MECHANICAL SYMBOLS LIST

AC-1 / TXF-1	EQUIPMENT SYMBOL
XX / X	RISER SYMBOL
AIR DEVICES	
	CEILING DIFFUSER SUPPLY
	CEILING DIFFUSER RETURN
DUCT ACCESSORIES	
M	MOTORIZED DAMPER W/ ACCESS DOOR
BD	BACK DRAFT DAMPER
VD VD	VOLUME DAMPER W/ ACCESS DOOR
	FIRE DAMPER
	DOOR UNDERCUT
HVAC PIPING	
CP	NEW CONDENSATE PIPING
REF	NEW REFRIGERANT PIPING
	FLUID FLOW DIRECTION
	PIPE TURNING DOWN
	PIPE GOING UP

CONTROLS AND SENSORS	
T	THERMOSTAT
T_S	TEMPERATURE SENSOR
H	HUMIDISTAT
S_D	DUCT SMOKE DETECTOR
DUCTWORK	
	AIR DUCT W/ 1.5" ACOUSTICAL LINING
	FLEXIBLE DUCT
FC FC	FLEXIBLE CONNECTION
24X12	RECTANGULAR DUCT (WIDTH X DEPTH)
ø12	ROUND DUCT (DIAMETER)
	ROUND DUCT CROSS SECTION
	SUPPLY AIR RECTANGULAR DUCT CROSS SECTION
	RETURN AIR RECTANGULAR DUCT CROSS SECTION

FIELD VERIFY ALL CONDITIONS

- DESIGN DRAWINGS ARE SCHEMATIC. THIS CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING OR AWARD OF CONTRACT TO INSPECT EXISTING FIELD CONDITIONS. THIS CONTRACT SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY FOR FIELD MODIFICATIONS DUE TO EXISTING CONDITIONS.
- THE CONTRACTOR SHALL CONTACT THE ARCHITECT, ENGINEER OR OWNER PRIOR TO BIDDING FOR INTERPRETATIONS AND CLARIFICATIONS OF THE DESIGN AND INCLUDE IN HIS BID ALL COSTS TO MEET THE DESIGN INTENT. CLARIFICATIONS MADE BY THE ARCHITECT, ENGINEER OR OWNER AFTER BIDDING WILL BE FINAL AND SHALL BE IMPLEMENTED AT CONTRACTORS COST.
- BIDDING CONTRACTORS SHALL HAVE A WORKING KNOWLEDGE OF LOCAL CODES AND ORDINANCES AND SHALL INCLUDE IN THEIR BIDS THE COSTS FOR ALL WORK INSTALLED IN STRICT ACCORDANCE WITH GOVERNING CODES, THE PLANS AND SPECIFICATIONS NOT WITHSTANDING. THE CONTRACTOR SHALL ALERT ARCHITECT, ENGINEER OR OWNER OF ANY APPARENT DISCREPANCIES BETWEEN GOVERNING CODES AND DESIGN INTENT.

APPLICABLE CODES

a. 2018 INTERNATIONAL BUILDING CODE
   2018 MARYLAND BUILDING PERFORMANCE STANDARDS
b. 2018 INTERNATIONAL MECHANICAL CODE.
c. 2018 INTERNATIONAL PLUMBING CODE
d. 2018 INTERNATIONAL FUEL GAS CODE
e. 2017 NATIONAL ELECTRICAL CODE
f. 2018 INTERNATIONAL ENERGY CONSERVATION CODE WITH LOCAL AMENDMENTS
g. STATE OF MARYLAND FIRE PREVENTION CODE

MECHANICAL DRAWING LIST

M-0.1	MECHANICAL GENERAL NOTES, SYMBOLS AND ABBREVIATION
M-0.2	MECHANICAL NOTES & SPECIFICATIONS (1 OF 2)
M-0.3	MECHANICAL SPECIFICATIONS (2 OF 2)
M-1.0	MECHANICAL FLOOR PLAN
M-1.1	MECHANICAL ROOF PLAN
M-4.0	HOOD DATA (1 OF 2)
M-4.1	HOOD DATA (2 OF 2)
M-5.0	MECHANICAL DETAILS (1 OF 3)
M-5.1	MECHANICAL DETAILS (2 OF 3)
M-5.2	MECHANICAL DETAILS (3 OF 3)
M-6.0	MECHANICAL SCHEDULES

MECHANICAL ABBREVIATIONS

RTU	ROOF TOP UNIT
DOAS	DEDICATED OUTSIDE AIR SUPPLY
AFF	ABOVE FINISHED FLOOR
AL	ACOUSTIC LINING
CFM	CUBIC FEET OF AIR PER MINUTE
COP	COEFFICIENT OF PERFORMANCE
DN	DOWN
EER	ENERGY EFFICIENCY RATIO
EF	EXHUAST FAN
EX	EXHAUST
FA	FRESH AIR
FC	FLEXIBLE CONNECTION
HSPF	HEATING SEASONAL PERFORMANCE FACTOR
IEER	INTEGRATED ENERGY EFFICIENCY RATIO
MD	MOTORIZED DAMPER
REF	REFRIGERANT PIPING
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SAE	SAME AS EXISTING
(N)	NEW
BD	BACKDRAFT DAMPER
SA	SUPPLY AIR
RA	RETURN AIR
OA	OUTSIDE AIR
WMS	WIRE MESH SCREEN
GD	GRAVITY/ BACKDRAFT DAMPER
MUA	MAKEUP AIR UNIT
WT	WEIGHT
KEF	KITCHEN EXHAUST FAN
KX	KITCHEN EXHAUST
TX	TOILET EXHAUST
CO	CLEANOUT

BONSBORO, MD BUILDING DEPARTMENT NOTES

ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF 2018-IBC WITH THE TOWN OF BOONSBORO LOCAL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.

1. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
2. TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH 2018 INTERNATIONAL BUILDING CODE REQUIREMENTS AS OUTLINES IN SECTION.
3. THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.
4. TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 2018 IMC 107 AND THE FOLLOWING SECTIONS OF THE 2018 IMC:
   A. MECHANICAL VENTILATION – SECTION 403.
5. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
   A. SPACE HEATING SYSTEMS – 2018 IMC 309.1
   B. DUCT CONSTRUCTION AND INSTALLATION– 2018 IMC 603
   C. AIR INTAKES, EXHAUSTS AND RELIEF – 2018 IMC 401.4
   D. AIR FILTERS – 2018 IMC 605
6. MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
7. VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018 IMC 403.
8. A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY 2018 IMC SECTION 403.2
9. REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION.
10. THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.
11. ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
12. SMOKE DETECTOR SHALL MEET UL268A.
13. SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THE REQUIREMENTS OF SECTION 606 2018 IMC TO CLOSE DAMPERS AND AUTOMATICALLY STOP THE FAN.
14. THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

SCOPE OF WORK

1. PROVIDE AND INSTALL 2# 7.5 TON RTU'S FOR SPACE HEARING AND COOLING. PROVIDE AND INSTALL 1# KITCHEN HOOD WITH EXHAUST FAN AND MAKEUP AIR UNIT FOR THE HOOD. PROVIDE 3# CEILING MOUNTED EXHAUST FAN RESTROOMS AND SINK AS SPECIFIED ON THE PLANS. PROVIDE DUCTING, AIR TERMINALS, DAMPERS AND REQUIRED MOUNTING FRAMES/CURB FOR ALL EQUIPMENT AS SPECIFIED IN THE FLOOR PLAN AND SCHEDULES. REFER TO SHEET M-6 FOR MECHANICAL SCHEDULES.
2. 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.
3. 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.
4. 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 OR 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 NOTES

1. CONTRACTOR SHALL SURVEY THE AREA OF THIS WORK BEFORE SUBMITTING A BID AND SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY CONDITIONS WHICH WOULD PREVENT THE INSTALLATION OF THE WORK AS SHOWN ON DRAWINGS.
2. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.
3. BEFORE PROCEEDING WITH ANY WORK IN OCCUPIED OR USED AREAS, THE CONTRACTOR SHALL APPLY TO OWNER FOR PERMISSION TO ENTER SUCH AREAS. THE CONTRACTOR IS OBLIGED TO PERFORM HIS WORK ONLY AT THE TIMES DESIGNATED BY OWNER. THERE WILL BE NO ADDITIONAL COMPENSATION FOR THE WORK PERFORMED AFTER HOURS OR ON OFF-DAYS WITHOUT PRIOR WRITTEN APPROVAL.
4. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
5. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
6. CONTRACTOR SHALL ASCERTAIN THE APPROPRIATE METHOD FOR BRINGING THE UNITS INTO AND THROUGH THE BUILDING TO POSITION UNIT IN LOCATION SHOWN ON THE PLANS. WHERE NECESSARY,EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH RESTRICTIVE SPACES.COORDINATE WITH BUILDING OWNER APPROPRIATE TIMES OF DAY SUCH EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
7. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.
8. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.
9. 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.
10. 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.
11. SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 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.
12. 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.
13. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL (FIBERGLASS INSULATION IS NOT ACCEPTABLE).
14. WHERE PENETRATIONS THROUGH FIRE RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
21. ALL EQUIPMENT SHALL BE PROVIDED WITH ONE YEAR WARRANTY PARTS AND LABOR AND FIVE YEARS ON COMPRESSORS. WARRANTY PERIOD BEGINS UPON PROJECT ACCEPTANCE
22. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
23. 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.
24. 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.
25. SUBMIT SHOP DRAWING OF ALL WORK WHICH MUST BE APPROVED BY THE ARCHITECT AND ENGINEER BEFORE WORK COMMENCES.
26. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
27. 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.
28. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS THE CONTRACTOR SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
29. 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.
30. 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.
31. 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:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

Property of NY Engineers

GENERAL HVAC NOTES

GENERAL:

1. PROVIDE ALL MATERIAL AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.

2. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK (HVAC, PLUMBING, AND FIRE PROTECTION) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.

3. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.

4. WHEN MECHANICAL WORK (HVAC, PLUMBING, SHEET METAL, FIRE PROTECTION, ETC.) IS SUBCONTRACTED, IT SHALL BE THE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE MECHANICAL CONTRACT OR WHICH CONTRACTOR PROVIDES FINAL CONNECTIONS FOR A PARTICULAR ITEM OF THE MECHANICAL CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE MECHANICAL CONTRACTOR, WHOSE DECISION SHALL BE FINAL.

5. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.

6. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.

7. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.

8. COORDINATE ALL EQUIPMENT CONNECTIONS WITH 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. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.

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

22. 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.

HVAC DUCTWORK - SHEET METAL

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

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

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

4. SUPPLY AND RETURN DUCTWORK 10'-0" FROM ALL AC 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. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.

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

10. 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.

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

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

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.

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.

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

SPECIFICATIONS

SECTION 0001 - NOTICE TO BIDDERS

1.1 BIDDERS REPRESENTATIONS

A. THE BIDDER BY MAKING A BID REPRESENTS THAT:

THE BIDDER HAS READ AND UNDERSTANDS THE BIDDING DOCUMENTS, TO THE EXTENT THAT SUCH DOCUMENTATION RELATES TO THE WORK FOR WHICH THE BID IS SUBMITTED, AND FOR OTHER PORTIONS OF THE PROJECT, IF ANY, BEING BID CONCURRENTLY OR PRESENTLY UNDER CONSTRUCTION.

B. THE BID IS MADE IN COMPLIANCE WITH THE BIDDING DOCUMENTS.

C. THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO SERVE JOINTLY AS A BASIS FOR THE BIDDER TO SUBMIT A CONTRACT PRICE FOR THE MATERIAL AND LABOR.

D. SHOULD CONFLICTS OR DISCREPANCIES OCCUR WITHIN THE BIDDING DOCUMENTS, THE ITEM OR ITEMS IN DISPUTE THAT REPRESENT THE GREATER COST SHALL PREVAIL IN THE FINAL BID.

E. THE BID IS BASED UPON THE MATERIALS, EQUIPMENT AND SYSTEMS REQUIRED BY THE BIDDING DOCUMENTS WITHOUT EXCEPTION.

1.2 EXISTING CONDITIONS AND COORDINATION

A. THE BIDDER HAS VISITED THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED AND HAS CORRELATED THE BIDDER'S PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE PROPOSED BIDDING DOCUMENTS.

B. THE BIDDER SHALL PROPOSE COORDINATION OF WORK SUCH THAT CONFLICTS WITH OTHER TRADES AND SPACE ALLOCATIONS ARE AVOIDED.

1.3 RESPONSIBILITIES

A. THE BIDDER UNDERSTANDS THAT ANY CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE TIMELY COMPLETION AND ACCEPTANCE OF THEIR WORK AND THAT ANY ITEMS DAMAGED, LOST OR STOLEN DURING TIME OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED WITHOUT ANY ADDITIONAL COST TO THE OWNER.

B. THE BIDDER UNDERSTANDS THAT ANY PROPOSED WORK IN OCCUPIED TENANT SPACES SHALL BE PERFORMED DURING TIMES OF NON-TENANT OCCUPANCY OR AS SCHEDULED OR DIRECTED BY THE BUILDING MANAGER.

C. THE BIDDER UNDERSTANDS THAT ANY PROPOSED SHUT-DOWN OF EXISTING SYSTEMS DURING CONSTRUCTION SHALL BE PRE-ARRANGED WITH THE BUILDING MANAGER AND THAT SUCH SHUT-DOWNS ARE TO BE KEPT TO A MINIMUM.

END OF SECTION 0001

SECTION 0101 - QUALITY OF WORK

1.1 WORKMANSHIP

A. ALL WORK SHALL BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE.

B. ALL DEFECTS WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ARCHITECT OR BUILDING MANAGER AT NO ADDITIONAL COST TO THE OWNER.

C. UPON COMPLETION OF THE WORK THE CONTRACTOR SHALL REMOVE FROM THE SITE, ALL TOOLS, DEMOLISHED APPLIANCES AND ANY SURPLUS MATERIAL.

1.2 CODE COMPLIANCE

A. ALL WORK SHALL MEET ALL STATE AND LOCAL CODES HAVING JURISDICTION.

END OF SECTION 0101

SECTION 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
h. SILICONE FOAM
i. PILLOWS/BAGS
j. INTUMESCENT WRAP STRIPS
k. INTUMESCENT COMPOSITE SHEET

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 PERFORMANCE REQUIREMENTS

A. DELEGATED DESIGN: DESIGN TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

B. STRUCTURAL PERFORMANCE: HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7.

1. DESIGN SUPPORTS FOR MULTIPLE PIPES CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, SYSTEM CONTENTS, AND TEST WATER.

2. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND

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.

5. PROCO PRODUCTS, INC.

1.2 SLEEVE-SEAL FITTINGS

A. MANUFACTURED PLASTIC, SLEEVE-TYPE, PLASTIC OR RUBBER WATER-STOP ASSEMBLY MADE FOR IMBEDDING IN CONCRETE SLAB OR WALL.

1.3 GROUT

A. NON-SHRINK, FACTORY PACKAGED.

1.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. USE SLEEVES AND SLEEVE SEALS FOR THE FOLLOWING PIPING-PENETRATION APPLICATIONS:

1. INTERIOR PARTITIONS:

a. PIPING SMALLER THAN NPS 6 (DN 150): GALVANIZED-STEEL-PIPE SLEEVES, PVC-PIPE SLEEVES.

b. PIPING NPS 6 (DN 150) AND LARGER: GALVANIZED-STEEL-SHEET SLEEVES.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. ONE-PIECE, CAST-BRASS TYPE: WITH POLISHED, CHROME-PLATED AND ROUGH-BRASS FINISH AND SETSCREW FASTENER.

B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

C. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

2.2 FLOOR PLATES

A. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE WITH HOLES FOR FASTENERS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.

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

1. ESCUTCHEONS FOR NEW PIPING:

a. PIPING WITH FITTING OR SLEEVE PROTRUDING FROM WALL: ONE-PIECE, DEEP-PATTERN TYPE.

b. INSULATED PIPING: ONE-PIECE, STAMPED-STEEL TYPE.

c. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED, CHROME-PLATED FINISH OR STAMPED-STEEL TYPE.

d. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED, CHROME-PLATED FINISH OR STAMPED-STEEL TYPE.

3.2 FIELD QUALITY CONTROL

A. REPLACE BROKEN AND DAMAGED ESCUTCHEONS AND FLOOR PLATES USING NEW MATERIALS.

END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 PERFORMANCE REQUIREMENTS

A. DELEGATED DESIGN: DESIGN TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

B. STRUCTURAL PERFORMANCE: HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7.

1. DESIGN SUPPORTS FOR MULTIPLE PIPES CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, SYSTEM CONTENTS, AND TEST WATER.

2. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND

3. DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.

1.2 SUBMITTALS

A. SHOP DRAWINGS: SIGNED AND SEALED BY A PROFESSIONAL ENGINEER

1.3 QUALITY ASSURANCE

A. AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE - STEEL."

1.4 COMPONENTS

A. METAL PIPE HANGERS AND SUPPORTS: CARBON OR STAINLESS STEEL

B. TRAPEZE PIPE HANGERS: CARBON OR STAINLESS STEEL

C. FIBERGLASS PIPE HANGERS: -CLEVIS, CENTURY COMPOSITES, COOPER B-LINE

D. METAL FRAMING SYSTEMS: MFMA MANUFACTURER

E. FIBERGLASS STRUT SYSTEMS: COOPER B-LINE

F. THERMAL-HANGER SHIELD INSERTS:

G. FASTENER SYSTEMS: POWDER-ACTUATED FASTENERS OR MECHANICAL-EXPANSION ANCHORS

H. PIPE STANDS: COMPACT, LOW TYPE, SINGLE PIPE, HIGH TYPE, SINGLE PIPE, HIGH TYPE, MULTIPLE PIPES, CURB-MOUNTED TYPE

I. EQUIPMENT SUPPORTS.

END OF SECTION 230529

SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 COMPONENTS

A. VIBRATION ISOLATORS:

1. ISOLATOR PADS: NEOPRENE, RUBBER, HERMETICALLY AND/OR SEALED COMPRESSED FIBERGLASS

2. MOUNTS: DOUBLE-DEFLECTION TYPE.

3. RESTRAINED MOUNTS: ALL DIRECTIONAL MOUNTINGS WITH SEISMIC RESTRAINT; CAST-DUCTILE-IRON HOUSING.

4. SPRING ISOLATORS: FREESTANDING, LATERALLY STABLE, OPEN-SPRING TYPE.

5. RESTRAINED SPRING ISOLATORS: FREESTANDING, STEEL, OPEN-SPRING TYPE WITH SEISMIC RESTRAINT.

6. HOUSED SPRING MOUNTS: DUCTILE-IRON OR STEEL HOUSING, WITH INTEGRAL, VERTICALLY ADJUSTABLE SEISMIC SNUBBERS.

7. ELASTOMERIC HANGERS: DOUBLE-DEFLECTION TYPE.

8. SPRING HANGERS: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION.

9. SPRING HANGERS WITH VERTICAL-LIMIT STOP: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION AND WITH VERTICAL-LIMIT STOP.

10. PIPE RISER RESILIENT SUPPORT: ALL-DIRECTIONAL, ACOUSTICAL PIPE ANCHOR.

11. RESILIENT PIPE GUIDES.

B. AIR-MOUNTING SYSTEMS:

1. AIR MOUNTS: FREESTANDING, SINGLE OR MULTIPLE, COMPRESSED-AIR BELLOWS.

2. RESTRAINED AIR MOUNTS: HOUSED COMPRESSED-AIR BELLOWS.

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:

1. STEEL BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS.

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

1.2 FIELD QUALITY CONTROL

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

Property of MY Engineer

PART–2 PRODUCTS

1.1 VIBRATION ISOLATORS & SEISMIC–RESTRAINT DEVICES

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

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

1. ACE MOUNTINGS CO., INC.
2. AMBER/BOOTH COMPANY, INC.
3. CALIFORNIA DYNAMICS CORPORATION.
4. HILTI, INC.
5. ISOLATION TECHNOLOGY, INC.
6. KINETICS NOISE CONTROL.
7. LOOS & CO.; CABLEWARE DIVISION.
8. MASON INDUSTRIES.
9. TOLCO INCORPORATED; A BRAND OF NIBCO INC.
10. UNISTRUT; TYCO INTERNATIONAL, LTD.

END OF SECTION 230548

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY

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

1. AIR SYSTEMS: CONSTANT–VOLUME SYSTEMS.

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 S3ECTION WITH THE BUILDING MANAGER. BALANCING WORK SHALL NOT CONFLICT WITH OTHER WORK SO AS TO MAINTAIN COMPLETION WITHIN THE SPECIFIED TIME.

G. ALL INSTRUMENTS USED FOR TAB SHALL BE MAINTAINED IN GOOD WORKING CONDITION AND ACCURATELY CALIBRATED.

H. TOLERANCES: PLUS OR MINUS 5 PERCENT OF DESIGN VALUES.

I. INSPECTIONS: RANDOM CHECKS BY OWNER OR ARCHITECT TO VERIFY FINAL TESTING, ADJUSTING, AND BALANCING REPORT.

J. ADDITIONAL TESTS: RANDOM TESTS WITHIN 90 DAYS OF COMPLETING TAB TO VERIFY BALANCE CONDITIONS AND SEASONAL TESTS.

END OF SECTION 230593

SECTION 230713 – DUCT INSULATION

1.1 QUALITY ASSURANCE

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 ASTME 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–6
WITHIN BUILDING ENVELOPE ASSEMBLY:	R–8
OUTSIDE OF BUILDING:	R–8

1.4 ITEMS NOT INSULATED:

1. FIBROUS–GLASS DUCTS.
2. METAL DUCTS WITH DUCT LINER OR SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1.
3. FACTORY–INSILATED FLEXIBLE DUCTS.
4. FACTORY–INSULATED PLENUMS AND CASINGS.
5. FLEXIBLE CONNECTORS.
6. VIBRATION–CONTROL DEVICES.
7. "FACTORY–INSULATED ACCESS PANELS AND DOORS.
8. DUCTS THAT HAVE INTERNAL ACOUSTICAL LINING.

1.5 PRODUCTS

A. THE FOLLOWING INSULATION MANUFACTURERS WILL BE ACCEPTABLE:

1. JOHNS–MANVILLE
2. OWENS–CORNING

1.6 ACOUSTICAL TREATMENT

1. WHERE SHOWN ON THE DRAWINGS, LOW PRESSURE DUCTWORK SHALL BE LINED WITH 1.5" 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 1 INCH WG PRESSURE, SEAL CLASS "A".

B. ALL DUCTWORK SHALL BE CONSTRUCTED TO SMACNA 1" WG DESIGN AND NOT LESS THAN THE FOLLOWING STANDARDS:

1. CONSTRUCT SO THAT ALL INTERIOR SURFACES ARE SMOOTH. USE SLIP AND DRIVE OR FLANGED AND BOLTED CONSTRUCTION WHEN FABRICATING RECTANGULAR DUCTWORK. USE SPIRAL LOCK SEAM CONSTRUCTION WHEN FABRICATING ROUND SPIRAL DUCTWORK. SHEET METAL SCREWS MAY BE USED ON DUCT HANGERS, TRANSVERSE JOINTS AND OTHER SMACNA APPROVED LOCATIONS IF THE SCREW DOES NOT EXTEND MORE THAN 1/2 INCH INTO THE DUCT.
2. SHEET STEEL SHALL COMPLY WITH ASTMA653 STANDARD SPECIFICATION FOR STEEL SHEET METAL, ZINC COATED (GALVANIZED) OR ZINC IRON ALLOY–COATED (GALVANIEALED) BY HOT DIP PROCESS, AND A924 STANDARD SPECIFICATION FOR GENERAL REQUIREMENT FOR SHEET METALLIC–COATED BY HOT DIP PROCESS. ALL ANGLE IRON USED FOR SUPPORT SHALL BE GALVANIZED. CONNECTIONS TO WALLS OR FLOOR SHALL BE AIR TIGHT WITH ANGLE IRON AND CAULKING. SEAL ALL DUCT SEAMS, TRANSVERSE AND LONGITUDINAL, AIR TIGHT. PROVIDE TURNING VANES ALL 90° ELBOWS.
3. USE ELBOWS AND TEES WITH A CENTER LINE RADIUS TO WIDTH OR DIAMETER RATIO OF 1.5 WHEREVER SPACE PERMITS. WHEN A SHORTER RADIUS MUST BE USED DUE TO LIMITED SPACE, INSTALL SINGLE WALL SHEET METAL SPLITTER VANES IN ACCORDANCE WITH SMACNA PUBLICATIONS. TYPE RE 3. WHERE SPACE WILL NOT ALLOW AND THE C VALUE OF THE RADIUS ELBOW, AS GIVEN IN SMACNA PUBLICATIONS, EXCEEDS 0.31, USE RECTANGULAR ELBOWS WITH TURNING VANES AS SPECIFIED IN SECTION 23 33 00. SQUARE THROAT–RADIUS HEEL ELBOWS WILL NOT BE ACCEPTABLE. STRAIGHT TAPS OR BULLHEAD TEES ARE NOT ACCEPTABLE.
4. WHERE RECTANGULAR ELBOWS ARE USED, PROVIDE TURNING VANES IN ACCORDANCE WITH SECTION 23 33 00.
5. PROVIDE EXPANDED TAKE–OFFS OR 45 DEGREE ENTRY FITTINGS FOR BRANCH DUCT CONNECTIONS WITH BRANCH DUCTWORK AIRFLOW VELOCITIES GREATER THAN 700 FPM. SQUARE EDGE 90–DEGREE TAKE–OFF FITTINGS OR TRAIGHT TAPS WILL NOT BE ACCEPTED.
6. BUTTON PUNCH SNAP–LOCK CONSTRUCTION WILL NOT BE ACCEPTED ON ALUMINUM DUCTWORK.
7. ROUND DUCTS MAY BE SUBSTITUTED FOR RECTANGULAR DUCTS IF SIZED IN ACCORDANCE WITH ASHRAE TABLE OF EQUIVALENT RECTANGULAR AND ROUND DUCTS. NO VARIATION OF DUCT CONFIGURATION OR SIZES PERMITTED EXCEPT BY WRITTEN PERMISSION OF THE ENGINEER.

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 BRACING
22	UP TO 12	S SLIP, DRIVE SLIP, ONE INCH POCKET LOCK ON 8 FOOT CENTERS
22	13 TO 24	1"X1"X1/8" ANGLES ON 4 FOOT CENTERS
20	25 TO 35	1"X1"X1/8" ANGLES ON 2 FOOT CENTERS

D. PROVIDE TAPPING IN DUCTS FOR THERMOMETERS WHERE SPECIFIED. IN ADDITION, PROVIDE AN AIRTIGHT PLUGGED TAPPING LOCATED AS FOLLOWS:

1. UPSTREAM OF EACH REHEAT COIL AND VAV BOX.
2. DOWNSTREAM OF EACH REHEAT COIL AND VAV BOX.

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

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

1.2 MATERIALS

A. SINGLE–WALL RECTANGULAR DUCTS AND FITTINGS.

B. SINGLE–WALL ROUND AND FLAT–OVAL DUCTS AND FITTINGS.

C. SHEET METAL MATERIALS:

1. GALVANIZED SHEET STEEL.
2. STAINLESS–STEEL SHEETS.
3. ALUMINUM SHEETS.
4. FACTORY–APPLIED ANTI–MICROBIAL COATING.

D. DUCT LINER:

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

E. SEALANT MATERIALS:

1. TWO–PART TAPE SEALING SYSTEM.
2. WATER–BASED JOINT AND SEAM SEALANT.
3. SOLVENT–BASED JOINT AND SEAM SEALANT.
4. FLANGED JOINT SEALANT.
5. FLANGE GASKETS.
6. ROUND DUCT JOINT O–RING SEALS.

1.3 DUCT CLEANING

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

B. CLEAN THE FOLLOWING ITEMS:

1. AIR OUTLETS AND INLETS.
2. SUPPLY, RETURN, AND EXHAUST FANS.
3. AIR–HANDLING UNITS.
4. COILS AND RELATED COMPONENTS.
5. RETURN–AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
6. SUPPLY–AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

1.4 DUCT SCHEDULE

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

8. MOIST ENVIRONMENT DUCT MATERIAL: ALUMINUM.

END OF SECTION 233113

SECTION 233713 – DIFFUSERS, REGISTERS, AND GRILLES

1.1 PRODUCTS

B. 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.

C. MANUFACTURERS: TITUS

1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:
   a. CARNES.
   b. HART & COOLEY INC.
   c. KRUEGER.
   d. METALAIRE, INC.
   e. NAILOR INDUSTRIES INC.

C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.

D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.

END OF SECTION 233713

COMMERCIAL KITCHEN EXHAUST DUCTWORK

A. ALL HORIZONTAL AND VERTICAL KITCHEN EXHAUST DUCTWORK SHALL BE CONSTRUCTED OF 16 GAUGE MINIMUM BLACK IRON OR PREFABRICATED DOUBLE WALL GREASE DUCTWORK APPROVED FOR KITCHEN EXHAUST APPLICATION WITH ETL LISTED TO UL 1978 AND UL 2221 SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER INSTALLATION INSTRUCTIONS AND LOCAL CODES. ALL SEAMS AND JOINTS SHALL HAVE A LIQUID TIGHT CONTINUOUS EXTERNAL WELD AS PER NFPA 96 FOR BLACK IRON DUCTWORK. THE EXTERIOR OF ALL KITCHEN RANGE BLACK IRON EXHAUST DUCTS SHALL HAVE 1–1/2" X 1–1/2" X 1/8"WELDED ANGLES, PUNCHED FOR SECURING BLOCK INSULATION. WHERE KITCHEN RANGE BLACK IRON EXHAUST DUCT RISER PASSED VERTICALLY THROUGH FLOORS OF THE BUILDING, PROVIDE ANGLE CLIPS WELDED TO THE DUCT OF REQUIRED SIZES TO SUPPORT THE WEIGHT OF THE RISER SECTIONS ON THE BUILDING STRUCTURE AT EACH OF THE FLOOR LEVELS. PROVIDE AND INSTALL ALL SUPPLEMENTARY STRUCTURAL STEEL IN SHAFTS TO PROPERLY SUPPORT EXHAUST DUCTWORK FROM BUILDING CONSTRUCTION. PROVIDE MINIMUM 12"X12" ACCESE DOOR ON SIDE OF HORIZONTAL DUCTS AT 12' SPACING. ACCESS DOORS SHALL BE SIMILAR TO DESCRIPTION IN "ACCESS DOORS IN SHEET METAL WORK WORK" EXCEPT THAT DOOR GAUGE SHALL BE THE SAME AS DUCT GAUGE. ALL HORIZONTAL DUCTS SHALL BE PITCHED BACK TO HOODS 1/4 " PER FOOT OR MAXIMUM PITCH ATTAINABLE. THIS TRADE SHALL DRILL OR CUT ALL REQUIRED OPENING AS REQUIRED BY THE DUCTS EXTINGUISHING SYSTEM AND AS COORDINATED WITH THE TRADE SUPPLYING THE EXTINGUISHING SPRAY HEADS. MAINTAIN 6" CLEARANCE BETWEEN SHEET METAL DUCT AND ANY SURFACE SUCH AS SLAB , BEAM OR SHAFT ENCLOSURE.

B. ALL HORIZONTAL AND VERTICAL KITCHEN RANGE BLACK IRON EXHAUST DUCTWORK GAUGES SHALL BE AS FOLLOWS.

SIZE	GAUGE BLACK IRON
LESS THEN 155 SQIN	16
155–200 SQIN	14
201–255 SQIN	12

KITCHEN EXHAUST SYSTEM NOTES:

1. PROVIDE CLEAN OUT AT ALL ELBOWS AND BOTTOM OF RISER AND EVERY 15 FEET HORIZONTAL KITCHEN EXHAUST DUCT.
2. CLEANOUT OPENINGS SHALL BE PROVIDED AT EVERY CHANGE IN DIRECTION AND WITHIN 3 FEET OF THE EXHAUST FAN.
3. CLEANOUT OPENINGS SHALL BE EQUIPPED WITH TIGHT–FITTING DOORS CONSTRUCTED OF STEEL HAVING A THICKNESS NOT LESS THAN THAT REQUIRED FOR THE DUCT. DOORS SHALL BE EQUIPPED WITH A SUBSTANTIAL METHOD OF LATCHING, SUFFICIENT TO HOLD THE DOOR TIGHTLY CLOSED. DOOR ASSEMBLIES SHALL HAVE A GASKET OR SEALANT THAT IS NON–COMBUSTIBLE AND LIQUID TIGHT AND SHALL NOT HAVE FASTENERS THAT PENETRATED THE DUCT.
4. THE CLEANOUTS FOR HORIZONTAL GREASE DUCT SHALL BE LOCATED ON THE SIDE OF THE DUCT WITH THE OPENING NOT LESS THAN 1.5" ABOVE THE BOTTOM OF THE DUCT AND NOT LESS THAN 1" BELOW THE TOP OF THE DUCT.
5. COMMERCIAL KITCHEN GREASE DUCTS SHALL BE DESIGNED FOR THE TYPE OF COOKING APPLIANCE AND HOOD SERVED.
6. JOINTS, SEAMS AND PENETRATIONS OF GREASE DUCTS SHALL BE MADE WITH A CONTINUOUS LIQUID TIGHT WELD OR BRAZE MADE IN THE EXTERNAL SURFACE IF THE DUCT SYSTEMS.
7. DUCT TO EXHAUST FAN CONNECTIONS SHALL BE FLANGED, GASKETED AND BOLTED TO THE INLET AND OUTLET OF THE FAN FOR INLINE FANS. APPROVED FLEXIBLE CONNECTIONS MAY BE PROVIDED.
8. A VIBRATION ISOLATION CONNECTOR FOR CONNECTING A DUCT TO A FAN SHALL CONSIST OF NON–COMBUSTIBLE PACKING IN A METAL SLEEVE JOINT OF APPROVED DESIGN OR SHALL BE A COATED–FABRIC FLEXIBLE DUCT CONNECTOR LISTED AND LABELED FOR THE APPLICATION. VIBRATION ISOLATION CONNECTORS SHALL BE INSTALLED ONLY AT THE CONNECTION OF A DUCT TO A FAN INLET OR OUTLET.
9. PRIOR TO THE USE OR CONCEALMENT OF ANY PORTION OF A GREASE DUCT SYSTEM, A LEAKAGE TEST SHALL BE PERFORMED. DUCT SHALL BE CONSIDERED TO BE CONCEALED WHERE INSTALLED IN SHAFTS OR COVERED BY COATINGS OR WRAPS THAT PREVENT THE DUCTWORK FROM VISUALLY INSPECTED ON ALL SIDE. THE DUCT INSTALLER SHALL BE RESPONSIBLE FOR PROVIDING THE NECESSARY EQUIPMENT AND PERFORMING THE GREASE DUCT LEAKAGE TEST. THE DUCT LEAKAGE TEST SHALL BE PERFORMED FOR ALL THE DUCT SYSTEMS, INCLUDING THE SHOT–TO–DUCT CONNECTION. THE DUCTWORK SHALL BE PERMITTED TO BE TESTED IN SECTIONS, PROVIDED THAT EVERY JOINT IS TESTED (IF TEST IS FAILED, CONTRACTOR TO PROVIDE NEW KITCHEN EXHAUST DUCT).
10. PROVIDE SMOKE TEST TO PROOF TIGHTNESS OF THE GREASE DUCT.
11. GREASE DUCT BRACING AND SUPPORTS SHALL BE OF NON–COMBUSTIBLE MATERIAL SECURELY ATTACHED TO THE STRUCTURE AND DESIGNED TO CARRY GRAVITY AND SEISMIC LADS WITHIN THE STREET LIMITATIONS THE CODE. BOLTS, SCREWS, RIVETS AND OTHER MECHANICAL FASTENERS SHALL NOT PENETRATE DUCT WALLS.
12. A RESIDUE TRAP SHALL BE PROVIDED AT THE BASE OF EACH VERTICAL RISER WITH PROVISION FOR CLEANOUT IN ACCORDANCE WITH NFPA 96.
13. A GREASE DUCT SERVING THE TYPE–1 HOOD THAT PENETRATED A CEILING, WALL OR FLOOR SHALL BE ENCLOSED FROM THE FIRE POINT OF PENETRATION TO THE OUTLET TERMINAL. DUCT ENCLOSURES SHALL HAVE A FIRE–RESISTANCE RATING NOT LESS THAN THAT OF THE FIRE–RESISTANCE RATED ASSEMBLY PENETRATED BUT NEED NOT EXCEED 2 HOURS.
14. KITCHEN–EXHAUST OUTLETS SHALL BE LOCATED NOT LESS THAN 10 FEET HORIZONTALLY FROM PARTS OF THE SAME OR CONTIGUOUS BUILDINGS, ADJACENT BUILDINGS AND ADJACENT PROPERTY LINE. THIS EXHAUST OUTLETS SHALL BE LOCATED NOT LESS THAN 10 FEET HORIZONTALLY FROM AND NOT LESS THAN 3 FEET ABOVE AIR INTAKE OPENINGS INTO ANY BUILDING.
15. PROVIDE TYPE–I EXHAUST DUCT FOR HOOD–1 EXHAUST, IN COMPLIANCE WITH IMC 2018.
16. PROVIDE UL LISTED 2 LAYERS OF 1.5" THICK FIRE WARP, TESTED IN ACCORDANCE WITH ASTM E2336 FOR TYPE–I EXHAUST DUCTS. FIRE WRAP TO PROVIDE 1 OR 2–HR ENCLOSURE. THROUGH PENETRATION FIRE STOP SYSTEMS ARE TO BE TESTED IN ACCORDANCE WITH ASTM E 814 (UL1479). FOIL COVERING TO BE PROVIDED ABOVE INSULATION.

THERMOSTATIC CONTROLS:

A. THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE INDIVIDUALLY CONTROLLED BY THERMOSTATIC CONTROLS RESPONDING TO TEMPERATURE WITHIN THE ZONE. FOR THE PURPOSES OF SECTION 6.4.3.1, A DWELLING UNIT SHALL BE PERMITTED TO BE CONSIDERED A SINGLE ZONE.

B. DEAD BAND:WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEAD BAND OF AT LEAST 5°F WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS SHUT OFF OR REDUCED TO A MINIMUM.
EXCEPTIONS: THERMOSTATS THAT REQUIRE MANUAL CHANGEOVER BETWEEN HEATING AND COOLING MODES.

C. SETBACK CONTROLS: HEATING SYSTEMS LOCATED IN CLIMATE ZONES 2–8 SHALL BE EQUIPPED WITH CONTROLS THAT HAVE THE CAPABILITY TO AUTOMATICALLY RESTART AND TEMPORARILY OPERATE THE SYSTEM AS REQUIRED TO MAINTAIN ZONE, ARE CAPABLE OF TEMPERATURES ABOVE A HEATING SETPOINT ADJUSTABLE DOWN TO 55°F OR LOWER. COOLING SYSTEMS LOCATED IN CLIMATE ZONES 1B, 2B, AND 3B SHALL BE EQUIPPED WITH CONTROLS THAT HAVE THE CAPABILITY TO AUTOMATICALLY RESTART AND TEMPORARILY OPERATE THE SYSTEM AS REQUIRED TO MAINTAIN ZONE TEMPERATURES BELOW A COOLING SETPOINT ADJUSTABLE UP TO 90°F OR HIGHER OR TO PREVENT HIGH SPACE HUMIDITY LEVELS.

D. AUTOMATIC SHUTDOWN: HVAC SYSTEMS SHALL BE EQUIPPED WITH AT LEAST ONE OF THE FOLLOWING:CONTROLS THAT CAN START AND STOP THE SYSTEM UNDER DIFFERENT TIME SCHEDULES FOR SEVEN DIFFERENT DAY–TYPES PER WEEK RETAINING PROGRAMMING AND TIME SETTING DURING LOSS OF POWER FOR A PERIOD OF AT LEAST TEN HOURS, AND INCLUDE AN ACCESSIBLE MANUAL OVERRIDE, OR EQUIVALENT FUNCTION, THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO TWO HOURS.

E. SETPOINT OVERLAP RESTRICTION: WHERE HEATING AND COOLING TO A ZONE ARE CONTROLLED BY SEPARATE ZONE THERMOSTATIC CONTROLS LOCATED WITHIN THE ZONE, MEANS (SUCH AS LIMIT SWITCHES, MECHANICAL STOPS, OR, FOR DDC SYSTEMS, SOFTWARE PROGRAMMING) SHALL BE PROVIDED TO PREVENT THE HEATING SETPOINT FROM EXCEEDING THE COOLING SETPOINT MINUS ANY APPLICABLE PROPORTIONAL BAND.

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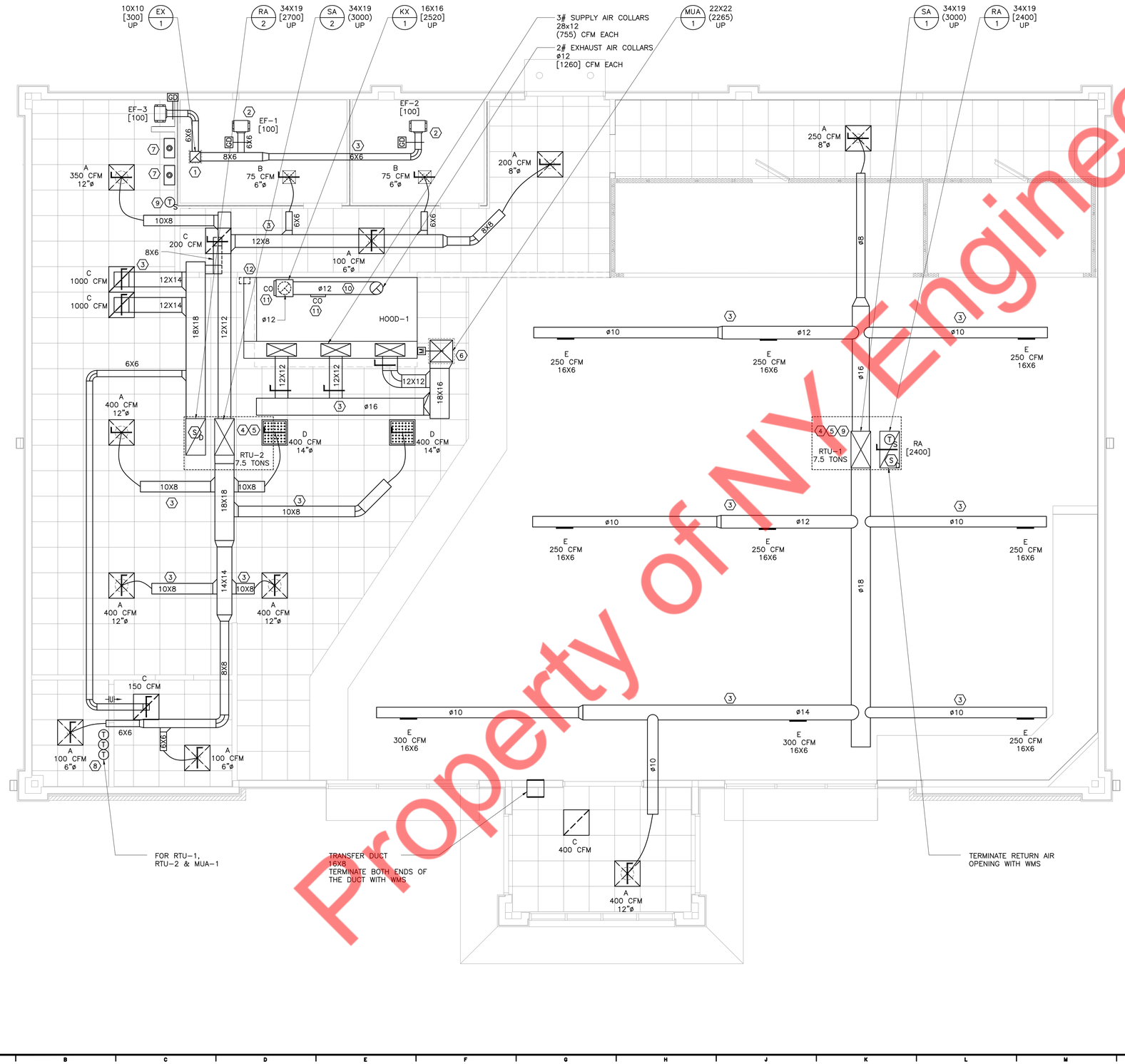

GENERAL NOTES:

A. PENETRATIONS OF THE AIR BARRIER SHALL BE CAULKED, GASKETED OR OTHERWISE SEALED IN A MANNER COMPATIBLE WITH THE CONSTRUCTION MATERIALS AND LOCATION. SEALING SHALL ALLOW FOR EXPANSION, CONTRACTION AND MECHANICAL VIBRATION. JOINTS AND SEAMS ASSOCIATED WITH PENETRATIONS SHALL BE SEALED IN THE SAME MANNER OR TAPED. SEALING MATERIALS SHALL BE SECURELY INSTALLED AROUND THE PENETRATION SO AS NOT TO DISLODGE, LOOSEN OR OTHERWISE IMPAIR THE PENETRATIONS' ABILITY TO RESIST POSITIVE AND NEGATIVE PRESSURE FROM WIND, STACK EFFECT AND MECHANICAL VENTILATION

B. ALL EQUIPMENT AND MATERIALS WILL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AND ACCORDING TO THE BEST PRACTICE.

