MECHANICAL SYMBOL LIST

HVAC DUCTWORK SYMBOLS

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- SINGLE LINE DUCTWORK OR EQUIPMENT – NEW
- SINGLE LINE DUCTWORK OR EQUIPMENT – EXISTING
- DUCTWORK TO BE REMOVED
- DUCTWORK WITH ACOUSTIC LINING
- DUCT UNDER POSITIVE PRESSURE (SUPPLY AIR OR FAN DISCHARGE)
- DUCT UNDER NEGATIVE PRESSURE (RETURN, EXHAUST OR OUTSIDE AIR)
- VD — VOLUME DAMPER
- FD — FIRE DAMPER AND ACCESS DOOR
- M — AUTOMATIC DAMPER (ELECTRIC)
- M FSD — COMBINATION SMOKE AND FIRE DAMPER (ELECTRIC) AND ACCESS DOOR
- M SD — AUTOMATIC SMOKE DAMPER (ELECTRIC) AND ACCESS DOOR
- R — RISE IN DUCTWORK (IN DIRECTION OF AIR FLOW)
- D — DROP IN DUCTWORK (IN DIRECTION OF AIR FLOW)
- ℄ — CENTER LINE
- $ OR CFM — CUBIC FEET PER MINUTE
- Ø — DIAMETER
- SQUARE FEET
- L, 1.0 ϕ F.A. — LOUVER IN DOOR – MIN. 1.0 SF FREE AREA
- UC — UNDERCUT DOOR
- CD–A, 400 $ — TYPE A CEILING DIFFUSER 400 CFM SUPPLY AIR
- 12x12 CD, 400 $ — RECTANGULAR CEILING DIFFUSER WITH 12"x12" NECK 400 CFM SUPPLY AIR
- 10x8 CR(CG), 300 $ — 10" BY 8" CEILING REGISTER (CEILING GRILLE) 300 CFM RETURN AIR
- RECTANGULAR DIFFUSER WITH BLANKING PLATE
- 10x6 TR, 150 $ — 10" BY 6" TOP REGISTER, 150 CFM SUPPLY AIR
- 10x6 TG, 150 $ — 10" BY 6" TOP GRILLE 150 CFM RETURN AIR
- 10x6 BG, 150 $ — 10" BY 6" BOTTOM GRILLE 150 CFM RETURN AIR
- VANED ELBOW (SEE DETAIL) OR RADIUS ELBOW
- RADIUS ELBOW
- FLEXIBLE DUCT
- SLOTTED LINEAR DIFFUSER WITH PLENUM
- SEE DUCT DETAILS FOR TYPE OF BRANCH CONNECTION
- DUCT FLEXIBLE CONNECTION
- VERTICAL DUCT DROP (IN DIRECTION OF AIRFLOW)
- VERTICAL DUCT RISE (IN DIRECTION OF AIRFLOW)
- SOUND ATTENUATOR
- VARIABLE AIR VOLUME BOX W/REHEAT COIL AND INTEGRAL SOUND ATTENUATING SECTION
- T — THERMOSTAT
- H — HUMIDISTAT
- SD — SMOKE DETECTOR
- H — HUMIDIFIER

HVAC GENERAL SYMBOLS

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- POINT OF CONNECTION
- POINT OF DISCONNECTION
- DETAIL NUMBER
- SHEET NO. WHERE DETAIL IS SHOWN

HVAC PIPING SYMBOLS

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

- NEW PIPE WITH DIRECTION OF FLOW
- EXISTING PIPING
- EXISTING PIPING TO BE REMOVED
- PIPE DROP
- PIPE RISE
- U — PITCH UP IN DIRECTION OF FLOW
- D — PITCH DOWN IN DIRECTION OF FLOW
- UNION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER – FLAT BOTTOM
- ECCENTRIC REDUCER – FLAT TOP
- FLANGED CONNECTION
- DEAD END – SCREWED CAP
- DEAD END – WELDED CAP
- GATE VALVE
- GLOBE VALVE
- NEEDLE VALVE COCK
- DRAIN VALVE
- LOCK SHIELD VALVE
- CHECK VALVE, SWING OR LIFT
- S — SILENT CHECK (NON–SLAM) VALVE
- FLEXIBLE CONNECTOR
- BUTTERFLY VALVE
- BALL VALVE
- SQUARE HEAD COCK
- BALANCING VALVE
- PLUG VALVE (TYPE AS NOTED)
- AUTOMATIC CONTROL VALVE
- THREE–WAY AUTOMATIC CONTROL VALVE
- FLOW CONTROL VALVE
- S, M — SOLENOID VALVE
- ELECTRIC MOTORIZED VALVE OPERATOR
- "Y" TYPE STRAINER WITH BLOWOFF VALVE AND CAP
- SINGLE BASKET STRAINER
- AUTOMATIC AIR VENT
- MANUAL AIR VENT
- THERMOMETER WELL
- THERMOMETER AND WELL
- PRESSURE GAUGE WITH SYPHON
- D — DRAIN
- HWR — HOT WATER RETURN
- HWS — HOT WATER SUPPLY

