BEAVERTON SCHOOL DISTRICT

Business Services
Procurement and Contracting
16550 SW Merlo Road
Beaverton, OR 97003
(503) 356-4324

July 7, 2020

SOLICITATION ADDENDUM NO. 2
ITB 19-0060
Barnes Elementary HVAC Replacement

THE FOLLOWING CHANGES/ADDITIONS TO THE ABOVE CITED SOLICITATION ARE ANNOUNCED:

This Addendum modifies the Invitation to Bid (ITB) document(s) only to the extent indicated herein. All other areas not changed or otherwise modified by this Addendum shall remain in full force and effect. This Addendum is hereby made an integral part of the ITB document. Bidder must be responsive to any requirements of this Addendum as if the requirements were set forth in the ITB. Failure to do so may result in Bid rejection. See the ITB regarding requests for clarification or change and protests of this Addendum, and the deadlines for the foregoing.

This addendum is to be acknowledged in the space provided on the Bidder Certification form supplied in the solicitation document. Failure to acknowledge receipt of this addendum may be cause to reject your offer.

The closing date **REMAINS UNCHANGED: July 14, 2020 at 2:00 PM Pacific Time**

CHANGES:

1) **The Attached Specification Revisions hereby amend Attachment J Specifications. These amendments superceded any amendments include in Addendum 1.**

2) **The Attached Drawing Revisions hereby amend Attachment K Drawings. These amendments supercede any amendments found in Addendum 1.**

CLARIFICATIONS:

Question: The two units on the roof that are being lifted, are they doing the condensers?

Answer: The Condensors are part of the unit.

Question: Is there any asbestos? Can you provide a report?

Answer: Per attached Testing Report, no asbestos was detected.

Question: Do we need CO2 for the unit ventilators?

Answer: Refer to the drawings and specifications.

Question: Is the UI continuous?

Answer: Yes

Question: Are all the Pneumatics gone?

Answer: Yes

Question: Are there controls in the scope?

Answer: Yes through any of our approved Johnson Controls contractors, Northwest Controls, Branch and Controls Contractors is Seattle who have a branch in Vancouver. These are listed in the Specs.

Question: The mandatory site walk is just for General Contractors?

Answer: Yes

Question: Are the pneumatics on the wall?

Answer: Yes, surface mount conduit.

Question: Do the controls need to be disconnected and reconnected for the two rooftop condensers?

Answer: This will need to be coordinated with the roof contractor during the project as the control connection/disconnection needs are undetermined at this time.

CONSTRUCTION DOCUMENT SET

BEAVERTON SCHOOL DISTRICT

MARCH 2020

MECHANICAL UPGRADE: BARNES ELEMENTARY SCHOOL

13730 SW WALKER RD. BEAVERTON, OREGON 97006

CONTACTS

OWNER

BEAVERTON SCHOOL DISTRICT
16550 SW MERLO ROAD
BEAVERTON, OREGON 97006
503.591.4575 FAX: 503.591.4469

MECHANICAL

SYSTEM DESIGN CONSUTANTS, INC
333 SE SECOND AVENUE, SUTIE 100
PORTLAND, OREGON 97214
503.248.0227 FAX: 503.248.0240
CONTACT: GARY BARNES

ELECTRICAL

SYSTEM DESIGN CONSUTANTS, INC
333 SE SECOND AVENUE, SUTIE 100
PORTLAND, OREGON 97214
503.248.0227 FAX: 503.248.0240
CONTACT: JEFFREY DAVIS