C. PLUMBING WATER HEATER VENTS SHALL BE INSTALLED AS PER MANUFACTURER'S INSTALLATION MANUAL, LOCAL CODES AND AHJ. COORDINATE WITH PLUMBING CONTRACTOR FOR WATER HEATER LOCATIONS.

D. ALL DUCTWORK SHALL BE COORDINATED WITH OTHER TRADES.

E. PROVIDE PROGRAMMABLE THERMOSTATS WITH SUB-BASE AND REMOTE TEMPERATURE SENSOR.

F. DUCTWORK LOCATED IN EXPOSED CEILING SHALL BE INTERNALLY INSULATED.

G. PROVIDE DOOR UNDERCUT FOR RESTROOM, MIN. 1/2" FOR MAKE-UP AIR.

H. ALL DUCT SIZES SHOWN ON MECHANICAL FLOOR PLANS ARE CLEAR INSIDE DIMENSIONS. INTERNAL INSULATION THICKNESS OF DUCTS SHALL BE CONSIDERED SEPARATELY.

I. PROVIDE ACOUSTICAL LINING FOR THE FIRST 10 FT OF SUPPLY AND RETURN DUCTWORK.

MECHANICAL PLAN KEY NOTES:

1. 8X8 EXHAUST DUCT UP THROUGH ROOF. PROVIDE OFFSET AND TRANSITION AS NEEDED.
2. RESTROOM EXHAUST FAN. INTERLOCK FAN OPERATION WITH RTU-2.
3. RUN DUCT IN WOODEN TRUSS. VERIFY AND COORDINATE EXACT LOCATION AS PER STRUCTURAL DRAWINGS AND SITE CONDITIONS.
4. EXTEND FULL SIZE SUPPLY AND RETURN DUCTWORK FROM ROOFTOP UNIT TO SPACE, EXTEND AS SHOWN. ACOUSTICALLY LINE THE FIRST 10 FEET OF SUPPLY AND/OR RETURN DUCTS.
5. MECHANICAL CONTRACTOR TO FURNISH AND INSTALL SMOKE DETECTOR IN THE RETURN AIR DUCT, IN ACCORDANCE WITH LOCAL CODES. DUCT SMOKE DETECTOR SHALL BE WIRED TO SHUT DOWN RESPECTIVE RTU UNDER FIRE CONDITIONS BY ELECTRICAL CONTRACTOR.
6. EXTEND FULL SIZE SUPPLY DUCTWORK FROM MAKE-UP AIR UNIT TO SPACE, EXTEND AS SHOWN.
7. FURNISH AND INSTALL 3"ø/5"ø WATER HEATER CONCENTRIC VENT TO ROOF. ROUTE VENT PIPING FROM RESPECTIVE UNIT TO LOCATION INDICATED ON ROOF PLAN. ROUTE PIPING WITH MINIMAL AMOUNT OF BENDS AND MINIMUM LENGTH AS REQUIRED BY RESPECTIVE UNIT MANUFACTURER'S REQUIREMENTS. COORDINATE WITH PLUMBING CONTRACTOR.
8. PROVIDE THERMOSTAT IN MANAGER OFFICE. COORDINATE FINAL LOCATION WITH ARCHITECT. AVOID SOURCES OF HEAT.
9. PROVIDE REMOTE THERMOSTAT REMOTE SENSOR AND MOUNT AT 60" A.F.F IN WALL NEAR LOCATION SHOWN OR RETURN AIR DUCT AS SHOWN. SEAL WALL OPENING AND CAULK. CONNECT TO RESPECTIVE THERMOSTAT IN MANAGER OFFICE. INSULATE BACKS OF SENSORS.
10. GREASE DUCT SERVING TYPE-1 KITCHEN HOOD, RUN DUCTWORK IN WOODEN TRUSSES, PROVIDE OFFSET AND TRANSITION AS NECESSARY TO CONNECT TO EXHAUST HOOD. REFER TO HOOD DETAILS ON SHEETS FROM M3.
11. PROVIDE CLEAN OUT ON SIDE OF THE GREASE DUCT OF DIMENSION 14X10.
12. MANUAL PULL STATION FOR TYPE-1 HOOD. CONFIRM NUMBER OF PULLS, LOCATION AND HEIGHT ABOVE FINISHED FLOOR WITH LOCAL CODES OR AHJ.

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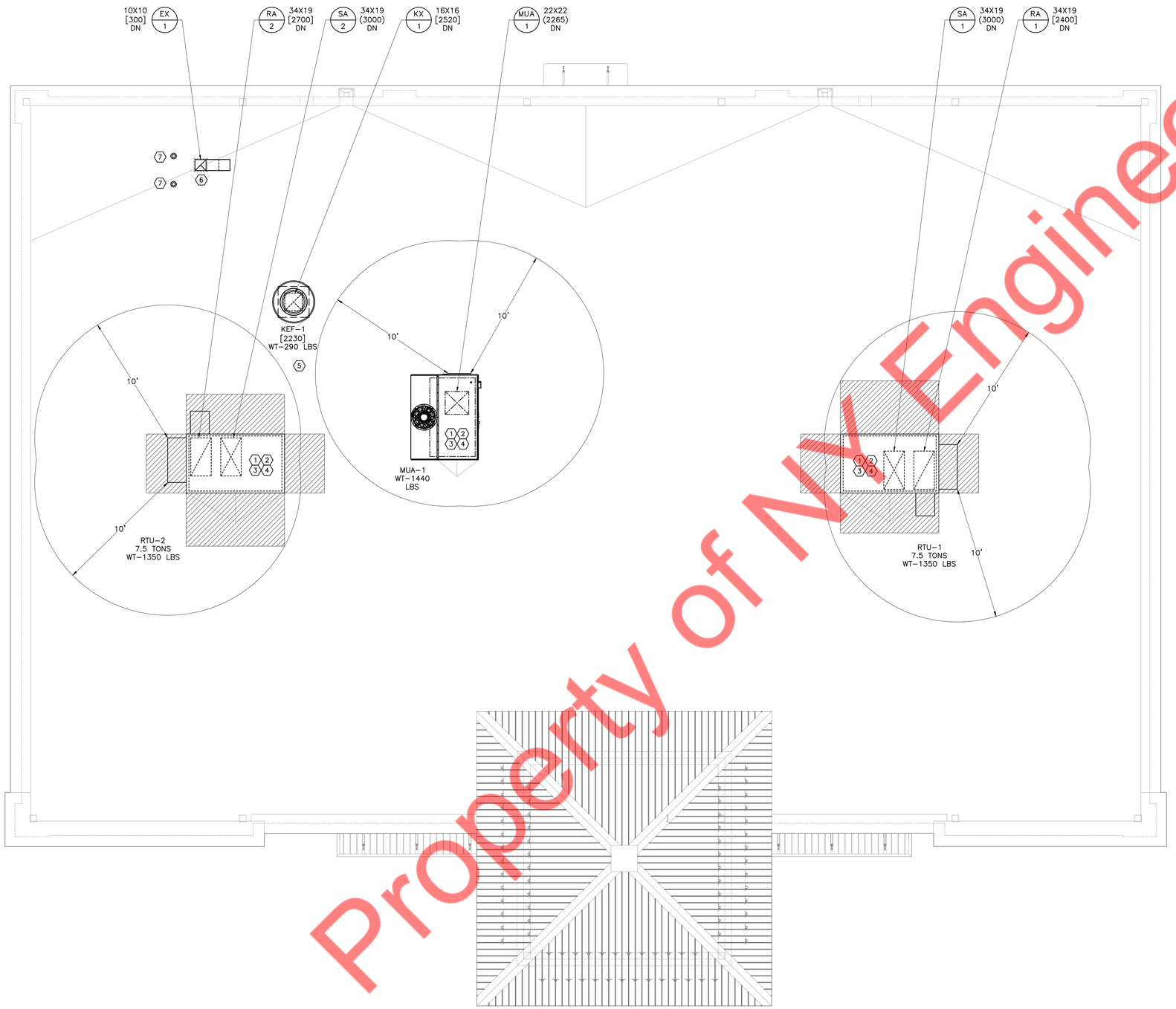

GENERAL NOTES:

A. PENETRATIONS OF THE AIR BARRIER SHALL BE CAULKED, GASKETED OR OTHERWISE SEALED IN A MANNER COMPATIBLE WITH THE CONSTRUCTION MATERIALS AND LOCATION. SEALING SHALL ALLOW FOR EXPANSION, CONTRACTION AND MECHANICAL VIBRATION. JOINTS AND SEAMS ASSOCIATED WITH PENETRATIONS SHALL BE SEALED IN THE SAME MANNER OR TAPED. SEALING MATERIALS SHALL BE SECURELY INSTALLED AROUND THE PENETRATION SO AS NOT TO DISLODGE, LOOSEN OR OTHERWISE IMPAIR THE PENETRATIONS' ABILITY TO RESIST POSITIVE AND NEGATIVE PRESSURE FROM WIND, STACK EFFECT AND MECHANICAL VENTILATION

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F. PROVIDE ACOUSTICAL LINING FOR THE FIRST 10 FT OF SUPPLY AND RETURN DUCTWORK.

G. PROVIDE WEATHERPROOF COATING FOR ALL EXPOSED REFRIGERANT PIPE AND DUCT INSULATION.

H. CONTRACTOR TO PROVIDE ROOF CURB OR STEEL RAIL AS REQUIRED PER MANUFACTURER TO SUPPORT THE EQUIPMENT ON ROOF.

MECHANICAL PLAN KEY NOTES:

1. EXTEND FULL SIZE SUPPLY AND RETURN DUCTWORK FROM ROOFTOP UNIT TO SPACE, EXTEND AS SHOWN.
2. COORDINATE FINAL LOCATION OF EQUIPMENT WITH LANDLORD AND EXISTING TRUSSES.
3. CONTRACTOR TO FIELD VERIFY THAT THE LOCATION OF ANY EXHAUST SOURCE SHOULD BE AT LEAST 10' AWAY FROM THE RTU'S/MAU'S OUTSIDE AIR INTAKE.
4. CONTRACTOR TO RUN CONDENSATE DRAIN FROM RTU/MAU TO NEAREST DOWNSPOUT OR APPROVED LOCATION OF DISPOSAL AS REQUIRED BY AHJ OR CITY CODE. COORDINATE IN FIELD.
5. KITCHEN EXHAUST TERMINATION SHALL TERMINATE 10 FEET FROM PROPERTY/ LOT LINE, 40 INCH ABOVE ROOF, 3 FEET AWAY FROM ANY OPERABLE OPENING INTO THE BUILDING AND 10 FEET AWAY FROM ANY OUTSIDE AIR INTAKES.
6. RESTROOM EXHAUST TERMINATION SHALL TERMINATE 10 FEET FROM PROPERTY/ LOT LINE, 40 INCH ABOVE ROOF, 3 FEET AWAY FROM ANY OPERABLE OPENING INTO THE BUILDING AND 10 FEET AWAY FROM ANY OUTSIDE AIR INTAKES.
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FOR QUESTIONS, CALL THE
Broward-Palm Beach Mechanical
REGION 64
PHONE: (305) 710 - 6110
EMAIL: reg64@econair.com

PATENT NUMBERS
AC-PSP (UNITED STATES) - US PATENT 7963830 B2.
AC-PSP WALL (CANADA) - CA PATENT 2820509.
AC-PSP ISLAND (CANADA) - CA PATENT 2520330.

HOOD INFORMATION - JOB#7107012

HOOD NO	TAG	MODEL	MANUFACTURER	LENGTH	MAX COOKING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM WIDTH	LENG	HEIGHT	RISER(S) DIA	CFM	VEL	SP	TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG END TO END	ROW
1	HD-1	6024 EX-2-PSP-F	ECON-AIR	12' 7"	600 DEG	I	HEAVY	200	2517			4"	12"	1258	1602	-0.738"	2265	430 SS WHERE EXPOSED	ALONE	ALONE
												4"	12"	1258	1602	-0.738"				

HOOD INFORMATION

HOOD NO	TAG	FILTER(S) TYPE	QTY	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	LIGHT(S) QTY	TYPE	WIRE GUARD	UTILITY CABINET(S) LOCATION	SIZE	FIRE SYSTEM TYPE	FIRE SYSTEM SIZE	ELECTRICAL MODEL #	SWITCHES QUANTITY	FIRE SYSTEM PIPING	HOOD HANGING WEIGHT
1	HD-1	CAPTRATE SOLO FILTER	9	16"	16"	85% SEE FILTER SPEC	6	RECESSED ROUND	NO	LEFT	12"x60"x24"	TANK FS	4.0/4.0	DCV-1111	1 LIGHT, 1 FAN	YES	1130 LBS

HOOD OPTIONS

HOOD NO	TAG	OPTION
1	HD-1	FIELD WRAPPER 18.00" HIGH FRONT, LEFT, RIGHT.
		BACKSPLASH 80.00" HIGH X 163.00" LONG 430 SS VERTICAL.
		RIGHT QUARTER END PANEL 23" TOP WIDTH, 0" BOTTOM WIDTH, 23" HIGH 430 SS.
		LEFT QUARTER END PANEL 23" TOP WIDTH, 0" BOTTOM WIDTH, 23" HIGH 430 SS.
		STRUCTURAL FRONT PANEL.
		RISER SENSOR INSTALL 6IN PLEN.

PERFORATED SUPPLY PLENUM(S)

HOOD NO	TAG	POS	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S) WIDTH	LENG	DIA	CFM	SP
1	HD-1	Front	163"	16"	6"	MUA	12"	28"		755	0.184"
						MUA	12"	28"		755	0.184"
						MUA	12"	28"		755	0.184"

GREASE DUCT & CHIMNEY SPECIFICATIONS:
PROVIDE GREASE DUCT EQUAL TO ECON-AIR MODEL "EDW"
ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "EDW"
IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "EDW" DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER THE MANUFACTURES INSTALLATION GUIDE.
PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER. PER MANUFACTURES LISTING MODEL "EDW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12". DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE ACCUMULATION IN HORIZONTAL RUNS.

IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY EQUAL TO ECON-AIR MODEL "EDW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

ECON-AIR RECOMMENDS THE USE OF LISTED, PRE-FABRICATED ROUND GREASE EXHAUST DUCT TO REDUCE STATIC PRESSURE IN THE SYSTEM, MINIMIZE INSTALLATION AND INSPECTION TIMES, AND ENSURE DUCT IS LIQUID TIGHT

HVAC DISTRIBUTION NOTE

HIGH VELOCITY DIFFUSERS OR HVAC RETURNS SHOULD NOT BE PLACED WITHIN TEN (10) FEET OF THE EXHAUST HOOD. PERFORATED DIFFUSERS ARE RECOMMENDED.

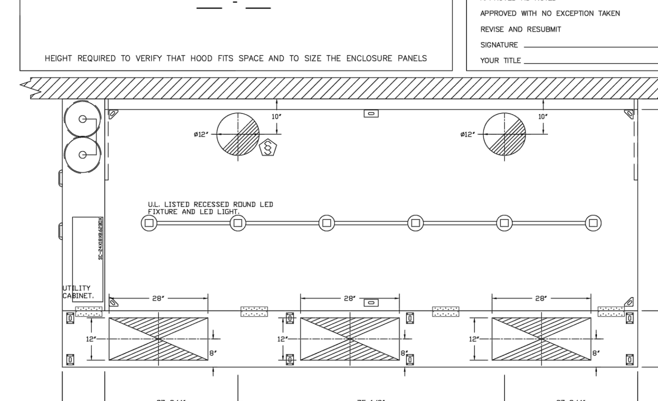
VERIFY CEILING HEIGHT

__' - __"

HEIGHT REQUIRED TO VERIFY THAT HOOD FITS SPACE AND TO SIZE THE ENCLOSURE PANELS

CUSTOMER APPROVAL TO MANUFACTURE:

APPROVED AS NOTED ☐
APPROVED WITH NO EXCEPTION TAKEN ☐
REVISE AND RESUBMIT ☐
SIGNATURE ________
YOUR TITLE ________ DATE ________



PLAN VIEW - HOOD #1 (HD-1)
12' 7.00" LONG 6024EX-2-PSP-F
NOTE: ADDITIONAL HANGING ANGLES PROVIDED FOR HOODS 12' AND LONGER.

CLEARANCE TO COMBUSTIBLES

HOODS #	SURFACE	*CLEARANCE
1	TOP	18"
	FRONT	0"
	BACK	18"
	LEFT	0"
	RIGHT	18"

- *0" CLEARANCE TO COMBUSTIBLES CONFORMS TO UL710 STANDARD.
- HOOD MOUNTED UTILITY CABINETS REQUIRE 36" SERVICE CLEARANCE.

SPECIFICATION: CAPTRATE® GREASE-STOP® SOLO FILTER

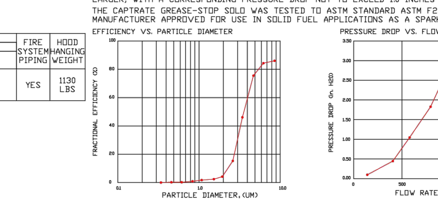
THE CAPTRATE GREASE-STOP SOLO FILTER IS A SINGLE-STAGE FILTER FEATURING A UNIQUE S-BAFFLE DESIGN IN CONJUNCTION WITH A SLOTTED REAR BAFFLE DESIGN, TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

FILTER IS STAINLESS STEEL CONSTRUCTION, AND SIZED TO FIT INTO STANDARD 2-INCH DEEP HOOD CHANNEL(S).

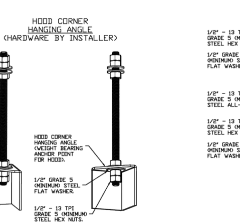
UNITS SHALL INCLUDE STAINLESS STEEL HANDLES AND A FASTENING DEVICE TO SECURE THE TWO COMPONENTS WHEN ASSEMBLED.

GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS IN SIZE, AND 85% GREASE PARTICLES SEVEN MICRONS IN SIZE AND LARGER, WITH A CORRESPONDING PRESSURE DROP NOT TO EXCEED 1.0 INCHES OF WATER GAUGE.

THE CAPTRATE GREASE-STOP SOLO WAS TESTED TO ASTM STANDARD ASTM F2519-05. MANUFACTURER APPROVED FOR USE IN SOLID FUEL APPLICATIONS AS A SPARK ARRESTER.

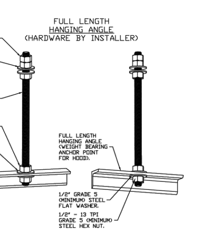


CAPTRATE FILTERS ARE BUILT IN COMPLIANCE WITH:
NFPA #96.
NSF STANDARD #2.
UL STANDARD #1046.
INT. MECH. CODE (IMC).
ULC-S649.



ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" - 13 TPI GRADE 5 (MINIMUM) ALL-THREAD. SANDWICH HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 (MINIMUM) STEEL FLAT WASHERS AND 1/2" - 13 TPI GRADE 5 (MINIMUM) HEX NUTS AS SHOWN. MUST USE DOUBLED HEX NUT CONFIGURATION BENEATH HOOD HANGING ANGLES AND ABOVE CEILING ANCHORS. MAINTAIN 1/4" OF EXPOSED THREADS BENEATH BOTTOM HEX NUT. TORQUE ALL HEX NUTS TO 57 FT-LBS.



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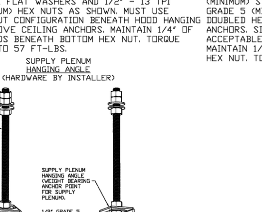

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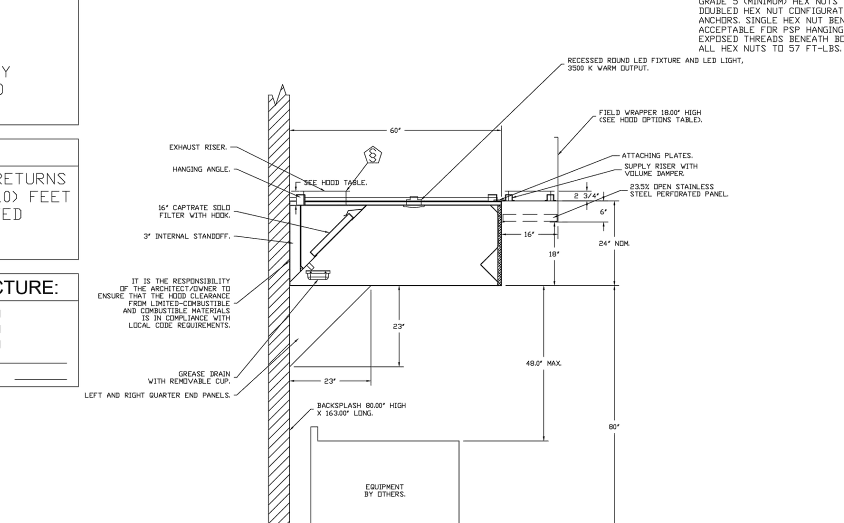

SECTION VIEW - MODEL 6024EX-2-PSP-F
HOOD - #1 (HD-1)

REVISIONS
DESCRIPTION | DATE:

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DATE: 10/16/2024
DWG.#: 7107012
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SCALE: 3/4" = 1'-0"
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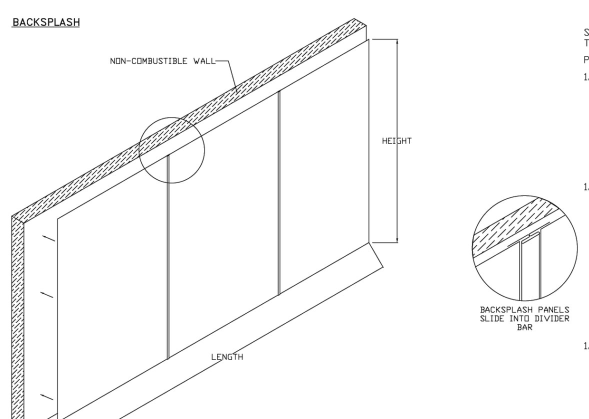
BACKSPLASH



- BACKSPLASH IS NOT INSULATED AND IS UNSUITABLE FOR INSTALL AGAINST COMBUSTIBLE WALLS

SECTION 23 38 13 13

SPECIFICATIONS
TAG: Commercial Kitchen Ventilation Hoods, Listed Commercial Kitchen Hoods

PART 1 - GENERAL

1.1 SUMMARY

A. The ND2 series is a Type I, wall canopy hood for use over 600°F cooking surface temperatures. The aerodynamic design includes a mechanical baffle and performance enhancing lip for exceptional capture and containment.

B. The hood shall have the size, shape, and performance specified on drawings.

1.2 SUBMITTALS

A. The manufacturer assumes no liability for the use or results of use from this document. Specifications are to be reviewed by the engineer to confirm the project's requirements and meet Federal, State, and Local codes and regulations.

B. As the manufacturer continues product development, it reserves the right to change design and specifications without notice.

C. The manufacturer shall supply complete computer generated submittal drawings, including hood section view(s) and hood plan view(s). These drawings must be available to the engineer, architect, and owner for their use in construction, operation, and maintenance.

1.3 QUALITY ASSURANCE

A. This hood is ETL-listed to standard UL710, ULC710, and ULC-S646 when installed in accordance with these installation instructions and National Fire Protection Association Standard "NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

B. Built-in compliance with NSF/ANSI Standard 2.

C. The hood shall be ETL Listed as:

1. "Exhaust Hood Without Exhaust Damper."
2. ETL Sanitation Listed and built in accordance with NFPA 96.
3. The ETL label shall list temperature rating(s) and minimum CFM/ft rating(s).

1.4 WARRANTY

A. All units shall be provided with the following standard warranty:

1. This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2-years from date of shipment.

B. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization, and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

C. Refer to Manufacturer's Operation, Installation, and Maintenance (OIM) Manual for detailed descriptions of what is/is not covered and contact information for warranty claims.

PART 2 - PRODUCTS

2.1 GENERAL

A. Construction shall be dependent on the structural application to minimize distortion and other defects. All seams, joints, and penetrations of the hood enclosure to the lower outermost perimeter, which directs and captures grease-laden vapor and exhaust gases, shall have a liquid-tight continuous external weld in accordance with NFPA 96.

B. Duct sizes, CFM, and static pressure requirements shall be as shown on drawings. Static pressure requirements shall be precise and accurate; air velocity and volume information shall be accurate within 1-ft increments along the length of the ventilator.

2.2 CONSTRUCTION

A. Construction shall be type 430 stainless steel.

B. Double wall insulated front to eliminate condensation and increase rigidity on wide sizes. The insulation shall have a flexural modulus of 475 EI, meet UL 181 requirements and be in accordance with NFPA 90A and 90B.

C. Hood shall be equipped with a minimum of four connections for hanger rods. Hood lengths greater than 12'will have added hangers.

D. Exhaust duct collar to be 4"high with flange.

E. The grease drain system shall be an enclosed integral part of the hood back and have slopes with an exposed, removable 1/2 grease cup to facilitate cleaning.

F. An integral baffle to direct grease laden vapors toward the exhaust filter bank.

G. Hood shall be furnished with UL classified filters, supplied in size and quantity as required by ventilator.

H. All seams shall be welded and have stainless steel on exposed surfaces.

2.3 FILTERS

A. Stainless Steel Captrate Solo filter with hook, ETL Listed. Particulate capture efficiency: 85% efficient at 9 microns, 76% efficient at 5 microns.

2.4 OPTIONS

A. Fire Suppression System: UL 300 fire suppression system.

B. Optional perforated supply plenum shall provide make-up air discharged below the cooking equipment.

1. Perforated diffuser plates shall be included in the design to provide even air distribution.
2. Unexposed surfaces shall be constructed of aluminized steel. Plenum shall be insulated to prevent condensation.
3. Perforated Supply Plenum (PSP)

C. Hood Mounted Utility Cabinet - Cabinet can store listed fire suppression system, listed components, pre-wired electrical controls.

2.5 ACCESSORIES

A. End Panel(s) maximize hood performance and eliminate the effects of cross drafts in the kitchen. Units constructed of stainless steel and sized according to hood width and cooking equipment. Exposed edges hemmed for safety and rigidity. Selected panels:

1. Quarter End Panel

B. Splash panel(s) selected:

1. Backsplash

C. Wrapper(s) may be installed from the factory or field installed. Wrapper(s) selected:

1. Wrapper

D. Miscellaneous option(s) selected:

1. Riser Sensor Install -Sensor set-up for 6"plenum.
2. Structural Front Panel -Front panel made with 18 gauge material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which the system is installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

FIRE SYSTEM INFORMATION - JOB#7107012

FIRE SYSTEM NO	TAG	TYPE	SIZE	MAX FP	DESIGN FP	INSTALLATION SYSTEM	LOCATION ON HOOD
1	FS-1	TANK FS	4.0/4.0	40	36	FIRE CABINET LEFT	LEFT, HOOD 1

GAS VALVE(S)

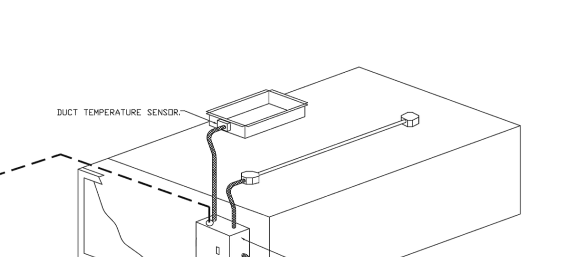
FIRE SYSTEM NO	TAG	TYPE	SIZE	SUPPLIED BY
1	FS-1	SC ELECTRICAL	2.000	ECON-AIR

FIRE SYSTEM PARTS LIST KEY

FIRE SYSTEM NO	TAG	KEY NUMBER - PART DESCRIPTION	QTY BY FACTORY	QTY BY DIST
1	FS-1	0 - 0 - TANK FIRE SUPPRESSION POST-DISCHARGE PROCEDURE UTILITY CABINET LABEL SHEET.	1	0
		0 - 0 - TANK FIRE SUPPRESSION MAINTENANCE GUIDE UTILITY CABINET LABEL SHEET.	1	0
		0 - 0 - 12-F28021-32144-DT-360 DUCT FIRE THERMOSTAT WITH 12 FOOT WIRE LEADS. NO, CLOSE ON TEMP RISE AT 360°F. (A0034310).	2	0
		0 - 0 - 4429K153 1/2" MALE NPT TO 1/2" FEMALE NPT ELBOW, BRASS.	2	0
		0 - 0 - 4429K422 1/2" X 1/4" BRASS REDUCING BUSHING.	1	0
		0 - 0 - 79525 1/2" 90 PRO-PRESS ELBOW WITH 1/2" NPT FEMALE CONNECTION, VIEGA.	1	0
		0 - 0 - 79580 1/2" X 1/2" PRO-PRESS TEE X 1/2" NPT FEMALE CONNECTION, VIEGA.	2	0
		0 - 0 - 87-120042-001 SECONDARY ACTUATOR VALVE (SVA) - SINGLE ACTUATOR, REQUIRES PRIMARY RELEASE ACTUATOR, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-120045-001 HOSE, SECONDARY ACTUATOR HOSE, 7.5" BRAIDED STAINLESS STEEL, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-300001-001 TANK - PRESSURIZED TANK USED FOR TANK FIRE SUPPRESSION.	2	0
		0 - 0 - 87-300030-001 PRIMARY ACTUATOR KIT (PAK) - ACTUATOR AND RELEASE SOLENOID ASSEMBLY, ONE NEEDED PER FIRE SYSTEM, SUPERVISED, TANK FIRE SUPPRESSION	1	0
		0 - 0 - 87-300152-001 HARDWARE, SVA BOLTS, TANK FIRE SUPPRESSION.	8	0
		0 - 0 - 98694A115 HARDWARE, DATANKLOCK LOCKING BRACKET SQUARE NUTS 5/16" ZINC, TANK FIRE SUPPRESSION.	4	0
		0 - 0 - A0034332 JUNCTION BOX FOR MANUAL PULL STATION, 1.5" DEEP BACK BOX, RED COLOR.	1	0
		0 - 0 - A31484 1/4" NPT SCHRADER VALVE AND CAP, JB INDUSTRIES. 1/4" FLARE X 1/4" MPT HALF UNION. USED ON TANK SERVICE PORT.	1	0
		0 - 0 - DATANKLOCK DISCHARGE ADAPTER TANK LOCKING PLATE FOR FIRE SYSTEM TANK INSTALLATION IN UTILITY CABINETS, TANK FIRE SUPPRESSION.	2	0
		0 - 0 - TANK STRAP TANK STRAP - USED FOR TANK FIRE SUPPRESSION.	6	0
		0 - 0 - TFS-UCTANKBRACKET TANK BRACKET FOR FIRE SYSTEM TANK INSTALLATION IN UTILITY CABINETS, TANK FIRE SUPPRESSION.	2	0
		0 - 0 - WK-283952-000 DISCHARGE ADAPTER, TANK FIRE SUPPRESSION.	2	0
		34 - 34 - A0034331 24VDC SINGLE ACTION MANUAL ACTUATION DEVICE (PUSH/PULL STATION) WITH PROTECTIVE COVER, ONE (1) NORMALLY OPEN CONTACT. RED COLOR.	1	0
		ADDITIONAL PARTS TO BE DETERMINED...		

DEMAND CONTROL VENTILATION HOOD CONTROL PANEL SPECIFICATIONS:

- CONTROLS SHALL BE LISTED BY ETL (UL 508A) AND SHALL COMPLY WITH DEMAND VENTILATION SYSTEM TURNDOWN REQUIREMENTS OUTLINED IN IECC 403.7.5 (2021).
- THE CONTROL ENCLOSURE SHALL BE NEMA 1 RATED AND LISTED FOR INSTALLATION INSIDE OF THE EXHAUST HOOD UTILITY CABINET. THE CONTROL ENCLOSURE MAY BE CONSTRUCTED OF STAINLESS STEEL OR PAINTED STEEL.
- TEMPERATURE PROBE(S) LOCATED IN THE EXHAUST DUCT RISER(S) SHALL BE CONSTRUCTED OF STAINLESS STEEL.
- A DIGITAL CONTROLLER SHALL BE PROVIDED TO ACTIVATE THE HOOD EXHAUST FANS DYNAMICALLY BASED ON A FIXED DIFFERENTIAL BETWEEN THE AMBIENT AND DUCT TEMPERATURES SENSORS. THIS FUNCTION SHALL MEET THE REQUIREMENTS OF IMC 507.1.1.
- A DIGITAL CONTROLLER SHALL PROVIDE ADJUSTABLE HYSTERESIS SETTINGS TO PREVENT CYCLING OF THE FANS AFTER THE COOKING APPLIANCES HAVE BEEN TURNED OFF AND/OR THE HEAT IN THE EXHAUST SYSTEM IS REDUCED.
- A DIGITAL CONTROLLER SHALL PROVIDE AN ADJUSTABLE MINIMUM FAN RUN-TIME SETTING TO PREVENT FAN CYCLING.
- VARIABLE FREQUENCY DRIVES (VFDS) SHALL BE PROVIDED FOR FANS AS REQUIRED. THE DIGITAL CONTROLLER SHALL MODULATE THE VFDS BETWEEN A MINIMUM SETPOINT AND A MAXIMUM SETPOINT ON DEMAND. THE DUCT TEMPERATURE SENSOR INPUT(S) TO THE DIGITAL CONTROLLER SHALL BE USED TO CALCULATE THE SPEED REFERENCE SIGNAL.
- THE VFD SPEED RANGE OF OPERATION SHALL BE FROM 0% TO 100% FOR THE SYSTEM, WITH THE ACTUAL MINIMUM SPEED SET AS REQUIRED TO MEET MINIMUM VENTILATION REQUIREMENTS.
- AN INTERNAL ALGORITHM TO THE DIGITAL CONTROLLER SHALL MODULATE SUPPLY FAN VFD SPEED PROPORTIONAL TO ALL EXHAUST FANS THAT ARE LOCATED IN THE SAME FAN GROUP AS THE SUPPLY FAN.
- THE SYSTEM SHALL OPERATE IN PREP MODE DURING LIGHT COOKING LOAD OR COOL DOWN MODE WHEN SUFFICIENT HEAT REMAINS UNDERNEATH THE HOOD SYSTEM AFTER COOKING OPERATIONS HAVE COMPLETED. OPERATION DURING EITHER OF THESE PERIODS WILL DISABLE THE SUPPLY FANS AND PROVIDE AN EXHAUST FAN SPEED THAT IS EQUAL TO THE MINIMUM VENTILATION REQUIREMENT.
- A DIGITAL CONTROLLER SHALL DISABLE THE SUPPLY FAN(S), ACTIVATE THE EXHAUST FAN(S), ACTIVATE THE APPLIANCE SHUNT TRIP, AND DISABLE AN ELECTRIC GAS VALVE AUTOMATICALLY WHEN FIRE CONDITION IS DETECTED ON A COVERED HOOD.
- A DIGITAL CONTROLLER SHALL ALLOW FOR EXTERNAL BMS FAN CONTROL VIA DRY CONTACT (EXTERNAL CONTROL SHALL NOT OVERRIDE FAN OPERATION LOGIC AS REQUIRED BY CODE).
- AN LCD INTERFACE SHALL BE PROVIDED WITH THE FOLLOWING FEATURES:
  A. ON/OFF PUSH BUTTON FAN & LIGHT SWITCH ACTIVATION.
  B. INTEGRATED GAS VALVE RESET FOR ELECTRONIC GAS VALVES (NO RESET RELAY REQUIRED).
  C. VFD FAULT DISPLAY WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
  D. DUCT TEMPERATURE SENSOR FAILURE DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
  E. MIS-WIRED DUCT TEMPERATURE SENSOR DETECTION WITH AUDIBLE & VISUAL ALARM NOTIFICATION.
  F. A SINGLE LOW VOLTAGE CAT-5 RJ45 WIRING CONNECTION.
  G. AN ENERGY SAVINGS INDICATOR THAT UTILIZES MEASURED KWH FROM THE VFDS.



TYPICAL HOOD CONTROL PANEL INSTALLATION

SEQUENCE OF OPERATIONS:
THE HOOD CONTROL PANEL IS CAPABLE OF OPERATING IN ONE OR MORE OF THE FOLLOWING STATES AT ANY GIVEN TIME:

- AUTOMATIC: THE SYSTEM OPERATES BASED ON THE DIFFERENTIAL BETWEEN ROOM TEMPERATURE AND THE TEMPERATURE AT THE HOOD CAVITY OR EXHAUST DUCT COLLAR. FANS ACTIVATE AT A CONFIGURABLE TEMPERATURE DIFFERENTIAL THRESHOLD. DEPENDING ON THE JOB CONFIGURATION EACH FAN ZONE CAN BE CONFIGURED AS STATIC OR DYNAMIC. THESE TERMS REFER TO WHETHER A VARIABLE MOTOR (SUCH AS EC MOTORS OR VFD DRIVEN MOTORS) MODULATE WITH TEMPERATURE. IF THE PANEL IS EQUIPPED WITH VARIABLE SPEED FANS AND THE ZONE IS DEFINED AS "DYNAMIC", THESE WILL MODULATE WITHIN A USER-DEFINED RANGE BASED ON THE TEMPERATURE DIFFERENTIAL. PANELS EQUIPPED WITH VARIABLE SPEED FANS AND A FAN ZONE DEFINED AS "STATIC", FANS WILL RUN AT A SET SPEED CALCULATED FOR THE DRIVE. DEMAND CONTROL VENTILATION SYSTEMS ARE CAPABLE OF MODULATING EXHAUST AND MAKE UP AIR FAN SPEEDS PER THE REQUIREMENTS OUTLINED IN IECC 403.7.5 (2021).
- MANUAL: THE SYSTEM OPERATES BASED ON HUMAN INPUT FROM AN HMI.
- SCHEDULE: A WEEKLY SCHEDULE CAN BE SET TO RUN FANS FOR A SPECIFIED PERIOD THROUGHOUT THE DAY. THERE ARE THREE OCCUPIED TIMES PER DAY TO ALLOW FOR THE USER TO SET UP A TIME THAT IS SUITABLE TO THEIR NEEDS. ANY TIME THAT IS WITHIN THE DEFINED OCCUPIED TIME, THE SYSTEM WILL RUN AT MODULATION MODE AND FOLLOW THE FAN PROCEDURE ALGORITHM BASED ON TEMPERATURE DURING THIS TIME. DURING UNOCCUPIED TIME, THE SYSTEM WILL HAVE AN EXTRA OFFSET TO PREVENT UNINTENDED ACTIVATION OF THE SYSTEM DURING A TIME WHERE THE SYSTEM IS NOT BEING OCCUPIED.
- OTHER: THE SYSTEM OPERATES BASED ON THE INPUT FROM AN EXTERNAL SOURCE (DDC, BMS OR HARD-WIRED INTERLOCK).
- FIRE: UPON ACTIVATION OF THE HOOD FIRE SUPPRESSION SYSTEM, THE EXHAUST FAN WILL COME ON OR CONTINUE TO TO RUN, THE HOOD MAKEUP AIR WILL SHUTDOWN, AND A SIGNAL WILL BE SENT FOR ACTIVATING THE SHUNT TRIP BREAKER PROVIDED BY THE ELECTRICIAN. FUEL GAS WILL SHUT OFF VIA A MECHANICAL/ELECTRICAL GAS VALVE ACTUATED BY THE HOOD FIRE SUPPRESSION SYSTEM.

