

**DIVISION 15 SPECIFICATIONS**

**PART 1 – GENERAL**

**CONDITIONS**

GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIAL CONDITIONS AND OTHER RELATED PORTION OF DIVISION I, APPLY TO THIS SECTION.

**SCOPE**

FURNISH, INSTALL, TEST, GUARANTEE, AND PLACE INTO OPERATION, A COMPLETE, OPERABLE, AND APPROVED MECHANICAL SYSTEM, AS INDICATED OR DESCRIBED BY THE CONTRACT DOCUMENTS. SECURE AND PAY FOR ALL MATERIALS, EQUIPMENT, LABOR, SUPERVISION, FEES, TESTS, PERMITS, CERTIFICATES OF INSPECTION AND ALL OTHER COSTS REQUIRED.

**REGULATIONS, PERMITS AND INSPECTIONS**

REGULATIONS: COMPLY WITH ALL APPLICABLE CODES, RULES AND REGULATIONS, INCLUDING ALL BUILDING AND SAFETY LAWS RELATING TO BUILDING, PUBLIC HEALTH AND SAFETY.

CODES: ALL MATERIALS, EQUIPMENT AND WORK MUST BE CONFORM TO APPLICABLE CODES.

PERMITS: OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND LICENSES.

INSPECTIONS: WHEN REQUIRED BY CODE, ALL WORK MUST BE INSPECTED AND APPROVED BY LOCAL AUTHORITIES. PRIOR TO FINAL APPROVAL, FURNISH THE ARCHITECT/OWNER WITH CERTIFICATES OF INSPECTION AND APPROVALS BY LOCAL AUTHORITIES.

**DESIGN DRAWINGS**

DESIGN DRAWINGS ARE DIAGRAMMATIC AND ARE ONLY INTENDED TO DEFINE THE BASIC FUNCTIONS REQUIRED. PROVIDE ALL WORK, MATERIAL, ETC., NECESSARY TO ACCOMPLISH THESE REQUIREMENTS. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND ARE A PART OF THE WORK INCLUDED, HOWEVER, NO CHANGES THAT ALTER THE CHARACTER OF THE WORK WILL BE PERMITTED. DO NOT SCALE THE DESIGN DRAWINGS.

IF A CONFLICT OCCURS BETWEEN THE DESIGN DRAWINGS AND SPECIFICATIONS, PROMPTLY NOTIFY THE ARCHITECT OR ENGINEER. INTERPRETATION MADE SHALL BE CONSIDERED PART OF THE CONTRACT.

**QUALIFICATION OF WORKMEN**

USE SUFFICIENT JOURNEMEN CRAFTSMEN AND COMPETENT SUPERVISORS TO ENSURE PROMPT, PROPER, AND SAFE EXECUTION OF WORK.

**SAFETY PRECAUTIONS**

EXERCISE CAUTION AT ALL TIMES TO PROTECT ALL PERSONS AND PROPERTY. FURNISH A PLACE OF EMPLOYMENT WHICH IS FREE FROM RECOGNIZED HAZARDS THAT ARE LIKELY TO CAUSE DEATH OR SERIOUS INJURY OR HARM TO EMPLOYEES. FURNISH AND MAINTAIN GUARDS, RAILINGS, FENCES, CANOPIES, LIGHTS, WARNING SIGNS, ETC., WHICH ARE REQUIRED BY LAW OR NECESSARY TO PROTECT ALL PERSONS AND PROPERTY.

BE FAMILIAR WITH AND COMPLY WITH ALL APPLICABLE LOCAL/STATE CODES AND LAWS, AND IN PARTICULAR, THE CODES OF FEDERAL REGULATIONS, AS ADMINISTERED BY THE STATE.

**PART 2 – PRODUCTS**

**GENERAL**

UTILIZE NEW AND UNUSED PRODUCTS OF ESTABLISHED AND REPUTABLE AMERICAN AND FOREIGN MANUFACTURERS. ITEMS OF EQUIPMENT USED FOR SIMILAR PURPOSES SHALL BE PRODUCTS OF THE SAME MANUFACTURER.

SYSTEM SHALL BE COMPLETE AND OPERABLE. ANY ACCESSORIES REQUIRED FOR THE OPERATION OF THE SYSTEMS SHALL BE INCLUDED AS THOUGH SPECIFICALLY INDICATED TO BE PROVIDED. SUCH ACCESSORIES WOULD INCLUDE FILTERS, CONTROLS, PANELS, TIMECLOCKS, CONDENSATE DRAINS, RELIEF VALVES, SERVICE VALVES, THERMOSTATS, VIBRATION ISOLATORS, ETC. MOTOR STARTERS FOR PREWIRED EQUIPMENT (AND OTHER PROTECTION AND CONTROL DEVICES) ARE ALSO INCLUDED IN THIS SPECIFICATION. STARTERS FOR NON-PREWIRED EQUIPMENT, I.E. FANS, PUMPS, ETC., ARE SPECIFIED IN ELECTRICAL SHEET SPECIFICATIONS.

SPECIFIC REFERENCE TO A MANUFACTURER'S PRODUCT IS ONLY TO ESTABLISH TYPE, QUALITY, AND PERFORMANCE REQUIRED. THESE QUALIFICATIONS ARE IN ADDITION TO THE REQUIREMENTS SHOWN ON THE PLANS AND ELSEWHERE IN THESE SPECIFICATIONS. LISTING OF ALTERNATE EQUIPMENT MANUFACTURERS SHALL NOT BE CONSIDERED AS AN UNCONDITIONAL APPROVAL OF THE PRODUCTS OF THOSE MANUFACTURERS.

PROVIDE OPERATION AND MAINTENANCE DOCUMENTATION TO THE OWNER THAT INCLUDE EQUIPMENT CAPACITY AND REQUIRED MAINTENANCE ACTIONS.

**EXHAUST FANS**

CENTRIFUGAL TYPE WITH ADJUSTABLE BELT-DRIVEN OR DIRECT-DRIVEN DRIVE (AS INDICATED ON THE DRAWINGS), STATICALLY AND DYNAMICALLY BALANCED. CEILING OR ROOF MOUNTED AS INDICATED ON THE DRAWINGS.

**DUCTWORK**

SHEETMETAL DUCTWORK: PROVIDE SHEETMETAL DUCTWORK FABRICATED AND INSTALLED IN ACCORDANCE WITH ASHRAE AND SMACNA STANDARDS. FOR 1" W.G. PRESSURE CLASS, SEAL CLASS "A". SHEETMETAL SHALL BE GALVANIZED SHEET STEEL OF LOCK FORMING QUALITY, WITH G90 ZINC COATING. SHEET STEEL SHALL COMPLY WITH ASTM A653 STANDARD SPECIFICATION FOR STEEL SHEETMETAL, ZINC COATED (GALVANIZED) OR ZINC-IRON ALLOY-COATED (GALVANNEALED) BY THE HOT DIP PROCESS, AND A924 STANDARD SPECIFICATION FOR GENERAL REQUIREMENTS FOR SHEET, METALLIC-COATED BY THE 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 AT ALL 90° ELBOWS.

FLEXIBLE DUCT: PROVIDE FACTORY ASSEMBLED CLASS 1 AIR DUCT (UL 181) WITH 1" THICK 1 PCF FIBERGLASS INSULATION AND REINFORCED OUTER PROTECTIVE COVER/VAPOR BARRIER. FLEXIBLE DUCT SHALL MEET NFPA 90A WITH FLAME SPREAD UNDER 25, SMOKE DEVELOPED UNDER 50, AND SHALL BE RATED FOR MINIMUM 2" W.G. PRESSURE AND 0 TO 250°F TEMPERATURE. PROVIDE SCREW-OPERATED METAL ADJUSTABLE CLAMPING DEVICES. USE TWIST-LOCK TAP COLLARS AT CONNECTIONS INTO SHEETMETAL DUCTWORK. MAXIMUM EXTENDED LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 6 FEET.

FLEXIBLE DUCT CONNECTORS: PROVIDE U.L. LABELED 30 OUNCE NEOPRENE COATED FIBERGLASS FABRIC DUCT CONNECTORS AT DUCT CONNECTIONS TO ALL VIBRATING EQUIPMENT.

