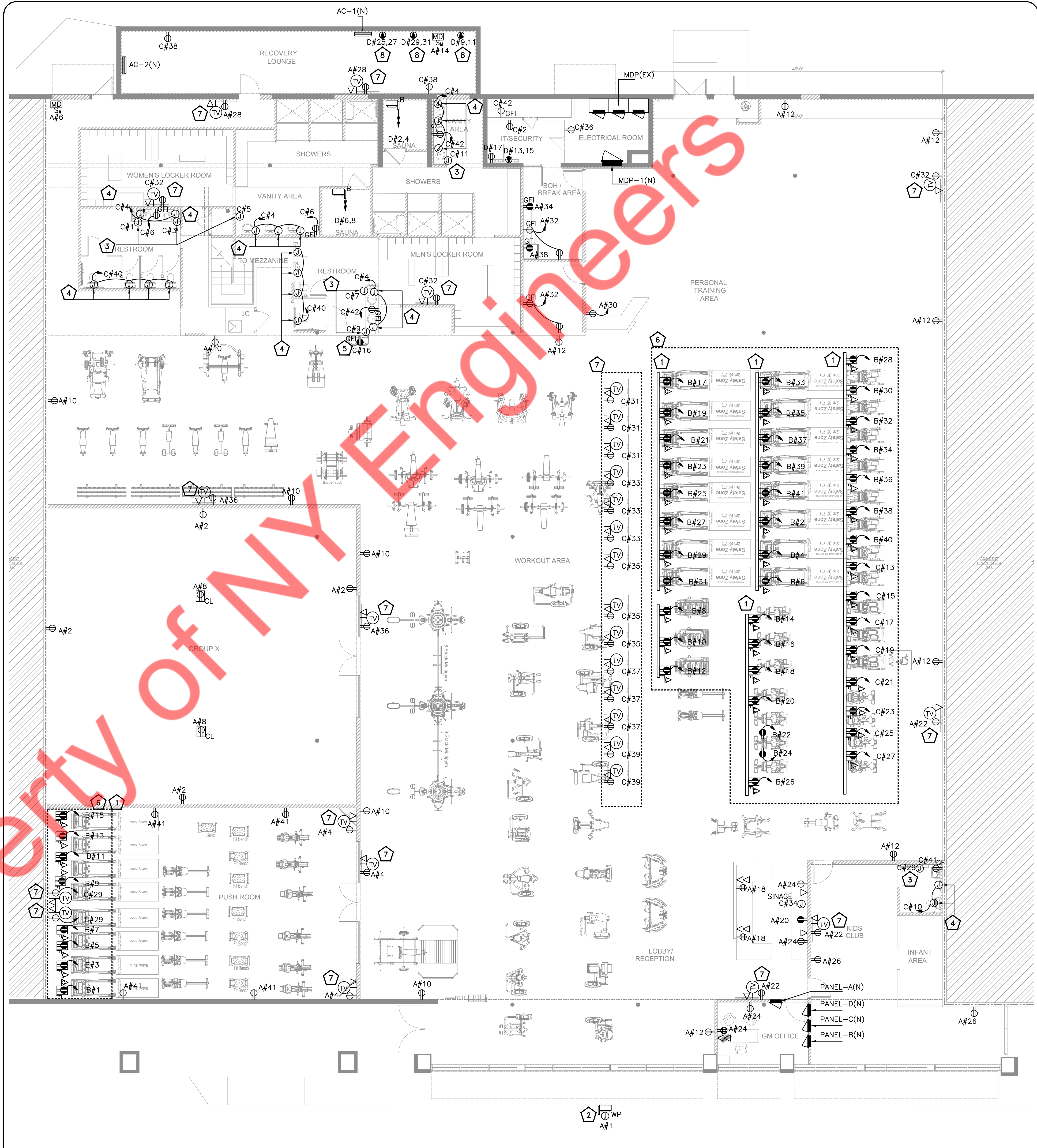
NOTE:
 ALL SYMBOLS DO NOT NECESSARILY APPLY
 MOUNTING HEIGHT TO CENTERLINE-U.N.O.
 IN HANDICAPPED AREAS, THE RECEPTACLES AND TELEPHONE OUTLETS SHALL BE MOUNTED AT 24" A.F.F.; THE TOGGLE SWITCHES, THERMOSTATS AND MANUAL MOTOR STARTERS SHALL BE MOUNTED AT 42" A.F.F.

ELECTRICAL POWER GENERAL NOTES:

- GENERAL USE CABLING SHALL BE OF #12 AWG MINIMUM AT 120V FOR CABLE UPTO 80 FEET. FOR CABLE ABOVE 80 FEET USE #10 AWG CABLES. ADJUST WIRE SIZE FOR A MAXIMUM VOLTAGE DROP OF 3%.
- CONTRACTOR TO COORDINATE WITH ARCHITECT FOR EXACT HEIGHT OF OUTLETS.
- E.C SHALL VERIFY ANY THIRD PARTY INSPECTION REQUIRED BY THE LOCAL JURISDICTION PRIOR TO BIDDING THIS PROJECT.
- ALL LOW VOLTAGE WIRING TO BE IN CONDUIT U.N.O BY AHJ.
- E.C TO COORDINATE WITH MECHANICAL CONTRACTOR FOR RTU SENSOR AND THERMOSTAT LOCATION.

ELECTRICAL POWER PLAN KEYED WORK NOTES:

- PROVIDE CHASE WITH SEPARATION FOR POWER AND COAXIAL CABLE FROM WIREMOLD TO ACCESSIBLE SPACE.
- PROVIDE AND INSTALL DISCONNECT FOR TENANT SIGNAGE PER ARTICLE 600.6 OF NEC. SIGN BY SIGN VENDOR, CIRCUITING AND FINAL CONNECTION BY E.C. SIGN CONTROLLED BY TIMECLOCK, PROVIDE ADDITIONAL J-BOX FOR PHOTOSENSOR, VERIFY IF EXISTING PRIOR TO BID AND INSTALL NEW.
- PROVIDE AND INSATALL J-BOX FOR POWER HAND DRYER AT 42" A.F.F CIRCUIT AS INDICATED.
- J-BOX FOR AUTOMATIC SENSORS AND SOAP DISPENSER.
- MOUNT RECEPTACLE PER MANUFACTURER TEMPLATE. GFI RECEPTACLE TO BE MOUNTED BELOW DRINKING FOUNTAIN PER NEC.
- PROVIDE 5-20R NEMA RECEPTACLE AND DEDICATED CIRCUIT FOR EACH TREADMILL. TRENCH POWER IF REQUIRED FROM POWER STRIP TO NEAREST COLUMN OR FULL HEIGHT WALL COMPLY WITH NEC 310.15 IF APPLICABLE. USE 10AWG WIRE MINIMUM. ADJUST WIRE SIZE FOR MAXIMUM VOLTAGE DROP OF 3%.
- ELECTRICAL POWER PROVISION FOR TV'S. E.C SHALL COORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT PRIOR TO ROUGH IN.
- ELECTRICAL POWER PROVISION FOR MASSAGE EQUIPMENTS. E.C SHALL COORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT PRIOR TO ROUGH IN.



ELECTRICAL SYMBOLS LEGEND

SYMBOL	DESCRIPTION
Ⓧ	ELECTRICAL JUNCTION BOX
Ⓧ	DUPLEX RECEPTACLE, 3 WIRE GROUND TYPE, 20A
ⓍWP	DUPLEX RECEPTACLE, WEATHERPROOF, 20A
Ⓧ	QUADRAPLEX WALL RECEPTACLE, 20A
Ⓧ	DEDICATED RECEPTACLE
Ⓧ	SIGNAL VIA COAXIAL CABLE
△	DATA OUTLET-CATAGORY 5
▲	TELEPHONE OUTLET
▲	TELE/DATA COMBO
Ⓧ	ELECTRICAL DISCONNECT SWITCH, CONFIRM # OF POLES & SIZE WITH MANUFACTURER OF EQUIPMENT BEING SERVED PRIOR TO PULLING WIRE.
ⓍTV	COAXIAL CABLE FOR TELEVISION - VERIFY MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS
Ⓧ	PROVIDE RECEPTACLE FOR SECURITY CAMERA - VERIFY RECEPTACLE REQUIREMENTS WITH TENANT
ⓍD	DUCT MOUNTED SMOKE DETECTOR

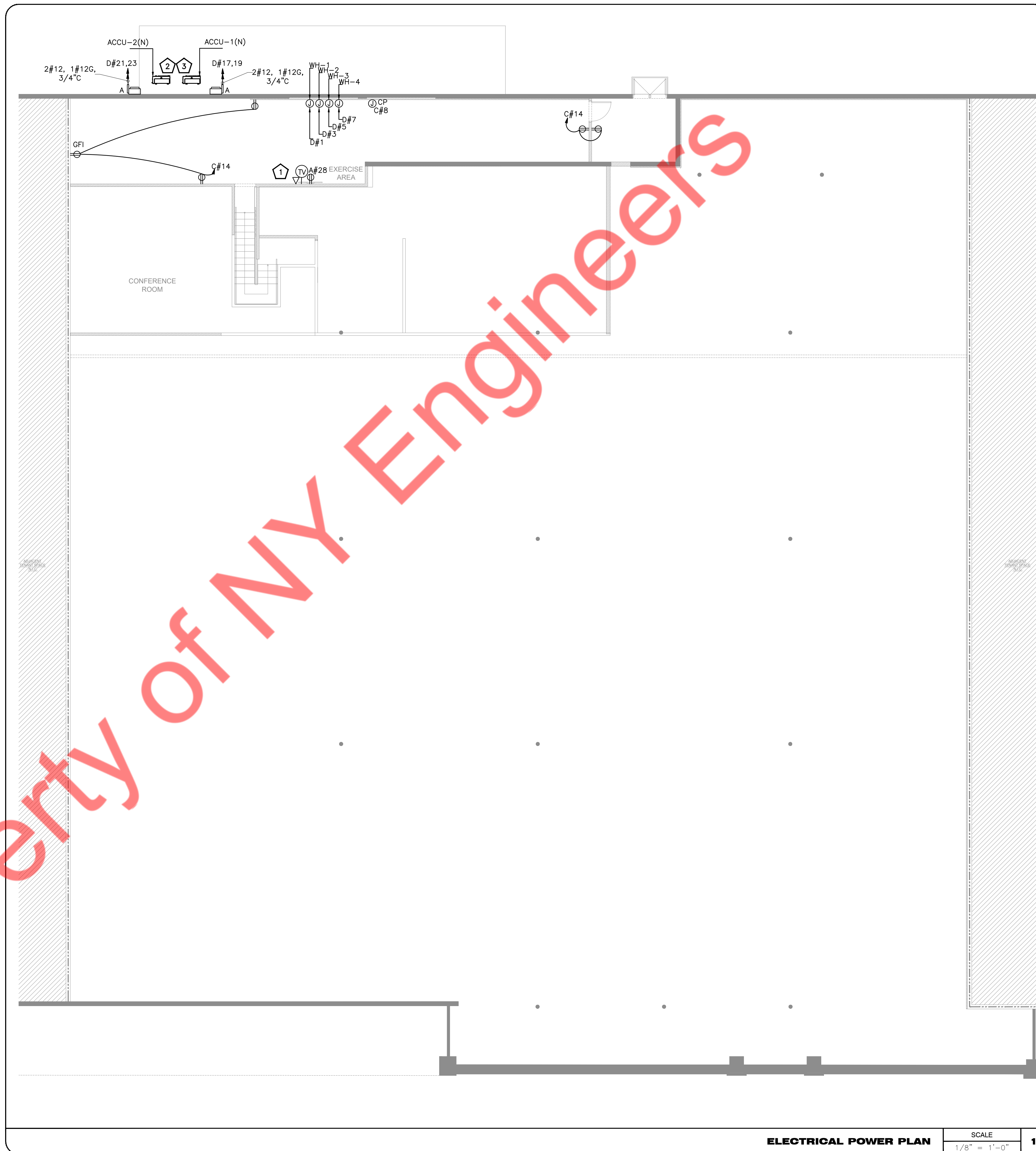
NOTE:
 ALL SYMBOLS DO NOT NECESSARILY APPLY
 MOUNTING HEIGHT TO CENTERLINE-U.N.O.
 IN HANDICAPPED AREAS, THE RECEPTACLES AND TELEPHONE OUTLETS SHALL BE MOUNTED AT 24" A.F.F.; THE TOGGLE SWITCHES, THERMOSTATS AND MANUAL MOTOR STARTERS SHALL BE MOUNTED AT 42" A.F.F.

ELECTRICAL POWER GENERAL NOTES:

1. GENERAL USE CABLING SHALL BE OF #12 AWG MINIMUM AT 120V FOR CABLE UPTO 80 FEET. FOR CABLE ABOVE 80 FEET USE #10 AWG CABLES. ADJUST WIRE SIZE FOR A MAXIMUM VOLTAGE DROP OF 3%.
2. CONTRACTOR TO COORDINATE WITH ARCHITECT FOR EXACT HEIGHT OF OUTLETS.
3. E.C SHALL VERIFY ANY THIRD PARTY INSPECTION REQUIRED BY THE LOCAL JURISDICTION PRIOR TO BIDDING THIS PROJECT.
4. ALL LOW VOLTAGE WIRING TO BE IN CONDUIT U.N.O BY AHJ.
5. E.C TO COORDINATE WITH MECHANICAL CONTRACTOR FOR RTU SENSOR AND THERMOSTAT LOCATION.

ELECTRICAL POWER PLAN KEYED WORK NOTES:

- 1 ELECTRICAL POWER PROVISION FOR TV'S. E.C SHALL COORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT PRIOR TO ROUGH IN.
- 2 ELECTRICAL CONTRACTOR SHALL COORDINATE FOR EXACT LOCATION OF MECHANICAL EQUIPMENTS WITH MECHANICAL DRAWINGS.
- 3 ELECTRICAL CONTRACTOR SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR MECHANICAL UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN AND PROVIDE AS REQUIRED. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES.

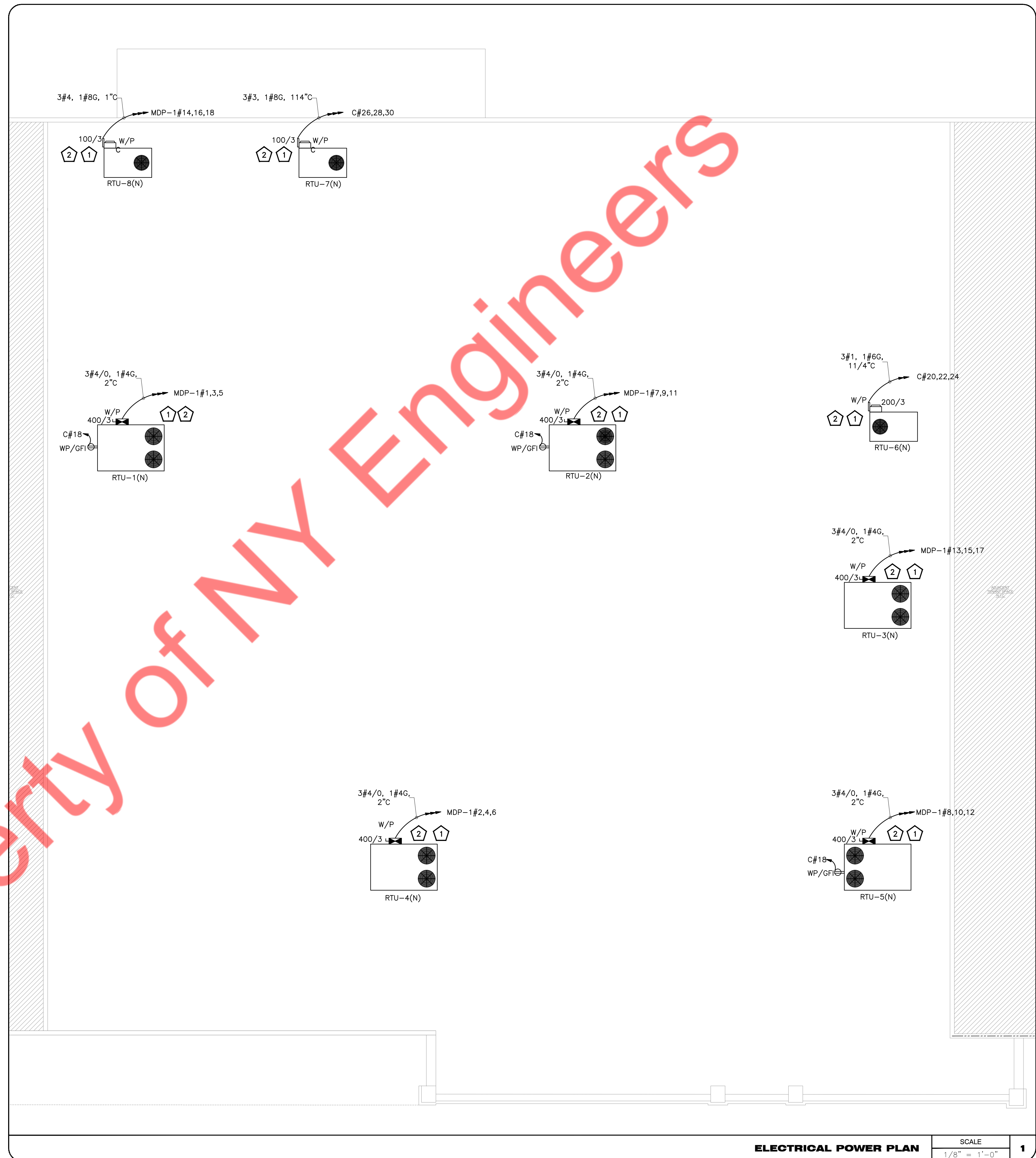


ELECTRICAL POWER GENERAL NOTES:

1. GENERAL USE CABLING SHALL BE OF #12 AWG MINIMUM AT 120V FOR CABLE UPTO 80 FEET. FOR CABLE ABOVE 80 FEET USE #10 AWG CABLES. ADJUST WIRE SIZE FOR A MAXIMUM VOLTAGE DROP OF 3%.
2. CONTRACTOR TO COORDINATE WITH ARCHITECT FOR EXACT HEIGHT OF OUTLETS.
3. E.C SHALL VERIFY ANY THIRD PARTY INSPECTION REQUIRED BY THE LOCAL JURISDICTION PRIOR TO BIDDING THIS PROJECT.