REVISIONS
DESCRIPTION | DATE:

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SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 2

EXHAUST FAN INFORMATION - JOB#7107012

FAN UNIT NO	TAG	QTY	FAN UNIT MODEL #	MANUFACTURER	CFM	ESP	RPM	MOTOR ENCL	HP	BHP	PHASE	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS)	SONES
1	EF-1	1	EADU180H	ECON-AIR	2517	1.500	1236	TEFC,PREMIUM	2.000	1.3040	3	208	7.3	581 FPM	200	16.9

DOAS/RTU FAN SCHEDULE - JOB#7107012

FAN UNIT NO	TAG	QTY	DOAS/RTU MODEL #	MANUFACTURER	BLOWER	RETURN AIR CFM	MAX OUTSIDE AIR CFM	TOTAL CFM	WEIGHT (LBS)	ESP	HP	PHASE	VOLT	MCA	MOCP	OUTSIDE AIR DB	OUTSIDE AIR WB	MIXED AIR DB	MIXED AIR WB	LEAVING AIR DB	LEAVING AIR WB	LEAVING AIR DP	CAPACITY TOTAL	CAPACITY SENS.	IEER	ISMRE	DISCHARGE DB	DISCHARGE WB	CAPACITY DESIRED	CAPACITY MAX	MOISTURE REMOVAL RATE	GAS TYPE	INPUT BTUs	OUTPUT BTUs	TEMP RISE	REQUIRED INPUT GAS PRESSURE	NOTES
2	MPU-1	1	EARTU1-I.200-16-5T-MPU	ECON-AIR	16Z-1	0	2265	2265	1190	0.500	2.50	3	208	27.9A	30A	90.0°F	73.0°F	90.0°F	73.0°F	65.6°F	65.4°F	65.3°F	63.4 MBH	60.5 MBH	17.9	6.1	78.0°F	74.0°F	30.6 MBH	53 MBH	2.2 LBS/HR	NATURAL	198617	160880	60°F	7 IN. W.C. - 14 IN. W.C.	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15

NOTES:
1. INVERTER SCROLL COMPRESSOR WITH INTEGRATED OIL SENSOR. DIGITAL OR STAGED SCROLL NOT AN APPROVED EQUAL
2. DIRECT DRIVE PLENUM BLOWER. BELT DRIVEN BLOWERS ARE NOT ACCEPTABLE
3. INTEGRATED MONITORING VIA CELLULAR CONNECTION BY MANUFACTURER
4. REFRIGERATION PRESSURE MONITORING ON HIGH AND LOW PRESSURE SIDE OF SYSTEM INCLUDED THROUGH DIGITAL INTERFACE
5. EC MOTOR CONDENSING FANS
6. ELECTRONIC EXPANSION VALVE. TXV NOT ACCEPTABLE
7. SUCTION LINE ACCUMULATOR
8. FACTORY COMMISSIONING WITH 5 YEAR PARTS WARRANTY, 25 YEAR WARRANTY ON STAINLESS STEEL HEAT EXCHANGER
9. AVERAGING INTAKE, EVAP AND DISCHARGE TEMPERATURE SENSORS (DISCHARGE SENSOR TO BE FACTORY MOUNTED WITHIN UNIT)
10. 81% EFFICIENT FURNACE, WITH MODULATING INDUCER TO MAINTAIN CONSTANT COMBUSTION EFFICIENCY ACROSS FIRING RANGE. 6:1 TURNDOWN WITH NG AND 5:1 TURNDOWN WITH LP
11. SUPPLY CFM MONITORING INTEGRAL TO UNIT WITH CFM MEASUREMENT INCLUDED THROUGH DIGITAL INTERFACE
12. FULLY MODULATING HOT GAS REHEAT
13. 1" EXTERIOR DUAL-WALL CONSTRUCTION W/ R-4.3 INSULATION-MINIMUM 24GA EXTERIOR W/ 18GA BASE
14. DOWN DISCHARGE/NO RETURN
15. DIRECT DRIVE ECM PLENUM BLOWER. BELT DRIVEN AND NON-ECM BLOWERS ARE NOT ACCEPTABLE

FAN OPTIONS

FAN UNIT NO	TAG	QTY	DESCRIPTION
1	EF-1	1	GREASE BOX
		1	MIAMI DADE CERTIFICATION - NOA-1 ALUMINUM UPBLAST
		1	EXHAUST FAN HEAT BAFFLE
		1	2 YEAR PARTS WARRANTY
2	MPU-1	1	INLET PRESSURE GAUGE, 0-35"
		1	MANIFOLD PRESSURE GAUGE, 0 TO 10" WC, 1 FURNACE
		1	TOTAL CFM MONITORING
		1	INTAKE FIRESTAT SET TO 135°F
		1	FREEZESTAT
		1	DISCHARGE FIRESTAT SET TO 240°F
		1	SHIP LOOSE GAS STRAINER 3/4"
		1	SINGLE POINT ELECTRICAL CONNECTION FOR RTU. 750VA TRANSFORMER USED. IF A NON-DCV PREWIRE CONTROLS THIS UNIT, THE #28, #47, "MA", OR "E2" PREWIRE OPTION MUST BE SELECTED. DOES NOT PROVIDE SUPPLY STARTER IN PREWIRE
		1	CASLINK BUILDING MONITORING SYSTEM - INTERNET OR CELLULAR CONNECTION REQUIRED
		1	CONSTRUCTION MODE - MODIFIES START-UP SETTINGS TO ALLOW TEMPERING A BUILDING STILL UNDER CONSTRUCTION
		1	2" MERV 13 FILTERS FOR RTU1 (QTY. 4)
		1	2" MERV 8 FILTERS FOR RTU1 (QTY. 4)
		1	RTU1 DOWN DISCHARGE
		1	RTU FIXED 100% OA INTAKE CONTROL
		1	RTU1 NO RETURN - 100% OA - MPU
		1	RTU1 CURB DUCT HANGER
		1	COMMERCIAL SMOKE DETECTOR/ALARM INTERLOCK - ALARM SUPPLIED BY OTHERS
		1	5 TON MODULATING COOLING OPTION, 208/230V. R410A REFRIGERANT, VARIABLE SPEED COMPRESSOR, OL ECM CONDENSING FAN
		1	ECM FAN DOAS - 3 PHASE
		1	5 TON MODULATING REHEAT OPTION - DISCHARGE DEWPOINT CONTROL - R410A
		1	ECM WIRING PACKAGE-RTU/MUA - PWM SIGNAL FROM ECPM03 PREWIRE
		1	5 YEAR ENTIRE UNIT PARTS WARRANTY, 10 YEAR ENTIRE UNIT PARTS WARRANTY WITH REMOTE MONITORING AND CAPTIVEAIRE SERVICE CONTRACT, 25 YEAR STAINLESS STEEL FURNACE PARTS WARRANTY (SEE ADDITIONAL DETAILS)
		1	EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET

FAN ACCESSORIES

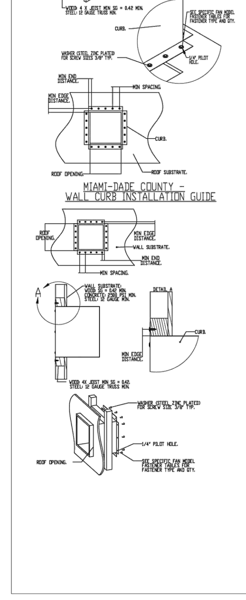
FAN UNIT NO	TAG	EXHAUST GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SUPPLY SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1	EF-1	YES						

CURB ASSEMBLIES

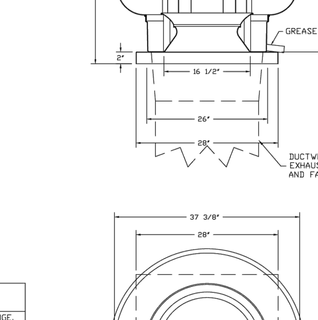
NO	ON FAN	TAG	WEIGHT	ITEM	SIZE
1	# 1	EF-1	53 LBS	CURB	26.500"W X 26.500"L X 26.000"H VENTED HINGED 16 GAUGE.
2	# 2	MPU-1	103 LBS	CURB	41.000"W X 71.000"L X 20.000"H INSULATED.

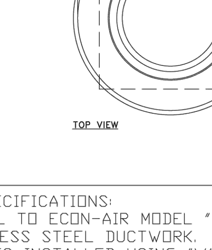
HMI SCHEDULE

UNIT NUMBER	HMI #	HMI LOCATION	TEMP AVERAGING	MODBUS ADDRESS
FAN #2	HMI #1 - UNIT	IN UNIT	NOT AVERAGED	55



FAN #1 EADU180H - EXHAUST FAN (EF-1)





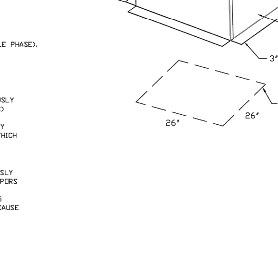
TOP VIEW

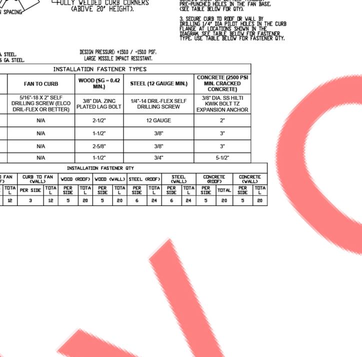
FEATURES:
- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS).
- ROOF MOUNTED FANS.
- RESTAURANT MODEL.
- UL705 AND UL762 AND ULC-S645
- VARIABLE SPEED CONTROL.
- INTERNAL WIRING.
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE).
- HIGH HEAT OPERATION 300°F (149°C).
- GREASE CLASSIFICATION TESTING.
- NEMA 3R SAFETY DISCONNECT SWITCH.

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS
- GREASE BOX.
- MIAMI DADE CERTIFICATION - NOA-1 ALUMINUM UPBLAST.
- EXHAUST FAN HEAT BAFFLE.
- 2 YEAR PARTS WARRANTY.





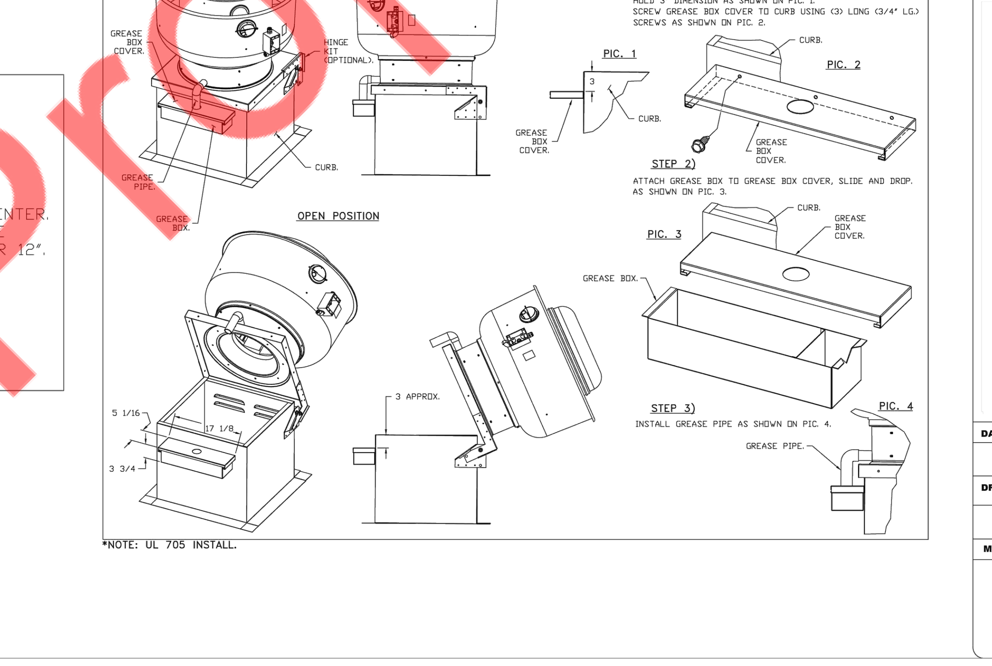
GREASE DUCT & CHIMNEY SPECIFICATIONS:
PROVIDE GREASE DUCT EQUAL TO ECON-AIR MODEL "EDW"
ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "EDW"
IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "EDW" DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER THE MANUFACTURES INSTALLATION GUIDE.
PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER. PER MANUFACTURES LISTING MODEL "EDW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12". DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE ACCUMULATION IN HORIZONTAL RUNS.

IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY EQUAL TO ECON-AIR MODEL "EDW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

CUSTOMER APPROVAL TO MANUFACTURE:

APPROVED AS NOTED ☐
APPROVED WITH NO EXCEPTION TAKEN ☐
REVISE AND RESUBMIT ☐
SIGNATURE ________
YOUR TITLE ________ DATE ________

GREASE BOX INSTALLATION



*NOTE: UL 705 INSTALL.

REVISIONS
DESCRIPTION | DATE:

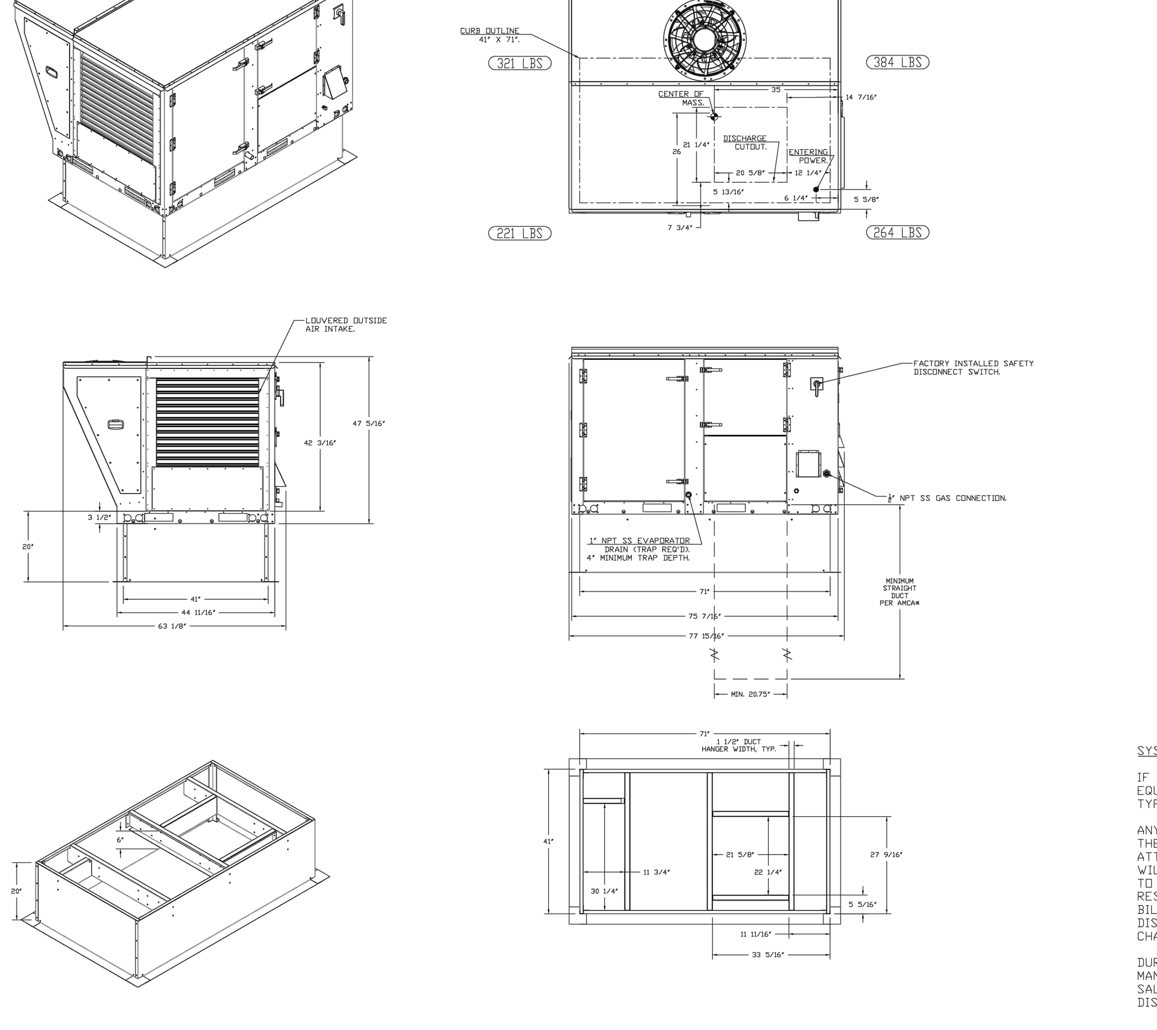
econ·air
Broward-Palm Beach Mechanical
www.econair.com
16735 92nd Lane North, Loxahatchee, FL 33470 PHONE: (305) 710 - 6110 FAX: 9197475623 EMAIL: reg64@econair.com

DATE: 10/16/2024
DWG.#: 7107012
DRAWN BY:
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 4

FAN #2 EARTU1-I.200-16Z-5T-MPU - HEATER (MPU-1)

NOTES:
1. DO NOT OBSTRUCT OUTSIDE AIR INLET, OUTSIDE AIR COIL OR OUTSIDE AIR FAN.
2. ( ) DENOTES CORNER WEIGHT.
3. ROOF OPENING MUST BE 2" SMALLER THAN CURB DIMENSIONS IN BOTH DIRECTIONS.
4. CONNECTION FROM BREAKER TO UNITS SAFETY DISCONNECT SWITCH TO BE COPPER WIRE ONLY.
5. EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET.

*NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE AS OUTLINED IN AMCA PUBLICATION 201. WHEN USING RECTANGULAR DUCTWORK, ELBOWS MUST BE RADIUS THROAT, RADIUS BACK WITH TURNING VANES. FLEXIBLE DUCTWORK AND SQUARE THROAT/SQUARE BACK ELBOWS SHOULD NOT BE USED. ANY TRANSITION AND/OR TURNS IN THE DUCTWORK WILL CAUSE SYSTEM EFFECT. SYSTEM EFFECT WILL DRASTICALLY INCREASE STATIC PRESSURE AND REDUCE AIRFLOW. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY. FAILURE TO PROPERLY SIZE DUCTWORK MAY CAUSE SYSTEM EFFECTS AND REDUCE PERFORMANCE OF THE EQUIPMENT.
SUGGESTED STRAIGHT DUCT SIZE IS 20.75" x 21.5".



SYSTEM DESIGN VERIFICATION (SDV)

IF ORDERED, CAS SERVICE WILL PERFORM A SYSTEM DESIGN VERIFICATION (SDV) ONCE ALL EQUIPMENT HAS HAD A COMPLETE START UP PER THE OPERATION AND INSTALLATION MANUAL. TYPICALLY, THE SDV WILL BE PERFORMED AFTER ALL INSPECTIONS ARE COMPLETE.

ANY FIELD RELATED DISCREPANCIES THAT ARE DISCOVERED DURING THE SDV WILL BE BROUGHT TO THE ATTENTION OF THE GENERAL CONTRACTOR AND CORRESPONDING TRADES ON SITE. THESE ISSUES WILL BE DOCUMENTED AND FORWARDED TO THE APPROPRIATE SALES OFFICE. IF CAS SERVICE HAS TO RESOLVE A DISCREPANCY THAT IS A FIELD ISSUE, THE GENERAL CONTRACTOR WILL BE NOTIFIED AND BILLED FOR THE WORK. SHOULD A RETURN TRIP BE REQUIRED DUE TO ANY FIELD RELATED DISCREPANCY THAT CANNOT BE RESOLVED DURING THE SDV, THERE WILL BE ADDITIONAL TRIP CHARGES.

DURING THE SDV, CAS SERVICE WILL ADDRESS ANY DISCREPANCY THAT IS THE FAULT OF THE MANUFACTURER. SHOULD A RETURN TRIP BE REQUIRED, THE GENERAL CONTRACTOR AND APPROPRIATE SALES OFFICE WILL BE NOTIFIED. THERE WILL BE NO ADDITIONAL CHARGES FOR MANUFACTURER DISCREPANCIES.

REVISIONS
DESCRIPTION | DATE:

econ·air
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16735 92nd Lane North, Loxahatchee, FL 33470 PHONE: (305) 710 - 6110 FAX: 9197475623 EMAIL: reg64@econair.com

DATE: 10/16/2024
DWG.#: 7107012
DRAWN BY:
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 5

Property of NY Engineers

SECTION 23 74 33

FACTORY FABRICATED PACKAGED, 100% OUTDOOR, HEATING AND COOLING MAKEUP AIR UNITS

SPECIFICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes packaged heating and cooling units capable of supplying up to 100 percent outdoor air.

1.2 SUBMITTALS

A. The manufacturer assumes no liability for the use or results of use of this document. This specification is to be reviewed by the engineer to confirm requirements of the project and building codes are met.

B. As the manufacturer continues product development, it reserves the right to change design and specifications without notice.

1.3 SEISMIC DESIGN

A. Should the project be located within a seismic zone requiring special provisions for support and restraint of equipment, components, and piping. Refer to state or local codes for Seismic, Wind, Flood Load Design for additional requirements.

1.4 WIND LOAD DESIGN

A. Refer to state or local codes for Seismic, Wind, Flood Load Design for additional requirements.

1.5 QUALITY ASSURANCE

A. All models shall be ETL listed and comply to safety standards UL 1995, the Standard for Safety for Heating and Cooling Equipment. The Engineer of Record shall take responsibility for the approval of any modifications or additions to the unit, including aftermarket UV or Ionization filtration devices. Units outfitted with indirect fired heaters shall also comply with ANSI Z83.8-2016, and CSA 2.6-2016.

B. All models shall be ETL listed and comply to safety standards CSA Std C22.2, No. 236-11.

C. Units outfitted with indirect fired heaters shall also comply with ANSI Z83.8-2016, and CSA 2.6-2016.

D. This unit has been tested in accordance to the following standards:

•ANSI/AHRI Standard 340/360
•ANSI/ASHRAE Standard 37
•AHRI Standard 270/370

1.6 WARRANTY

A. All units shall be provided with the following standard warranties:

1. 10-Year (non-prorated) parts warranty covering the entire unit when accompanied by a company provided service plan. 5-Year (non-prorated) parts warranty covering the entire unit otherwise.
2. 25-year (non-prorated) parts warranty for SS heat exchanger on indirect fired units.

B. This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the manufacturer's installation instructions shipped with the product.
2. The equipment is not installed in accordance with Federal, State, and Local codes and regulations.
3. The equipment is misused, neglected, or not maintained per the manufacturer's maintenance instructions.
4. The equipment is not operated within its published capacity.
5. The invoice is not paid within the terms of the sales agreement.

C. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 10-year period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL

A. Supply single zone one piece packaged units that are complete as per the following specification, deliver all capacities scheduled, and conform to design indicated herein. Alternate layouts or dimensional changes will not be accepted.

2.2 CABINET

A. Size 1 Unit(s) shall be constructed of minimum 24 gauge G-90 galvanized steel riveted together via structural pop-rivets. All metal shall be CNC bent for precise assembly.

1. Rigging Provisions: Size 1 unit(s) shall have a structural base constructed of minimum 10 gauge G-90 galvanized steel. Include full-sized fork pockets and lifting points on all four sides.
2. Roof Construction: The lids shall be fabricated by forming a double-standing, self-locking seam that requires no additional support. Roof shall be pitched to allow for proper drainage.
3. Exterior Wall Construction: All exterior walls shall consist of a double wall, G-90 galvanized steel construction. Cabinet size 1 shall be insulated with 1in. thick, R4.3 Fiber glass duct board insulation.
4. Service Access Doors: All door jambs shall be gasketed around their perimeter, and allow for doors to be mounted via removable, spring actuated, stainless steel hinges with stainless steel rivets, and self-compressing latches. Each compartment shall have removable access panels to allow for ease of service and maintainability. Electrical cabinet access doors shall have a door hold installed to prop doors open. All doors shall have stainless steel latches with pad lockable. Electrical cabinet doors shall be outfitted with schematic/manual pouches formed into the door, along with wiring diagram attached to the indoor of the door from the factory.

B. Entire interior and exterior casing shall be constructed of minimum G90 galvanized steel. The unit casing will not be painted. Unit shall meet a 1000-hour salt spray corrosion test as per ASTM B 117.

2.3 AIRFLOW CONFIGURATIONS

A. Discharge: Unit shall be configurable for Down (Vertical) Discharge through the unit's base.

B. Fan #2: Return: Unit shall be configurable for Down (Vertical) Return through the unit's base.

C. Return: Unit shall be configurable for No Return.

D. Unit intake airflow configuration shall be through use of a fresh/outdoor and return air damper.

1. Damper: Shall exceed AMCA Class 1A standard for low leakage. Damper assembly shall be a single assembly, and outfitted with an integral bird screen. Louver/gutter system used to divert any drainage through the unit's base -intake air hood not required.
2. Actuator: A single direct drive damper actuator shall be used with spring return to ensure that the outdoor air section closes when not powered.

2.4 SUPPLY AIR BLOWER AND MOTOR

A. All supply fans shall be direct drive (belt-drive not acceptable) variable speed plenum fans.

B. Blower Motor: Motor shall be a premium efficiency motor available as:

1. Fan #2: Electronically Commutated Motor (ECM).

C. Fans to be selected at or near efficiency peak. (Submit fan curves)

D. Blower and motor assembly shall be dynamically balanced. The entire blower and motor assembly shall be mounted on rubber vibration isolators. Wheels balanced as per AMCA 204-96, Balance Quality and Vibration Levels for Fans.

E. Unit equipped with total CFM monitoring to measure airflow across supply discharge.

2.5 REFRIGERATION SYSTEM Fan #2:

A. Unit shall utilize a variable speed inverter duty scroll compressor with the following features:

Fan #2: 15%-100% on 5, 6, 7.5, 8, 10, & 12.5 Ton units

1. Refrigerant: Unit shall be factory charged with R410A refrigerant.
2. Vibration Isolation: Compressor as well as blower assembly shall each be mounted on rubber vibration isolators to reduce transmission of vibration to the building structure.
3. Internal Overload Protection: Compressor shall include internal thermal overload production to protect against excessive motor temperatures.
4. Crankcase Heater: Compressor shall include a crankcase heater to protect against liquid flood-back and elimination of oil foaming on startup. The crankcase heater must remain powered when the compressor is not in operation.
5. Oil Management: Unit shall utilize both passive and active oil return management using Oil Level Sensor and scheduled oil boosts.
6. Monitored Envelope: Unit shall monitor all critical refrigeration points to ensure compressor does not operate outside of safe operating envelope.
7. Throttling Logic: Unit shall allow for high head pressure monitoring throttle mode for high ambient operation, and low suction pressure throttle mode for low capacity operation or any conditions resulting in low suction pressure.
8. Pump-Down: Active pump-down mode with discharge line check valve to protect against liquid migration into compressor during idle times.

B. The unit shall be outfitted with the following:

1. Indoor Coil: Indoor coil shall be a high efficiency 4 row coil design with aluminum fins mechanically bonded to copper tubes. Coil is staggered to increase turbulence, reduce the coil bypass factor, and ultimately increase the time the air stays within the coil. Includes two probe sensors to read average coil face temperature.
2. Electronic Expansion Valve: Each refrigeration circuit will be outfitted with an electronic expansion valve metering device which can be throttled from 0-100% open to allow for precise superheat control.
3. Indoor Coil Drain Pan: The indoor coil shall be outfitted with a sloped stainless steel drain pan. This pan shall be insulated along the entire base to prevent condensation, and outfitted with a safety overflow switch which will automatically shut down cooling operation prior to water overflowing the drain pan in the event of a drain clog. The entire drain pan shall be 20 GA Stainless Steel construction and wrap beneath the entire coil with flashing on entering side of coil to ensure capture of all condensate. Drain pan discharge shall also be stainless steel construction. Drain pan shall be designed to exceed ASHRAE 62.1 standard.
4. Base of the condensing coil cabinet shall be pitched away from the unit as a safety to ensure all draining exits away from the curb.
5. Optional Hot Gas Reheat Coil: The unit shall include an optional copper tube and aluminum fin hot gas reheat coil mounted downstream of the indoor coil. This coil shall be controlled via fully modulating hot gas reheat valve to provide precise reheat temperature control. This coil shall include the addition of an evaporative coil leaving condition sensor to maintain a coil dew point. This also prevents operation of a dehumidification coil when intake dew point conditions are found to be below space dew point conditions, preventing wasted energy.
6. Outdoor (Condenser) Coil: Outdoor coil shall be a high efficiency coil design with aluminum fins mechanically bonded to copper tubes. The coil shall be downward sloped to protect coil from hail damage.
7. Outdoor Fans: The outdoor coil shall have a vertical discharge outfitted with quiet, efficient, fully modulating Electronically Commutated Motor (ECM) condensing fans. These fans shall modulate to maintain a temperature differential between outside air and the outdoor coil.

C. To help mitigate any long-term potential for leaks or hardware failures, the unit shall be outfitted with the following protection measures:

1. Suction line accumulator for added protection against liquid entering suction line of compressor.
2. Bi-flow, low pressure drop, filter drier.
3. Electronic Expansion Valve (EEV) for precise superheat control. EEV shall open partially allowing system pressure equalization prior to activation of the compressor.
4. Protective rubber sleeves installed on all distribution lines of indoor coil to prevent wear from rubbing.
5. All refrigeration ports shall be short-stub assembly and any access port with a transducer or switch is mounted vertically to mitigate risk of bent/cracked stub joints.
6. Refrigeration circuit shall be mechanically CNC pre-bent tubing wherever possible with minimal brazed joints to minimize points for potential refrigeration leaks.
7. Factory tested for leaks via high pressure nitrogen decay and helium tracer gas testing.
8. Suction line temperature sensor failure detection.
9. Preventative failure alerts through a manufacturer provided, cloud based, cellular remote monitoring system.

2.6 HEATING SYSTEM

A. The gas burner shall be an indirect-fired, push-through type, using natural gas or liquid propane gas. The inlet-supply pressure to the unit for natural gas must be 7"w.c. minimum. For liquid propane gas, the minimum inlet supply pressure to the unit must be 11" w.c.

B. Burner shall be a tubular in-shot fired design capable of using natural or LP type gas. Each burner ignition shall be of the direct-spark design with remote flame sensing at inlet of the last firing tube of the gas manifold.

C. Direct-sparking sequence shall last through the complete duration of the trial for ignition period for guaranteed light-off. Burner shall always be lit at maximum gas flow and combustion airflow for guaranteed light-off. Each burner ignition module shall have LED indicators for troubleshooting and a set of exposed prongs for testing flame indication signal.

D. All furnaces shall be controlled by an electronic Vernier-type fully modulating control system capable of achieving 80% combustion efficiency over the entire gas firing range of the unit.

E. Each furnace shall have:

1. A minimum turndown ratio of 6:1 for natural gas and 5:1 for LP gas while maintaining a constant 80% efficiency (90% for high efficiency furnace option). No cold air bypass of the heat exchanger.
2. Each furnace heat exchanger shall be a bent-tube style design made entirely of stainless steel.
3. Stainless steel Quick Seal Connection for gas connection.
4. Manifold and Input gas pressure gauges.
5. Factory piped condensate drain to exterior of cabinet.
6. A combustion flue to be installed on adjacent side as combustion intake with integrated high velocity wind cap.
7. A blocked vent safety airflow switch with high temperature silicone tubing operating off of absolute pressure measured inside of the power-vent blower housing.
8. A high temperature auto-recycling limit with a maximum non-adjustable set point.
9. A manual reset high temperature flame rollout switch with a non-adjustable set point.
10. Each furnace compartment shall have a removable post and panel that allows the furnace to be easily removed for service and maintainability.
11. A power-vent assembly for exhausting flue gases with a PSC or ECM type motor that is securely mounted and easily accessible/removable for service.
12. A 0-10"w.c. gas pressure gauge installed on the gas manifold.

2.7 FILTERS

A. Provide filters as part of unit. All filters shall be furnished and installed to meet the performance requirements set forth in the schedule and as specified under another section of this work.

B. All filters shall be installed on tracks for easy removal from the unit.

C. Up to 3 layers of outdoor air filtration installed. Unit shall ship with a 2"washable metal mesh outdoor air filter. Mixed air shall have optional 2"MERV-8 filters. Mixed air shall have optional 2"MERV-13 filters.

2.8 ELECTRICAL

A. All controls shall be pre-wired and housed in an insulated electrical cabinet within the unit to protect against risk of condensation.

B. Fan #2: Units shall be provided with single point electrical connection.

C. Unit shall be provided with a door safety switch that de-energizes the supply fan when the door is opened.

D. Unit shall be provided with a factory mounted averaging supply air temperature sensor to allow for accurate discharge temperature readings within unit when a downstream sensor is not installed. Field mounted and wired discharge air sensors will not be accepted.

E. Unit shall be provided with a factory mounted averaging intake air temperature sensor to allow for accurate intake temperature reading regardless of how the OA/RA dampers are positioned.

F. The electrical cabinet shall be outfitted with the following:

1. Disconnect for power to fully de-energize the electrical cabinet.
2. LED electrical cabinet service light with automatic activation upon door switch.
3. Color wiring schematics, laminated to the interior wall of the cabinet doors.
4. Factory mounted disconnect with unit button knockouts.
5. A LED backlit, LCD Human-Machine Interface (HMI) shall be mounted within the unit's control cabinet to allow for all set points configuration and refrigeration system monitoring at the unit.

G. All sensors shall be wired back to the main control board that continuously monitors all critical components and makes decisions based on pre-determined logic to accurately control the following:

1. PID logic to control heater modulation ensuring precise discharge/space temperature control.
2. PID logic to control compressor speed to provide precise control over evaporative coil temperatures, leaving dew point, and discharge/space temperatures.
3. PID logic for Outdoor fan modulation to maintain an optimal outdoor coil temperature.
4. PID logic for Electronic Expansion Valve (EEV) position to maintain a precise superheat temperature.
5. PID logic for Modulating Reheat valve to limit supply air temperature and relative humidity based off of space or discharge conditions.

2.9 CONTROLS

A. Unit shall be outfitted with a control board to allow for full control of the entire unit.

B. Provide air flow switch on the supply fan system to sense air flow with available set of contacts for connection to BMS for airflow alerts.

C. All unit controls shall be compatible with BACnet and LonWorks based building management systems.

D. All units shall be outfitted with CASLink cloud based monitoring, which monitors every point of operation. Provides configurable automated fault alert e-mails, and remote control capabilities.

E. Integrated cellular module to provide remote connection to monitoring services to view both real time and historical unit operation. Data shall be stored a minimum of 3 years on the cloud. Data sample rate shall be a maximum of 60 seconds.

F. Temperature Control System

1. Discharge Temp Control (Heating)
Unit modulates the burner flame (current supply in the case of electric heating) to accurately maintain the desired discharge temperature set point and compensate for fluctuations in entering air temperature, air volume and % of OA using heating PID controls designed specifically for the Paragon.
2. Discharge Temp Control (Cooling)
Unit modulates the compressor frequency to accurately maintain the desired discharge temperature set point and compensate for fluctuations in entering air temperature, air volume and % of OA using proprietary cooling PID controls designed specifically for the Paragon.
3. Discharge Humidity Control (Dehumidification)
Fan #2: Unit modulates the compressor frequency to accurately maintain a desired evaporative coil dew point measured via a coil mounted temperature sensor between the evaporative and hot gas reheat coils. A fully modulating hot gas reheat valve shall utilize excess waste heat from the condensing section feeding the hot gas reheat coil with the precise amount of heat needed to accurately reheat the airstream to maintain a desired discharge temperature and compensate for fluctuations in entering air temperature, air volume and % of OA using proprietary dehumidification PID controls designed specifically for the Paragon.

G. Activation Controls (For Paragon Units)

1. Activate Based on Intake (Heating)
Unit will activate heating when the intake temperature drops below the desired set point.
2. Activate Based on Intake (Cooling)
Fan #2: Unit will activate cooling when the intake temperature rises above the desired set point.
3. Activate Based on Intake (Dehumidification) Fan #2:
Unit will activate dehumidification when the intake conditions rise above the desired intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
4. Activate Based on Space (Heating)
Unit will activate heating when the space temperature drops below the desired set point.
5. Activate Based on Space (Cooling)
Fan #2: Unit will activate cooling when the space temperature rises above the desired set point.
6. Activate Based on Space (Dehumidification) Fan #2:
Unit will activate dehumidification when the space set point rises above the desired space set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
7. Activate Based on Both (Heating)
Unit will activate heating when the space AND intake temperature drop below the desired set point.
8. Activate Based on Both (Cooling)
Fan #2: Unit will activate cooling when the space AND intake temperature rise above the desired set point.
9. Activate Based on Both (Dehumidification)
Fan #2: Unit will activate dehumidification when the space and intake set point rise above the desired space and intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
10. Activate Based on Either (Heating)
Unit will activate heating when the space OR intake temperature drops below the desired set point.
11. Activate Based on Either (Cooling)
Fan #2: Unit will activate cooling when the space OR intake temperature rises above the desired set point.
12. Activate Based on Either (Dehumidification)
Fan #2: Unit will activate dehumidification when the space or intake set point rises above the desired space or intake set point, with activation set points configured to a Dew Point, Relative Humidity or a combination of Dew Point/Relative Humidity.
13. Activate Based on Stat (Heating)
Unit will activate heating when the space thermostat sends a 24V signal to W and G on the main control board. Unit will modulate to maintain a constant discharge heat set point.
14. Activate Based on Stat (Cooling)
Fan #2: Unit will activate cooling when the space thermostat sends a 24V signal to Y and G on the main control board. Unit will modulate to maintain a constant discharge cool set point.

2.10 ROOF CURB

A. Unit shall be factory assembled, and constructed of 18GA galvanized steel, with optional 16GA available.

B. Curb shall be fully insulated with 1"acoustical and thermal insulation.

C. Curb shall be factory outfitted with duct support hangers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which packaged units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual and all applicable building codes.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. Install piping to allow service and maintenance.

B. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts.

C. Electrical: Conform to applicable requirements in Division 26 Sections.

3.4 SYSTEM START-UP

A. System start-up is performed by a factory trained Service Technician.

END OF SECTION 23 74 33

SECTION 23 34 23

POWER VENTILATORS

TAG: Centrifugal Upblast

PART 1 - GENERAL

1.1 SUMMARY

A. Fan shall be a spun aluminum, G90 Galvanized, roof or wall-mounted, direct drive, upblast centrifugal exhaust ventilator.

1.2 SUBMITTALS

A. The manufacturer assumes no liability for the use or results of use of this document. This specification is to be reviewed by the engineer to confirm requirements of the project and building codes are met.

B. As the manufacturer continues product development, it reserves the right to change the design and specifications without notice.

1.3 QUALITY ASSURANCE

A. ETL Listed and complies with UL705 (electrical) Standards and CSA Std C22.2, No 113.

B. Fan shall bear the AMCA certified rating seal for air performance.

C. Wheels shall be balanced in two planes and done in accordance with AMCA standard 204-96, Balance Quality and Vibration Levels for Fans.

D. Fan #1: Miami-Dade Certification -NOA 1 Aluminum Downblast.

1.4 WARRANTY

A. All units are provided with the following 2-year standard warranty from date of shipment.

B. This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the manufacturer's installation instructions shipped with the product.
2. The equipment is not installed in accordance with Federal, State, and Local codes and regulations.
3. The equipment is misused, neglected, or not maintained per the manufacturer's maintenance instructions.
4. The equipment is not operated within its published capacity.
5. The invoice is not paid within the terms of the sales agreement.

C. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL ASSEMBLY

A. The fan shall be factory assembled, tested, and shipped as a complete unit.

B. The following specifications, delivering all capacities scheduled and conforming to the design indicated herein. Alternate layouts or dimensional changes will not be accepted.

2.2 CONSTRUCTION

A. The fan wind band shall be constructed of heavy gauge aluminum or G90 Galvanized and shall be spun on an automatic lathe to provide consistent dimensions.

B. Horizontal and vertical internal supports shall be used to fasten the wind band to the discharge apron securely. This provides rigidity for hinging and shields against damage.

C. The discharge apron shall have a rolled bead for added strength.

D. Base corners shall be welded to provide strength and support for hinging and cleaning and prevent leakage into the building.

E. The fan shall bear a permanently attached nameplate displaying model and serial number of unit for future identification.

F. Nylon washers provide a tight seal. All fasteners in the fan housing shall be backed with nylon washers.

G. The unit shall be factory tested after assembly.

2.3 CURB

A. The curb shall be constructed of galvanized steel.

B. The heavy duty G90 galvanized curb cap shall have fully welded corners for added strength and leak protection.

C. Fan #1 has curb options:

1. Hinged Base: Attached
2. Vented
3. Full Bottom Corners
4. 16-gauge

2.4 WHEEL

A. The fan wheel shall be centrifugal backward inclined and non-overloading.

B. The wheel blades shall be aerodynamically designed to minimize turbulence, increase efficiency and reduce noise.

C. The wheel blades shall be welded to the wheel inlet cone.

D. If balancing weights are required, they shall be riveted to the blades or wheel.

E. The wheel inlet shall overlap the fan base inlet for maximum performance and efficiency.

F. The wheel shall be firmly attached to the motor shaft with two set screws.

2.5 MOTOR

A. Fan(s) Fan #1: Totally Enclosed Fan Cooled (TEFC) motor driven by a Variable Frequency Drive.

B. Motor shall be permanently lubricated and rated for continuous duty.

C. Furnished at the specified voltage, phase, and enclosure. Motor speed shall be variable, controlled using an integrated speed controller.

D. Motors shall be mounted out of the airstream and furnished at the specified voltage, phase, and enclosure.

E. Motor mounting plate shall be constructed of heavy gauge galvanized steel.

F. The motor compartment shall be cooled by outside air drawn through an extruded aluminum conduit tube.

G. An integral electrical conduit running from the fan base to the motor compartment is provided for ease of installation.

H. The conduit tube passage shall be sealed to prevent noise. Silicone rubber grommets shall be used in the fan housing.

I. The motor compartment shall be a two-piece construction. The cap has quick-release clips to provide fast and easy access to the motor compartment.

2.6 GREASE

A. The grease spout shall be made of aluminum tubing, welded to the fan housing. The weld shall be factory tested to ensure no leaks.

B. Grease Box.

2.7 OPTIONS AND ACCESSORIES

A. Fan #1 has fan options:

1. Grease Box.
2. Miami Dade Certification - NOA-1 Aluminum Upblast.
3. Exhaust Fan Heat Baffle.

2.8 CONNECTIONS

A. Electrical connections conform to applicable requirements in Division 26 Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all areas and conditions under which package(s) are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. Install the package in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

3.3 CONNECTIONS

A. Electrical connections conform to applicable requirements in Division 26 Sections.

3.4 SYSTEM START-UP

A. System start-up is performed by a factory-trained Service Technician.

SECTION 23 09 23

SPECIFICATIONS

TAG: CASLink Building Management System, SCADA

PART 1- GENERAL

1.1 SUMMARY

A. Building Management System (BMS), utilizing Direct Digital Controls (DDC).

1.2 DESCRIPTION

A. CASLink is a cloud-based Building Management System that can be used to monitor, control and optimize the operation of kitchen ventilation, lighting, utilities and HVAC equipment. It gathers sensor data, component operating data, alarms, user and factory settings information periodically.

B. Information is displayed in a user-friendly interface hosted on the CASLink website, which is accessible through a secure login to owners and operators using an Internet enabled device.

C. Email alerts based on sensor data and system alarms, both prescriptive and custom, can be set up on demand.

1.3 SUBMITTALS

A. The manufacturer assumes no liability for the use or results of use from this document. Specifications are to be reviewed by the engineer to confirm requirements of the project and meet Federal, State, and Local codes.

B. As the manufacturer continues product development, it reserves the right to change the design and specifications without notice.

1.4 WARRANTY

A. All units shall be provided with the following standard warranties:

1. System is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2-years from date of shipment.

B. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

C. Refer to Manufacturer's Operation, Installation, and Maintenance (OIM) Manual for detailed descriptions of what is/is not covered and contact information for warranty claims.

PART 2- PRODUCTS

2.1 GENERAL

A. CASLink is implemented by a SCADA module installed in an electrical control panel or in an electrical cabinet. The SCADA module serves as a gateway to communicate locally gathered data from CASLink-enabled controllers to CASLink's servers. Data is transmitted via a factory installed cellular device, which is integral to the SCADA module.

2.2 COMPONENTS

A. System Integration (Products Not Furnished or Installed)

1. Kitchen Hood Demand Control Ventilation Systems
2. Kitchen Hood Smart Control Systems
3. Paragon Dedicated Outdoor Air System
4. Direct Fired MUA Controls
5. Indirect Fired MUA Controls
6. RTULink Cloud-Based Thermostat
7. CORE Fire Protection
8. TANK Fire Protection
9. High Volume Low Speed (HVLS) Fans
10. Lighting Control Panel
11. Hood Self-Cleaning Remote Manifold

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which the system is installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 APPLICATION

A. CASLink monitors relevant sensor and system data at adequate data rates which allows users and support teams to assess performance and diagnose alarms remotely. Gathered data is displayed and organized in a user-friendly interface which can be accessed by customers and manufacturer engineering support teams.

