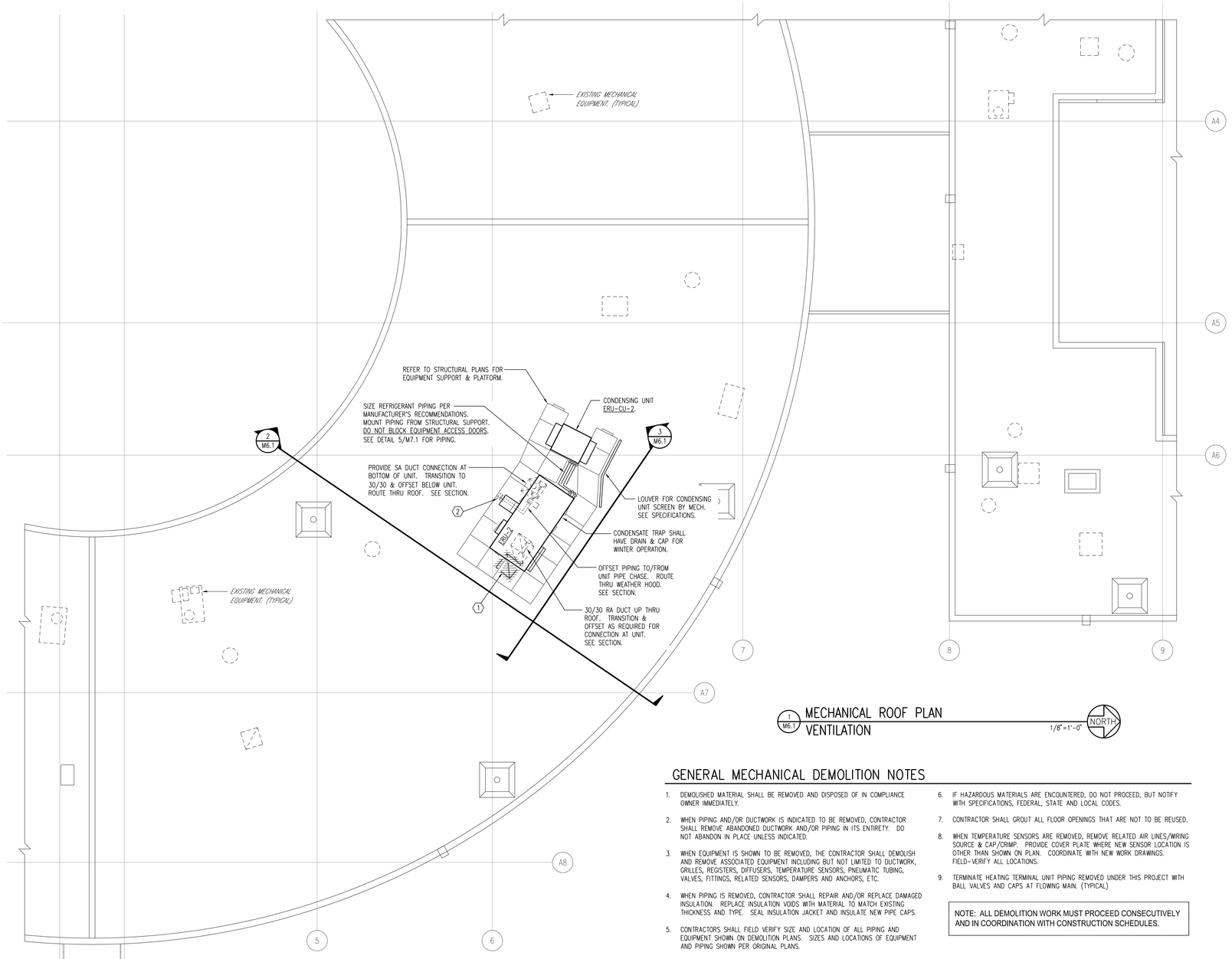


1 M6.1 MECHANICAL ROOF PLAN VENTILATION

1/8"=1'-0"

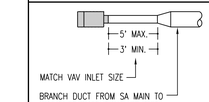
ITALIC DENOTES *EXISTING* PIPE, DUCT, OR EQUIPMENT.

HATCHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO BE REMOVED.

DASHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO REMAIN.

EXISTING MECHANICAL EQUIPMENT/PIPING NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.

VAV BOX INLET DUCT SIZING



NOTE: EXISTING DUCTWORK, EQUIPMENT, DATA & RELATED ACCESSORIES OR NOTES ARE SHOWN IN ITALICS.

NOTE:

NEW DUCTWORK THRU JOIST SPACES & WEBBING MAY CONFLICT WITH EXISTING STRUCTURAL CROSS BRACING/BRIDGING. SEE ARCHITECTURAL PLANS FOR MODIFICATION INFORMATION REGARDING THESE STRUCTURAL ELEMENTS.

CROSS-BRACING

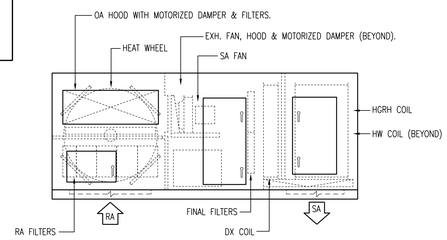
SPECIFIC NOTES

1. REMOVE EXISTING RELIEF HOOD, DUCT THRU ROOF & ROOF CURB. ROOF OPENING PATCHED BY ARCH. COORDINATE PATCHING WITH EQUIPMENT REMOVAL. REFER TO 1/MD5.1 FOR MORE RELATED DEMOLITION.
2. ROUTE PIPING/WIRING THRU WEATHER HOOD (BELOW PLATFORM) AT ROOF TO/FROM PIPE CHASE AS UNIT. WEATHER HOOD SHALL BE LOCATED MIN. 24" DISTANCE FROM ANY OTHER ROOFED-IN CURB. SEE SECTION. REFER TO DETAIL 13/M7.1

GENERAL NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. COORDINATE ROOF DRAINS AND RAIN WATER LEADERS WITH DUCTWORK LOCATIONS.
3. VERIFY EXACT WALL LOCATIONS WITH ARCHITECTURAL PLANS.
4. ALL WORK SHALL MEET STATE AND LOCAL CODES.
5. MAXIMUM FLEXIBLE DUCT LENGTHS SHALL BE NO GREATER THAN FIVE FEET (5'-0") SEE DETAILS.
6. REFER TO REFLECTED CEILING PLANS FOR EXACT REGISTER, GRILLE AND DIFFUSER LOCATIONS.
7. THIS CONTRACTOR (SUB-CONTRACTOR) SHALL COORDINATE INSTALLATION OF THEIR WORK WITH OTHER CONTRACTORS AND RESOLVE ALL DISPUTES PRIOR TO INSTALLATION.
8. IN GENERAL – DUCTWORK SHALL RUN TIGHT TO OR BETWEEN STRUCTURE UNLESS OTHERWISE SPECIFIED.
9. VENTILATION CONTRACTOR SHALL ASCERTAIN LOCATION OF ALL ELECTRICAL PANEL BOARDS AND SHALL KEEP ALL PIPING AND DUCTWORK OUT OF AREA ABOVE THE PANEL BOARDS AND FOR A DISTANCE OF 3'-6" IN FRONT OF AND 1'-6" FROM EACH SIDE OF PANEL BOARDS. THIS INCLUDES CONTROL PANELS FOR MECHANICAL EQUIPMENT.
10. PROVIDE TEST HOLES FOR ALL SUPPLY DUCTS NEAR AIR HANDLING UNITS.
11. (T) SEE SPECIFICATIONS FOR TEMPERATURE SENSOR TYPE.
12. (M) INDICATES MOTORIZED DAMPER. SEE SPECIFICATIONS FOR CONTROL.
13. WHERE 45 DEGREE BRANCH TAKE-OFFS CANNOT BE USED, PROVIDE 90 DEGREE CONICAL TAKE-OFFS.
14. DENOTES FIRE DAMPER.
15. RUNOUT DUCTS TO VAV BOXES SHALL BE SAME SIZE AS BOX INLETS. REFER TO VAV SCHEDULE IN SPECIFICATIONS FOR SIZES.
16. INSTALL MECHANICAL EQUIPMENT REQUIRING MAINTENANCE NO HIGHER THAN 3'-0" ABOVE FINISHED CEILING UNLESS OTHERWISE NOTED ON PLAN. THIS INCLUDES, BUT IS NOT LIMITED TO: VAV BOXES, FAN COILS, FAN-POWERED BOXES, REHEAT COILS & ETC.)

NOTE: ALL NEW WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.



4 M5.1 ROOFTOP UNIT COMPONENTS (ERU-2)

NO SCALE

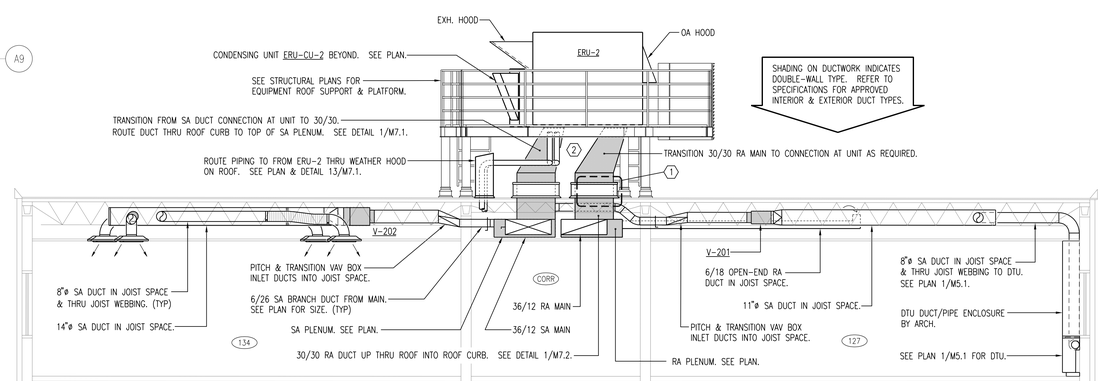
GENERAL MECHANICAL DEMOLITION NOTES

1. DEMOLISHED MATERIAL SHALL BE REMOVED AND DISPOSED OF IN COMPLIANCE OWNER IMMEDIATELY.
2. WHEN PIPING AND/OR DUCTWORK IS INDICATED TO BE REMOVED, CONTRACTOR SHALL REMOVE ABANDONED DUCTWORK AND/OR PIPING IN ITS ENTIRETY. DO NOT ABANDON IN PLACE UNLESS INDICATED.
3. WHEN EQUIPMENT IS SHOWN TO BE REMOVED, THE CONTRACTOR SHALL DEMOLISH AND REMOVE ASSOCIATED EQUIPMENT INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REGISTERS, DIFFUSERS, TEMPERATURE SENSORS, PNEUMATIC TUBING, VALVES, FITTINGS, RELATED SENSORS, DAMPERS AND ANCHORS, ETC.
4. WHEN PIPING IS REMOVED, CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGED INSULATION. REPLACE INSULATION VOIDS WITH MATERIAL TO MATCH EXISTING THICKNESS AND TYPE. SEAL INSULATION JACKET AND INSULATE NEW PIPE CAPS.
5. CONTRACTORS SHALL FIELD VERIFY SIZE AND LOCATION OF ALL PIPING AND EQUIPMENT SHOWN ON DEMOLITION PLANS. SIZES AND LOCATIONS OF EQUIPMENT AND PIPING SHOWN PER ORIGINAL PLANS.
6. IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT PROCEED, BUT NOTIFY WITH SPECIFICATIONS, FEDERAL, STATE AND LOCAL CODES.
7. CONTRACTOR SHALL GROUT ALL FLOOR OPENINGS THAT ARE NOT TO BE REUSED.
8. WHEN TEMPERATURE SENSORS ARE REMOVED, REMOVE RELATED AIR LINES/WRING SOURCE & CAP/CRIMP. PROVIDE COVER PLATE WHERE NEW SENSOR LOCATION IS OTHER THAN SHOWN ON PLAN. COORDINATE WITH NEW WORK DRAWINGS. FIELD-VERIFY ALL LOCATIONS.
9. TERMINATE HEATING TERMINAL UNIT PIPING REMOVED UNDER THIS PROJECT WITH BALL VALVES AND CAPS AT FLOWING MAIN. (TYPICAL)

NOTE: ALL DEMOLITION WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

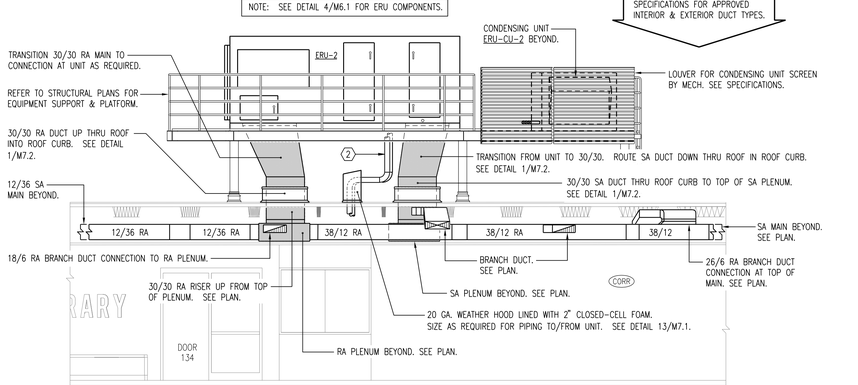
CEILING WORK BY MECHANICAL

REFER TO, AND COORDINATE WITH, ARCHITECTURAL DEMOLITION PLANS FOR CEILING REMOVAL AREAS. ALL OTHER CEILINGS REQUIRING REMOVAL, WHICH ARE NOT DESIGNATED FOR REMOVAL ON ARCHITECTURAL PLANS, SHALL BE REMOVED AND REINSTALLED BY DIVISION 23 CONTRACTOR. DIVISION 23 CONTRACTOR IS RESPONSIBLE FOR REPLACING DAMAGED CEILING TILE AND/OR GRID COMPONENTS OCCURRING DURING THIS WORK AT NO COST TO OWNER OR OTHER CONTRACTOR.