HVAC EQUIPMENT DESIGNATIONS

- XXX / # — EQUIPMENT DESIGNATION (POWERED) (REFER TO SPECIFIC TRADE LIST)
- EQUIPMENT TAG NUMBER
- XXX / # — EQUIPMENT DESIGNATION (NOT POWERED) (REFER TO SPECIFIC TRADE LIST)
- EQUIPMENT TAG NUMBER
- 1 — TERMINAL UNIT EQUIPMENT TAG
- BOX ID — UNIT ID
- MAX CFM — MAXIMUM AIRFLOW SETPOINT
- MIN CFM — MINIMUM AIRFLOW SETPOINT
- GPM — REHEAT COIL FLOW (IF APPLICABLE)
- SIZE — UNIT DESIGNATION (SEE SCHEDULES)

ABBREVIATIONS

(NOT ALL ABBREV. ARE NECESSARILY USED ON THIS PROJECT)

A	AMPERES
AAV	AUTOMATIC AIR VENT
AC	AIR CONDITIONING
ACCU	AIR COOLED CONDENSING UNIT
ACS	AUTOMATIC CONTROL SYSTEM
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
BF	BOOSTER FAN
BG	BOTTOM GRILLE
BHP	BRAKE HORSEPOWER
BIDW	BACKWARD INCLINE DOUBLE WIDTH
BISW	BACKWARD INCLINE SINGLE WIDTH
BMS	BUILDING MANAGEMENT SYSTEM
BR	BOTTOM REGISTER
BT	BOTTOM THROAT
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
°C	DEGREES CENTIGRADE (CELSIUS)
CC	COOLING COIL
CCW	COUNTER CLOCKWISE
CD	CEILING DIFFUSER
CFFC	CAP FOR FUTURE CONNECTION
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CLG	CEILING
COND	CONDENSATE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CU IN	CUBIC INCHES
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	CLOCKWISE
CWP	CONDENSER WATER PUMP
DB	DRY BULB
DX	DIRECT EXPANSION
DIAM	DIAMETER
DMPR	DAMPER
DN	DOWN
(E)	EXISTING TO REMAIN
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EF	EXHAUST FAN
ELEC	ELECTRIC
EDH	ELECTRIC DUCT HEATER
EQ	EQUAL
(ER)	EXISTING TO BE REMOVED
(ERR)	EXISTING TO BE REMOVED & RELOCATED
EUH	ELECTRIC UNIT HEATER
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXIST	EXISTING
°F	DEGREES FAHRENHEIT
FA	FREE AREA (SQ.FT.)
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FIN FL	FINISHED FLOOR
FLA	FULL LOAD AMPERES
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FLOOR REGISTER
FT	FEET
FV	FACE VELOCITY
GPM	GALLONS PER MINUTE
GX	GENERAL EXHAUST
H	HUMIDIFIER
HALX	HALON EXHAUST
HC	HEATING COIL
HD	HEAD
HR	HOUR
HT	HEIGHT
HWP	HOT WATER PUMP
HV	HEATING AND VENTILATING
HX	HEAT EXCHANGER
IN	INCH OR INCHES
IPS	IRON PIPE SIZE
KW	KILOWATT
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LD	LINEAR DIFFUSER
LDB	LEAVING DRY BULB TEMPERATURE
LF, LIN.FT.	LINEAR FEET
LR	LINEAR RETURN
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MB	MIXING BOX
MBH	THOUSAND BTU PER HOUR
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOT	MOTOR
MOV	MOTOR OPERATED VALVE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO.	NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
O.R.	OPERATING ROOM
P	PUMP
PD	PRESSURE DROP
PHC	PREHEAT COIL
PSI	POUNDS PER SQUARE INCH
PSIA	PSI ABSOLUTE
PSIG	PSI GAUGE
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
(RE)	RELOCATED EXISTING
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHWP	REHEAT WATER PUMP
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
(RRO)	EXISTING TO BE REMOVED AND RETURN TO OWNER
SA	SUPPLY AIR
SAU	SOUND ATTENUATION UNIT
SD	SMOKE DAMPER
SF	SUPPLY FAN
SP	STATIC PRESSURE
T	THROAT
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE
TG	TOP GRILLE
TR	TOP REGISTER
TRD	TRANSFER DUCT
TRF	TRANSFER FAN
TRG	TRANSFER GRILLE
TT	TOP THROAT
TYP	TYPICAL
TX	TOILET EXHAUST
UON	UNLESS OTHERWISE NOTED
UH	UNIT HEATER
V	VOLTS
W	WIDTH
W/	WITH
W/O	WITHOUT
WB	WET BULB
WG	WATER GAUGE
WMS	WIRE MESH SCREEN
WSP	WORKING STEAM PRESSURE