STANDARD SYMBOLS

NORTH ARROW

GRID BUBBLE & GRID LINE

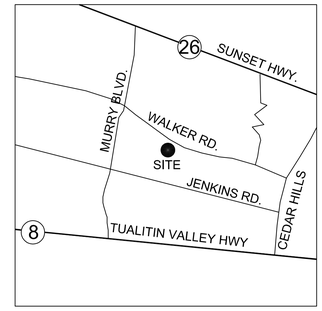
REVISION TAG

ROOM NAME
101
FLOOR PLAN ROOM LABEL & NUMBER

DRAWING INDEX

MECHANICAL SCHEDULES

ELECTRICAL SCHEDULES



1 M1.00 VICINITY MAP NTS

GENERAL NOTES

1. COORDINATE ALL WORK WITH THE DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE FROM DRAWINGS.
3. CONTRACTOR AND SUB-CONTRACTORS SHALL FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS, LOCATIONS, AND PROJECT REQUIREMENTS PRIOR TO SUBMITTING A BID.
4. CONTRACTOR AND SUB-CONTRACTORS SHALL FIELD VERIFY DIMENSIONS, AND FAMILIARIZE THEMSELVES WITH PROJECT REQUIREMENTS PRIOR TO COMMENCING WITH THE WORK. CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO ARCHITECT.
5. WORK SHALL INCLUDE ALL REQUIRED TRADE PERMITS, LABOR, MATERIALS, AND EQUIPMENT TO COMPLETE ALL WORK INDICATED ON DRAWINGS AND SPECIFICATIONS.
6. PROVIDE TEMPORARY DUST-PROOF PARTITIONS AS REQUIRED TO PROTECT ALL EXISTING AREAS AND EQUIPMENT FROM DAMAGE DUE TO DEMOLITION OR NEW CONSTRUCTION ACTIVITIES. COORDINATE LOCATIONS AND REQUIREMENTS WITH OWNER.
7. GENERAL CONTRACTOR TO PATCH, REPAIR AND PAINT (REFINISH) SURFACES AND BUILDING ELEMENTS DAMAGED BY MECHANICAL, ELECTRICAL, AND PLUMBING WORK AND WHERE ITEMS ARE REMOVED, RELOCATED OR ADDED.
8. REPAIR FLOORS WHERE DAMAGED BY THE WORK OF THIS PROJECT.
9. PATCH AND REPAIR ALL SURFACES TO MATCH EXISTING WHERE ITEMS ARE REMOVED OR ALTERED - FIELD VERIFY EXTENT REQUIRED.
10. CONTRACTOR IS RESPONSIBLE FOR FINAL CLEANUP OF WORK AREA AND ALL EXPOSED BUILDING SURFACES AT SUBSTANTIAL COMPLETION.
11. ALL TRASH AND TOOLS SHALL BE REMOVED FROM PREMISES EACH DAY AND THE AREA LEFT CLEAN WHENEVER UNATTENDED. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP. COORDINATE WITH OWNER IF SECURE STORAGE IS NEEDED ONSITE.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO FINISHED SURFACES, EQUIPMENT, FURNITURE, EXISTING MATERIALS OR FINISHES, CAUSED AS A RESULT OF HIS WORK. REPAIR OR REPLACE DAMAGED ITEMS AS DIRECTED BY BEAVERTON SCHOOL DISTRICT
13. ALL WORK SHALL BE DONE IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.
14. WORK SHALL BE DONE BY THOSE SKILLED AND EXPERIENCED IN THEIR RESPECTIVE TRADES. WORK SHALL BE OF THE HIGHEST QUALITY WORKMANSHIP.

DEFERRED SUBMITTAL

1. SEISMIC EQUIPMENT DETAILS AND CALCULATIONS BY MECHANICAL CONTRACTOR

BEAVERTON SCHOOL DISTRICT
2020 MECHANICAL UPGRADE BARNES ELEMENTRAY SCHOOL

SYSTEM DESIGN CONSULTANTS INC.
333 SE SECOND AVENUE, SUITE 100
PORTLAND, OREGON 97214
503.248.0227 FAX: 503.248.0240
CONTACT: GARY BARNES

BEAVERTON SCHOOL DISTRICT
BARNES ELEMENTARY SCHOOL
13730 SW WALKER ROAD, BEAVERTON, OR 97006

KEYPLAN

Drawn:
Date: 05/15/2020
Check:

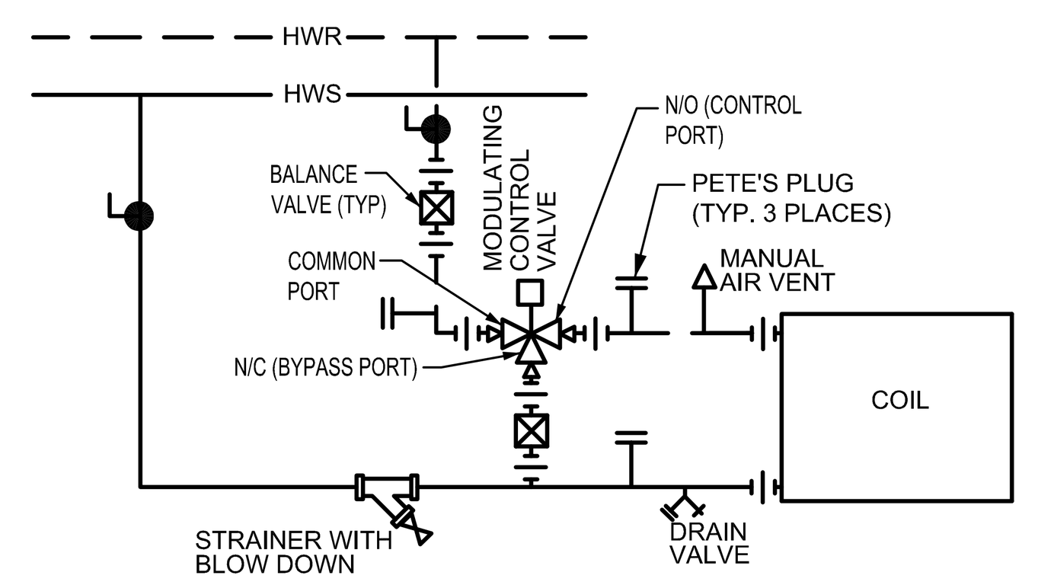
REVISIONS

NO.	DESCRIPTION	DATE

Sheet Title
COVER SHEET

REGISTERED PROFESSIONAL ENGINEER
83212PE
OREGON
FEBRUARY 05, 2019
CHRISTOPHER JOEL CHURCHILL
EXPIRES 12/31/21

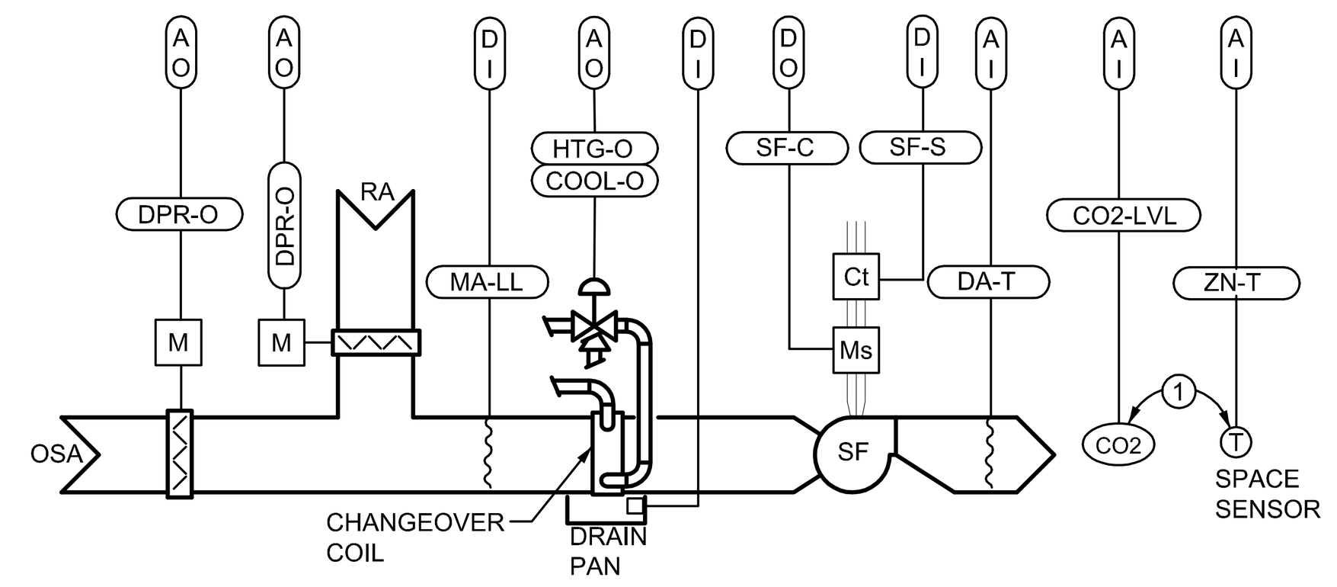
M0.00
Job No: BSD1901



NOTE - THIS SCHEMATIC IS DIAGRAMMATIC - COORDINATE THE VALVE PORT NOMENCLATURE ON THE VALVES SUPPLIED TO THE PROJECT WITH THE MANUFACTURERS INSTALLATION INSTRUCTIONS AND THE REQUIREMENTS OF THIS SCHEMATIC DIAGRAM. INSTALL THE VALVE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS TO PERFORM THE CONTROL SEQUENCE REQUIRED BY THIS DIAGRAM AND THE SPECIFICATIONS

1 M1.00 3-WAY HEATING WATER VALVE PIPING SCHEMATIC

DIAGRAMMATIC



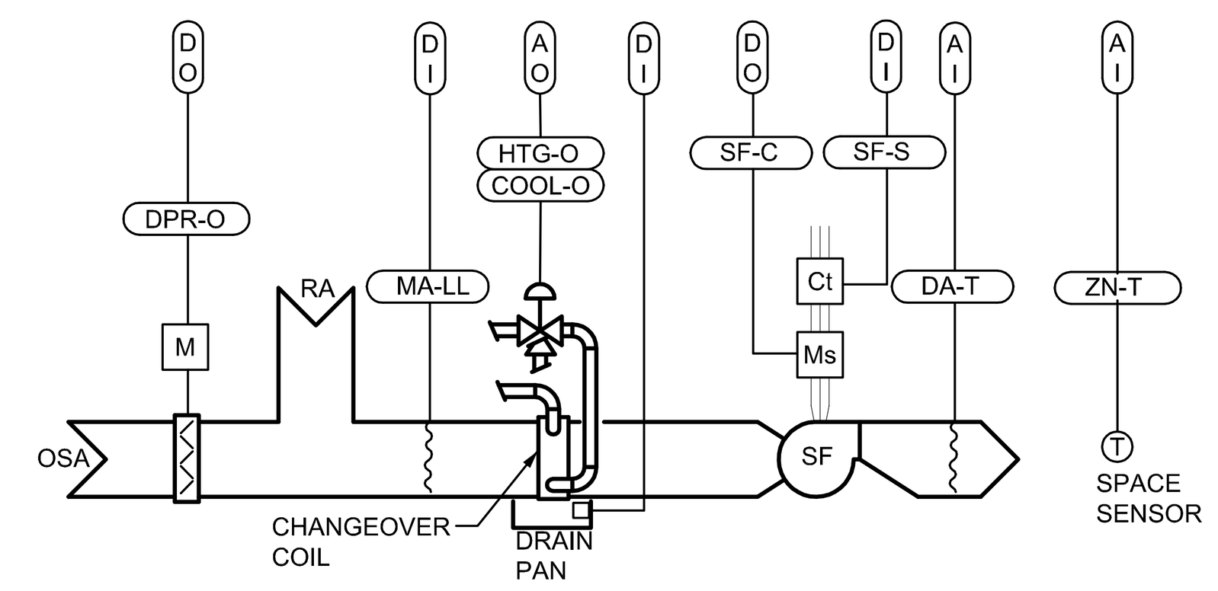
CONTROL FUNCTION	POINT
SPACE TEMPERATURE	AI
CO2 SENSOR	AI
DISCHARGE AIR TEMPERATURE	AI
SUPPLY FAN STATUS	DI
SUPPLY FAN STOP / START	DO

CONTROL FUNCTION	POINT
DRAIN PAN OVERFLOW SWITCH	AI
CHANGEOVER VALVE POSITION	AO
MIXED AIR TEMPERATURE (FREEZE)	AO
RETURN AIR DAMPER POSITION	DI
OUTSIDE AIR DAMPER POSITION	AO