2 M6.1 MECHANICAL SECTION (ERU-2)

1/4"=1'-0"



3 M6.1 MECHANICAL SECTION (ERU-2)

1/4"=1'-0"

ATSR

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CONSULTANTS

REVISIONS

SAND CREEK ELEMENTARY SCHOOL

HVAC Replacement and Deferred Maintenance - Phase 1
Anoka-Hennepin Schools I.S.D. No. 11
12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE

Blayne Parkos, PE
TYPED OR PRINTED NAME

December 2, 2021
DATE

46630
LICENSE NUMBER

KEYPLAN

NORTH

DRAWN BY
TMSO

CHECKED BY
BJP

ISSUED FOR
CONSTRUCTION DOCUMENTS

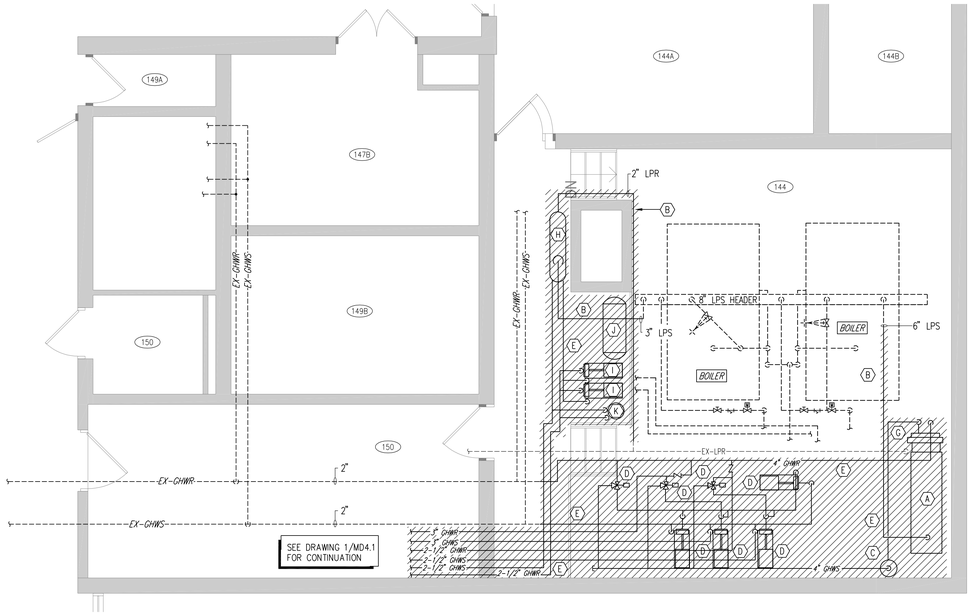
ISSUE DATE
DECEMBER 2, 2021

SHEET NAME
1/8 SCALE MECHANICAL ROOF PLAN

AT&R PROJECT NO.
21046

REVISION NO.

SHEET NUMBER
M6.1



1 M6.2 BOILER ROOM PLAN HYDRONIC DEMOLITION 1/4"=1'-0" NORTH

SPECIFIC DEMOLITION NOTES:

(A) REMOVE LPS TO HW CONVERTOR AND ASSOCIATED PIPING, SUPPORTS AND ACCESSORIES.

(B) REMOVE LPS/LPR PIPING, VALVING AND CONTROLS.

(C) REMOVE AIR REMOVAL FITTING.

(D) REMOVE HEATING PUMPS, 3-WAY VALVES AND RELATED PIPING.

(E) REMOVE HEATING PIPING AND RELATED VALVES AND INSULATION.

(F) REMOVE EXPANSION TANK.

(G) REMOVE SIDE STREAM FILTER.

(H) REMOVE LPS TO HW CONVERTOR AND ASSOCIATED PIPING, SUPPORTS AND ACCESSORIES. TURN OVER CONVERTOR TO OWNER.

(I) REMOVE HEATING PUMPS, 3-WAY VALVES AND RELATED PIPING. TURN OVER PUMPS TO OWNER.

(J) REMOVE EXPANSION TANK. TURN OVER TO OWNER.

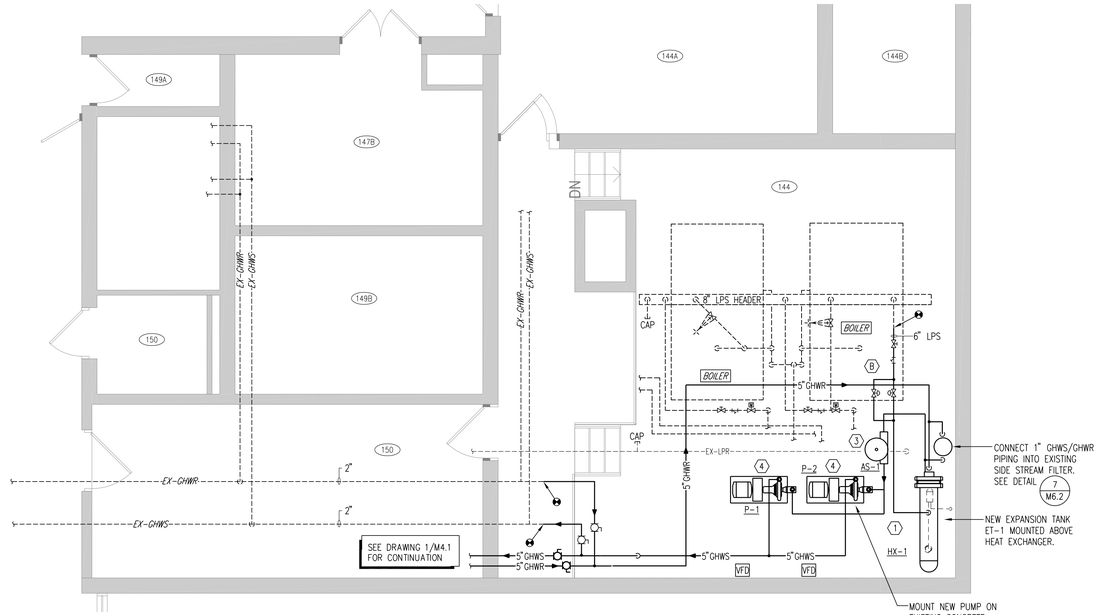
(K) REMOVE SIDE STREAM FILTER. TURN OVER TO OWNER.

NOTE:

HATCHING DENOTES MECHANICAL DUCTWORK AND/OR EQUIPMENT TO BE REMOVED.

ALL DASHED MECHANICAL EQUIPMENT ON THIS SHEET AND/OR MECH. EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.

– TYPICAL THIS SHEET –



1A M6.2 BOILER ROOM PLAN HYDRONIC 1/4"=1'-0" NORTH

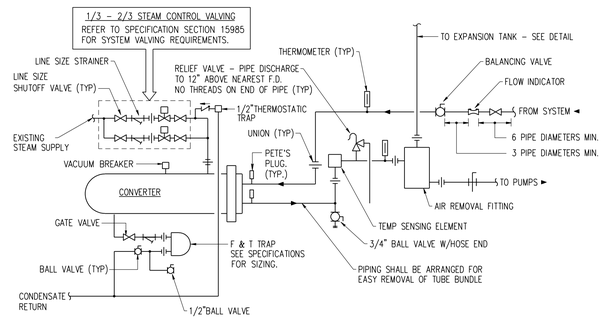
SPECIFIC NOTES:

(1) PROVIDE NEW STEAM TO HW CONVERTOR. REFER TO DETAIL 3/M6.2

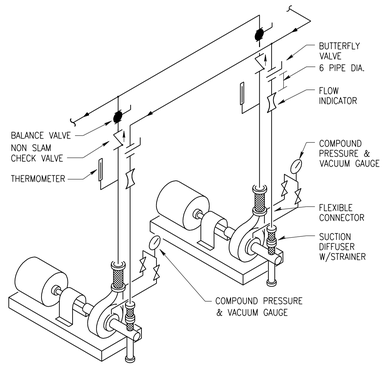
(2) PROVIDE NEW STEAM VALVES, STRAINER AND CONTROLS.

(3) PROVIDE NEW AIR SEPARATOR. TIE INTO EXPANSION TANK.

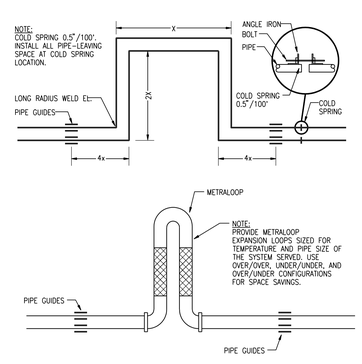
(4) PROVIDE NEW PARALLEL FLOW HEATING PUMPS. REFER TO DETAIL 4/M6.2



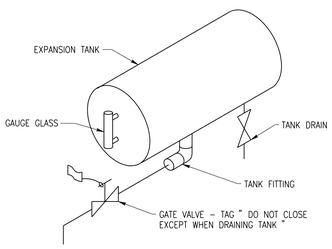
3 M6.2 STEAM CONVERTER PIPING DETAIL NO SCALE



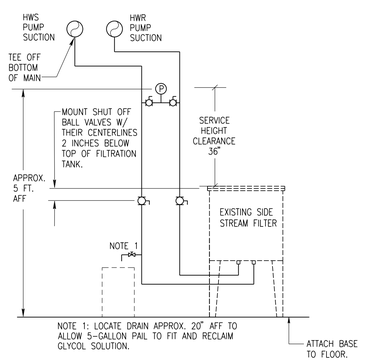
4 M6.2 PARALLEL PUMP AND STANDBY PUMP DETAIL NO SCALE



5 M6.2 EXPANSION LOOP PIPING DETAIL NO SCALE



6 M6.2 EXPANSION TANK NO SCALE



7 M6.1 SIDE STREAM FILTER DETAIL NO SCALE

GENERAL NOTES – MECHANICAL DEMOLITION

1. DEMOLISHED MATERIAL SHALL BE REMOVED AND DISPOSED OF IN COMPLIANCE WITH SPECIFICATIONS, FEDERAL, STATE AND LOCAL CODES.
2. WHEN PIPING AND/OR DUCTWORK IS INDICATED TO BE REMOVED, CONTRACTOR SHALL REMOVE ABANDONED DUCTWORK AND/OR PIPING IN ITS ENTIRETY. DO NOT ABANDON IN PLACE UNLESS INDICATED.
3. WHEN EQUIPMENT IS SHOWN TO BE REMOVED, THE CONTRACTOR SHALL DEMOLISH AND REMOVE ASSOCIATED EQUIPMENT INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REGISTERS, DIFFUSERS, TEMPERATURE SENSORS, PNEUMATIC TUBING, VALVES, FITTINGS, RELATED SENSORS, DAMPERS AND ANCHORS, ETC.
4. WHEN PIPING OR INSULATED DUCTORK IS REMOVED, CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGED INSULATION. REPLACE INSULATION VOIDS WITH MATERIAL TO MATCH EXISTING THICKNESS AND TYPE. SEAL INSULATION JACKET AND INSULATE NEW PIPE CAPS.
5. CONTRACTORS SHALL FIELD VERIFY SIZE AND LOCATION OF ALL PIPING AND EQUIPMENT SHOWN ON DEMOLITION PLANS. SIZES AND LOCATIONS OF EQUIPMENT AND PIPING SHOWN PER ORIGINAL PLANS.
6. IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT PROCEED, BUT NOTIFY OWNER IMMEDIATELY.
7. CONTRACTOR SHALL GROUT ALL FLOOR OPENINGS THAT ARE NOT TO BE REUSED.
8. WHEN TEMPERATURE SENSORS ARE REMOVED, REMOVE RELATED AIR LINES/WIRING SOURCE & CAP/CRIMP. PROVIDE COVER PLATE WHERE NEW SENSOR LOCATION IS OTHER THAN SHOWN ON PLAN. COORDINATE WITH NEW WORK DRAWINGS. FIELD-VERIFY ALL LOCATIONS.
9. TERMINATE HEATING TERMINAL UNIT PIPING REMOVED UNDER THIS PROJECT WITH BALL VALVES AND CAPS AT FLOWING MAIN. (TYPICAL)

