GENERAL SPECIFICATIONS

1. GENERAL: (ALL SPECIFICATIONS ON THIS SHEET AS APPLICABLE)
   - A. WORK INDICATED ON THESE DRAWINGS IS DIAGRAMMATIC AND SHOULD NOT BE SCALED TO ESTABLISH LOCATION OF WORK. THE DRAWINGS ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE GENERAL ARRANGEMENTS OF ENGINEERED SYSTEMS. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND MAKE ADJUSTMENTS AS NECESSARY TO COMPLETE THE WORK.
   - B. FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND SERVICES FOR ALL WORK, IN ACCORDANCE WITH PROVISIONS OF THE CONTRACT DOCUMENTS. ALTHOUGH SUCH WORK IS NOT SPECIFICALLY INDICATED, FURNISH AND INSTALL ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES AND DEVICES INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION, AT NO ADDITIONAL COST TO THE OWNER.
   - C. ALL EQUIPMENT UNDER THIS CONTRACT SHALL BE TESTED, AT COMPLETION, TO THE SATISFACTION OF THE OWNER. IT IS THE INTENTION OF THESE DRAWINGS TO CALL FOR FINISHED WORK, TESTED, AND READY FOR OPERATION. WHEREVER THE WORD "PROVIDE" IS USED, IT SHALL MEAN FURNISH AND INSTALL COMPLETE AND READY FOR USE.
   - D. ALL MATERIALS AND EQUIPMENT SHALL BE NEW, OF FIRST QUALITY AND COMPATIBLE WITH EXISTING SYSTEMS OR MATERIAL WHERE THEY INTERFACE. INSTALL AS RECOMMENDED BY MANUFACTURER AND BEST ENGINEERING PRACTICE.
   - E. SHOULD THE CONTRACTOR ENCOUNTER ANY EXISTING PIPING, DUCTWORK, CONDUITS, OR OTHER OBSTRUCTIONS IN THE WAY OF NEW WORK, CONTRACTOR SHALL REMOVE, REARRANGE AND/OR RELOCATE SAME TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL COST TO THE OWNER.
   - F. CONTRACTOR SHALL OBTAIN OWNER'S APPROVAL IN WRITING PRIOR TO CUTTING OF ANY SLAB, WALLS, CEILING, ROOF AND SHAFTS FOR PENETRATION OF DUCTWORK AND PIPING. THE CONTRACTOR SHALL REPAIR ALL WALLS, CEILING, FLOORS, ETC., THAT ARE REQUIRED TO BE PENETRATED, OR OTHERWISE DISTURBED. THE REPAIRS SHALL BE WITH MATERIALS AND FINISHES TO MATCH EXISTING. ALL FIRE WALL PENETRATIONS SHALL BE SEALED WITH SUITABLE MATERIALS TO PRESERVE FIRE WALL INTEGRITY.
   - G. CLEAN UP ALL WASTE AND DEBRIS AT THE END OF EACH WORKING DAY AND AS REQUIRED TO KEEP ALL BUILDING AREAS CLEAN, CLEAR AND UNOBSTRUCTED. AT THE COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL REMOVE ALL TOOLS, APPLIANCES, SURPLUS MATERIAL AND SCRAP FROM THE JOB SITE AND CLEAN THE ENTIRE JOB SITE TO BE READY FOR OCCUPANCY.
2. COORDINATION AND SCHEDULING:
   - A. COMPLETELY COORDINATE AND SCHEDULE WORK OF ALL TRADES. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS SO THAT CONFLICTS IN SCHEDULING AND LOCATION WILL NOT OCCUR.
   - B. CONTRACTOR IS RESPONSIBLE FOR COMPLETE COORDINATION BETWEEN ALL SUB-CONTRACTORS, SUPPLIERS, GOVERNMENT AUTHORITIES HAVING JURISDICTION, BUILDING PERSONNEL, CODE ENFORCEMENT OFFICIALS, ARCHITECT/ENGINEER AND BUILDING OWNER.
   - C. CONTRACTOR SHALL REVIEW AND COORDINATE THE INSTALLATION OF NEW SYSTEM(S) AND EQUIPMENT. NO WORK SHALL BE PERFORMED PRIOR TO THE CONTRACTOR OBTAINING EXACT FIELD DIMENSIONS OF EXISTING BUILDINGS, EXISTING CEILINGS, STRUCTURAL OBSTRUCTIONS, EXISTING BUILDING SYSTEMS TO REMAIN, EXISTING FURNITURE TO REMAIN, ETC., WHICH, MAY AFFECT INSTALLATION OF NEW EQUIPMENT OR SYSTEMS.
   - D. CONTRACTOR SHALL SCHEDULE AND PHASE WORK IN A FASHION SO AS TO CAUSE MINIMUM DISTURBANCE TO ACTIVITIES IN OTHER AREAS OF THE BUILDING, WHICH MAY REMAIN OCCUPIED THROUGHOUT THE DURATION OF THE CONTRACT. CONTRACTOR'S WORK SCHEDULE SHALL BE SUBMITTED TO AND APPROVED BY THE OWNER. PROVIDE BARRIERS (PLASTIC, GYPBOARD, ETC) BETWEEN PROJECT AREA AND ADJACENT SPACES AS NECESSARY.
   - E. NOTIFY THE OWNER, IN WRITING, AT LEAST FOURTEEN DAYS IN ADVANCE OF ANY REQUIRED SHUTDOWN OF ANY UTILITY. OBTAIN OWNER'S WRITTEN APPROVAL PRIOR TO SHUTDOWN.
   - F. CONTRACTOR SHALL THOROUGHLY EXAMINE PREMISES AND OBSERVE ALL CONDITIONS AND CIRCUMSTANCES UNDER WHICH THE WORK SHALL BE PERFORMED. NO ALLOWANCES WILL BE MADE FOR ERRORS OR NEGLIGENCE IN THIS RESPECT.
3. CODE, PERMITS AND INSPECTIONS:
   - A. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LATEST APPLICABLE CODES, REGULATIONS AND STANDARDS. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND SHALL ARRANGE FOR ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.
   - B. APPROVAL AND SIGN-OFF BY ALL AUTHORITIES HAVING JURISDICTION AND THE SECURING OF AN APPROVED OCCUPANCY PERMIT IS REQUIRED AT THE COMPLETION OF PROJECT. SECURE PERMIT AND INSPECTION CERTIFICATES AND TRANSMIT SAME TO THE OWNER AT THE COMPLETION OF THE PROJECT.
   - C. PERFORM ALL WORK IN ACCORDANCE WITH THE CURRENT EDITIONS OF APPLICABLE CODES AND STANDARDS ENFORCED IN THE PROJECT JURISDICTION.
   - D. CODES AND STANDARDS LISTED ARE MINIMUM STANDARDS. WHERE CONTRACT DOCUMENTS CALL FOR A HIGHER STANDARD, CONTRACT DOCUMENTS WILL TAKE PRECEDENCE OVER ALL REFERENCED CODES AND STANDARDS. IF CONTRACT DOCUMENTS CONFLICT WITH CODES OR STANDARDS, CONTRACTOR SHALL INFORM ARCHITECT/ENGINEER, IN WRITING, PRIOR TO QUOTE.
   - E. CONTRACTOR SHALL COMPLY WITH ALL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIREMENTS.
   - F. CONTRACTOR SHALL COMPLY WITH RULES AND REGULATIONS OF ALL AFFECTED UTILITY COMPANIES.
4. WARRANTY:
   - A. ALL WORK SHALL BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE. ALL DEFECTS THAT DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR, TO THE SATISFACTION OF THE ARCHITECT/ENGINEER AND AT NO ADDITIONAL COST TO THE OWNER.
5. SHOP DRAWINGS:
   - A. SHOP DRAWINGS AND PRODUCT DATA: SUBMIT TO ENGINEER, OWNER AND ARCHITECT ELECTRONIC COPIES OF SHOP DRAWINGS AND MANUFACTURER'S CERTIFIED CAPACITY DATA FOR ALL NEW EQUIPMENT.
6. RECORD DRAWINGS/ASBUILTS:
   - A. THE CONTRACTOR SHALL MAINTAIN AT THE SITE, FOR THE OWNER, ONE COPY OF ALL DRAWINGS, ADDENDA, APPROVED SHOP DRAWINGS, REVISIONS, AND OTHER MODIFICATIONS, IN GOOD ORDER AND MARKED TO RECORD ALL CHANGES MADE DURING CONSTRUCTION. THE SET OF DRAWINGS AND OTHER INFORMATION SHALL BE DELIVERED TO THE OWNER UPON COMPLETION OF WORK, AS REQUESTED.