(1) FUNCTIONS MAY BE COMBINED IN A SINGLE DEVICE

2 M1.00 UNIT VENTILATOR CONTROL SCHEMATIC

DIAGRAMMATIC

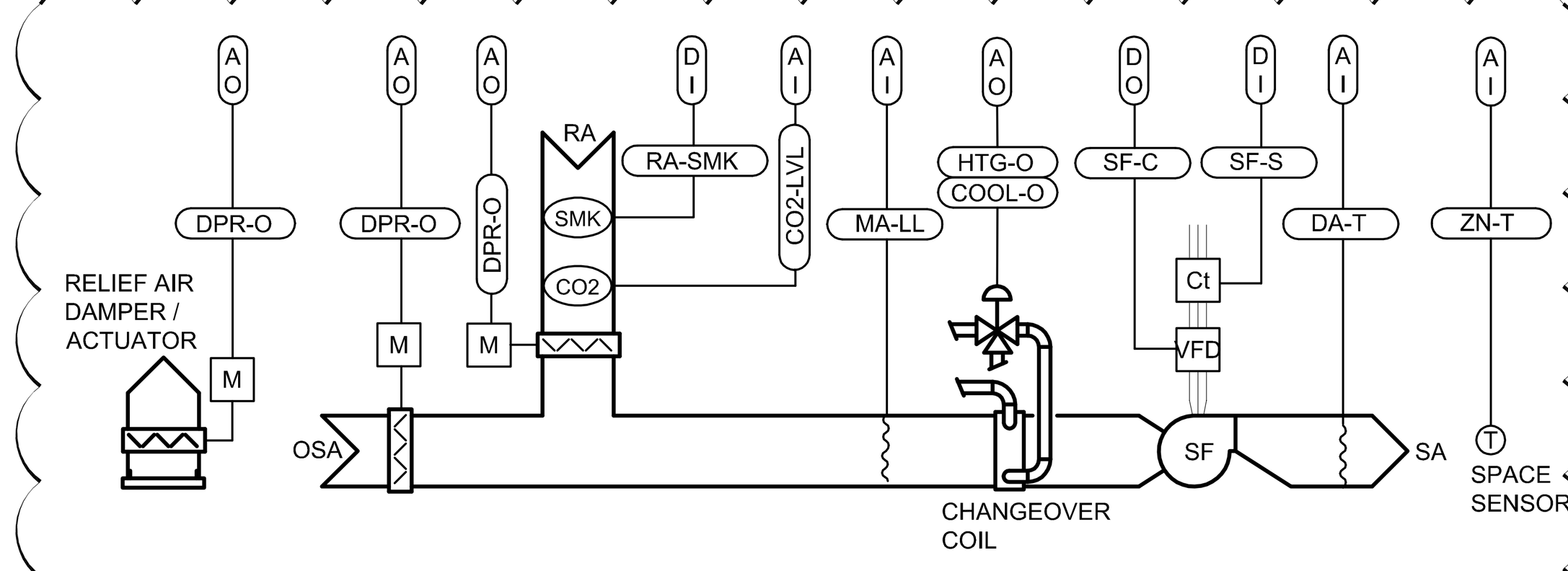


CONTROL FUNCTION	POINT
SPACE TEMPERATURE	AI
DISCHARGE AIR TEMPERATURE	AI
SUPPLY FAN STATUS	DI
SUPPLY FAN STOP / START	DO

CONTROL FUNCTION	POINT
DRAIN PAN OVERFLOW SWITCH	DI
CHANGEOVER VALVE POSITION	AO
MIXED AIR TEMPERATURE (FREEZE)	AI
OUTSIDE AIR DAMPER POSITION	DO

3 M1.00 FAN COIL CONTROL SCHEMATIC

DIAGRAMMATIC



CONTROL FUNCTION	POINT
SPACE TEMPERATURE	AI
DISCHARGE AIR TEMPERATURE	AI
SUPPLY FAN STATUS	DI
(1) SUPPLY FAN STOP / START	DO
CHANGEOVER VALVE POSITION	AO
MIXED AIR TEMPERATURE (FREEZE)	AI