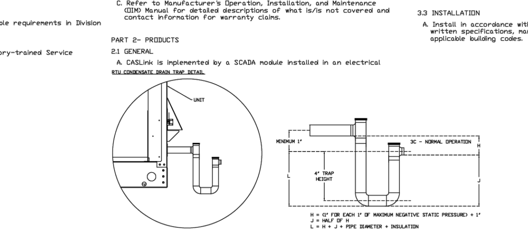
B. CASLink's website requires login credentials. These can be created for owners and operators as needed. Two-factor authentication is required for enhanced security.

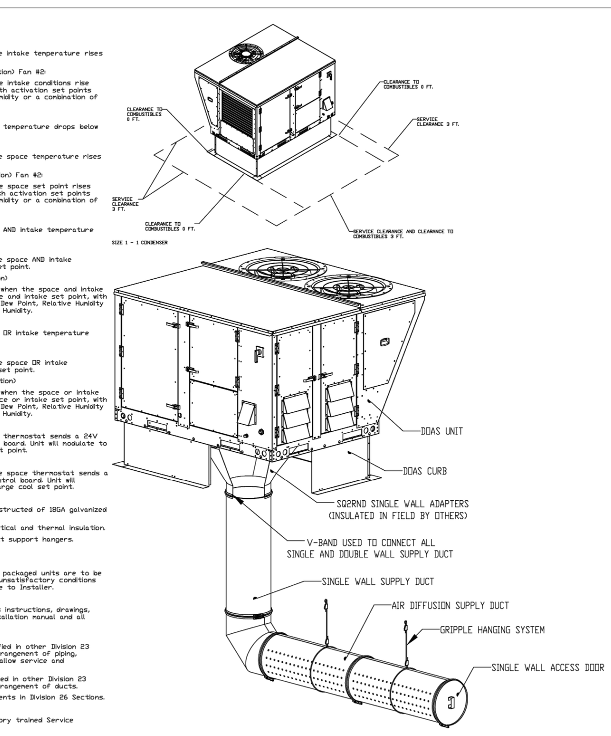
C. CASLink's interface allows for adjustments of critical system settings such that performance can be optimized remotely using historical data. CASLink processes historical data to create dashboards that include real time operation history, analytics and insights derived from proprietary machine learning algorithms.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

RTU CONDENSATE DRAIN TRAP DETAIL





AIR DIFFUSION SUPPLY DUCT SPECIFICATIONS:
PROVIDE AIR DIFFUSION SUPPLY DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL DW-S0(HC), DW-S90(HC), & DW-S180(HC).
THREE DISTINCT HOLE PATTERN OPTIONS TO COVER A VARIETY OF CEILING HEIGHTS.
NO ADDITIONAL DIFFUSERS REQUIRED, AS THE DUCT ITSELF PROVIDES AIR DIFFUSION.
MADE OF HIGH QUALITY STAINLESS STEEL DESIGNED TO LAST 20+ YEARS.
HIGH INDUCTION SUPPLY DUCT IS CONSTRUCTED USING 24 GAUGE, 430 SS - 5" THRU 24".
HIGH INDUCTION SUPPLY DUCT IS CONSTRUCTED USING 20 GAUGE, 430 SS - 26" THRU 36".
QUICK ONSITE ASSEMBLY USING EPDM GASKETS & UNIVERSAL V-BANDS.
DOUBLE WALL SUPPLY DUCT AVAILABLE FOR INTERIOR AND EXTERIOR SPACES, EITHER CONDITIONED OR UNCONDITIONED.
DOUBLE WALL SUPPLY DUCT AVAILABLE IN DW-1S, DW-2S, & DW-3S TO MEET SPECIFIC REGIONAL "R" VALUE REQUIREMENTS.

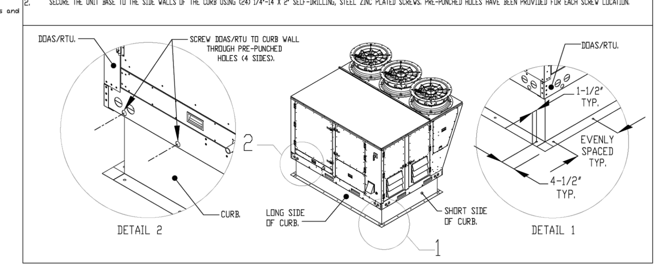
Insulation R-Value Recommendations

Supply Duct Type	Minimum R-value	Space Type
Single Wall - S & -HC	N/A	Conditioned Space Only
Double Wall - 1S	R-4	Unconditioned Interior Space Only
Double Wall - 2S	R-8	Unconditioned Space Climate Zones 1-4
Double Wall - 3S	R-12	Unconditioned Space Climate Zones 5-8

DOUBLE WALL SUPPLY DUCT IS INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.
AIR DIFFUSION SUPPLY DUCT COMPLIES WITH SMACNA (SHEET METAL AND AIR CONDITIONING CONTRACTORS) BEST PRACTICES.
POSITIONING OF SPRINKLERS TO AVOID OBSTRUCTION TO DISCHARGE, SEE NFPA 13, TABLE 8.12.5.1.1.

TYPICAL DOAS/RTU ROOF MOUNTING INSTALLATION INSTRUCTIONS

1. SECURE THE CURB TO THE ROOF FRAMING MEMBERS BY DRILLING 1/4" PILOT HOLES IN THE CURB FLANGES AT LOCATIONS SHOWN IN THE DIAGRAM BELOW. USING 3/8" X 2" ZINC PLATED STEEL LAG BOLTS, AND ZINC PLATED WASHERS, SCREW THROUGH THE CURB FLANGES AND INTO THE ROOF FRAMING MEMBERS. A MINIMUM OF (5) LAG BOLTS ON EACH SHORT SIDE, AND (7) LAG BOLTS ON EACH LONG SIDE IS REQUIRED.
2. SECURE THE UNIT BASE TO THE SIDE WALLS OF THE CURB USING (24) 1/4"-14 X 2" SELF-DRILLING, STEEL ZINC PLATED SCREWS. PRE-PUNCHED HOLES HAVE BEEN PROVIDED FOR EACH SCREW LOCATION.



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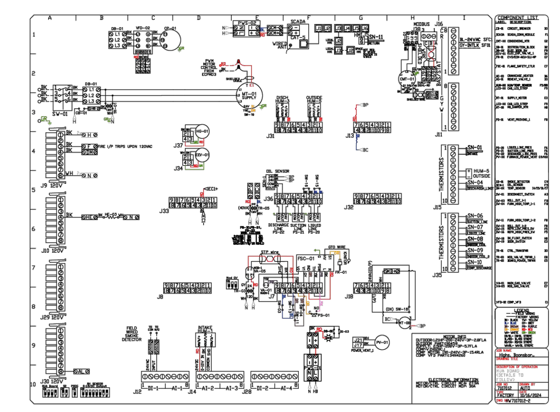
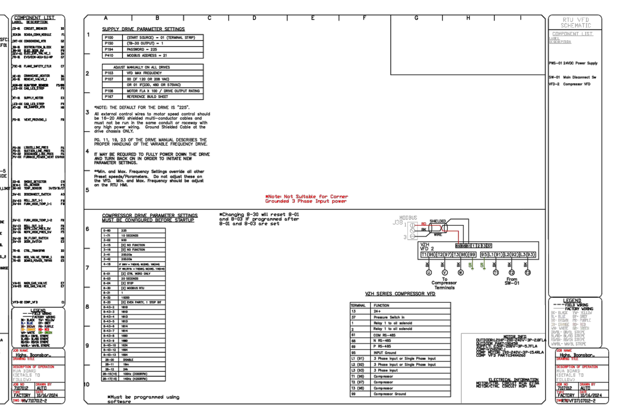
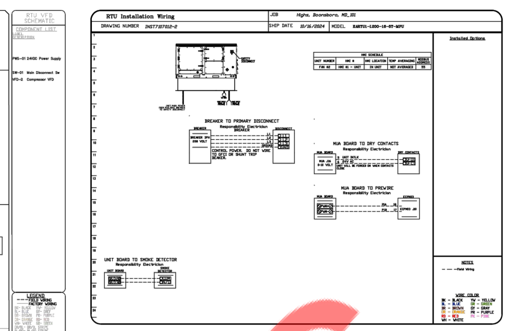

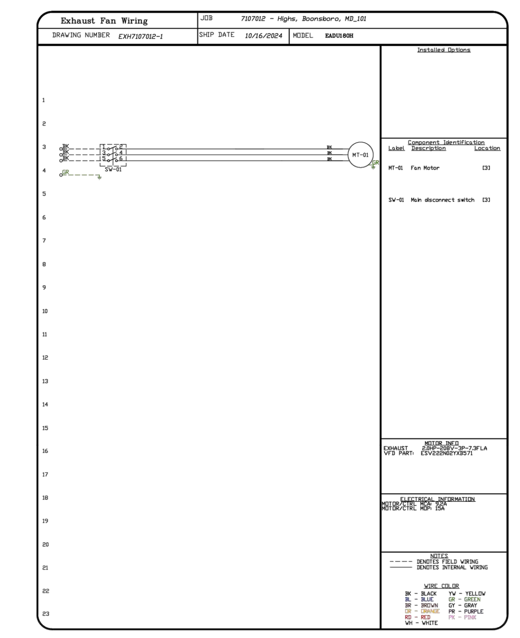

SECTION 26 27 16

SPECIFICATIONS

TAG: Electrical Cabinets and Enclosures

PART 1 - GENERAL

1.1 SUMMARY

A. ECP #1:

1. Control Package: Demand Control Ventilation (DCV).
2. The system is designed to control, activate, and operate 1st Voltage: 1 Exhaust Fans, 1 Supply Fans, CORE System(s)Fire System #1 TANK FS - 4.0/4.0 (FS-1), and wash system dependent on the HMI settings and temperature sensors.
3. Zone Configuration: Fan Zones: 1, Light Zones: 1

1.2 SUBMITTALS

A. The manufacturer assumes no liability for the use or results of use from this document. Specifications are to be reviewed by the engineer to confirm the project's requirements and meet Federal, State, and Local codes and regulations.

B. As the manufacturer continues product development, it reserves the right to change design and specifications without notice.

C. The manufacturer shall supply complete computer generated submittal drawings, including hood section view(s) and hood plan view(s). These drawings must be available to the engineer, architect, and owner for their use in construction, operation, and maintenance.

1.3 QUALITY ASSURANCE

A. Control package shall be listed by ETL and complies with UL508A Standard and CAN/CSA C22.2, No. 14-05 Standards.

B. ECPM03 Circuit Board shall be listed by ETL and complies with UL 61010-1 Standard and CAN/CSA C22.2, No. 61010-1 Standards.

1.4 WARRANTY

A. All units shall be provided with the following standard warranty:

1. This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2-years from date of shipment.

B. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization, and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

C. Refer to Manufacturer's Operation, Installation, and Maintenance (OIM) Manual for detailed descriptions of what is and is not covered, and contact information for warranty claims.

PART 2 - PRODUCTS

2.1 GENERAL

A. The system includes an LCD screen interface for fan(s) and hood lights control, wash control (if applicable), gas valve reset, programmable schedule, Max Air Override function, Preparation Time mode, Cool Down mode, and diagnostics including VFD status.

B. The LCD screen shows descriptive plain text explaining the functions or values. The LCD screen interface will be installed on the face of the hood, on the face of the utility cabinet, or on the face of a wall mounted control enclosure.

2.2 CONSTRUCTION

A. Control enclosure will be NEMA 1 rated and listed for installation inside of the exhaust hood utility cabinet. Control enclosure may be constructed of stainless steel or painted steel.

2.3 FAN CONNECTIONS

A. ECP #1: 1st Voltage: 1 Exhaust Fans, 1 Supply Fans.

2.4 SWITCHES

A. Switches to be included with the packages ECP #1:

1. Light Switches: 1
2. Fan Switches: 1

2.5 ZONE CONFIGURATION

A. Zone Configuration to be included with the packages ECP #1:

1. Number of Fan Zones: 1
2. Number of Light Zones: 1

2.6 ZONE SCHEDULING

A. Zone Scheduling ECP #1: Zone Scheduling Enabled

2.7 ZONE OPTIONS

A. ECP #1 Fan Zone 1:

1. Modulation Activation Offset: 15
2. Preparation Activation Offset: 10
3. External Interlock.
4. ID 1 Max Air Enable.

2.8 LOCATION

A. ECP #1:

1. ECP: Utility Cabinet Left
2. Switches: Utility Cabinet Left

2.9 BUILDING MANAGEMENT SYSTEM

A. ECP #1: CASLink Cellular.

2.10 HOOD COVERAGE

A. ECP #1 will cover: Hood #1 6024EX-2-PSP-F (HD-1)

B. ECP #1 Smart Control coverage for installed Fire System control board: Fire System #1 TANK FS - 4.0/4.0 (FS-1)

2.11 FAN AND MOTOR COVERAGE

A. ECP #1:

1. 1st Voltage Exhaust - Fan #1
2. 2.00HP * 3Ph * 208V * 60Hz * 7.3 FLA * TEFC, Premium * GP0026
3. Hood #1 6024EX-2-PSP-F (HD-1)
4. 208 Single Phase Input
5. 1st Voltage Supply - Fan #2
6. 2.50HP * 3Ph * 208V * 60Hz * 5.7 FLA * ODP-ECM * 186728/A01-ECM-60-240-16
7. Hood #1 6024EX-2-PSP-F (HD-1)
8. 208 Single Phase Input

2.12 OPTIONS

A. ECP #1 has options:

1. 120V Elec. Gas Valve Coverage.
2. Relay On/Off with Exhaust.
3. Zone Scheduling.
4. External Interlock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which the system is installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

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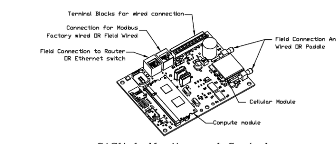
ELECTRICAL PACKAGE - JOB#7107012

NO	TAG	PACKAGE #	LOCATION	SWITCHES: LOCATION	SWITCHES: QUANTITY	OPTION	FANS CONTROLLED: FAN TAG	TYPE	ϕ	HP	VOLT	FLA
1	ECP-1	DCV-1111	UTILITY CABINET LEFT	UTILITY CABINET LEFT	1 LIGHT	SMART CONTROLS DCV	EF-1	EXHAUST	3	2.000	208	7.3
				HOOD # 1	1 FAN		MPU-1	SUPPLY	3	2.500	208	5.7



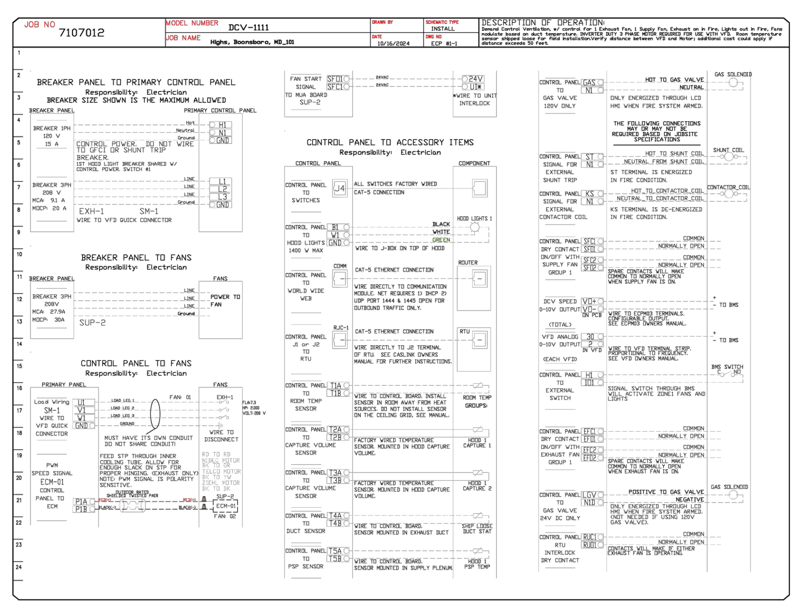
CASlink Monitor and Control

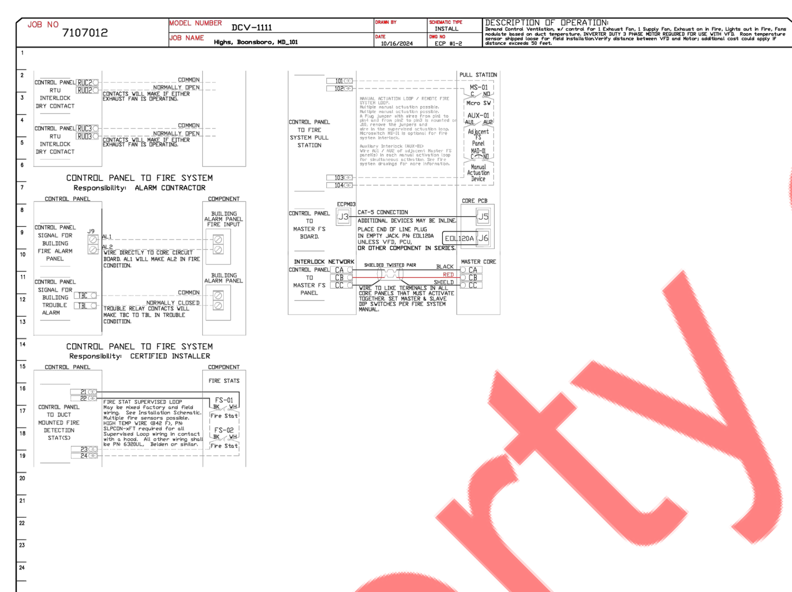
— Hood control panel to support communications to cloud-based Building Management System.
— Hood Control Panel to allow cloud-based Building Management System to monitor real time parameters outlined as MONITOR in the points list.
— Hood Control Panel to allow cloud-based Building Management System to control parameters outlined as CONTROL in the points list.
— Hood Control Panel to allow cloud-based Building Management System to implement SYSTEM ECONOMIZER control strategies for fully integrated Building Management.

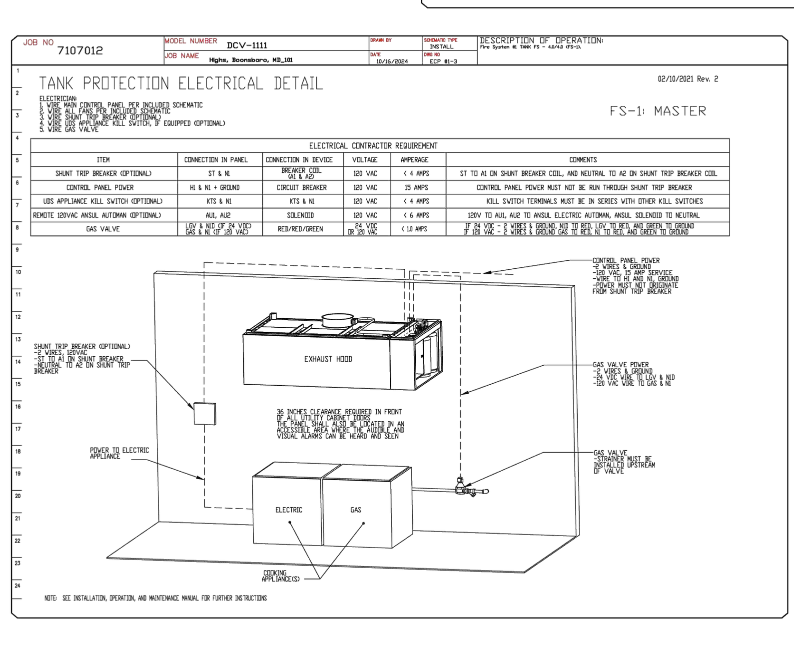
MONITORING AND CONTROL POINTS LIST

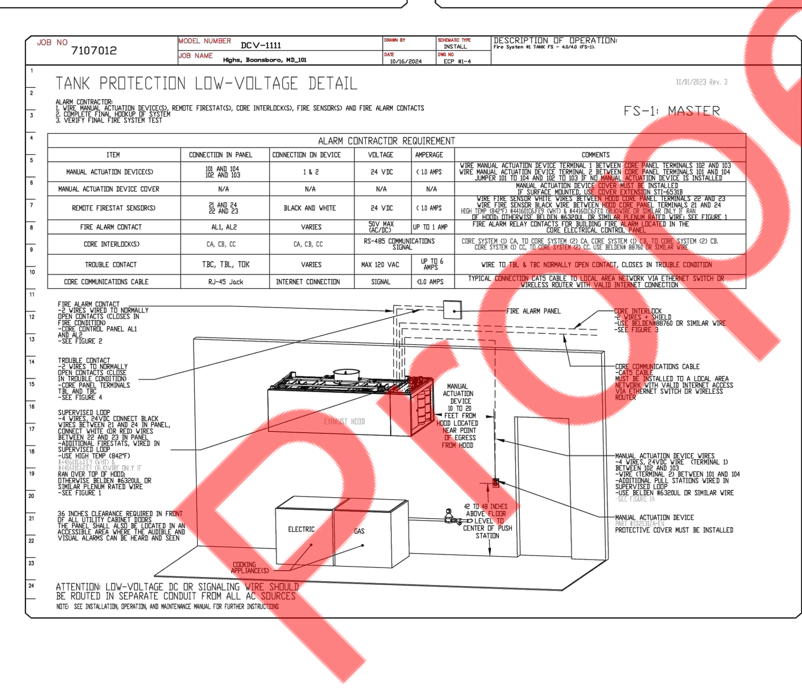
DCV Packages	Function
Room Temperature	MONITOR
Duct Temperature(s)	MONITOR
MUA Discharge Temperature	MONITOR
Kitchen RTU Discharge Temperature	MONITOR
Fan Speed	MONITOR
Fan Amperage	MONITOR
Fan Power	MONITOR
VFD Faults	MONITOR
Controller Faults	MONITOR
Fan Faults	MONITOR
Fan Status	MONITOR
PCU Faults	MONITOR
PCU Filter Clog Percentages	MONITOR
Fire Condition	MONITOR
CORE Fire System	MONITOR
Building Pressures	MONITOR
Prep Time Button	MONITOR & CONTROL
Fans Button	MONITOR & CONTROL
Lights Button	MONITOR & CONTROL
Wash Button	MONITOR & CONTROL

SC Packages	Function
Room Temperature(s)	MONITOR
Duct Temperature(s)	MONITOR
MUA Discharge Temperature	MONITOR
Kitchen RTU Discharge Temperature	MONITOR
Controller Faults	MONITOR
Fan Faults	MONITOR
Fan Status	MONITOR
PCU Faults	MONITOR
PCU Filter Clog Percentages	MONITOR
Fire Condition	MONITOR
CORE Fire System	MONITOR
Building Pressures	MONITOR
Fans Button(s)	MONITOR & CONTROL
Lights Button(s)	MONITOR & CONTROL
Wash Button	MONITOR & CONTROL









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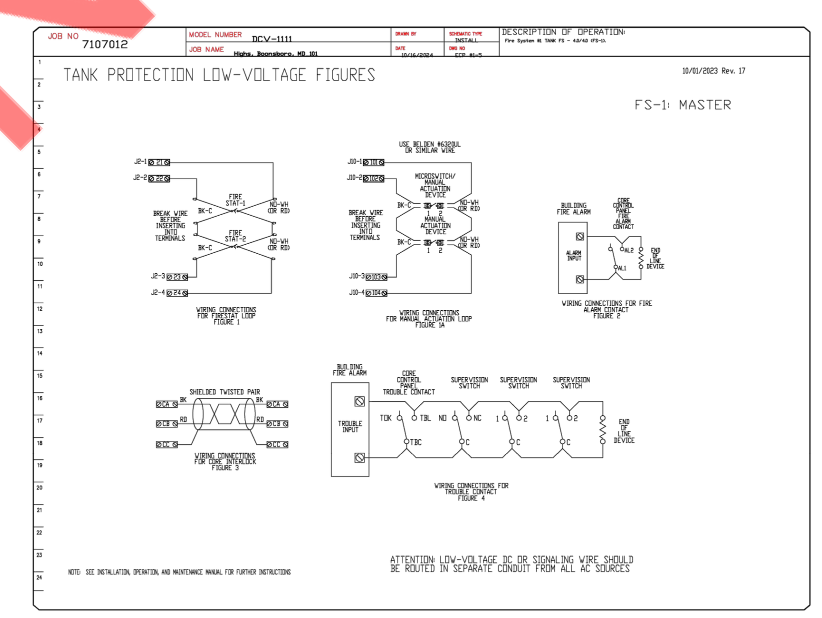

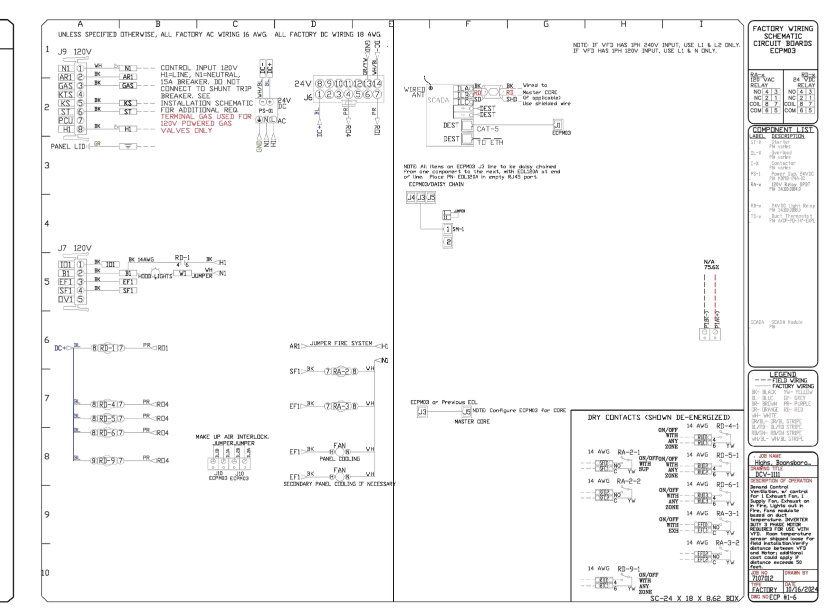

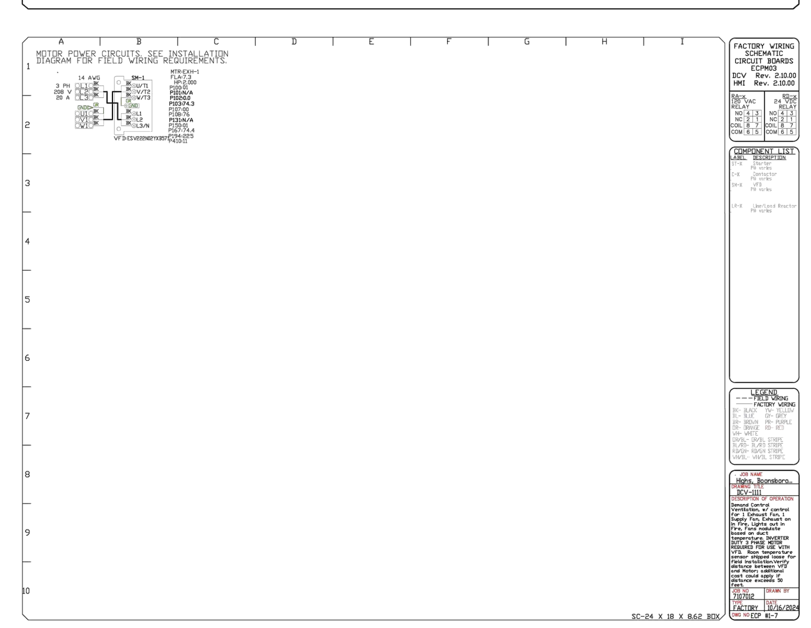

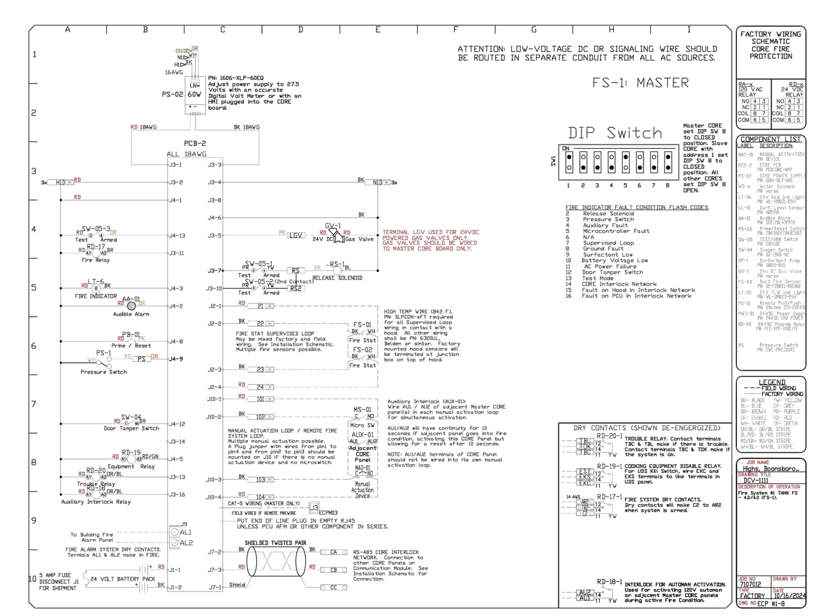

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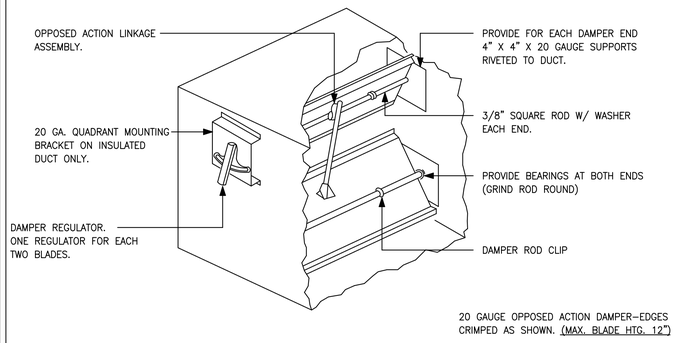
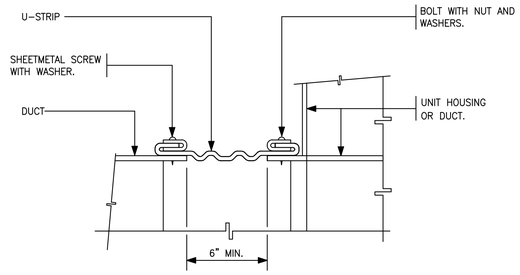


NOTE : 1. FOR DUCTS OVER 29" WIDE AND/OR OVER 12" HIGH.

1 / M-5.0 LOW PRESSURE BALANCING DAMPER N.T.S



2 / M-5.0 FLEXIBLE CONNECTION (DUCT-EQUIPMENT) N.T.S

NOTES:
DUCTS TO BE ACOUSTICALLY LINED SHALL BE DESIGNATED BY THE SYMBOL IN FIG. "C" TO THE EXTENT OF LINING. THICKNESS SHALL BE AS SPECIFIED.
DUCTS LINED WITH ACOUSTICAL MATERIAL SHOULD BE FASTENED WITH CLIPS, ADHESIVE, OR PINS

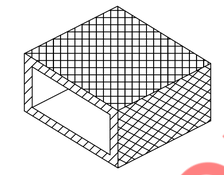


FIG. A

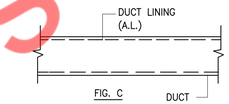


FIG. C

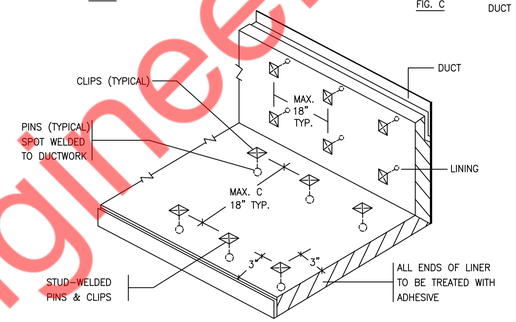
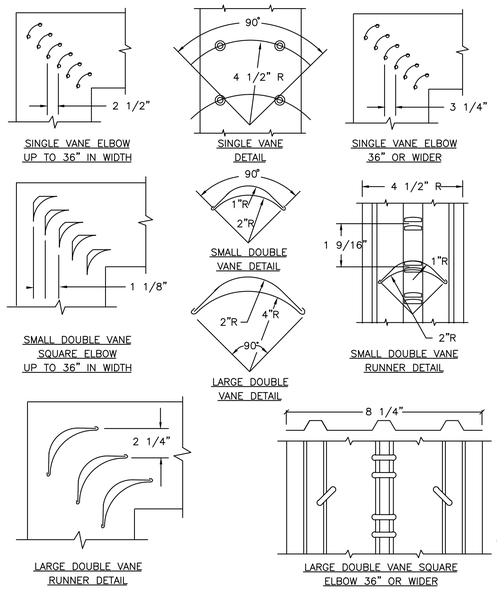
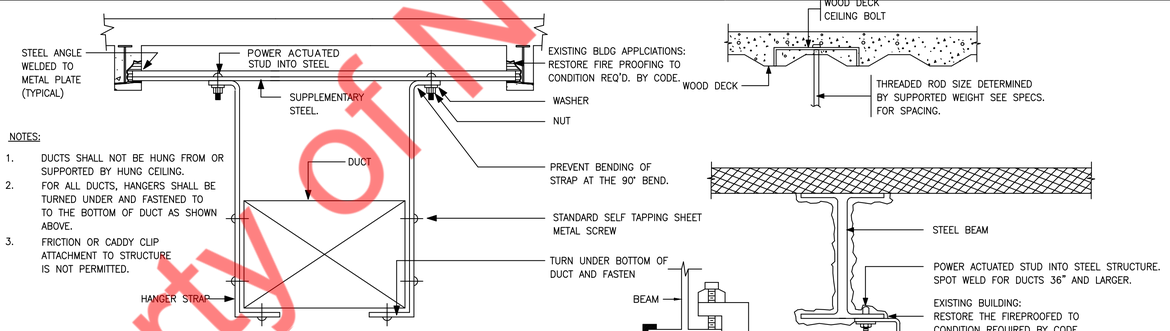


FIG. B

3 / M-5.0 ACOUSTICAL TREATMENT DUCT LINING N.T.S

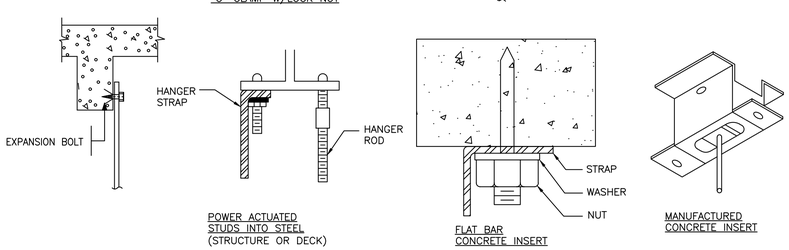


4 / M-5.0 LOW VELOCITY DUCTWORK ELBOWS N.T.S



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

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



5 / M-5.0 DUCT HANGING DETAILS N.T.S

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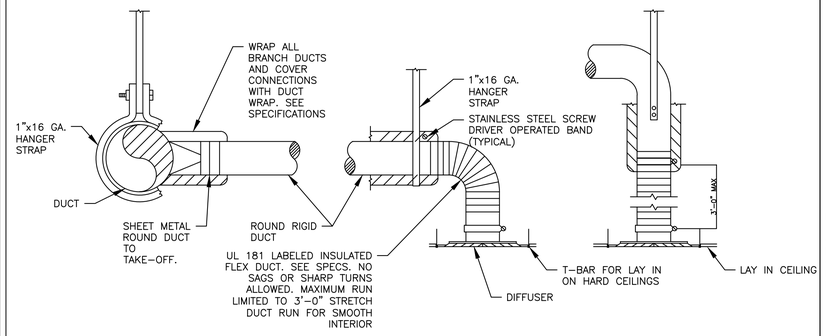
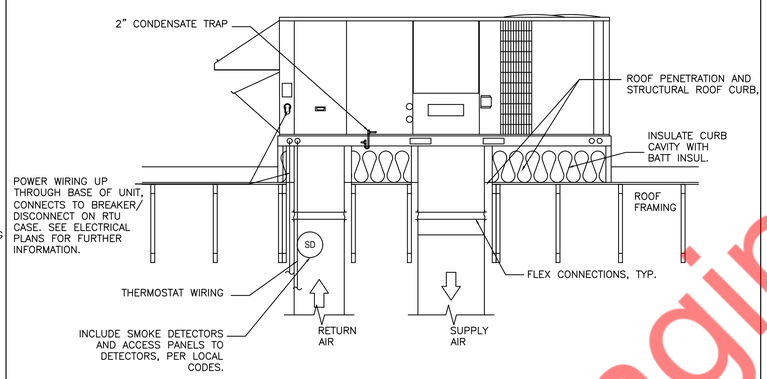
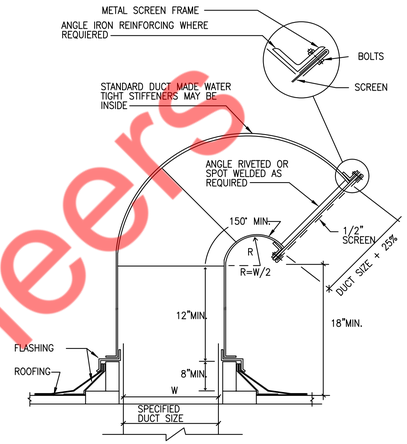


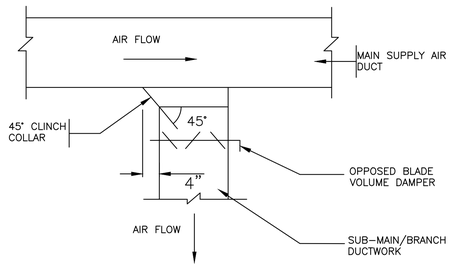
1 M-5.1 TYPICAL DIFFUSER CONNECTION DETAIL
N.T.S

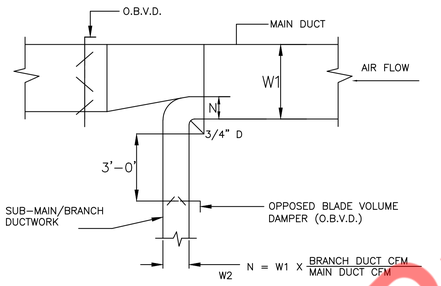


2 M-5.1 TYPICAL ROOF TOP UNIT DETAILS
N.T.S



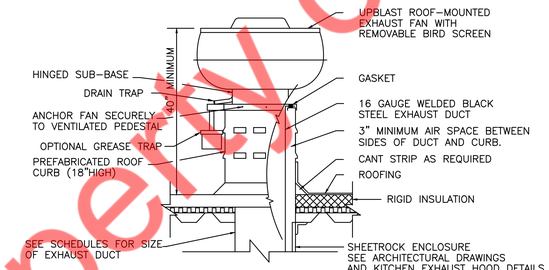
3 M-5.1 TYPICAL GOOSNECK DETAIL
N.T.S



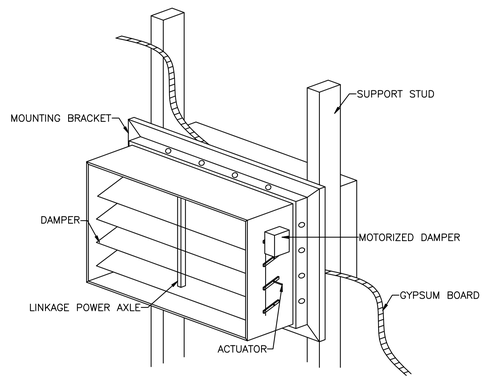


NOTE:
FURNISH THIS TYPE CONNECTION WHEN SINGLE LINE DUCTWORK IS INDICATED AS THIS

4 M-5.1 SUPPLY AIR DUCTWORK SUB-MAIN/BRANCH DUCT CONNECTION
N.T.S



5 M-5.1 KITCHEN ROOF EXHAUST FAN DETAIL
N.T.S



6 M-5.1 MOTORIZED DAMPER DETAIL
N.T.S

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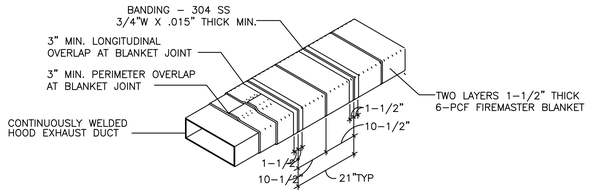
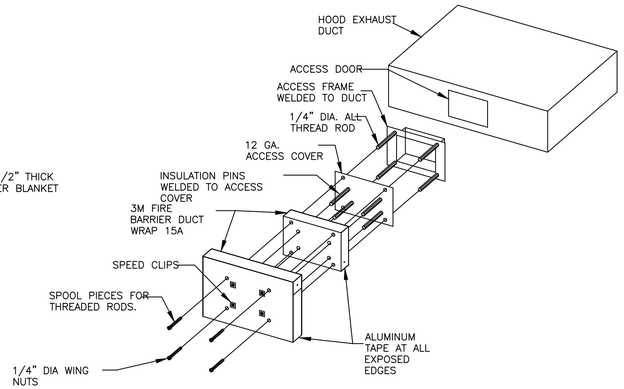


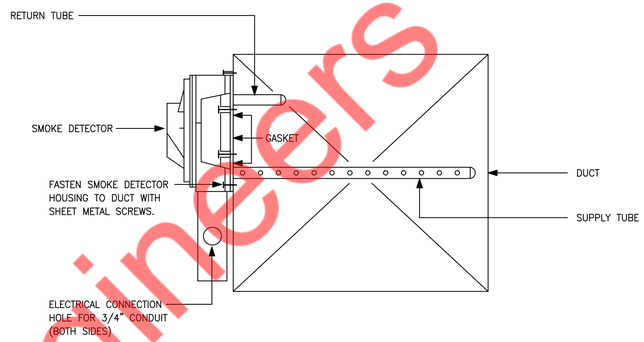
BANDING REQUIREMENTS: USE 304 STAINLESS STEEL BANDS A MAXIMUM 1–1/2" FROM BLANKET EDGE AND SPACED A MAXIMUM OF 10–1/2" ON CENTER.