DUCT TURNING VANES: PROVIDE FABRICATED TURNING VANES AND VANE RUNNERS, CONSTRUCTED IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS". PROVIDE TURNING VANES CONSTRUCTED OF CURVED BLADES, SUPPORTED WITH BARS PERPENDICULAR TO BLADES, AND SET INTO SIDE STRIPS SUITABLE FOR MOUNTING IN DUCTWORK. FOLLOW SMACNA GUIDELINES FOR SPACING SUPPORT, AND CONSTRUCTION. ALL BLADES SHALL BE DOUBLE THICKNESS AIRFOIL TYPE.

**DUCT INSULATION**

DUCT INSULATION (ALL SUPPLY DUCT, ROUND RETURN, AND EXHAUST DUCT LOCATED ABOVE CEILINGS): PROVIDE MINIMUM 1-1/2" THICK BLANKET TYPE FIBERGLASS INSULATION COMPLYING WITH ASTM C-553, TYPE II, WITH FACTORY APPLIED KRAFT BONDED TO ALUMINUM FOIL, REINFORCED WITH FIBERGLASS VAPOR BARRIER/JACKET. JACKET SHALL CONFORM TO ASTM C-1136, TYPE II.

DUCT LINER (ALL RECTANGULAR RETURN DUCT): PROVIDE MINIMUM 1" THICK, 3 PCF DENSITY, NEOPRENE COATED, LONG TEXTILE FIBER TYPE DUCT LINER, WITH COATING ON THE AIR STREAM SIDE CONFORMING TO NFPA 90A. DUCT LINER ADHESIVE SHALL BE AS RECOMMENDED BY DUCT LINER MANUFACTURER, AND SHALL COMPLY WITH ASTM C-916. DUCT LINER FASTENERS SHALL COMPLY WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION.

**ELIE VENTS**

PROVIDE TYPE 'B' VENTS WHERE REQUIRED. EXTEND UP THROUGH ROOF AND TERMINATE WITH ROOF JACK, STORM COLLAR AND ALL WEATHER CAP. TERMINATE

PER CODE, A MINIMUM OF 36" ABOVE ANY INTAKE WITHIN 10'-0". APPLY RTV SILICONE ADHESIVE SEALANT LIBERALLY AT ALL VENT PIPE JOINTS AND 1" (25MM) THICK PIPE INSULATION WRAPPED AROUND SINGLE WALL SHEET METAL VENT PIPE PER MANUFACTURER REQUIREMENTS.

**INSTALLATION OF HANGERS AND SUPPORTS:**

PROVIDE HANGERS AT ALL OFFSETS, TEES, WITHIN 12" OF ALL HORIZONTAL ELBOWS, AND ELSEWHERE AS HEREIN DESCRIBED.

PROVIDE INSULATION THICKNESS AS INDICATED:

CONDENSATE PIPING: 1/2" THICKNESS.

CLEAN-UP: ALL UNINSULATED FITTINGS, MATERIALS, EQUIPMENT AND STRUCTURES SHALL BE LEFT FREE AND CLEAR OF INSULATING AND COATING MATERIALS.

**GRILLES, REGISTERS, AND DIFFUSERS**

DIFFUSERS: RECTANGULAR FIXED PATTERN TYPE (FACE PATTERN SHALL BE SELECTED TO SUIT AIR PATTERN REQUIRED). REMOVABLE CORE/OPOSED BLADED VOLUME CONTROL/ENAMEL FINISH.

RETURN AIR FILTER GRILLES: FIXED BARS AT APPROXIMATELY 40 DEGREES, WITH HINGED FACE, OR PERFORATED PLATE TO MATCH SUPPLY DIFFUSER, OR 1/2" X 1/2" X 1/2" "EGGCRATE". ALUMINUM OR ENAMELED STEEL.

AIR DISTRIBUTION DEVICES SHALL BE SELECTED AND SIZED IN ACCORDANCE WITH THE REQUIREMENTS OF EACH APPLICATION. DEVICES, GENERALLY, SHALL PROVIDE UNIFORM, DRAFT-FREE, AND QUIET AIR DISTRIBUTION. ALL DEVICES SHALL HAVE RIGID FRAMES, COMPATIBLE WITH THE SURFACE OR STRUCTURE. DEVICES SHALL BE MANUFACTURED BY KRUEGER, TITUS, METALAIR OR TUTTLE & BAILEY.

**TEMPERATURE CONTROLS AND WIRING**

WIRING IS INCLUDED UNDER THE ELECTRICAL DIVISION OF THE SPECIFICATIONS BUT ALL INTEGRAL STARTERS, CONTROLS (INCLUDING THERMOSTAT WIRING), RELAYS AND OTHER DEVICES ARE INCLUDED UNDER THE MECHANICAL DIVISION. ALL EQUIPMENT, DEVICES AND WIRING SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE. ALL CONTROLS SHALL BE FURNISHED AND PROPERLY IDENTIFIED WITH INSTRUCTIONS FOR PROPER CONNECTIONS, RESPONSIBILITY FOR PROPER CONNECTIONS AND OPERATION IS INCLUDED UNDER THE MECHANICAL CONTRACTORS RESPONSIBILITY. VERIFY ALL VOLTAGES, PHASES AND ELECTRICAL CONNECTIONS WITH THE ELECTRICAL CONTRACTOR BEFORE ORDERING ANY EQUIPMENT, AND IF ANY DISCREPANCIES OCCUR, THEY SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT FOR HIS DECISION.

**AIR SYSTEM BALANCING**

GENERAL: THE AIR CONDITIONING CONTRACTOR SHALL PROVIDE A TEST AND BALANCE REPORT, CONDUCTED AND PREPARED BY A QUALIFIED THIRD PARTY, OF HEATING, VENTILATING, AND AIR MOVING EQUIPMENT AND AIR DISTRIBUTING OR EXHAUSTING SYSTEMS.

MATERIALS: ALL INSTRUMENTS USED BY THIS AGENCY SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER. IF REQUESTED, CONDUCT THE TESTS IN PRESENCE OF THE ARCHITECT AND/OR THE MECHANICAL ENGINEER RESPONSIBLE FOR THE PROJECT AND/OR HIS REPRESENTATIVE. DO NOT BEGIN AIR BALANCING AND TESTING UNTIL SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER. PUT ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS AND EQUIPMENT INTO FULL OPERATION AND CONTINUE THE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING OF THE AIR CONDITIONING, HEATING AND VENTILATING SYSTEMS. THE AIR BALANCE AGENCY SHALL PROVIDE PROOF OF HAVING SUCCESSFULLY COMPLETED AT LEAST FIVE PROJECTS OF SIMILAR SIZE AND SCOPE AND SHALL BE A CERTIFIED MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL OR NEBB. SUBMIT THE TEST AND BALANCE CONTRACT TO THE ARCHITECT FOR APPROVAL WITHIN 90 DAYS AFTER THE AIR CONDITIONING CONTRACTOR HAS RECEIVED HIS CONTRACT TO PROCEED WITH THE AIR CONDITIONING INSTALLATION TO ALLOW AIR BALANCE AGENCY TO SCHEDULE THIS WORK IN COOPERATION WITH OTHER TRADES INVOLVED, AND COMPLY WITH THE COMPLETION DATE.

AIR BALANCING: UPON COMPLETION OF THE AIR CONDITIONING SYSTEM, THE AIR BALANCE AGENCY SHALL PERFORM THE TEST, COMPIL THE TEST DATA, AND SUBMIT FIVE (5) COPIES OF THE COMPLETE TEST DATA TO THE ENGINEERS FOR EVALUATION AND APPROVAL. AIR BALANCE AGENCY SHALL BALANCE PROJECT TO JOBSITE CONDITIONS WHICH INCLUDES BUT IS NOT LIMITED TO SUPPLYING AND CHANGING OUT BELTS AND/OR PULLEYS AS NECESSARY.

**PART 3 – EXECUTION**

**GENERAL**

INSTALL MATERIALS AND EQUIPMENT IN AN ARRANGEMENT WHICH WILL GIVE THE GREATEST PRACTICAL EASE OF OPERATION AND SERVICE BY THE OWNER. MAKE NO EQUIPMENT SUBSTITUTIONS WHICH WOULD LEAVE INADEQUATE OPERATING AND/OR SERVICING SPACE.

INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THESE SPECIFICATIONS AND ALL MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.

PERFORM ALL WORK IN ACCORDANCE WITH THE BEST TRADE PRACTICES. INSTALL ALL MATERIALS AND EQUIPMENT SQUARELY WITH THE BUILDING LINES. PROVIDE LEVEL, RIGID, PERMANENT BASES AND SUPPORTS FOR ALL WORK.

CONSTRUCT AND BRACE EQUIPMENT, PIPING, ETC., SO THAT THERE WILL BE NO VIBRATION OR RATTLING WHEN THE SYSTEM IS IN OPERATION.

COVER AND PROTECT ALL EQUIPMENT AND MATERIALS FROM WEATHER, THEFT, ETC., UNTIL DATE OF COMPLETION. PLUG OR CAP ALL OPEN ENDS OF INSTALLED PIPING OR DUCTWORK.

**DUCTWORK**

CONSTRUCT DUCTWORK WITH MATERIAL GAUGES, JOINTS, BRACING AND SUPPORTS IN ACCORDANCE WITH APPLICABLE RECOMMENDATIONS OF ASHRAE AND SMACNA, WITH ADDITIONAL BRACING AS REQUIRED.

DUCTWORK SHALL BE RIGIDLY CONSTRUCTED AND AIR TIGHT. JOINTS SHALL BE TIGHTLY FITTED WITH NO VOIDS. MINOR GAPS SHALL BE CLOSED WITH CANVAS TAPE SET INTO AND SEALED WITH BRUSH APPLIED ADHESIVE, OR WITH SILICONE CAULKING COMPOUND. DO NOT UTILIZE PRESSURE SENSITIVE TAPE.

SEAL ALL JOINTS OF DUCTWORK ABOVE ROOF WITH GLASS FIBER TAPE EMBEDDED IN ROOFING CEMENT. APPLY SECOND COAT OF CEMENT AFTER FIRST HAS SET AND FINISH WITH TWO COATS OF ALUMINUM ROOFING PAINT.

MAKE CONNECTIONS BETWEEN FLEXIBLE DUCTS AND RIGID TRUNK DUCTS WITH FACTORY FABRICATED FITTINGS WITH DAMPER (WHERE "TAP-INS" SERVE SINGLE OUTLETS, AND WHERE TAP-IN DAMPER IS ACCESSIBLE, OUTLET DAMPER MAY BE OMITTED).

ELBOWS SHALL HAVE A THROAT RADIUS EQUAL TO DUCT WIDTH. SQUARE ELBOWS SHALL HAVE TURNING VANES. TRANSITIONS SHALL NOT EXCEED 4 TO 1 RATIO.

IF OBSTRUCTIONS REQUIRE A CHANGE IN DUCT SHAPES, MAINTAIN EQUIVALENT AREAS. ALL SIZES SHOWN ON THE DRAWINGS ARE NET DIMENSIONS INSIDE THE INSULATION.

**AIR DISTRIBUTION DEVICES**

INSTALL TIGHTLY AND SQUARE WITH BUILDING LINES. FLANGED DEVICES SHALL BE SEALED AIR TIGHT WITH SPONGE RUBBER GASKETS. ADJUST BLADES AND DAMPERS FOR PROPER AIR DISTRIBUTION. VERIFY EXACT POSITIONING OF ALL EQUIPMENT WITH ARCHITECTURAL DRAWINGS AND NOTES.

**ROUGH-IN AND FINAL CONNECTIONS**

PROVIDE ROUGH-IN AND FINAL CONNECTIONS FOR ALL FIXTURE AND EQUIPMENT REQUIREMENTS. THE CONTRACT DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF THE REQUIRED ROUGH-IN. HOWEVER, ALL DETAILS AND DIMENSIONS SHALL BE DETERMINED FROM INFORMATION OBTAINED FROM THE SUPPLIER OF THE ITEM. THIS REQUIREMENT APPLIES EQUALLY TO EQUIPMENT FURNISHED BY OWNER OR OTHER CONTRACTORS.

**EXCAVATION AND BACKFILL**

ACCURATELY GRADE BOTTOM OF TRENCHES TO PROVIDE UNIFORM CONTINUOUS BEARING AND SUPPORT FOR EACH SECTION OF PIPE. TEST ALL PIPING PRIOR TO BACKFILLING. BACKFILL IN ACCORDANCE WITH ALL APPLICABLE SECTIONS OF

THESE SPECIFICATIONS. MAKE BACKFILL IN SIX INCH (6") LAYERS, EACH THOROUGHLY COMPACTED AS DIRECTED. BACKFILL SHALL BE FREE OF ROCKS, WOOD AND DEBRIS. RESTORE TO ORIGINAL CONDITIONS ALL PAVEMENT, SIDEWALKS, LAWNS, LANDSCAPING, ETC. JETTING IS NOT AN ACCEPTABLE MEANS OF COMPACTION OR BACKFILLING.

**TESTING REQUIREMENTS**

TEST ALL SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE LOCAL/STATE CODES, REGULATIONS, ORDINANCES, ETC., AND AS FOLLOWS:

IF ANY TEST SHOWS THE WORK TO BE DEFECTIVE IN ANY WAY OR AT VARIANCE WITH SPECIFICATION REQUIREMENTS, MAKE ALL NECESSARY CHANGES AND REMEDY ALL DEFECTS.

**FOAM INSULATION:**

COVER TRANSVERSE JOINTS AND LARGER TEARS OR PENETRATIONS WITH 4" WIDE TAPE. SECURE LAP OF FACING AND TAPE WITH FULL COVERAGE OF ADHESIVE AND OUTWARD CLINCH STAPLES. INSULATE FITTINGS WITH MITERED SECTIONS OF PIPE INSULATION. NOTE: IF PRESSURE SENSITIVE ADHESIVE IS UTILIZED, LAPS SHALL BE SECURED WITH METAL BANDS AT 18" CENTERS.

INSULATE FITTINGS WITH MITERED SECTIONS OF PIPE INSULATION, PREMOLDED FITTINGS, OR WRAP WITH FIBERGLASS WOOL TO A THICKNESS EQUAL TO THE ADJOINING PIPE INSULATION. SECURE INSULATION WITH MULTIPLE WRAPS OF GLASS OR JUTE TWINE SMOOTH OUT SURFACE WITH 1/8" FOSTER 60-25 MASTIC. WHILE MASTIC IS STILL WET, EMBED A GLASS MEMBRANE FABRIC AND THEN APPLY AN ADDITIONAL 1/8" COAT OF MASTIC.

COVER ALL EXPOSED INSULATION AND ALL INSULATED FITTINGS WITH 8 OUNCE CANVAS JACKET. (FOUR OUNCE CANVAS MAY BE USED ON FITTINGS 1-1/2" AND SMALLER). SATURATE CANVAS WITH FOSTER 30-36 COATING, DILUTED WITH WATER, ONE PART WATER TO THREE PARTS COATING. APPLY CANVAS SMOOTHLY WITH LAP PLACED NEXT TO WALL OR CEILING AND FINISH WITH A FINAL COAT OF UNDILUTED COATING. FINAL COATING SHALL BE OF SUFFICIENT THICKNESS TO FILL ALL LAPS AND CLOTH TEXTURE. PROTECT INSULATION OUTDOORS WITH AN 0.016" THICK ALUMINUM JACKET WITH 2" LAPS AND SECURED WITH BANDS ON 12" CENTERS.

FLEXIBLE FOAM: SLIP INSULATION OVER PIPING PRIOR TO ASSEMBLY. DO NOT SLIT INSULATION LENGTHWISE. SOLVENT WELD ALL JOINTS. DO NOT USE TAPE TO SECURE INSULATION.

PROVIDE POLISHED CHROME PLATED ESCUTCHEONS IN FINISHED ROOMS, AND POLISHED BRASS IN OTHER AREAS.

PROVIDE REQUIRED STRUCTURAL MEMBERS, HANGERS, SUPPORTS AND INSERTS TO KEEP PIPING IN PROPER ALIGNMENT.