DRAWING INDEX

DRAWING NO.	DRAWING TITLE
M–000	MECHANICAL COVER SHEET
M–100	MECHANICAL DEMOLITION PLAN
M–200	MECHANICAL DUCTWORK PLAN
M–300	MECHANICAL PIPING PLAN
M–400	MECHANICAL SCHEDULES AND DETAILS
M–500	MECHANICAL SPECIFICATIONS SHEET 1 OF 2
M–501	MECHANICAL SPECIFICATIONS SHEET 2 OF 2

GENERAL NOTES

1. GENERAL NOTES, SYMBOL LIST AND DETAILS ARE APPLICABLE TO ALL HVAC/MECHANICAL DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC. DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD. RELOCATE EXISTING WORK THAT INTERFERES WITH WORK OF THIS CONTRACT.
3. COORDINATE THIS WORK WITH THAT OF OTHER TRADES.
4. DIMENSIONS SHOWN ON PLAN ARE HORIZONTAL. DIMENSIONS SHOWN IN ELEVATION ARE VERTICAL EXCEPT IN WAY OF STRUCTURAL STEEL, DIMENSIONS ARE MEASURED PERPENDICULAR TO FLANGE.
5. NEITHER ACCURACY NOR COMPLETION OF SERVICES AND UTILITY LOCATIONS SHOWN ON DRAWINGS IS GUARANTEED. DETERMINE EXACT LOCATIONS OF EXISTING SERVICES AND UTILITIES IN FIELD, WHETHER OR NOT SHOWN ON DRAWINGS. EXERCISE CAUTION AND IDENTIFY LOCATIONS OF UNMARKED UTILITY LINES AS NECESSARY TO PERFORM WORK OF THIS SECTION.
6. MANUFACTURERS MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARDS OF QUALITY FOR PERFORMANCE AND MATERIALS.
7. PRODUCT INSTALLATION SHALL ADHERE TO MANUFACTURERS RECOMMENDATIONS.
8. PROVIDE ACCESS PANELS FOR EQUIPMENT THAT REQUIRES PERIODIC SERVICE.
9. PROVIDE HANGERS, INSERTS, ANCHORS, SUPPLEMENTAL STEEL & SUPPORTS AS REQUIRED TO SUPPORT DUCTWORK, PIPING AND EQUIPMENT FROM STRUCTURE.
10. SCHEDULE WORK OF THIS SECTION TO AVOID INTERFERING WITH EXISTING OPERATIONS IN THE FACILITY.
11. RUN DUCTS AND PIPING CONCEALED, UNLESS OTHERWISE SPECIFIED AND CLEAR OF CEILING INSERTS.
12. INSTALL THERMOSTATS 4'–6" ABOVE FINISHED FLOOR OR AS DIRECTED OTHERWISE BY ARCHITECT.
13. STRUCTURAL WELDING SHALL BE CONTINUOUS 1/4" FILLET UNLESS REQUIRED OTHERWISE.

AIR SYSTEMS

14. AIR SYSTEMS REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
15. INTERNAL AIRFLOW DIMENSIONS ARE SHOWN FOR DUCTS. INCREASE DUCT SIZE AS NECESSARY TO MAINTAIN FREE FLOW AREA INDICATED.
16. USE FLAT TRANSVERSE SEAM FOR DUCTWORK WHERE SPACE AVAILABLE DICTATES.
17. DIFFUSER SIZES SHOWN ARE NECK SIZES. REGISTERS AND GRILLE SIZES ARE NOMINAL.
18. PROVIDE VOLUME DAMPERS OR OTHER APPROVED BALANCING DEVICES AT DUCT BRANCHES AND RUN OUTS, AND AT REGISTER GRILLE AND DIFFUSER NECKS IN SUPPLY, RETURN AND EXHAUST DUCTWORK WHETHER SHOWN OR NOT.
19. PROVIDE 36" CLEARANCE IN FRONT OF ALL ELECTRIC CONTROL PANELS PER N.E.C. AND MFG. REQUIREMENTS.
20. PROVIDE DUCT TRANSITIONS FROM VAV BOX INLET/OUTLET DUCT WORK AT SIZES INDICATED TO VAV BOX INLET/OUTLET UNIT CONNECTIONS.
21. VAV DUCT INLET SIZE SHALL BE AS SCHEDULED OR AS INDICATED ON THE FLOOR PLANS. PROVIDE TRANSITION FROM DUCT SIZE INDICATED ON THE FLOOR PLANS TO SCHEDULED SIZE MINIMUM 2'–0" FROM VAV BOX INLETS.