NOTE: ALL DEMOLITION WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

GENERAL NOTES – VENTILATION

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. COORDINATE ROOF DRAINS AND RAIN WATER LEADERS WITH DUCTWORK LOCATIONS.
3. VERIFY EXACT WALL LOCATIONS WITH ARCHITECTURAL PLANS.
4. ALL WORK SHALL MEET STATE AND LOCAL CODES.
5. MAXIMUM FLEXIBLE DUCT LENGTHS SHALL BE NO GREATER THAN FIVE FEET (5'-0"). SEE DETAILS.
6. REFER TO REFLECTED CEILING PLANS FOR EXACT REGISTER, GRILLE AND DIFFUSER LOCATIONS.
7. ALL RETURN DIFFUSER BOOTS SHALL BE LINED WITH 1/2" FIBER-FREE DUCT LINER. SEE SPECIFICATIONS FOR TYPE.
8. ALL TRANSFER AIR DUCTS SHALL BE LINED WITH 1-INCH CLOSED-CELL FOAM INSULATION. SEE SPECIFICATIONS.
9. THIS CONTRACTOR (SUB-CONTRACTOR) SHALL COORDINATE INSTALLATION OF THEIR WORK WITH OTHER CONTRACTORS AND RESOLVE ALL DISPUTES PRIOR TO INSTALLATION.
10. IN GENERAL – DUCTWORK SHALL RUN TIGHT TO OR BETWEEN STRUCTURE UNLESS OTHERWISE SPECIFIED.
11. VENTILATION CONTRACTOR SHALL ASCERTAIN LOCATION OF ALL ELECTRICAL PANEL BOARDS AND SHALL KEEP ALL PIPING AND DUCTWORK OUT OF AREA ABOVE THE PANEL BOARDS AND FOR A DISTANCE OF 3'-6" IN FRONT OF AND 1'-6" FROM EACH SIDE OF PANEL BOARDS. THIS INCLUDES CONTROL PANELS FOR MECHANICAL EQUIPMENT.
12. PROVIDE TEST HOLES FOR ALL SUPPLY DUCTS NEAR AIR HANDLING UNITS.
13. (T) SEE SPECIFICATIONS FOR TEMPERATURE SENSOR TYPE.
14. (C) INDICATES CO_2 SENSOR. SEE SPECIFICATIONS FOR CONTROL.
15. (M) INDICATES MOTORIZED DAMPER. SEE SPECIFICATIONS FOR CONTROL.
16. WHERE 45 DEGREE BRANCH TAKE-OFFS CANNOT BE USED, PROVIDE 90 DEGREE CONICAL TAKE-OFFS.
17. DENOTES FIRE DAMPER.
18. RUNOUT DUCTS TO VAV BOXES SHALL BE SAME SIZE AS BOX INLETS. REFER TO VAV SCHEDULE IN SPECIFICATIONS FOR SIZES.
19. INSTALL MECHANICAL EQUIPMENT REQUIRING MAINTENANCE NO HIGHER THAN 3'-0" ABOVE FINISHED CEILING UNLESS OTHERWISE NOTED ON PLAN. THIS INCLUDES, BUT IS NOT LIMITED TO: VAV BOXES, FAN COILS, FAN-POWERED BOXES, REHEAT COILS & ETC.)

NOTE: ALL NEW WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

GENERAL NOTES – HYDRONIC

1. THIS CONTRACTOR SHALL COORDINATE INSTALLATION OF HIS WORK WITH ALL OTHER CONTRACTORS AND RESOLVE ALL DISPUTES PRIOR TO INSTALLATION.
2. ALL PLUMBING & HYDRONIC PIPING SHALL BE RUN IN THE CEILING OF THE PLAN ON WHICH IT IS SHOWN, UNLESS OTHERWISE INDICATED.
3. ALL PIPING THAT PASSES THRU FLOORS SHALL BE SLEEVED AND CAULKED TO AIR TIGHT CONDITIONS.
4. IN GENERAL – ALL PIPE MAINS SHALL BE RUN TIGHT TO BOTTOM OF JOISTS, BRANCH PIPES MAY RISE INTO JOIST SPACES WHERE SPACE PERMITS.
5. PLUMBING & HYDRONIC CONTRACTOR SHALL ASCERTAIN LOCATION OF ALL ELECTRICAL PANEL BOARDS AND SHALL KEEP ALL PIPING OUT OF AREA ABOVE THE PANEL BOARDS AND FOR A DISTANCE OF 3'-6" IN FRONT OF & 1'-6" FROM EACH SIDE OF PANEL BOARDS.
6. VERIFY EXACT WALL LOCATIONS WITH ARCHITECTURAL PLANS.
7. ALL WORK SHALL MEET STATE & LOCAL CODES.
8. PIPE BREAKS ARE FOR CLARITY ONLY.
9. COORDINATE HYDRONIC PIPING AT PENETRATIONS THRU ROOF WITH RTU COIL LOCATIONS.
10. VENT ALL HIGH POINTS ON HEATING PIPING.
11. RUN-OUTS TO EQUIPMENT SHALL BE 3/4" UNLESS NOTED OTHERWISE.

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CONSULTANTS

REVISIONS

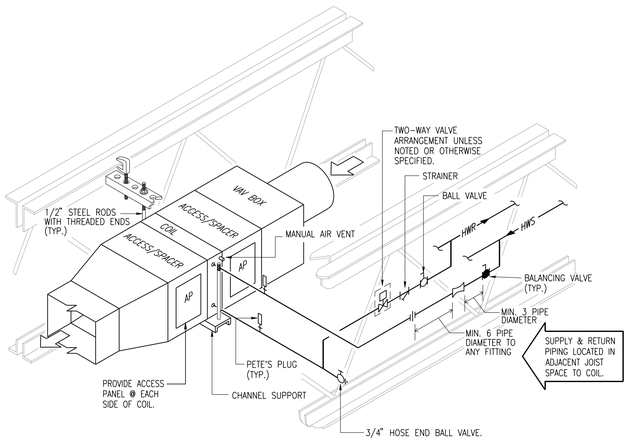
SAND CREEK ELEMENTARY SCHOOL
HVAC Replacement and Deferred Maintenance - Phase 1
Anoka-Hennepin Schools I.S.D. No. 11
12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
SIGNATURE
Blayne Parkos, PE
TYPED OR PRINTED NAME
December 2, 2021
DATE
46630
LICENSE NUMBER

KEYPLAN
NORTH

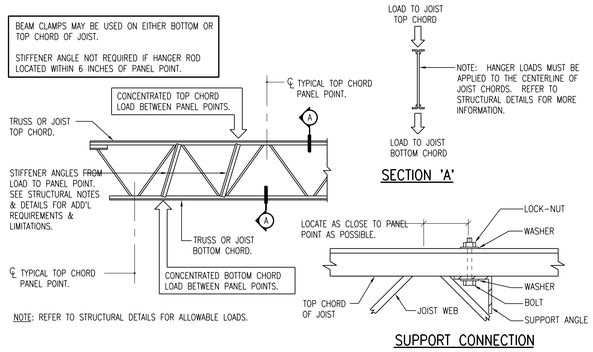
DRAWN BY
BJW
CHECKED BY
BJP
ISSUED FOR
CONSTRUCTION DOCUMENTS
ISSUE DATE
DECEMBER 2, 2021
SHEET NAME
BOILER ROOM HYDRONIC DEMOLITION & NEW WORK PLANS
ATS&R PROJECT NO.
21046
REVISION NO.

SHEET NUMBER
M6.2



1 M7.1 COIL PIPING FOR VAV BOX MOUNTED IN JOIST SPACE

NO SCALE

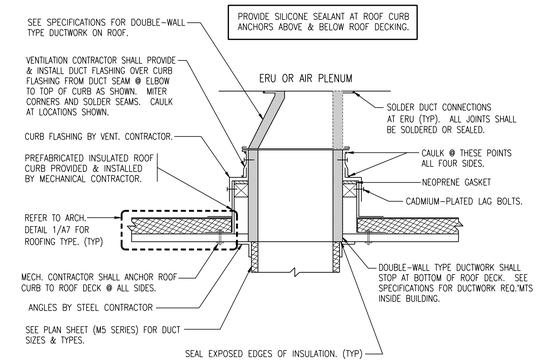


SUPPORT CONNECTION

2 M7.1 CONCENTRATED MECHANICAL/ELECTRICAL LOADS TO STEEL TRUSS OR JOIST

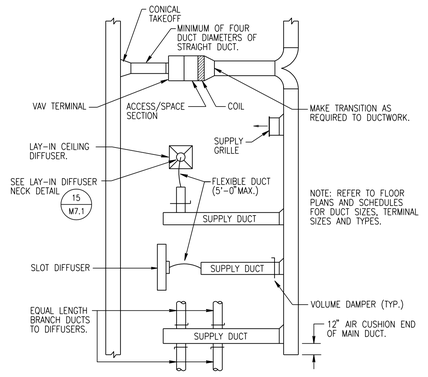
SEE STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION AS REQUIRED.

NO SCALE



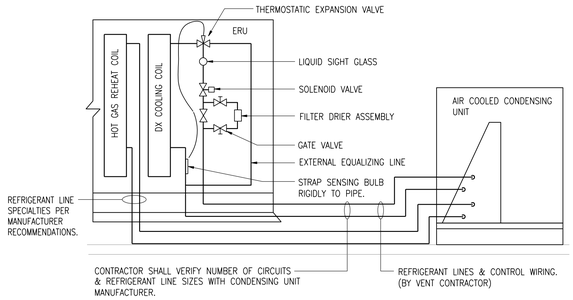
3 M7.1 DUCT THRU ROOF TO/FROM ENERGY RECOVERY UNIT

NO SCALE



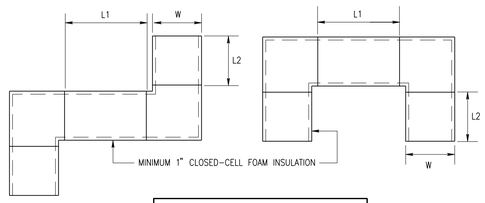
4 M7.1 DOUBLE-LINE DUCT DIAGRAM

NO SCALE



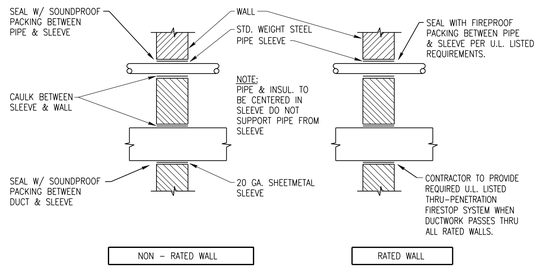
5 M7.1 REFRIGERANT PIPING

NO SCALE



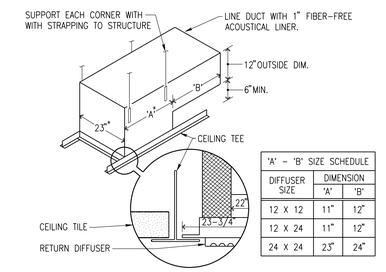
6 M7.1 TYPICAL TRANSFER DUCT DETAIL

NO SCALE



7 M7.1 PIPE & DUCT SLEEVE DETAIL

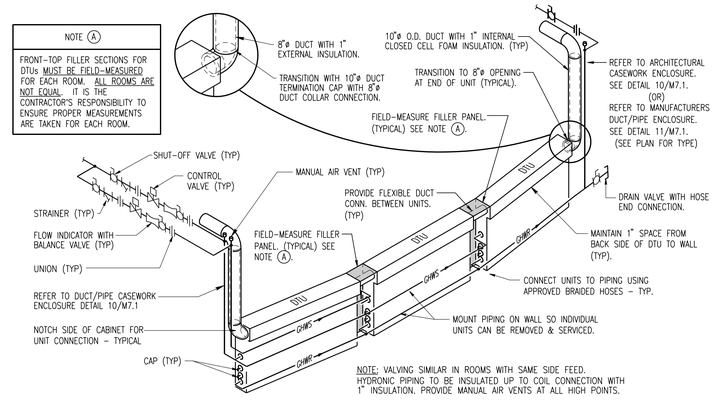
NO SCALE



'A' - 'B' SIZE SCHEDULE		
DIFFUSER SIZE	DIMENSION 'A'	DIMENSION 'B'
12 X 12	11"	12"
12 X 24	11"	12"
24 X 24	23"	24"

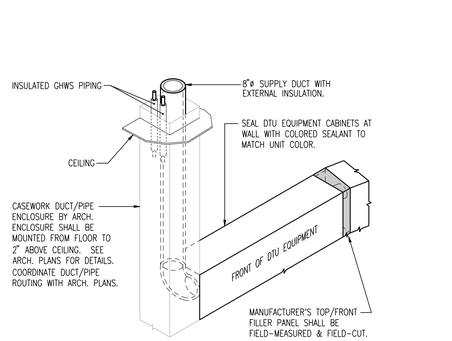
8 M7.1 RETURN DIFFUSER BOOT DETAIL

NO SCALE



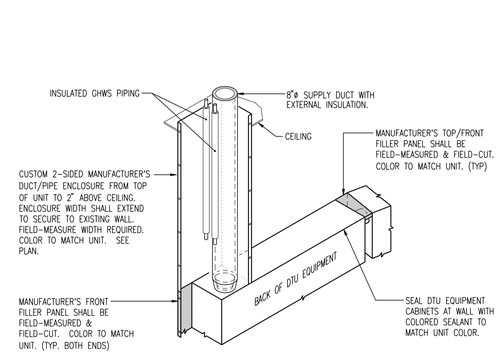
9 M7.1 TYPICAL CLASSROOM DTU INSTALLATION DIAGRAM

NO SCALE



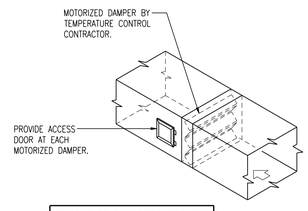
10 M7.1 TYPICAL DUCT/PIPE ENCLOSURE (BY ARCH.) DETAIL (CASEWORK ENCLOSURE BY ARCH.)