EXPOSED PIPING AT RESTROOMS UNDER SINK REQUIRES INSULATION AS A PROTECTIVE COVERING PER THE ADA. INSULATE WATER AND WASTE PIPING UNDER LAVATORY AS SPECIFIED ELSE WHERE ON THE DRAWING. RI 34" AFF TO RIM.

**PART 4 – ALTERNATE EQUIPMENT**

**GENERAL**

COMPLETION HEREIN BY BRAND NAME IS INTENDED TO ESTABLISH A STANDARD OF QUALITY. EQUIPMENT HAS BEEN MADE ACCORDINGLY.

**EXISTING CONDITIONS**

THE CONTRACTOR SHALL VISIT THE SITE AND INSPECT THE SITE FOR WORK HE MUST PERFORM. IN ADDITION TO WHAT IS SHOWN HEREIN, AND INCLUDE IN HIS BID AN AMOUNT TO DO SUCH WORK.

**SUBSTITUTIONS**

SUBMITLIST OF EQUIPMENT BY OTHER ACCEPTABLE MANUFACTURERS MUST BE COMPLETE IN EVERY DETAIL INCLUDING SPACE REQUIREMENTS, WEIGHT, COMPLETE PERFORMANCE DATA AND SUPPLEMENTAL DATA REQUIREMENTS DETAILED IN THIS AND OTHER SECTIONS, WILL FIT SPACE AS SHOWN ON THE DRAWINGS.

**LIST OF ACCEPTABLE MANUFACTURERS**

THE FOLLOWING IS A LIST OF MANUFACTURERS WHOSE EQUIPMENT IS ACCEPTABLE AS TO MANUFACTURE, SUBJECT TO CONFORMANCE WITH ALL DRAWINGS, SPECIFICATIONS, AND ADDENDA ITEMS. CAREFUL CHECKING MUST BE MADE TO VERIFY THAT EQUIPMENT WILL MEET ALL CAPACITIES, REQUIREMENTS AND SPACE ALLOCATIONS AND THAT WEIGHTS ARE NOT EXCESSIVE.

AIR CONDITIONING UNITS: CARRIER, YORK, TRANE, RUUD

EXHAUST FANS: GREENHECK, BROAN, PENN, ACME, COOK

GRILLES, REGISTERS, DIFFUSERS: TITUS, TUTTLE/BAILEY, KRUEGER, METALAIR, J&J

VIBRATION ISOLATION: MASON INDUSTRIES, VIBREX, KORFUND, VIBRATION MOUNTINGS, INC., AMBER-BOOTH

DUCT TURNS: TUTTLE/BAILEY, DURO DYNE, BARBER-COLMAN, ELCEN, TITUS, HEP

VALVES (GATE, GLOBE, CHECK): CRANE, WALWORTH, KENNEDY, CENTER-LINE, STOCKHAM, LUNDENHEIMER, MISSION, WILLIAMS-HAGER, GRINNELL, NIBCO-SMOTT

VALVES (PLUG): HOMESTEAD

DUCT AND PIPE INSULATION: OWENS-CORNING, CERTAIN-TEED, JOHNS-MANVILLE, PITTSBURGH, CAREY, DOW CHEMICAL CO.

FILTERS: (PLEATED AIR FILTERS) FARR, CONTINENTAL, BURKE, AMERICAN AIR FILTERS, CAMBRIDGE

CONTROLS: HONEYWELL, JOHNSON SERVICE, POWERS

LOUVERS AND DAMPERS: RUSKIN, POTTORFF, TITUS

PIPE HANGERS AND SUPPORTS: GRINNELL, ELCEN, FEE & MASON, KINLINE, F&S, B-LINE, MICHIGAN



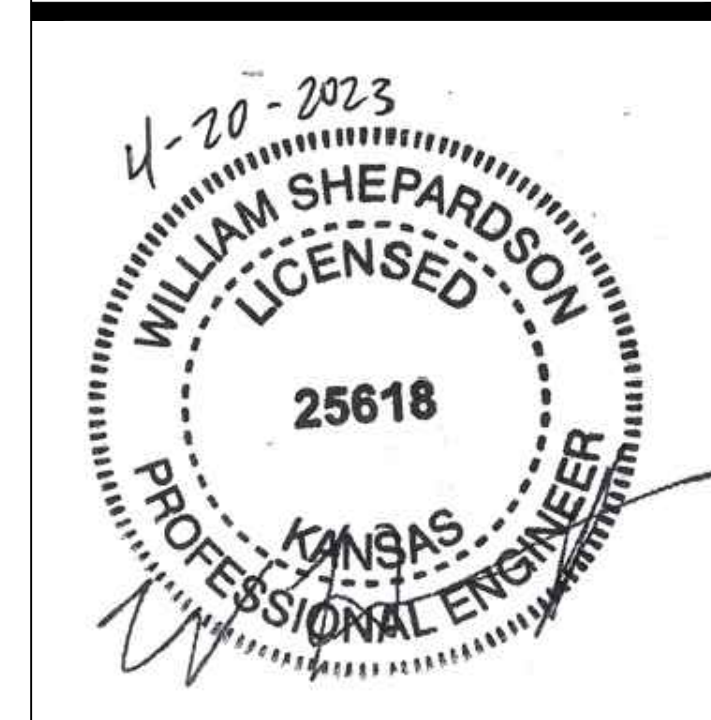
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No.	Description	Date
	Review	04/12/2023
	Permit	04/20/2023
1	Revision	07/25/2023

PROJECT NUMBER

DATE 07/25/2023

DRAWN BY KML

CHECKED BY MKC

SHEET NAME  
MECHANICAL SPECIFICATIONS

SHEET #

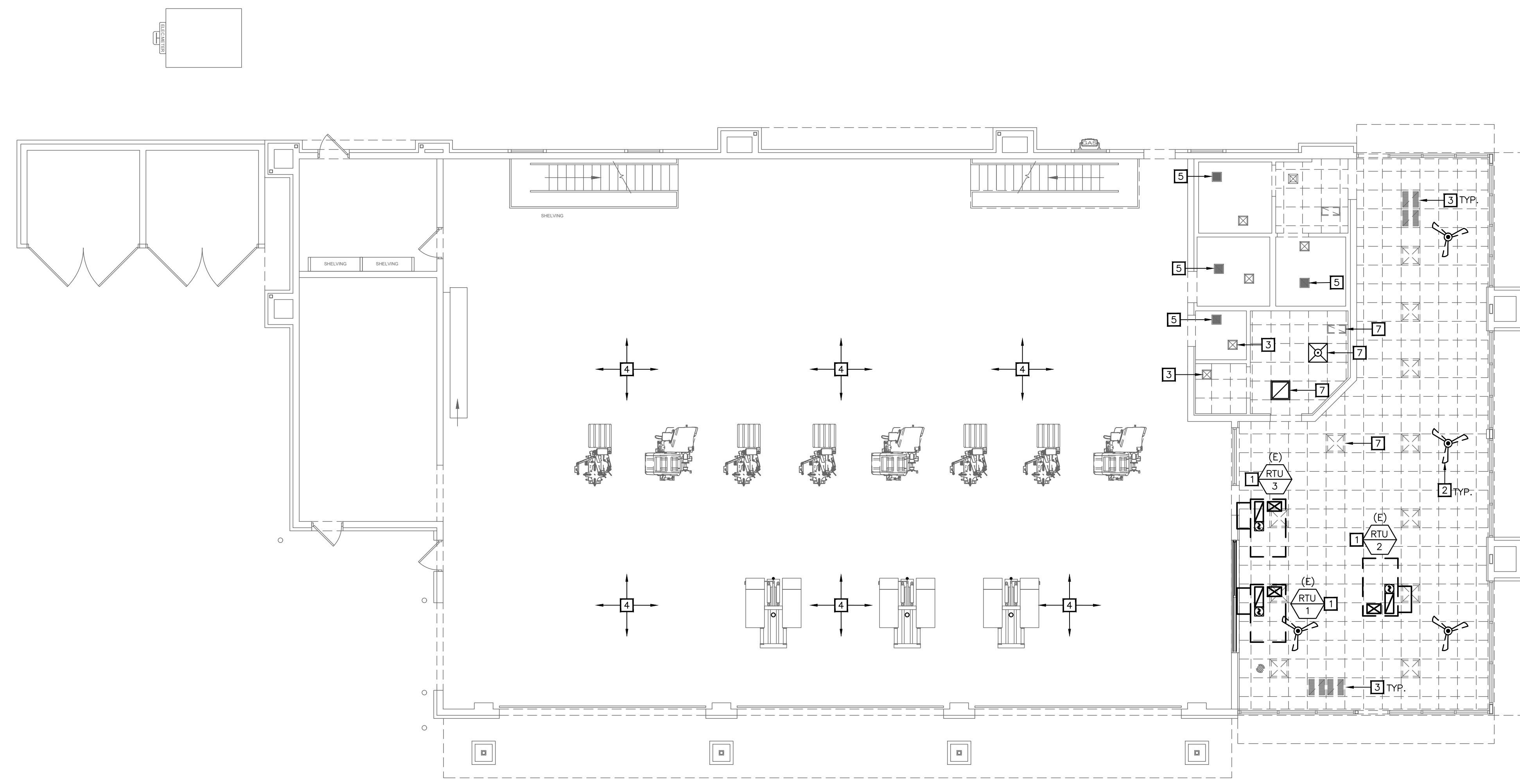
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MECHANICAL DEMOLITION KEY NOTES