PIPING SYSTEMS

22. PITCH PIPING 1" IN 20' IN DIRECTION OF FLOW.

DEMOLITION NOTES

1. GENERAL
   - A. THIS CONTRACTOR SHALL VISIT THE SITE AND ADJOINING AREAS AND EXAMINE THE EXISTING CONDITIONS TO BECOME FAMILIAR WITH THEM AND TO DETERMINE THE DIFFICULTIES WHICH WILL AFFECT THE EXECUTION OF THE WORK OF THIS CONTRACT. THIS CONTRACTOR SHALL PERFORM THIS PRIOR TO THE SUBMISSION OF HIS PROPOSAL. 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.
   - B. THE DEMOLITION WORK SHALL INCLUDE, PROVIDING ALL MATERIALS, ALL NECESSARY EXTENSIONS, CONNECTIONS, CUTTING, REPAIRING, ADAPTING AND OTHER MECHANICAL WORK REQUIRED, TOGETHER WITH ANY REQUIRED TEMPORARY CONNECTIONS TO MAINTAIN SERVICE PENDING THE COMPLETION OF THE PERMANENT WORK. NOTES AND GRAPHIC REPRESENTATION SHALL NOT LIMIT THE EXTENT OF DEMOLITION REQUIRED. EXTENT OF DEMOLITION WORK SHALL BE COORDINATED WITH THE ARCHITECT AND BUILDING MANAGEMENT.
   - C. REFER TO ARCHITECTS PLANS FOR AREA OF WORK.
3. SCOPE OF WORK
   - A. EXISTING WORK INTERFERING WITH NEW.
     1) ALL EXISTING WORK REQUIRED TO REMAIN BUT INTERFERING WITH PROPOSED NEW MECHANICAL (AS WELL AS ELECTRICAL AND GENERAL CONSTRUCTION WORK) SHALL BE RELOCATED AND RECONNECTED USING MATERIALS CONFORMING TO STANDARDS OF THIS CONTRACT.
   - B. REMOVAL OF PIPING.
     1) REMOVE ALL PIPING, VALVING AND HANGERS ASSOCIATED WITH PIPING TO BE REMOVED BACK TO MAINS. IDENTIFY ALL PIPING BY SERVICE TYPE AND CAP AT MAINS.
   - C. REMOVAL OF DUCTWORK AND ACCESSORIES
     1) REMOVE ALL SUPPLY AIR, RETURN AIR AND EXHAUST AIR DUCTWORK WITH ALL ASSOCIATED DIFFUSERS, TERMINAL BOXES, CONTROLS, COLLARS, DAMPERS, RETURN/EXHAUST GRILLES AND CONTROLS BACK TO THE EXISTING SUPPLY AND RETURN AIR SHAFTS, OR AS NOTED ON DRAWINGS.
     2) CONTRACTOR TO CONTACT BUILDING OWNER REGARDING DUCTWORK REMOVAL SCOPE OF WORK TO ENSURE THAT OTHER AREAS THAT ARE TO STAY OPERATIONAL ARE NOT AFFECTED BY REMOVALS OF THE BASE BUILDING DUCTWORK.
     3) ALL EXISTING BUILDING FIRE DAMPERS, FIRE/SMOKE DAMPERS, DUCT MOUNTED SMOKE DETECTORS AT SUPPLY AND RETURN AIR SHAFTS TO REMAIN.
   - D. PERIMETER SERVICES
     1) REMOVE PERIMETER HEATING ELEMENTS, AS NOTED. REMOVE PIPING, FITTINGS, VALVES, AND INSULATION FOR ALL EQUIPMENT TO BE REMOVED BACK TO MAIN AND CAP. PATCH AND CAP EXISTING AS REQUIRED FOR CONTINUED OPERATION.
     2) LEAVE ALL BUILDING FREEZE PROTECTION SPACE HEATING INTACT.
   - E. CONTRACTOR TO REPLACE/ PATCH WALLS AND FLOORS TO MATCH EXISTING.
   - F. PROVIDE ADDITIONAL SUPPORT FOR ALL EXISTING DUCTS AND PIPING TO REMAIN WHICH ARE AFFECTED BY DEMOLITION OF EXISTING CEILING AND PARTITIONS.
   - G. EQUIPMENT REQUIRED TO BE TURNED OVER TO THE OWNER SHALL BE PLACED IN A MUTUALLY ACCEPTABLE LOCATION. ALL MATERIALS AND EQUIPMENT REMOVED AS A RESULT OF DEMOLITION SHALL BE TAKEN FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND ENVIRONMENTAL REGULATIONS.
   - H. CONTRACTOR SHALL IDENTIFY ALL EXISTING WORK TO REMAIN BY ACCEPTABLE IDENTIFICATION MEANS TO CONFIRM PROPER SCOPE PRIOR TO COMMENCEMENT OF DEMOLITION.

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MECHANICAL COVER SHEET

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