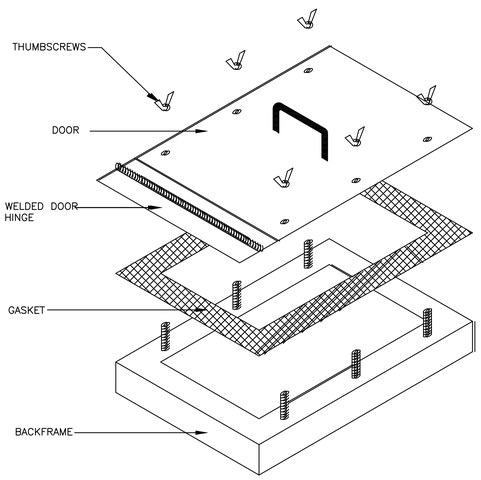
NOTES:

1. WRAP GREASE DUCT CONTINUOUS AS SHOWN FROM CONNECTION AT FAN THROUGH CURB AND EXTEND 18" MIN. BELOW ROOF DECK.
2. FOR HORIZONTAL RUNS OF EXHAUST DUCTS PROVIDE TYPICAL TRAPEZE SUPPORT SYSTEM WITH 1/2" HANGER RODS A MAXIMUM OF 6" FROM INSULATION EDGE. TRAPEZE SUPPORTS SHALL BE SPACED A MAXIMUM OF 60" ON CENTER FROM CENTERLINE OF VERTICAL EXHAUST DUCT.
3. SLOPE HORIZONTAL EXHAUST DUCT RUNS A MINIMUM OF 1/4" PER FOOT (2% SLOPE) TOWARDS EXHAUST HOOD.
4. PROVIDE INSULATED ACCESS DOOR OR PANEL NEAR MID POINT OF EXHAUST DUCT RUN FOR CLEANING AND INSPECTION OF DUCT. PROVIDE AN APPROVED SIGN ON ACCESS DOOR OR PANEL WHICH READS " ACCESS PANEL DO NOT OBSTRUCT"
5. KITCHEN EXHAUST DUCT SHALL BE LISTED FOR LISTED FOR ZERO CLEARANCE TO COMBUSTIBLE IN ACCORDANCE WITH UL 710.

1 / M–5.2 GREASE DUCT WRAP DETAIL
N.T.S



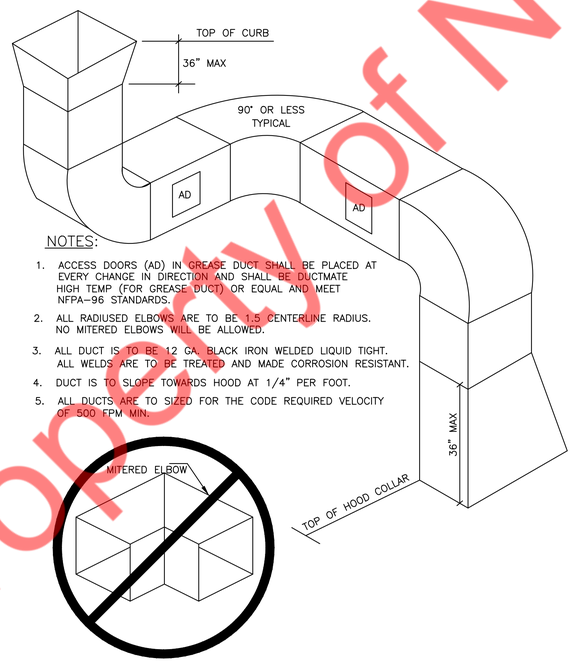
2 / M5.2 SMOKE DETECTOR MOUNTING DETAIL
N.T.S



NOTES:

1. ACCESS DOOR IS TO BE DUCTMATE ULTIMATE DOOR II OR EQUAL.
2. ACCESS DOOR IS TO BE U.L. LISTED # 65X3.
3. ACCESS DOOR IS TO MEET OR EXCEED THE REQUIREMENTS OF NFPA 96, 2008 EDITION AT ALL LOCATIONS REQUIRED BY LOCAL CODE.

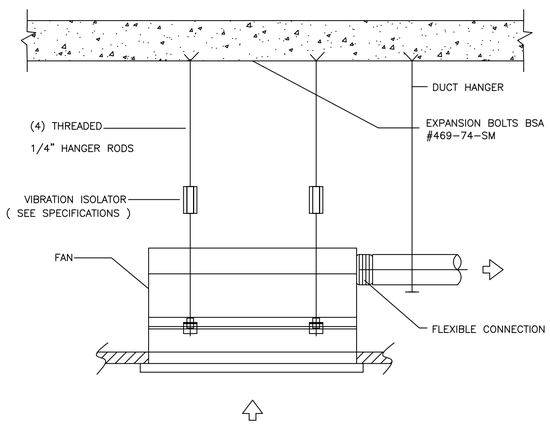
3 / M–5.2 GREASE DUCT ACCESS DOOR DETAIL
N.T.S



NOTES:

1. ACCESS DOORS (AD) IN GREASE DUCT SHALL BE PLACED AT EVERY CHANGE IN DIRECTION AND SHALL BE DUCTMATE HIGH TEMP (FOR GREASE DUCT) OR EQUAL AND MEET NFPA–96 STANDARDS.
2. ALL RADIUSED ELBOWS ARE TO BE 1.5 CENTERLINE RADIUS. NO MITERED ELBOWS WILL BE ALLOWED.
3. ALL DUCT IS TO BE 12 GA. BLACK IRON WELDED LIQUID TIGHT. ALL WELDS ARE TO BE TREATED AND MADE CORROSION RESISTANT.
4. DUCT IS TO SLOPE TOWARDS HOOD AT 1/4" PER FOOT.
5. ALL DUCTS ARE TO SIZED FOR THE CODE REQUIRED VELOCITY OF 500 FPM MIN.

4 / M–5.2 TYPICAL GREASE DUCT DETAIL
N.T.S



5 / M–5.2 CEILING FAN HANGING SUPPORT DETAIL
N.T.S

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ROOF TOP UNIT SCHEDULE

UNIT ID	MANUFACTURER	MODEL	AREA SERVED	NOMINAL TONS	SUPPLY FAN					HEATING CAPACITY			COOLING CAPACITY				ELECTRICAL			IEER	EER	WEIGHT (LBS.)
					SUPPLY AIR CFM	OUTSIDE AIR CFM	ESP (IN. OF WG)	RPM	HP	INPUT MBH	OUTPUT MBH	THERMAL EFFICIENCY (%)	TOTAL MBH	SENSIBLE MBH	AMBIENT TEMP. DB (°F)	ENTERING TEMP. DB / WB (°F)	V/PH/HZ	MCA (A)	MOCP (A)			
RTU-1	TRANE OR EQUIVALENT	YSK090A3S0M	SEE PLAN	7.5	3000	600	1.0	1289	3.0	150.0	121.5	81	93.08	68.84	95	80/67	208-230/3/60	49	60	14.6	11	1350
RTU-2	TRANE OR EQUIVALENT	YSK090A3S0M	SEE PLAN	7.5	3000	300	1.0	1289	3.0	150.0	121.5	81	93.08	68.84	95	80/67	208-230/3/60	49	60	14.6	11	1350
MUA-1	ECON-AIR	EARTU1-I.200-16-5T-MPU	SEE PLAN	-	2265	2265	0.5	-	2.5	198.6	160.8	81	66	63.4	60.5	80/67	208/3/60	27.9	30	17.9	-	1350

NOTES:

1. PROVIDE WITH R454B REFRIGERANT.
2. ELECTRICAL CONNECTION TO BE SINGLE POINT AND THROUGH THE BOTTOM OF THE UNIT.
3. 14"ROOF CURB - CONTRACTOR SHALL FIELD INSULATE. SHIP ASAP AHEAD OF THE UNIT.
4. CONDENSATE DRAIN WITH 2" DEEP VENTED TRAP DISCHARGE TO SPLASH BLOCK ON ROOF. PROVIDE ROOF ADAPTER IF REQUIRED.
5. CABINET WITH 1/2" FIBERGLASS INSULATION.
6. UNIT SHALL BE COMPLETE WITH GAS HEATING SECTION. GAS REGULATOR TO RECEIVE MIN. 7" GAS PRESSURE FROM MAIN.
7. PROVIDE 8-WIRE, 24 VAC, AUTOMATIC CHANGEOVER, REMOTELY PROGRAMMABLE THERMOSTAT.
8. REMOTE SENSORS SHALL BE PROVIDED IN SPACE WIRED BACK TO PROGRAMMABLE, 24 HOUR, 7 DAY, THERMOSTATS.
9. ANTI SHORT CYCLE TIMER. PROVIDE HOT GAS BYPASS.
10. THROWAWAY 2" FILTERS (MERV 8).
11. PROVIDE ALL COMPRESSORS WITH 5 YEAR WARRANTY.
12. PROVIDE ECONOMIZER FOR RTU MORE THAN 4.5 TONS W/ SINGLE ENTHALPY DDC. PROVIDE WITH FAULT DETECTION AND DIAGNOSTIC.
13. PROVIDE OUTSIDE AIR INTAKE HOOD AND MOTORIZED DAMPER.

FAN SCHEDULE

UNIT ID	MANUFACTURER	MODEL	CFM	TYPE	DRIVE	FAN RPM	WEIGHT (LBS)	E.S.P. (IN. W.G.)	MOTOR HP	MOTOR VOLTS	MOTOR PHASE	SERVICE	INTERLOCKED WITH	NOTES
KEF-1	ECONAIR	EADU180H	2520	ROOF	DIRECT	1236	260	1.10	2.00	208	3	HOOD-1	HOOD CONTROL	1,2,3,4,6,7,8
EF-1, 2	GREENHECK	SP-A125	100	CEILING	DIRECT	1100	30	0.25	0.01(BHP)	115	1	REST ROOM	RTU-2	4,5,7
EF-3	GREENHECK	SP-A125	100	CEILING	DIRECT	1100	30	0.25	0.01(BHP)	115	1	SINK	KITCHEN LIGHTS	4,5,7

NOTES / ACCESSORIES:

1 WEATHER PROOF DISCONNECT SWITCH
2 VARIABLE SPEED CONTROL
3 SPEED CONTROL SWITCH
4 THERMAL OVERLOAD PROTECTION
5 GRAVITY BACKDRAFT DAMPER
6 ROOF CURB
7 AMCA SEAL
8 UL 762 LISTED (GREASE)

AIR BALANCE

UNIT	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	RETURN AIR (CFM)	EXHAUST AIR(CFM)	PRESSURE
RTU-1	3000	600	2400	0	+600
RTU-2	3000	300	2700	0	+300
MUA-1	2265	2265	0	0	+2265
KEF-1	0	0	0	2520	-2520
EF-1	0	0	0	100	-100
EF-2	0	0	0	100	-100
EF-3	0	0	0	100	-100
TOTAL:	8265	3165	5100	2820	345
				BUILDING PRESSURE:	**POSITIVE**

NOTES:

1. CONTRACTOR TO ADJUST VOLUME DAMPER ON FRESH AIR TAP TO PROVIDE OUTSIDE AIR AS MENTIONED IN ABOVE TABLE.

HOODS

UNIT ID	MANUFACTURER	LENGTH (FEET-INCH)	MODEL	TYPE	COOKING TEMPERATURE (DEG F)	EXHAUST AIR (CFM)	EXHAUST COLLAR (INCH)	EXHAUST E.S.P (IN. W.G.)	CONSTRUCTION	WEIGHT (LBS)
HOOD-1	ECONAIR	12'-9"	6024 EX-2-PSP-F	I	600	2520	2# 12"	0.738	430 STAINLESS STEEL	1130

VENTILATION CALCULATION

ROOM NAME	AREA (SQ.FT.)	NUMBER OF PEOPLE/1000sq.ft AS PER IMC 2021	NUMBER OF PEOPLE AS PER IMC 2021	NUMBER OF CHAIR	FINAL PEOPLE NO.	MIN OUTSIDE AIR AS PER IMC 2021 CFM/ PEOPLE	MIN OUTSIDE AIR AS PER IMC 2021 CFM/ SQ.FT	REQ. OA (CFM)	Provided OA (CFM)	EXHAUST AIRFLOW RATE (CFM/SQ.FT OR /FIXT.)	TOTAL EXHAUST REQUIRED (CFM)	PROVIDED EXHAUST (CFM)
VESTIBULE	137	0	0	0	0	0	0.06	8	3165	0	0	0
SALES AREA	2285	15	35	16	35	7.5	0.12	537		0	0	0
KITCHEN AREA	1285	20	26	0	10	7.5	0.12	229		0.7	900	2620
OFFICE	50	5	1	1	1	5	0.06	8		0	0	0
OFFICE STORAGE	76	0	0	0	0	0	0.12	9		0	0	0
WALK-IN STORAGE	235	0	0		0	0	0.12	28		0	0	0
MEN'S RESTROOM	85	0	0	0	0	0	0	0		50	100	100
WOMEN'S RESTROOM	105	0	0	0	0	0	0	0		50	100	100
TOTAL								819		-	Total	2820

DIFFUSER AND REGISTER SCHEDULE

UNIT ID	MANUFACTURER	MODEL	SIZE	DESCRIPTION	REMARKS
A	METALAIRE	570006-AL (01) WHITE 570006-AL (03) BLACK	24x24	ALUMINUM, 2-CONE SQUARE FACE DIFFUSER WITH ROUND NECK. ALUMINUM, WITH ADJUSTABLE DISCHARGE AND RADIAL OPPOSED BLADE DAMPER, MODEL D3.	1,2,3,4,5
B	METALAIRE	570006-AL (01) WHITE 570006-AL (03) BLACK	12x12	ALUMINUM, 2-CONE SQUARE FACE DIFFUSER WITH ROUND NECK. ALUMINUM, WITH ADJUSTABLE DISCHARGE AND RADIAL OPPOSED BLADE DAMPER, MODEL D3.	1,2,3,4,5
C	METALAIRE	RH-6 (01) WHITE RH-6 (03) BLACK	24X24	ALUMINUM RETURN GRILLE -0 .667" SPACING SET AT 45 DEGREE ANGLE, VOLUME CONTROL OPPOSED BLADE DAMPERS, MODEL OBDA.	1,2,4
D	METALAIRE	7500-AL (01) WHITE 7500-AL (03) BLACK	24X24	ALUMINUM,PERFORATED FACE CEILING DIFFUSER WITH FACE MOUNTED PATTERN CONTROLLER, WITH RADIAL SHUTTER DAMPER, MODEL RSD.	1,2,4,5
E	METALAIRE	4004PCF (01) WHITE 4004PCF (01) WHITE	16X6	ALUMINIUM SUPPLY ADJUSTABLE DOUBLE DFLECTION SPIRAL DUCT MOUNTED GRILLES WITH AIR SCOOP DAMPER.	1,2

NOTES:

1. MAXIMUM NOISE CRITERION RATING < 35 DBA.
2. BAKED ENAMEL FINISH, COLOR TO BE SELECTED BY ARCHITECT.
3. DIFFUSERS SHALL BE 4-WAY BLOW UNLESS OTHERWISE INDICATED ON PLANS.
4. MOUNTING FRAME TYPE SHALL BE COORD. WITH CEILING / WALL CONSTRUCTION TYPE.
5. NECK SIZE SHALL BE AS SCHEDULED.

NECK SIZES:

Up To 100 Cfm	- 6" DIA
101 To 225 Cfm	- 8" DIA
176 To 275 Cfm	- 10" DIA
276 To 395 Cfm	- 12" DIA
396 To 535 Cfm	- 14" DIA
536 To 615 Cfm	- 15" DIA

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ELECTRICAL SYMBOLS LIST

LIGHTING

◪ □	LIGHTING FIXTURE AND OUTLET BOX. HALF SHADED FIXTURE OR "EM" INDICATES FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY SERVICE, U.O.N.
A_a^2	LUMINAIRE TYPE : INDICATE BY LIPPERCASE LETTER SEE LIGHTING EXTURE SCHEDULE. CIRCUIT NUMBER : INDICATED BY NUMBER SWITCHING INDICATED BY LOWER CASE LETTERS.
EM	DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.
NL	DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 HOURS UNSWITCHED CIRCUIT.
	CEILING/WALL MOUNTED SELF POWERED EXIT LIGHT FIXTURE WITH DIRECTIONALARROWS AS INDICATED. SHADED AREA DENOTES FACE(S). ISOLITE ELITE SERIES LED EXIT SIGN

SWITCHES AND CONTROLS

S_a	20A SPST TOGGLE SWITCH U.O.N. "a" DENOTES LIGHTING FIXTURE CONTROLLED.
S_a^3	20A 3–WAY TOGGLE SWITCH U.N.O. "a" DENOTES LIGHTING FIXTURE CONTROLLED
S_{OS}	WALL OCCUPANCY SENSOR, NUMBER INDICATES TYPE.
OS	CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE

ELECTRICAL DRAWING LIST

E–1	ELECTRICAL SYMBOL LIST, ABBREVIATIONS & GENERAL NOTES
E–2	ELECTRICAL SPECIFICATIONS SHEET 1 OF 2
E–3	ELECTRICAL SPECIFICATIONS SHEET 2 OF 2
E–4	LIGHTING PLAN
E–5	FLOOR POWER PLAN
E–6	ROOF POWER PLAN
E–7	ELECTRICAL DETAILS
E–8	ELECTRICAL SCHEDULES AND RISER DIAGRAM

CODE COMPLIANCES

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. INTERNATIONAL BUILDING CODE 2018

b. INTERNATIONAL MECHANICAL CODE 2018

c. INTERNATIONAL PLUMBING CODE 2018

d. INTERNATIONAL FUEL GAS CODE 2018

e. INTERNATIONAL ENERGY CONSERVATION CODE 2018

f. NATIONAL ELECTRIC CODE 2017

POWER AND TELECOMMUNICATION

J	JUNCTION BOX WITH BLANK COVER PLATE, CEILING MOUNTED..
	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
GFI	DEDICATED GFI RECEPTACLE, +18" AFF OR AS NOTED.
GFI	DUPLEX GFI RECEPTACLE, +18" AFF OR AS NOTED.
CL	DUPLEX CONVENIENCE RECEPTACLE – 20A–1P, 125V, NEMA 5–20R MOUNTED FLUSH IN CELING.
	DATA OUTLET – (1) PORT U.N.O, TEL / DATA OUTLET TO BE PROVIDED WITH 1" CONDUIT U.O.N. TO H.C. AND TERMINATED WITH 90 DEGREE ELBOW AND BUSHING. TEL / DATA OUTLET PLATE SHALL BE PROVIDED WITH 1 1/4" DIAMETER GROMMETED OPENING.
	DOUBLE DUPLEX RECEPTACLE – 20A–1P, 125V, NEMA 5–20R.
	SPECIAL RECEPTACLE

MOTORS AND CONTROLS

M	EXHAUST FAN WITH JUNCTION BOX AND MOTOR SWITCH.
A	30A NON FUSED DISCONNECT SWITCH
B	60A NON FUSED DISCONNECT SWITCH
S	MANUAL MOTOR SWITCH

ANNOTATION

+24"	INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.
X	KEYED NOTE REFERENCE
1 / E/2–1	DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP; DRAWING NUMBER INDICATED ON BOTTOM

POWER DISTRIBUTION

	POWER PANELBOARD, 208Y/120V–SURFACE MOUNTED.

ELECTRICAL ABBREVIATIONS

A	AMPERES	EA	EACH
A/C, AC	AIR CONDITIONING UNIT	EM	EMERGENCY
AF	AMPERE FRAME/AMP FUSE	EMT	ELECTRICAL METALLIC TUBING
AFF	ABOVE FINISHED FLOOR	EQUIP	EQUIPMENT
AS	AMP SWITCH	ER	EXISTING TO BE RELOCATED
AIC	AMPS INTERRUPTING CAPACITY	FA	FIRE ALARM
AT	AMP TRIP	E	EXISTING
ATS	AUTOMATIC TRANSFER SWITCH	FL	FLOOR
AUTO	AUTOMATIC	G	GROUND
AWG	AMERICAN WIRE GAUGE	GFI	GROUND FAULT INTERRUPTER
C	CONDUIT	GP	GENERAL PURPOSE
C/B,CB	CIRCUIT BREAKER	HP	HORSEPOWER
CKT	CIRCUIT	HWH	HOW WATER HEATER
CLG	CEILING	HZ	HERTZ
COMM	COMMUNICATION	IC	INTERRUPTING CAPACITY
CT	CURRENT TRANSFORMER	PP	POWER PANEL
CU	COPPER	PWR	POWER
DIA	DIAMETER	R	REMOVE
DISC	DISCONNECT	RE	RELOCATED EXISTING
DN	DOWN	REC	RECEPTACLE
DP	DISTRIBUTION PANEL	RGS	RIGID GALVANIZED STEEL
DWG	DRAWING	RR	REMOVE & RELOCATE
JB	JUNCTION BOX	SECT	SECTION
KCMIL	ONE THOUSAND CIRCULAR MILS	SPDT	SINGLE POLE DOUBLE THROW
KV	KILOVOLT	SPST	SINGLE POLE SINGLE THROW
KVA	KILOVOLT–AMPERES	SPEC	SPECIFICATION
KW	KILOWATTS	SW	SWITCH
LTG	LIGHTING	SWBD	SWITCHBOARD
MAX	MAXIMUM	SYM	SYMMETRICAL
MC	MOTOR CONTROLLER	SYS	SYSTEMS
MCB	MAIN CIRCUIT BREAKER	TELE	TELEPHONE
MLO	MAIN LUGS ONLY	TEMP	TEMPERATURE
MTD	MOUNTED	TXF	TOILET EXHAUST FAN
MTS	MANUAL TRANSFER SWITCH	TYP	TYPICAL
N	NEUTRAL	UON	UNLESS OTHERWISE NOTED
NIC	NOT IN CONTRACT	V	VOLT/VOLTAGE
NTS	NOT TO SCALE	VA	VOLT AMPERE
PNL	PANEL	WP	WEATHER PROOF
W	WATT	ø	PHASE
RH	RANGE HOOD	DW	DISHWASHER
WA	WASHER	REF	REFRIGERATOR
DR	DRYER	MW	MICROWAVE

GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CURRENT VERSION OF THE LOCAL ELECTRICAL CODE, 2017 NEC, LOCAL JURISDICTION REQUIREMENTS, AND ALL GOVERNING LOCAL CODES, LAWS, AND REGULATIONS.
2. CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK. NO ADDITIONAL COMPENSATION WILL BE CONSIDERED FOR FAILURE TO DO SO.
3. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, TEST REPORTS, AND CERTIFICATIONS FOR TEMPORARY AND FINAL CERTIFICATE OF OCCUPANCY.
4. FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER IN ORDER TO MAINTAIN FIRE RATING. ALL PENETRATIONS SHALL BE SLEEVED AND SEALED WATERTIGHT.
5. SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOLTS (HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AND BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK). NAILS, RAWL PLUGS AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTURE, PROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS OF METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
6. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT INSTALLED: FURNISH FISH WIRE.
7. VERIFY LOCATIONS OF OUTLETS AND SWITCHES IN FINISHED ROOMS WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISH. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS AND MECHANICAL EQUIPMENT, EQUIPMENT, VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS AND THE LIKE. CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
8. CONTRACTOR SHALL PROVIDE A WARRANTY ON ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
9. ALL UNUSED MATERIALS AND DEBRIS SHALL BE LEGALLY REMOVED AND DISPOSED OF AWAY FROM THE PREMISES ON A DAILY BASIS.
10. CONTRACTOR SHALL PATCH, PAINT, AND RESTORE EXISTING SURFACES DAMAGED DURING THE COURSE OF THIS CONSTRUCTION TO PRE–EXISTING CONDITIONS OR BETTER.
11. MINIMUM SIZE OF CONDUIT SHALL BE ¾", AND TYPE SHALL BE ELECTRICAL METALLIC TUBING (EMT), UNLESS OTHERWISE NOTED. PROVIDE NYLON DRAG LINE AND CONDUIT CAP FOR ALL EMPTY CONDUITS.
12. CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
13. PULL AND JUNCTION BOXES WHERE INDICATED ON THE DRAWINGS, SHALL BE CONSIDERED SHOWN AT THEIR APPROXIMATE LOCATION. THE CONTRACTOR SHALL LOCATE THEM AS FIELD CONDITIONS DICTATE. ADDITIONAL PULL AND JUNCTION BOXES NOT SHOWN ON DRAWINGS SHALL BE PROVDED WHERE REQUIRED BY APPLICABLE CODE PROVISIONS OR WHERE CALLED FOR BY FIELD CONDITIONS. PULL AND JUNCTION BOXES SHALL BE SURFACE TYPE IN UNFINISHED AREAS AND INSTALLED CANCEALED IN FINISHED AREAS, AND ALL COVERS TO PULL & JUNCTION BOXES SHALL BE READILY ACCESSIBLE.
14. SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
15. FOR EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES AND SWITCH/RECEPTACLE OUTLETS, REFER TO ARCHITECTURAL REFLECTED CEILING AND POWER PLANS.
16. ALL ELECTRICAL ACCESSORIES AND EQUIPMENT INSTALLED OUTSIDE OR EXPOSED TO WEATHER SHALL HAVE NEMA 3R ENCLOSURES AND SHALL BE TIGHTLY GASKETED FOR A COMPLETE RAINTIGHT INSTALLATION. ALL BUILDING EXTERIOR MOUNTED RECEPTACLES SHALL BE GFCI RATED AND MOUNTED IN WEATHERPROOF ENCLOSURE.
17. ALL ACCESS PANEL LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.
18. ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTALLATION OF NEW WORK WITH THE GENERAL CONTRACTOR AND OTHER ASSOCIATED TRADES IN A TIMELY MANNER. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS AND CONDITIONS PRIOR TO CONSTRUCTION. REFER TO ALL GENERAL, MECHANICAL, AND ELECTRICAL, DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT.
19. ALL CONDUITS AND EQUIPMENT TO BE CONCEALED IN FINISHED SPACES UNLESS OTHERWISE NOTED. CONDUITS SHALL BE ENCASED IN THE CONCRETE FLOOR SLAB.
20. ALL EQUIPMENT AND MATERIALS INSTALLED IN PLENUM CEILINGS SHALL BE APPROVED FOR THAT APPLICATION.
21. OUTLET BOXES AND JUNCTION BOXES ON OPPOSITE SIDES OF FIRE–RATED WALLS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF NOT LESS THAN 24 INCHES, UNLESS FIRE–RATED BOXES OR PUTTY PADS ARE UTILIZED.
22. COORDINATE ALL FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. CONFIRM PENETRATION LOCATIONS WITH THE ENGINEER AND OWNER BEFORE INSTALLATION.
23. COORDINATE THE MOUNTING HEIGHT AND LOCATION OF RACEWAYS, COMMUNICATIONS OUTLETS, AND RECEPTACLES WITH THE ARCHITECTURAL CASEWORK DRAWINGS AND DETAILS. COORDINATE LOCATIONS OF LIGHT FIXTURES, SWITCHES, AND RELATED DEVICES WITH THE ARCHITECTURAL DRAWINGS AND DETAILS.
24. REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL LUMINARIES AND SWITCHES, AND FOR ALL FINISHED CEILING HEIGHTS.
25. REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL ELECTRICAL DEVICES, AND FOR FINAL CEILING AND WALL HEIGHTS AND LAYOUTS.
26. LIGHTING FIXTURES PROVIDED WITH EMERGENCY BATTERY PACKS AND INDICATED WITH SWITCH CONTROL SHALL BE WIRED WITH BATTERY CHARGING/SENSING CIRCUIT WIRED AHEAD OF SWITCH CONTROL.
27. NUMBER(S) SHOWN AT RECEPTACLES, JUNCTION BOXES AND EQUIPMENT INDICATES CIRCUIT NUMBERS IN PANELBOARD. PROVIDE WIRE AND CONDUIT TO INTERCONNECT EQUIPMENT AND DEVICES WITH SAME CIRCUIT NUMBERS AND RUN TO PANELBOARD.

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ELECTRICAL SPECIFICATIONS

1. GENERAL:

A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.

B. DRAWING ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED, MAINTAIN HEADROOM AND SPACE CONDITIONS.

C. BIDDERS, BEFORE SUBMITTING PROPOSALS, SHALL VISIT AND CAREFULLY EXAMINE THE AREA AFFECTED BY THIS WORK TO FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND THE DIFFICULTIES THAT WILL ATTEND THE EXECUTION OF THIS WORK. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE, AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT, OR MATERIALS, REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.

D. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOROPERATION,MAINTANANCE AND REPAIR, MINOR DEVIATIONS FROM DRAWING MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.

E. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES AND CHARGES IN MAKING UP THE WORK PROPOSAL.

F. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES. AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.

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

H. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.

I. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL, UNLESS OTHERWISE NOTED.

J. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT, PROVIDE EQUIPMENT CURBS AS REQUIRED.

K. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT ND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.

L. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

M. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

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

O. INSURANCE: PROVIDE IN ACCORDANCE WITH OWNER/BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

P. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATED OF INSPECTION AND APPROVAL.

2. GENERAL PROVISIONS FOR ELECTRICAL WORK:

A. DEFINITIONS:

1) "PROVIDE": TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE. AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "WIRING": RACEWAY. FITTINGS, WIRE, BOXES, AND RELATED ITEMS.

6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

B. TEMPORARY LIGHT AND POWER: PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES, AS HEREIN DESCRIBED. EXTEND SYSTEMS TO NEW CONSTRUCTION AS SOON AS PHYSICALLY POSSIBLE. MAINTAIN SYSTEM DURING WORKING OWNER. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS.

C. QUALITY ASSURANCE

1) QUALITY OF MATERIALS: ALL EQUIPMENT SHALL BE NEW SPECIFICATION GRADE, FREE FROM DEFECTS AND LISTED BY APPROVED TESTING AGENCY AND BEARING THEIR LABEL MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.

2) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AS DEFINED IN PARAGRAPH 2.C.

3) CURRENT CHARACTERISTICS:

a. SERVICE: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

b. DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

4) HEIGHTS OF OUTLETS:

a. FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS FOR:

– RECEPTACLES AND TELEPHONES: 1 FT–6 IN.

– WALL SWITCHES: 4 FT–0 IN.

– WALL FIXTURES: 7 FT–0 IN.

– MOTOR CONTROLLERS: 5 FT–0 IN.

– CLOCKS: 7 FT 6 IN

b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.

D. PRODUCT DELIVERY, STORAGE AND HANDLING

1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.

2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS SHALL BE PERMITTED, CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.

E. MATERIALS

1) NAMEPLATES: PROVIDE BLACK LAMICOID SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.

2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.

3) INSERTS AND SUPPORTS:

a. INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.

– SINGLE ROD: SIMILAR TO GRINNELL FIG. 281.

– MULTI–ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.

– CLIP FORM NAILS FLUSH WITH INSERTS.

– MAXIMUM LOADING 75 PERCENT OF RATING.

b. SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR REVIEW.

c. GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.

d. WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.

F. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION. UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC BASED PRIMER FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. ZINC BASED PRIMER WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD–APPLIED ZINC BASED PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.

G. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED; CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.

H. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.

I. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

3. SCOPE OF WORK:

A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMING WITH THE 2017 NATIONAL ELECTRICAL CODE (NEC) WITH AMENDMENTS, AND ALL OTHER APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.

B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLIED OR SPECIFIED HEREIN.

C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR, PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER, DATE IS EARLIER, THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDED THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR

D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION, WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

E. CONTRACTOR SHALL PERFORM ALL CONTROLLED INSPECTIONS IN ACCORDANCE WITH THE STATE BUILDING CODE. SECURE ALL REQUIRED PERMITS AND APPROVALS AND TRANSMIT SAME TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES.

F. AREAS WITH NO ELECTRICAL WORK SHALL REMAIN AS IS. CONTRACTOR SHALL MAINTAIN CONTINUITY OF ALL ELECTRICAL SYSTEMS TO ALL AREAS NOT COVERED BY THIS RENOVATION AND SHALL PROVIDE 48 HOUR NOTICE TO LANDLORD OF ANY PLANNED POWER INTERRUPTIONS OR SIGNAL SYSTEM OUTAGES.

4. SHOP DRAWINGS

A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL PROVIDE COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED:

1) PROJECT NAME AND LOCATION

2) NAME OF ARCHITECT AND ENGINEER

3) ITEM IDENTIFICATION

4) APPROVAL STAMP OF PRIME CONTRACTOR

C. SUBMISSIONS:

1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.

2) SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER.

D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

1) SAFETY/DISCONNECT SWITCHES

2) FUSES

3) CIRCUIT BREAKERS

4) PANELBOARDS/LOADCENTER (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS).

5) RACEWAYS

6) WIRE AND CABLE

7) WALL SWITCHES

8) INSERTION RECEPTACLES

9) MOMENTARY CONTACT SWITCHES

10) TIME SWITCHES

11) LIGHTING FIXTURES.

E. ASSIST AND PROVIDE ALL NECESSARY INFORMATION, DIAGRAMS, SKETCHES, ETC. TO THE HVAC CONTRACTOR, FOR THE PREPARATION OF COORDINATED SHOP DRAWINGS INDICATING ROUTING OF FEEDERS, CONTROL CONDUITS, RECESSED FIXTURES AND ADJACENT NEARBY PIPING AND DUCTWORK WHERE APPLICABLE, CERTIFIED BY ALL TRADES THAT COORDINATION HAS BEEN ESTABLISHED. SUBMIT FOUR(4) BOOKBOUND OPERATING AND SERVICE MANUALS WHICH SHALL INCLUDE COPIES OF ALL SHOP DRAWING. PROVIDE SHOP DRAWINGS FOR PANELS, FIXTURES, WIRING DEVICES, CONDUIT, CABLE, DISCONNECT SWITCH, RELAYS, CONTRACTORS, AND OTHER SYSTEMS AS DIRECTED BY THE ENGINEER.

5. AS–BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

B. THESE INSTRUCTIONS SHALL BE TYPED ON 8–1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.

C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.

D. REPRODUCIBLE "AS–BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS–BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

6. LOW–VOLTAGE DISTRIBUTION EQUIPMENT:

A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.

B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.

C. DISCONNECT SWITCHES SHALL BE FUSED OR NONFUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY, EXCEPT AS NOTED, AND HORSEPOWER RATED FOR MOTOR LOADS. TOGGLE TYPE SWITCHES SHALL BE NONFUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 20 AMP AT 600 VOLTS AND 30 AMP AT 240 VOLTS. TWO–POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 6808F. THREE–POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 7810F. KNIFE–BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK–MAKE– QUICK–BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO GENERAL ELECTRIC QMR. ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.

7. FUSES:

A. CIRCUITS 0 TO 600 AMPERES SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN LOW–PEAK DUAL–ELEMENT TIME–DELAY LPN–RK (AMP)SP (250V) /LPS–RK (AMP)SP (600V) OR LPJ (AMP)SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.

B. MOTOR CIRCUITS – ALL INDIVIDUAL MOTOR CIRCUITS WITH FULL LOAD AMPERE RATINGS (FLA) OF 480 AMPERES OR LESS SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMANN LOW–PEAK DUAL–ELEMENT TIME–DELAY LPN–RK (AMP)SP (250V) /LPS–RK (AMP)SP (600V) OR LPJ (AMP)SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.

C. ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER.

D. PROVIDE 1 SPACE MATCHING FUSE FOR EACH SET OF 3.

E. CIRCUIT BREAKERS: MOLDED CASE BREAKERS SHALL BE THERMAL–MAGNETIC, QUICK–MAKE–QUICK–BREAK, BOLT–ON TYPE, MANUALLY OPERATED WITH INSULATED TRIP–FREE HANDLE. MULTI–POLE TYPE BREAKERS SHALL CONTAIN INTERNAL TRIP BAR. TERMINALS SHALL BE SUITABLE FOR COPPER OR ALUMINUM CABLE. FURNISH AUXILIARY DEVICES WHERE REQUIRED FOR SHUNT–TRIPPING, OPEN A ND CLOSE MOTOR OPERATOR AND ALARM INDICATION. ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED. FRAMES, IC AND INTERCHANGEABLE TRIPS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:

1) 120 VOLTS, 100–AMP FRAME: 10,000 AMPS, 1 POLE.

2) 120/240 VOLTS, 225–AMP FRAME: 22,000 AMPS MINIMUM

8. DISTRIBUTION PANELBOARDS, SWITCH AND FUSE:

A. THREE PHASE, 3 OR 4 WIRE WITH COPPER BUS BARS. ALL THROUGH BUS SHALL BE INSULATED.

B. NEMA CLASS 1 CONSTRUCTION TO ACCOMMODATE FUSIBLE, INDIVIDUALLY ENCLOSED SWITCHES, FRONT REMOVABLE, SWITCH AND DOOR INTERLOCKS. COVERS TO BE PAD–LOCKABLE.

C. PANELBOARD SHALL BE CONSTRUCTED OF CODE–GAUGE STEEL, GRAY FINISH OVER RUST INHIBITOR, FOR SURFACE MOUNTING. BOX AND PANEL FRAME SHALL BE FLANGED AND REINFORCED FOR RIGID SUPPORT OF INTERIOR AND ACCURATE ALIGNMENT OF INTERIOR WITH FRONT. TRIMS TO BE FASTENED TO BACK BOX WITH SCREWS.

D. ALL BRANCH SWITCHES SHALL HAVE INDIVIDUAL ENGRAVED LAMICOID NAMEPLATES (BLACK WITH WHITE CORE).

E. DISTRIBUTION PANELBOARD CONSTRUCTION MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, REMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. APPLICATIONS.

F. DISCONNECTS

1) DISCONNECT SWITCHES SHALL CONFORM TO NEMA AND UL STANDARDS, AND SHALL BE HORSEPOWER RATED.

2) SWITCHING MECHANISM SHALL BE QUICK–MAKE, QUICK–BREAK, SINGLE THROW WITH EXTERNAL OPERATING HANDLE MECHANICALLY INTERLOCKED WITH ENCLOSURE COVER TO PROVIDE ACCESS TO INTERIOR WHEN DISCONNECT IS IN OFF POSITION ONLY. PROVIDE MEANS TO LOCK OPERATING HANDLE IN THE OPEN AND CLOSED POSITION. DESIGNATE ON THE ENCLOSURE THE OPEN AND CLOSED POSITION OF THE OPERATING HANDLE.

3) SWITCHES SHALL BE OF THE DOUBLE STATIONARY CONTACT TYPE.

4) SWITCHES SHALL BE EQUIPPED WITH REJECTION TYPE FUSE HOLDERS, FUSIBLE AS SHOWN ON THE DRAWINGS; PROVIDE COMPLETE WITH FUSES AS SCHEDULED.

G. INSTALLATION

1) DISTRIBUTION PANELBOARD SHALL BE MOUNTED TO STRUCTURAL STEEL CHANNEL (KINDORF) WHICH SHALL BE BOLTED TO THE WALL USING EXPANSION ANCHORS FOR LARGE PANELS.

H. IDENTIFICATION

1) PROVIDE NAMEPLATE AT EACH SWITCH IDENTIFYING THE LOAD SERVED.

2) NAMEPLATES SHALL BE MOUNTED ON THE FRONT COVER SECURED WITH SELF–TAPPING SCREWS OR NUTS AND BOLTS. NAMEPLATES SHALL BE LAMINATED PHENOLIC, BLACK WITH A MINIMUM OF ¼" HIGH WHITE LETTERING.

I. DISTRIBUTION AND SUB–DISTRIBUTION PANELBOARDS SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.

J. POWER PANELBOARDS SHALL BE SIMILAR TO GENERAL ELECTRIC TYPE "QMR" AS MANUFACTURED BY ATLAS SWITCH COMPANY, ELECTRIC SWITCHBOARD COMPANY OR APPROVED EQUAL.

K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLES AND TRIP RATINGS OF BRANCH CIRCUIT BREAKERS TO BE AS INDICATED ON DRAWINGS.

L. PANELBOARD SHALL HAVE ENGRAVED WHITE CORE, BLACK LAMACOID NAMEPLATE SCREWED ONTO PANE TRIM WITH DESIGNATION LISTED (PANELBOARD NAME, VOLTAGE, RATING OR MAINS IN AMPS).

B. MATERIALS

1) RACEWAYS:

a. RIGID STEEL CONDUIT: FULL–WEIGHT PIPE, GALVANIZED, THREADED.

b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADLESS.

c. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.

d. WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16 GAUGE STEEL WITH GROUND CONTINUITY. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW–ON.

e. SURFACE METAL RACEWAY: SIZE AS NOTED. BASE 0.04 IN., COVER 0.25 IN. MATERIAL SHALL BE STEEL. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW–ON.

2) FITTINGS AND ACCESSORIES:

a. RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.

b. ELECTROMETALLIC TUBING: COMPRESSION TYPE. GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER.

c. FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.

d. BUSHINGS: METALLIC INSULATED TYPE.

Proof Not for Engineers

ELECTRICAL SPECIFICATIONS (CONT.)

3) BOXES:

a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED, WITHOUT FIXTURE OR DEVICE: FURNISH BLANK COVER. OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.

b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN NEW AND RENOVATED BOXES BETWEEN 120/208 VOLT AND 265/460 VOLT WIRING AND BETWEEN EMERGENCY AND NORMAL WIRING. FLOOR BOXES SHALL BE SUITABLE FOR CONDUIT AND DEVICES NOTED. RAISED OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH ABOVE FLOOR FITTING. TELEPHONE: BUSHED HOLE. POWER: DUPLEX RECEPTACLE OR OTHER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY. FLUSH OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH FLUSH FLOOR FITTING FOR TELEPHONE AND FLUSH DUAL FLAP COVER WITH DUPLEX RECEPTACLE FOR POWER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY.

C. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.

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

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

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

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

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

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

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

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

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

RACEWAYS PASSING THROUGH FIRE-RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.

D. PROVIDE CABLE SUPPORTS IN ACCORDANCE WITH NATIONAL ELECTRIC CODE ARTICLE 300.19. CABLE SUPPORTS SHALL UTILIZE A ONE-PIECE PLUG WITH POZI-GRIP WEDGING PLUG AS MANUFACTURED BY OZ-GEDNEY. TYPE SF SHALL BE USED FOR ARMORED CABLE.

INSTALL CABLE SUPPORTS AT THE TOP OF A VERTICAL RISE AND PROVIDE INTERMEDIATE ADDITIONAL SUPPORTS AS REQUIRED TO LIMIT SUPPORTED CONDUCTOR LENGTHS TO NOT GREATER THAN THOSE SPECIFIED IN TABLE 300.19(A).

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

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

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

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

9. WIRE AND CABLE:

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

B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 100 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM. AT 265 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.

C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 12 MINIMUM. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.

D. INSULATION SHALL BE RUBBER AND THERMOPLASTIC MEETING ASTM AND IPCEA STANDARDS. TYPE THW OR THWN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. TYPE SFF-2 SHALL BE UTILIZED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG C. FOR UNGROUNDED ISOLATED BRANCH CIRCUITS PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW).

E. ARMORED CABLE (BX) SHALL BE UTILIZED FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILINGS, AND BLOCK WALLS.

F. COLOR CODING SHALL BE AS FOLLOWS:

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

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

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

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

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

I. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF 120/208 AND 265/460 VOLT SYSTEMS, EXCEPT 460 VOLT MOTOR BRANCH CIRCUIT WIRING AND RELATED 120 VOLT CONTROL WIRING. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.

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

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

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

11. WIRING DEVICES:

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

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

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

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

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

1) HEALTH CARE FACILITIES:

a) DUPLEX, 20 AMP, 125 VOLTS, 2 POLE, 3 WIRE, U GROUND SLOT. SIMILAR TO HUBBELL NO. 8300.

b) SINGLE, 20 AMP, 125 VOLT, 2 POLE, 3 WIRE, U GROUND SLOT. SIMILAR TO HUBBELL NO. 8310.