DUCTWORK & INSULATION

SHEET-METAL DUCTWORK:

- A. ALL NEW DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED SHEET METAL (UNLESS OTHERWISE INDICATED) AND INSTALLED IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION STANDARDS, 2005 EDITION AND NFPA 90A. DUCTWORK SHALL BE MINIMUM 24 GAUGE AND HAVE A G60 GALVANIZED COATING.
- B. ALL NEW DUCTWORK MUST BE FIELD VERIFIED PRIOR TO FABRICATION, PURCHASE, OR INSTALLATION. NO ALLOWANCE WILL BE MADE FOR DUCTWORK THAT IS NOT USED.
- C. ALL DUCTWORK UP TO 2" W.G. SHALL BE SEAL CLASS A FOR JOINTS, SEAMS AND CONNECTIONS. PROVIDE SINGLE THICKNESS TURNING VANES IN ALL DUCTWORK ELBOWS (45° & 90°). TURNING VANES SHALL COMPLY WITH SMACNA STANDARD.
- D. FLEXIBLE CONNECTIONS SHALL BE PROVIDED BETWEEN DUCTWORK AND HVAC EQUIPMENT (VAV BOXES, AC UNITS, AHU'S, ETC.). FLEXIBLE DUCTWORK SHALL BE WIRE HELIX SUPPORTING A BLANKET OF FIBERGLASS INSULATION OVER A FIBERGLASS SCRIM AND POLYETHYLENE VAPOR BARRIER. DUCTWORK SHALL BE U.L. LISTED AS A CLASS 1 AIR DUCT CONNECTOR, AND COMPLYING WITH NFPA STANDARDS 90A AND 90B. FLEXIBLE DUCTWORK SHALL BE THERMAFLEX MODEL G-KM. PROVIDE SPIN-ON COLLAR WITH BUTTERFLY VOLUME DAMPER AT EACH FLEXIBLE DUCTWORK TAP. FLEXIBLE DUCT LENGTH SHALL NOT EXCEED 6'-0".
- E. ALL EXPOSED ROUND DUCTWORK SHALL BE SINGLE WALL, GALVANIZED METAL HAVING A LONGITUDINAL OR SPIRAL SEAM AS INDICATED ON THE PLANS.

DUCTWORK INSULATION & SOUNDLINING:

1. R-VALUE:
   ALL SUPPLY AIR DUCTWORK SHALL BE INSULATED TO R-6 MINIMUM.
   ALL OUTSIDE AIR DUCTWORK SHALL BE INSULATED TO R-8 MINIMUM.
   ALL SUPPLY/RETURN/OUTSIDE AIR DUCTWORK LOCATED IN UNCONDITIONED/UNHEATED SPACE OR OUTDOOR SHALL BE INSULATED TO R-8 MINIMUM.

   ALL EXPOSED DUCTWORK REQUIRED TO BE INSULATED SHALL BE LINED INTERNALLY AND PAINTED, UNLESS OTHERWISE DIRECTED BY THE OWNER/ARCHITECT. COLOR TO BE SELECTED BY ARCHITECT. OUTDOOR SUPPLY AND RETURN DUCTS SHALL HAVE ONE LAYER OF WEATHERPROOF COVERING OVER INSULATION. COVERING SHALL BE VENTURECLAD 1577CW WEATHERPROOF COATING, ALUMINUM FINISH.

2. DUCT INSULATION BASIS OF DESIGN:
   DUCT INSULATION SHALL BE A FLEXIBLE, FIBERGLASS BLANKET WITH A FOIL-REINCORCED KRAFT (FRK) OR A FOIL-SCRIM KRAFT (FSK) JACKET AND A 2" OVERLAPPING FLAP. THE JACKET SHALL SERVE AS A VAPOR BARRIER AND FINAL FINISH FOR INSULATION COVERING ALL BUILDING SERVICES INDICATED HEREIN.
   ALL INSULATION AND ACCESSORIES SHALL HAVE A COMPOSITE FIRE HAZARD RATING AS TESTED BY ASTM E-84, NFPA 255, OR U.L. 723 NOT TO EXCEED A FLAME SPREAD RATING OF 25 AND A SMOKE DEVELOPED RATING OF 50. ALL INSULATION SHALL BE BY ONE MANUFACTURER. INSULATION SHALL HAVE A MINIMUM DENSITY OF 1 POUND PER CUBIC FOOT, 1-1/2" THICKNESS AND SHALL HAVE K FACTOR NO GREATER THAN 0.27 AT 75° F MEAN TEMPERATURE.