ELECTRICAL ROOF PLAN KEYED WORK NOTES:

- 1 ELECTRICAL CONTRACTOR SHALL COORDINATE FOR EXACT LOCATION OF MECHANICAL EQUIPMENTS WITH MECHANICAL DRAWINGS.
- 2 ELECTRICAL CONTRACTOR SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR MECHANICAL UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN AND PROVIDE AS REQUIRED. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES.



LIGHTING SCHEDULE						
SYMBOL	TYPE	DESCRIPTION	REMARKS	MODEL	VOLTAGE	WATTAGE
⊕	A	JUNO 6" LED RECESSED DOWNLIGHT TRIM #J6RLG3-3K-6-WWH	LOBBY, OFFICE, BREAKROOM, STORAGE AND RESTROOM	IC23-LEDT24	120V	10.5W
⊕	B	JUNO 6" LED RECESSED DOWNLIGHT W/ WHITE BAFFLE AND WHITE TRIM	RECOVERY LOUNGE	TC922LED-3K-1-WWH-LEDT24	120 V	26W
—	C	LINEAR FIXTURE-WHITE	WORKOUT AREAS	CDS-L48-MVOLT-DM-40K-80CRI-WH	120 V	38W
—	D	LED LIGHT OVAL MIRROR	LAVATORY MIRRORS	MODEL - TBD BY TENANT	120 V	20W
⊙	E	JUNO 6" LED RECESSED HORIZONTAL CFL DOWN LIGHT SUITABLE FOR WET LOCATION	SHOWER STALLS	TC922LED-3K-24W-WH	120V	26W
⊗	F	LED 2X4 FIXTURE	PUSH ROOM, KIDS ROOM, X ROOM	SURE-LITE: APC7RSQ	120V	48.4W
⊗		SKYBADE FAN, SHOPPROP SERIES	WORKOUT AREA, CYCLE STUDIO, PUSH ROOM	SP-0B24-5, 8FT	120V	
⊗	EX	EXIT SIGN-EMERGENCY LIGHT COMBO		SURE-LITE: APC7RSQ	120V	
⊗	X	EXIT SIGN				
↔	EU	WALL MOUNTED EMERGENCY LIGHT		SURE-LITE: CU2-LED	120V	
⊕	EU	CEILING MOUNTED EMERGENCY LIGHT				
(E)		EXISTING				

ELECTRICAL LIGHTING PLAN GENERAL NOTE:

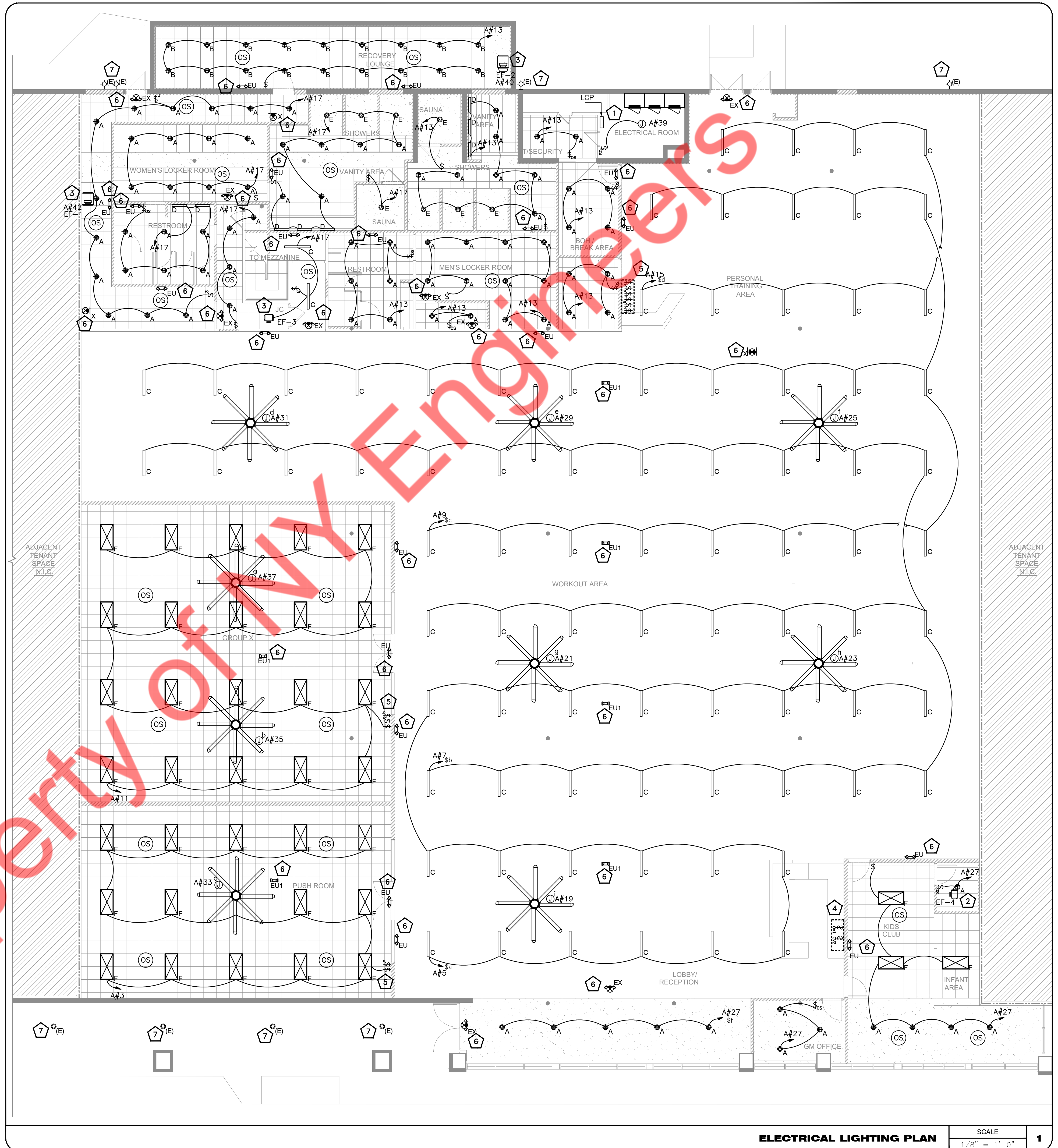
- ALL LIGHT FIXTURE SHALL BE SELECTED TO OPERATE ON 120V. COORDINATE WITH ARCHITECT FOR FINAL FINISH.
- ALL EMERGENCY, EGRESS AND LIGHT LIGHTING FIXTURES SHALL BE CONNECTED TO NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES. EXIT SIGNS SHALL NOT EXCEED 5 WATTS PER FACE.

LIGHTING CONTROLS:

AREA	CONTROLS
PUSH ROOM, LOCKER, KIDS CLUB, RECOVERY, GROUP-X, VANITY.	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA CEILING MOUNTED OCCUPANCY SENSOR. FIXTURES DESIGNATED 'EM' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.
ELECTRICAL ROOM, BREAK ROOM, OFFICE, RESTROOM, IT.	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA WALL MOUNTED OCCUPANCY SENSOR. FIXTURES DESIGNATED 'EM' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.
WORKOUT AREA, LOBBY/RECEPTION.	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA TIMECLOCK. FIXTURES DESIGNATED 'EM' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.

ELECTRICAL LIGHTING PLAN KEYED WORK NOTES:

- E.C. SHALL COORDINATE EXACT LOCATION OF THE LIGHTING CONTROL PANEL "LCP" WITH ARCHITECT/OWNER.
- EXHAUST FANS SHALL BE CIRCUITED AND CONTROLLED ALONG WITH THE LIGHT FIXTURES IN THE SAME ROOM.
- COORDINATE EXACT LOCATION OF EXHAUST FAN WITH MECHANICAL CONTRACTOR.
- MASTER SWITCH BANK LOCATION. E.C. TO COORDINATE FINAL LOCATION WITH ARCHITECT/OWNER.
- PROVIDE APPROPRIATE VARIABLE SPEED SWITCHES FOR CONTROLLING SPEED OF CEILING FANS AS SHOWN. VERIFY WITH THE CEILING FAN MANUFACTURER TYPE OF VARIABLE SPEED SWITCH AND QUANTITY NEEDED. COORDINATE LOCATION OF SWITCHES WITH ARCHITECT/OWNER PRIOR TO ROUGH-IN.
- CONNECT ALL EMERGENCY EGRESS FIXTURES AND EXIT SIGNS TO THE NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES.
- EXISTING LIGHT FIXTURES IN THIS AREA SHALL REMAIN CONNECTED TO THE RESPECTIVE EXISTING ELECTRICAL HOUSE PANEL. E.C. SHALL VERIFY EXACT CONTROLS AND THEIR OPERABLE CONDITION IN FIELD. PROVIDE NEW CONTROLS IF FOUND INOPERABLE. BASE BID ACCORDINGLY.



LIGHTING SCHEDULE						
SYMBOL	TYPE	DESCRIPTION	REMARKS	MODEL	VOLTAGE	WATTAGE
⊕	A	JUNO 6" LED RECESSED DOWNLIGHT TRIM #J6RLG3-3K-6-WWH	LOBBY, OFFICE, BREAKROOM, STORAGE AND RESTROOM	IC23-LEDT24	120V	10.5W
⊕	B	JUNO 6" LED RECESSED DOWNLIGHT W/ WHITE BAFFLE AND WHITE TRIM	RECOVERY LOUNGE	TC922LED-3K-1-WWH-LEDT24	120 V	26W
—	C	LINEAR FIXTURE-WHITE	WORKOUT AREAS	CDS-L48-MVOLT-DM-40K-80CRI-WH	120 V	38W
—	D	LED LIGHT OVAL MIRROR	LAVATORY MIRRORS	MODEL - TBD BY TENANT	120 V	20W
⊙	E	JUNO 6" LED RECESSED HORIZONTAL CFL DOWN LIGHT SUITABLE FOR WET LOCATION	SHOWER STALLS	TC922LED-3K-24W-WH	120V	26W
⊠	F	LED 2X4 FIXTURE	PUSH ROOM, KIDS ROOM, X ROOM	SURE-LITE: APC7RSQ	120V	
⊗		SKYBADE FAN, SHOPPROP SERIES	WORKOUT AREA, CYCLE STUDIO, PUSH ROOM	SP-0824-5, 8FT	120V	
⊗	EX	EXIT SIGN-EMERGENCY LIGHT COMBO		SURE-LITE: APC7RSQ	120V	
⊗	X	EXIT SIGN				
↔	EU	WALL MOUNTED EMERGENCY LIGHT		SURE-LITE: CU2-LED	120V	
⊠	EU	CEILING MOUNTED EMERGENCY LIGHT				
(E) EXISTING						

ELECTRICAL LIGHTING PLAN GENERAL NOTE:

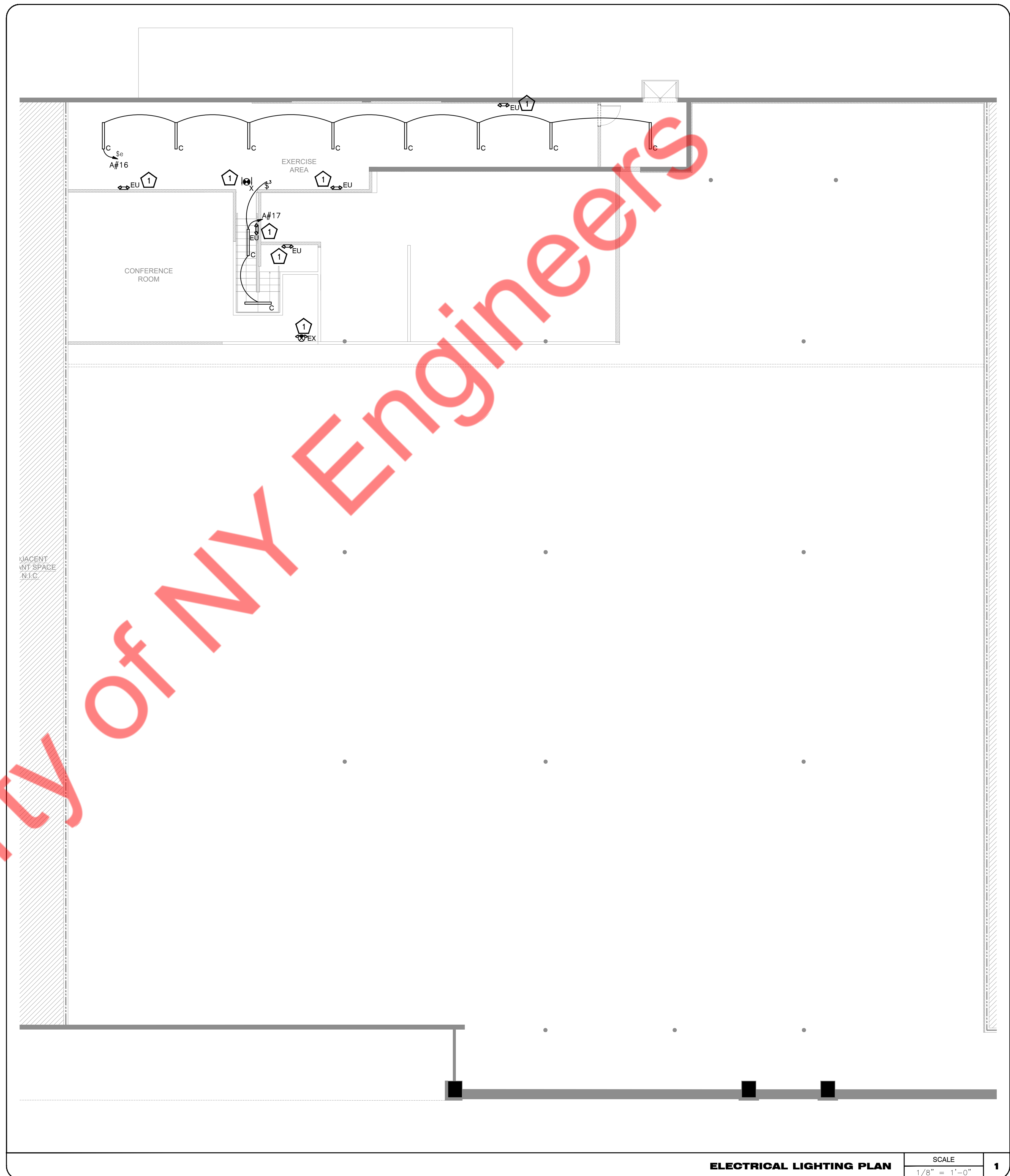
1. ALL LIGHT FIXTURE SHALL BE SELECTED TO OPERATE ON 120V. COORDINATE WITH ARCHITECT FOR FINAL FINISH.
2. ALL EMERGENCY, EGRESS AND LIGHT LIGHTING FIXTURES SHALL BE CONNECTED TO NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES. EXIT SIGNS SHALL NOT EXCEED 5 WATTS PER FACE.

LIGHTING CONTROLS:

AREA	CONTROLS
EXERCISE AREA.	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA TIMECLOCK. FIXTURES DESIGNATED 'EM' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.

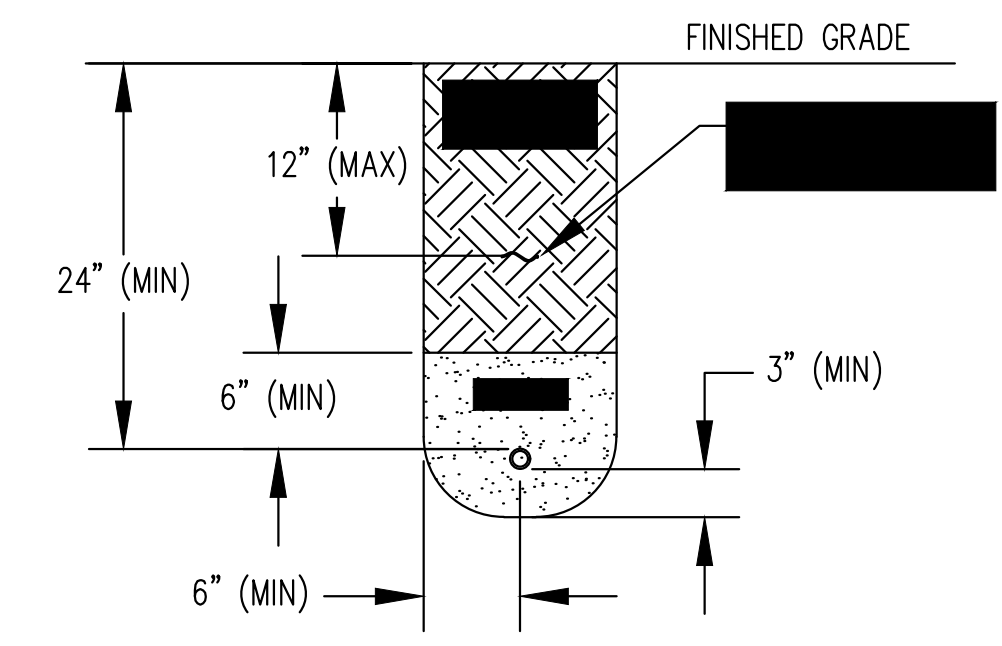
ELECTRICAL LIGHTING PLAN KEYED WORK NOTES:

- ① CONNECT ALL EMERGENCY EGRESS FIXTURES AND EXIT SIGNS TO THE NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES.