NO SCALE



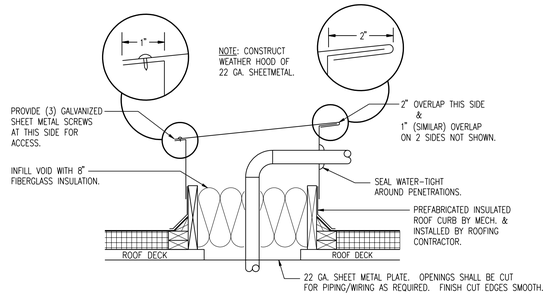
11 M7.1 TYPICAL DUCT/PIPE ENCLOSURE (MFR.) DETAIL (ENCLOSURE BY MANUFACTURER)

NO SCALE



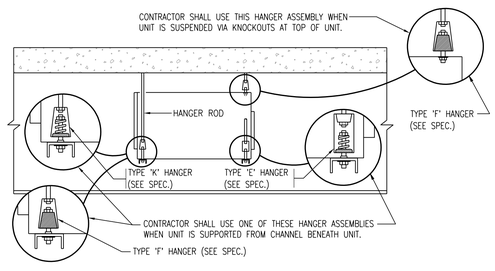
12 M7.1 MOTORIZED DAMPER ACCESS DOOR DETAIL

NO SCALE



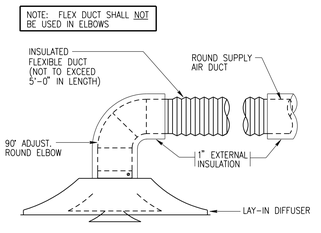
13 M7.1 WEATHER HOOD FOR PIPING DETAIL

NO SCALE



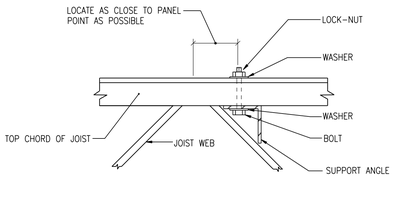
14 M7.1 HANGER AND VIBRATION ISOLATOR

NO SCALE



15 M7.1 TYPICAL SQUARE DIFFUSER INSTALLATION

NO SCALE



16 M7.1 HANGING UNIT SUPPORT

NO SCALE

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SAND CREEK ELEMENTARY SCHOOL

HVAC Replacement and Deferred Maintenance - Phase 1

Anoka-Hennepin Schools I.S.D. No. 11
12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE

Blayne Parkos, PE

TYPED OR PRINTED NAME

December 2, 2021

DATE

46630

LICENSE NUMBER

KEYPLAN

NORTH

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TMSO

CHECKED BY
BJP

ISSUED FOR
CONSTRUCTION DOCUMENTS

ISSUE DATE
DECEMBER 2, 2021

SHEET NAME
MECHANICAL DETAILS

ATS&R PROJECT NO.
21046

REVISION NO.

SHEET NUMBER
M7.1

ENERGY RECOVERY UNIT SCHEDULE

UNIT NO.	LOCATION	AREA SERVED	MANUFACTURER	MODEL NO.	SUMMER DESIGN			WINTER DESIGN				SUPPLY FAN							EXHAUST FAN						OUTDOOR AIR FILTERS			
					O/A - ENTERING AIR TEMP. DB/WB (°F)	O/A - LEAVING AIR TEMP. DB/WB (°F)	E/A - ENTERING AIR TEMP. DB/WB (°F)	O/A - ENTERING AIR TEMP. DB (°F)	O/A - LEAVING AIR TEMP. DB (°F)	E/A - ENTERING AIR TEMP. DB (°F)	FROST CONTROL SETPOINT (DEG F)	CFM	MAX / MIN OUTDOOR AIR (%)	EXT. STATIC PRESS. (IN W.G.)	TOTAL STATIC PRESS. (IN W.G.)	FAN RPM	MOTOR HP	VFD CONTROL	CFM	EXT. STATIC PRESS. (IN W.G.)	TOTAL STATIC PRESS. (IN W.G.)	FAN RPM	MOTOR HP	VFD CONTROL BY MANUFACTURER	TYPE	AREA (SF)	1st STAGE-THICKNESS / EFFICIENCY	2nd STAGE-THICKNESS / EFFICIENCY
ERU-2	ROOF	NORTHEAST CLASSROOMS	XETEX	AHS-1600-RT-CD-HG-HW-FF	92/75	80.0/67.1	75/63	-16	46	72	15	6250	100/40	2	5.5	2100	10	YES	6586	1	3	1757	7.5	YES	PLEAT	12	2" MERV-8	4" MERV-13

ENERGY RECOVERY UNIT SCHEDULE - CONTINUED

UNIT NO.	EXHAUST AIR FILTERS			HOT WATER HEATING COIL											DX COOLING COIL										RETURN AIR DUCT SMOKE DETECTOR BY MANUFACTURER	UNIT POWER	REMARKS
	TYPE	AREA (SF)	1st STAGE-THICKNESS / EFFICIENCY		ROWS	FINS PER INCH (MAX)	FACE VELOCITY (FPM)	AIR PRESS. DROP (IN W.G.)	ENTERING AIR TEMP DB (°F)	LEAVING AIR TEMP DB (°F)	GPM/MBH	ENTERING WATER TEMP (°F)	LEAVING WATER TEMP (°F)	WATER PRESS. DROP (FT W.G.)	ETHYLENE GLYCOL (%)		ROWS	FINS PER INCH (MAX)	FACE VELOCITY (FPM)	AIR PRESS. DROP (IN W.G.)	ENTERING AIR TEMP DB (°F)	ENTERING AIR TEMP WB (°F)	LEAVING AIR TEMP DB (°F)	LEAVING AIR TEMP WB (°F)	TOTAL CLG. CAP. (MBH)				
ERU-2	PLEAT	10	MERV-8		2	11	538	0.22	28	75.6	22.5 / 322.8	140	110	10.8	30		8	11	505	1.19	80	67.1	50.9	50.4	311.5		NO	22.5mca @ 460/3	NOTE 1, 2, 3

NOTES:
1. WELD UNIT BASE TO STRUCTURAL STEEL BEAMS. UNIT SHALL BE SINGLE POINT CONNECTION WITH 120/1 LIGHT/GFI CONNECTION. SF, EF & RECOVERY WHEEL VFD's SHALL BE INCLUDED IN UNIT. UNIT SHALL NOT EXCEED 15 FEET IN LENGTH. SF, EF & OA AIR FLOW MEASURING STATIONS SHALL BE INCLUDED WITH UNIT.
2. PROVIDE HOTGAS REHEAT COIL . CONTRACTOR TO PROVIDE VARIOUS REFRIGERANT PIPING AND ACCESSORIES REQUIRED BETWEEN THE COOLING COIL AND HOT GAS REHEAT COIL AND PIPE PER MANUFACTURERS RECOMMENDATION. HG REHEAT COIL 1 ROW, 9 FPI, 538 FPM, 0.10 SP, 50.9 EAT, 72.2 LAT, 144.4 MBH.
3. PROVIDE A FACTORY MONTED AND WIRED GFI OUTLET BREAKER, LIGHTING BREAKER, 120v TO 24v TRANFORMER AND LED LIGHTS.

AIR COOLED CONDENSING UNIT SCHEDULE - PURCHASED BY OWNER

UNIT NO.	LOCATION	MANUFACTURER	MODEL NO.	CAPACITY (MBH)	REFRIGERANT	OUTDOOR AIR TEMP (°F)	ELECTRICAL	REMARKS
ERU-CU-2	ROOF	YORK	J25YCC00A4GAB4	269.8	R410A	95	45.1mca @ 460/3	PROVIDE WITH HAIL GUARDS, COTTONWOOD SCREENS, HOT GAS REHEAT VALVE WITH (2) PORTS FOR CONNECTION BY CONTRACTOR TO ERU IN FIELD & RAWAL APR CONTROL DEVICE
NOTE: UNIT PURCHASED BY OWNER BUT INSTALLED BY CONTRACTOR. CONTRACTOR TO INSTALL ALL ACCESSORIES AND DEVICES WITH UNIT FOR A COMPLETE SYSTEM.								

CIRCULATING PUMP SCHEDULE

UNIT NO.	LOCATION	SYSTEM	TYPE	MANUFACTURER	MODEL NO.	GPM	HEAD (FT W.G.)	HP	PUMP EFFICIENCY	MOTOR RPM	PARALLEL OR STANDBY	VFD CONTROL	SUCTION DIFFUSER	SYSTEM PIPE SIZE INCHES		REMARKS
P-1	BOILER ROOM	HEATING	BASE MTD	B&G	1510-3EB	330	80	15	76.2	1800	PARRALLEL	YES	YES	4		
P-2	BOILER ROOM	HEATING	BASE MTD	B&G	1510-3EB	330	80	15	76.2	1800	PARRALLEL	YES	YES	4		

STEAM TO WATER HEAT EXCHANGER SCHEDULE

UNIT NO.	LOCATION	MANUFACTURER	MODEL NO.	STEAM (LBS/HR)	STEAM PRESSURE (PSIG)	GPM	ENTERING WATER TEMP (°F)	LEAVING WATER TEMP (°F)	WATER PRESSURE DROP (FT W.G.)	GLYCOL (%)	GLYCOL TYPE	SYSTEM FILL PRESSURE (PSI)	PRESSURE RELIEF SETTING (PSI)	REMARKS
HX-1	BOILER ROOM	XYLEM	SU-166-2	6952	5	472	150	180	3.0	30	ETH	18	45	

GRILLES, REGISTERS AND DIFFUSERS SCHEDULE

TYPE	SYSTEM	MANUFACTURER	MODEL NO.	VOLUME DAMPER	FINISH	NOTES	MATERIAL	MISC.	DESCRIPTION
H	CEILING DIFFUSER	TITUS	TMSA	---	WHITE ENAMEL	NOTE 1	STEEL		ADJUSTABLE STEEL SQUARE CEILING DIFFUSER FOR 24 X 24 NOMINAL LAY-IN TILE CEILING.
M	CEILING RETURN/ TRANSFER GRILLE	TITUS	50F	---	WHITE ENAMEL	---	ALUMINUM		24 x 24 ALUMINUM FRAME W/ 1/2"x1/2"x1" EGGCRATE GRID.
N	CEILING RETURN GRILLE	TITUS	50F	---	WHITE ENAMEL	---	ALUMINUM		24 x 12 ALUMINUM FRAME W/ 1/2"x1/2"x1" EGGCRATE GRID.
P	RETURN REGISTER	TITUS	355RL	OPPOSED BLADE DAMPER	NOTE 4, 5	NOTE 2	STEEL		35° FIXED DEFLECTION STEEL REGISTER WITH BLADES IN LONG DIMENSION. 1/2 INCH SPACING.

DIFFUSER LABELING NOMENCLATURE EXAMPLE : DIFFUSER TYPE/NECK SIZE/CFM/QUANTITY. A/8/250/3

NOTES: 1. NECK SIZE INDICATED ON DRAWINGS.

2. SIZE INDICATED ON DRAWINGS.

3. FILTER SHALL BE PROVIDED BY CONTRACTOR.

4. DIFFUSERS, GRILLES AND REGISTERS MOUNTED ON PAINTED DUCTWORK SHALL HAVE PRIMED FINISH.

5. DIFFUSERS, GRILLES AND REGISTERS MOUNTED ON PAINTED WALLS, SOFFITS OR BURNISHED BLOCK SURFACES SHALL HAVE PRIMED FINISH .

AIR SEPARATOR SCHEDULE

UNIT NO.	LOCATION	SYSTEM	MANUFACTURER	MODEL NO.	SIZE	GPM	REMARKS
AS-1	144	HOT WATER	BELL & GOSSET	RL-5	5"	528	

EXPANSION TANK SCHEDULE

UNIT NO.	LOCATION	SYSTEM	MANUFACTURER	MODEL NO.	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	DIAMETER x HEIGHT (IN)	SYSTEM FILL PRESSURE (PSI)	PRESSURE RELIEF SETTING (PSI)	REMARKS
ET-1	BOILER ROOM	HOT WATER	BELL & GOSSETT	B-500	132	76	24 x 82.5	18	45	1. HORRIZONTAL
1. FOR BLADDER STYLE TANKS MARK SYSTEM FILL PRESSURE AND DATE ON TANK WITH PERMANENT MARKER AFTER CHARGING TANK.										