3. SOUNDLINING BASIS OF DESIGN:
   SOUNDLINING SHALL BE COATED ON ONE SIDE. LINING SHALL BE ONE INCH THICK, 2 POUND PER CUBIC FOOT DENSITY, FIRE HAZARD CLASSIFICATION SHALL NOT EXCEED 25 FOR FLAME SPREAD AND 50 FOR SMOKE DEVELOPED. SOUND LINING SHALL BE CERTAINTEED TOUGHGUARD-R OR APPROVED EQUAL. THE LINER SURFACE SHALL BE TREATED WITH AN EPA REGISTERED ANTI-MICROBIAL AGENT TO PREVENT THE GROWTH OF MOLD, FUNGUS AND BACTERIA.

MECHANICAL CODE NOTES

LEAKAGE TEST:
A. ALL EXPOSED DUCT JOINTS SHALL BE SEALED WITH HARDCAST 601.
B. LEAKAGE TESTING FOR ALL DUCTWORK SHALL BE AS FOLLOWS:

THE TOTAL DUCT LEAKAGE SHALL BE = 4 CFM/100FT² WITH AIR HANDLER INSTALLED. A WRITTEN REPORT OF THE RESULTS OF THE TEST SHALL BE SIGNED BY THE PARTY CONDUCTING THE TEST AND PROVIDED TO THE CODE OFFICIAL UPON REQUEST. THE TEST SHALL BE PERFORMED IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.

C. PERFORM ALL TESTING AFTER THE SEALS HAVE CURED COMPLETELY AND BEFORE COVERING WITH INSULATION OR CONCEALING IN MASONRY. ALL DUCT JOINTS ABOVE CEILING SHALL BE SEALED WITH MASTIC.

BLOWER TEST:
FOR ALL LEVEL 3, GUT REHAB OR NEW CONSTRUCTION: BLOWER DOOR TEST MUST BE CONDUCTED AT 50 Pa LESS THAN OR EQUAL TO 3 CHANGES PER HOUR.
FOR NEW CONSTRUCTION AND LEVEL 3-ALTERATION PROJECTS, AN APPROVED PERMANENT CERTIFICATE SHALL BE COMPLETED BY THE BUILDER OR REGISTERED DESIGN PROFESSIONAL AND POSTED ON A WALL IN THE SPACE WHERE THE FURNACE IS LOCATED, A UTILITY ROOM OR AN APPROVED LOCATION INSIDE THE BUILDING.

DRYER DUCT NOTES:
1. EXHAUST DUCTS SHALL TERMINATE ON THE OUTSIDE OF THE BUILDING. EXHAUST DUCT TERMINATIONS SHALL BE IN ACCORDANCE WITH THE DRYER MANUFACTURER'S INSTALLATION INSTRUCTIONS. IF THE MANUFACTURER'S INSTRUCTIONS DO NOT SPECIFY A TERMINATION LOCATION, THE EXHAUST DUCT SHALL TERMINATE NOT LESS THAN 3 FEET IN ANY DIRECTION FROM OPENINGS INTO BUILDINGS. EXHAUST DUCT TERMINATIONS SHALL BE EQUIPPED WITH A BACK DRAFT DAMPER. SCREENS SHALL NOT BE INSTALLED AT THE DUCT TERMINATION. MAXIMUM VENT LENGTH SHALL BE 35FT INCLUDING ELBOWS. IF 35FT IS NOT POSSIBLE THEN PROVIDE LONG LENGTH VENT.

EQUIPMENT:
1. FAN EFFICACY SHALL BE MINIMUM 2.8CFM/W.
2. ALL FANS SHALL BE ENERGY STAR.
3. AIR HANDLER LEAKAGE MUST BE LESS THAN OR EQUAL TO 2% OF AIR FLOW.
4. FOR GAS UNITS FLUE PIPES SHALL BE NON-PVC AND PER TEMPERATURE RATING OF THE SYSTEM. PROVIDE DRAIN PAN UNDER INDOOR UNIT.
5. PROVIDE 2" CONCRETE OR PLASTIC BASE UNDER OUTDOOR UNIT.
6. PROVIDE ELECTRICAL SERVICE AND FILTER ACCESS.
7. CONFIRM REFRIGERANT PIPE LENGTH WITH MANUFACTURER PRIOR TO PURCHASE.
8. PROVIDE EQUIPMENT SUPPORT. PROVIDE CONDENSATE DRAIN PUMP.
9. PROVIDE VIBRATION ISOLATION AS RECOMMENDED BY MANUFACTURER.

MISCELLANEOUS:
1. EQUIPMENT HAS BEEN SIZED PER MANUAL J CALCULATIONS. SMALLEST SIZE AVAILABLE FROM THE MANUFACTURER HAS BEEN SELECTED.
2. MAINTAIN DISTANCE OF 3 FT BETWEEN EXHAUST AND BUILDING OPENINGS.
3. MAINTAIN DISTANCE OF 10 FT FROM BUILDING MECHANICAL AIR INTAKES AND EXHAUST.
4. MAINTAIN DISTANCE OF 10 FT FROM BUILDING EXHAUST AND PROPERTY LINE AND ADJACENT BUILDINGS.
5. PROVIDE MOTORIZED DAMPERS ON ALL EA AND OA DUCTS WHERE REQUIRED BY CODE. LEAKAGE RATES SHALL COMPLY WITH CODE. GRAVITY BACKDRAFT DAMPERS SHALL ONLY BE USED IF ALLOWED BY CODE.
6. MECHANICAL PIPING SHALL BE INSULATED WITH R-3 INSULATION. PROVIDE ALUMINUM JACKET WHEN INSTALLED OUTDOORS FOR WEATHER PROTECTION.
7. TEMPERATURE CONTROLS SHALL HAVE SETPOINT OVERLAP RESTRICTIONS.
8. MAXIMUM LEAKAGE FOR AHU CABINET SHALL BE 2%.