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

F. COLORS: COORDINATE COLORS WITH ARCHITECT.

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

12. LIGHTING FIXTURES:

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

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

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

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

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

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

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

H. EXIT SIGNS SHALL BE PRECISION DIE-CAST ALUMINUM HOUSING WITH LASER-FORMED ACRYLIC LEGEND. EXIT SIGNS SHALL COMPLY WITH UL 924 AND BE MEA APPROVED FOR USE IN CITY. AC POWERED WITH PREMIUM LONG-LIFE NICKEL CADMIUM BATTERY WITH STANDARD UL LISTED 3-HOUR RUN TIME. PROVIDE WITH INTEGRAL AUTOMATIC CHARGER IN A SELF CONTAINED POWER PACK. LED INDICATOR WITH PUSH TO TEST SWITCH.

13. TELEPHONE CONDUIT SYSTEM:

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

B. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF TELEPHONE COMPANY.

C. OUTLETS SHALL BE:

1) WALL: 4 IN. SQUARE WITH BUSHED COVER PLATE.

D. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.

E. CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM OUTLET BOX TO BUSHED END THRU WALL 6" BELOW THE PLASTER CEILING.

F. FACE RACEWAYS IN ROOMS SHALL HUBBELL HBL500, HBL750 OR HBL2000 SERIES OR AS ACCEPTABLE.

14. GROUNDING AND BONDING:

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

B. USE EXOTHERMIC WELDING PROCESS FOR INACCESSIBLE CONNECTIONS.

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

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

E. IN ADDITION, FURNISH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR WHERE INDICATED ON DRAWINGS AND FOR THE FOLLOWING BRANCH CIRCUITS:
1) CIRCUITS SERVING ANY WALL BOX DIMMER.

2) CIRCUITS SERVING ANY ISOLATED GROUND RECEPTACLES. TERMINATE GROUND DIRECTLY AT AN EQUIPMENT GROUNDING CONDUCTOR TERMINAL OF THE SOURCE AT THE SOURCE , OR AS OTHER WISE NOTED ON DRAWINGS.

3) CIRCUITS SERVING ANY DUPLEX OR SIMPLEX COMPUTER RECEPTACLES

4) ANY CIRCUIT SERVED VIA AN ISOLATION TRANSFORMER OR COMPUTER POWER DISTRIBUTION UNIT.

15. PANELBOARDS:

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

B. CIRCUIT BREAKERS SHALL BE OF THE BOLT-ON THERMAL MAGNETIC MOLDED CASE TYPE, AND SHALL HAVE THE TRIP RATINGS AND NUMBER OF POLES SHOWN IN SCHEDULES ON THE CONTRACT DRAWINGS. FOR BLANK (SPACE) COMPARTMENTS, PROVIDE FULL RATED BUS. MINIMUM GUTTER SPACES SHALL BE 5-3/4". SIDES, TOP AND BOTTOM, INCREASE FOR THROUGH FEEDERS. PROVIDE 25% COPPER GROUND BUS AND 100% COPPER NEUTRAL BUS AND INCREASE NEUTRAL BUS INDICATED.

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

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

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

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

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

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

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

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

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

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

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

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

17. SMOKE ALARMS

A. PROVIDE SOLID STATE, PHOTOELECTRIC TYPE, HARD-WIRED SMOKE ALARM WITH 9V BATTERY BACKUP AND INTEGRAL TEMPORAL PATTER EVACUATION HORN. EDWARDS 517 SERIES OR APPROVED EQUAL.

B. THREE POSITION TEST FEATURE THAT SIMULATES ACTUAL SMOKE CONDITIONS. SHALL CONTAIN MAINTENANCE INDICATOR.

C. PROVIDE WITH INTEGRAL 135 DEGREE F ISOLATED HEAT DETECTION OR INTEGRAL RELAY RATED 0.6A AT 125V AC., AS INDICATED ON THE PLANS AND DRAWINGS.

D. DEVICE SHALL BE RATED TO OPERATE AT A RANGE OF 40°f TO 100°F.

E. UL LISTED TO UL217 AND APPROVED FOR USE CITY.

18. INTERCOM CONDUIT SYSTEM:

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

B. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF INTERCOM MANUFACTURER.

C. OUTLETS SHALL BE:

1)WALL: 4 IN. SQUARE WITH SINGLE GANG COVER PLATE.

D. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.

E. CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM EACH APARTMENT TO MAIN INTERCOM CONTROLLER AT ENTRANCE.

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LIGHTING PLAN GENERAL NOTES

A. CONTRACTOR IS ADVISED THAT ADJUSTMENTS TO EMERGENCY AND EXIT LIGHT FIXTURE LOCATIONS/QUANTITIES MAY BE REQUIRED BY AHJ UPON FINAL INSPECTION.

B. SWITCHES LOCATIONS SHOWN IN THE DRAWINGS ARE DIAGRAMMATIC, FOR ACTUAL LOCATION AND MOUNTING HEIGHTS OF SWITCHES REFER TO ARCHITECTURAL PLANS.

C. CIRCUITING FOR LIGHTING FIXTURE IN ROOMS/AREA WITH SWITCHES SHALL BE CONTROLLED BY DESIGNATED SWITCHES. IF SPECIFIC DESIGNATION IS NOT INDICATED, ALL LIGHTING FIXTURES IN ROOM/AREA SHALL BE CONTROLLED BY THE SWITCH INDICATED.

D. REFER TO ARCHITECTURAL DRAWINGS FOR LIGHTING FIXTURE SCHEDULE AND MORE DETAILS. E.C. SHALL COORDINATE WITH ARCHITECT/OWNER FOR FINAL SELECTION, COLOR, FINISH AND MOUNTING DETAILS OF LIGHT FIXTURES.

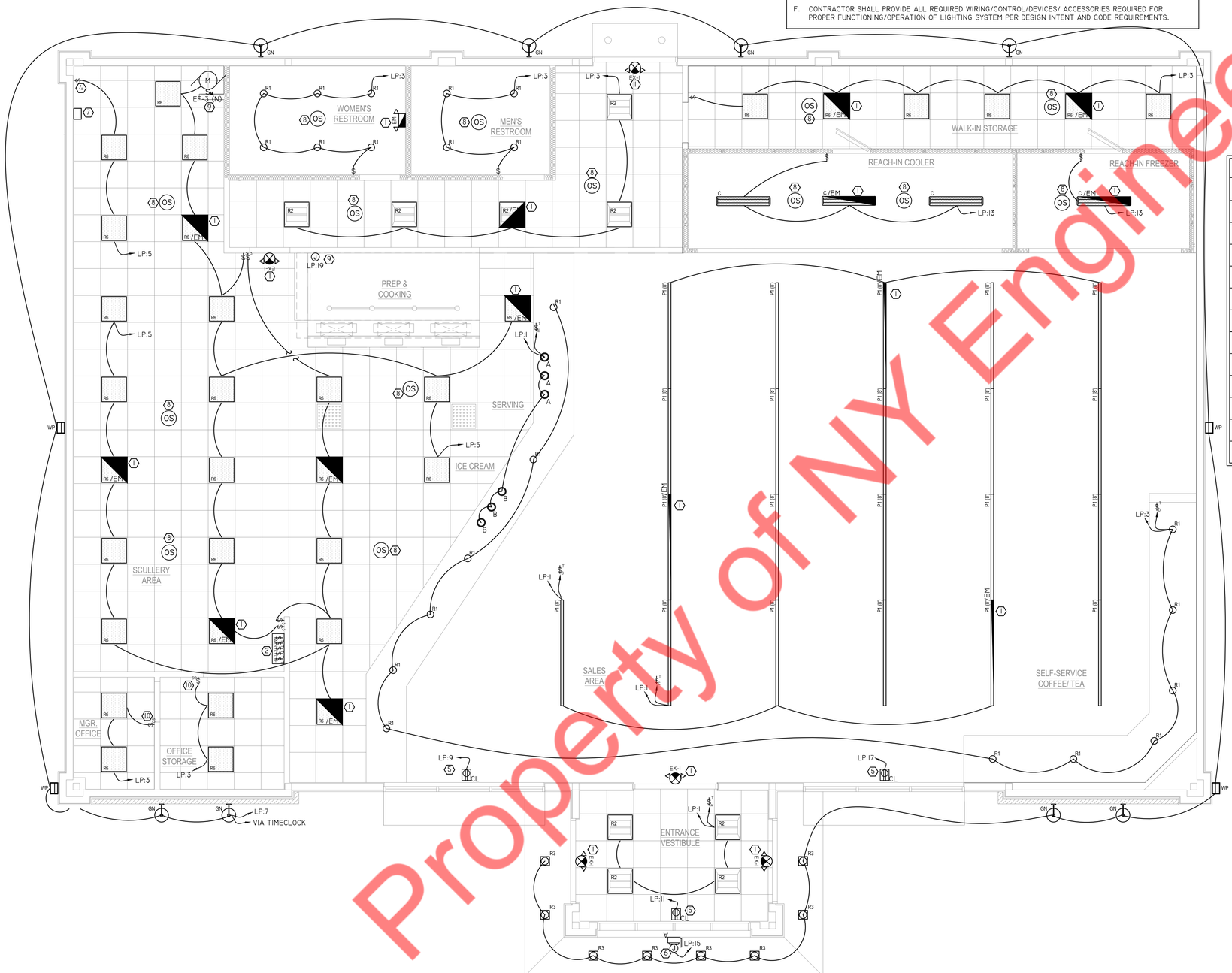
E. CONTRACTOR SHALL PROVIDE THE LIGHTING CONTROLS AND ALL REQUIRED DEVICES/ACCESSORIES/WIRING AS PER LATEST ENERGY CONSERVATION CODE REQUIREMENTS.

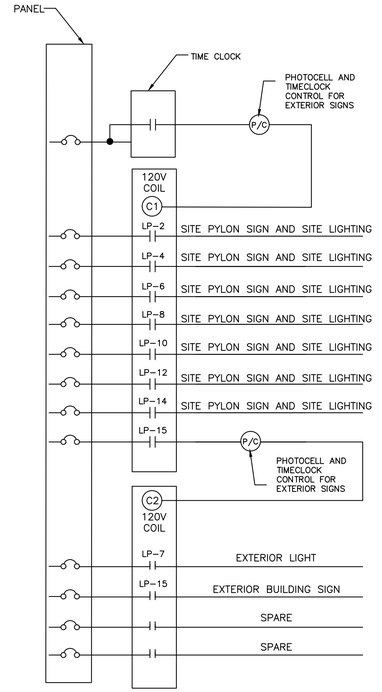
F. CONTRACTOR SHALL PROVIDE ALL REQUIRED WIRING/CONTROL/DEVICES/ ACCESSORIES REQUIRED FOR PROPER FUNCTIONING/OPERATION OF LIGHTING SYSTEM PER DESIGN INTENT AND CODE REQUIREMENTS.

(#) LIGHTING PLAN - LIGHTING KEYED WORK NOTES

1. WIRE ALL EMERGENCY, EXIT AND NIGHT LIGHT TO THE NEAREST CIRCUIT AHEAD OF ALL CONTROLS & SWITCHING FOR CONTINUOUS OPERATION.
2. E.C SHALL COORDINATE EXACT LOCATION OF TIMER SWITCH BANK IN FIELD WITH ARCHITECT/OWNER.
3. INTERLOCK EF-3(N) WITH LIGHTS IN SAME AREA . E.C TO COORDINATE WITH MECHANICAL DRAWINGS.
4. LIGHTING NEAR ELECTRICAL PANEL SHALL NOT BE CONTROLLED BY ANY AUTOMATIC MEANS ONLY AND SHALL BE COMPLIED AS PER NEC 110.26(D).
5. PROVIDE SHOW WINDOW RECEPTACLE AS PER NEC 210.62. VERIFY EXACT LOCATION WITH ARCHITECT/OWNER.
6. PROVIDE WP JUNCTION BOX AND 120V IP DISCONNECT FOR CONNECTION TO EXTERIOR SIGN. COORDINATE LOCATIONS/MOUNTING PER ARCHITECTURAL PLANS. COORDINATE LOCATION AND MOUNTING HEIGHT PRIOR TO ROUGH-IN. WIRE THROUGH ASTRONOMIC TIMECLOCK.
7. E.C. SHALL COORDINATE EXACT LOCATION OF ASTRONOMIC TIMECLOCK IN FIELD WITH ARCHITECT/OWNER.
8. CEILING MOUNTED LOW VOLTAGE OCCUPANCY SENSOR EQUAL TO KASON . PROVIDE POWER PACK(S) AS REQUIRED. INTERCONNECT OCCUPANCY SENSORS SO THAT ANY SENSOR WILL TRIGGER ALL LIGHTS. SET OFF TIME AS PER AHJ REQUIREMENT.
9. E.C SHALL PROVIDE THE HOOD LIGHTING AS PER THE HOOD MANUFACTURE AND REFER HOOD DRAWING.
10. DUAL TECH WALL OCCUPANCY SENSOR EQUAL TO WATTSTOPPER PW-100.

SR. NO.	TYPE	DESCRIPTION	MANUFACTURER	VOLTAGE	WATTAGE (W)
1.	PI	8' SUSPENDED LINEAR LIGHTS	SES-FR-96L-S62W6200L-DMV-35K-BK BY TFC	120V	62W
2.	RI	6" RECESSED LED DOWNLIGHT	RC6/CR6T-1600L-35K BY CREE	120V	21W
3.	R2	2X2 LAY-IN TROFFER LED LIGHT	CR22-32L-35K-S-HD BY CREE	120V	32W
4.	R6	2X2 LAY-IN LED LIGHT FIXTURE	SFP22-LED-UE-30-DIM-35-U BY LSI	120V	30W
5.	R6/EM	2X2 LAY-IN LED LIGHT FIXTURE	SFP22-LED-UE-30-DIM-35-U-EM BY LSI	120V	30W
6.	GN	GOOSENECK	RLM-15LED-(VERIFY)-S3-RB-U BY HUBBELL	120V	38W
7.	R3	EXTERIOR LED RECESSED DOWNLIGHT	LCD4-LED-24L-UNV-DIMI-40-FL BY LSI	120V	22W
8.	WP	EXTERIOR WALL PACK	TWRI LED-P2-50K-MVOLT BY LITHONIA LIGHTING	120V	40W
9.	A	HEAT LAMPS	DL-1700-RCL BY HATCO	120V	2W
9.	B	DECORATIVE LAMPS	DL-1700-RCL BY HATCO	120V	2W
10.	EM	2-HEAD EMERGENCY BATTERY PACK	MPRIO-ABB-EMERGI-LITE	120V	5W
11.	EX-I	COMBO LED EXIT SIGN W/LIGHT HEADS (WHITE)	VLED-U-WH-EL90 BY EXITRONIX	120V	3W
12.	C	WALK-IN LIGHT FIXTURES	TBD	120V	45.2W





A1 LIGHTING PLAN

SCALE: 1/4" = 1'-0"

M1 EXTERIOR LIGHTING AND SIGNAGE CONTROL DETAILS

SCALE: 1/4" = 1'-0"

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POWER PLAN GENERAL NOTES

A. ALL RECEPTACLES IN THE KITCHEN AREA SHALL BE "GFCI" PROTECTED IN ACCORDANCE WITH NEC ART. 210.8(B). GFCI RECEPTACLES, ONCE INSTALLED, SHALL BE READILY ACCESSIBLE.IF GFCI RECEPTACLE IS NOT READILY ACCESSIBLE, PROVIDE GFCI RATED CIRCUIT BREAKER IN THE PANEL.

B. SEE ARCHITECTURAL ELEVATIONS FOR PLACEMENT AND MOUNTING OF DEVICES.

C. E.C. SHALL VERIFY THE EXACT ELECTRICAL REQUIREMENT INCLUDING RECEPTACLE, PLUG/CIRCUIT BREAKER AND CABLES FOR ALL THE KITCHEN EQUIPMENTS IN FIELD AND ACCORDINGLY PROVIDE THE ELECTRICAL CONNECTION FOR ALL KITCHEN EQUIPMENTS AS REQUIRED. BASE BID ACCORDINGLY.

D. E.C. TO PROVIDE LABEL ON EACH OUTLET AND DISCONNECT MEANS INDICATING THE POWER SOURCE PANEL AND CIRCUIT NUMBER.

E. E.C. HAS OPTION TO PROVIDE CORD-AND-PLUG-CONNECTED INSTEAD OF DISCONNECT SWITCH FOR LOCAL DISCONNECT MEANS. THE SEPARABLE CONNECTOR SHALL BE ACCESSIBLE, THE RATING SHALL NOT BE LESS THAN THE OVER-CURRENT DEVICE.

F. VERIFY ALL FUSE SIZES AND TYPES WITH THE AIR CONDITIONING EQUIPMENT MANUFACTURER PRIOR TO INSTALLATION.

G. REVIEW THE MECHANICAL PLANS FOR ALL THE HVAC EQUIPMENT CONTROL REQUIREMENTS AND SCOPE OF WORK PRIOR TO BIDDING AND INCLUDE ALL COSTS IN BID.

H. SEE MECHANICAL DRAWINGS FOR EXACT LOCATIONS OF MECHANICAL EQUIPMENT. PROVIDE RACEWAY SYSTEM FOR ALL CONTROL WIRING AS REQUIRED BY DETAIL ON MECHANICAL DRAWING.

I. ELECTRICAL CONTRACTOR TO VERIFY WITH MANUFACTURER FOR ALL KITCHEN EQUIPMENT POWER/CONNECTION REQUIREMENTS AND VERIFY WITH OWNER FOR ALL OUTLET HEIGHTS BEFORE ROUGH-IN.

J. ANY NEW WIRING TO BE COPPER AND RUN IN CONDUIT, INCLUDING LOW VOLTAGE.

(#) FLOOR PLAN - POWER KEYED WORK NOTES

1. E.C SHALL COORDINATE EXACT LOCATION AND POWER REQUIREMENT OF REMOTE PULL STATION IN FIELD WITH ARCHITECT/OWNER/MECHANICAL CONTRACTOR.
2. COORDINATE OUTLET AND DATA POINT WITH OWNER/ARCHITECT FOR DESK/KIOSK/POS STATIONS/MONITORS.
3. E.C SHALL COORDINATE EXACT POWER REQUIREMENT OF BUBBLER BEVERAGE DISPENSER IN FIELD WITH ARCHITECT/OWNER. PROVIDE ELECTRICAL CONNECTIONS ACCORDINGLY.
4. WALK-IN COOLER/FREEZER EVAPORATOR. E.C SHALL COORDINATE EXACT LOCATION AND POWER REQUIREMENT IN FIELD WITH OWNER/MECHANICAL CONTRACTOR/EQUIPMENT MANUFACTURER.
5. E.C. TO COORDINATE THE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF PLUMBING EQUIPMENTS WITH PLUMBING CONTRACTOR/EQUIPMENT SUPPLIER. PROVIDE THE ELECTRICAL CONNECTION AS PER FINAL SELECTION OF PLUMBING EQUIPMENT IN FIELD.
6. E.C. TO COORDINATE THE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF MECHANICAL EQUIPMENTS WITH MECHANICAL CONTRACTOR/EQUIPMENT SUPPLIER. PROVIDE THE ELECTRICAL CONNECTION AS PER FINAL SELECTION OF MECHANICAL EQUIPMENT IN FIELD.
7. INTERLOCK EF-1(N) & EF-2(N) WITH RTU-2(N). E.C TO COORDINATE WITH MECHANICAL DRAWINGS.
8. NEW 600A, 120/208V, 3 PHASE, 4 WIRE ELECTRICAL METER AND CT CABINET FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
9. NEW 600A, 120/208V, 3 PHASE, 4 WIRE FUSED DISCONNECT SWITCH FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
10. NEW 600A, 120/208V GENERATOR DOCKING STATION. E.C SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
11. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "LP" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "LP" IN FIELD WITH ARCHITECT/OWNER.
12. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "A" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "A" IN FIELD WITH ARCHITECT/OWNER.
13. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "B" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "B" IN FIELD WITH ARCHITECT/OWNER.
14. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "C" FOR FUTURE GAS PUMP FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "C" IN FIELD WITH ARCHITECT/OWNER.
15. E.C.TO PROVIDE CLEAR SPACE IN FRONT OF ELECTRICAL PANELS AS PER NEC 110.26(A).
16. J-BOX FOR HOOD CONTROL. COORDINATE THE LOCATION WITH ARCHITECT PRIOR TO ROUGH- IN.
17. G.C. TO PROVIDE RAISED OUTLET BOX AT SLAB. E.C. SHALL COORDINATE EXACT LOCATION OF THE OUTLET BOX IN FIELD WITH ARCHITECT/OWNER. PROVIDE CONNECTION ACCORDINGLY.
18. NEW 600A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "MDP" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "MDP" IN FIELD WITH ARCHITECT/OWNER.
19. ALL 15/20A RECEPTACLES IN THE RECEPTION SHALL BE TAMPER RESISTANCE AS PER NEC 406.12(5).
20. PROVIDE (QTY.3) 1" CONDUITS FOR POWER AND (QTY.1) 1" CONDUIT FOR DATA. ELECTRICAL STUB UP LOCATION. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE FURNITURE SYSTEM VENDOR FOR THE ELECTRICAL ROUGH-INS. MAKE POWER PROVISION AND BASE BID ACCORDINGLY. COORDINATE WITH OWNER FOR THE EXACT NUMBER OF OUTLETS/DATA POINTS REQUIREMENTS AT THE WORKSTATION.
21. E.C SHALL PROVIDE THE FLOOR MOUNTED RECEPTACLES FOR THE PRODUCT GONDOLAS. E.C SHALL COORDINATE WITH THE ARCHITECT/OWNER FOR THE EXACT LOCATION AND POWER REQUIREMENT OF THE FLOOR MOUNTED RECEPTACLES. BASE BID ACCORDINGLY.
22. E.C SHALL COORDINATE WITH THE ARCHITECT/OWNER/VENDOR FOR THE EXACT POWER REQUIREMENT OF THE ATM MACHINE. BASE BID ACCORDINGLY.
23. CONDUITS FOR FUEL BLACK BOX TO RUN UNDERGROUND TO POS COUNTER.
24. VENDOR TO ROUTE FUEL DETECTION WALL MOUNTED BOX WITH 2" ROUTED CONDUIT. COORDINATE WITH OWNER FOR EXACT REQUIREMENT IN FIELD. BASE BID ACCORDINGLY.
25. PROVIDE LOWER OUTLETS FOR COUNTERTOP EQUIPMENT AT WINDOW AS REQUIRED. E.C SHALL COORDINATE EXACT MOUNTING HEIGHT WITH THE ARCHITECT/OWNER. BASE BID ACCORDINGLY.
26. FUEL POWER MANAGEMENT SYSTEM. E.C SHALL COORDINATE WITH THE OWNER/VENDOR FOR THE EXACT REQUIREMENT AND SCOPE OF WORK AND LIABILITIES. PROVIDE POWER PROVISION AS REQUIRED. BASE BID ACCORDINGLY

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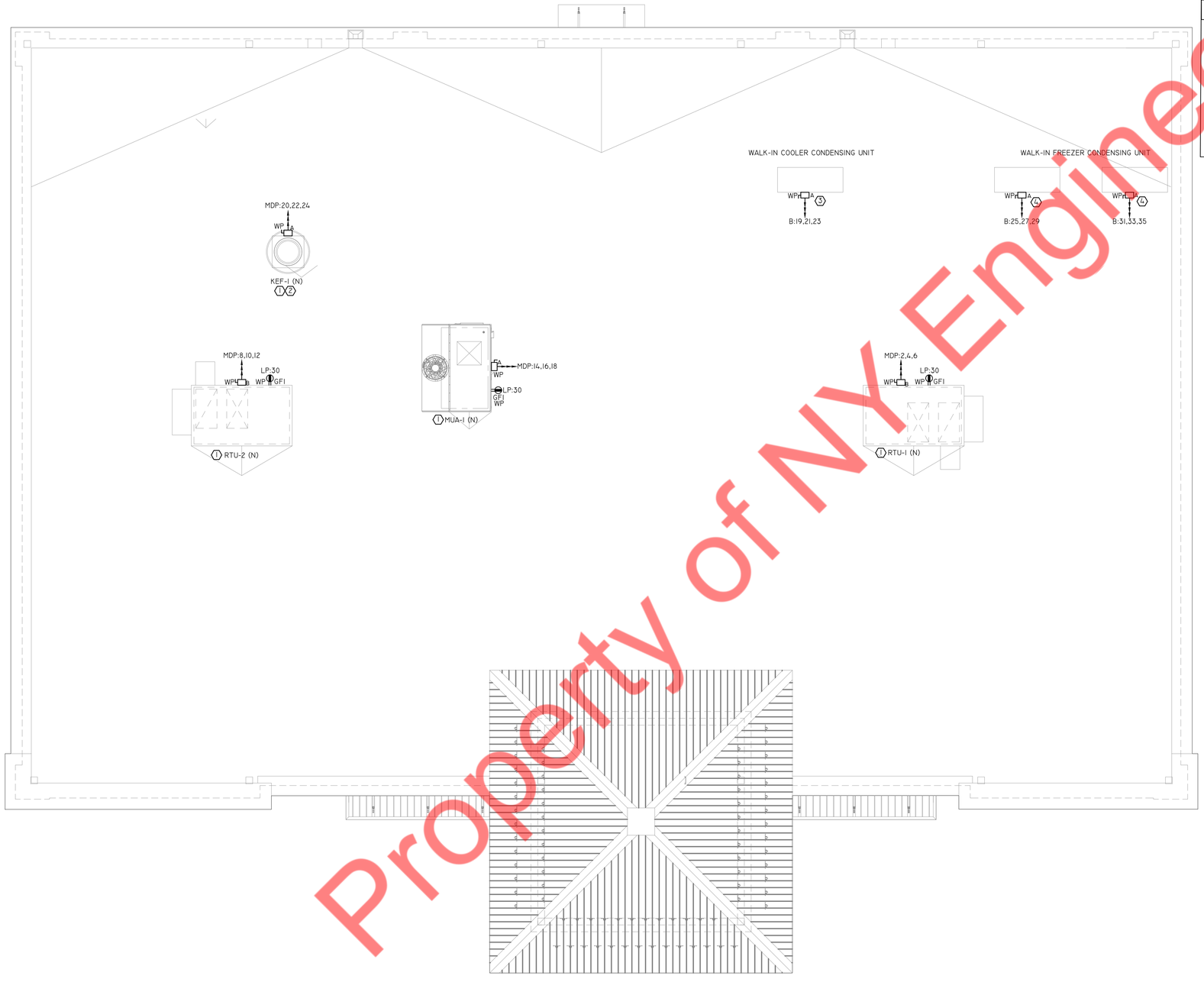
A1 FLOOR POWER PLAN

SCALE: 1/4" = 1'-0"



ROOF POWER PLAN GENERAL NOTES

A. ALL ROOF MOUNTED EQUIPMENT SHALL BE IN NEMA-3R ENCLOSURES.

B. ALL ROOF RECEPTACLES SHALL BE GFI & WP TYPE.

C. VERIFY ALL FUSE SIZES AND TYPES WITH THE AIR CONDITIONING EQUIPMENT MANUFACTURER PRIOR TO INSTALLATION.

D. REVIEW THE MECHANICAL PLANS FOR ALL THE HVAC EQUIPMENT CONTROL REQUIREMENTS AND SCOPE OF WORK PRIOR TO BIDDING AND INCLUDE ALL COSTS IN BID.

E. SEE MECHANICAL DRAWINGS FOR EXACT LOCATIONS OF MECHANICAL EQUIPMENT. PROVIDE RACEWAY SYSTEM FOR ALL CONTROL WIRING AS REQUIRED BY DETAIL ON MECHANICAL DRAWING.

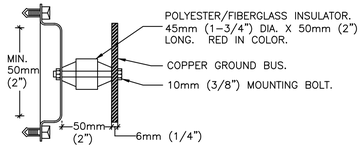
(#) FLOOR PLAN - POWER KEYED WORK NOTES

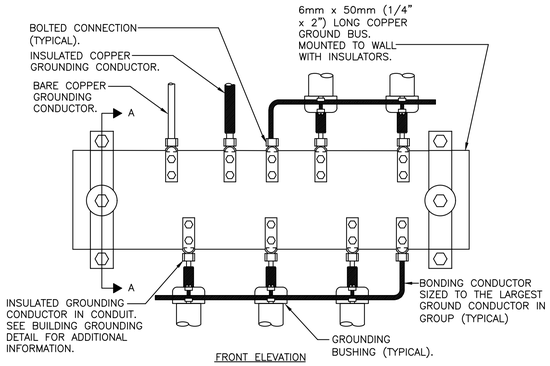
1. E.C TO COORDINATE THE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF MECHANICAL EQUIPMENTS WITH MECHANICAL CONTRACTOR/EQUIPMENT SUPPLIER. PROVIDE THE ELECTRICAL CONNECTION AS PER FINAL SELECTION OF MECHANICAL EQUIPMENT IN FIELD. BASE BID ACCORDINGLY.
2. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT POWER SUPPLY AND CONTROL REQUIREMENTS OF THE FAN. PROVIDE ELECTRICAL CONNECTIONS ACCORDINGLY.
3. WALK-IN COOLER CONDENSING UNIT. E.C SHALL COORDINATE EXACT LOCATION AND POWER REQUIREMENT IN FIELD WITH OWNER/MECHANICAL CONTRACTOR/EQUIPMENT MANUFACTURER.
4. WALK-IN FREEZER CONDENSING UNIT. E.C SHALL COORDINATE EXACT LOCATION AND POWER REQUIREMENT IN FIELD WITH OWNER/MECHANICAL CONTRACTOR/EQUIPMENT MANUFACTURER.

Property of NY Engineers

A1 ROOF POWER PLAN

SCALE: 1/4" = 1'-0"

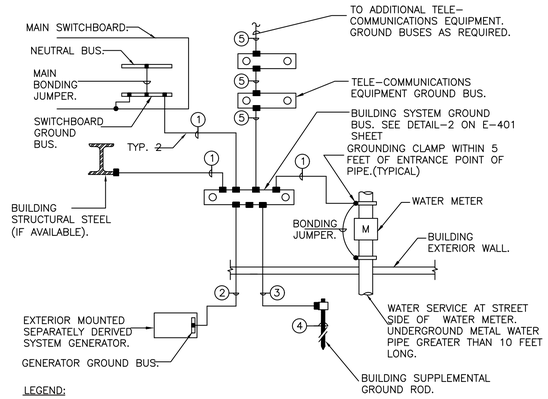




NOTES:

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

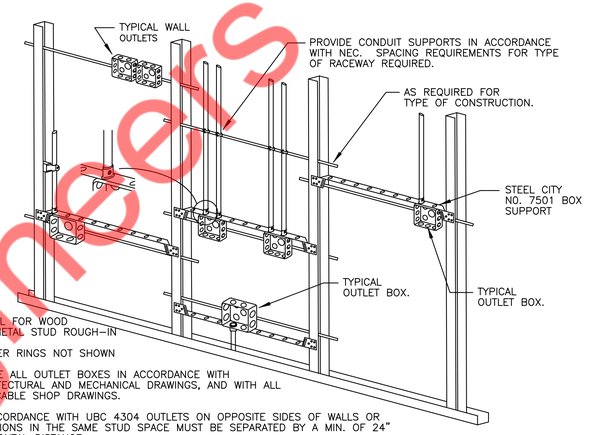
6 / E2.0 BUILDING ELECTRICAL SYSTEMS GROUND BUS
N.T.S



LEGEND:

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

4 / E2.0 BUILDING GROUNDING ELECTRODE SYSTEM
N.T.S



NOTES:

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

2 / E2.0 DETAIL TYPICAL ROUGH-IN REQUIREMENTS
N.T.S

MANUAL MODE OPERATION:

1. PUSHBUTTON PRESS IS REQUIRED TO TURN LOAD ON.
2. LOAD TURNS OFF WHEN SENSOR TIMES OUT OR BY PRESSING PUSH BUTTON.

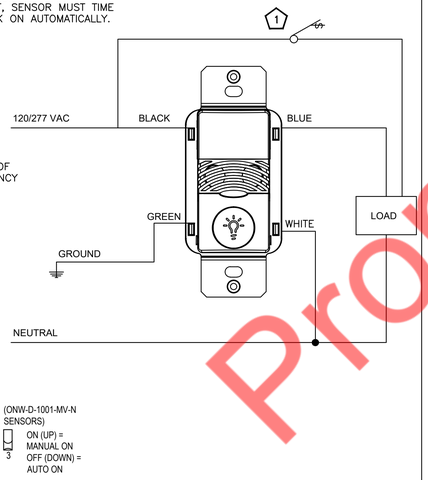
AUTOMATIC MODE OPERATION:

1. WHEN SENSOR ACTIVATES LOAD TURNS ON.
2. PUSHBUTTON CAN BE USED TO TURN LOAD ON OR OFF. IF PUSHBUTTON IS USED TO TURN LOAD OFF, SENSOR MUST TIME OUT FIRST, BEFORE LOAD CAN TURN BACK ON AUTOMATICALLY.

SENSOR TYPES INCLUDE:

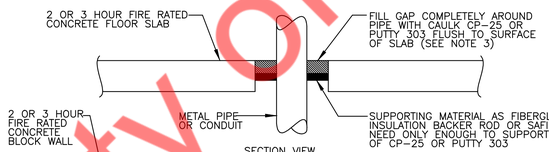
ONW-D-1001-MV-N

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

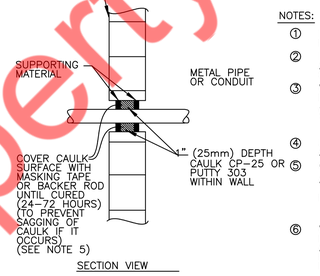


(ONW-D-1001-MV-N SENSORS)
ON (UP) = MANUAL ON
OFF (DOWN) = AUTO ON

5 / E2.0 CONNECTION) OCCUPANCY/VACANCY-SINGLE LEVEL WIRING DIAGRAM-LOW VOLTAGE WALL SWITCH SENSOR(NEUTRAL
N.T.S



SECTION VIEW



SECTION VIEW

NOTES:

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

WET DEPTH	PIPE SIZE	FIRE RATING
1/2" (13mm)	MAX. 8" (203mm)	2 HRS.
2" (25mm)	MAX. 6" (152mm)	3 HRS.

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

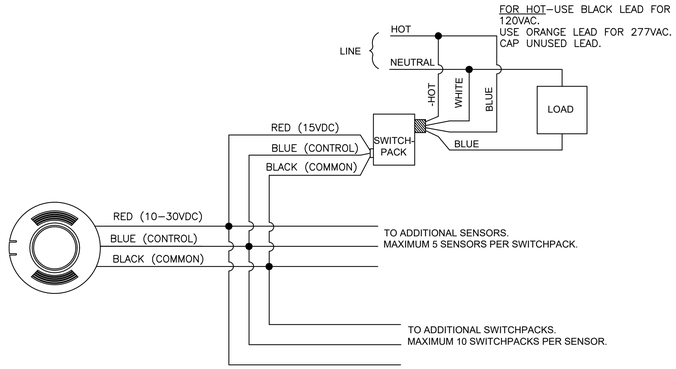
3 / E2.0 FIRE STOP DETAIL
N.T.S

AUTOMATIC MODE OPERATION

1. WHEN SENSOR ACTIVATES, LOAD TURNS ON.
2. LOAD TURNS OFF, WHEN SENSOR TIMES OUT.

RECOMMENDED WIRE

18-3 AWG STRANDED WIRE SHIELDED OR NON-SHIELDED



1 / E2.0 OCCUPANCY - AUTO ON/OFF. WIRING DIAGRAM - LOW VOLTAGE CEILING SENSOR
N.T.S

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PANEL:	MDP (NEW)											MOUNTING:	SURFACE
120/208	VOLTS,	3	PHASE,		4	WIRE						PANEL LOCATION:	BOH
MCB:	600A	MLO:	NA		BUS:	600A	MIN.					FED FROM:	ATS SWITCH

NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA) A	B	C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1			O	8.43		14.31				5.88	H			2
3	200A/3P	PANEL-LP	O	8.43	4#3/0, #6G, 2"C		14.31		3#6, #10G, 3/4"C	5.88	H	RTU-1 (N)	60/3P	4
5			O	8.43				14.31		5.88	H			6
7			O	13.66		19.54				5.88	H			8
9	200A/3P	PANEL-A	O	13.66	4#3/0, #6G, 2"C		19.54		3#6, #10G, 3/4"C	5.88	H	RTU-2 (N)	60/3P	10
11			O	13.66				19.54		5.88	H			12
13			O	10.97		14.38				3.41	H			14
15	200A/3P	PANEL-B	O	10.97	4#3/0, #6G, 2"C		14.38		3#10, #10G, 3/4"C	3.41	H	MUA-1 (N)	30/3P	16
17			O	10.97				14.38		3.41	H			18
19			O	10.00		10.69				0.69	H			20
21	200A/3P	PANEL-C	O	10.00	4#3/0, #6G, 2"C		10.69		3#10, #10G, 3/4"C	0.69	H	KEF-1 (N)	30/3P	22
23			O	10.00				10.69		0.69	H			24
25						0.00						SPARE	20	26
27							0.00					SPARE	20	28
29								0.00				SPARE	20	30
31						0.00						SPARE	20	32
33							0.00					SPARE	20	34
35								0.00				SPARE	20	36
37						0.00						SPARE	20	38
39							0.00					SPACE		40
41								0.00				SPACE		42
		TOTAL CONNECTED LOAD (KVA)				58.92	58.92	58.92						

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	0.00	125%	0.00			
TOTAL RECEPTACLE	R	0.00	100%	0.00	TOTAL CONNECTED LOAD	176.75	KVA
TOTAL HVAC	H	47.55	100%	47.55	TOTAL DEMAND LOAD	176.75	KVA
TOTAL MOTOR	M	0.00	100%	0.00	TOTAL CONNECTED CURRENT	491.20	AMP
TOTAL KITCHEN/EQUIPMENTS	E	0.00	100%	0.00	TOTAL DEMAND CURRENT	491.20	AMP
TOTAL OTHER/MISCILLANEOUS	O	129.20	100%	129.20	SYSTEM VOLTAGE	120/208 Wye	

PANEL:	LP (NEW)											MOUNTING:	SURFACE
120/208	VOLTS,	3	PHASE,		4	WIRE						PANEL LOCATION:	BOH
MCB:	200A	MLO:	NA		BUS:	225A	MIN.					FED FROM:	MDP PANEL

NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA) A	B	C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	SALES & SERVICE AREA LIGHTING	L	1.30	2#12, #12G, 3/4"C	2.34			2#12, #12G, 3/4"C	1.04	L	LTG- SITE POLES (FUTURE)	20/2P	2
3	20	OFFICES/ RR/ WALK IN STORAGE LIGHTS	L	0.90	2#12, #12G, 3/4"C		1.94			1.04	L			4
5	20	SCULLERY/ BOH LIGHTS+EF-3	L	1.20	2#12, #12G, 3/4"C			2.24	2#12, #12G, 3/4"C	1.04	L	LTG- SITE POLES (FUTURE)	20/2P	6
7	20	EXTERIOR LIGHTS	L	0.75	2#12, #12G, 3/4"C	1.79				1.04	L			8
9	20	SHOW WINDOW RECEPTACLE	L	1.20	2#12, #12G, 3/4"C		2.40		2#12, #12G, 3/4"C	1.20	L	LTG- MONUMENT SIGN (FUTURE)	20	10
11	20	SHOW WINDOW RECEPTACLE	L	1.20	2#12, #12G, 3/4"C			2.40	2#12, #12G, 3/4"C	1.20	L	LTG- CANOPY SIGNS (FUTURE)	20	12
13	20	WALK IN BOX LIGHTS	L	0.30	2#12, #12G, 3/4"C	1.98			2#12, #12G, 3/4"C	1.68	L	LTG- GAS CANOPY (FUTURE)	20	14
15	20	BUILDING SIGNAGE	L	1.20	2#12, #12G, 3/4"C		1.71		2#12, #12G, 3/4"C	0.51	M	EF-1 (N)	20	16
17	20	SHOW WINDOW RECEPTACLE	L	1.20	2#12, #12G, 3/4"C			1.71	2#12, #12G, 3/4"C	0.51	M	EF-2 (N)	20	18
19	20	HOOD LIGHTS	L	0.50	2#12, #12G, 3/4"C	1.04			2#12, #12G, 3/4"C	0.54	R	FLOOR MOUNTED RECEPTACLES	20	20
21	20	SPARE					0.54		2#12, #12G, 3/4"C	0.54	R	FLOOR MOUNTED RECEPTACLES	20	22
23	20	SPARE						0.18	2#12, #12G, 3/4"C	0.18	R	ATM MACHINE RECEPTACLE	20	24
25	20	SPARE				0.18			2#12, #12G, 3/4"C	0.18	R	ATM MACHINE RECEPTACLE	20	26
27	20	SPARE					0.00					SPARE	20	28
29	20	SPARE						0.36	2#12, #12G, 3/4"C	0.36	R	ROOF RECEPTACLES	20	30
31		SPACE				0.00						SPARE	20	32
33		SPACE					0.00					SPARE	20	34
35		SPACE						0.00				SPARE	20	36
37		SPACE				0.00						SPARE	20	38
39		SPACE					0.00					SPACE		40
41		SPACE						0.00				SPACE		42
		TOTAL CONNECTED LOAD (KVA)				7.33	6.59	6.89						

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	17.99	125%	22.49			
TOTAL RECEPTACLE	R	1.80	100%	1.80	TOTAL CONNECTED LOAD	20.80	KVA
TOTAL HVAC	H	0.00	100%	0.00	TOTAL DEMAND LOAD	25.30	KVA
TOTAL MOTOR	M	1.01	100%	1.01	TOTAL CONNECTED CURRENT	57.81	AMP
TOTAL KITCHEN/EQUIPMENTS	E	0.00	65%	0.00	TOTAL DEMAND CURRENT	70.31	AMP
TOTAL OTHER/MISCILLANEOUS	O	0.00	100%	0.00	SYSTEM VOLTAGE	120/208 Wye	

PANEL:	A (NEW)											MOUNTING:	SURFACE
120/208	VOLTS,	3	PHASE,		4	WIRE						PANEL LOCATION:	BOH
MCB:	200A	MLO:	NA		BUS:	225A	MIN.					FED FROM:	MDP PANEL