- 1 EXISTING ROOFTOP UNIT TO REMAIN. VERIFY EXACT SIZE AND LOCATION OF EQUIPMENT IN FIELD PRIOR TO BID.
- 2 REMOVE EXISTING CEILING FAN.
- 3 EXISTING AIR DEVICE TO REMAIN.
- 4 NO WORK IN THIS AREA.
- 5 REMOVE EXISTING EXHAUST FAN. MAINTAIN AND PROTECT ASSOCIATED BRANCH DUCTWORK FOR FUTURE CONNECTION.
- 6 NOT USED.
- 7 REMOVE AND SALVAGE EXISTING AIR DEVICE. MAINTAIN AND PROTECT ASSOCIATED BRANCH DUCTWORK FOR FUTURE CONNECTION.



01 FIRST FLOOR MECHANICAL DEMOLITION PLAN  
1/8" = 1'-0"



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SHEET NAME  
MECHANICAL DEMOLITION PLANS

SHEET #  
M1.0



**MECHANICAL KEY NOTES**

- 1 EXISTING ROOFTOP UNIT & ASSOCIATED DUCTWORK TO REMAIN. VERIFY EXACT LOCATION OF EQUIPMENT & DUCT IN FIELD PRIOR TO BID.
- 2 RELOCATE EXISTING CEILING TEMPERATURE SENSOR. VERIFY OPERATION OF ALL CONTROLS AND REPLACE IF REQUIRED.
- 3 COORDINATE WITH ELECTRICAL CONTRACTOR AND INSTALL SALES AREA CEILING FANS. REFER TO ARCHITECTURAL PLANS AND DETAILS.
- 4 EXISTING AIR DEVICE TO REMAIN.
- 5 CONNECT NEW EXHAUST FANS INTO EXISTING EXHAUST DUCT. REWORK FLEX DUCT AS/IF REQUIRED. VERIFY LOCATION IN FIELD PRIOR TO BID.
- 6 NOT USED.
- 7 CLEAN AND REINSTALL SALVAGED AIR DEVICE IN NEW CEILING GRID AS/IF REQUIRED. REWORK FLEX DUCT AS/IF REQUIRED TO RECONNECT TO AIR DEVICE. VERIFY LOCATION IN FIELD PRIOR TO BID.

**GENERAL NOTES**

- A. CONTRACTORS AND SUB-CONTRACTORS SHALL CAREFULLY REVIEW THE CONSTRUCTION DOCUMENTS. INFORMATION REGARDING THE COMPLETE WORK IS DISPERSED THROUGHOUT THE DOCUMENT SET AND CANNOT BE ACCURATELY DETERMINED WITHOUT REFERENCE TO THE COMPLETE DOCUMENT SET.
- B. COORDINATE WITH THE WORK OF OTHER SECTIONS, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND WITH THE CONSTRAINTS OF THE EXISTING CONDITIONS OF THE PROJECT SITE. PROVIDE DUCT RISES AND DROPS AS REQUIRED FOR FIELD INSTALLATION AND TRADE COORDINATION. NOTIFY ARCHITECT OF ANY DISCREPANCIES BEFORE STARTING WORK.
- C. DRAWINGS FOR HVAC WORK ARE DIAGRAMMATIC, SHOWING THE GENERAL LOCATION, TYPE, LAYOUT, AND EQUIPMENT REQUIRED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENT. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DIMENSIONS. REFER TO MANUFACTURER'S STANDARD INSTALLATION DRAWINGS FOR EQUIPMENT CONNECTIONS AND INSTALLATION REQUIREMENTS. PROVIDE DUCTWORK, CONNECTIONS, ACCESSORIES, OFFSETS, AND MATERIALS NECESSARY FOR A COMPLETE SYSTEM.
- D. ALL WORK SHALL COMPLY WITH STATE AND LOCAL CODE REQUIREMENTS AS APPROVED AND AMENDED BY THE GOVERNING CITY. PURCHASE ALL PERMITS ASSOCIATED WITH THE WORK. OBTAIN ALL INSPECTIONS REQUIRED BY CODE.
- E. PROVIDE TURNING VANES IN ALL SQUARE (90 DEGREE) ELBOWS.

**THERMOSTAT PROGRAMMING**

PROGRAM SHOWROOM AND OFFICE THERMOSTATS AS FOLLOWS:

**COOLING**  
 MONDAY THROUGH SATURDAY 5:30 AM TO 7:00 PM = 72°F.  
 (SETBACK TO 82°F OTHERWISE).

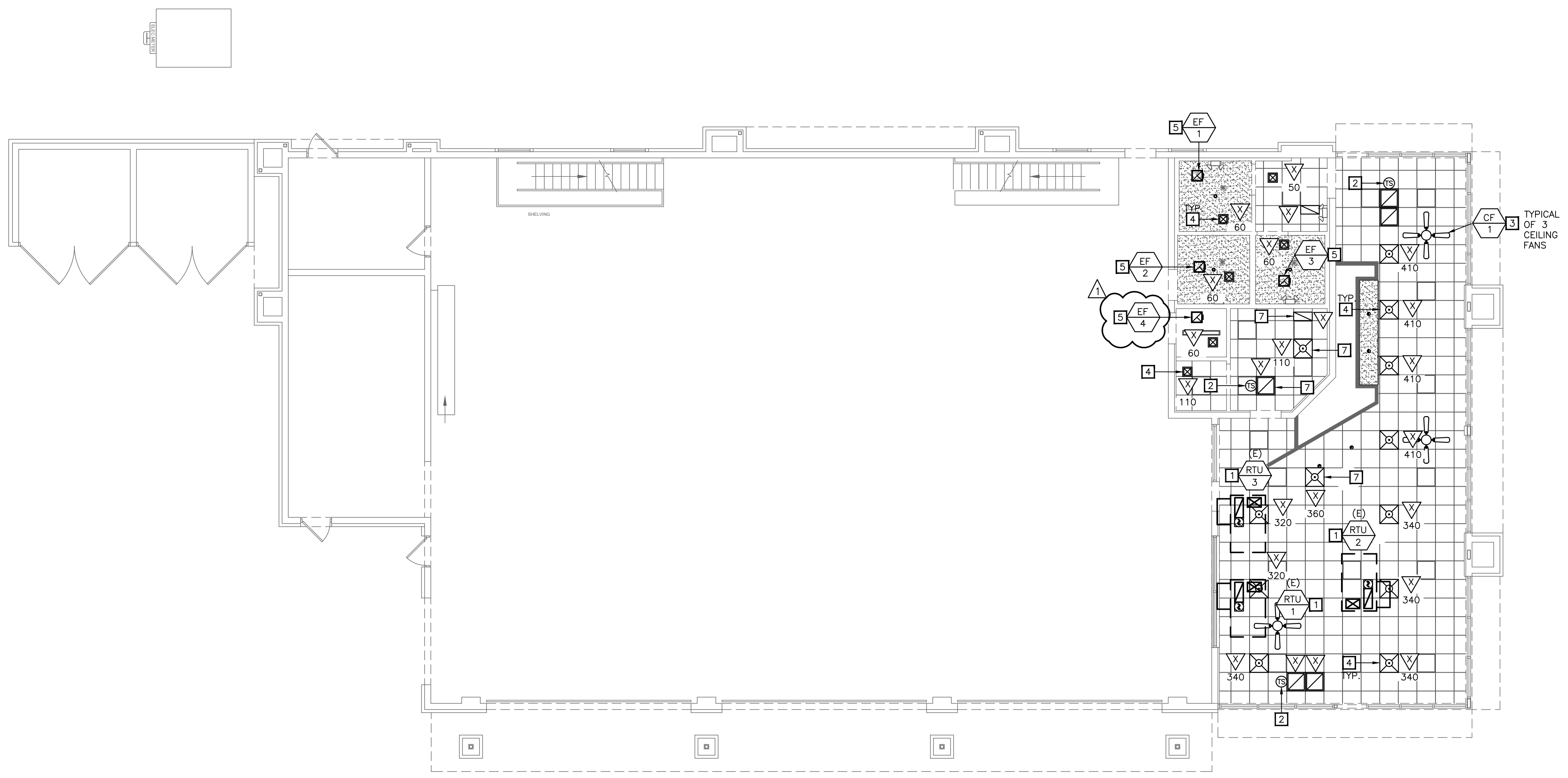
**HEATING**  
 MONDAY THROUGH SATURDAY 5:30 AM TO 7:00 PM = 67°F.  
 (SETBACK TO 57°F OTHERWISE).