SPACE TEMPERATURES:
SUMMER SPACE SETPOINT: 75°F. WINTER SPACE SETPOINT: 72°F.

CONTROLS

CONTROLS

1. INSTALLER QUALIFICATIONS: ALL CONTROLS TIE-INS, PROGRAMMING AND RELATED WORK SHALL BE PERFORMED BY A CONTRACTOR APPROVED BY THE OWNER.
2. PROVIDE ALL CONTROLS WIRING AND TRANSFORMERS REQUIRED FOR INTENDED CONTROL OF THE EQUIPMENT.
3. PROVIDE PROGRAMMABLE THERMOSTAT. INSTALL AT LOCATION APPROVED BY OWNER.
4. TEST ALL EQUIPMENT AND DEMONSTRATE OPERATION TO THE OWNER, PRIOR TO COMPLETION OF THE PROJECT.

TESTING & BALANCING

TEST AND BALANCING

1. SCOPE:
   - A. AN INDEPENDENT CONTRACTOR WITH NEBB OR AABC CERTIFICATION SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICES AND PERFORM ALL OPERATIONS REQUIRED FOR COMPLETE BALANCING OF THE MECHANICAL SYSTEMS AND RELATED WORK AS INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN.
   - B. BALANCING SHALL NOT BE PERFORMED UNTIL ALL MECHANICAL EQUIPMENT IS PROPERLY INSTALLED AND IS 100% OPERATIONAL, ALL TEMPERATURE CONTROLS ARE INSTALLED AND CALIBRATED AND ALL SYSTEMS ARE CLEANED, PIPING AND STRAINERS FLUSHED, AND CLEAN FILTERS INSTALLED.
   - C. IT IS THE INTENT OF THIS SPECIFICATION TO ENSURE THAT THE ENTIRE PROJECT IS SUBSTANTIALLY COMPLETE SO THAT ALL COMPONENTS OF ALL MECHANICAL SYSTEMS CAN BE PUT INTO NORMAL OPERATION WITH ALL WINDOWS AND DOORS CLOSED AND BALANCED IN THAT CONDITION, IN NO CASE IS THE CONTRACTOR TO PERFORM HIS WORK IN PIECEMEAL FASHION.
2. QUALITY ASSURANCE: SUBMIT TO OWNER THREE (3) COPIES OF BALANCING AND TESTING RECORDS SPECIFIED HEREIN SHOWING THE MECHANICAL SYSTEMS HAVE BEEN BALANCED AND ARE DELIVERING SPECIFIED QUANTITIES.
3. EACH PIECE OF EQUIPMENT SHALL BE IDENTIFIED AS TO LOCATION, SERVICE, MANUFACTURER AND MODEL NUMBER. THIS INFORMATION SHALL BE RECORDED AND INCLUDED IN THE FINAL BALANCE REPORT.
4. AFTER ADJUSTMENTS ARE COMPLETED, THE MECHANICAL SYSTEMS SHALL BE TESTED, AND THE FOLLOWING INFORMATION RECORDED AND INCLUDED IN THE FINAL BALANCE REPORT: ALL SCHEDULED AIRFLOWS, HEATING/COOLING CAPACITIES, VOLTAGES, ETC. FOR ALL HVAC EQUIPMENT. DESIGN AND TEST AIRFLOW AND LOCATION OF ALL AIR DEVICES.
5. AFTER THE SYSTEMS HAVE BEEN BALANCED AND ALL ADJUSTMENTS COMPLETED, RUN EACH SYSTEM THROUGH A COMPLETE HEATING AND COOLING CYCLE BY ADJUSTING SET POINTS TO DETERMINE IF SYSTEM IS RESPONDING TO TEMPERATURE CONTROLS. RECORD THE SET POINTS USED, AND TIME FOR THE SPACE TO REACH SET POINTS FOR EACH MODE OF OPERATION. INCLUDE THERMOSTAT TEMPERATURE READING, AND AN INDEPENDENT TEMPERATURE MEASUREMENT AT EACH THERMOSTAT WHILE TESTING EACH MODE OF OPERATION. PROVIDE RESULTS IN TESTING AND BALANCING REPORT.

PIPING & INSULATION

REFRIGERANT AND CONDENSATE DRAIN PIPING

1. REFRIGERANT PIPING: TYPE ACR HARD COPPER WITH STREAMLINE FITTINGS JOINTED WITH SPECIAL REFRIGERATION SOLDER SUCH AS SIL-FOS. RUN, SIZE, AND TRAP REFRIGERANT LINES PER MANUFACTURER'S RECOMMENDATIONS. PIPE FITTINGS AND COMPONENTS SHALL BE CAPABLE OF WITHSTANDING THE PRESSURES AND TEMPERATURES OF THE SERVICE THEY ARE HANDLING. PRE-CHARGED OR PREFABRICATED LINES BY EQUIPMENT MANUFACTURER MAY BE USED. TUBING, USED FOR REFRIGERANT SERVICE SHALL BE CLEANED, SEALED, CAPPED OR PLUGGED PRIOR TO BEING SHIPPED FROM THE MANUFACTURER'S PLANT.
2. IDENTIFICATION: ALL PIPING SHALL BE IDENTIFIED BY NAME AND DIRECTIONAL FLOW ARROWS IN ACCORDANCE WITH ASME AND ANSI STANDARDS.
3. FINAL DRAIN AND REFRIGERANT LINES SHALL NOT BLOCK SERVICE ACCESS TO FAN OR AIR FILTER REMOVAL AT THE AHU.
4. CONDENSATE DRAIN PIPING: TYPE SCHEDULE 40 PVC PIPING WITH GLUE TYPE FITTINGS. SLOPE ALL CONDENSATE PIPING TOWARDS DRAIN AT 1/8" PER FOOT.
5. PROVIDE TRAPS FOR CONDENSATE DRAIN LINES AT ALL HVAC EQUIPMENT THAT IS NOT INTERNALLY TRAPPED.
6. DIELECTRIC UNIONS OR PLASTIC FITTINGS: SHALL BE USED TO CONNECT NON-FERROUS PIPE AND EQUIPMENT TO FERROUS PIPE AND EQUIPMENT. FITTINGS SHALL BE BY EPCO SALES, INC. DIELECTRIC BREAKS ARE ALSO REQUIERED AT ALL SCIF PENETRATIONS.