ELECTRICAL SYMBOLS AND NOMENCLATURE

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DOUBLE-OUTLET "DUPLEX" RECEPTACLE		CIRCUIT BREAKER (AMPS/POLES AS NOTED)
	DOUBLE-OUTLET "DUPLEX" GFI-TYPE RECEPTACLE		FUSE (AMPS/POLES AS NOTED)
	DOUBLE-OUTLET "DUPLEX" RECEPTACLE WITH USB CONNECTIONS		SHEET NOTE INDICATOR
	QUADRUPLE-OUTLET "QUAD" RECEPTACLE		SHEET/EQUIPMENT NOTE INDICATOR
	SPECIAL RECEPTACLE (VOLTAGE/CONFIGURATION AS NOTED)		EQUIPMENT NOTE INDICATOR
	JUNCTION BOX		REVISION "DELTA" NOTE INDICATOR
	THERMOSTAT		FEEDER NOTE INDICATOR
	FLOOR MOUNT RECEPTACLE		DETAIL/SHEET NOTE INDICATOR
	SAFETY DISCONNECT SWITCH (SIZE/VOLTAGE/CONFIGURATION AS NOTED)		48" MOUNTING HEIGHT A.F.F. (ACTUAL HEIGHT AS NOTED)
	COMBINATION SAFETY SWITCH/MAGNETIC STARTER	A.F.F.	ABOVE FINISHED FLOOR
	TELEPHONE/DATA JUNCTION BACKBOX	A.F.G.	ABOVE FINISHED GRADE
	SINGLE-POLE TOGGLE SWITCH (VOLTAGE AS REQUIRED)	A.T.S.	AUTOMATIC TRANSFER SWITCH
	MULTI-STATION "THREE-WAY" TOGGLE SWITCH (VOLTAGE AS REQUIRED)	C	CONDUIT
	SOLID STATE DIMMING SWITCH (VOLTAGE AS REQUIRED)	CB	CIRCUIT BREAKER
	MOTOR-RATED TOGGLE SWITCH (VOLTAGE AS REQUIRED)	CL	CEILING
	KEYED TOGGLE SWITCH (VOLTAGE AS REQUIRED)	(E)	EXISTING
	OCCUPANCY SENSING (MOTION SENSOR) SWITCH	(F)	FUTURE
	[*] CONDUIT INTO ACCESSIBLE CEILING SPACE	F.B.O.	FURNISHED BY OTHERS
	PANELBOARD (NAME/AMP/PHASE/VOLTAGE/CONFIGURATION AS NOTED)	GFI	GROUND FAULT INTERRUPTING TYPE
	AUXILIARY SYSTEM EQUIPMENT (KEYPAD/FOB)	HID	HIGH INTENSITY DISCHARGE
	MULTI-OUTLET ASSEMBLY (PLUG MOLD)	LTG	LIGHTING
	TRANSFORMER (NAME/KVA RATING/PHASE/VOLTAGE AS NOTED)	LV	LOW VOLTAGE
	MECHANICAL EQUIPMENT INDICATOR	MCB	MAIN CIRCUIT BREAKER
	PHOTO ELECTRIC CELL	'MSB'	MAIN SWITCH BOARD
	TIME CLOCK	(N)	NEW
	DUCT DETECTOR FIRE ALARM SYSTEM COMPONENT	NL	NIGHT LIGHT
	SMOKE DETECTOR FIRE ALARM SYSTEM COMPONENT	TYP	TYPICAL
	HEAT DETECTOR FIRE ALARM SYSTEM COMPONENT	UG	UNDER GROUND
	CONTACTOR	UN	UNLESS OTHERWISE NOTED
		WP	WEATHER PROOF
		XFMR	TRANSFORMER

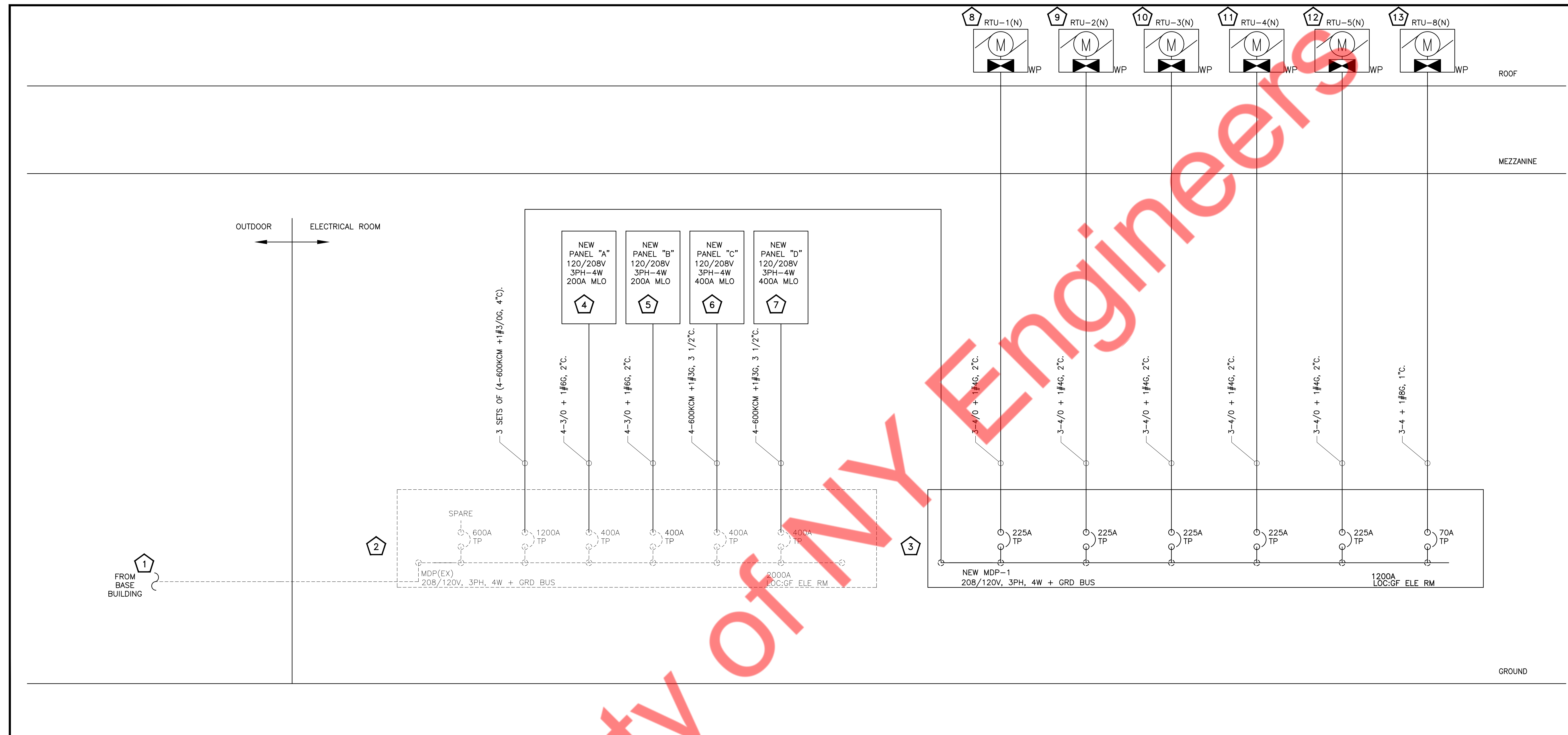


TYPICAL BRANCH CIRCUIT TRENCHING DETAIL 1"=1'-0" A

GENERAL ELECTRICAL NOTES

1. IT IS THE INTENT OF THESE DRAWINGS TO REQUIRE A COMPLETE AND FINISHED ELECTRICAL SYSTEM IN EVERY WAY. FURNISH ALL LABOR, MATERIALS, TOOLS, ACCESSORIES, ETC. REQUIRED FOR A COMPLETE ELECTRICAL INSTALLATION.
2. ALL ELECTRICAL WORK SHALL COMPLY WITH ALL APPLICABLE STATE, COUNTY AND LOCAL CODES AND ORDINANCES, AS WELL AS ALL CURRENT STANDARDS, CODES AND PRACTICES AS REQUIRED BY: 2017 NEC, 2009 IECC, AND UTILITY COMPANY STANDARDS.
3. CONTRACTOR SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS, AT THE PROJECT SITE, PRIOR TO SUBMITTING A BID. NO EXTRA PAYMENT WILL BE MADE FOR CONDITIONS THAT WOULD HAVE BEEN EVIDENT DURING A SITE INSPECTION. PAYMENT WILL BE MADE FOR CONDITIONS THAT WOULD HAVE BEEN EVIDENT DURING A SITE INSPECTION.
4. APPEARANCE AND WORKMANSHIP SHALL BE OF THE HIGHEST STANDARDS OF QUALITY. ONLY LICENSED ELECTRICIANS AND TECHNICIANS SHALL BE USED TO ACCOMPLISH THE ELECTRICAL WORK.
5. ELECTRICAL CONTRACTOR SHALL GUARANTEE THE ELECTRICAL WORK TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE. LIGHTING LAMPS SHALL BE EXEMPT FROM THIS REQUIREMENT BUT SHALL BE NEW AND IN PERFECT WORKING ORDER AT THE TIME OF FINAL ACCEPTANCE.
6. VERIFY THE EXACT LOCATION AND ELEVATION OF ALL ELECTRICAL EQUIPMENT AND OUTLETS PRIOR TO ROUGHING-IN. FINAL CONNECTIONS TO EQUIPMENT SHALL BE MADE ACCORDING TO THE EQUIPMENT MANUFACTURERS APPROVED WIRING DIAGRAMS, DETAILS AND INSTRUCTIONS.
7. ELECTRICAL CONTRACTOR SHALL PROVIDE A NEAT AND COMPLETE SET OF 'AS-BUILT' DRAWINGS WITHIN 30 DAYS OF FINAL ACCEPTANCE OF WORK.
8. CONDUIT/CONDUCTOR RUNS SHOWN ARE DIAGRAMMATICAL ONLY. THE BEST FINAL CONDUIT ROUTING SHALL BE AS DETERMINED BY THE ELECTRICAL CONTRACTOR AT THE TIME OF INSTALLATION.
9. ALL CONDUCTORS SHALL BE COPPER TYPE THHN/THWN 90° C. RATED.

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1 ELECTRICAL RISER DIAGRAM
NOT TO SCALE

ELECTRICAL RISER KEYED WORK NOTES:

- 1 EXISTING INCOMING SERVICE FOR THE LEASED SPACE FROM BASE BUILDING. E.C SHALL GET INFORMATION ABOUT THE EXISTING POWER DISTRIBUTION PRIOR TO COMMENCING ANY WORK AND INFORM ENGINEER ON RECORD FOR ANY DISCREPANCIES. BASE BID ACCORDINGLY.
- 2 EXISTING 2000A, 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "MPD(EX)" FOR OUR SPACE TO REMAIN. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR EXACT POWER DISTRIBUTION. E.C SHALL VERIFY EXACT SIZE AND OPERABLE CONDITION OF PANEL ON FIELD.
- 3 NEW 1200A (MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "MDP-1(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 4 NEW 200A (MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PANEL-A(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 5 NEW 200A (MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PANEL-B(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 6 NEW 400A (MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PANEL-C(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 7 NEW 400A (MLO), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "PANEL-D(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 8 NEW 225A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-1(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 9 NEW 225A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-2(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 10 NEW 225A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-3(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 11 NEW 225A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-4(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 12 NEW 225A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-5(N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 13 NEW 70A, 120/208V, 3-PHASE, 4-WIRE DISCONNECT SWITCH FOR "RTU-8 (N)". E.C SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.

NOTES:

- 1.) ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ALL EXISTING ELECTRICAL CONDITIONS AND COORDINATE NEW WITH EXISTING CONDITIONS. REPORT ANY DISCREPANCIES TO ARCHITECT & ENGINEER.
- 2.) G.C. SHALL VERIFY ALL EXISTING ELECTRICAL EQUIPMENT AND REPORT ANY DISCREPANCIES TO ARCHITECT & ENGINEER.
- 3.) G.C. TO BALANCE ALL PHASES TO WITHIN 10%.

ELECTRICAL GENERAL NOTES:

1. ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (Isc) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO COMMENCING ANY WORK
2. ELECTRICAL CONTRACTOR TO FIELD VERIFY EXACT POWER DISTRIBUTION SYSTEM AND SHALL COORDINATE WITH BASE BUILDING/LAND LORD FOR EXACT LOCATION OF SWITCHGEAR.

PANELBOARD		A(N)										MOUNTING:		RECESSED	
208Y/120		VOLTS,		3 PHASE,			4 WIRE								
MCB		NA	MLO	200A	BUS		225A MIN,								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	TENANT SIGNAGE	L	1.20	2#12, #12G, 3/4"C	1.92			2#12, #12G, 3/4"C	0.72	R	RECEPTILES -X ROOM	20	2	
3	20	LIGHTING-PUSH ROOM	L	0.69	2#12, #12G, 3/4"C		1.23		2#12, #12G, 3/4"C	0.54	R	RECEPTILES-TV (PUSH ROOM,WORK OUT)	20	4	
5	20	LIGHTING- WORKOUT AREA	L	0.79	2#12, #12G, 3/4"C			0.89	2#12, #12G, 3/4"C	0.10	M	MD	20	6	
7	20	LIGHTING- WORKOUT AREA	L	0.57	2#12, #12G, 3/4"C	0.93			2#12, #12G, 3/4"C	0.36	R	CEILING MOUNTED RECP FOR AV/IT	20	8	
9	20	LIGHTING- WORKOUT AREA	L	0.98	2#12, #12G, 3/4"C			2.06	2#12, #12G, 3/4"C	1.08	R	RECEPTILES -WORKOUT AREA	20	10	
11	20	LIGHTING- X ROOM	L	0.97	2#12, #12G, 3/4"C			2.23	2#12, #12G, 3/4"C	1.26	R	RECEPTILES -WORKOUT AREA	20	12	
13	20	LIGHTING- MENS REST ROOM,SHOWER,BOH,LOCKER,SAUNA,IT,RECO. LOUNGE	L	1.09	2#12, #12G, 3/4"C	1.19			2#12, #12G, 3/4"C	0.10	M	MD	20	14	
15	20	LIGHTING- WORKOUT AREA	L	0.35	2#12, #12G, 3/4"C		0.67		2#12, #12G, 3/4"C	0.32	L	LIGHTING -EXERCISE MEZZANINE	20	16	
17	20	LIGHTING- WOMENS REST ROOM,SHOWER,LOCKER,SAUNA,CORRIDOOR,STAIR	L	0.82	2#12, #12G, 3/4"C			1.54	2#12, #12G, 3/4"C	0.72	R	RECEPTILES -RECEPTION	20	18	
19	20	FAN	M	1.00	2#10, #10G, 3/4"C	1.50			2#12, #12G, 3/4"C	0.50	R	RECEPTILE - PRINTER	20	20	
21	20	FAN	M	1.00	2#10, #10G, 3/4"C		1.54		2#12, #12G, 3/4"C	0.54	R	RECEPTILES -TV	20	22	
23	20	FAN	M	1.00	2#10, #10G, 3/4"C			1.90	2#12, #12G, 3/4"C	0.90	R	RECEPTILES -RECEPTION+OFFICE	20	24	
25	20	FAN	M	1.00	2#10, #10G, 3/4"C	1.36			2#12, #12G, 3/4"C	0.36	R	RECEPTILES -KIDS CLUB	20	26	
27	20	LIGHTING-LOBBY,OFFICE,KIDS CLUB,INFANT AREA	L	0.32	2#12, #12G, 3/4"C		0.86		2#12, #12G, 3/4"C	0.54	R	RECEPTILES-TV (EXERCISE,RECOVERY,CORRIDOOR)	20	28	
29	20	FAN	M	1.00	2#10, #10G, 3/4"C			1.18	2#12, #12G, 3/4"C	0.18	R	RECEPTILES -PERSONAL TRAINING COUNTER	20	30	
31	20	FAN	M	1.00	2#10, #10G, 3/4"C	1.72			2#12, #12G, 3/4"C	0.72	R	RECEPTILES -BREAK ROOM,ROOM	20	32	
33	20	FAN	M	1.00	2#10, #10G, 3/4"C		2.20		2#12, #12G, 3/4"C	1.20	E	RECEPTILES -BREAK ROOM OVEN	20	34	
35	20	FAN	M	1.00	2#10, #10G, 3/4"C			1.36	2#12, #12G, 3/4"C	0.36	R	RECEPTILES-TV (WORK OUT)	20	36	
37	20	FAN	M	1.00	2#10, #10G, 3/4"C	2.20			2#12, #12G, 3/4"C	1.20	E	RECEPTILES -BREAK ROOM REFRIGERATOR	20	38	
39	20	LIGHTING- ELECTRICAL ROOM	L	0.10	2#12, #12G, 3/4"C		0.48		2#12, #12G, 3/4"C	0.38	L	EF-2	20	40	
41	20	RECEPTILES -PUSH ROOM	R	0.72	2#12, #12G, 3/4"C			1.10	2#12, #12G, 3/4"C	0.38	L	EF-1	20	42	
TOTAL LOAD (KVA)						10.82	9.03	10.20							

PANELBOARD		B(N)										MOUNTING:		RECESSED	
208Y/120		VOLTS,		3 PHASE,			4 WIRE								
MCB		NA	MLO	200A	BUS		225A MIN,								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.80			2#10, #10G, 3/4"C	1.40	M	TRADEMILL	20	2	
3	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.80		2#10, #10G, 3/4"C	1.40	M	TRADEMILL	20	4	
5	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.80	2#10, #10G, 3/4"C	1.40	M	TRADEMILL	20	6	
7	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.00			2#10, #10G, 3/4"C	0.60	M	CLIMB MILL	20	8	
9	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.00		2#10, #10G, 3/4"C	0.60	M	CLIMB MILL	20	10	
11	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.00	2#10, #10G, 3/4"C	0.60	M	CLIMB MILL	20	12	
13	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.12			2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	14	
15	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.12		2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	16	
17	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.12	2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	18	
19	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.12			2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	20	
21	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.12		2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	22	
23	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.12	2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	24	
25	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.12			2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	26	
27	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.12		2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	28	
29	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.12	2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	30	
31	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.12			2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	32	
33	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.12		2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	34	
35	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			2.12	2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	36	
37	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C	2.12			2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	38	
39	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C		2.12		2#10, #10G, 3/4"C	0.72	M	NON CARDIO	20	40	
41	20	TRADEMILL	M	1.40	2#10, #10G, 3/4"C			1.40	SPACE				20	42	
TOTAL LOAD (KVA)						15.40	15.40	14.68							