CABINET UNIT HEATER SCHEDULE

UNIT NO.	LOCATION	MANUFACTURER	MODEL NO.	SIZE	ARRANGEMENT	CAPACITY (MBH)	CAPACITY (GPM)	ENTERING WATER TEMP (°F)	LEAVING WATER TEMP (°F)	WATER PRESSURE DROP (FT W.G.)	CFM	MOTOR HP	ETHYLENE GLYCOL (%)
CUH-1	EAST VESTIBULE	RITTLING	RWI-300-10	10	WALL HUNG	33.1	3.5	140	120	6.4	720	1/15	30

PERIMETER INDUCTION - DISPLACEMENT TERMINAL ROOM SCHEDULE

Room Number	Model	Quantity Per Room	2 or 4 Pipe	Depth (inches)	Nominal Length (inches)	Size	Primary Air Flow CFM per unit	Supply Air Flow Rate CFM CFM per unit	Air PD (in WG) per unit	Heating MBH per unit	Heating GPM per unit	Heating PD (ft. H2O) per unit	Cooling MBH (future)	Cooling GPM (future)	Cooling PD (ft. H2O) (future)	Max. Space NC Level	Basic Curved Filler Section (BFS-CF)	Unit Types Per Room	Room Ceiling Height	Notes
126	QLCI-2000	3	2	13.5	87.44	2000	150	450	0.3	8.7	1.5	12.4	8.3	1.5	14.7	23	2	B, B, B	8'-10"	
127	QLCI-2000	3	2	13.5	87.44	2000	150	450	0.3	8.7	1.5	12.4	8.3	1.5	14.7	23	2	B, B, B	8'-10"	
128	QLCI-2000	3	2	13.5	87.44	2000	150	450	0.3	8.7	1.5	12.4	8.3	1.5	14.7	23	2	B, B, B	8'-10"	
129	QLCI-2000	3	2	13.5	87.44	2000	150	450	0.3	8.7	1.5	12.4	8.3	1.5	14.7	23	2	B, B, B	8'-10"	
130	QLCI-2000	3	2	13.5	87.44	2000	150	450	0.3	8.7	1.5	12.4	8.3	1.5	14.7	23	2	B, B, B	8'-10"	

VARIABLE AIR VOLUME TERMINAL UNIT WITH REHEAT COILS SCHEDULE

MANUFACTURER:	TITUS					
EAT / LAT / EWT / LWT:	55 / 95 / 140 / 110					
UNIT NO.	LOCATION	SPACE SERVED	MODEL NO	MAX CFM / MIN CFM	GPM	NOTES
V-202	134	134	DESV-9	675 / 300	2.2	
V-203	134	134	DESV-9	675 / 300	2.2	
V-204	134	Corridor	DESV-6	250 / 50	1	
V-209	Corridor	Corridor	DESV-6	250 / 50	1	
V-210	124	124	DESV-6	320 / 200	1	ALTERNATE
V-211	125	125	DESV-8	640 / 285	2	ALTERNATE
V-212	133	133	DESV-4	135 / 50	1	

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE

MANUFACTURER:	TITUS					
UNIT NO.	LOCATION	SPACE SERVED	MODEL NO	MAX CFM	MIN CFM	NOTES
VAV-201	127	127	DESV-7	450	160	
VAV-205	126	126	DESV-7	450	160	
VAV-206	128	128	DESV-7	450	160	
VAV-207	129	129	DESV-7	450	160	
VAV-208	130	130	DESV-7	450	160	

PERIMETER INDUCTION - DISPLACEMENT TERMINAL MODEL SCHEDULE

Type	Unit Model	Left End Panel			Right End Panel			Top Panel		
		Blank Panel	Duct	Notched	Blank Panel	Duct	Notched	Blank Panel	Left Duct / Pipe Knockout	Right Duct / Pipe Knockout
A	QLCI-4-X/2000/C1/0	X				X	X		X	
B	QLCI-4-X/2000/C1/0		X	X		X	X	X		
C	QLCI-4-X/2000/C1/0		X	X	X					X

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SAND CREEK ELEMENTARY SCHOOL
HVAC Replacement and Deferred Maintenance - Phase 1
Anoka-Hennepin Schools I.S.D. No. 11
12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

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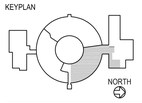
Blayne Parkos, PE
TYPED OR PRINTED NAME
December 2, 2021
DATE
4 6 6 3 0
LICENSE NUMBER

KEYPLAN



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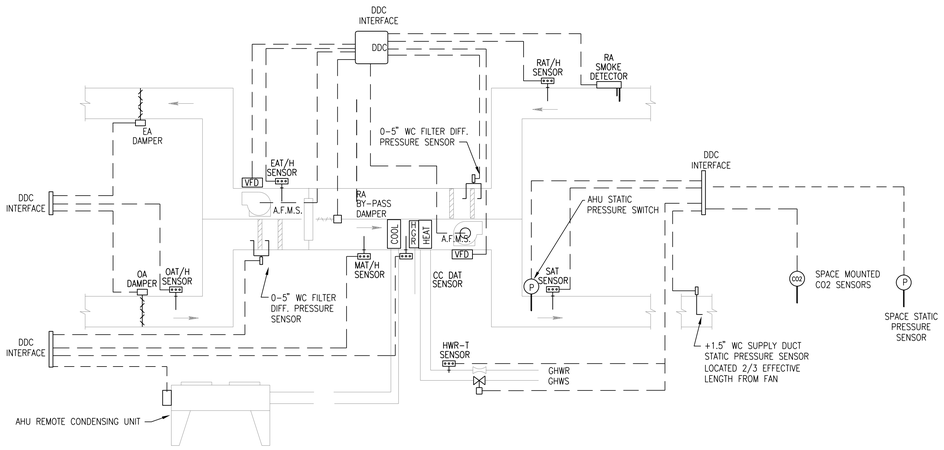
DECEMBER 2, 2021
SHEET NAME
MECHANICAL EQUIPMENT SCHEDULES
ATS&R PROJECT NO.
21046
REVISION NO.

SHEET NUMBER
M9.1

POINTS LEGEND	
AI = ANALOG INPUT	SA = STATUS ALARM
AO = ANALOG OUTPUT	TL = TRNED LOG
DI = DIGITAL INPUT	SP = SETPOINT
DO = DIGITAL OUTPUT	SC = SCHEDULE
HA = HIGH ALARM	IL = INTERLOCK
LA = LOW ALARM	



1 M10.1 DEDICATED OUTDOOR AIR UNIT W/ HEAT/COOL & RECOVERY WHEEL ERU-1

AIR HANDLING UNIT - VAV INTERNAL HEAT RECOVERY DOAS UNIT

SEQUENCE

1. Fan shall start and stop following the occupancy schedule as defined by the BAS.
2. Variable speed drive shall be used to: soft start fan, balance fan (set max airflow) and control for occupancy volume control
3. Amp Draw for fan status to be monitored through the VFD by the BAS.
4. Points shall be monitored by the BAS.
5. On fan startup, VFD shall gradually ramp up to half speed. After 5 minute delay begin pre-occupancy warm-up or cool down mode, see below for warm-up sequences.
6. When pre-occupancy mode is complete, unit shall switch to occupied-standby mode
7. When unit has multiple fans operating in parallel and the VFD amp draw of any VFD is more than 10% different from the others then send a fan failure alarm.
8. A command fail alarm shall be sent to the BAS any time the fan command and status don't match for 60 seconds (adjustable).
9. Variable speed drive shall modulate to maintain duct static pressure setpoint at static pressure sensor located 2/3 distance down the longest supply run or where determined by the BAS contractor and approved by the Engineer.
10. The duct static pressure setpoint shall be optimally reset based on zone airflow request and meeting airflow and space temperature requirements. The static pressure set-point shall be reset using Trim & Respond logic within the range 0.15" w.g (adjustable) to 1.3" w.g. (adjustable). When the supply fan is off, the set-point shall be 0.5" w.g.. While the fan is proven on, every two minutes, trim the set-point by 0.4" w.g., if there are more than two zone pressure requests. If there are more than two zone pressure requests, respond by increasing the set-point by 0.06" w.g.(adjustable)
11. The exhaust fan shall modulate speed based on space static pressure to maintain a positive 0.05"wc positive pressure.
12. A duct static pressure at the discharge of the unit that exceeds the high limit setpoint shall send high static alarm and shut unit down.
13. Airflow measuring stations shall indicate outdoor and supply fan air flow for trending
14. Piezo ring airflow measuring station shall measure supply airflow for each fan at the ERU for trending.
15. Outdoor Air and By-pass damper control by CO2: The BAS shall monitor the space mounted CO2 sensors and shall control to the highest space CO2. The Outdoor air quantity shall modulate between a minimum (20%) Outdoor Air (OA) and and maximum Outdoor of 100% based on a scale of 500 ppm to 1200 ppm of CO2. The Return Air By-Pass damper shall modulate with the outdoor air damper to return the remainder of the required supply air back to the system.
16. Heating Mode (partial recovery): If the Outdoor Air (OA) and Mixed Air (MA) temperature is below discharge air set point, the energy wheel shall start at low speed until discharge air supply temperature is satisfied. If the mixed air temperature (MA) rises above set-point, the wheel speed should be reduced to maintain the mixed air temperature set-point. On further call for heat unit shall switch to " Heating Mode (full recovery)" and heating control valve shall modulate to maintain setpoint. EMS shall monitor energy wheel speed for trend data.
17. Heating Mode (full recovery): If the Outdoor Air (OA) and Mixed Air (MA) temperature is below discharge air set point, the energy wheel be operated at full speed and heating control valve shall modulate to maintain setpoint of discharge air supply temperature. If the mixed air temperature (MA) rises above the discharge air set-point, the unit shall go back to patial recovery mode. EMS shall monitor energy wheel speed for trend data.
18. Economizer mode (economizer plus partial cooling): If OA temperature is greater than unit discharge air temperature set-point and the OA enthalpy is less than RA enthalpy the energy wheel shall be off. Cooling control valve shall modulate to meet discharge air temperature setpoint.
19. Economizer mode (free cooling): If OA temperature is less than the discharge air temperature set-point the outdoor air and exhaust air dampers shall be fully open, wheel return by-pass damper closed and energy wheel shall be off. The cooling coil and heating coil control valves shall be closed. If the mixed air temperature starts to drop below the unit discharge air temperature by more than 3 degrees F, modulate the heating coil to maintain discharge air temperature.
20. Cooling Mode (full recovery, and cooling): If Outdoor air enthalpy is greater than the return air enthalpy; The Outdoor air and Exhaust air dampers shall be fully open, the energy wheel shall be at full speed, the cooling coil control valve shall modulate to maintain discharge air temperature set-point. As outdoor air enthalpy becomes less than the return air enthalpy, switch to "economizer mode with partial cooling".
21. The discharge air temperature setpoint shall be reset (between 55F and 95F) by the space below ts heating setpoint.
22. During unocupied mode the heating valve will cycle as needed and the wheel by-pass damper shall open with the air handler to meet set-back temperature.
23. Heating coil valve operator shall be spring return to fail open.
24. During the unoccupied mode the heating coil shall cycle open to maintain a 40 to 50F. at the mixed air chamber.
25. When return air humitity rises to 55% RH, initiate Dehumidification mode until R.A humidity drops to 50% RH. During dehumidification mode, the cooling coil discharge temperature shall be set to 50 degrees and the EMS shall send a 0 to 10 vdc signal to the hotgas reheat coil valve at the condenser to meet the unit discharge temperature setpoint (55 to 65 Deg F adjustable). EMS shall cycle the hotgat reheat coil valve to 100% once each hour of DX operation.
26. During unoccupied mode or when the fan is off the cooling control valve shall be closed.
27. Frost control mode: If OA temp drops below the manufacturers required temperature for frost control (-3 deg F adjustable) the wheel speed shall be at minimum.

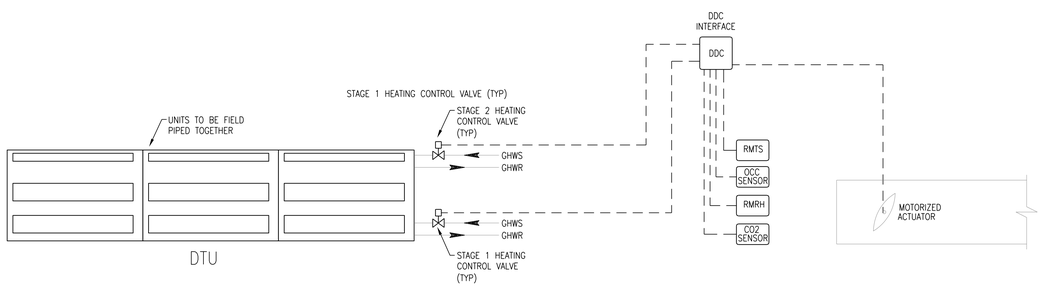
OPTIMUM START - WARM UP MODE

1. Warm-up will be based on the return air temperature. Sequence will be used if the return air temperature is below 63 F. (adjustable).
2. Prior to beginning occupied mode, the discharge temperature shall be increased (95F max., adj.) until the return air temperature rises above 68F. (adjustable). Outside air damper shall be fully closed. ERW By-pass return air damper shall be fully open.
3. An adaptive optimal start algorithm shall be used to minimize the energy required and warm-up time during the unoccupied period, necessary to achieve zone occupied temperature setpoints by the of the scheduled occupied period.
4. Upon completion of the warm-up cycle the unit shall commense normal occupied operation. If the cycle has not been completed prior to scheduled occupancy, unit shall commence normal occupied operation.