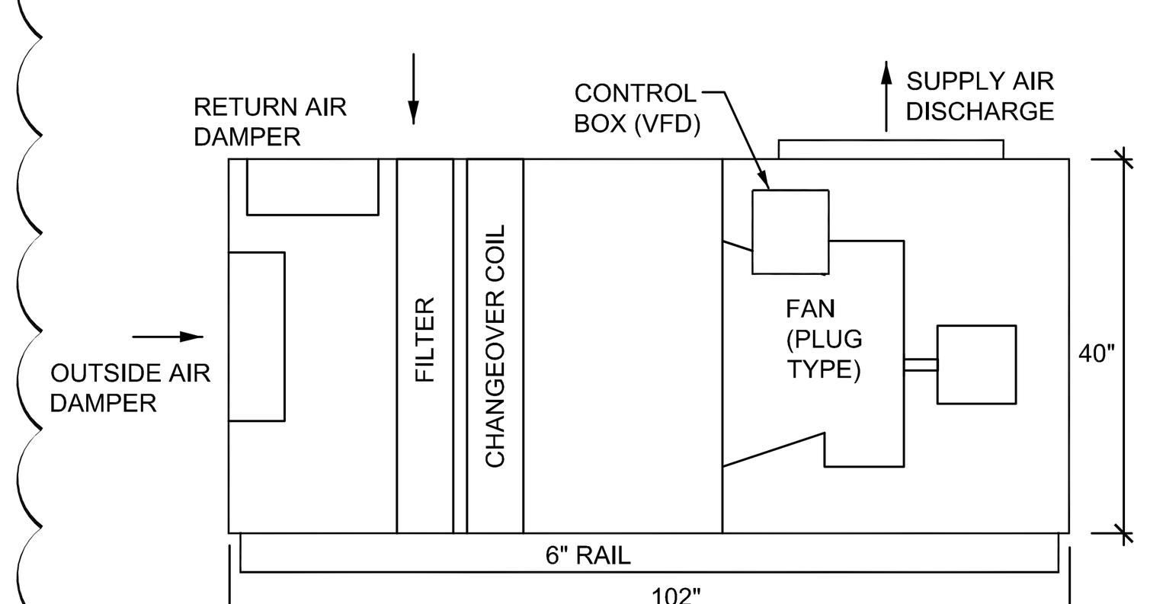
CONTROL FUNCTION	POINT
CO2 SENSOR	AI
SMOKE DETECTOR (ALARM)	DI
RETURN AIR DAMPER POSITION	AO
OUTSIDE AIR DAMPER POSITION	AO
RELIEF AIR DAMPER POSITION	AO