**OWNER FURNISHED EQUIPMENT**

THE FOLLOWING HVAC COMPONENTS SHALL BE FURNISHED BY OWNER, AND INSTALLED BY THE MECHANICAL CONTRACTOR. CONTRACTOR SHALL PROVIDE ONE YEAR LABOR WARRANTY ON ALL OWNER FURNISHED EQUIPMENT:

- ALL EXHAUST AND VENTILATION FANS
- ALL PROGRAMMABLE THERMOSTATS AND REMOTE SENSORS
- ALL SUPPLY AND CEILING FANS (HVL'S FANS INSTALLED BY OTHERS)

THE OWNER SHALL FURNISH ALL ACCESSORIES LISTED IN THE EQUIPMENT SCHEDULES. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ACCESSORIES, MOUNTING HARDWARE, AND OTHER APPURTENANCES REQUIRED FOR INSTALLATION AND NOT LISTED IN THE SCHEDULES.



**01 FIRST FLOOR MECHANICAL PLAN**  
 1/8" = 1'-0"  
 NORTH  
 TRUE



20225 NORTH SCOTTSDALE RD  
 SCOTTSDALE, ARIZONA 85255

PROJECT NAME:  
 KSK 01

PROJECT ADDRESS:  
 20050 W 133RD ST  
 OLATHE, KS 66062

**Design Forum Architects Inc.**

2056 BYERS RD  
 Mansburg, OH 45342  
 Tel: (844) 804-7700

Donald J. Rehrman  
 Architect in Charge  
 License: AP0017303



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No.	Description	Date
	Review	04/12/2023
	Permit	04/20/2023
1	Revision	07/25/2023

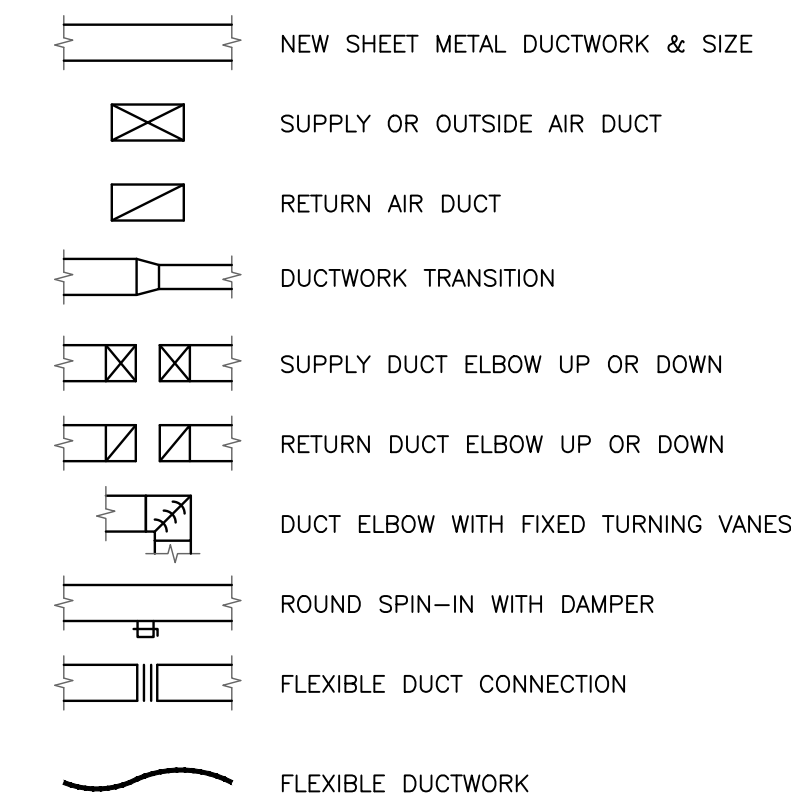
PROJECT NUMBER	
DATE	07/25/2023
DRAWN BY	KML
CHECKED BY	MKC
SHEET NAME	MECHANICAL PLAN

SHEET #  
 M2.0



**MECHANICAL SYMBOLS LEGEND**

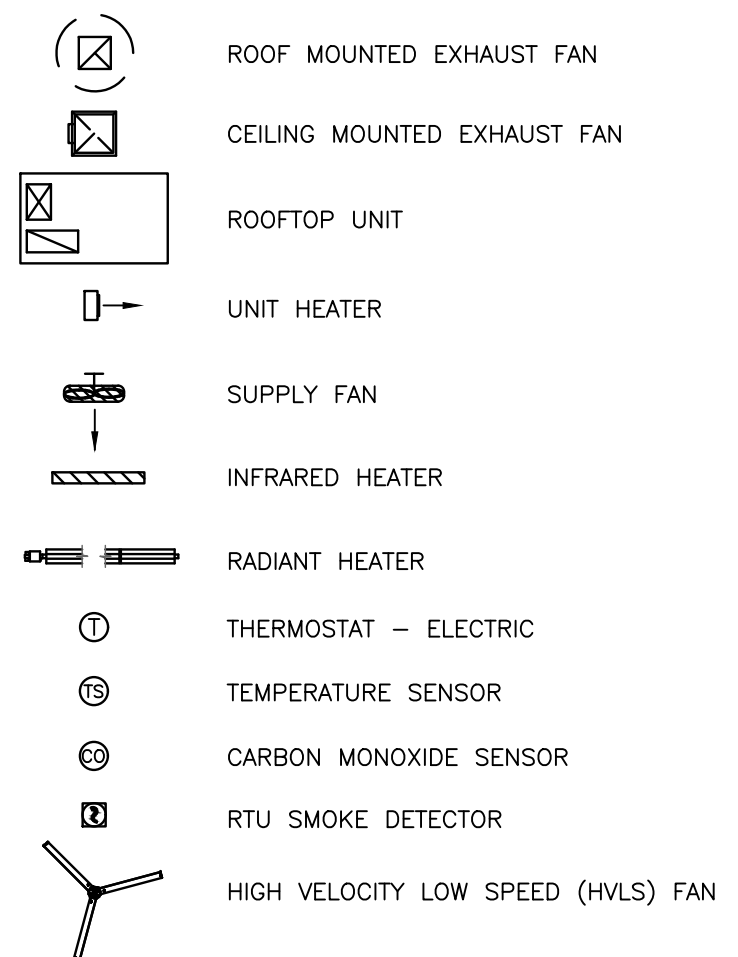
**DOUBLE LINE DUCT SYMBOLS:**



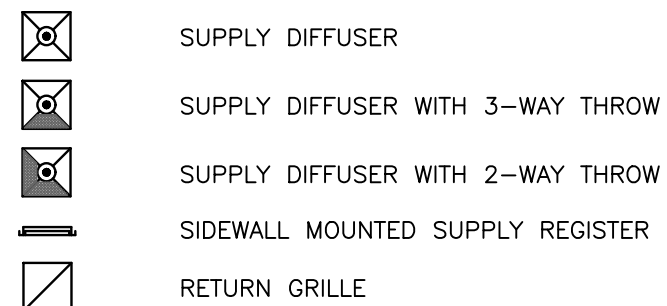
**ABBREVIATIONS:**

AFF	ABOVE FINISHED FLOOR
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB
EAT	ENTERING AIR TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
HZ	FREQUENCY
LAT	LEAVING AIR TEMPERATURE
NC	NOISE CRITERIA
OA	OUTSIDE AIR
PSI	POUNDS PER SQUARE INCH
RA	RETURN AIR
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
TYP	TYPICAL
WC	WATER COLUMN
WB	WET BULB