OPTIMUM START - COOLING

1. Cool-down will be based on the return air temperature. Sequence will be used if the return air temperature is above 76 Deg F. (adjustable).
2. Prior to beginning occupied mode, the discharge temperature shall be lowered (55F min., adj.) until the return air temperature falls below 76F. (adjustable). Outside air damper shall be fully closed. ERW By-pass return air damper shall be fully open.
3. An adaptive optimal start algorithm shall be used to minimize the energy required and cool-down time during the unoccupied period, necessary to achieve zone occupied temperature setpoints by the of the scheduled occupied period.
4. Upon completion of the cool-down cycle the unit shall commense normal occupied operation. If the cycle has not been completed prior to scheduled occupancy, unit shall commence normal occupied operation.
5. An adaptive optimal start algorithm shall be used to minimize the energy required and cool-down time during the unoccupied period, necessary to achieve zone occupied temperature setpoints by the of the scheduled occupied period.
6. Upon completion of the cool-down cycle the unit shall commense normal occupied operation. If the cycle has not been completed prior to scheduled occupancy, unit shall commence normal occupied operation.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
SS SUPPLY FAN			X	X			X	X		X	
ACTIVE SETPOINT									X		
SUP FAN VFD AMPS	X						X	X			
SUP FAN SPEED		X									
EXHAUST FAN VFD AMPS	X						X	X			
EXHAUST FAN SPEED		X									
HEAT CONTROL VALVE		X						X			
EXHAUST AIR DAMPER		X						X			
OUTSIDE AIR DAMPER		X							X		
RETURN AIR HUMIDITY	X				X			X			
RETURN AIR TEMPERATURE	X							X	X		
MIXED AIR TEMPERATURE	X							X	X		
COOLING COIL DISCHARGE AIR TEMP.	X							X	X		
UNIT DISCHARGE AIR TEMP.	X					X		X	X		
OUTDOOR AIR TEMP & HUMIDITY	X							X	X		
EXHAUST AIR TEMP & HUMIDITY	X							X	X		
SPACE TEMPERATURE & HUMIDITY			X					X			X
HIGH ZONE CO2	X							X	X		
DUCT STATIC PRESSURE SETPOINT		X			X			X			
DUCT STATIC PRESSURE " W.C.	X					X		X	X		
OUTSIDE AIRFLOW CFM	X					X		X	X		
SUPPLY/EXHAUST FANS AIRFLOW CFM	X					X		X			
SS EXHAUST FAN			X	X			X			X	
ACTIVE SETPOINT									X		
COOLING STAGING			X					X			
COOLING ENABLE/DISABLE				X							
DX COOLING SYSTEM STATUS			X				X	X			
DEHUMIDIFICATION SIGNAL	X							X			
O.A. FILTER STAUS	X				X			X			
EXH FILTER STAUS	X				X			X			
WHEEL SPEED S.P.		X									
WHEEL SPEED STATUS	X							X			
HOT WATER RETURN TEMP	X							X			
STATIC PRESSURE SWITCH	X				X			X			
SPACE STATIC PRESSURE	X					X		X	X		



2 M10.1 DISPLACEMENT-INDUCTION UNIT (DTU)

HVAC DISPLACEMENT TERMINAL UNITS (DTU'S)

A. Central Control Panel: Provide monitoring, alarm and control functions as indicated on the Point List. A unitary controller shall be used to interface into the DTU's.

B. General Requirements: Two heating control valves will be provided for each room. The first control valve shall control the Displacement Terminal Unit heating coil (Stage 1) and the second control valve will control the airside Displacement Terminal Units heating coils (Stage 2). Each room shall be provided with one cooling control valve to control chilled water to the cooling coil at the DTU.

1. During the occupied heating cycle, the Stage 2 control valve shall modulate open and closed in response to the room thermistor to satisfy room conditions. The occupied setpoint shall be 70 degrees for heating and 78 degrees for dehumidification (adjustable). If Stage 2 cannot maintain room setpoint then the Stage 1 control valve shall modulate open to satisfy the room thermistor.
2. During the un-occupied cycle, the heating Stage I and Stage II control valves shall modulate open and closed in sequence in response to the room thermistor to satisfy unoccupied room conditions. The unoccupied setpoint shall be 5 degrees below occupied setpoint (adjustable). If the unoccupied heating setpoint cannot be maintained, the room air supply control damper shall open and the rooftop or indoor DOAS unit shall operate as per Control Group BB or BB1, Paragraph D. In the heating-warmup cycle, the room air supply control damper shall open and the rooftop or indoor DOAS unit shall be operated as per its sequence.
3. During the occupied cooling cycle, the occupied setpoint shall be 72 degrees for cooling and 76 degrees for dehumidification (adjustable).
4. During the un-occupied cycle, The unoccupied setpoint shall be 5 degrees above occupied setpoint (adjustable). If the unoccupied cooling setpoint cannot be maintained, the room air supply control damper shall open and the rooftop or indoor DOAS unit shall operate as per its control sequence. In the cool-down cycle, the room volume control damper or VAV Box shall open and the rooftop or indoor DOAS unit shall be
5. During the occupied or unoccupied times, if the cooling water supply temperature drops greater than 2 degrees below the space calcualtioed dewpoint, the cooling control valve shall close and stop flow to the chilled beam.

C. Air Supply Control by Occupancy: Provide control of the Room VAV box based on Occupancy detectors.

1. Stand-by Control (Supply Fan "On", No Occupant in Room): When the room is indexed to Unoccupied by the occupancy detector through the DDC Central System, the room volume control damper or VAV box will go to its unoccupied cfm/flow setting which is 20% of Max cfm. The volume control damper or VAV Box Damper shall modulate open if required for the room sensor to maintain the standby setting of 70 F +/- 4 (adjustable) heating, 72 F +/- 4 (adjustable) cooling.
2. Occupied Control: When the room is indexed to Occupied by the Occupancy Detector, the room volume control damper or VAV Box Damper shall go open and the room sensor will maintain occupied room temperature setting as indicated previously.
3. DOAS Unit: Based on the CO2 sensor in the room, reduce or increase the outside air cfm supplied by the unit supply fan to maintain a maximum of 1000 ppm (adjustable) CO2 level.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
HEATING CONTROL VALVE STAGE 1	X	X						X			
HEATING CONTROL VALVE STAGE 2	X	X						X			
C.O.2	X					X					
OCCUPANCY SENSOR				X							
VAV CONTROL DAMPER		X						X			
SPACE TEMPERATURE/HUMIDITY	X						X		X	X	
ACTIVE SETPOINT									X		

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HVAC Replacement and Deferred Maintenance - Phase 1

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12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE

Blayne Parkos, PE
TYPED OR PRINTED NAME

December 2, 2021
DATE

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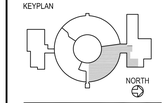
LICENSE NUMBER

KEYPLAN



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MECHANICAL CONTROL DIAGRAMS

ATS&R PROJECT NO.
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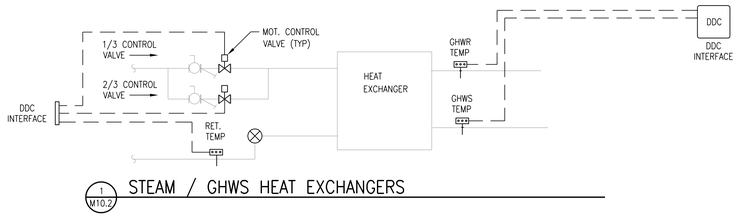


1 M10.2 STEAM / GHWS HEAT EXCHANGERS

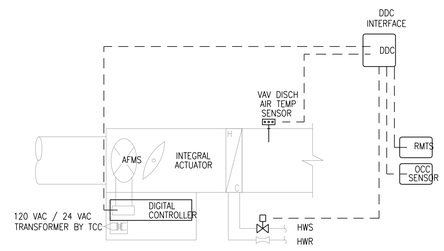
STEAM TO HOT WATER/GLYCOL CONVERTORS

SEQUENCE

1. One third (1/3) control valve shall modulate to meet discharge setpoint.
2. On further call for heat, the two thirds (2/3) control valve shall modulate.
3. The HX units shall stage based on supply water temperature to the system. HX-01 shall stage on first to maintain the discharge setpoint as determined by the outdoor air reset schedule. If hot water supply set-point is not met by the first HX unit for a period 5 minutes (adjustable), then stage on the second HX unit starting with the 1/3 valve, then the 2/3rds valve to increase Hot Water Supply temperature to meet set-point. If hot water supply set-point is not met by the second HX unit for a period of 5 minutes (adjustable), then stage on the third HX unit starting with the 1/3 valve, then the 2/3rds valve to increase Hot Water Supply temperature to meet set-point.
4. On rise above setpoint, reverse shall occur.
5. Hot water supply temperature shall be reset based on outdoor air temperature, if Outdoor air temp is 0 Deg F or lower, Water supply temperature shall be 200 Deg F (Adjustable), at 10 Deg F Outdoor, HWS = 170 Deg F, at 20 Deg F Outdoor, HWS = 160 Deg F, at 30 Deg F Outdoor, HWS = 150 Deg F, at 40 Deg F or above Outdoor, HWS = 140 Deg F.
6. Indicate heated return & supply water temperatures.
7. Indicate heating return & supply steam pressures.
8. The spring return normally closed valve will fail closed to no heat.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
SUPPLY WATER TEMPERATURE	X				X	X		X	X	X	
ACTIVE SETPOINT									X		
RETURN WATER TEMPERATURE	X							X			
STEAM SUPPLY PRESSURE	X							X			
CONDENSATE RETURN TEMPERATURE	X							X			
1/3 CONTROL VALVE HX-01		X						X			
2/3 CONTROL VALVE HX-01		X						X			
1/3 CONTROL VALVE HX-02		X						X			
2/3 CONTROL VALVE HX-02		X						X			

REFER TO SPECIFICATION SECTION 23 09 93 FOR MINIMUM VAV BOX CONTROL BY OCCUPANCY.



2 M10.2 HOT WATER VAV BOX

VAV BOXES WITH REHEAT COILS

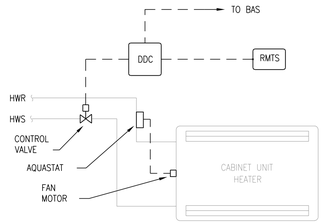
SEQUENCE - HEATING MODE

1. On a call for heat, the control valve shall open from 0% to 100%.
2. On a further call for heat, the VAV damper shall modulate from minimum setpoint to maximum setpoint.
3. Setpoint minus 2 degrees F. = Maximum heating CFM and control valve full open.
4. Setpoint minus 2 F. to minus 1 F. = Modulate from heating max to heating min CFM, control valve full open.
5. Minus 1 F to Setpoint = modulate control valve closed.
6. Setpoint to plus 1 F. = Control Valve closed, Modulate from min CFM to max CFM.
6. Reverse shall occur on drop in temperature.
7. The spring return normally open valve will fail open to full heat.
8. Points shall be monitored by the BAS.

SEQUENCE - COOLING MODE

1. On a call for cooling, the control valve shall be closed.
2. On a further call for cooling, the VAV damper shall modulate from minimum setpoint to maximum setpoint.
3. Setpoint plus 2 degrees F. = Maximum cooling CFM and control valve full closed.
4. Setpoint plus 1 F. to setpoint = Modulate from cooling max to cooling min CFM, control valve full closed.
5. Setpoint to minus 1 degree = Modulate control valve open.
6. Reverse shall occur on rise in temperature.
7. Points shall be monitored by the BAS.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
SPACE TEMPERATURE	X					X		X	X	X	
ACTIVE SETPOINT									X		
REHEAT CONTROL VALVE		X						X			
VAV CONTROL DAMPER		X						X			
DISCHARGE AIR TEMPERATURE	X							X	X		
OCCUPANCY SENSOR			X					X			
AIR FLOW	X							X			



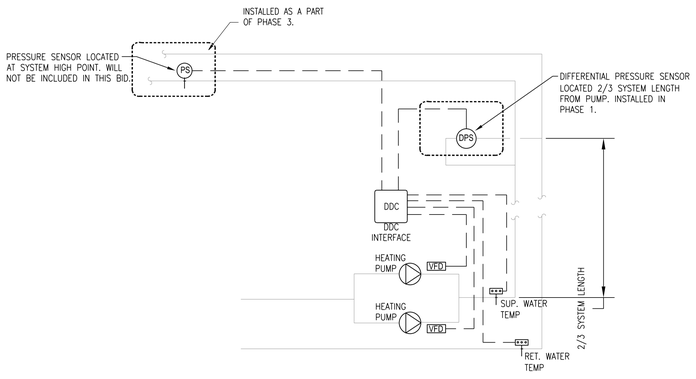
3 M10.2 HOT WATER CABINET UNIT HEATER

CABINET UNIT HEATER WITH DIGITAL STAT - TWO POSITION CONTROL VALVE & AQUASTAT

SEQUENCE

1. Two position control valve shall open and close to satisfy space temperature setpoint of 66 F. (adjustable).
2. Fan shall cycle on and off through control relay from aquastat setpoint of 90 F. (adjustable).
3. The spring return normally open valve will fail open to full heat.
4. Points shall be monitored by the BAS.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
SPACE TEMPERATURE	X					X		X	X		
CONTROL VALVE		X									



4 M10.2 PARALLEL HEATING PUMP CONTROL

HEATING PUMPS (P-1, P-2)

SEQUENCE

1. Lead pump shall operate continuously when heating or dehumidification is enabled.
2. Lag pump shall operate alternate weeks or upon failure of the lead pump.
3. Lag pump shall start automatically upon failure of the lead pump and an alarm shall activate.
4. Lag pump shall start when lead pump Amp draw exceeds 75% of its operating range.
5. Pump speed shall be controlled to maintain differential pressure setpoint (approximately 2/3 system length from pump).
6. Both pumps shall equalize and run in parallel until both pumps operating Amp draw drops to 30% of their operating range.
7. A pressure sensor at the far end (and/or highest point) of the heating piping system shall indicate system pressure.
8. Indicate run time for each pump.
9. Points shall be monitored by the BAS.

POINTS	HARDWARE				SOFTWARE						
	AI	AO	DI	DO	HA	LA	SA	TL	SP	SC	IL
ACTIVE SETPOINT									X		
SS PUMP							X	X			X
VFD - AMPS EACH PUMP		X					X	X			
CONTROL RELAY			X								
DIFFERENTIAL PRESSURE SENSOR - 1		X						X			
DIFFERENTIAL PRESSURE SENSOR - 2		X						X			
PRESSURE SENSOR		X						X			
PUMP SPEED		X						X			

ADDITIONAL CONTROLS SCOPE

A. OTHER CONTROLS NOT SHOWN ON PLANS: (REFER TO SPEC SECTION 23 09 93 FOR OTHER MISC SYSTEM CONTROLS TO BE INTEGRATED INTO EMS SYSTEM)
   1. CONTROLS CONTRACTOR TO REPLACE FRONT END SAGE UNIT WITH LATEST DISTRICT STANDARD.
   2. REMOVE PNEUMATICS TUBING AND CONTROLS BACK TO THE SOURCE OR NEAREST BRANCH FOR EQUIPMENT BEING REMOVED OR REPLACED.