(SMK) HARD WIRE SMOKE DETECTOR TO SHUT DOWN UNIT

(1) VFD FOR MANUAL AIR VOLUME BALANCING

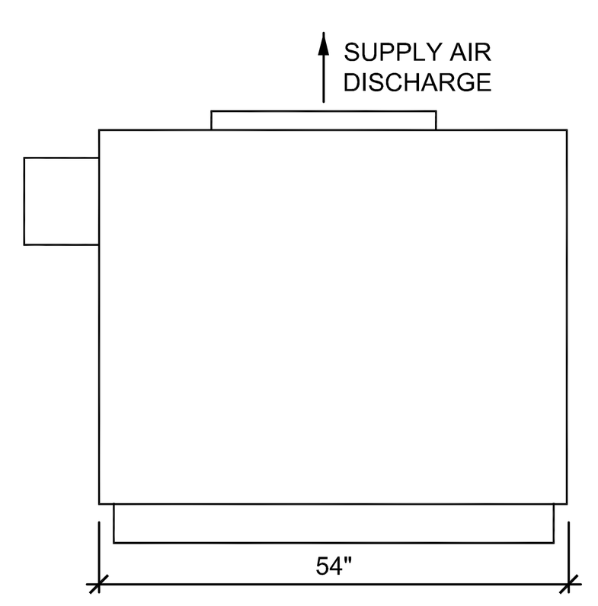
4 M1.00 AIR HANDLING UNIT CONTROL SCHEMATIC

DIAGRAMMATIC



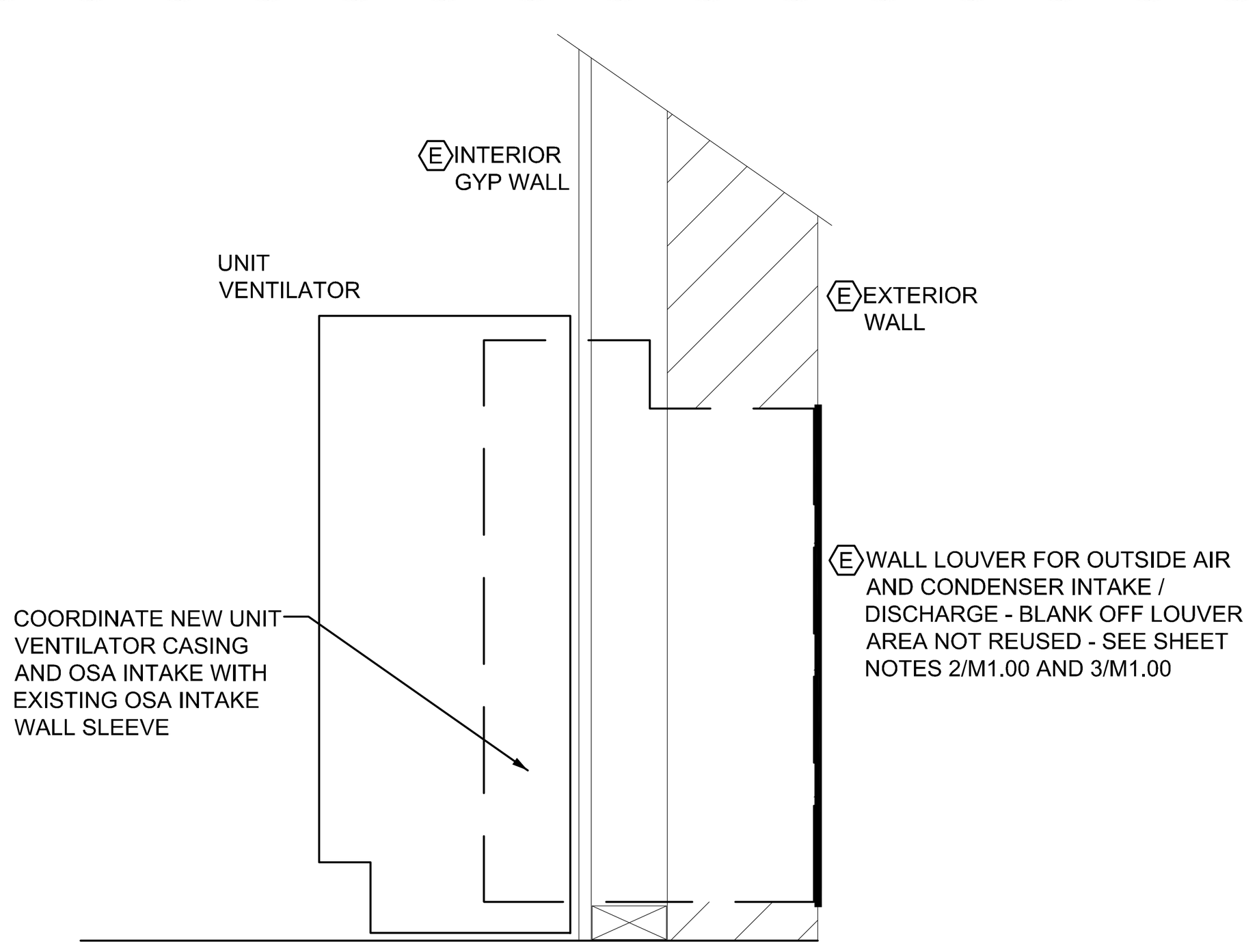
5 M1.00 AH-1 SCHEMATIC

DIAGRAMMATIC