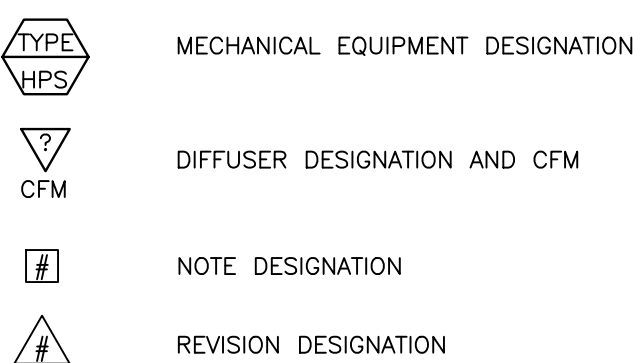
**EQUIPMENT:**



**GRILLES/DIFFUSERS:**

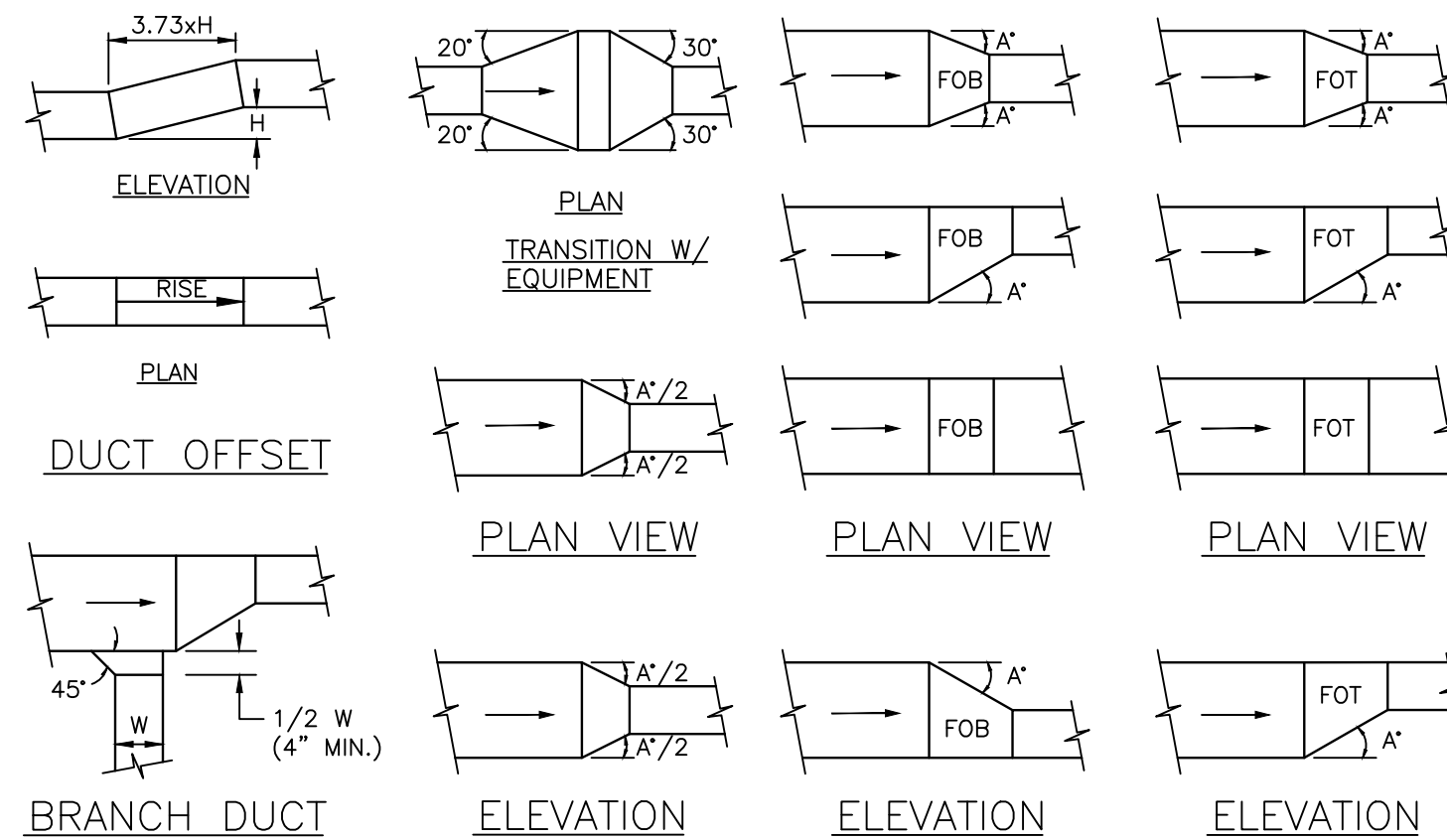


**GENERAL REFERENCES/NOTATIONS:**



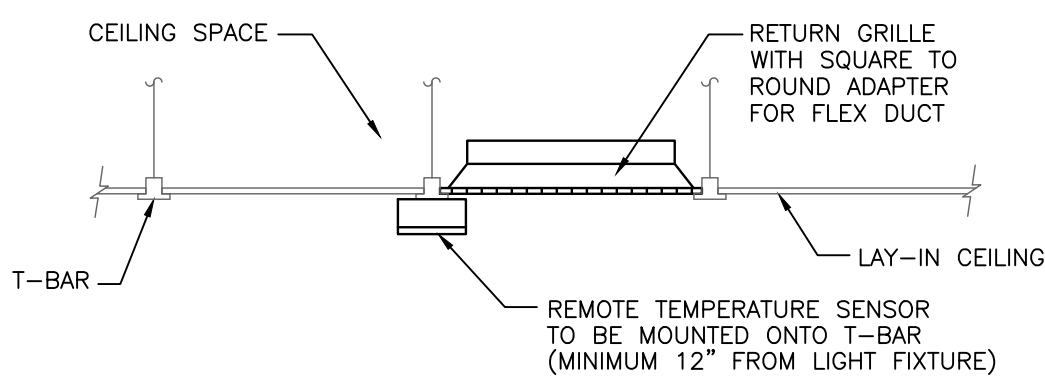
**SYMBOLS LEGEND NOTES:**

- REFER TO SPECIFICATIONS AND PLAN NOTES FOR DETAILED DESCRIPTION OF ALL DEVICES SHOWN IN THIS SCHEDULE, PROVIDED BY THIS CONTRACTOR.
- NOT ALL SYMBOLS AND/OR ABBREVIATIONS ARE NECESSARILY USED FOR THIS PROJECT.