PANELBOARD		C(N)										MOUNTING:		RECESSED	
208Y/120		VOLTS,		3 PHASE,			4 WIRE								
MCB		NA	MLO	400A	BUS		400A MIN,								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C	2.00			2#12, #12G, 3/4"C	1.00	R	RECEPTILES -IT RACK	20	2	
3	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C		2.00		2#12, #12G, 3/4"C	1.00	R	SOAP DISPENSER	20	4	
5	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C			1.36	2#12, #12G, 3/4"C	0.36	R	RECEPTILES -WASH ROOM WOMENS AREA	20	6	
7	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C	1.09			2#12, #12G, 3/4"C	0.09	O	CP	20	8	
9	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C		1.20		2#12, #12G, 3/4"C	0.20	R	SOAP DISPENSER	20	10	
11	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C			1.00				SPARE	20	12	
13	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C	1.62			2#12, #12G, 3/4"C	0.90	R	RECEPTILES -WORK OUT MEZZANINE	20	14	
15	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C		1.92		2#12, #12G, 3/4"C	1.20	R	DRINKING FOUNTAIN	20	16	
17	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C			1.26	2#12, #12G, 3/4"C	0.54	R	RECEPTILES -ROOF	20	18	
19	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C	12.85				12.13	H		20	20	
21	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C		12.85			12.13	H	RTU-6(N)	110/3P	22	
23	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C			12.85		12.13	H		24	24	
25	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C	11.77				11.05	H		26	26	
27	20	NON CARDIO	M	0.72	2#10, #10G, 3/4"C		11.77			11.05	H	RTU-7(N)	100/3P	28	
29	20	HAND DRYER	R	1.00	2#12, #12G, 3/4"C			12.05		11.05	H		30	30	
31	20	RECEPTILES -TV	R	0.54	2#12, #12G, 3/4"C	1.08			2#12, #12G, 3/4"C	0.54	R	RECEPTILES -TV (MENS,WOMENS LOCKER ROOM)	20	32	
33	20	RECEPTILES -TV	R	0.54	2#12, #12G, 3/4"C		1.54		2#12, #12G, 3/4"C	1.00	R	LED SINAGE	20	34	
35	20	RECEPTILES -TV	R	0.54	2#12, #12G, 3/4"C			0.72	2#12, #12G, 3/4"C	0.18	R	RECEPTILES -ELE RM	20	36	
37	20	RECEPTILES -TV	R	0.54	2#12, #12G, 3/4"C	0.90			2#12, #12G, 3/4"C	0.36	R	RECEPTILES -RECOVERY LOUNGE	20	38	
39	20	RECEPTILES -TV	R	0.36	2#12, #12G, 3/4"C		1.16		2#12, #12G, 3/4"C	0.80	R	SOAP DISPENSER	20	40	
41	20	RECEPTILES -WASH ROOM KIDS CLUB	R	0.18	2#12, #12G, 3/4"C			0.72	2#12, #12G, 3/4"C	0.54	R	RECEPTILES -WASH ROOM MENS AREA ,SPRINKLER ROOM	20	42	
TOTAL LOAD (KVA)						31.31	32.44	29.96							

Property of **ESR Engineers**

PANELBOARD D(N)														MOUNTING:		RECESSED									
208Y/120														VOLTS,		3		PHASE,		4		WIRE			
MCB														NA		MLO		400		BUS		400		MIN,	
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.											
						A	B	C																	
1	15	WH-1	O	0.08	2#12, #12G, 3/4"	3.83			2#8, #10G, 3/4"	3.75	M	SAUNA	40/2P	2											
3	15	WH-2	O	0.08	2#12, #12G, 3/4"		3.83			3.75	M			4											
5	15	WH-3	O	0.08	2#12, #12G, 3/4"			3.83		3.75	M			6											
7	15	WH-4	O	0.08	2#12, #12G, 3/4"	3.83			2#8, #10G, 3/4"	3.75	M	SAUNA	40/2P	8											
9	30/2P	MASSAGE EQUIPMENT-3	O	2.50	2#10, #10G, 3/4"		2.50				SPARE	20	10												
11			O	2.50			2.50				SPARE	20	12												
13	30/2P	DRYER	O	2.50	2#10, #10G, 3/4"	2.50					SPARE	20	14												
15			O	2.50			2.50				SPARE	20	16												
17	20/2P	ACCU-1(N)	O	1.56	2#12, #12G, 3/4"			1.56			SPARE	20	18												
19			O	1.56				1.56			SPARE	20	20												
21	20/2P	ACCU-2(N)	O	1.56	2#12, #12G, 3/4"		1.56				SPARE	20	22												
23			O	1.56				1.56			SPARE	20	24												
25	30/2P	MASSAGE EQUIPMENT-1	O	2.50	2#10, #10G, 3/4"	2.50					SPARE	20	26												
27			O	2.50			2.50				SPARE	20	28												
29	30/2P	MASSAGE EQUIPMENT-2	O	2.50	2#10, #10G, 3/4"			2.50			SPARE	20	30												
31			O	2.50		2.50					SPARE	20	32												
33	20	SPARE					0.00				SPARE	20	34												
35	20	SPARE						0.00			SPARE	20	36												
37	20	SPARE					0.00				SPARE	20	38												
39	20	SPARE						0.00			SPARE	20	40												
41	20	SPARE							0.00		SPARE	20	42												
TOTAL LOAD (KVA)						16.72	12.89	11.95																	

PANELBOARD MDP-1(N)														MOUNTING:		SURFACE							
208Y/120														VOLTS,		3		PHASE,		4		WIRE	
MLO														1200A		BUS		1200A		MIN,			
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.									
						A	B	C															
1			H	25.22										2									
3	225/3P	RTU-1(N)	H	25.22	3#4/0,1#4G, 2"C		50.44						225/3P	4									
5			H	25.22				50.44						6									
7			H	25.22					50.44					8									
9	225/3P	RTU-2(N)	H	25.22	3#4/0,1#4G, 2"C			50.44					225/3P	10									
11			H	25.22					50.44					12									
13			H	25.22						36.27				14									
15	225/3P	RTU-3(N)	H	25.22	3#4/0,1#4G, 2"C					36.27			70/3P	16									
17			H	25.22							36.27			18									
TOTAL LOAD (KVA)						137.14	137.14	137.14															

PANELBOARD MDP(EX)														MOUNTING:		SURFACE							
208Y/120														VOLTS,		3		PHASE,		4		WIRE	
MAIN CB														2000A		BUS		2000A		MIN,			
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.									
						A	B	C															
1						15.16								2									
3	600/3P	SPARE					15.16		4#3/0,1#6G, 2"C	15.16	O	PANEL-B(N)	400/3P	4									
5								15.16			O			6									
7			O	137.14	THREE SETS OF (4-600 KCM, 1#3/0 G, 4"C)	168.37			4-600 KCM, 1#3G, 3 1/2"C	31.23	O	PANEL-C (N)	400/3P	8									
9	1200/3P	MDP-1(N)	O	137.14			168.37				31.23		O		10								
11			O	137.14				168.37			31.23		O		12								
13			O	10.48	4#3/0,1#6G, 2"C	24.33			4-600 KCM, 1#3G, 3 1/2"C	13.85	O	PANEL-D (N)	400/3P	14									
15	400/3P	PANEL-A(N)	O	10.48			24.33				13.85		O		16								
17			O	10.48				24.33			13.85		O		18								
TOTAL LOAD (KVA)						207.86	207.86	207.86															

Property of M.Y. Engineers

PLUMBING SPECIFICATIONS

- TENANT'S PLUMBING SHALL NOT BE CHASED OR CUT INTO OR THROUGH THE DEMISION WALLS (SEPARATING TENANT'S LEASE SPACE FROM ADJOINING TENANT SPACES ETC) OR EXTERIOR WALLS.
- VENTS SHALL NOT BE LOCATED WITHIN 25'0" OF AN EXTERIOR WALL ROOF FLASHING SERVICES MUST BE INSTALLED AS PER LANDLORD EQUIREMENTS (EXISTING VENTS)
- LANDLORD FURNISHED SANITARY OUTLET BELOW SLAB: LOCATION SHOWN ON PLUMBING SHEETS
- LANDLORD INSTALLED COLD WATER LINE; LOCATION SHOWN ON PLUMBING SHEETS.
- PLUMBING CONTRACTOR IS RESPONSIBLE TO VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ALL DESCREPANCIES TO THE TENANT'S REPRESENTATIVE.
- PROVIDE MINIMUM 1" INSULATION ON ALL HOT WATER AND COLD WATER PIPING.
- HOT/COLD WATER PIPING AND WASTE LINE BELOW LAVATORY SHALL BE INSULATED AS REQUIRED BY LOCAL CODE.
- ALL PIPE INSULATION SHALL BE NONCOMBUSTIBLE MATERIALS AS REQUIRED BY LOCAL CODE.
- WATER METER IF REQUIRED SHALL HAVE SHUT OFF VALVES ON BOTH SIDES OF METER.
- FOR ADDITIONAL PLUMBING INFORMATION, REFER TO THE SPECIFICATIONS AND DETAILS ON PLUMBING DRAWINGS.
- FIXTURES SHALL BE AS SCHEDULED ON SHEET P1.0, REPORT ANY DISCREPANCIES TO ARCHITECT PRIOR TO BID.
- MATERIALS
 - SANITARY SEWER—CAST IRON PIPING MAY BE USED EXCEPT THAT ALL PIPING BELOW GRADE SHALL BE CAST IRON VENT TWO (2") IN SIZE AND SMALLER MAY BE EITHER SCHEDULE 40 GALVANISED STEEL OR COPPER PIPING PVC IS ALLOWED FOR WASTE/VENT WHERE APPROVED BY A.H.J.
 - DOMESTIC WATER AND HOT WATER PIPING SHALL BE COPPER TYPE "L" WITH WROUGHT COPPER FITTINGS. ALL HOT WATER PIPING SHALL BE INSULATED WITH ARMAFLEX OR EQUIVALENT INSULATING TO A THICKNESS OF 1".
 - GAS PIPING SHALL BE BLACK STEEL SCHEDULE 40 WITH SCREWED FITTINGS.
- MAKING UP PIPE
 - SCREWED PIPE SHALL BE MADE WITH PIPE COMPOUND APPLIED TO THE MALE THREAD WITH NOT MORE THAN TWO THREADS LEFT EXPOSED, PIPE SHALL BE REAMED AFTER THREADING.
 - BELOW GRADE SANITARY PIPING THAT IS CAST IRON SHLL BE MADE UP WITH ONE THIRD OF THE HUB CAULKED WITH FIRST QUALITY OAKUM, AND THE REMAINDER FILLED WITH FIRST QUALITY QAULKING AT ONE POURING AND CAULKED TIGHT.
 - COPPER JOINTS SHALL BE MADE UP WITH 95-5 SOLDER
- HANGERS AND SUPPORTS

HORIZONTAL PIPING SHALL BE SUPPORTED AT INTERVALS NOT TO EXCEED 10'0" WITH SWIVEL SPLIT PIPE HANGERS EQUAL TO CRANE NO. 199F OR GRINNEL NO. 104. VERTICAL PIPING SHALL BE SUPPORTED BY MEANS OF WROUGHT IRON CLAMPS SUSPENDED FROM THE UNDERSIDE OF STRUCTURE WITH HANGER RODS.
- CLEANOUTS

CLEANOUTS SHALL BE MANUFACTURED BY TYLER, MILWAKEE OR EQUAL AND SHALL BE INSTALLED AT ALL BENDS, ANGLES AND ENDS OF ALL WASTE AND SEWER LINES AS CALLED FOR THE DRAWINGS AND AS REQUIRED BY THE LOCAL CODES. ALL CLEANOUTS SHALL BE BROUGHT TO GRADE AND IN ALL CASES, SHALL BE PROVIDED WITH SUFFICIENT SPACE FOR RODDING.

ENERGY CONSERVATION NOTES

- AS PER 2009 INTERNATIONAL ENERGY CONSERVATION CODE, WATER-HEATING EQUIPMENT SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS OF TABLE 503.2.3(5).
- AS PER 2009 INTERNATIONAL ENERGY CONSERVATION CODE 504.4, WATER-HEATING EQUIPMENT NOT SUPPLIED WITH INTEGRAL HEAT TRAPS AND SERVING NON-CIRCULATING SYSTEMS SHALL BE PROVIDED WITH HEAT TRAPS ON THE SUPPLY AND DISCHARGE PIPING ASSOCIATED WITH THE EQUIPMENT.
- AS PER 2009 INTERNATIONAL ENERGY CONSERVATION CODE 504.5, FOR AUTOMATIC-CIRCULATING HOT WATER SYSTEMS, PIPING SHALL BE INSULATED WITH 1 INCH OF INSULATION HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H * FT2 * F. THE FIRST 8 FEET OF PIPING IN NON-CIRCULATING SYSTEMS SERVED BY EQUIPMENT WITHOUT INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 0.5 INCH OF MATERIAL HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H * FT2 * F.

EXISTING CONTIDITONS NOTES

STOP AND READ
THE CONTRACTOR AND SUB-CONTRACTORS SHALL NOT INITIATE ANY WORK UNTIL EXISTING FIELD CONDITIONS ARE PROPERLY VERIFIED. THIS SHALL HOLD TRUE FOR FIRST GENERATION AND 2ND GENERATION SPACES. WHEN DEMOLITION IS REQUIRED, THAT WILL BE PERMITTED TO EXPOSE CONDITIONS. THESE VERIFICATIONS SHALL INCLUDE BUT NOT LIMITED TO: DIMENSIONS BOTH HORIZONTALLY AND VERTICAL, ELECTRICAL SERVICE /PANELS LOCATION AND VOLTS/PHASE, LOCATION/QTY OF ROOF MOUNTED HVAC EQUIPMENT, CONFIRM THAT INTERIOR HVAC HUNG UNITS HAVE PROPER SUPPORT CONNECTIONS FOR EXISTING STRUCTURE, FIRE SPRINKLER MAIN RUNS, TOILET ROOM DIMENSIONS, DOOR SWING FOR DOORS TO REMAIN AND ETC. IF NOT VERIFIED AND DISCOVERED AT A LATER TIME, THE CONTRACTOR SHALL REIMBURSE THE ARCHITECT FOR THE REDESIGN FEE. THIS DOES NOT INCLUDE HIDDEN WORK I.E. PITCH OF SANITARY LINES, ACTUAL CONDITIONS OF EXISTING HVAC EQUIPMENT, STRUCTURAL COLUMNS/BEARING WALLS OR CONDITIONS OF GREASE INTERCEPTORS AND ETC.

SCOPE OF WORK

PROVIDE ALL PLUMBING FOR NEW FIXTURE INCLUDING ALL WATER & SANITARY LINES AND CONNECT TO EXISTING UTILITIES. CONNECT 4 NEW GAS TANKLESS WATER HEATERS.
COORDINATE WITH GC & MECHANICAL CONTRACTOR FOR ANY REQUIRED CONDENSATE LINES AND GAS FLUE FOR WATER HEATERS.

PLUMBING LEGEND

	SANITARY SEWER PIPING
	VENT PIPING
	DOMESTIC COLD WATER PIPING
	HOT WATER PIPING
	HOT WATER RETURN PIPING
	PIPE RISE OR DROP
	PIPE RISER UP
	GAS PIPING
	BALANCING VALVE
	CAPPED END OF PIPE
	CLEAN OUT / CODP
	P-TRAP
S.O.V.	SHUT-OFF VALVE
CO	CLEAN OUT
CW	DOMESTIC COLD WATER
HW	DOMESTIC HOT WATER
HWR	DOMESTIC HOT WATER RETURN
VTR	VENT THRU ROOF
RF	REFRIGERATOR
BS	BREAKAREA SINK
WB	WASHER BOX/DRYER
WCO	WALL CLEAN OUT
BFP	BACKFLOW PREVENTER
WH	WATER HEATER
DN	DOWN
	GATE VALVE
	CHECK VALVE
	WATER HAMMER ARRESTER
	FLOOR DRAIN
	THERMOSTATIC MIXING VALVE