INSULATION

1. ALL PIPE INSULATION AND COVERINGS SHALL HAVE A FIRE AND SMOKE HAZARD RATING AS TESTED UNDER PROCEDURE ASTM-E-84, NFPA 255 AND UL 723 NOT EXCEEDING A FLAME SPREAD RATING OF 25 AND A SMOKE DEVELOPED RATING OF 50. INSULATE ALL HEATING AND COOLING SYSTEM PIPING WITH R-3 INSULATION.
2. REFRIGERANT SUCTION: (OUTSIDE BUILDING) FOR PIPING SIZES 1-1/2" OR LESS, INSULATE WITH 1" THICKARMAFLEX FIRE RATED INSULATION OR APPROVED ON EQUAL, WITH ALL JOINTS SEALED WITH ARMAFLEX ADHESIVE FOR PIPING SIZES GREATER THAN 1-1/2", INSULATION SHALL BE 1-1/2" THICK. WHERE POSSIBLE, INSULATION SHALL BE SLIPPED OVER THE TUBING AS FULL CYLINDER. INSULATION OF PIPING SHALL BE VAPOR TIGHT AND CONTINUOUS THROUGH HANGERS, WALLS, ETC. PROVIDE GALVANIZED SHEET METAL SADDLES AT HANGERS. OUTDOOR INSULATION SHALL BE COVERED WITH CONTINUOUS ALUMINUM JACKET CLAMPED AND SEALED TO WITH STAND ALL WEATHER CONDITIONS.
3. REFRIGERANT LIQUID AND HOT GAS PIPING WITHIN THE BUILDING: INSULATE WITH 1/2" THICK ARMAFLEX FIRE RATED INSULATION OR APPROVED EQUAL.
4. INSULATION ON PIPING PASSING THROUGH NON-RATED WALLS SHALL BE CONTINUOUS THROUGH THE WALL PENETRATION.
5. WHEREVER PIPES, DUCTWORK OR OTHER ITEMS PASS THROUGH FIRE RATED WALLS AND FLOORS, THE CONTRACTOR SHALL ADEQUATELY FIRE STOP THE SPACE BETWEEN THE ITEMS AND THE MASONRY OR THE SPACE BETWEEN THE ITEM AND SLEEVE. FIRE STOP SHALL BE A NON-COMBUSTIBLE, NON-MELTING, APPROVED MATERIAL.

HVAC SYMBOLS

SYMBOL	DESCRIPTION
12x6(E)	EXISTING DUCTWORK, EQUIPMENT OR PIPING TO REMAIN
12x6	EXISTING DUCTWORK, EQUIPMENT OR PIPING TO BE REMOVED OR RELOCATED
12x6	NEW OR RELOCATED DUCTWORK, EQUIPMENT OR PIPING
	DUCTWORK WITH SOUNDLINING
	SUPPLY DUCT TURNING UP
	RETURN/EXHAUST DUCT TURNING UP
	SUPPLY DUCT TURNING DOWN
	RETURN/EXHAUST DUCT TURNING DOWN
	TRANSITION IN DUCT, SQUARE TO SQUARE
	TRANSITION IN DUCT, SQUARE TO ROUND
	SQUARE THROAT DUCT ELBOW WITHOUT TURNING VANES
	SQUARE THROAT DUCT ELBOW WITH TURNING VANES
	RADIUS ELBOW
	45 DEGREE TAP
	SPIN-IN RUNOUT FITTING WITH BALANCING DAMPER AND FLEXIBLE DUCT
	CONICAL TAP
	FLEXIBLE DUCT
	FLEXIBLE DUCT CONNECTION
	RECTANGULAR SUPPLY AIR DIFFUSER
	RETURN AIR GRILLE
H T C	HUMIDISTAT, THERMOSTAT, CO2 SENSOR
	EXHAUST FAN
	SIDE WALL/DUCT REGISTER
125	CFM DESIGNATION SYMBOL & QUANTITY
1	KEYED NOTE, DEMOLITION
1	KEYED NOTE, NEW WORK
	POINT OF REMOVAL
	POINT OF CONNECTION TO EXISTING
A	DIFFUSER OR GRILLE DESIGNATION SYMBOL
	ACCESS DOOR, SIZE ON FLOOR PLANS
	RECTANGULAR SUPPLY AIR DIFFUSER
VD	VOLUME DAMPER
XX	FD: FIRE DAMPER SD: SMOKE DAMPER MD: MOTORIZED DAMPER F/SD: COMBINATION FIRE/SMOKE DAMPER BDD: BACKDRAFT DAMPER

ABBREVIATIONS

(E)	EXISTING TO REMAIN	KW	KILOWATTS
(R)	EXISTING TO BE REMOVED AND RELOCATED	LAT	LEAVING AIR TEMPERATURE
(RE)	RELOCATED EQUIPMENT	LBS	POUNDS
ACU	AIR CONDITIONING UNIT	LRA	LOCKED ROTOR AMPS
AFF	ABOVE FINISHED FLOOR	LWT	LEAVING WATER TEMPERATURE
AHU	AIR HANDLING UNIT	MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
BAS	BUILDING AUTOMATION SYSTEM	MCA	MINIMUM CIRCUIT AMPACITY
BTUH	BRITISH THERMAL UNITS PER HOUR	MIN	MINIMUM
CFM	CUBIC FEET PER MINUTE	MOCP	MAX OVER-CURRENT PROTECTION
CLG	CEILING	OA	OUTSIDE AIR
DB	DRY BULB TEMPERATURE	PD	PRESSURE DROP
DN	DOWN	PH	PHASE
EAT	ENTERING AIR TEMPERATURE	PSI	POUNDS PER SQUARE INCH
EF	EXHAUST FAN	RA	RETURN AIR
EFF	EFFICIENCY	RH	RELATIVE HUMIDITY
ESP	EXTERNAL STATIC PRESSURE	RLA	RUNNING LOAD AMPS
EWB	ENTERING WET BULB TEMPERATURE	RPM	REVOLUTIONS PER MINUTE
EWT	ENTERING WATER TEMPERATURE	SA	SUPPLY AIR
°F	DEGREES FAHRENHEIT	SL	SOUND LINING
FLA	FULL LOAD AMPS	TYP	TYPICAL
FT	FOOT, FEET	TF	TRANSFER FAN
GPM	GALLONS PER MINUTE	V	VOLT, VOLTS
HP	HORSEPOWER	W/	WITH
HZ	HERTZ (CYCLES PER SECOND)	WB	WET BULB TEMPERATURE
IN	INCH, INCHES	WG	WATER GAUGE
IN WG	INCHES OF WATER GAUGE		