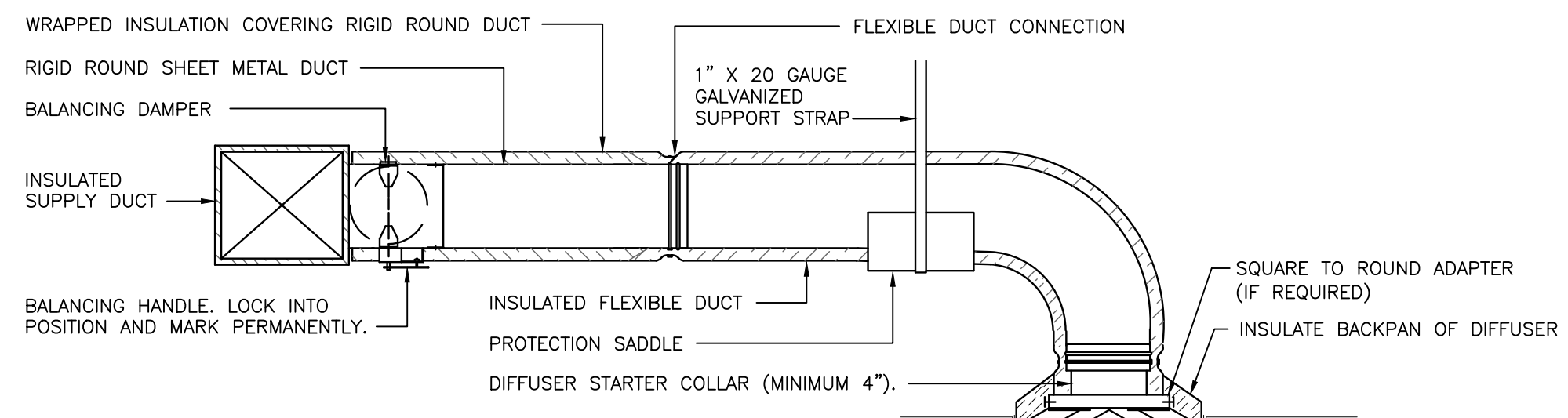


- NOTES: 1) ANGLE A = 30° WHEN AIR FLOWS IN DIRECTION OF ARROW (SUPPLY AIR).  
2) ANGLE A = 20° WHEN AIR FLOWS IN OPPOSITE DIRECTION OF ARROW (RETURN OR EXHAUST).

**01 LOW VELOCITY DUCT FITTINGS DETAIL**  
REFER TO SHEET M1.0



**03 TEMPERATURE SENSOR MOUNTING DETAIL**  
REFER TO SHEET M1.0



- NOTES: 1) PROVIDE METAL OR "PANDUIT" DRAW BAND AT FLEXIBLE DUCT CONNECTION ON INTERIOR FLEXIBLE DUCT HELIX. SECURE INSULATION OVER DRAW BAND WITH ADDITIONAL DRAW BAND.  
2) PROVIDE BEADING ON ROUND METAL DUCT 12" OR LARGER IN DIAMETER.  
3) PROVIDE MINIMUM 4" COLLARS FOR ATTACHMENT OF FLEXIBLE DUCT TO ROUND DUCT, DAMPERS AND DIFFUSERS.  
4) BAND RIGID ROUND DUCT INSULATION TO DUCT AND PROVIDE TAPE FOR INSULATION OVERLAP.

**FLEXIBLE DUCTS SHALL NOT EXCEED 6'-0" IN LENGTH.**

**02 DIFFUSER CONNECTION DETAIL**  
NOT TO SCALE

**EXISTING GRILLE, REGISTER, AND DIFFUSER SCHEDULE**

MARK	-	X
MANUFACTURER	-	-
MODEL	-	-
TYPE	-	-
NECK SIZE (L"XW")	PER PLAN	-
FACE SIZE (L"XW")	-	-
FRAME TYPE	-	-
FINISH	OFF-WHITE	-
NOISE CRITERIA LEVEL	<30	-
ACCESSORIES	-	-
NOTES	1	-

**ACCESSORIES:**

NOTES:  
1) EXISTING TO REMAIN.

**EXISTING ROOFTOP UNIT SCHEDULE**

MARK (RTU-#)	1, 2	3
MANUFACTURER	CARRIER	CARRIER
MODEL	48HCEA06	48HCEA06
AIR FLOW (CFM)	2,000	1,800
OA FLOW (CFM)	180	110
AMBIENT OAT (°F)	95	95
EXTERNAL STATIC (IN. W.C.)	0.8	0.8
DX COOLING COIL	-	-
EAT (°FDB/WB)	80/67	80/67
TOTAL (BTU/HR)	60,400	57,800
SENSIBLE (BTU/HR)	48,000	41,300
GAS HEAT	-	-
FUEL	NATURAL GAS	NATURAL GAS
INPUT (BTU/HR)	115,000	115,000
OUTPUT (BTU/HR)	93,000	93,000
ELECTRICAL	-	-
VOLTS/Ø/HZ	208/3/60	208/3/60
MOTOR HP	2.4	2.4
UNIT MCA	26.5	26.5
MOCP AMPS	40	40
APPROX. WEIGHT (LBS)	780	780
EER / SEER	-	-
NOTES	1	1

**ACCESSORIES:**

NOTES:  
1) EXISTING TO REMAIN

**CEILING FAN SCHEDULE**

MARK (CF-#)	1 (TYP. OF 3)
MANUFACTURER	ROBOTO
MODEL	FR-W1910-52
TYPE	PROPELLER
DRIVE TYPE	DIRECT
PERFORMANCE	-
AIR FLOW (CFM)	VARIABLE
EXTERNAL STATIC (IN W.C.)	0
FAN SPEED (RPM)	VARIABLE
ELECTRICAL	-
VOLTS/Ø/HZ	120/1/60
FAN MOTOR WATTS	38
APPROX. WEIGHT (LBS)	20
NOTES	ALL

**ACCESSORIES:**

NOTES:  
1) DISCONNECT PROVIDED BY ELECTRICAL CONTRACTOR.  
2) CEILING FAN TO MATCH CEILING COLOR BEING INSTALLED IN. SEE ARCHITECTURAL DRAWINGS FOR CEILING COLORS.

**EXHAUST AND VENTILATION FAN SCHEDULE**

MARK (EF-#)	1, 2, 3	4
MANUFACTURER	BROAN	-
MODEL	L100	-
TYPE	CEILING	CEILING
DRIVE TYPE	DIRECT	-
PERFORMANCE	-	-
AIR FLOW (CFM)	80	-
EXT. STATIC (IN W.C.)	0.375	-
FAN SPEED (RPM)	640	-
ELECTRICAL	-	-
VOLTS/Ø/HZ	120/1/60	120/1/60
FAN MOTOR HP	-	-
FAN MOTOR WATTS	87	-
ACCESSORIES	BD, DP	-
APPROX. WEIGHT (LBS)	25	-
SERVES	RESTROOMS	JANITOR
NOTES	1	1

**ACCESSORIES:**  
BD-BACKDRAFT DAMPER, BS-BIRD SCREEN, DP-DISCONNECT PLUG, DS-DISCONNECT SWITCH, DT-DAMPER TRAY, FSC-FAN SPEED CONTROL

**NOTES:**  
1) MOTORS PROVIDED WITH INTERNAL THERMAL OVERLOAD PROTECTORS.

**DISCOUNT TIRE**

20225 NORTH SCOTTSDALE RD  
SCOTTSDALE, ARIZONA 85255

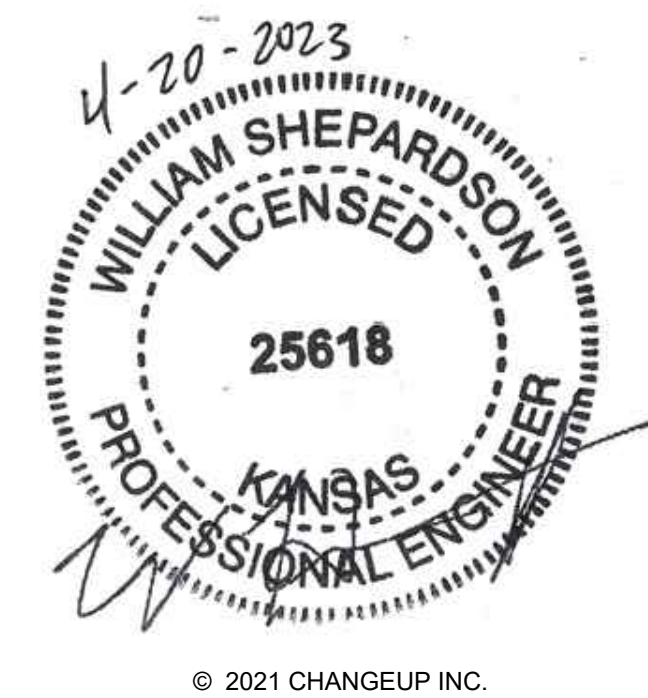
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PROJECT NUMBER  
DATE 07/25/2023  
DRAWN BY KML  
CHECKED BY MKC

SHEET NAME  
MECHANICAL DETAILS & SCHEDULES

SHEET #  
M3.0

**whs engineering**  
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