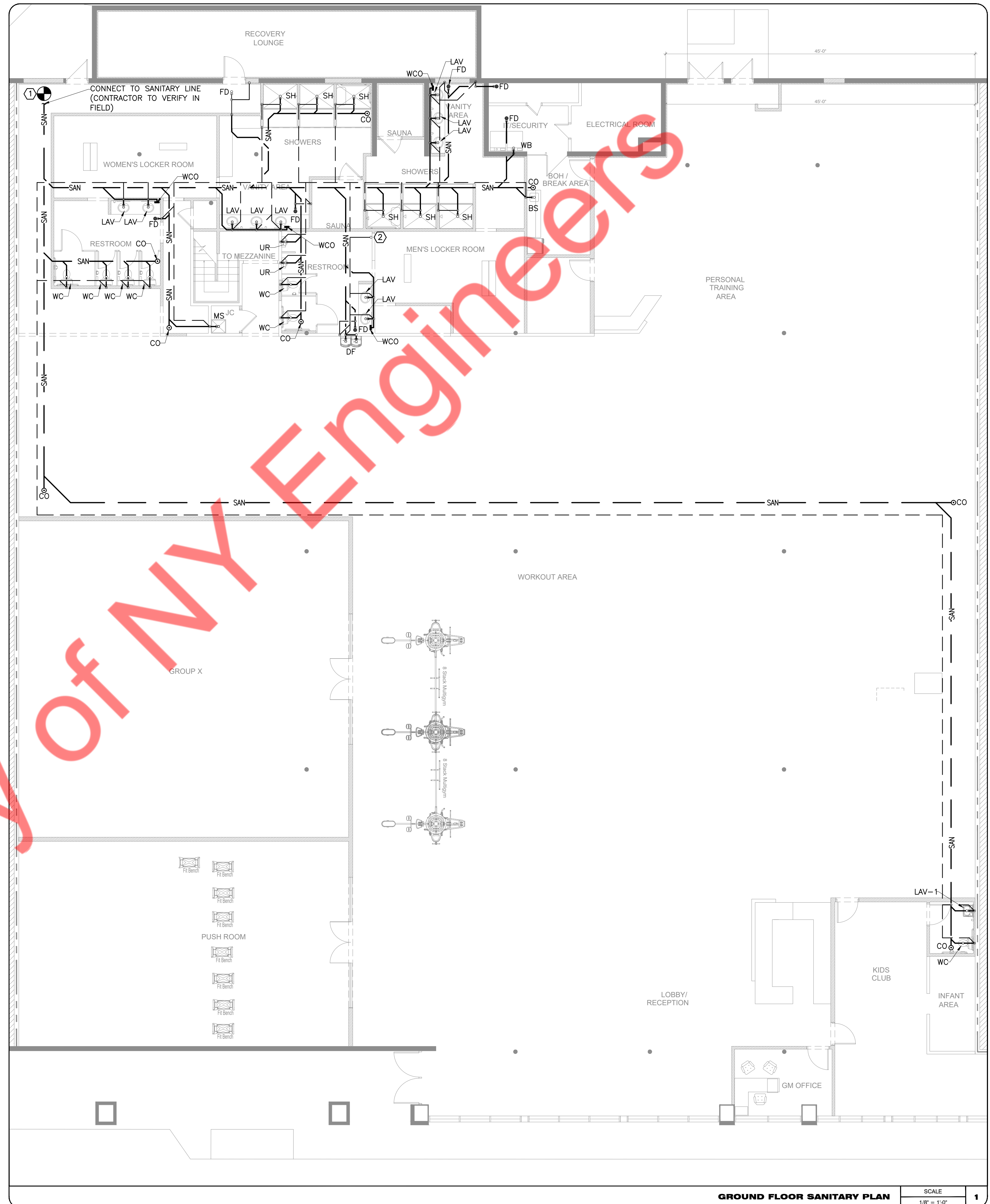
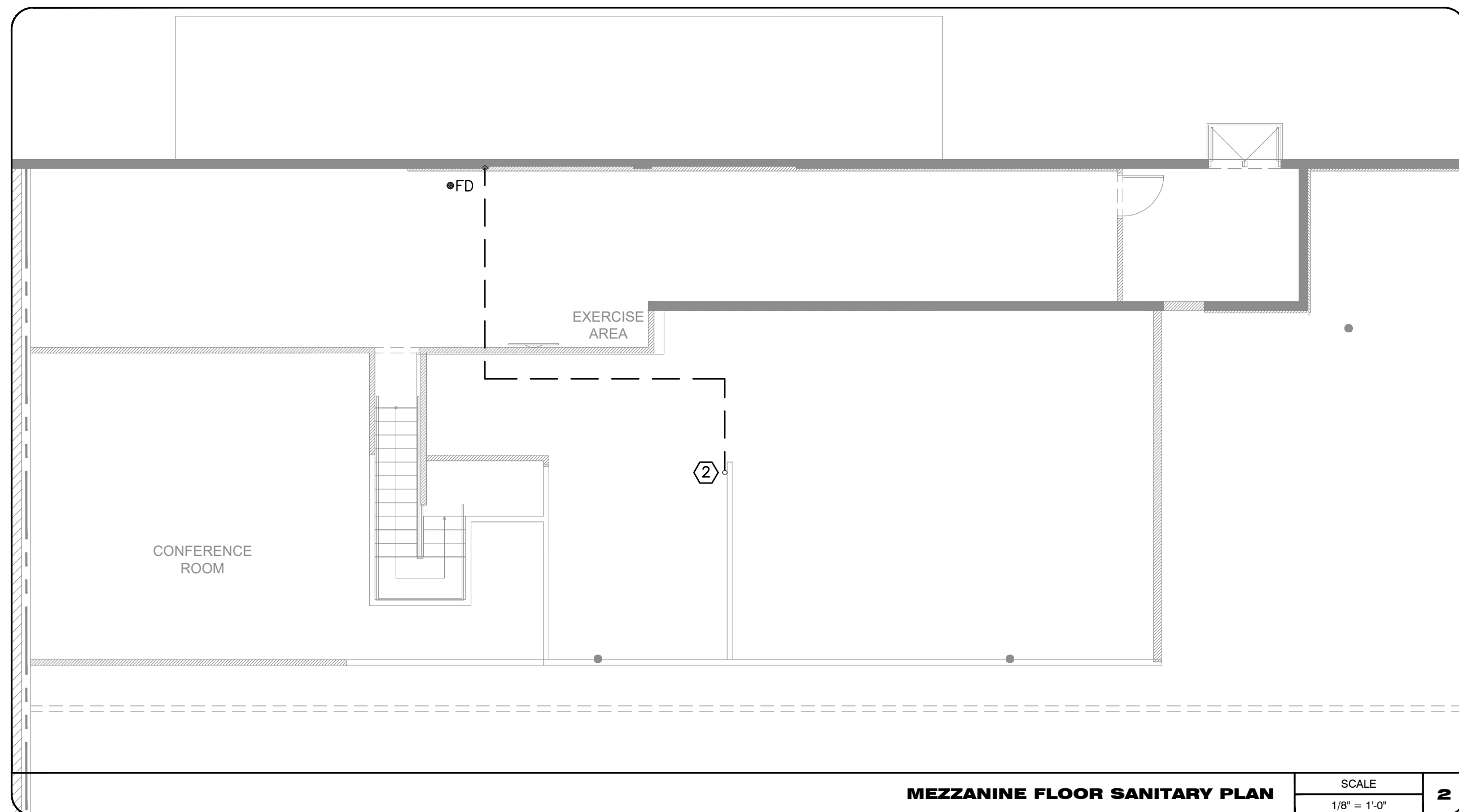
PLUMBING NOTES

- ALL WORKMANSHIP AND MATERIALS SHALL BE IN STRICT ACCORDANCE WITH APPLICABLE LOCAL CODES, RULES AND ORDINANCES.
- PLUMBING CONTRACTOR SHALL REVIEW ALL DRAWINGS OF THIS SET. CONTRACTOR TO VERIFY THAT ALL EQUIPMENT SHOWN AS EXISTING MATCHES THE DESCRIPTIONS AND SPECIFICATIONS SHOWN ON DRAWINGS AND SCHEDULES. IF DIFFERENT NOTIFY ARCHITECT/ENGINEER BEFORE BIDDING, ORDERING OR PRECEDING WITH WORK.
- ALL EQUIPMENT WHICH IS TO REMAIN MUST BE REFURBISHED TO A LIKE NEW CONDITION.
- PLUMBING CONTRACTOR SHALL VISIT THE JOB SITE AND THOROUGHLY FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS.
- ALL MATERIALS SHALL BE NEW.
- ALL WORK SHALL BE PERFORMED BY A LICENSED PLUMBING CONTRACTOR IN A FIRST CLASS WORKMANLIKE MANNER. THE COMPLETED SYSTEM SHALL BE FULLY CONSTRUCTION SHALL BE A PART OF THIS CONTRACT.
- REQUIRED INSURANCE SHALL BE PROVIDED BY THE PLUMBING CONTRACTOR FOR PROTECTION AGAINST PUBLIC LIABILITY AND PROPERTY DAMAGE FOR THE DURATION OF THE WORK.
- PLUMBING CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS, FEES, INSPECTION AND TESTS. PLUMBING CONTRACTOR TO OBTAIN PERMIT AND APPROVED SUBMITTALS PRIOR TO BEGINNING WORK OR ORDERING EQUIPMENT. PLUMBING CONTRACTOR MUST BE PRESENT FOR ALL INSPECTIONS OF HIS WORK BY REGULATORY AUTHORITIES.
- DRAWINGS ARE DIAGRAMMATIC. DO NOT SCALE FOR THE EXACT LOCATION OF FIXTURES, PIPING, EQUIPMENT, ETC.
- ALL WORK SHALL BE COORDINATED WITH OTHER TRADES TO AVOID INTERFERENCE WITH THE PROGRESS OF CONSTRUCTION. REPORT ANY DISCREPANCY TO ENGINEER/ARCHITECT PRIOR TO BEGINNING CONSTRUCTION.
- VERIFY LOCATION, SIZE, DIRECTION OF FLOW AND INVERTS OF ALL EXISTING UTILITIES PRIOR TO BEGINNING OF CONSTRUCTION. ADVISE ENGINEER OF ANY DISCREPANCIES.
- SOIL, WASTE, VENT AND RAINWATER PIPING SHALL BE PVC BUT MAY NOT RUN THRU RATED ASSEMBLIES OR IN PLENUMS.
- ALL FIXTURES MUST BE PROVIDED WITH READILY ACCESSIBLE STOPS AND APPROPRIATELY MARKED ACCESS PANELS. COORDINATE LOCATIONS WITH GENERAL CONTRACTOR PRIOR TO INSTALLATION.
- FURNISH AND INSTALL APPROVED AIR CHAMBERS AT EACH PLUMBING FIXTURE GROUP AS PER CODE AND WITH GOOD ENGINEERING PRACTICE.
- DIELECTRIC COUPLINGS ARE REQUIRED BETWEEN ALL DISSIMILAR METAL IN PIPING AND EQUIPMENT CONNECTIONS; EXCEPT AT WATER HEATER AS PER CODE.
- ISOLATE COPPER PIPE FROM HANGER OR SUPPORTS WITH ISOLATOR PAD.
- ALL FIRE RATED FLOOR AND WALL PENETRATIONS SHALL BE PROPERLY PROTECTED FROM FIRE, SMOKE AND WATER PENETRATION BY FILLING VOIDS BETWEEN PIPE AND WALL/FLOOR SLEEVES WITH FIRE RATED FOAM, TO ACHIEVE THE SAME RATING AS WALLS OR FLOORS AS PART OF THE PLUMBER'S WORK.
- PLUMBING CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FREE FROM DEFECTS FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR FROM DATE OF CERTIFICATE OF OCCUPANCY. CORRECTION OF ANY DEFECTS SHALL BE COMPLETED WITHOUT ADDITIONAL CHARGE WITHIN 72 HOURS OF NOTIFICATION AND SHALL INCLUDE REPLACEMENT OR REPAIR OF ANY OTHER PHASE OF THE INSTALLATION WHICH MAY HAVE BEEN DAMAGED. PROVIDE COPY TO LL.
- STUDOR MINI/MAXI AIR ADMITTANCE VALVES MAY NOT BE USED AS AN ALTERNATE TO VENT PIPING THRU ROOF.
- PROVIDE CHROME PLATED COMBINATION COVER PLATE AND CLEAN OUT PLUG OR ACCESS PANEL FOR ALL CLEANOUTS.
- NO COMBUSTIBLE MATERIAL TO BE USED IN MECHANICAL ROOMS OR IN CEILING SPACES WHERE USED AS RETURN AIR PLENUMS.
- NO WATER, SANITARY OR DRAINAGE PIPING PERMITTED IN ELECTRICAL OR ELEVATOR EQUIPMENT ROOMS.
- WATER PIPING INSULATION SHALL BE 1" THICK ARMAFLEX INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR ALL HOT WATER PIPING. WHERE DOMESTIC WATER TEMPERATURES CAN CAUSE SWEATING, ALL COLD WATER PIPING SHALL BE INSULATED WITH 1/2" THICK ARMAFLEX INSULATION.
- CONDENSATE DRAIN LINES TO BE RUN UNDER SLAB IN PVC SCH40 PIPE AND STUBBED OUT OF WALL TO UNIT. TIE-IN OF A/C TO BE BY OTHERS. PVC PIPING WITH 1/2" THICK ARMAFLEX INSULATION MAY BE USED IN LOCATIONS WHERE ALLOWED BY LOCAL CODES. SEE PLUMBING DRAWINGS FOR SIZE AND LOCATION OF PIPING.
- PROVIDE ANGLE STOPS ON ALL WATER SERVICE LINES TO FIXTURES FOR INDIVIDUAL SHUT-OFF.
- NO JOINTS UNDERGROUND FOR COPPER.
- PLUMBING FIXTURES SHALL COMPLY WITH SC STATE PLUMBING CODE.
- WATER HAMMER ARRESTORS AS PER SC STATE PLUMBING CODE.
- PLUMBING CONTRACTOR TO PROVIDE ANTI-SCALDING VALVE FOR TUBS AND SHOWERS.
- PLUMBING CONTRACTOR SHALL REVIEW ALL BID DOCUMENTATION.
- PLUMBING CONTRACTOR SHALL REVIEW WALL FINISHES @ LOCATION REQUIRING BARRIER-FREE COMPLIANCE (EXAMPLE: CENTER LINE TO TOILET).
- CONSTRUCTION "AS BUILT" DRAWINGS AND DOCUMENTS SHALL BE PROVIDED TO THE OWNER WITHIN 30 DAYS AFTER THE DATE OF ACCEPTANCE. PROVIDE A COPY TO LL.
- OPERATION MANUALS AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE BUILDING OWNER. PROVIDE A COPY TO LL.

PLUMBING EQUIPMENT SCHEDULE

(IMPORTANT NOTE: EQUIPMENT SUBJECT TO CHANGE, GC TO CONFIRM EQUIPMENT WITH TENANT PRIOR TO CONSTRUCTION)

MARK	QUANTITY	ITEM DESCRIPTION	MANUFACTURER	MODEL NUMBER	FURNISHED BY	INSTALLED BY	SIZE			SHOWER HEAD/ FAUCET TYPE/ STYLE	REMARKS
							WIDTH	DEPTH	HEIGHT		
PLUMBING FIXTURES											
1	WC	7 WATER CLOSET (FLOOR MOUNT)	KOHLER	-	GC	GC	-	-	-	-	-
2	UR	2 URINAL (WALL HUNG)	KOHLER	K-5016-ET-0	GC	GC	-	-	-	-	-
3	LAV	10 LAVATORY (UNDERMOUNT) ADA OVAL, STAINLESS STEEL	KOHLER	K-2602-SU-NA	GC	GC	23.2"	15.25"	6.25"	FAUCET: SLOAN EAF-100-P-ISM, SEE PLUMBING	W/ADAPTOR TO HARDWIRE, G.C TO VERIFY SIZE, VOLTAGE, ORDER AS ACCESSORY W/SINK.
4	LAV-1	1 ACCESSIBLE HAND SINK	AMERICAN STANDARD	0356.421	GC	GC	20.5"	18.25"	8.125"	FAUCET: KOHLER K-R22797-4D, TMV	-
5	SH	6 SHOWER	CUSTOM	CUSTOM	GC	GC	36"	39"	5.5"	SHOWER HEAD: DELTA T17230 SEE PLUMBING	GC TO VERIFY ROUGH OPENING WITH MANUFACTURER PRIOR TO FRAMING OPENING
6	MS	1 MOP SINK (FLOOR MOUNT)	FLORESTONE	MSR 2424	GC	GC	24"	24"	10"	FAUCET: SPEAKMEN SC-5811	-
7	DF	1 HI LOW DRINKING FOUNTAIN	ELKAY	EXSTL8WSLK	GC	GC	-	-	-	ADA COMPLAINT	-
8	BS	1 BREAKAREA SINK	-	-	GC	GC	-	-	-	-	-
9	FD	5 FLOOR DRAIN	-	-	GC	GC	-	-	-	-	-
10	WH	4 GAS WATER HEATERS	RINNAI	C199	GC	GC	-	-	-	UTILIZE EZ CONNECT CABLE	(4) RINNAI MODEL NO. CU199 CONDENSING TANKLESS INDOOR COMMERCIAL WALL MOUNTED CONTINUOUS FLOW WATER HEATER 19900BTU/HR INPUT EA. 79600BTU/HR TOTAL OR EQUIVALENT COMPLETE WITH WALL MOUNTED REMOTE CONTROL UNIT, SET HEATER @140°F-- SEE SHEET P-2.0 FOR LOCATION OF WATER HEATERS.
11	ET	1 EXPANSION TANK	AMTROL	ST-447C	GC	GC	-	-	-	-	(1) NEW AMTROL MODEL NO. ST-447C, EXPANSION TANK, TANK VOLUME OF 53 GAL. -- SEE SHEET P-3.0 FOR LOCATION OF EXPANSION TANK.
12	CP	1 CIRCULATION PUMP	GRUNDFOS	UP15-10B5	GC	GC	-	-	-	-	XYLEM MODEL NO. NBF-18S RE-CIRCULATION PUMP, 2.5 GPM @ 13.5 FOOT OF HEAD, 90 WATTS (ELECTRICAL CONNECTION), 60HZ (TIMER CONTROL), 0.74 F.L. AMPS (TIME CONTROL-CONTACT RATING) OR EQUIVALENT--SEE ELECTRICAL DRAWINGS FOR ELECTRICAL REQUIREMENTS.
13	WB	1 WASHER BOX AND DRYER	-	-	GC	GC	-	-	-	-	-



SANITARY NOTES BY SYMBOLS

① CONTINUE WASTE PIPING TO EXISTING SANITARY SERVICE, PLUMBING CONTRACTOR SHALL FIELD VERIFY THE SIZE, LOCATION, DEPTH OF INVERT, AND DIRECTION OF FLOW PRIOR TO BID.

② CONTINUE 4" VENT PIPE. CONTRACTOR TO FIELD VERIFY ACTUAL LOCATION AND SIZE IN FIELD.