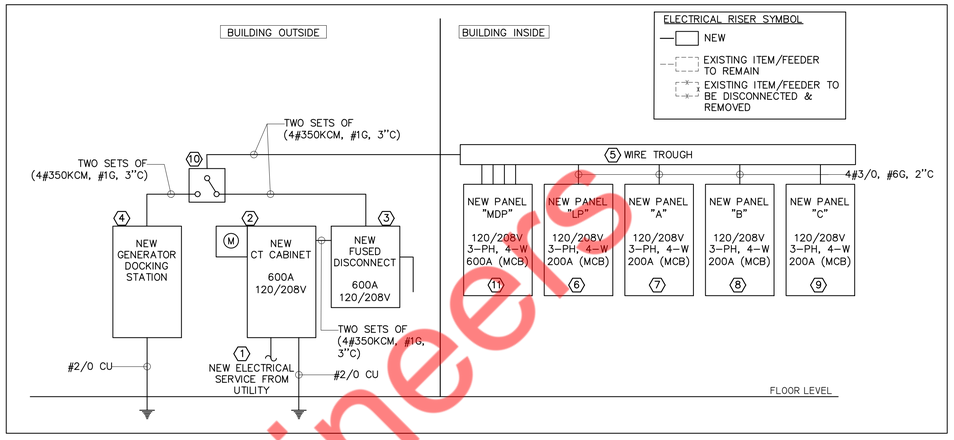
NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA) A	B	C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	#32_REFRIGERATED AIR CURTAIN MERCHANDISER	E	1.92	2#12, #12G, 3/4"C	2.46			2#12, #12G, 3/4"C	0.54	R	POS RECEPTACLES	20	2
3	30/2P	#29_ESPRESSO MACHINE	E	2.50	2#10, #10G, 3/4"C		3.04		2#12, #12G, 3/4"C	0.54	R	POS RECEPTACLES	20	4
5			E	2.50				3.04	2#12, #12G, 3/4"C	0.54	R	POS RECEPTACLES	20	6
7	20	#38_CREAMER DISPENSER	E	1.80	2#12, #12G, 3/4"C	2.22			2#12, #12G, 3/4"C	0.42	E	#51_ICE CREAM DIPPING CABINET	20	8
9	30/2P	#27_BEAN TO CUP MACHINE	E	2.50	2#10, #10G, 3/4"C		2.68		2#12, #12G, 3/4"C	0.18	E	#42_COUNTERTOP DISPLAY REFRIGERATOR	20	10
11			E	2.50				4.80	2#10, #10G, 3/4"C	2.30	E	#47_HOT FOOD DROP-IN WELL	20	12
13	20	#57_COUNTERTOP BAKERY CASE	E	0.18	2#12, #12G, 3/4"C	0.76			2#12, #12G, 3/4"C	0.58	E	#45_PREP TABLE, MEGA TOP SEE-THRU LID	20	14
15	30/2P	#27_BEAN TO CUP MACHINE	E	2.50	2#10, #10G, 3/4"C		4.16		2#12, #12G, 3/4"C	1.66	E	#44_HIGH SPEED OVEN	20/2P	16
17			E	2.50				4.16		1.66	E			18
19	20	#38_CREAMER DISPENSER	E	1.80	2#12, #12G, 3/4"C	3.46			2#12, #12G, 3/4"C	1.66	E	#44_HIGH SPEED OVEN	20/2P	20
21	20	#2_COLD BREW COFFEE MACHINE	E	1.44	2#12, #12G, 3/4"C		3.10			1.66	E			22
23	20	#36_ICE MAKER, NUGGET STYLE	E	1.61	2#12, #12G, 3/4"C			4.42		2.81	E	#40_OVEN, CONVEYOR	40/2P	24
25	20/2P	#31_FROZEN BEVERAGE DISPENSER	E	3.12	2#12, #12G, 3/4"C	5.93			2#8, #10G, 3/4"C	2.81	E			26
27			E	3.12			3.12					SHUNT-TRIP		28
29	20/2P	#31_FROZEN BEVERAGE DISPENSER	E	3.12	2#12, #12G, 3/4"C			4.92	2#12, #12G, 3/4"C	1.80	E	#43_PRESSURE FRYER, GAS	20	30
31			E	3.12		3.74			2#12, #12G, 3/4"C	0.62	E	#55_BLENDER	20	32
33	20	#35_BEVERAGE & ICE DISPENSER	E	0.69	2#12, #12G, 3/4"C		1.31		2#12, #12G, 3/4"C	0.62	E	#55_BLENDER	20	34
35	20	SPARE						0.25	2#12, #12G, 3/4"C	0.25	E	#14_UNDERCOUNTER REFRIGERATOR	20	36
37	20	#33_BUBBLER	E	0.63	2#12, #12G, 3/4"C	2.19			2#12, #12G, 3/4"C	1.55	E	#34_ICE MAKER, NUGGET STYLE	20	38
39	20	#33_BUBBLER	E	0.63	2#12, #12G, 3/4"C		2.43		2#12, #12G, 3/4"C	1.80	E	#43_PRESSURE FRYER, GAS	20	40
41	20	SPARE						0.00				SPACE		42
		TOTAL CONNECTED LOAD (KVA)				20.76	19.85	21.58						

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	0.00	125%	0.00			
TOTAL RECEPTACLE	R	1.62	100%	1.62	TOTAL CONNECTED LOAD	62.19	KVA
TOTAL HVAC	H	0.00	100%	0.00	TOTAL DEMAND LOAD	40.99	KVA
TOTAL MOTOR	M	0.00	100%	0.00	TOTAL CONNECTED CURRENT	172.81	AMP
TOTAL KITCHEN/EQUIPMENTS	E	60.57	65%	39.37	TOTAL DEMAND CURRENT	113.90	AMP
TOTAL OTHER/MISCILLANEOUS	O	0.00	100%	0.00	SYSTEM VOLTAGE	120/208 Wye	

1 ELECTRICAL PANEL SCHEDULES

SCALE: NTS



(#) RISER DIAGRAM KEYED WORK NOTES

1. NEW 600A, 120/208V, 3 PHASE, 4 WIRE ELECTRICAL SERVICE FOR PROJECT SPACE. E.C. SHALL COORDINATE WITH THE LAND LORD/OWNER/UTILITY PROVIDER FOR EXACT POWER DISTRIBUTION.
2. NEW 600A, 120/208V, 3 PHASE, 4 WIRE ELECTRICAL METER AND CT CABINET FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
3. NEW 600A, 120/208V, 3 PHASE, 4 WIRE FUSED DISCONNECT SWITCH FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
4. NEW 600A, 120/208V GENERATOR DOCKING STATION. E.C SHALL COORDINATE WITH LANDLORD/OWNER FOR THE EXACT LOCATION IN FIELD.
5. NEW 600A, 120/208V, 3 PHASE, 4 WIRE ELECTRICAL WIRE TROUGH FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH OWNER/ARCHITECT FOR THE EXACT LOCATION OF ELECTRICAL WIRE TROUGH IN FIELD.
6. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "LP" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "LP" IN FIELD WITH ARCHITECT/OWNER.
7. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "A" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "A" IN FIELD WITH ARCHITECT/OWNER.
8. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "B" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "B" IN FIELD WITH ARCHITECT/OWNER.
9. NEW 200A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "C" FOR FUTURE GAS PUMP FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "C" IN FIELD WITH ARCHITECT/OWNER.
10. E.C. SHALL COORDINATE THE EXACT LOCATION OF AUTOMATIC TRANSFER SWITCH IN FIELD WITH ARCHITECT/OWNER.
11. NEW 600A (MCB), 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "MDP" FOR THE PROJECT SPACE. E.C. SHALL COORDINATE THE EXACT LOCATION OF ELECTRICAL PANEL "MDP" IN FIELD WITH ARCHITECT/OWNER.

RISER DIAGRAM GENERAL NOTES

A. E.C. SHALL COORDINATE WITH UTILITY/OWNER FOR INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION.

B. ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (ISC) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO BID..

C. E.C. SHALL COORDINATE WITH LANDLORD/OWNER FOR ALL LANDLORD PROVIDED EQUIPMENT AND VERIFY ITS OPERABLE CONDITION. REPLACE IF INOPERABLE. BASE BID ACCORDINGLY.

D. VERIFY SCOPE OF WORK WITH LANDLORD/OWNER PRIOR TO BID.

BUILDING ELECTRICAL SERVICE LOAD SUMMARY
VOLTAGE: 208V/120, 3-PHASE, 4W

SR. NO.	LOAD TYPE	CONNCETED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
1	LIGHTING / SHOW WINDOW / SIGN	17.49	125%	21.86
2	RECEPTACLES	8.62	100%	9.31
3	HVAC	67.26	100%	67.26
4	KITCHEN	65.06	65%	42.29
6	MOTOR	1.01	100%	1.01
7	LARGEST MOTOR	0.51	25%	0.13
8	OTHER / MISC.	32.20	100%	32.20
	TOTAL LOAD (KVA)	191.65		174.06

TOTAL CONNECTED LOAD:	191.65	KVA
TOTAL CONNECTED CURRENT:	531.97	AMP
TOTAL DEMAND LOAD:	174.06	KVA
TOTAL DEMAND CURRENT:	483.17	AMP

2 ELECTRICAL RISER DIAGRAM

SCALE: NTS

PANEL:	B (NEW)											MOUNTING:	SURFACE
120/208	VOLTS,	3	PHASE,		4	WIRE						PANEL LOCATION:	BOH
MCB:	200A	MLO:	NA		BUS:	225A	MIN.					FED FROM:	MDP PANEL

NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA) A	B	C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	#54_ICE CREAM STORAGE CABINET	E	0.62	2#12, #12G, 3/4"C	1.16			2#12, #12G, 3/4"C	0.54	R	MANAGER'S OFFICE DESK RECEPTACLES	20	2
3	20	#260.3_PULL STATION	O	0.20	2#12, #12G, 3/4"C		1.18		2#12, #12G, 3/4"C	0.98	E	#18_REFRIGERATOR, ROLL IN	20	4
5	20	#65_REFRIGERATOR, PASS-THRU	E	0.81	2#12, #12G, 3/4"C			2.07	2#12, #12G, 3/4"C	1.26	R	CONVENIENCE RECEPTACLES	20	6
7	20	#62_UNDERCOUNTER REFRIGERATOR	E	0.29	2#12, #12G, 3/4"C	0.83			2#12, #12G, 3/4"C	0.54	E	#64_BREADING SYSTEM	20	8
9	20	RESTROOM RECEPTACLES	R	0.72	2#12, #12G, 3/4"C		0.90		2#12, #12G, 3/4"C	0.18	R	#191_WATER FILTER ASSEMBLY	20	10
11	20	EXTERIOR RECEPTACLES	R	0.36	2#12, #12G, 3/4"C			1.98	2#12, #12G, 3/4"C	1.62	R	#67_HEATED MERCHANDISER	20	12
13	20	CONVENIENCE RECEPTACLES	R	0.72	2#12, #12G, 3/4"C	1.22			2#12, #12G, 3/4"C	0.50	H	REACH-IN COOLER EVAPORATOR_1	20	14
15	20	CONVENIENCE RECEPTACLES	R	0.54	2#12, #12G, 3/4"C		1.04		2#12, #12G, 3/4"C	0.50	H	REACH-IN COOLER EVAPORATOR_2	20	16
17	20	CONVENIENCE RECEPTACLES	R	0.54	2#12, #12G, 3/4"C			1.49	2#12, #12G, 3/4"C	0.95	H	REACH-IN FREEZER EVAPORATOR_1	20/2P	18
19			H	1.73		2.68				0.95	H			20
21	25/3P	REACH-IN COOLER CONDENSOR_1	H	1.73	3#10, #10G, 3/4"C		2.68		2#12, #12G, 3/4"C	0.95	H	REACH-IN FREEZER EVAPORATOR_2	20/2P	22
23			H	1.73				2.68		0.95	H			24
25			H	1.62		2.89			2#12, #12G, 3/4"C	1.27	E	#112_REFRIGERATOR, REACH IN	20	26
27	20/3P	REACH-IN FREEZER CONDENSOR_1	H	1.62	3#12, #12G, 3/4"C		2.68		2#12, #12G, 3/4"C	1.06	R	KITCHEN DISPLAY SCREEN	20	28
29			H	1.62				2.12	2#12, #12G, 3/4"C	0.50	O	WH-1 (N)	20	30
31			H	1.62		2.12			2#12, #12G, 3/4"C	0.50	O	WH-2 (N)	20	32
33	20/3P	REACH-IN FREEZER CONDENSOR_2	H	1.62	3#12, #12G, 3/4"C		2.12		2#12, #12G, 3/4"C	0.50	O	RCP	20	34
35			H	1.62				2.12	2#12, #12G, 3/4"C	0.50	O	HOOD CONTROL	20	36
37	20	CONVENIENCE RECEPTACLES	R	0.72	2#12, #12G, 3/4"C	0.72						SPARE	20	38
39	20	SPARE					0.00					SPACE		40
41	20	SPARE						0.00				SPACE		42
		TOTAL CONNECTED LOAD (KVA)				11.61	10.60	12.46						

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	0.00	125%	0.00			
TOTAL RECEPTACLE	R	8.28	100%	8.28	TOTAL CONNECTED LOAD	34.67	KVA
TOTAL HVAC	H	19.71	100%	19.71	TOTAL DEMAND LOAD	33.09	KVA
TOTAL MOTOR	M	0.00	100%	0.00	TOTAL CONNECTED CURRENT	96.34	AMP
TOTAL KITCHEN/EQUIPMENTS	E	4.50	65%	2.92	TOTAL DEMAND CURRENT	91.96	AMP
TOTAL OTHER/MISCILLANEOUS	O	2.20	100%	2.20	SYSTEM VOLTAGE	120/208 Wye	

Property of NV Engineers

PLUMBING LEGENDS

SYMBOL	DESCRIPTION
SAN	SANITARY WASTE
SAN	SANITARY SEWER (UNDERFLOOR)
GSAN	GREASE SANITARY SEWER (UNDERFLOOR)
	VENT PIPING
CW	COLD WATER
HW	HOT WATER
HWR	HOT WATER RETURN
FW	FILTER WATER PIPING
G	GAS PIPING
G	GAS PLUG VALVE
	CHECK VALVE
	FLOOR DRAIN
	PIPE UP OR DOWN
	PIPE UP
	UNION
	SHUT–OFF VALVE IN RISER
	CAP ON END OF PIPE
	FLOOR CLEANOUT
	SOLENOID VALVE
	POINT OF NEW CONNECTION
	FLOOR SINK

PLUMBING DRAWING LIST

P–1 PLUMBING SYMBOLS & ABBREVIATIONS

P–2 PLUMBING SPECIFICATIONS

P–3 PLUMBING SANITARY FLOOR PLAN

P–4 PLUMBING DOMESTIC WATER FLOOR PLAN

P–5 PLUMBING ROOF PLAN

P–6 PLUMBING DETAILS

P–7 PLUMBING SCHEDULES

P–8 PLUMBING RISER DIAGRAMS

CODE COMPLIANCES

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. INTERNATIONAL BUILDING CODE 2018

b. INTERNATIONAL MECHANICAL CODE 2018

c. INTERNATIONAL PLUMBING CODE 2018

d. INTERNATIONAL FUEL GAS CODE 2018

e. INTERNATIONAL ENERGY CONSERVATION CODE 2018

f. NATIONAL ELECTRIC CODE 2017

PLUMBING ABBREVIATIONS

FCO	FLOOR CLEANOUT
CW	COLD WATER
HW	HOT WATER
HWR	HOT WATER RETURN
FW	FILTER WATER
SAN	SANITARY
S	SOIL
W	WASTE
LAV	LAVATORY
WC	WATER CLOSET
TYP.	TYPICAL
DN	DOWN
EXIST.	EXISTING
G	GAS
AFF	ABOVE FINISH FLOOR
FD	FLOOR DRAIN
SQ. FT.	SQUARE FEET
BFP	BACK FLOW PREVENTER
WH	HOT WATER HEATER
SV	SHUTOFF VALVE
UR	URINAL
HD	HUB DRAIN
FS	FLOOR SINK
TP	TRAP PRIMER
MS	MOP SINK

PLUMBING SPECIFICATIONS

1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS

1.01 SCOPE

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

B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING AND NEW CONDITIONS AND MATERIALS WITHIN THE CONSTRUCTION AREA. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE OWNER'S SATISFACTION.

C. OBTAIN ALL PERMITS, PAY ALL PERMIT FEES AND SCHEDULE ALL REQUIRED INSPECTIONS. COPIES OF ALL PERMITS AND INSPECTION CERTIFICATES SHALL BE FORWARDED TO THE OWNER FOR RECORD.

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

E. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID TO DETERMINE CONDITIONS AND THE EXTENT OF THE WORK. BY COMMENCING WORK, THE CONTRACTOR ACKNOWLEDGES HIS CONFIRMATION OF ALL CONDITIONS AS ACCEPTABLE WITH REFERENCE TO HIS CONTRACT, SCOPE OF WORK AND BID PRICE SUCH THAT NO ADDITIONAL COMPENSATION SHALL BE FORTHCOMING FOR UNFORESEEN EXISTING CONDITIONS.

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

G. ALL ELECTRICAL REQUIREMENTS SHALL BE COORDINATED WITH THE CONTRACTOR FOR ELECTRICAL WORK. THIS CONTRACTOR IS RESPONSIBLE FOR ALL LOW VOLTAGE WIRING FOR EQUIPMENT INSTALLED UNDER HIS CONTRACT. THE CONTRACTOR FOR ELECTRICAL WORK IS RESPONSIBLE FOR LINE VOLTAGE POWER WIRING ONLY.

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

I. MINOR DETAILS NOT SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER AND ACCEPTABLE CONSTRUCTION, INSTALLATION OR OPERATION OF ANY PART OF THE WORK AS DETERMINED BY THE ENGINEER SHALL BE INCLUDED AS IF SPECIFIED OR INDICATED ON THE DRAWINGS.

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

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

1.02 SUBMITTALS

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

1. PIPE AND FITTINGS
2. VALVES
3. HANGERS AND SUPPORTS
4. PLUMBING PIPING LAYOUT
5. TESTS
6. PLUMBING FIXTURES
7. WATER HEATERS & ACCESSORIES
8. FLOOR DRAINS
9. MIXING VALVES
10. ALL SCHEDULED PLUMBING EQUIPMENT

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

C. THE ENGINEER'S REVIEW OF SUBMITTALS IS A COURTESY WHICH DOES NOT RELIEVE THE CONTRACTOR FROM CONFORMING WITH THE CONSTRUCTION DOCUMENTS, REGARDLESS OF THE ACTION INDICATED BY THE SHOP DRAWINGS STAMP.

D. SUBMIT PROOF OF APPROVAL AND/OR CONFIRMATION OF SATISFACTORY TEST RESULTS TO THE OWNER AND THE ARCHITECT.

E. SUBMIT TO THE OWNER'S MAINTENANCE PERSONNEL OPERATION AND MAINTENANCE DATA FOR ALL SYSTEM COMPONENTS, SERVICING REQUIREMENTS, INSPECTION DATA, REPLACEMENT PART NUMBERS AND AVAILABILITY AND CONTACT INFORMATION FOR SERVICE/SUPPLY COMPANY.

F. FOR ALL BELOW GRADE PIPING WHERE ACTUAL INSTALLATION DEVIATES FROM CONSTRUCTION DRAWINGS, THE CONTRACTOR SHALL PROVIDE AS–BUILT DRAWINGS INDICATING BELOW GRADE PIPE LOCATIONS DIMENSIONED TO NEAREST COLUMN LINES.

G. RECORD AS–BUILT DRAWINGS SHALL BE SUPPLIED TO THE OWNER/TENANT AFTER COMPLETION OF THE WORK SHOWING ANY ALTERATIONS, ADDITIONS AND/OR DELETIONS TO THE SYSTEM(S) INSTALLED.

1.03 SUBSTITUTIONS

A. ALL EQUIPMENT SHALL BE PRODUCTS OF THE SPECIFIED MANUFACTURER OR MANUFACTURERS. ALL BIDS SHALL BE BASED ON THE SPECIFIED MANUFACTURER OR MANUFACTURER'S EQUIPMENT. FOR SUBSTITUTIONS OF OTHER MANUFACTURER'S EQUIPMENT TO BE CONSIDERED, THE SUBSTITUTION MUST BE INDICATED PRIOR TO BIDDING WITH THE REASON FOR THE PROPOSED SUBSTITUTION IDENTIFIED, AND THE PROPOSED CREDIT TO THE OWNER INDICATED. THE ENGINEER SHALL DETERMINE THE ACCEPTABILITY OF ANY PROPOSED SUBSTITUTIONS.

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

1.04 DEFINITIONS

A. FURNISH: TO PURCHASE, PROCURE, ACQUIRE AND DELIVER, COMPLETE WITH RELATED ACCESSORIES.

B. INSTALL: TO ERECT, MOUNT AND CONNECT, COMPLETE WITH RELATED ACCESSORIES.

C. PROVIDE: TO FURNISH AND INSTALL.

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

E. REFER TO THE INTERNATIONAL PLUMBING CODE 2018 FOR ADDITIONAL DEFINITIONS.

1.04 DRAWINGS

A. THE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO ILLUSTRATE THE GENERAL ARRANGEMENT AND ROUTING OF PIPING AND GENERAL LOCATIONS OF EQUIPMENT. PRECISE LOCATIONS OF EQUIPMENT, RISERS AND STACKS, AND ROUTING AND ELEVATION OF ALL PIPING SYSTEMS SHALL BE COORDINATED IN THE FIELD WITH THE ARCHITECT, ARCHITECTURAL DRAWINGS, THE WORK OF OTHER TRADES, EXISTING AND NEW BUILDING CONDITIONS AND/OR THE PREFERENCES OF THE OWNER/TENANT AS CONSTRUCTION PROCEEDS. ALL PIPING SHALL BE INSTALLED CONCEALED IN FINISHED SPACES, UNLESS NOTED OTHERWISE.

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

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

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

E. VERIFY ALL INDICATED CONDITIONS BEFORE STARTING WORK AND REPORT ANY DISCREPANCIES. THE DRAWINGS REFLECT CONDITIONS WHICH CAN BE REASONABLY INTERPRETED FROM THE EXISTING VISIBLE CONDITIONS OR FROM DRAWINGS AND INFORMATION FURNISHED BY THE OWNER.

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

1.05 PRODUCTS

A. SANITARY AND VENT PIPING:

1. ABOVE GRADE/ UNDERGROUND PIPING SHALL BE CAST IRON PIPE WHICH SHOULD COMPLY WITH ASTM A 74 STANDARD/CISPI 301.
2. SLOPE OF DRAINAGE SYSTEM SHALL BE 1/8" PER FOOT OF RUN FOR PIPE OVER 3" (I.D.) AND 1/4" PER FOOT OF RUN FOR PIPE 3" AND SMALLER (I.D.). VENT PIPING SHALL BE PITCHED TO DRAIN.
3. PVC OR OTHER COMBUSTIBLE PLASTIC PIPING SHALL NOT BE INSTALLED IN CEILING PLENUM SPACES.
4. ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE (CISPI), AND BE LISTED BY NSF INTERNATIONAL.

B. DOMESTIC WATER PIPING:

1. ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD–DRAWN COPPER TUBE.
2. FITTINGS IN DOMESTIC WATER PIPING SHALL BE COPPER OR COPPER ALLOY AS PER TABLE 605.5, 2018 INTERNATIONAL PLUMBING CODE.
3. JOINTS SHALL BE MADE WITH LEAD–FREE SOLDER.
4. THE ENTIRE DOMESTIC WATER DISTRIBUTION SYSTEM SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.
5. COMPLY WITH NSF 61 FOR MATERIALS FOR WATER–SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.
6. ALL DOMESTIC WATER PIPING ABOVE GRADE SHALL BE INSULATED WITH FIRE–RETARDANT, FACTORY–APPLIED JACKET. PROVIDE COLD WATER PIPING WITH FACTORY–APPLIED VAPOR BARRIER. INSULATION REQUIREMENT SHOULD COMPLY WITH 2018 INTERNATIONAL ENERGY CONSERVATION CODE WITH MARYLAND AMENDMENTS. REFER BELOW TABLE C403.11.3 FOR MINIMUM PIPE INSULATION THICKNESS.

MINIMUM PIPE INSULATION THICKNESS							
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (INCHES)				
	CONDUCTIVITY BTU· IN./ (H· FT2· °F)	MEAN RATING TEMPERATURE, °F	<1	1 to < 1½	1½ to < 4	4 to < 8	<8
105–140	0.21–0.28	100	1.0	1.0	1.5	1.5	1.5
40–60	0.21–0.27	75	0.5	0.5	1.0	1.0	1.0

7. WATER–HEATING EQUIPMENT AND HOT WATER STORAGE TANKS SHALL MEET THE MINIMUM PERFORMANCE REQUIREMENTS GIVEN IN THE IECC 2018, SECTION C404.2, TABLE C404.2. THE EFFICIENCY SHALL BE VERIFIED THROUGH DATA FURNISHED BY THE MANUFACTURER OF THE EQUIPMENT OR THROUGH CERTIFICATION UNDER AN APPROVED CERTIFICATION PROGRAM.
8. AS PER IECC 2018 EDITION, C404.7 WATER DISTRIBUTION SYSTEM HAVING ONE OR MORE RECIRCULATION PUMPS THAT PUMP WATER FROM A HEATED–WATER SUPPLY PIPE BACK TO THE HEATED–WATER SOURCE THROUGH A COLD–WATER SUPPLY PIPE SHALL BE A DEMAND RECIRCULATION WATER SYSTEM.PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:
   1. THE CONTROL SHALL START THE PUMP UPON RECEIVING A SIGNAL FROM THE ACTION OF A USER OF A FIXTURE,SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE.
   2. THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD–WATER PIPING TO 104°F(40°C).
9. AS PER IECC 2018,C404.3, STORAGE TANK TYPE WATER HEATERS AND HOT WATER STORAGE TANK THAT HAVE VERTICAL WATER PIPES CONNECTING TO INLET AND OUTLET OF THE TANK SHALL BE PROVIDED WITH INTEGRAL HEAT TRAPS AT INLET AND OUTLET.
10. HW SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.5, THE HW PIPE LENGTH FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER FOLLOWING TABLE.

NOMINAL PIPE SIZE (INCHES)	MIXIMUM PIPING LENGTH (FEET)	
	PUBLIC LAV	OTHER FIXTURES
½"	2'	43'
¾"	0.5'	21'
1"	0.5'	13'
1¼"	0.5'	8'
1½"	0.5'	6'
2" OR LARGER	0.5'	4'

C. GAS WATER HEATER

1. TANKLESS GAS FIRED HEATER WITH TOTAL APPLICATION FLOW OF CAPACITY 4.2 GPM AND NO. OF UNITS WILL BE 2 NO.
2. BURNER SHALL BE ALUMINIZED STEEL OR CAST IRON, ADJUSTABLE, OR SELF–ADJUSTING AIR–GAS MIXTURE CONTROL.
3. INSTALL THE WORK OF THIS SECTION IN ACCORDANCE WITH NFPA 54, NFPA 211, AND THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, UNLESS OTHERWISE SPECIFIED.
4. THE OUTER JACKET SHALL BE STEEL WITH BAKED ENAMEL/ACRYLIC FINISH AND SHALL BE PROVIDED WITH ACCESS DOOR FOR SERVICING CONTROLS AND BURNER
5. 5. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING.NT PANEL AND SHALL ENCLOSE THE TANK WITH FOAM INSULATION. ELECTRICAL JUNCTION BOX WITH HEAVY DUTY TERMINAL BLOCK SHALL BE PROVIDED. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING.

D. MIXING VALVES

1. VALVE BODY SHALL BE MADE OF CAST BRASS. THE INTERNAL COMPONENTS SHALL BE MADE OF BRASS OR STAINLESS STEEL.
2. TYPES A, C & D VALVES: VALVE SHUTS OFF IN FULL COLD POSITION AND MUST PASS THROUGH COLD RANGE BEFORE DELIVERING WARM, AND/OR HOT WATER. TEMPERATURE LIMIT SET AT 105°F MAXIMUM DELIVERY TEMPERATURE. IF ONE SUPPLY SHOULD FAIL, THE OTHER WILL AUTOMATICALLY AND INSTANTLY SHUT DOWN. DELIVERY CAPACITY IS 5GPM @ 45 PSIG DIFFERENTIAL.
3. TYPES OF VALVES: TYPE A– THERMOSTATICALLY OPERATED BY MEANS OF BI–METALLIC STRIP, OR EXPANSION BELLOWS; TYPE B– SINGLE HANDLE MECHANICAL MIXER, OR INDIVIDUAL HOT AND COLD CONTROL VALVES; TYPE C– PRESSURE BALANCING SHOWER VALVE/PISTON OPERATED MIXING VALVE; TYPE D– BALANCED PRESSURE OPERATION, WITH INTEGRAL DIAL THERMOMETER INDICATING DELIVERED WATER TEMPERATURE.
4. EACH ELEMENT SHALL BE CONTROLLED BY AN INDIVIDUALLY MOUNTED THERMOSTAT AND HIGH TEMPERATURE CUT–OFF SWITCH. ALL INTERNAL CIRCUITS SHALL BE FUSED. THE OUTER JACKET SHALL BE OF BAKED ENAMEL FINISH AND SHALL BE PROVIDED WITH FULL SIZE CONTROL COMPARTMENT FOR PERFORMANCE OF SERVICE AND MAINTENANCE THROUGH HINGED FRONT PANEL AND SHALL ENCLOSE THE TANK WITH FOAM INSULATION. ELECTRICAL JUNCTION BOX WITH HEAVY DUTY TERMINAL BLOCK SHALL BE PROVIDED. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING.

E. GAS PIPING:

1. ALL GAS PIPING WORK SHALL COMPLY WITH INTERNATIONAL FUEL GAS CODE 2018 AND LOCAL UTILITY GAS REQUIREMENTS.
2. FURNISH AND INSTALL ALL NECESSARY GAS PIPING TO ALL EQUIPMENT REQUIRING GAS SUPPLY INCLUDING RECONNECTION TO EXISTING ACTIVE GAS BURNING EQUIPMENT
3. PROVIDE A LUBRICATED GAS VALVE AT ALL CONNECTIONS TO EQUIPMENT.
4. ALL GAS PIPING AND INSTALLATION SHALL BE IN ACCORDANCE WITH RULES AND REGULATIONS OF LOCAL UTILITY GAS COMPANY AND OTHER AUTHORITIES HAVING JURISDICTION.
5. PROVIDE ADEQUATE SUPPORT FOR ALL PIPING.
6. GAS PIPING SHALL BE STEEL SCHEDULE 40 THREADED PIPE CONFORMING TO ANSI B36.10, 10M. OR ASTM A 106.
7. FITTINGS SHALL BE MALLEABLE IRON.
8. PIPING UNDERGROUND BENEATH BUILDING SHALL COMPLY WITH INTERNATIONAL FUEL GAS CODE 2018 EDITION.

F. HANGERS AND SUPPORTS:

1. HANGERS SHALL BE STANDARD STEEL, MALLEABLE OR WROUGHT IRON, AS MANUFACTURED BY GRINNELL OR APPROVED EQUAL, SUITABLE FOR THE TYPE OF CONSTRUCTION. PIPING SHALL NOT BE HUNG FROM OTHER PIPE.
2. SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.
3. ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS..
4. SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPING MANUFACTURER.

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F. VALVES:

1. PROVIDE GATE VALVES, BUTTERFLY OR BALL VALVES FOR SHUT–OFF DUTY ON MAIN AND BRANCH SUPPLY LINES. FOR ALL PIPE RUNS 2" AND SMALLER, PROVIDE BALL FOR ALL PIPE RUNS LARGER THAN 2" AND SMALLER THAN 4", PROVIDE GATE VALVES. PIPING 4" AND LARGER, PROVIDE BUTTERFLY VALVES FOR SHUT–OFF DUTY.

2. ALL FIXTURES WITH THE EXCEPTION O FLUSHOMETER–EQUIPPED WATER CLOSETS AND URINALS SHALL HAVE STOP VALVES TO CONTROL SUPPLY TO THE FIXTURE. WHERE SUPPLIES ARE EXPOSED PROVIDE CHROME–PLATED STOPS WITH CHROME–PLATED ESCUTCHEONS ON PIPING PENETRATIONS.

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

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

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

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

G. SLEEVES AND ESCUTCHEONS:

1. SLEEVES THROUGH STRUCTURAL CONCRETE MEMBERS AND SLEEVES FOR WALLS BELOW GRADE AND FLOORS ON GRADE SHALL BE STANDARD WEIGHT GALVANIZED SCHEDULE 40 STEEL PIPE. SLEEVES THROUGH OTHER THAN STRUCTURAL COMPONENTS OF THE BUILDING SHALL BE 20 GAGE GALVANIZED SHEET METAL WITH LOCK SEAM JOINTS. USG THERMAFIBER SAFING INSULATION SHALL BE INSTALLED BETWEEN PIPE AND SLEEVE.

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

H. DRAINAGE ACCESSORIES

1. GENERAL:

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

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

2. DEVICES:

a. CLEANOUT & CLEANOUT PLUG

- THREADED PIPE FITTING OR CAST IRON FERRULE WITH GAS TIGHT CLEANOUT PLUG
- PLUG SHOULD BE CAST BRASS OR BRONZE, WITH THREADED END, AND RAISED OR COUNTERSUNK HEAD.
- LUBRICATE THREADS OF CLEANOUT PLUG WITH ANTI–SEIZE LUBRICANT BEFORE FINAL INSTALLATION.

b. CLEANOUT WALL PLATE

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

c. CLEANOUT DECK PLATE

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

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

J. VERIFY EXACT LOCATIONS OF ALL EXISTING UTILITIES.

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

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

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

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

O. VENT PENETRATIONS THROUGH THE ROOF SHALL BE FLASHED.

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

Q. PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.

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

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

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

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

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

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

Y. CONNECT GAS PIPING TO ALL GAS–FIRED EQUIPMENT WITH GAS COCK, DIRT LEG AND UNION.

AA. FOR ALL GAS–FIRED EQUIPMENT, VERIFY INPUT RATING AND PRESSURE REQUIREMENTS. PROVIDE GAS PRESSURE REGULATORS VENTED TO THE BUILDING EXTERIOR ON GAS SUPPLY TO ALL EQUIPMENT REQUIRING LOWER THAN LINE GAS PRESSURE.

AB. ALL PIPING INSTALLED ON THE ROOF SHALL BE SUPPORTED BY "PILLOW BLOCK" PIPE STANDS AS MANUFACTURED BY MIRO INDUSTRIES, OR APPROVED EQUAL. WOOD PIPE SUPPORTS SHALL NOT BE ACCEPTABLE. PROVIDE TRAFFIC/WALK PADS BELOW ALL PIPE STANDS.

AC. INSTALL SLEEVES FOR ALL PIPES WHICH PASS THROUGH WALLS, FLOORS, AND CEILINGS. WHERE PIPES ARE TO BE INSULATED, THE SLEEVE SHALL BE LARGE ENOUGH TO ACCOMMODATE INSULATION. SLEEVES SHALL BE FLUSH WITH FINISHED SURFACES AT BOTH ENDS. ON FINISHED SURFACES IN EXPOSED AREAS PROVIDE ESCUTCHEONS COMPATIBLE WITH FINISH.

AD. PROVIDE WATER HAMMER ARRESTERS ON SUPPLY PIPING TO ALL FLUSHOMETER VALVES AND QUICK–CLOSING VALVES.

AE. UNLESS OTHERWISE INDICATED, TRAPS SEALS AT ALL FLOOR DRAINS SHALL BE MAINTAINED BY AN APPROVED TRAP PRIMING DEVICE.

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

AG. MAINTAIN MINIMUM 10'–0" CLEARANCE BETWEEN ALL PLUMBING V.T.R.S AND ALL OUTDOOR AIR INTAKES. OFFSET VENT STACKS AND STACK VENTS IF AND AS REQUIRED BELOW ROOF TO MAINTAIN SUCH CLEARANCE WHETHER OR NOT SUCH OFFSET IS INDICATED ON THE DRAWINGS. PROVIDE ALL REQUIRED SEISMIC SUPPORTS.

2. INSTALLATION

2.01 GENERAL

A. ALL WORK WHICH REQUIRES DISRUPTION OF THE ROOFING SHALL BE DONE BY A CONTRACTOR CERTIFIED BY THE ROOFING MANUFACTURER AS REQUIRED TO MAINTAIN ANY EXISTING ROOF WARRANTIES.

B. EXTERIOR INSTALLATIONS TO BE WEATHER PROOF IN ALL RESPECTS.

C. EXTERIOR MATERIALS AND EQUIPMENT SHALL BE PAINTED TO PREVENT CORROSION, COLOR PER ARCHITECT.

D. COORDINATE THE PLUMBING WORK WITH ALL OTHER AFFECTED WORK AND THE CONSTRUCTION SCHEDULE.

E. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN AND FERROUS END PIPE.

F. REMOVE SCALE AND FOREIGN MATERIAL, FROM INSIDE AND OUTSIDE, BEFORE ASSEMBLY.

G. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES AND UNIONS.

H. COORDINATION WITH THE WORK OF OTHER TRADES IS REQUIRED. PROVIDE OFFSETS IN PIPING SYSTEMS OR MINOR DEVIATIONS TO THE INDICATED PIPE ROUTING IN ORDER TO COORDINATE THE PLUMBING WORK WITH THE WORK OF ALL OTHER TRADES AND THE GENERAL BUILDING CONDITIONS.

I. NO DOMESTIC WATER PIPING SHALL BE INSTALLED IN UNHEATED SPACES.

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

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

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

2.02 ABOVE GRADE

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

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

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

2.03 INSULATION

COVER ALL HOT WATER AND HOT WATER RECIRCULATION PIPE WITH 1½" THICK FOR PIPE SIZE UP TO 1½" AND 2" THICK FOR PIPE SIZE GREATER THAN 1½". INSTALL ALL INSULATION AS PER MANUFACTURERS RECOMMENDATIONS. ALL PIPE INSULATION SHALL COMPLY WITH INTERNATIONAL ENERGY CONSERVATION CODE 2018 EDITION.

3. TESTING

A. AT THE COMPLETION OF THE PLUMBING WORK, COMPLETELY TEST THE ENTIRE INSTALLATION OF ALL SYSTEMS FOR PROPER OPERATION AND COMPLIANCE WITH APPLICABLE CODES AND LOCAL REQUIREMENTS. CORRECT ALL DEFICIENCIES FOUND.

B. TESTING OF THE INSTALLED SYSTEMS SHALL BE MADE BY THE CONTRACTOR IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER.

C. THE CONTRACTOR SHALL NOT COVER UP OR PERMANENTLY CONCEAL PIPING, DEVICES OR ANY PORTION OF NEWLY CONSTRUCTED PLUMBING SYSTEM(S) UNTIL SUCH SYSTEM, OR PORTION OF THE SYSTEM, HAS BEEN TESTED IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER AND INSPECTED BY THE LOCAL INSPECTOR AND APPROVED IN WRITING, EXCEPT PIPING PASSING THROUGH FLOORS, WALLS, PARTITIONS, OR BEAMS, FOR DISTANCES EQUAL TO THE THICKNESS OF SUCH FLOOR, WALL, PARTITION OR BEAM.

D. THIS CONTRACTOR SHALL NOTIFY THE VARIOUS DEPARTMENTS, BUREAUS AND INDIVIDUALS AT LEAST TWO WEEKS IN ADVANCE OF THE TIME THAT THE TESTS ARE TO BE CONDUCTED.

E. ALL DEFECTIVE PARTS SHALL BE REPLACED OR CORRECTED BY THIS CONTRACTOR AND AN EXTRA TEST OR TESTS SHALL BE MADE UNTIL THE OPERATION IS SATISFACTORY. ALL ARRANGEMENTS AND EXPENSES NECESSARY TO CONDUCT ALL TESTS REQUIRED BY THESE SPECIFICATIONS AND THE VARIOUS AGENCIES HAVING JURISDICTION OVER THE WORK INSTALLED UNDER THIS CONTRACT SHALL BE MADE BY THIS CONTRACTOR. NO EXTRA COMPENSATION WILL BE ALLOWED FOR THESE TESTS, THE COST THEREOF BEING INCLUDED IN THE LUMP SUM BID FOR THIS CONTRACT.

F. WHERE ANY EVIDENCE OF STOPPAGE IS FOUND IN PIPING OR EQUIPMENT, THIS CONTRACTOR SHALL DISCONNECT, CLEAN, REPAIR AND RECONNECT ALL OBSTRUCTED PIPING OR EQUIPMENT AND SHALL ALSO PAY FOR ALL NECESSARY CUTTING AND REPAIRS TO ADJOINING WORK.

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

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

I. ALL EQUIPMENT WILL BE FACTORY TESTED.

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

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

M. TESTING REQUIREMENTS

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

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

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

4. WARRANTY

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

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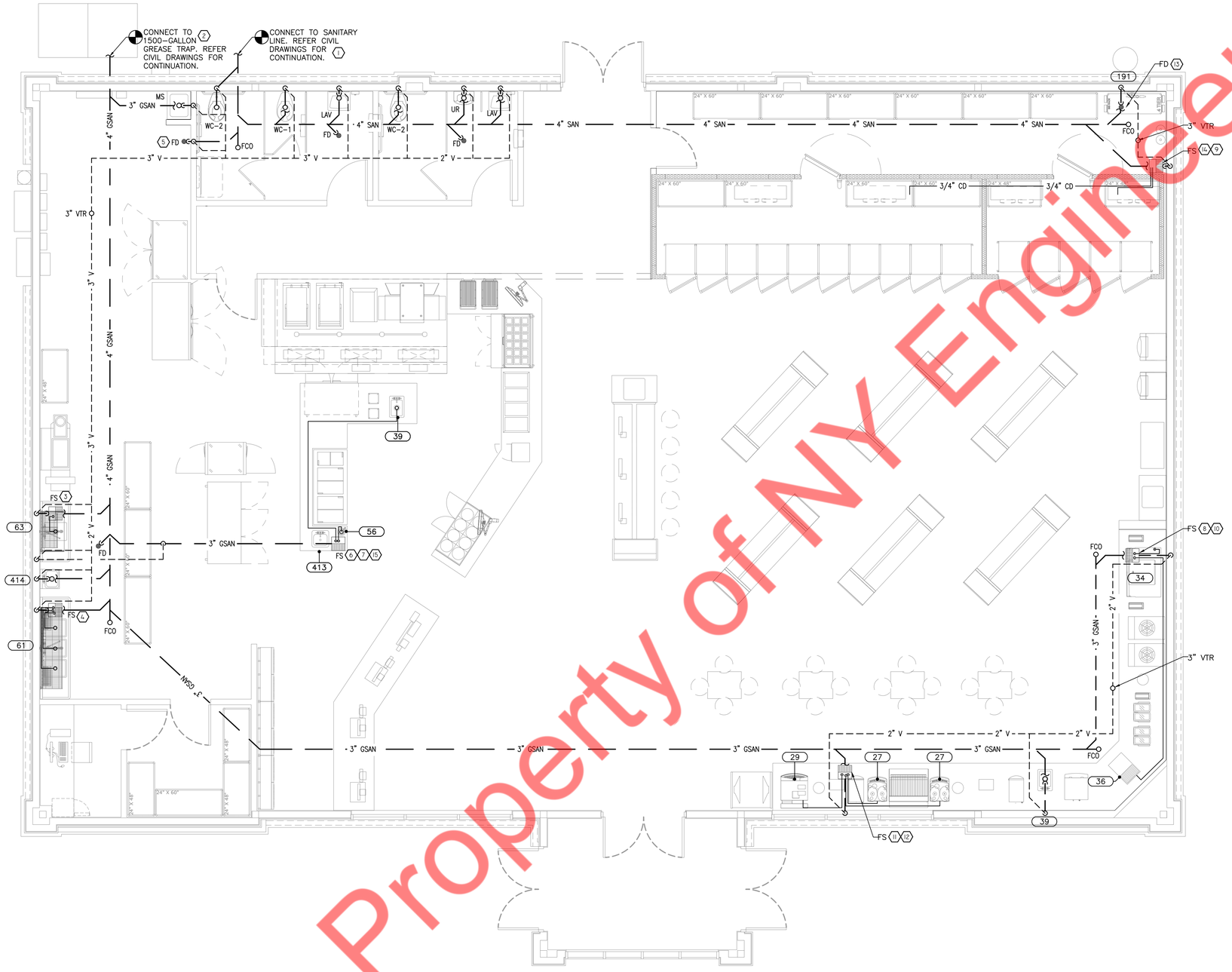


PLUMBING KEYED NOTES:

1. EXTEND AND CONNECT NEW 4" SANITARY PIPING TO SANITARY MAIN. REFER CIVIL DRAWING FOR CONTINUATION. CONTRACTOR SHALL VERIFY EXACT LOCATION, SIZE & INVERT LEVEL ON SITE.
2. EXTEND & CONNECT NEW GREASE WASTE PIPE TO GREASE WASTE PIPE AND 1500-GALLON GREASE INTERCEPTOR PROVIDED BY LANDLORD. REFER CIVIL DRAWING FOR CONTINUATION. CONTRACTOR TO VERIFY SIZE, ROUTING & INVERT OF GREASE WASTE ON SITE. CONTRACTOR TO ALSO VERIFY LANDLORD PROVIDED GREASE INTERCEPTOR HAS ADEQUATE CAPACITY TO MEET PROJECT DEMAND.
3. ROUTE INDIRECT WASTE FROM 1 COMP SINK (#TAG 63) TO FLOOR SINK WITH APPROVED AIR GAP.
4. ROUTE INDIRECT WASTE FROM 3 COMP SINK (#TAG 61) TO FLOOR SINK WITH APPROVED AIR GAP.
5. ROUTE INDIRECT WASTE FROM WATER HEATERS WH-1 & 2 TO FLOOR DRAIN WITH APPROVE AIR GAP.
6. ROUTE INDIRECT WASTE FROM DIPPER WELL (#TAG 56) TO FLOOR SINK WITH APPROVE AIR GAP.
7. ROUTE INDIRECT WASTE FROM DROP-IN SINK (#TAG 413) TO FLOOR SINK WITH APPROVE AIR GAP.
8. ROUTE INDIRECT WASTE FROM ICE MAKER (#TAG 34) TO FLOOR SINK WITH APPROVE AIR GAP.
9. ROUTE INDIRECT WASTE FROM BACK FLOW PREVENTER (#TAG 27) TO FLOOR SINK WITH APPROVE AIR GAP.
10. ROUTE INDIRECT WASTE FROM COUNTERTOP ICE & WATER DISPENSER (#TAG 36) TO FLOOR SINK WITH APPROVE AIR GAP.
11. ROUTE INDIRECT WASTE FROM ESPRESSO MACHINE (#TAG 29) TO FLOOR SINK WITH APPROVE AIR GAP.
12. ROUTE INDIRECT WASTE FROM #2 BEAN-TO-CUP MACHINE (#TAG 27) TO FLOOR SINK WITH APPROVE AIR GAP.
13. ROUTE INDIRECT WASTE FROM WATER FILTRATION SYSTEM (#TAG 191) TO FLOOR DRAIN WITH APPROVE AIR GAP.
14. ROUTE CONDENSATE DRAIN FROM WALK IN COOLER AND FREEZER TO FLOOR SINK WITH APPROVE AIR GAP.
15. ROUTE INDIRECT WASTE FROM SINK, DROP-IN (#TAG 39) TO FLOOR SINK WITH APPROVE AIR GAP.