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Date: 5/17/25

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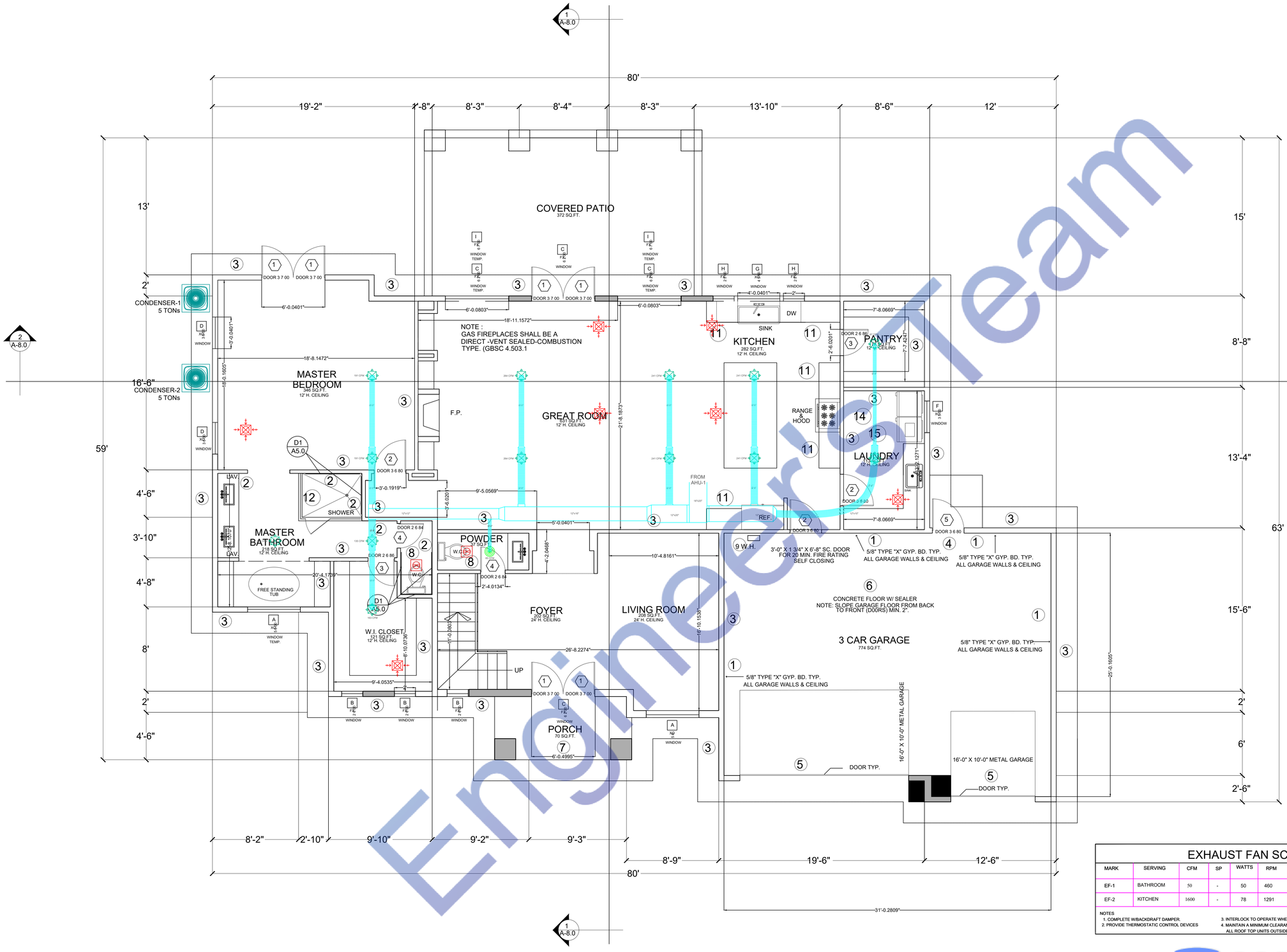
GENERAL NOTE FOR MECHANICAL PLAN

Drawing Number:
HO



EXHAUST FAN SCHEDULE

MARK	SERVING	CFM	SP	WATTS	RPM	VOLTAGE	MAKE MODEL	NOTES	FAN TYPE
EF-1	BATHROOM	50	-	50	460	120/60/1	Broan-NuTone 688		IN-LINE
EF-2	KITCHEN	1600	-	78	1291	115/60/1	HOODMART 28D-1600-FF		IN-LINE

NOTES
1. COMPLETE W/BACKDRAFT DAMPER.
2. PROVIDE THERMOSTATIC CONTROL DEVICES
3. INTERLOCK TO OPERATE WHENEVER RTU'S OPERATE.
4. MAINTAIN A MINIMUM CLEARANCE OF 10'-0" FROM ALL INTAKE AIR FANS AND ALL ROOF TOP UNITS OUTSIDE AIR INTAKE OPENINGS.

Mechanical Legends

- AIR HANDLING UNIT
- ROOF TOP UNIT
- OUTDOOR CONDENSER
- SUPPLY AIR DIFFUSER
- EXHAUST AIR DIFFUSER
- KITCHEN CHIMNEY
- EXHAUST FAN
- SUPPLY AIR DUCT