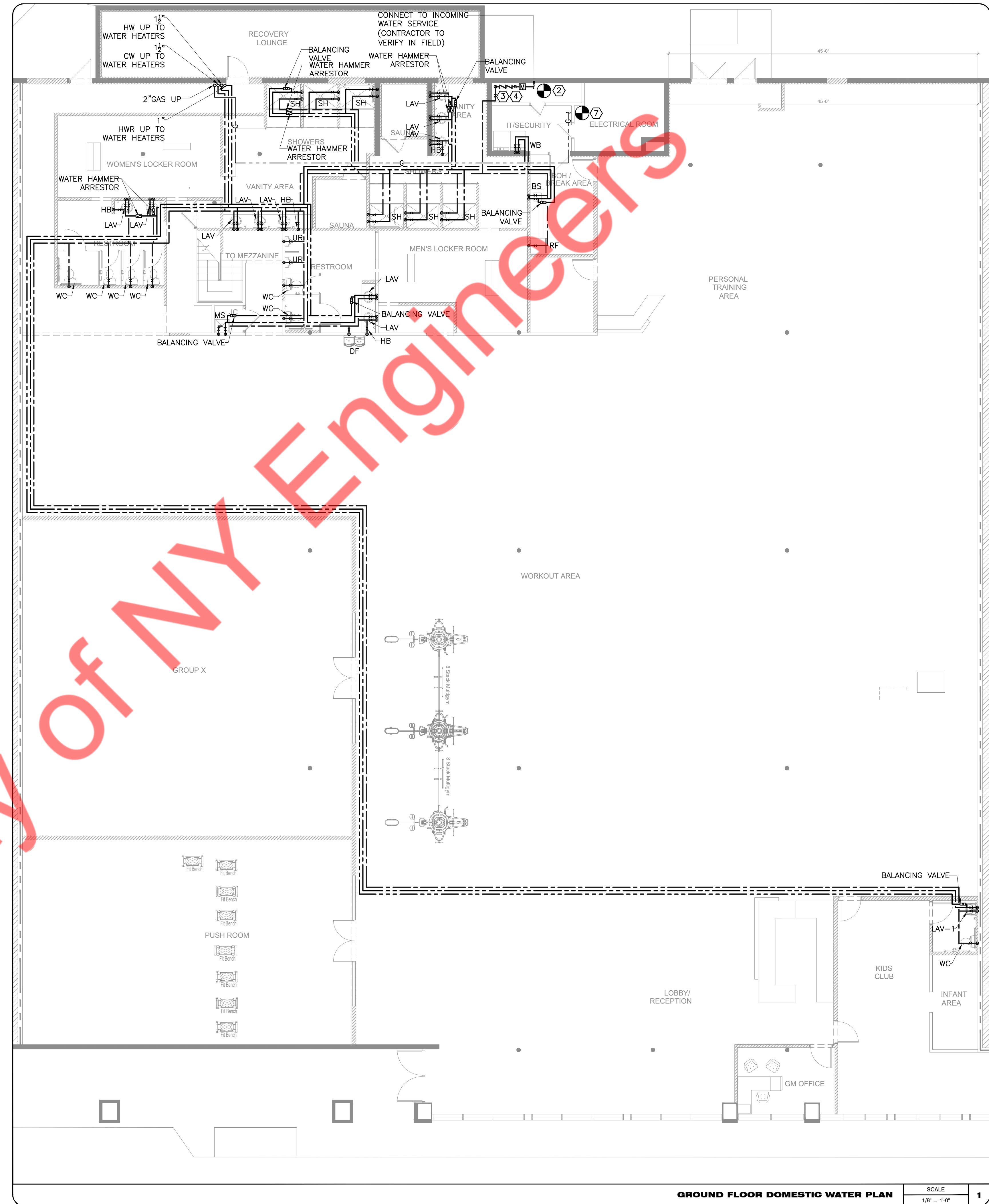
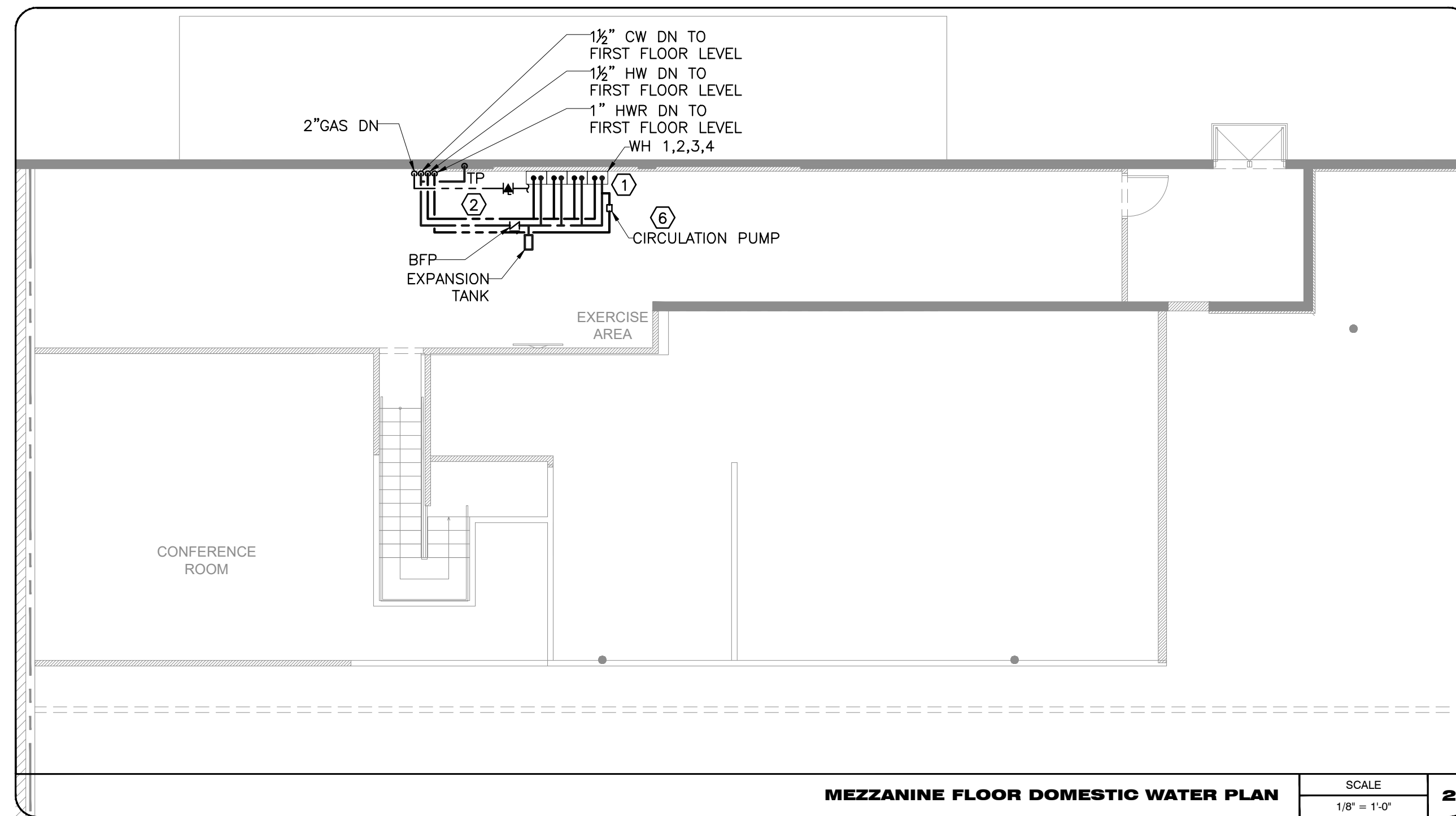
PLUMBING ABBREVIATIONS

WC WATER CLOSET-FLUSH TANK
 UR URINAL-FLUSH VALVE
 LAV LAVATORY
 LAV-1 ACCESSIBLE HAND SINK
 SH SHOWER
 DF DRINKING FOUNTAIN
 WH WATER HEATER
 MS MOP SINK
 TP TRAP PRIMER
 HB HOSE BIB
 RF REFRIGERATOR
 BS BREAKAREA SINK
 WB WASHER BOX & DRYER

SANITARY SEWER AND WATER SERVICE PLUMBING CALCULATION
 PROJECT: FUELFITNESS, SC

FIXTURE TYPE	QUANTITY	WASTE FIXTURE UNITS PER FIXTURE	TOTAL WASTE FIXTURE UNITS FOR FIXTURE TYPE	WATER FIXTURE UNITS PER FIXTURE	TOTAL WATER FIXTURE UNITS FOR FIXTURE TYPE
WATER CLOSET (FLUSH TANK)	7	4	28	5	35
URINALS	2	4	8	5	10
LAVATORY	11	1	11	2	22
BREAKAREA SINK	1	2	2	1.4	1.4
HOSE BIB	4	-	-	1.5	6
FLOOR DRAIN	6	2	12	-	-
SHOWER	6	2	12	4	24
DRINKING FOUNTAIN	1	0.5	0.5	0.25	0.25
MOP SINK	1	2	2	3	3
WASHER BOX & DRYER	1	3	3	3	3
TOTAL FIXTURE UNITS:			78.5		104.65
SERVICE PIPE SIZE			4"		2"
DISTANCE FROM METER TO REMOTE FIXTURE (FEET)					275'

FIXTURE UNIT AS PER 2018 SOUTH CAROLINA PLUMBING CODE TABLE E103.3(2) AND TABLE 709.1



- WATER & GAS NOTES BY SYMBOLS**
- ① INSTALL WATER HEATERS PER MANUFACTURER'S RECOMMENDATIONS, ROUTE DISCHARGE TO FLOOR DRAIN.
 - ② INSTALL TRAP PRIMERS ABOVE CEILING, OR PROVIDE ACCESS WALL PANEL.
 - ③ PLUMBING CONTRACTOR TO CHECK EXISTING STREET SERVICE AND METER. PLUMBING CONTRACTOR TO PROVIDE 2" BUILDING SERVICES FROM TO FIXTURE, PLUMBING CONTRACTOR SHALL FIELD VERIFY LOCATION OF MAIN WATER SUPPLY LINE.
 - ④ PROVIDE MASTER SHUT OFF VALVE, LOCATE IN WALL AT 48 A.F.F. IF POSSIBLE
 - ⑤ PROVIDE RPZ BACK FLOW PREVENTER AT 2' BEYOND METER.
 - ⑥ THIS IS A 365 DAY, 24/7 FACILITY WHERE HOT WATER IS IN DEMAND AT ALL TIMES, FOR HOT WATER CIRCULATION CONTROLS, PROVIDE AUTOMATIC SHUT DOWN OF PUMPS WHEN DESIRED WATER TEMPERATURE IS ACHIEVED IN THE RETURN PIPING.
 - ⑦ CONNECT NEW 2" GAS LINE TO NEW GAS METER. CONTRACTOR TO FIELD VERIFY EXISTING AVAILABLE GAS PRESSURE AND MAKE SURE TO PROVIDE ADEQUATE INLET PRESSURE REQUIRED FOR GAS FIRED WATER HEATERS.

PLUMBING ABBREVIATIONS

WC	WATER CLOSET-FLUSH TANK
UR	URINAL-FLUSH VALVE
LAV	LAVATORY
LAV-1	ACCESSIBLE HAND SINK
SH	SHOWER
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Property of NY Engineers

WATER & GAS NOTES BY SYMBOLS

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SANITARY SEWER AND WATER SERVICE PLUMBING CALCULATION
PROJECT: FUELFITNESS, SC

FIXTURE TYPE	QUANTITY	WASTE FIXTURE UNITS PER FIXTURE	TOTAL WASTE FIXTURE UNITS FOR FIXTURE TYPE	WATER FIXTURE UNITS PER FIXTURE	TOTAL WATER FIXTURE UNITS FOR FIXTURE TYPE
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MOP SINK	1	2	2	3	3
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TOTAL FIXTURE UNITS:			78.5		104.65
SERVICE PIPE SIZE			4"		2"
DISTANCE FROM METER TO REMOTE FIXTURE (FEET)					275'
FIXTURE UNIT AS PER 2018 SOUTH CAROLINA PLUMBING CODE TABLE E103.3(2) AND TABLE 709.1					

NAT. GAS DESIGN

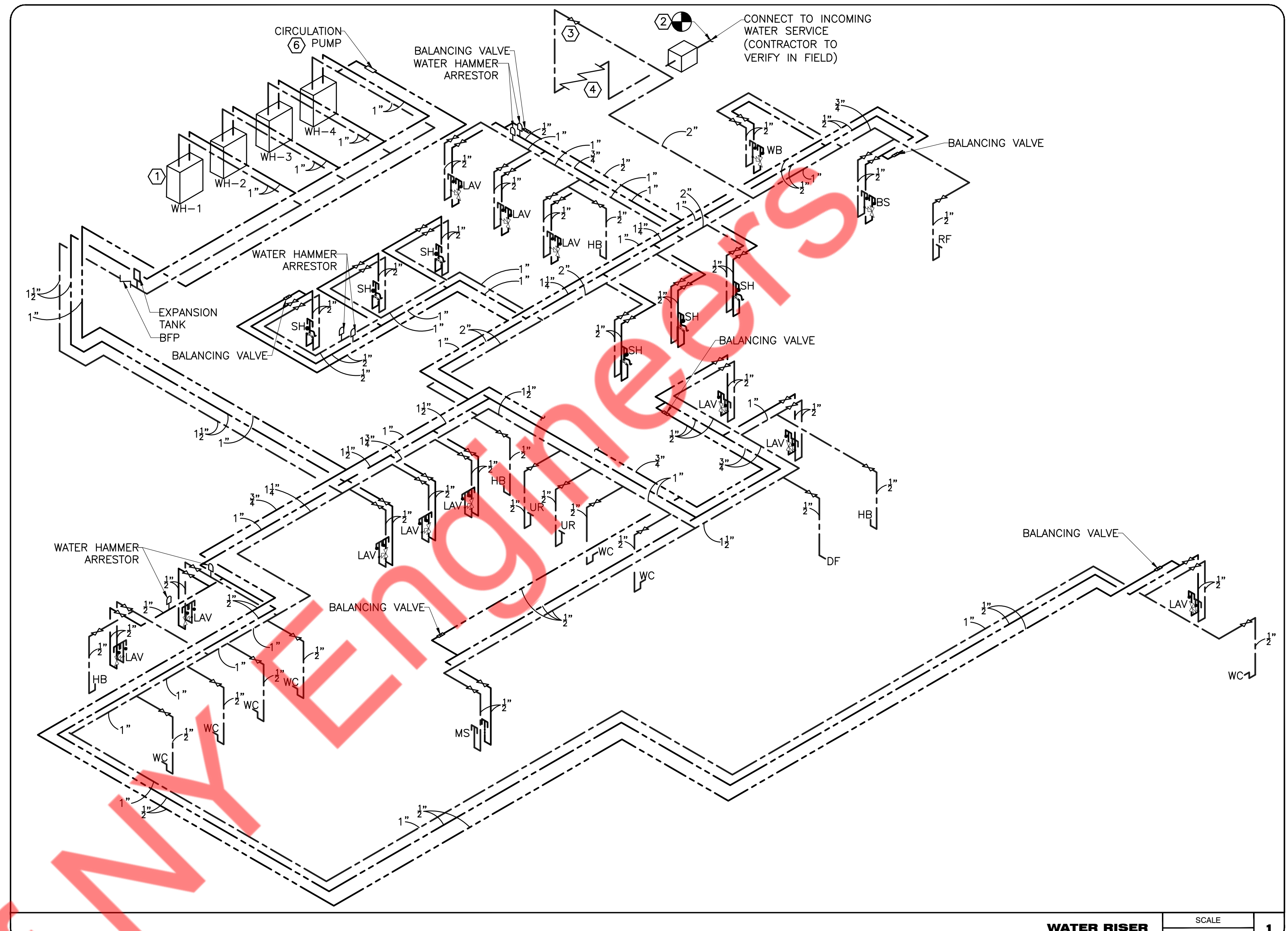
INLET PRESSURE < 2.0PSI
PRESSURE DROP- 0.5 IN W.C
LONGEST LENGTH-APPROX. 160'

GAS LOAD SUMMARY

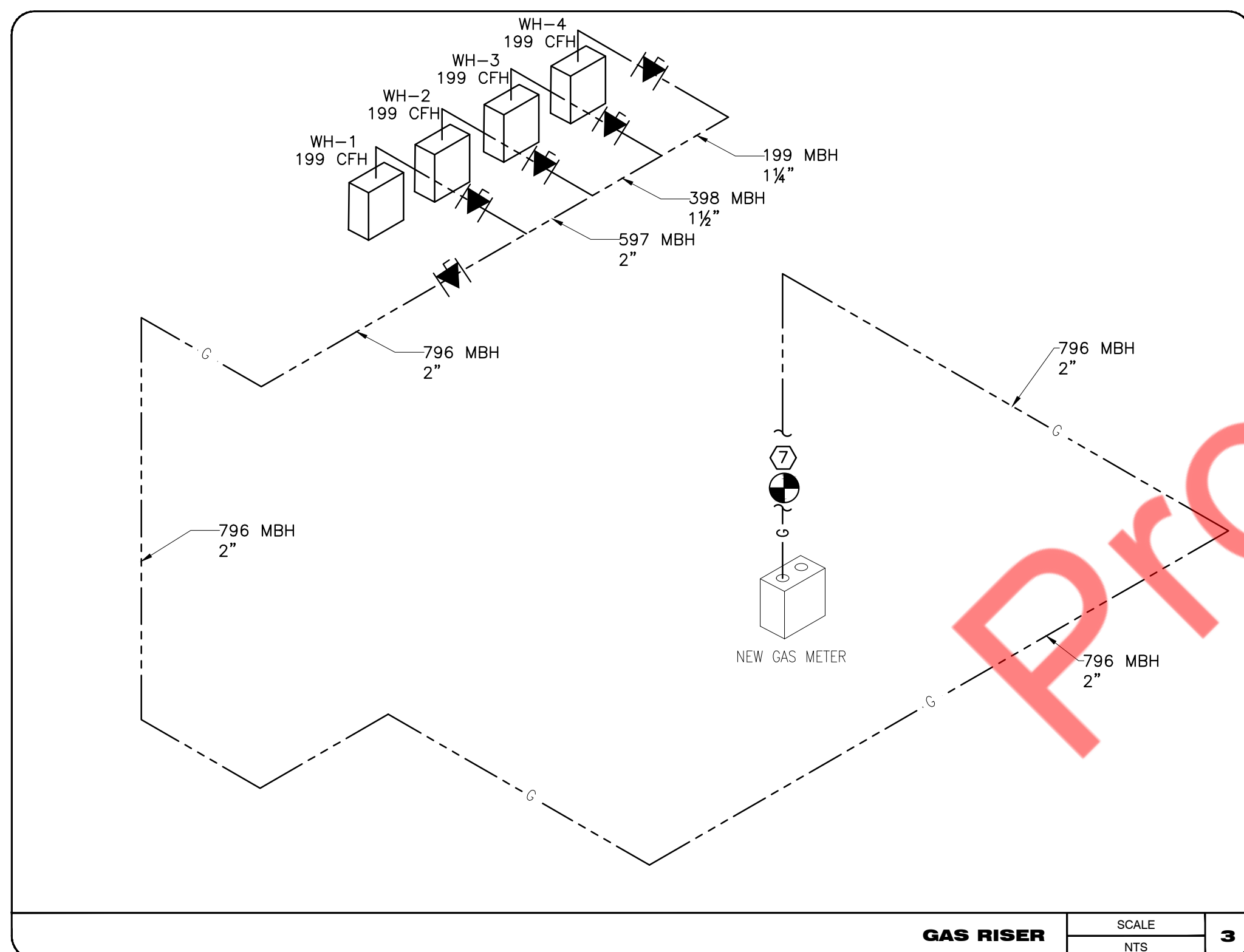
EQUIPMENT TAG	CFH LOAD
WH-1,2,3,4(4*199 MBH)	796
TOTAL LOAD	796
GAS PIPE SIZING BASED ON TABLE 402.4(2). 2018 INTERNATIONAL FUEL GAS CODE.	