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HVAC Replacement and Deferred Maintenance - Phase 1

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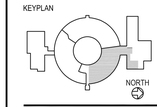

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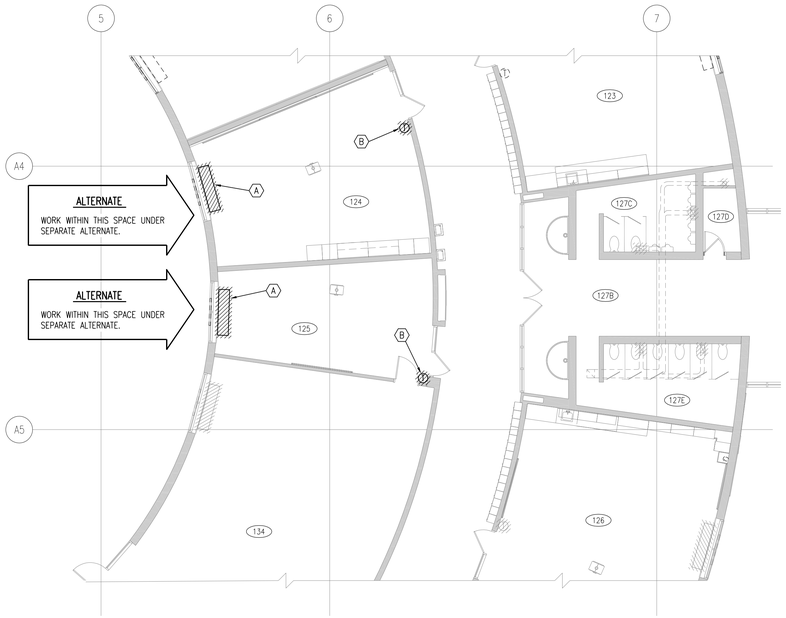
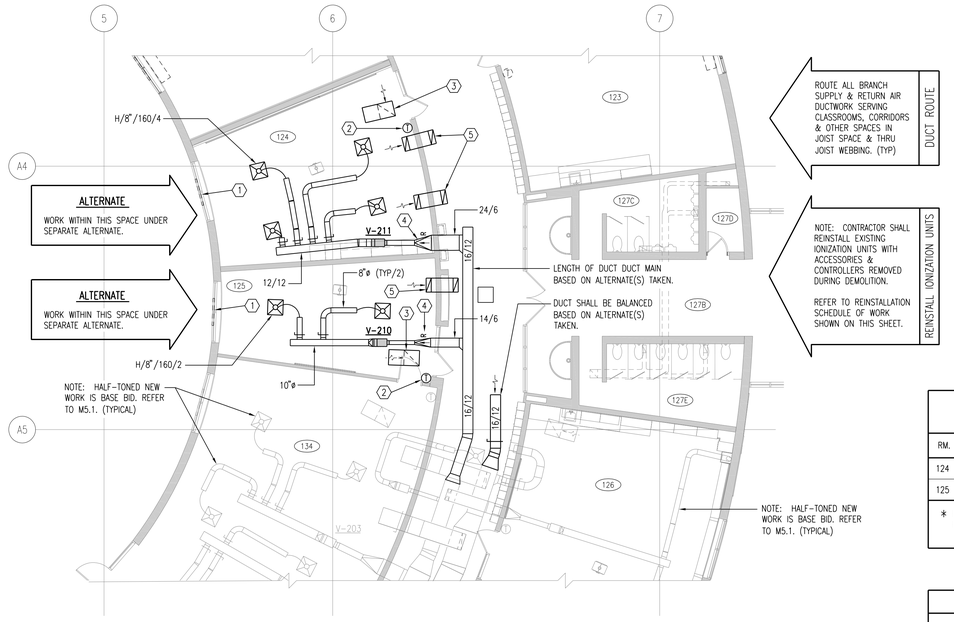


1 M11.1 FIRST FLOOR PLAN
(ALTERNATE) VENTILATION DEMOLITION
1/8" = 1'-0"



2 M11.1 FIRST FLOOR PLAN
(ALTERNATES) VENTILATION
1/8" = 1'-0"

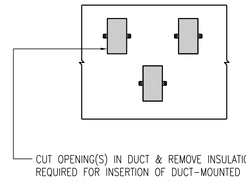
ROUTE ALL BRANCH SUPPLY & RETURN AIR DUCTWORK SERVING CLASSROOMS, CORRIDORS & OTHER SPACES IN JOIST SPACE & THRU JOIST WEBBING. (TYP)

DUCT ROUTE

NOTE: CONTRACTOR SHALL REINSTALL EXISTING IONIZATION UNITS WITH ACCESSORIES & CONTROLLERS REMOVED DURING DEMOLITION.

REFER TO REINSTALLATION SCHEDULE OF WORK SHOWN ON THIS SHEET.

REINSTALL IONIZATION UNITS



4 M11.1 DUCT MOUNTED IONIZATION UNIT INSTALLATION
NO SCALE

IONIZATION UNIT INSTALLATION SCHEDULE OF WORK
(EACH SPACE UNDER SEPARATE ALTERNATE)

RM.	NEW ION'ZR	INSTALL IN	EXIST. ION'ZR	REMOVE FROM	REINSTALL IN
124	--	--	✓	124 UNIT VENT.	* DUCT DOWNSTREAM OF V-211
125	--	--	✓	125 UNIT VENT.	* DUCT DOWNSTREAM OF V-210

* REFER TO DETAIL 4/M11.1 FOR IONIZATION UNIT INSTALLATION. IONIZATION UNITS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR SHALL VERIFY THESE RECOMMENDATIONS PRIOR TO START OF WORK.

CEILING WORK BY MECHANICAL

REFER TO, AND COORDINATE WITH, ARCHITECTURAL DEMOLITION PLANS FOR CEILING REMOVAL AREAS. ALL OTHER CEILINGS REQUIRING REMOVAL, WHICH ARE NOT DESIGNATED FOR REMOVAL ON ARCHITECTURAL PLANS, SHALL BE REMOVED AND REINSTALLED BY DIVISION 23 CONTRACTOR. DIVISION 23 CONTRACTOR IS RESPONSIBLE FOR REPLACING DAMAGED CEILING TILE AND/OR GRID COMPONENTS OCCURRING DURING THIS WORK AT NO COST TO OWNER OR OTHER CONTRACTOR.

GENERAL MECHANICAL DEMOLITION NOTES

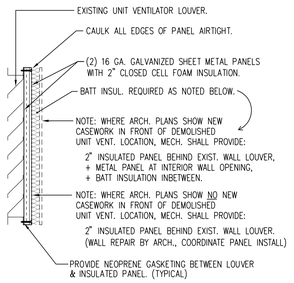
1. DEMOLISHED MATERIAL SHALL BE REMOVED AND DISPOSED OF IN COMPLIANCE OWNER IMMEDIATELY.
2. WHEN PIPING AND/OR DUCTWORK IS INDICATED TO BE REMOVED, CONTRACTOR SHALL REMOVE ABANDONED DUCTWORK AND/OR PIPING IN ITS ENTIRETY. DO NOT ABANDON IN PLACE UNLESS INDICATED.
3. WHEN EQUIPMENT IS SHOWN TO BE REMOVED, THE CONTRACTOR SHALL DEMOLISH AND REMOVE ASSOCIATED EQUIPMENT INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REGISTERS, DIFFUSERS, TEMPERATURE SENSORS, PNEUMATIC TUBING, VALVES, FITTINGS, RELATED SENSORS, DAMPERS AND ANCHORS, ETC.
4. WHEN PIPING IS REMOVED, CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGED INSULATION. REPLACE INSULATION VOIDS WITH MATERIAL TO MATCH EXISTING THICKNESS AND TYPE. SEAL INSULATION JACKET AND INSULATE NEW PIPE CAPS.
5. CONTRACTORS SHALL FIELD VERIFY SIZE AND LOCATION OF ALL PIPING AND EQUIPMENT SHOWN ON DEMOLITION PLANS. SIZES AND LOCATIONS OF EQUIPMENT AND PIPING SHOWN PER ORIGINAL PLANS.
6. IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT PROCEED, BUT NOTIFY WITH SPECIFICATIONS, FEDERAL, STATE AND LOCAL CODES.
7. CONTRACTOR SHALL GROUT ALL FLOOR OPENINGS THAT ARE NOT TO BE REUSED.
8. WHEN TEMPERATURE SENSORS ARE REMOVED, REMOVE RELATED AIR LINES/WIRING SOURCE & CAP/CRIMP. PROVIDE COVER PLATE WHERE NEW SENSOR LOCATION IS OTHER THAN SHOWN ON PLAN. COORDINATE WITH NEW WORK DRAWINGS. FIELD-VERIFY ALL LOCATIONS.
9. TERMINATE HEATING TERMINAL UNIT PIPING REMOVED UNDER THIS PROJECT WITH BALL VALVES AND CAPS AT FLOWING MAIN. (TYPICAL)

NOTE: ALL DEMOLITION WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

SPECIFIC DEMOLITION NOTES

(A) REMOVE UNIT VENTILATOR. OA LOUVER TO REMAIN IN PLACE. SEE SHEET M5.1 FOR WORK AT LOUVER. FIELD-VERIFY SIZE & LOCATION. SEE ALSO 'REMOVE IONIZATION UNITS' BOX NOTE, THIS SHEET, FOR WORK AT UNIT VENTILATOR PRIOR TO DEMOLITION OF UNIT VENTILATOR.

(B) REMOVE TEMPERATURE SENSOR. REMOVE PNEUMATIC TUBING OR WIRING BACK TO SOURCE & CRIMP/CAP. PROVIDE COVER PLATE WHERE NEW LOCATION DIFFERS FROM EXISTING LOCATION. FIELD-VERIFY LOCATION. COORDINATE WITH NEW WORK. WHEN WALL IS TO BE DEMOLISHED, REMOVE AIR LINES/WIRING UP INTO CEILING SPACE & CAP OR CRIMP AIRTIGHT. SEE SHEET M5.1 FOR NEW WORK.



3 M11.1 LOUVER PANEL DETAIL
NOTE: LOUVER TO BE SEALED AIRTIGHT.
NO SCALE

GENERAL NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. COORDINATE ROOF DRAINS AND RAIN WATER LEADERS WITH DUCTWORK LOCATIONS.
3. VERIFY EXACT WALL LOCATIONS WITH ARCHITECTURAL PLANS.
4. ALL WORK SHALL MEET STATE AND LOCAL CODES.
5. MAXIMUM FLEXIBLE DUCT LENGTHS SHALL BE NO GREATER THAN FIVE FEET (5'-0"). SEE DETAILS.
6. REFER TO REFLECTED CEILING PLANS FOR EXACT REGISTER, GRILLE AND DIFFUSER LOCATIONS.
7. THIS CONTRACTOR (SUB-CONTRACTOR) SHALL COORDINATE INSTALLATION OF THEIR WORK WITH OTHER CONTRACTORS AND RESOLVE ALL DISPUTES PRIOR TO INSTALLATION.
8. IN GENERAL – DUCTWORK SHALL RUN TIGHT TO OR BETWEEN STRUCTURE UNLESS OTHERWISE SPECIFIED.
9. VENTILATION CONTRACTOR SHALL ASCERTAIN LOCATION OF ALL ELECTRICAL PANEL BOARDS AND SHALL KEEP ALL PIPING AND DUCTWORK OUT OF AREA ABOVE THE PANEL BOARDS AND FOR A DISTANCE OF 3'-6" IN FRONT OF AND 1'-6" FROM EACH SIDE OF PANEL BOARDS. THIS INCLUDES CONTROL PANELS FOR MECHANICAL EQUIPMENT.
10. PROVIDE TEST HOLES FOR ALL SUPPLY DUCTS NEAR AIR HANDLING UNITS.
11. (T) SEE SPECIFICATIONS FOR TEMPERATURE SENSOR TYPE.
12. (M) INDICATES MOTORIZED DAMPER. SEE SPECIFICATIONS FOR CONTROL.
13. WHERE 45 DEGREE BRANCH TAKE-OFFS CANNOT BE USED, PROVIDE 90 DEGREE CONICAL TAKE-OFFS.
14. DENOTES FIRE DAMPER.
15. RUNOUT DUCTS TO VAV BOXES SHALL BE SAME SIZE AS BOX INLETS. REFER TO VAV SCHEDULE IN SPECIFICATIONS FOR SIZES.
16. INSTALL MECHANICAL EQUIPMENT REQUIRING MAINTENANCE NO HIGHER THAN 3'-0" ABOVE FINISHED CEILING UNLESS OTHERWISE NOTED ON PLAN. THIS INCLUDES, BUT IS NOT LIMITED TO: VAV BOXES, FAN COILS, FAN-POWERED BOXES, REHEAT COILS & ETC.)

NOTE: ALL NEW WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

SPECIFIC NOTES

(1) PROVIDE 2" INSULATED SHEET METAL PANEL AT BACK OF EXISTING LOUVER. SEE DETAIL 3/M11.1 FOR WORK AT LOUVER. SEE ARCH PLANS FOR WALL PATCHING WHEN WALL PATCHING IS REQUIRED.

(2) NEW DDC TEMPERATURE SENSOR. REFER TO SPECIFICATIONS FOR TYPE.