1 FIRST FLOOR HVAC PLAN

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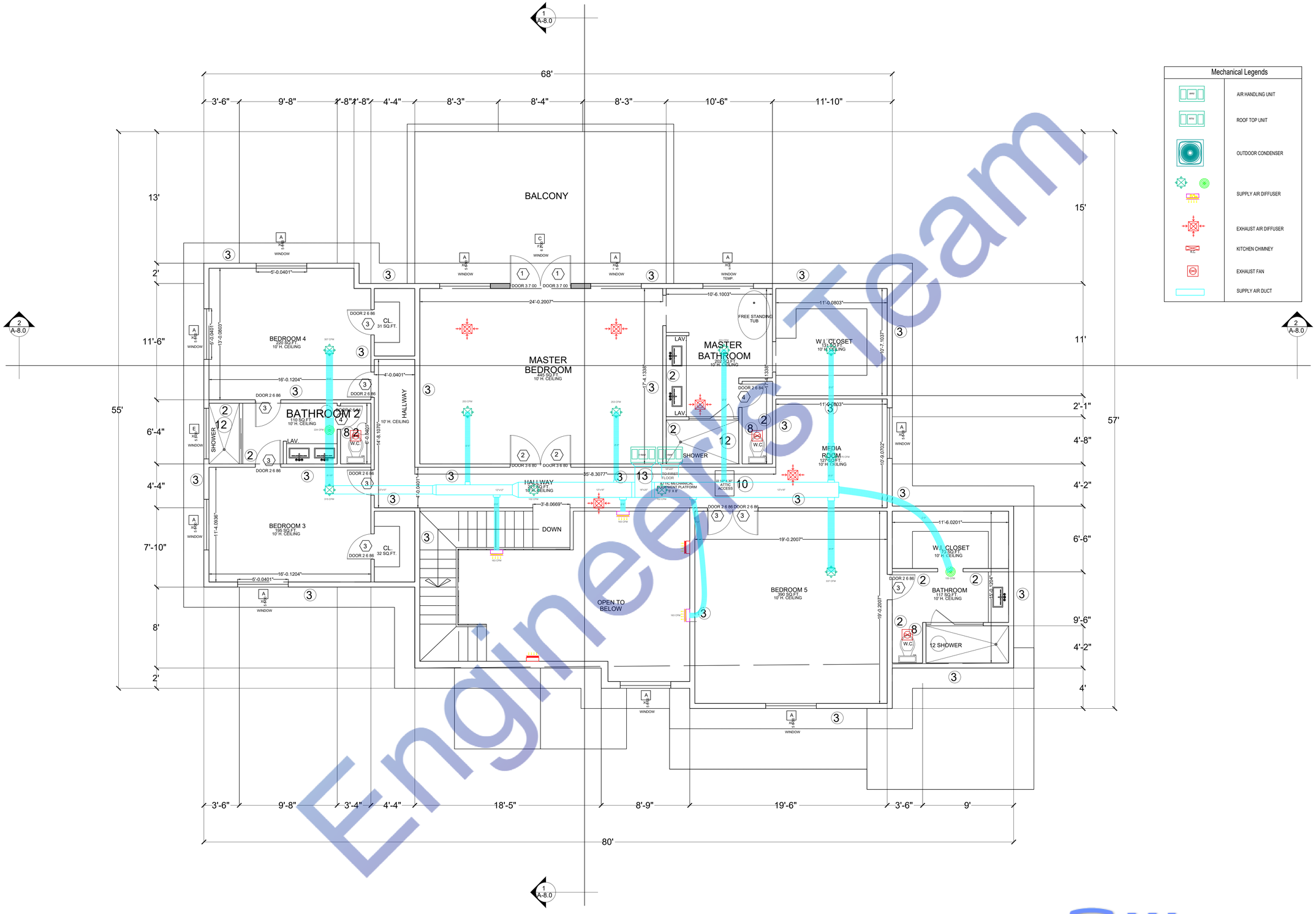

1 SECOND FLOOR HVAC PLAN

Mechanical Legends	
AHU	AIR HANDLING UNIT
RTU	ROOF TOP UNIT
	OUTDOOR CONDENSER
	SUPPLY AIR DIFFUSER
	EXHAUST AIR DIFFUSER
KC	KITCHEN CHIMNEY
	EXHAUST FAN
	SUPPLY AIR DUCT

ENGINEER'S TEAM
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For City Stamps:

Project No.:

Drawn by:

Date: 5/17/25

Sheet Name:
PROPOSED
HVAC PLAN

Drawing Number:
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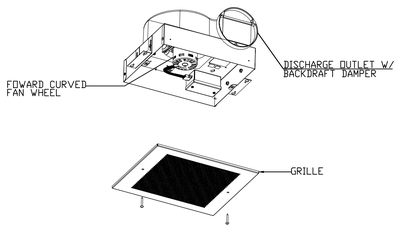
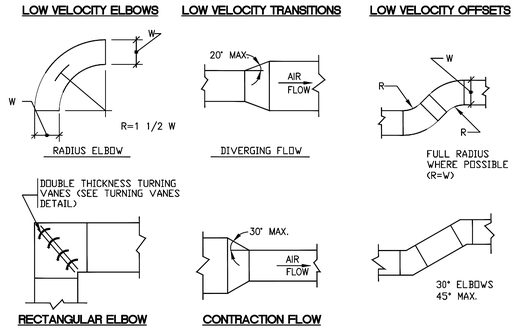
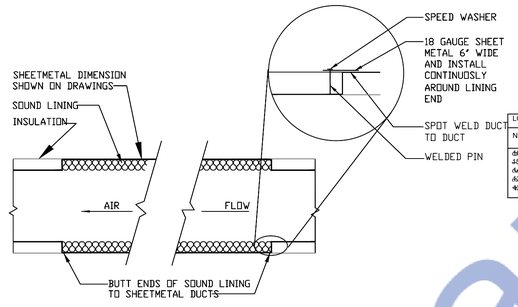


CEILING FAN DETAIL
NOT TO SCALE

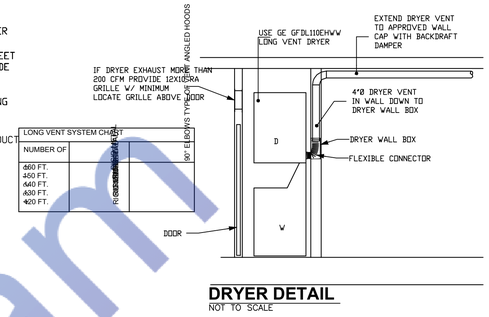
CEILING RADIATION DAMPERS SHALL BE INSTALLED IN ACCORDANCE WITH UL 555C



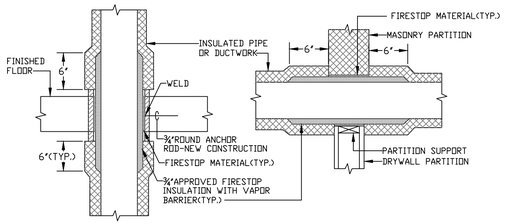
LOW VELOCITY TRANSITIONS, OFFSETS AND ELBOWS
NOT TO SCALE



TYPICAL SOUND LINING DETAIL
NOT TO SCALE



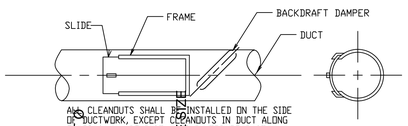
DRYER DETAIL
NOT TO SCALE



NOTE:

APPLICABLE TO PENETRATIONS OF ALL FIRE RATED MEMBRANES, IN ACCORDANCE WITH 2012 IBC 714. REFER UL LISTED FIRE STOPPING SYSTEMS UL-1479, UL-2043

PENETRATION OF FIRE/SMOKE BARRIERS
NOT TO SCALE



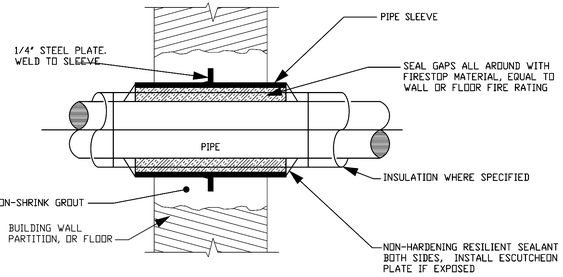
SLIDE SIZE		
4" - 5"	3" X 6"	4" X 8"
6"	4" X 6"	6" X 8"

CLEAN OUT / INSPECTION DETAIL
NO SCALE

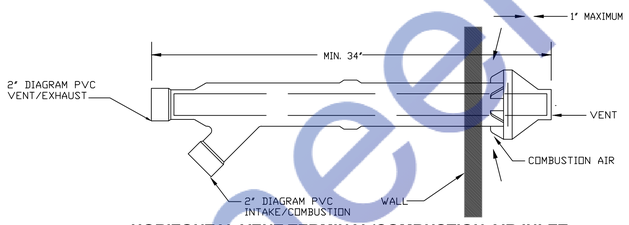
RESIDENTIAL GRILLES & REGISTERS SCHEDULE

DESIG ◯	TYPE (REFER TO DETAILS)	SERVICE	AIR FLOW RANGE (CFM)	NOMINAL SIZE/ DESCRIPTION (INCH)	INLET/ NECK SIZE (IN)	BASIS OF DESIGN/REMARKS
A	REGISTER	SA	0–50	6x4	4"ø	300RL, BORDER TYPE A
B	REGISTER	SA	51–100	6x6 OR 10X4	6"ø	300RL, BORDER TYPE A
C	REGISTER	SA	101–150	10x6	7"ø	300RL, BORDER TYPE A
D	REGISTER	SA	151–200	12x6	8"ø	300RL, BORDER TYPE A
E	REGISTER	SA	201–250	14x6	9"ø	300RL, BORDER TYPE A
F	RG	RA/EA	0–100	6x6	6x6	350RL, BORDER TYPE A
G	RG	RA/EA	101–200	8x8	8x8	350RL, BORDER TYPE A
H	RG	RA/EA	201–300	10x10	10x10	350RL, BORDER TYPE A
I	RG	RA/EA	301–450	12x12	12x12	350RL, BORDER TYPE A
J	RG	RA/EA	451–600	14x14	14x14	350RL, BORDER TYPE A
K	RG	RA/EA	601–800	16x16	16x16	350RL, BORDER TYPE A
L	RG	RA/EA	801–1100	18x18	18x18	350RL, BORDER TYPE A
M	RG	RA/EA	1101–1300	20x20	20x20	350RL, BORDER TYPE A
N	RG	RA/EA	1301–1600	22x22	22x22	350RL, BORDER TYPE A

NOTES:
1. REFER TO ARCHITECT DRAWINGS FOR TYPE OF CEILING.
2. MODEL NUMBERS IN "BASIS OF DESIGN" ARE TITUS
3. PROVIDE HEAVY DUTY FRAME AND CORE WHERE MOUNTED IN FLOORS.
4. PROVIDE WITH FIRE DAMPER FOR UL LISTED CEILING
5. PROVIDE ROUND TO SQUARE ADAPTOR BOOT

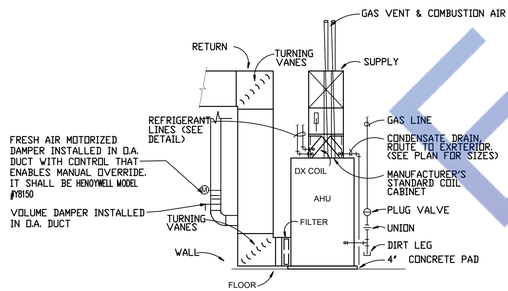


INTERIOR MASONRY WALL AND FLOOR PENETRATION
NOT TO SCALE

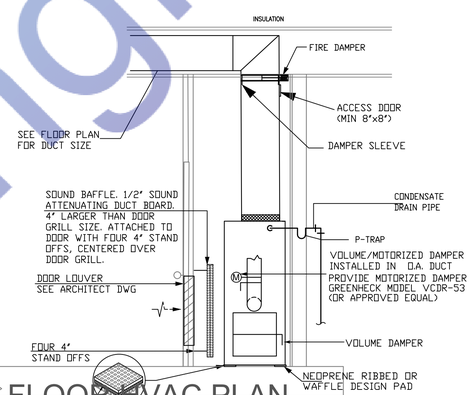


HORIZONTAL VENT TERMINAL/COMBUSTION AIR INLET
NOT TO SCALE

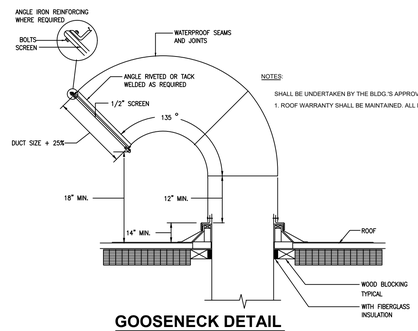
NOTE-PLASTIC PIPE AND FITTINGS USED TO VENT, APPLIANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE APPLIANCE MANUFACTURER'S INSTRUCTIONS. PLASTIC PIPE VENTING MATERIALS LISTED AND LABELED IN ACCORDANCE WITH UL 1738 SHALL BE INSTALLED IN ACCORDANCE WITH THE VENT MANUFACTURER'S INSTALLATION INSTRUCTIONS. FLUID PVC PIPING SHALL NOT BE USED FOR COMBUSTION GAS VENTING.



GAS-FIRED AIR HANDLING UNIT DETAIL
N.T.S.



AHU MOUNTING DETAIL
NOT TO SCALE



GOOSENECK DETAIL
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