SANITARY NOTES BY SYMBOLS

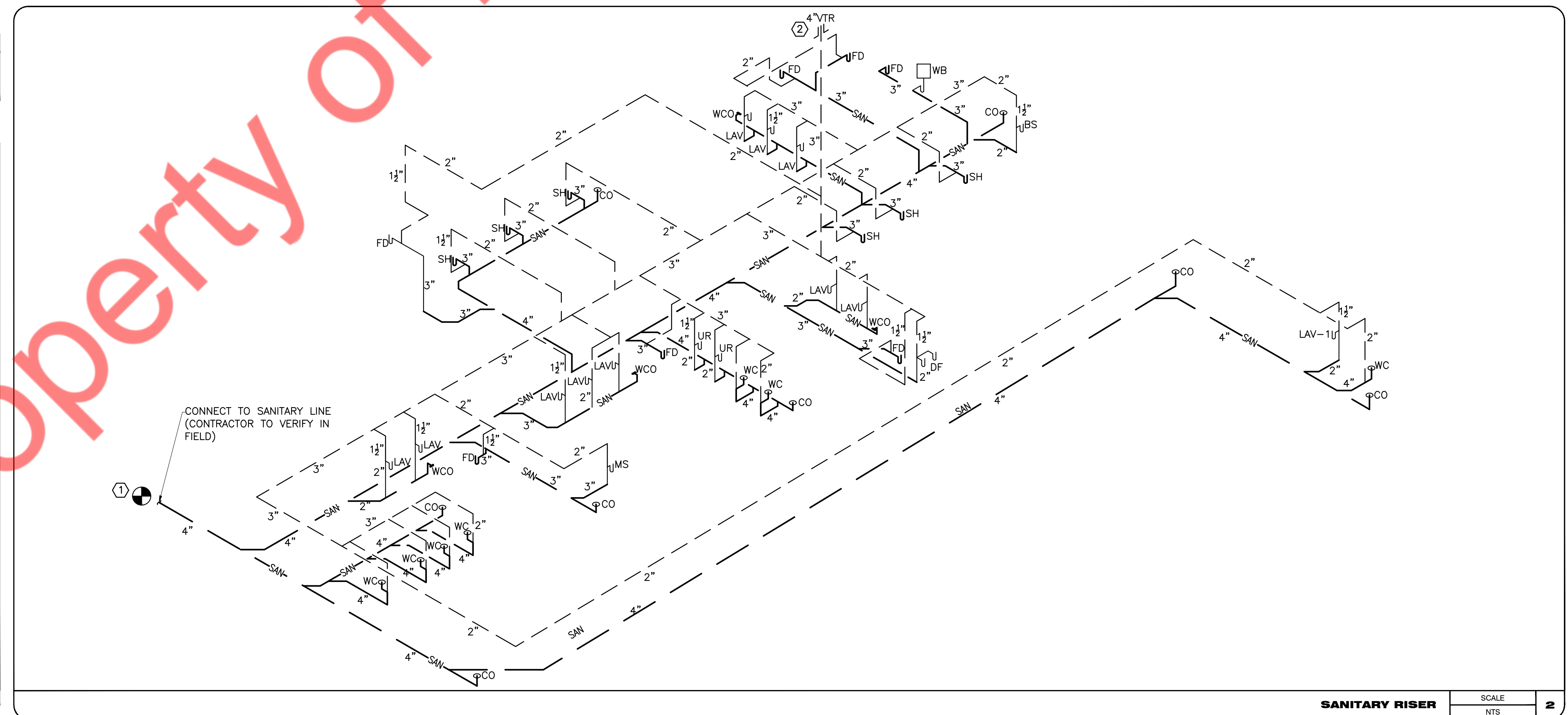
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WATER RISER SCALE NTS 1



GAS RISER SCALE NTS 3



SANITARY RISER SCALE NTS 2

CONDENSING TANKLESS
TWO UNIT CIRCULATION

RINNAI EQUIPMENT LIST	QTY
RINNAI CONDENSING WATER HEATER	4
ELECTRONIC CONNECTION	

REFER TO RINNAI ACCESSORIES AND MODEL APPLICABILITY FOR ELECTRONIC CONNECTION DETAILS.

NOTE:

ALL CONDENSATE MUST DRAIN AND DISPOSE OF ACCORDING TO LOCAL CODES. USE ONLY CORROSION RESISTANT MATERIALS FOR THE CONDENSATE DRAIN LINES SUCH AS PVC PIPE OR PLASTIC HOSE. THE CONDENSATE DRAIN PIPE (ALONG ITS ENTIRE LENGTH) MUST BE AT LEAST THE SAME DIAMETER AS THE DRAIN LINE (1/2 INCH NPT).

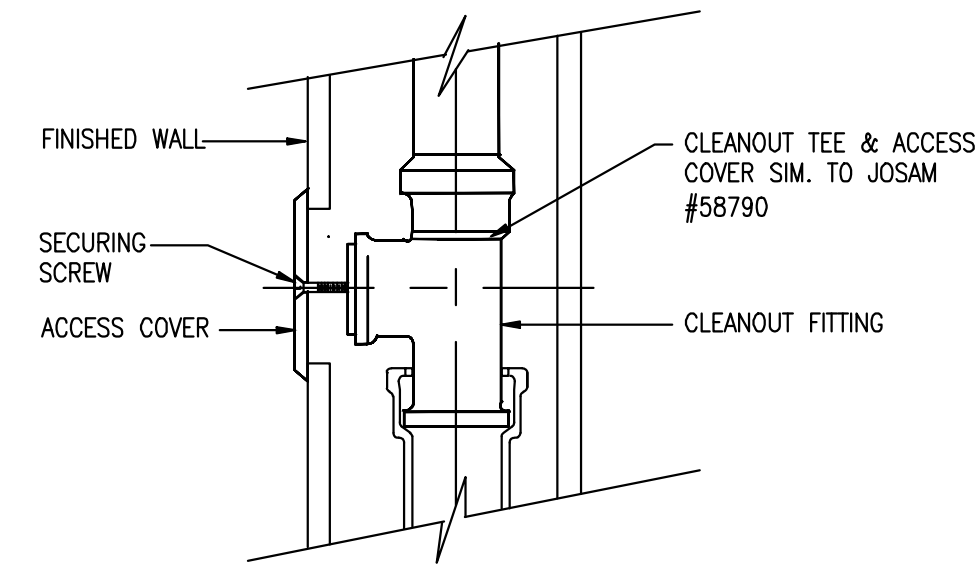
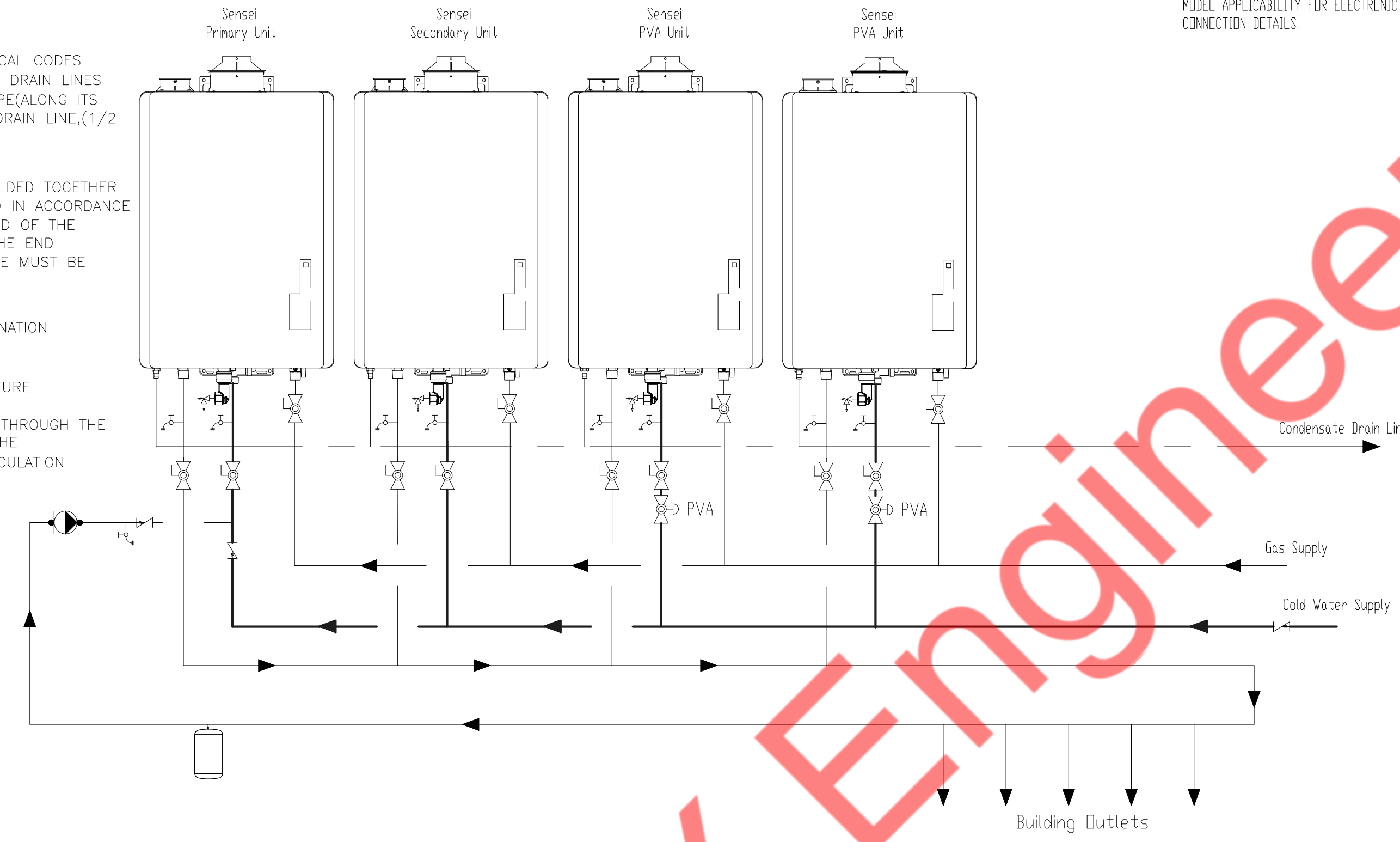
WHERE THE DRAIN PIPES FROM MORE THAN ONE UNIT ARE MANIFOLDED TOGETHER FOR CONDENSATE DRAINAGE, THE PIPE OR TUBING SHALL BE SIZED IN ACCORDANCE WITH AN APPROVED METHOD AS DICTATED BY LOCAL CODES. THE END OF THE CONDENSATE DRAIN PIPE SHOULD BE OPEN TO THE ATMOSPHERE. THE END SHOULD NOT BE UNDER WATER OR OTHER SUBSTANCES. CONDENSATE MUST BE DISPOSED OF ACCORDING TO LOCAL CODES.

PUMP SHOULD BE CONTROLLED BY AN AQUASTAT, TIMER OR COMBINATION AQUASTAT AND TIMER

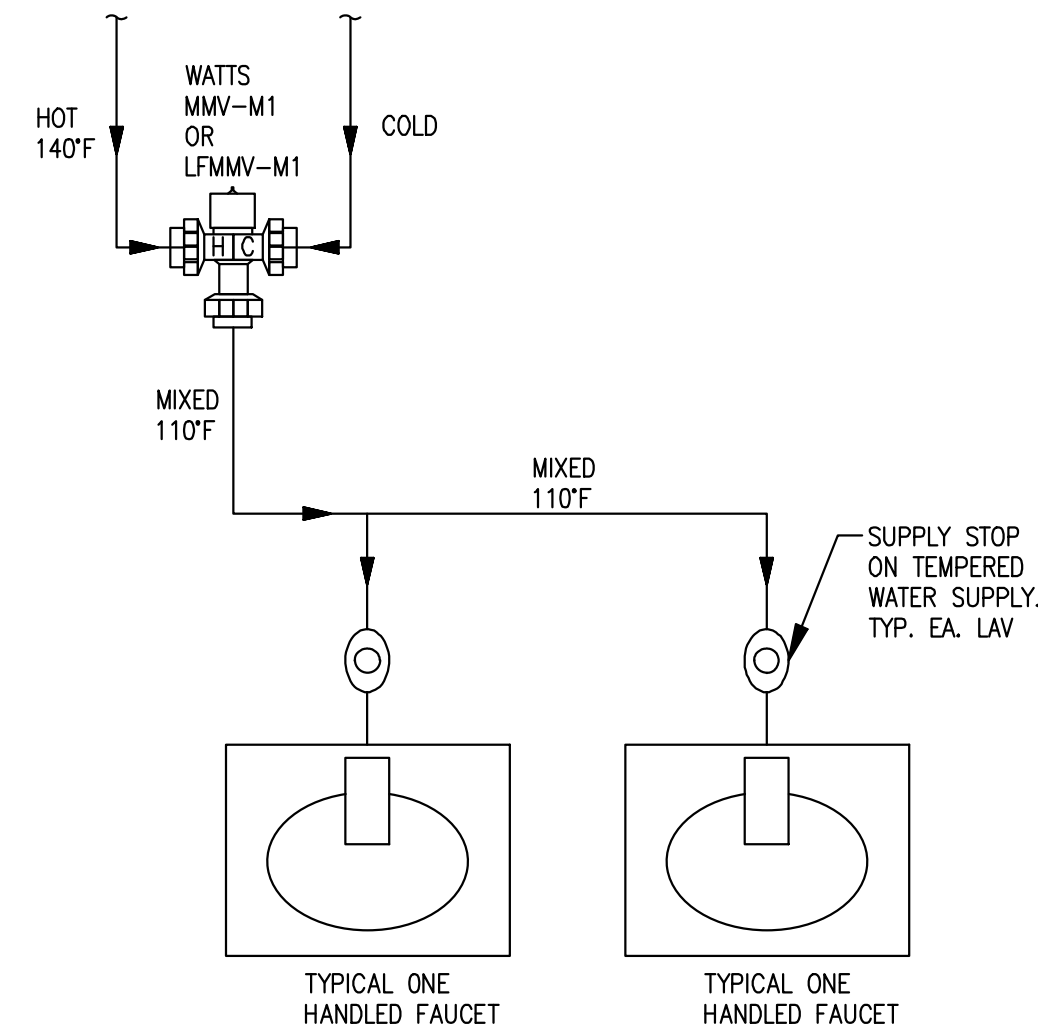
PUMP SHOULD BE SIZED TO MAINTAIN CIRCULATION LOOP TEMPERATURE

THE PUMP SHOULD BE SIZED TO OVERCOME THE PRESSURE LOSS THROUGH THE TANKLESS WATER HEATER, SUPPLY AND RETURN PLUMBING. REFER THE RINNAI HOT WATER SYSTEM DESIGN MANUAL, PUMP SIZING FOR CIRCULATION