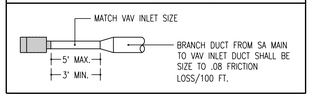
(3) TYPE 'M' RETURN AIR DIFFUSER BOOT. MOUNT BETWEEN JOISTS. SEE TYPICAL DETAIL 8/M7.1.

(4) TRANSITION & PITCH DUCT INTO JOIST SPACE.

(5) 22/6 TRANSFER AIR DUCT. TURN OPEN ENDS OF DUCT UP TOWARD STRUCTURE. MAINTAIN MIN. 6" CLEAR ABOVE OPENING FOR AIRFLOW.

ROOM NO.	ROOM NAME
103	CORRIDOR
124	STAFF LOUNGE
125	SPECIALIST
126	CLASSROOM
127	CLASSROOM
127A	CORRIDOR
127B	CORRIDOR
127C	BOYS TOILET
127D	CUSTODIAN
127E	GIRLS TOILET
128	CLASSROOM
129	CLASSROOM
130	CLASSROOM
133	OFFICE
133B	CORRIDOR
133C	HEADEND
134	MEDIA CENTER
150	CUSTODIAN
151	CORRIDOR
152	VESTIBULE

VAV BOX INLET DUCT SIZING

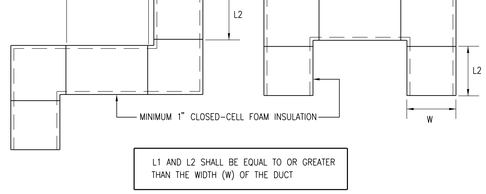


ITALIC DENOTES *EXISTING* PIPE, DUCT, OR EQMT.

HATCHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO BE REMOVED.

DASHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO REMAIN.

EXISTING MECHANICAL EQUIPMENT/PIPING NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.



L1 AND L2 SHALL BE EQUAL TO OR GREATER THAN THE WIDTH (W) OF THE DUCT

5 M11.1 TYPICAL TRANSFER DUCT DETAIL
NO SCALE

CROSS-BRACING

NOTE:
NEW DUCTWORK THRU JOIST SPACES & WEBBING MAY CONFLICT WITH EXISTING STRUCTURAL CROSS BRACING/BRIDGING. SEE ARCHITECTURAL PLANS FOR MODIFICATION INFORMATION REGARDING THESE STRUCTURAL ELEMENTS.

DIFFUSERS

NOTE:
BRANCH DUCT SIZES FOR SA DIFFUSERS SHALL MATCH DIFFUSER NECK SIZES AS SHOWN UNLESS OTHERWISE NOTED.

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CONSULTANTS

REVISIONS

SAND CREEK ELEMENTARY SCHOOL
HVAC Replacement and Deferred Maintenance - Phase 1
Anoka-Hennepin Schools I.S.D. No. 11
12156 Olive Stree NW
Coon Rapids, MN 55448

SIGNATURE / SEAL
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
SIGNATURE
Blayne Parkos, PE
TYPED OR PRINTED NAME
December 2, 2021
DATE
46630
LICENSE NUMBER

KEYPLAN
NORTH

DRAWN BY
TMSO
CHECKED BY
BJP
ISSUED FOR
CONSTRUCTION DOCUMENTS
ISSUE DATE
DECEMBER 2, 2021
SHEET NAME
ALTERNATE VENTILATION PLANS
ATS&R PROJECT NO.
21046
REVISION NO.
SHEET NUMBER
M11.1

1/M11.2 FIRST FLOOR PLAN
(ALTERNATE) HYDRONIC DEMOLITION

1/8" = 1'-0" NORTH

ROOM NO.	ROOM NAME
103	CORRIDOR
124	STAFF LOUNGE
125	SPECIALIST
126	CLASSROOM
127	CLASSROOM
127A	CORRIDOR
127B	CORRIDOR
127C	BOYS TOILET
127D	CUSTODIAN
127E	GIRLS TOILET
128	CLASSROOM
129	CLASSROOM
130	CLASSROOM
133	HEADEND
133B	CORRIDOR
134	MEDIA CENTER
150	CUSTODIAN
151	CORRIDOR
152	VESTIBULE

SPECIFIC NOTES

(A) REMOVE PIPING, VALVES, CONTROLS, AND ACCESSORIES ASSOCIATED WITH UNIT VENTILATOR. SEE MD5.1 FOR VENTILATION DEMOLITION. REPAIR FLOOR/WALL OPENINGS TO MATCH EXISTING WHERE PIPING HAS BEEN REMOVED.

(B) REMOVE HEATING PIPING, HANGERS AND ACCESSORIES.

CEILING WORK BY MECHANICAL

REFER TO, AND COORDINATE WITH, ARCHITECTURAL DEMOLITION PLANS FOR CEILING REMOVAL AREAS. ALL OTHER CEILINGS REQUIRING REMOVAL, WHICH ARE NOT DESIGNATED FOR REMOVAL ON ARCHITECTURAL PLANS, SHALL BE REMOVED AND REINSTALLED BY DIVISION 23 CONTRACTOR. DIVISION 23 CONTRACTOR IS RESPONSIBLE FOR REPLACING DAMAGED CEILING TILE AND/OR GRID COMPONENTS OCCURRING DURING THIS WORK AT NO COST TO OWNER OR OTHER CONTRACTOR.

ITALIC DENOTES *EXISTING* PIPE, DUCT, OR EQMT.

HATCHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO BE REMOVED.

– – – DASHING DENOTES MECHANICAL PIPING, DUCTWORK, AND/OR EQUIPMENT TO REMAIN.

EXISTING MECHANICAL EQUIPMENT/PIPING NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.

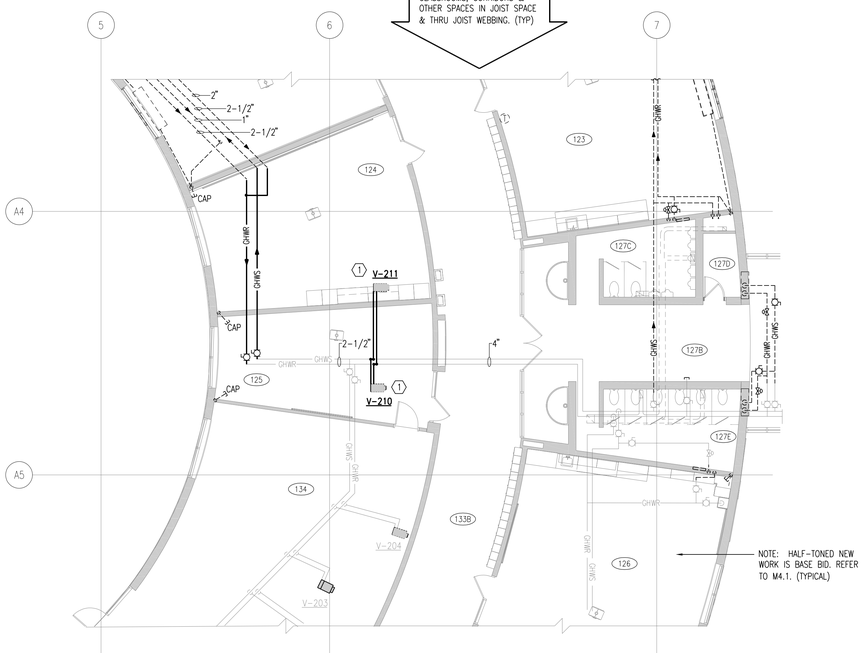
GENERAL MECHANICAL DEMOLITION NOTES

1. DEMOLISHED MATERIAL SHALL BE REMOVED AND DISPOSED OF IN COMPLIANCE OWNER IMMEDIATELY.
2. WHEN PIPING AND/OR DUCTWORK IS INDICATED TO BE REMOVED, CONTRACTOR SHALL REMOVE ABANDONED DUCTWORK AND/OR PIPING IN ITS ENTIRETY. DO NOT ABANDON IN PLACE UNLESS INDICATED.
3. WHEN EQUIPMENT IS SHOWN TO BE REMOVED, THE CONTRACTOR SHALL DEMOLISH AND REMOVE ASSOCIATED EQUIPMENT INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REGISTERS, DIFFUSERS, TEMPERATURE SENSORS, PNEUMATIC TUBING, VALVES, FITTINGS, RELATED SENSORS, DAMPERS AND ANCHORS, ETC.
4. WHEN PIPING IS REMOVED, CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGED INSULATION. REPLACE INSULATION VOIDS WITH MATERIAL TO MATCH EXISTING THICKNESS AND TYPE. SEAL INSULATION JACKET AND INSULATE NEW PIPE CAPS.
5. CONTRACTORS SHALL FIELD VERIFY SIZE AND LOCATION OF ALL PIPING AND EQUIPMENT SHOWN ON DEMOLITION PLANS. SIZES AND LOCATIONS OF EQUIPMENT AND PIPING SHOWN PER ORIGINAL PLANS.
6. IF HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT PROCEED, BUT NOTIFY WITH SPECIFICATIONS, FEDERAL, STATE AND LOCAL CODES.
7. CONTRACTOR SHALL GROUT ALL FLOOR OPENINGS THAT ARE NOT TO BE REUSED.
8. WHEN TEMPERATURE SENSORS ARE REMOVED, REMOVE RELATED AIR LINES/WIRING SOURCE & CAP/CRIMP. PROVIDE COVER PLATE WHERE NEW SENSOR LOCATION IS OTHER THAN SHOWN ON PLAN. COORDINATE WITH NEW WORK DRAWINGS. FIELD-VERIFY ALL LOCATIONS.
9. TERMINATE HEATING TERMINAL UNIT PIPING REMOVED UNDER THIS PROJECT WITH BALL VALVES AND CAPS AT FLOWING MAIN. (TYPICAL)

NOTE: ALL DEMOLITION WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

DUCT ROUTE

ROUTE ALL BRANCH SUPPLY & RETURN AIR DUCTWORK SERVING CLASSROOMS, CORRIDORS & OTHER SPACES IN JOIST SPACE & THRU JOIST WEBBING. (TYP)



NOTE: HALF-TONED NEW WORK IS BASE BID. REFER TO M4.1. (TYPICAL)

2/M11.2 FIRST FLOOR PLAN
(ALTERNATE) HYDRONIC

1/8" = 1'-0" NORTH

GENERAL NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. COORDINATE ROOF DRAINS AND RAIN WATER LEADERS WITH DUCTWORK LOCATIONS.
3. VERIFY EXACT WALL LOCATIONS WITH ARCHITECTURAL PLANS.
4. ALL WORK SHALL MEET STATE AND LOCAL CODES.
5. MAXIMUM FLEXIBLE DUCT LENGTHS SHALL BE NO GREATER THAN FIVE FEET (5'-0"). SEE DETAILS.
6. REFER TO REFLECTED CEILING PLANS FOR EXACT REGISTER, GRILLE AND DIFFUSER LOCATIONS.
7. THIS CONTRACTOR (SUB-CONTRACTOR) SHALL COORDINATE INSTALLATION OF THEIR WORK WITH OTHER CONTRACTORS AND RESOLVE ALL DISPUTES PRIOR TO INSTALLATION.
8. IN GENERAL – DUCTWORK SHALL RUN TIGHT TO OR BETWEEN STRUCTURE UNLESS OTHERWISE SPECIFIED.
9. VENTILATION CONTRACTOR SHALL ASCERTAIN LOCATION OF ALL ELECTRICAL PANEL BOARDS AND SHALL KEEP ALL PIPING AND DUCTWORK OUT OF AREA ABOVE THE PANEL BOARDS AND FOR A DISTANCE OF 3'-6" IN FRONT OF AND 1'-6" FROM EACH SIDE OF PANEL BOARDS. THIS INCLUDES CONTROL PANELS FOR MECHANICAL EQUIPMENT.
10. PROVIDE TEST HOLES FOR ALL SUPPLY DUCTS NEAR AIR HANDLING UNITS.
11. (T) SEE SPECIFICATIONS FOR TEMPERATURE SENSOR TYPE.
12. (M) INDICATES MOTORIZED DAMPER. SEE SPECIFICATIONS FOR CONTROL.
13. WHERE 45 DEGREE BRANCH TAKE-OFFS CANNOT BE USED, PROVIDE 90 DEGREE CONICAL TAKE-OFFS.
14. DENOTES FIRE DAMPER.
15. RUNOUT DUCTS TO VAV BOXES SHALL BE SAME SIZE AS BOX INLETS. REFER TO VAV SCHEDULE IN SPECIFICATIONS FOR SIZES.
16. INSTALL MECHANICAL EQUIPMENT REQUIRING MAINTENANCE NO HIGHER THAN 3'-0" ABOVE FINISHED CEILING UNLESS OTHERWISE NOTED ON PLAN. THIS INCLUDES, BUT IS NOT LIMITED TO: VAV BOXES, FAN COILS, FAN-POWERED BOXES, REHEAT COILS & ETC.)

NOTE: ALL NEW WORK MUST PROCEED CONSECUTIVELY AND IN COORDINATION WITH CONSTRUCTION SCHEDULES.

SPECIFIC NOTE

(1) CONNECT PIPING TO VAV BOX. SEE DETAIL 4/M4.1

RUN-OUTS TO EQUIPMENT	
GPM	PIPE SIZE
0-3.5	3/4"
3.6-7.5	1"
7.6-14	1-1/4"
14.1-21	1-1/2"
21.1-45	2"

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HVAC Replacement and Deferred Maintenance - Phase 1

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SIGNATURE / SEAL

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

SIGNATURE

Blayne Parkos, PE
TYPED OR PRINTED NAME

December 2, 2021
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ALTERNATE HYDRONIC PLANS

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M11.2