GREASE INTERCEPTOR SIZING CALCULATIONS

FIXTURE	QUANTITY	DFU PER FIXTURE	TOTAL DFU
FLOOR SINK (FS)	5	5	25
MOP SINK (MS)	1	2	2
HAND SINK (414)	1	1	1
SINK, DROP-IN (39)	1	1	1
FLOOR DRAIN (FD)	1	2	2
TOTAL DRAINAGE FIXTURE UNITS (DFU) CONNECTED TO GREASE INTERCEPTOR			31
MINIMUM 1000 GALLONS VOLUME BASED GREASE INTERCEPTOR REQUIRED			
SIZING AS PER TABLE 1003.D OF 2019 WSSC PLUMBING AND FUEL GAS CODE			
THE PROPOSED GREASE INTERCEPTOR CAPACITY IS 1500 GALLON.			

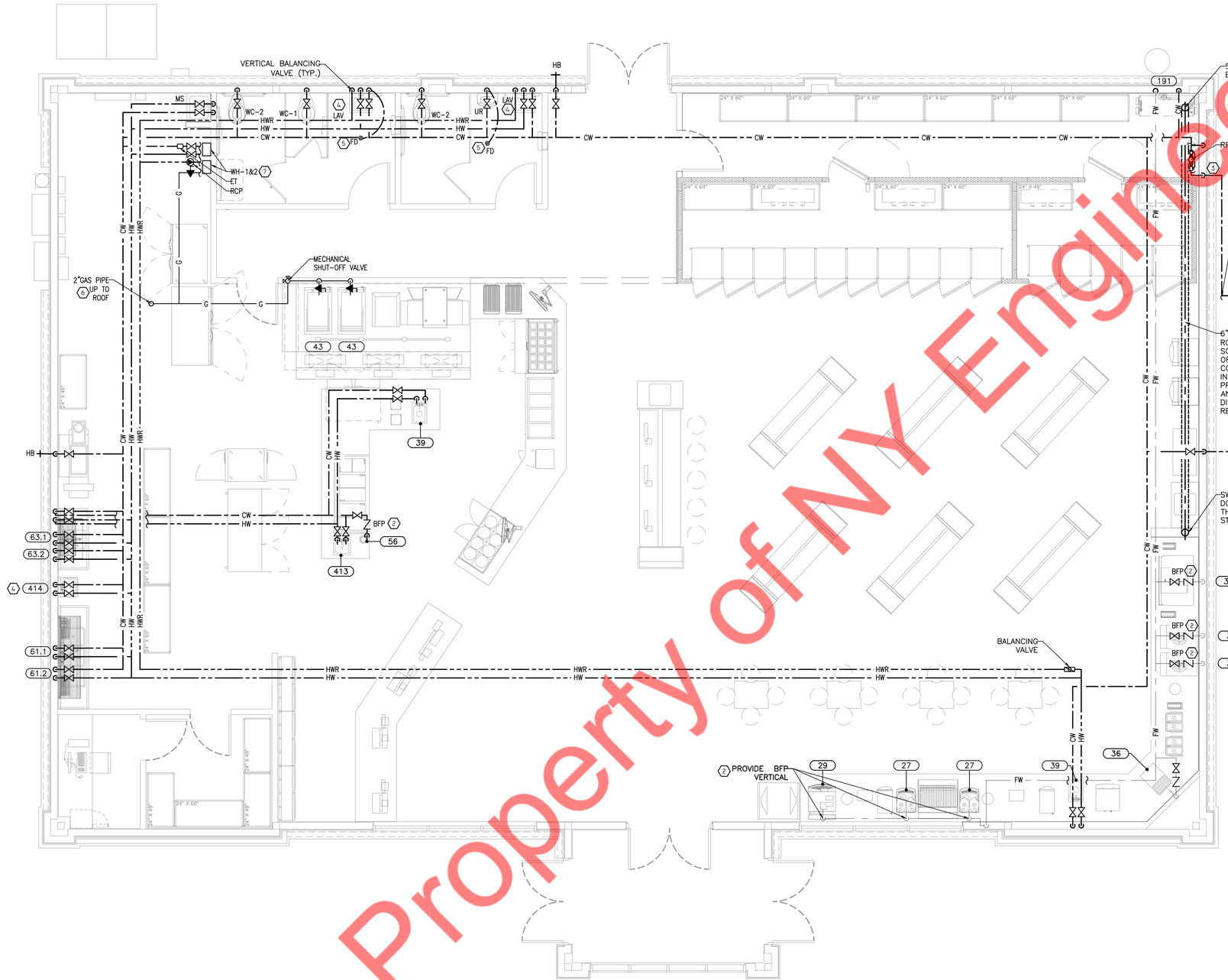
PLUMBING GENERAL NOTES:

1. NOTES APPLY TO ALL PLUMBING SHEETS.
2. EACH CONTRACTOR IS RESPONSIBLE FOR HAVING THOROUGH KNOWLEDGE OF ALL DRAWINGS AND SPECIFICATIONS AS THEY RELATE TO THIS WORK. NO ADDITIONAL COMPENSATION SHALL BE ALLOWED DUE TO LACK OF THIS KNOWLEDGE.
3. PROVIDE ALL MATERIALS FOR A COMPLETE INSTALLATION IN ALL RESPECTS READY FOR INTENDED USE AND IN STRICT ACCORDANCE WITH STATE AND LOCAL CODES AND MANUFACTURER'S RECOMMENDATIONS.
4. CONTRATOR TO COORDINATE SEWER AND WATER CONNECTIONS WITH CIVIL AND AHJ. PROVIDE PRESSURE REDUCING VALVE AND BACKFLOW PREVENTER AS SHOWN OR REQUIRED BY AHJ. VERIFY INVERT AND SLOPE OF INCOMING SANITARY SEWER BEFORE TRENCHING.
5. REFER TO RISER DIAGRAMS AND PLUMBING FIXTURE SCHEDULE FOR ALL PIPING AND PIPE SIZES NOT SHOWN ON PLAN.
6. ALL SEWER PIPING BELOW SLAB TO BE 2" DIAMETER MINIMUM.
7. CONTRACTOR TO PROVIDE ACCESS DOORS TO ALL CONCEALED VALVES AND CLEAN-OUTS; AND NOT ABOVE AN ACCESSIBLE CEILING.
8. CONTRACTOR TO PROVIDE TRAP SEAL PRIMERS AND 1/2" COPPER TUBING CONNECTION TO ALL FLOOR DRAINS AS SHOWN OR AS REQUIRED BY AHJ. CONTRACTOR SHALL VERIFY REQUIREMENTS.
9. CONTRACTOR TO INSTALL VTR'S, EXHAUST FANS, AND FLUES A MINIMUM 5'-0" FROM PARAPET OR OUTSIDE WALL AND 10'-0" MINIMUM FROM EQUIPMENT WITH OUTSIDE AIR INTAKE.
10. CONTRACTOR TO INSTALL WATER PIPE ON INSIDE OF EXTERIOR WALL INSULATION TO PREVENT FREEZING.
11. WHEN DEEP FROST LOCATIONS ARE ENCOUNTERED, ROUTE SANITARY LINES UNDER BUILDING AS MUCH AS POSSIBLE.
12. CONTRACTOR TO PROVIDE PVC SLEEVE FOR ALL COLD/HOT WATER FLOOR PIPE PENETRATIONS. MAKE SLEEVE LARGE ENOUGH FOR INSULATION. SEAL WITH GRAY MASTIC AND ENSURE NO WATER PENETRATIONS.
13. CONTRACTOR TO FURNISH AND INSTALL WATTS 8A VACUUM BREAKER ON ANY THREADED EXTERIOR OR INTERIOR FAUCETS.
14. ALL WATER SHUT-OFF VALVES SHALL BE "BALL LOCK" TYPE. CONTRACTOR TO PROVIDE SHUT-OFF VALVES AT EACH TERMINATION POINT OF ASSOCIATED EQUIPMENT.
15. COORDINATE WITH OTHER TRADES TO PREVENT INTERFERENCE WITH HVAC DUCTS, STRUCTURE, ELECTRICAL LIGHTING, AND OTHER PIPING IN THE CEILING SPACE. VENT PIPING SHALL BE HELD EITHER ABOVE OR BELOW HVAC DUCTWORK AS COORDINATED WITH HVAC CONTRACTOR.
16. VERIFY MOUNTING HEIGHT AND WATER CONNECTION SIZES TO ALL PLUMBING FIXTURES TO BE INSTALLED IN MILLWORK, TO THE GENERAL CONTRACTOR.
17. ALL PLUMBING VENTS IN EXTERIOR WALLS SHALL BE OFF-SET A MINIMUM OF 3'-0" BEFORE ROOF PENETRATION.
18. INSTALL WATER HAMMER ARRESTERS WHERE WATER PRESSURE ARE EXCESSIVE OR WHERE REQUIRED TO ELIMINATE WATER HAMMER OR WHEN DEEMED NECESSARY BY LOCAL AUTHORITIES. LOCATE AND SIZE AS RECOMMENDED BY THE AMERICAN SOCIETY OF PLUMBING ENGINEERS.

Property of NY Engineers

A1 SANITARY FLOOR PLAN

SCALE: 1/4" = 1'-0"



PLUMBING KEYED NOTES:

1. CONNECT NEW 2" CW PIPING TO 2" NEW INCOMING CW LINE. CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND SIZE OF INCOMING CW LINE.
2. PROVIDE ASSE 1022 BACKFLOW PREVENTOR.
3. DO NOT TAKE TAP-OFF BEFORE RPZ.
4. PROVIDE THERMOSTATIC MIXING VALVES AT ALL LAVATORIES AND HAND SINKS. SET AT 110° F MAX.
5. PROVIDE TRAP PRIMER TO ALL RESTROOM FLOOR DRAINS. REFER DETAIL SHEET P FOR INSTALLATION DETAIL.
6. REFER SHEET P-5 FOR CONTINUATION.
7. PROVIDE TWO WALL MOUNTED TANKLESS WATER HEATERS (WH-1) & (WH-2). REFER SHEET P-6 FOR INSTALLATION DETAIL.

TANKLESS WATER HEATER CALCULATIONS

SR. NO.	FIXTURE	QUANTITY	FLOW RATE (GPM)	
			PER FIXTURE	TOTAL
01	PRE RINSE FAUCET (61.1)	01	2	2.0
02	ADD ON FAUCET (61.2)	01	2	2.0
03	HAND SINK (HS) (414)	01	0.5	0.5
04	LAVATORY (LAV)	02	0.5	1.0
05	DROP-IN SINK (413)	01	0.5	0.5
06	SINK, DROP-IN (39)	02	0.5	1.0
07	PRE RINSE FAUCET (63.1)	01	0.5	0.5
08	ADD ON FAUCET (63.2)	01	0.5	0.5
09	MOP SINK (MS)	01	2	2.0
		TOTAL FLOW RATE (GPM)		10

PLUMBING GENERAL NOTES:

1. NOTES APPLY TO ALL PLUMBING SHEETS.
2. EACH CONTRACTOR IS RESPONSIBLE FOR HAVING THOROUGH KNOWLEDGE OF ALL DRAWINGS AND SPECIFICATIONS AS THEY RELATE TO THIS WORK. NO ADDITIONAL COMPENSATION SHALL BE ALLOWED DUE TO LACK OF THIS KNOWLEDGE.
3. PROVIDE ALL MATERIALS FOR A COMPLETE INSTALLATION IN ALL RESPECTS READY FOR INTENDED USE AND IN STRICT ACCORDANCE WITH STATE AND LOCAL CODES AND MANUFACTURER'S RECOMMENDATIONS.
4. CONTRATOR TO COORDINATE SEWER AND WATER CONNECTIONS WITH CIVIL AND AHJ. PROVIDE PRESSURE REDUCING VALVE AND BACKFLOW PREVENTER AS SHOWN OR REQUIRED BY AHJ. VERIFY INVERT AND SLOPE OF INCOMING SANITARY SEWER BEFORE TRENCHING.
5. REFER TO RISER DIAGRAMS AND PLUMBING FIXTURE SCHEDULE FOR ALL PIPING AND PIPE SIZES NOT SHOWN ON PLAN.
6. ALL SEWER PIPING BELOW SLAB TO BE 2" DIAMETER MINIMUM.
7. CONTRACTOR TO PROVIDE ACCESS DOORS TO ALL CONCEALED VALVES AND CLEAN-OUTS; AND NOT ABOVE AN ACCESSIBLE CEILING.
8. CONTRACTOR TO PROVIDE TRAP SEAL PRIMERS AND 1/2" COPPER TUBING CONNECTION TO ALL FLOOR DRAINS AS SHOWN OR AS REQUIRED BY AHJ. CONTRACTOR SHALL VERIFY REQUIREMENTS.
9. CONTRACTOR TO INSTALL VTR'S, EXHAUST FANS, AND FLUES A MINIMUM 5'-0" FROM PARAPET OR OUTSIDE WALL AND 10'-0" MINIMUM FROM EQUIPMENT WITH OUTSIDE AIR INTAKE.
10. CONTRACTOR TO INSTALL WATER PIPE ON INSIDE OF EXTERIOR WALL INSULATION TO PREVENT FREEZING.
11. WHEN DEEP FROST LOCATIONS ARE ENCOUNTERED, ROUTE SANITARY LINES UNDER BUILDING AS MUCH AS POSSIBLE.
12. CONTRACTOR TO PROVIDE PVC SLEEVE FOR ALL COLD/HOT WATER FLOOR PIPE PENETRATIONS. MAKE SLEEVE LARGE ENOUGH FOR INSULATION. SEAL WITH GRAY MASTIC AND ENSURE NO WATER PENETRATIONS.
13. CONTRACTOR TO FURNISH AND INSTALL WATTS 8A VACUUM BREAKER ON ANY THREADED EXTERIOR OR INTERIOR FAUCETS.
14. ALL WATER SHUT-OFF VALVES SHALL BE "BALL LOCK" TYPE. CONTRACTOR TO PROVIDE SHUT-OFF VALVES AT EACH TERMINATION POINT OF ASSOCIATED EQUIPMENT.
15. COORDINATE WITH OTHER TRADES TO PREVENT INTERFERENCE WITH HVAC DUCTS, STRUCTURE, ELECTRICAL LIGHTING, AND OTHER PIPING IN THE CEILING SPACE. VENT PIPING SHALL BE HELD EITHER ABOVE OR BELOW HVAC DUCTWORK AS COORDINATED WITH HVAC CONTRACTOR.
16. VERIFY MOUNTING HEIGHT AND WATER CONNECTION SIZES TO ALL PLUMBING FIXTURES TO BE INSTALLED IN MILLWORK, TO THE GENERAL CONTRACTOR.
17. ALL PLUMBING VENTS IN EXTERIOR WALLS SHALL BE OFF-SET A MINIMUM OF 3'-0" BEFORE ROOF PENETRATION.
18. INSTALL WATER HAMMER ARRESTERS WHERE WATER PRESSURE ARE EXCESSIVE OR WHERE REQUIRED TO ELIMINATE WATER HAMMER OR WHEN DEEMED NECESSARY BY LOCAL AUTHORITIES. LOCATE AND SIZE AS RECOMMENDED BY THE AMERICAN SOCIETY OF PLUMBING ENGINEERS.

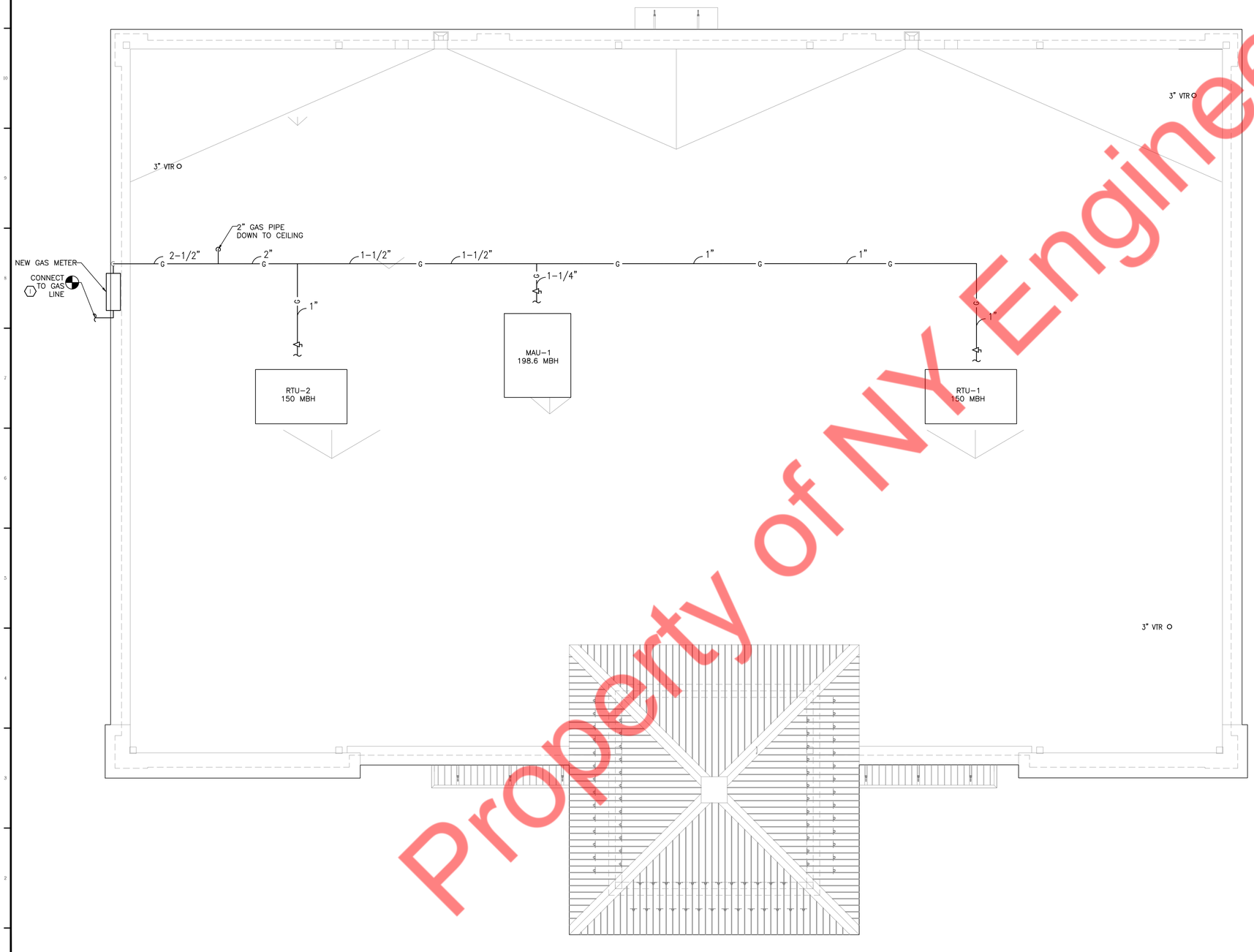
Property of NY Engineers

A1 DOMESTIC WATER FLOOR PLAN

SCALE: 1/4" = 1'-0"

PLUMBING KEYED NOTES:

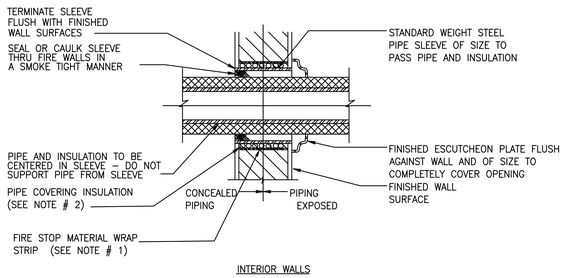
1. EXTEND AND CONNECT NEW 2-1/2" GAS PIPING WITH NEW GAS METER & PRESSURE REGULATOR TO THE GAS SERVICE AVAILABLE IN THE FIELD. CONTRACTOR TO CONFIRM EXACT GAS METER LOCATION WITH OWNER/ARCHITECT. CONTRACTOR TO ENSURE ADEQUATE PRESSURE BETWEEN 12 TO 14 IN. OF WC IS AVAILABLE.



A1 GAS FLOOR PLAN

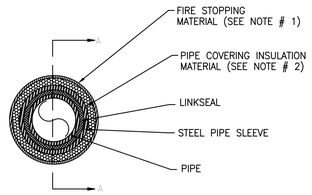
SCALE: 1/4" = 1'-0"

Property of NY Engineers



PIPE SLEEVE THRU WALL SECTION

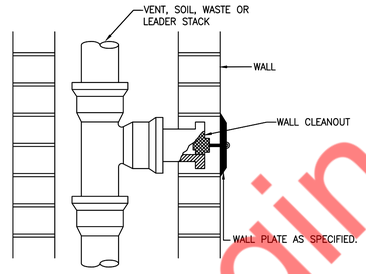
1 / P-6 PIPE SLEEVE THRU WALL SECTION N.T.S



PIPE SLEEVE VIEW

NOTES:

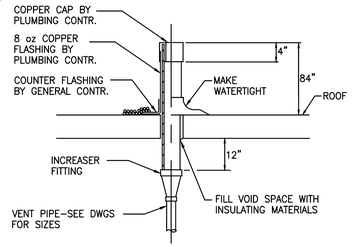
1. FIRESTOP MATERIAL WRAP STRIP SHALL BE ¼" THICK INTUMESCENT ELASTOMERIC MATERIAL FACED ON ONE SIDE WITH ALUMINUM FOIL SUPPLIED IN 2 IN. WIDE STRIPS AND WRAP AROUND THE PIPE AS PER UL MATERIAL LISTED3M COMPANY FS-195+ OR FILL CAVITY WITH CAULK OR SEALANT MIN. ¼" DIA. CONTINUOUS BEAD APPLIED TO THE WRAP STRIP/WALL INTERFACE AND TO THE EXPOSED OF THE WRAP STRIP LAYER APPROX. 3/4" FROM WALL SURFACE. AS PER UL LISTED 3M COMPANY CP25WB+, IC 15WB+, FIRE DAM 150+CAULK.
2. PIPE COVERING INSULATION SHALL BE 2" THICK HOLLOW CYLINDRICAL HEAVY DENSITY GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKETED. AS PER UL CLASSIFICATION AND MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 OR LESS MAY BE USED.



2 / P-6 WALL CLEANOUT DETAIL N.T.S

NOTES:

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



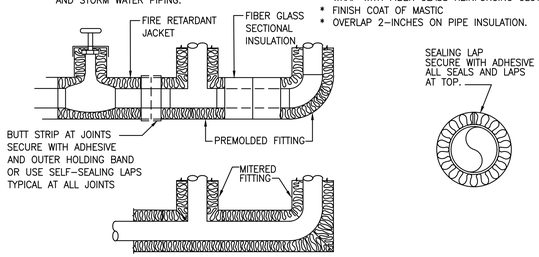
3 / P-6 VENT INCREASER DETAIL N.T.S

CONCEALED VALVES AND FITTINGS

- WRAP WITH 1-INCH THICK, 1-POUND DENSITY TO REQUIRED PIPE INSULATION THICKNESS
- SECURE WITH WIRE OR TAPE.
- VAPOR SEAL COLD WATER, CHILLED WATER AND STORM WATER PIPING.

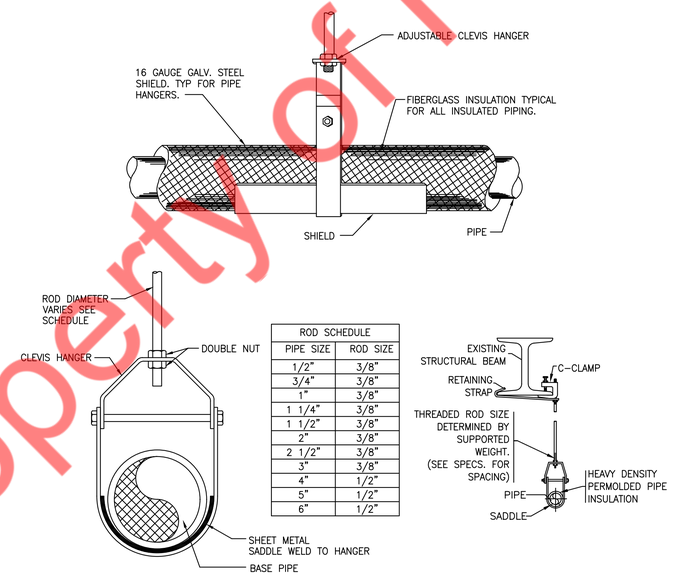
CONCEALED VALVES AND FITTINGS

- PREMOLDED FIBER GLASS OR RADIAL MITERED PIPE INSULATION
- SKIM COAT OF INSULATION CEMENT
- COAT OF MASTIC
- WRAP WITH FIBER GLASS REINFORCING CLOTH.
- FINISH COAT OF MASTIC
- OVERLAP 2-INCHES ON PIPE INSULATION.



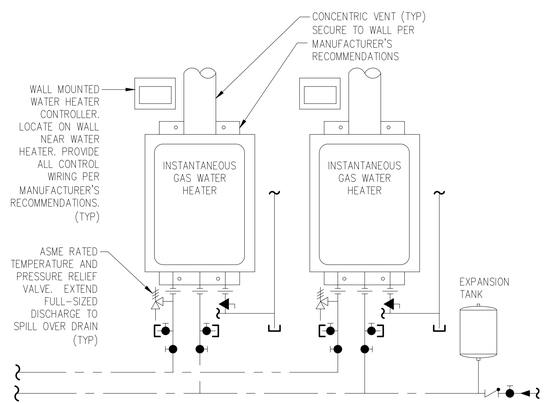
INSULATION OF PIPING, VALVES AND FITTINGS FOR EXPOSED AND CONCEALED LOCATIONS

4 / P-6 N.T.S



ROD SCHEDULE	
PIPE SIZE	ROD SIZE
1/2"	3/8"
3/4"	3/8"
1"	3/8"
1 1/4"	3/8"
1 1/2"	3/8"
2"	3/8"
2 1/2"	3/8"
3"	3/8"
4"	1/2"
5"	1/2"
6"	1/2"

5 / P-6 HANGER DETAIL N.T.S



6 / P-6 WALL MOUNTED TANKLESS WATER HEATER DETAIL N.T.S

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PLUMBING FIXTURE SCHEDULE

LEGEND	PLUMBING FIXTURE	CONNECTION SIZE – INCHES					REMARKS	MAKE & MODEL
		TRAP	SOIL/WASTE	VENT	COLD WATER	HOT WATER		
WC–1	WATER CLOSET	–	4"	2"	1"	–	SIPHON JET ACTION, ELONGATED BOWL, WALL MOUNTED, 1–1/2" TOP SPUD, VITREOUS CHINA. SLOAN ROYAL FLUSH VALVE NO. 111, 1.6 GPF. ZURN CARRIER NO. Z–1203–NR4 AND Z1203–NL4. FRONT OPEN SEAT LESS COVER, STAINLESS STEEL SELF–SUSTAINING CHECK HINGE.	AMERICAN STANDARD AFWALL 2257.103
WC–2	WATER CLOSET	–	4"	2"	1"	–	BARRIER FREE, SIPHON JET ACTION, ELONGATED BOWL, WALL MOUNTED, MOUNT AT 17" AFFTO RIM. 1–1/2" TOP SPUD, VITREOUS CHINA. SLOAN ROYAL FLUSH VALVE NO. 111, 1.6 GPF. ZURN CARRIER NO. Z–1203–NR4 AND Z1203–NL4. FRONT OPEN SEAT LESS COVER, STAINLESS STEEL SELF–SUSTAINING CHECK HINGE. FLUSH HANDLE TO BE MOUNTED ON THE WIDE SIDE OF THE TOILET (OPPOSITE GRAB BAR)	AMERICAN STANDARD AFWALL 2257.103
UR	URINAL	2"	2"	1½"	½"	½"	WASHOUT, 3/4" TOP SPUD, 14" RIM, VITREOUS CHINA, 0.125 GPF. SENSOR OPERATED SLOAN ROYAL OPTIMA FLUSH VALVE NO. 186 ESS–HARDWIRE. PROVIDE FLOOR CARRIER. FOR BARRIER FREE MOUNT AT 17" AFF TO TOP OF FRONT RIM.	KOHLER STEWARD K–5244–ET
LAV	LAVATORY	2"	2"	1½"	½"	½"	SOLID SURFACE MATERIAL WITH SOAP, WATER, & DRYER. COORDINATE DRYER WITH ELECTRICAL CONTRACTOR. PLUG–IN 120V SOLENOID VALVE, 0.38 GPM FAUCET. MOUNT PER MANUFACTURER INSTRUCTIONS DOE BARRIER FREE INSTALLATION.	BRADLEY ADVOCATE AV90
MS	MOP SINK	3"	3"	2"	¾"	¾"	FIXTURE AND HARDWARE FURNISHED AND INSTALLED BY CONTRACTOR. NO. 830AA FAUCET WITH INTEGRAL VACUUM BREAKER, NO.832–AAHOSE AND BRACKET, NO.1453BB FLOOR STRAINER AND NO. 899–CC MOP HANGER	FIAT MSB–2424
HB	EXTERNAL HOSE BIB (FREEZE PROOF)	–	–	–	¾"	–	FREEZE–LESS BRASS WALL HYDRANT. PROVIDE WITH MODEL 34HA VACUUM BREAKER	WOODFORD 25C
FS	FLOOR SINK	3"	3"	2"	–	–	SANI–FLOR RECEPTOR, 12"X12"X8" DEEP CAST IRON BODY, ACID RESISTANT ENAMEL INTERIOR, ALUMINUM BOTTOM DOME STRAINER. COORDINATE WITH EQUIPMENT FOR GRATE SELECTION.	ZURN Z–1901
FD	FLOOR DRAIN	3"	3"	2"	–	–	"TYPE B" ADJUSTABLE STRAINER TO WITH SQUARE HEELPROOF OPENINGS AN SECURED CRATE. DURA COATED CAST IRON BODY WITH TRAP PRIMER CONNECTION	ZURN Z–415–P
TP	TRAP PRIMER	–	–	–	½"	–	BRONZE PRIMER VALVE WITH REMOVABLE OPERATING PARTS INTEGRAL VACUUM BREAKER, AND GASKETED ACCESS COVER	SIOUX CHIEF 695
FCO	FLOOR CLEANOUT	–	–	–	–	–	POLISHED BRONZE ACCESS COVER, DURA–COATED CAST IRON BODY.	ZURN Z–1444

NOTE:
1. CONTRACTOR TO COORDINATE WITH ARCHITECTURAL DRAWINGS FOR ALL PLUMBING FIXTURES SPECIFICATIONS AND MOUNTING HEIGHT INSTALLATION.
2. CLEANOUT SHALL BE SAME SIZE AS PIPE BEING SERVED

KITCHEN EQUIPMENT SCHEDULE

LEGEND	PLUMBING FIXTURE	CONNECTION SIZE – INCHES							REMARKS
		TRAP	SOIL/WASTE	VENT	COLD WATER	HOT WATER	FILTER WATER	GAS	
(27)	BEAN–TO–CUP MACHINE	–	–	–	–	–	½"	–	ROUTE DRAIN INDIRECTLY TO FS.
(29)	ESPRESSO MACHINE	–	–	–	–	–	½"	–	ROUTE DRAIN INDIRECTLY TO FS.
(31)	FROZEN BEVERAGE DISPENSER	–	–	–	–	–	½"	–	–
(34)	ICE MAKER, NUGGET STYLE	–	–	–	–	–	½"	–	ROUTE DRAIN INDIRECTLY TO FS.
(36)	COUNTERTOP ICE & WATER DISPENSER	–	–	–	–	–	½"	–	ROUTE DRAIN INDIRECTLY TO FS.
(39)	SINK, DROP–IN	2"	2"	1½"	½"	½"	–	–	–
(43)	PRESSURE FRYER, LP GAS	–	–	–	–	–	–	1"	95 MBH
(56)	DIPPER WELL FAUCET W/ DRAIN	–	–	–	½"	–	–	–	ROUTE DRAIN INDIRECTLY TO FS.
(61)	3 COMP. SINK	–	–	–	–	–	–	–	ROUTE DRAIN INDIRECTLY TO FS.
(61.1)	PRE–RINSE FAUCET ASSEMBLY	–	–	–	¾"	¾"	–	–	–
(61.2)	ADD ON FAUCET, FOR PRE–RINSE	–	–	–	¾"	¾"	–	–	–
(63)	1 COMP. SINK	–	–	–	–	–	–	–	ROUTE DRAIN INDIRECTLY TO FS.
(63.1)	PRE–RINSE FAUCET ASSEMBLY	–	–	–	½"	½"	–	–	–
(63.2)	ADD ON FAUCET	–	–	–	½"	½"	–	–	–
(191)	WATER FILTER ASSEMBLY	–	–	–	¾"	–	–	–	ROUTE DRAIN INDIRECTLY TO FS.
(413)	DROP–IN SINK	–	–	–	½"	½"	–	–	ROUTE DRAIN INDIRECTLY TO FS.
(414)	HAND SINK	2"	2"	1½"	½"	½"	–	–	–

TANKLESS HOT WATER HEATER

TAG No.	QTY	CAPCITY (GPM @ RISE)	TYPE	MANUFACTURER & MODEL NO.	GAS	REMARKS
WH–1 & 2	2	4.2 GPM @ 90°F	GAS WATER HEATER (WALL MOUNTED)	RINNAI CX199IN	199	–DIMENSIONS 11.45" W X 28.6"H –HEATERS SHALL HAVE 150PSI WORKING PRESSURE.

EXPANSION TANK SCHEDULE

ITEM	SERVICE	GALLONS	MAKE	REMARKS
EXPANSION TANK (ET)	HOT WATER	2	AMTROL ST–5	DIMENSIONS– 12 5/8"(H) X 8"(DIA.) SHIPPING WEIGHT– 5 LBS

RECIRCULATING PUMP SCHEDULE

TAG	SERVICE	GPM	MOTOR HP	MANUFACTURER & REMARKS
RCP	HW RECIRCULATION	2	0.115	GRUNDFOS UPS 15–18 BUC5 W/AQUASTAT + TIMER

BACKFLOW PREVENTER SCHEDULE:

TYPE OF BACKFLOW PREVENTER	ASSE NUMBER	MAKE & MODEL
BFP	1022	WATTS SD–3
RPZ	1013	WATTS LF009

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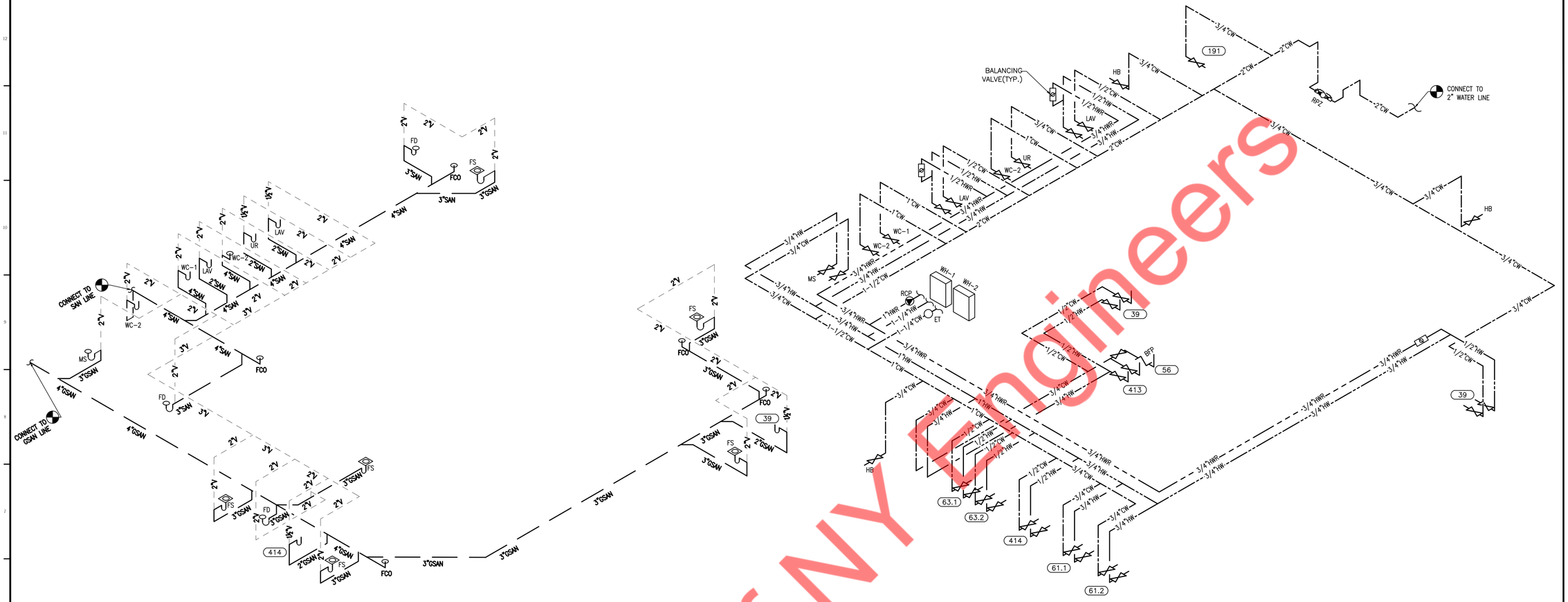
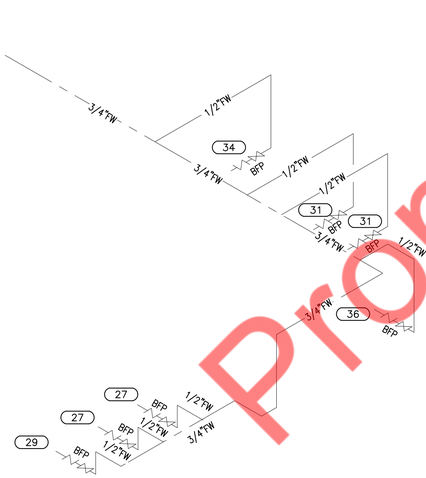


B5 PLUMBING RISER-WASTE AND VENT

SCALE: NTS



B6 PLUMBING RISER-FILTER WATER

SCALE: NTS

GAS LOAD SUMMARY	
EQUIPMENT TAG	MBH LOAD
ROOF TOP UNIT (RTU-1)	150
ROOF TOP UNIT (RTU-2)	150
MAKE UP AIR UNIT (MAU-1)	198.2
WATER HEATER (WH-1)	199
WATER HEATER (WH-2)	199
PRESSURE FRYER (43)	#2 95
TOTAL GAS LOAD	1086.2

PROPANE GAS PIPE SIZING PER TABLE 404.2(2) –INTERNATIONAL FUEL GAS CODE 2018

GAS' INLET PRESSURE– LESS THAN 2 PSI

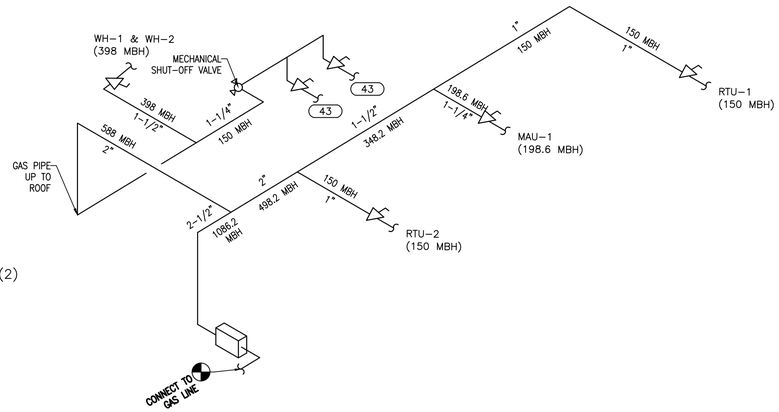
PRESSURE DROP– 0.5 IN. W.C.

SPECIFIC GRAVITY– 0.6

EQUIVALENT LENGTH OF PIPE = 135 FT

L5 PLUMBING RISER-DOMESTIC WATER

SCALE: NTS



L1 PLUMBING RISER-GAS

SCALE: NTS

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