PUMP SHOULD BE OF BRONZE OR STAINLESS CONSTRUCTION

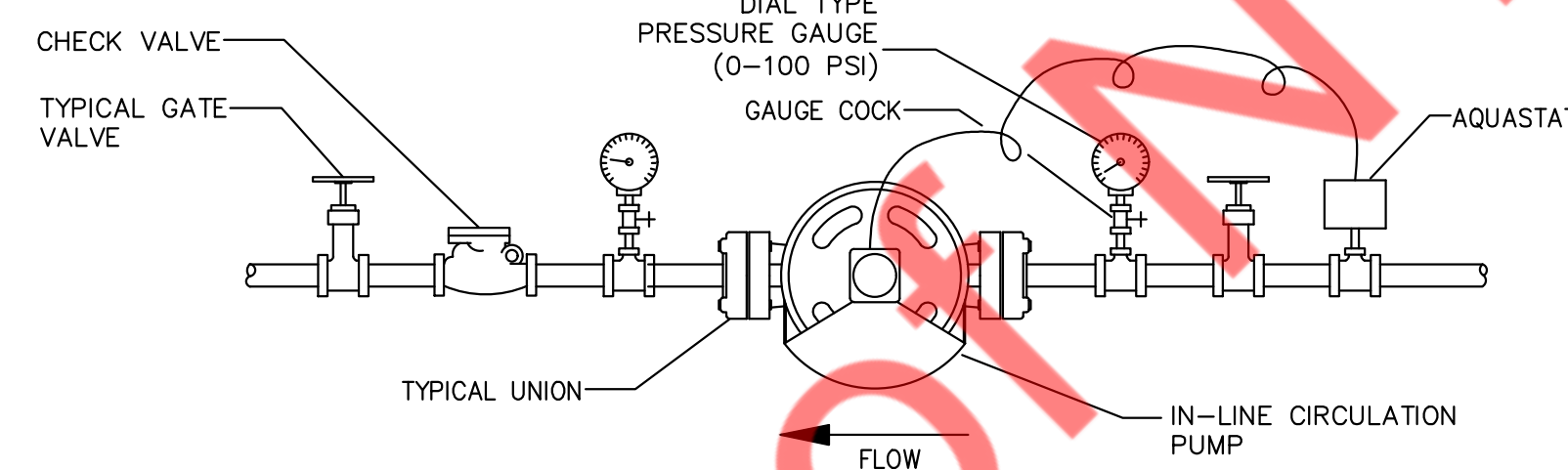


7 WALL CLEANOUT DETAIL
NOT TO SCALE

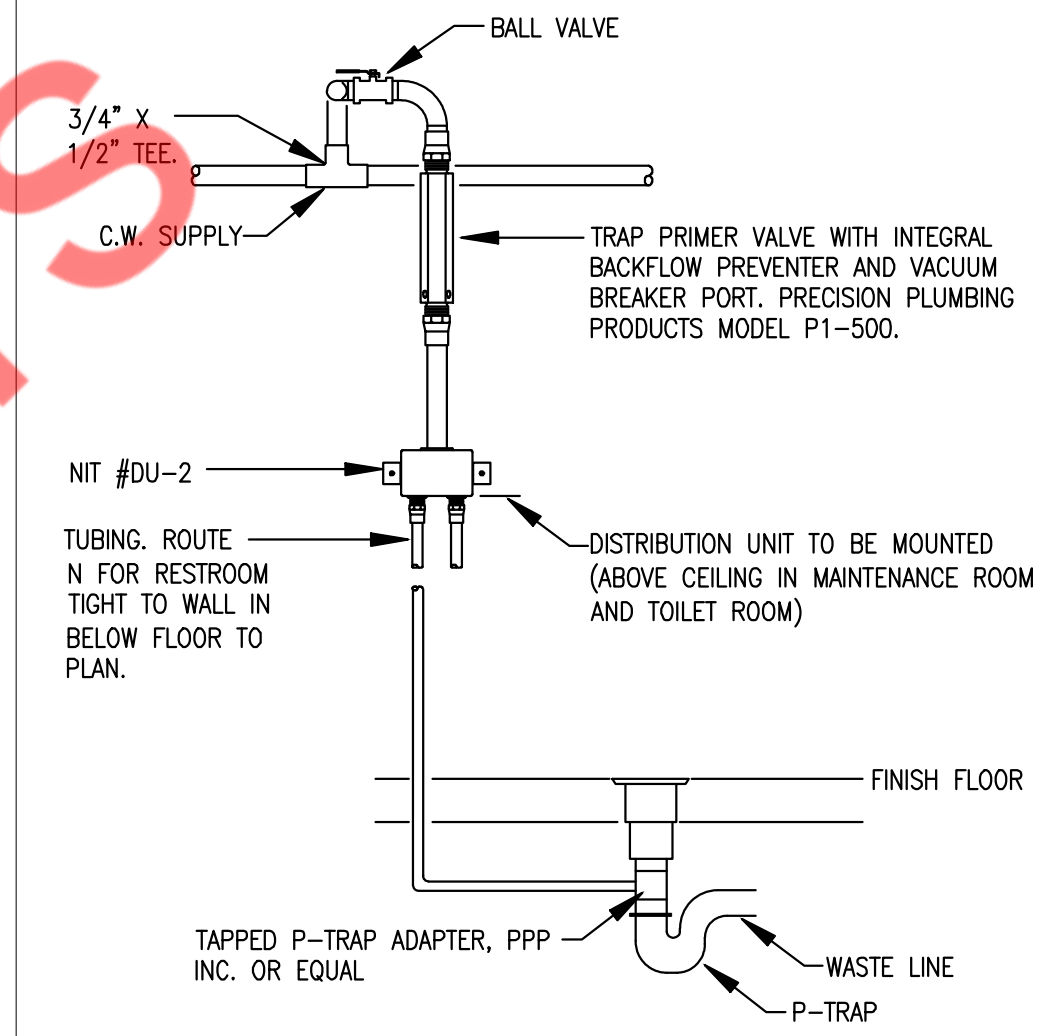


8 TEMPERATURE MIXING VALVE DETAIL
NOT TO SCALE

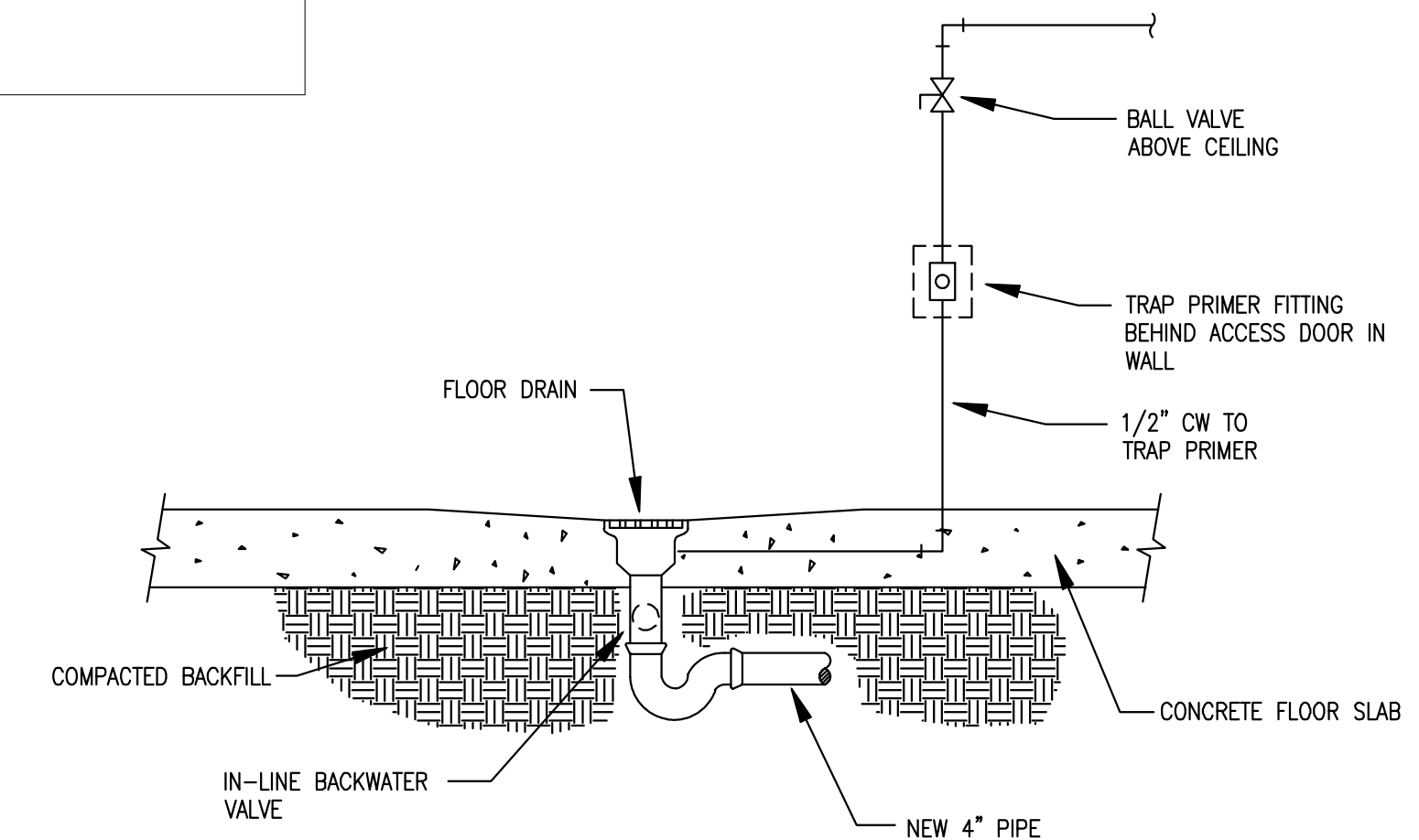
4 WATER HEATER INSTALLATION DETAIL
NOT TO SCALE



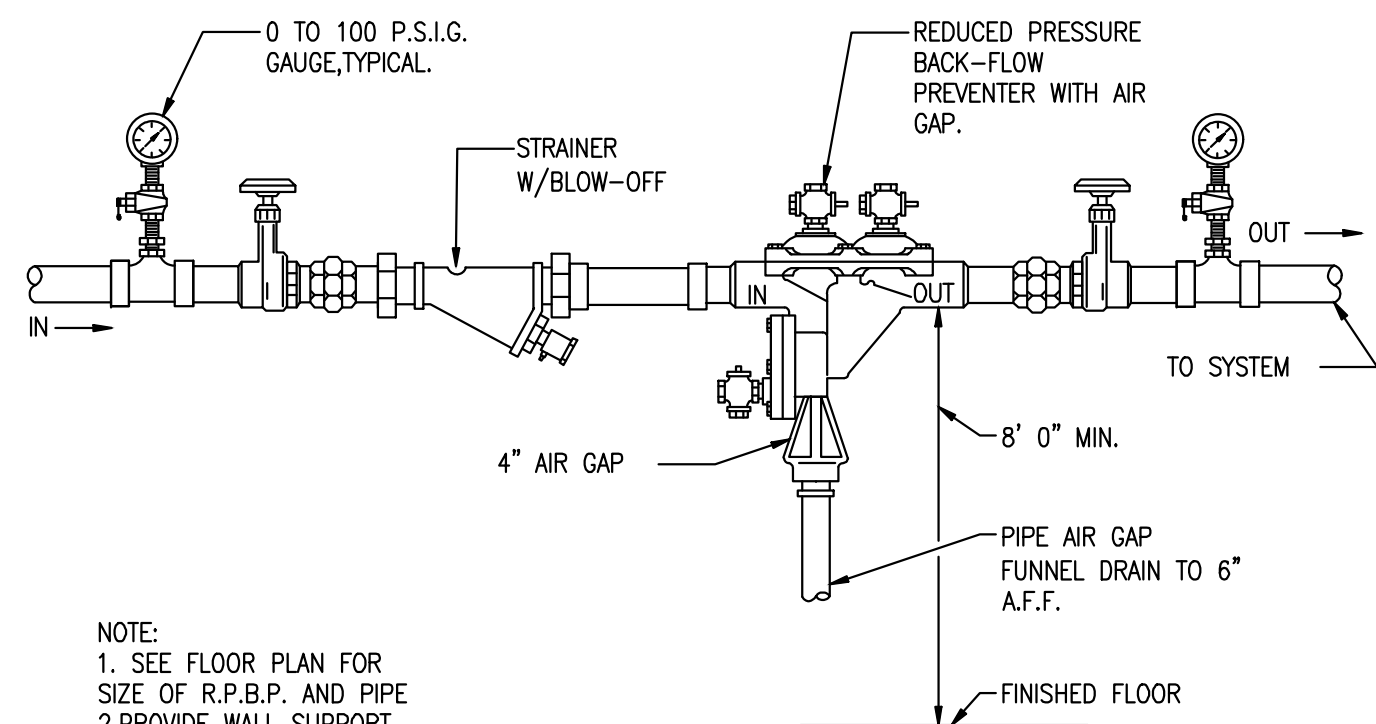
5 HOT WATER RECIRCULATING PUMP DETAIL
NOT TO SCALE



1 TRAP PRIMER DETAIL
NOT TO SCALE

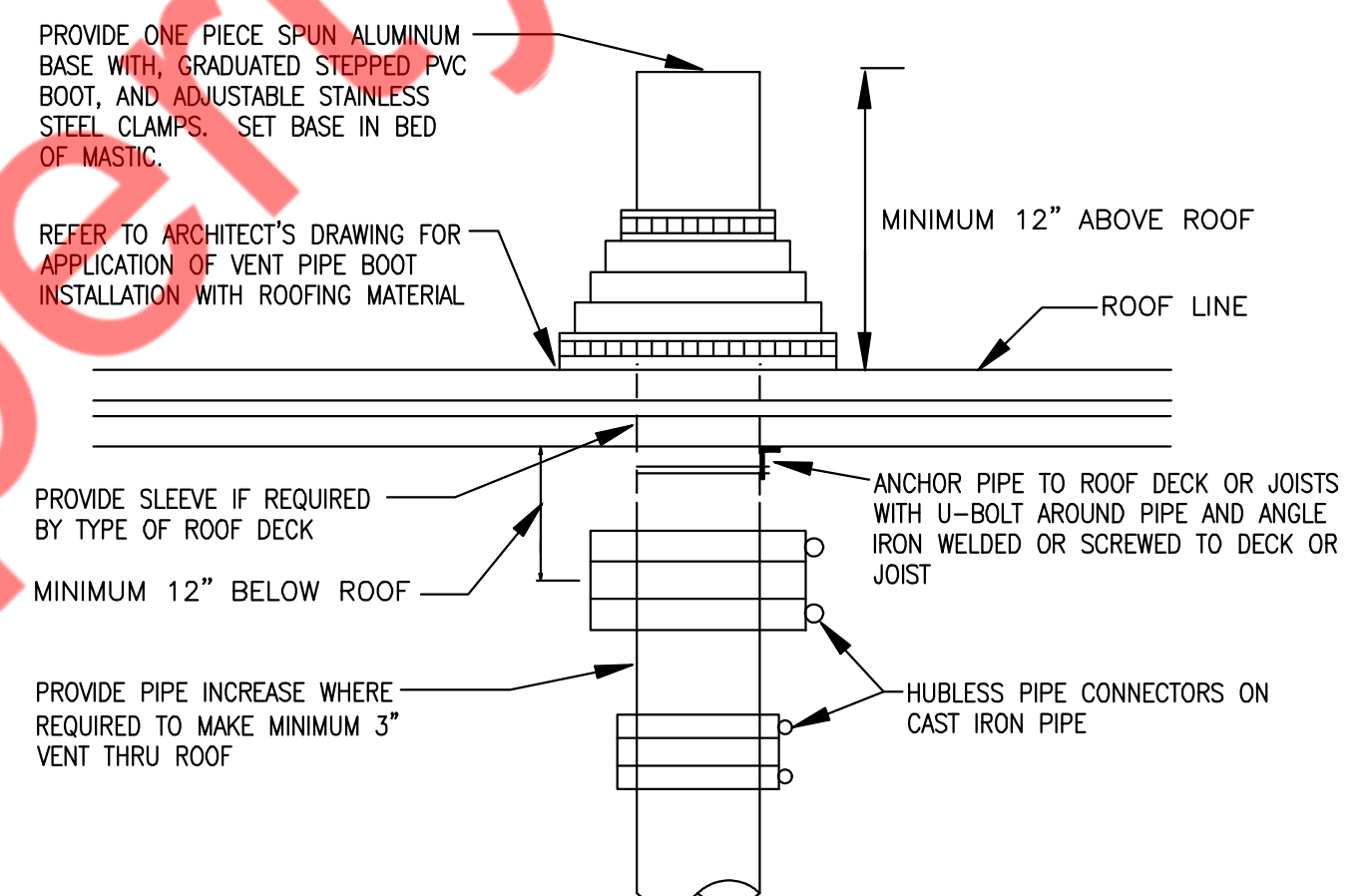


2 FLOOR DRAIN DETAIL
NOT TO SCALE



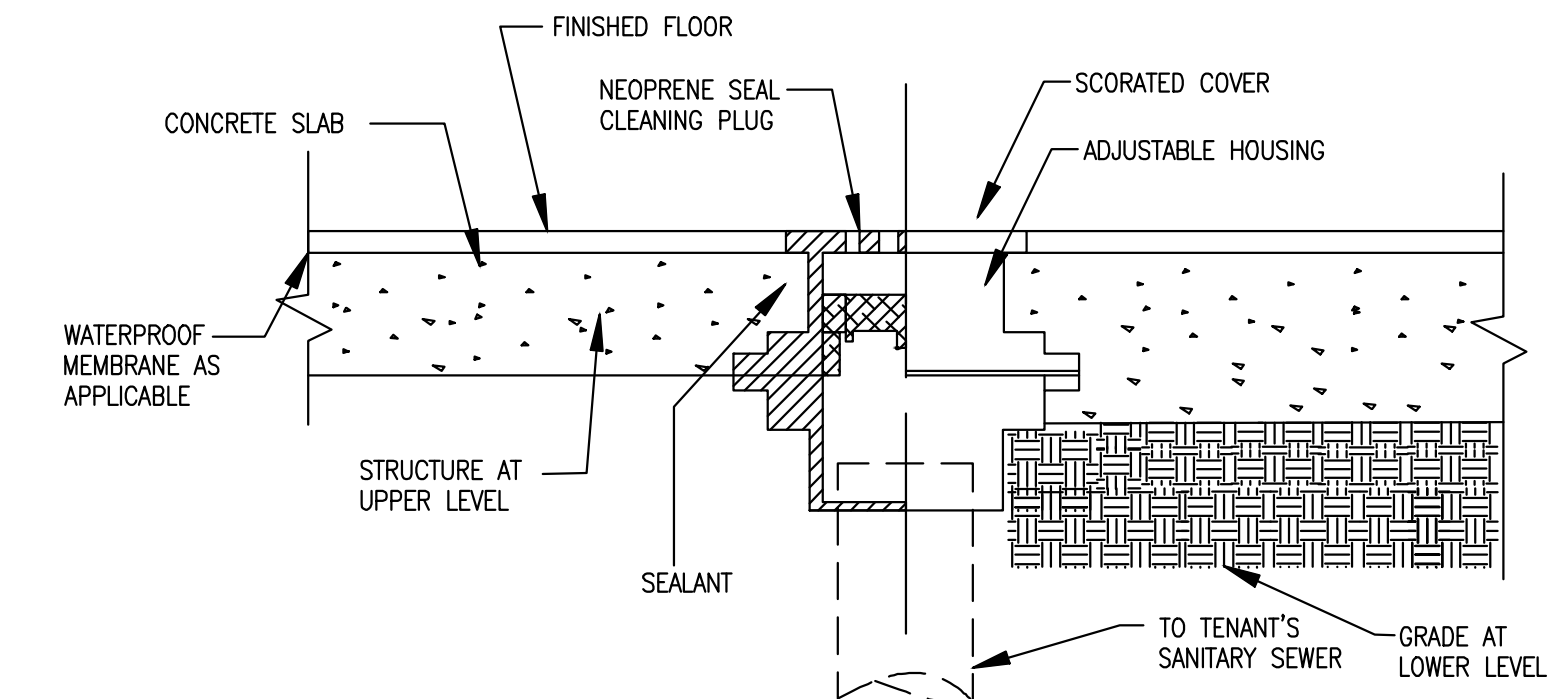
NOTE:
1. SEE FLOOR PLAN FOR SIZE OF R.P.B.P. AND PIPE
2. PROVIDE WALL SUPPORT FOR R.P.B.P.

9 RPZ BACKFLOW PREVENTER DETAIL
NOT TO SCALE



REFER TO PLANS FOR VTR PIPE SIZES AND LOCATIONS. LOCATE VTR MINIMUM TEN FEET HORIZONTAL OR THREE FEET VERTICAL ABOVE ANY BUILDING OPENING OR FRESH AIR INTAKE, AND ONE FOOT FROM ANY VERTICAL SURFACE. PROVIDE 1" FIBERGLASS INSULATION WITH ALL SERVICE JACKET ON VENT PIPE INSIDE BUILDING WITHIN SIX FEET OF VENT THRU ROOF LOCATION. VERIFY FLASHING AND COUNTERFLASHING WITH ROOFING CONTRACTOR

6 VENT THRU ROOF DETAIL
NOT TO SCALE



3 FLOOR CLEAN OUT DETAIL
NOT TO SCALE

TYPICAL ASSE 1070 APPLICATION