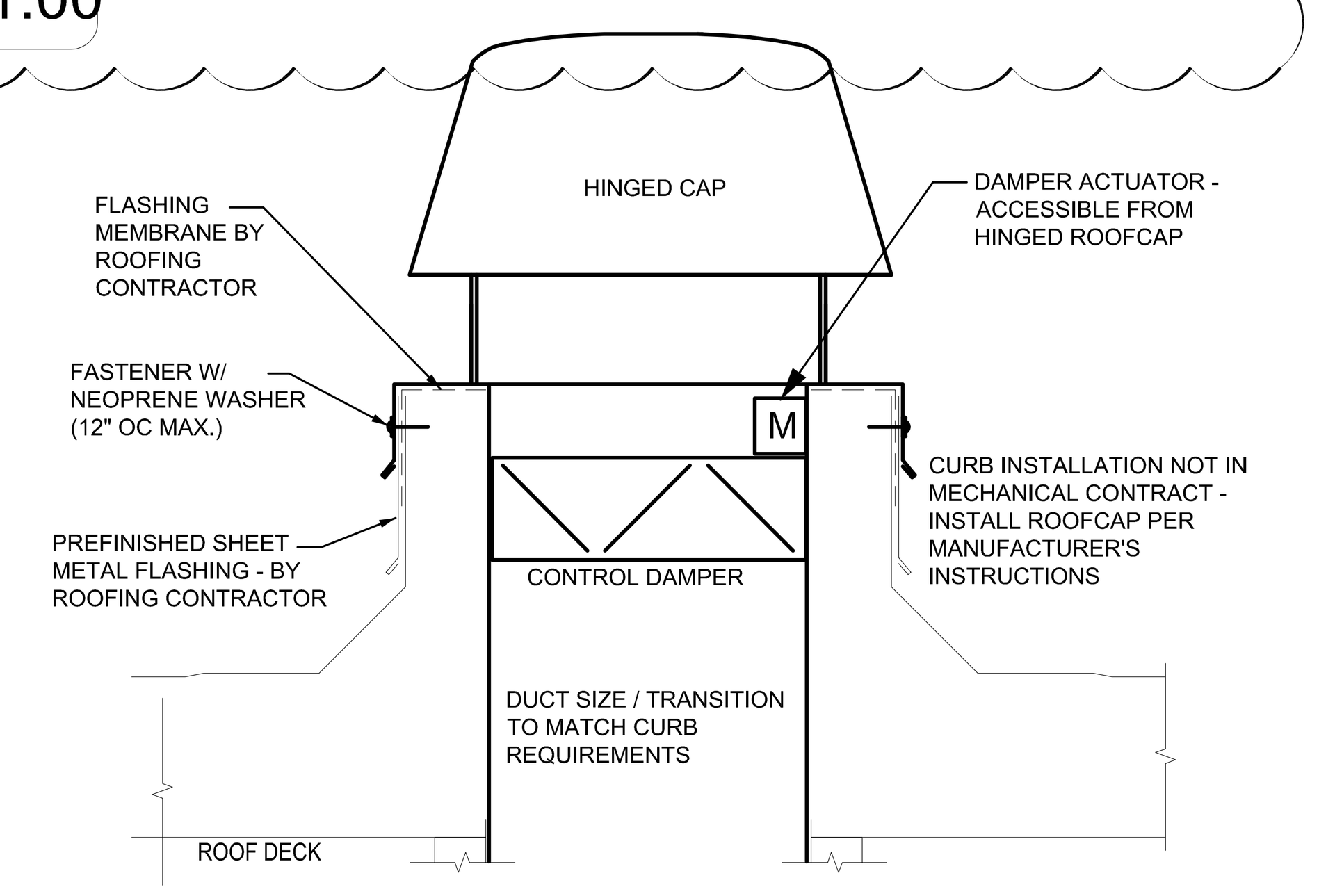
6 M1.00 NOT USED

DIAGRAMMATIC



7 M1.00 UNIT VENT DETAIL

DIAGRAMMATIC



THIS DETAIL DENOTES GENERAL FLASHING AND CURB CONFIGURATION. VERIFY THE EXACT REQUIREMENTS OF THE ROOFCAP FLASHING WITH THE ARCHITECTURAL DETAILS AND ROOFING SYSTEM

COORDINATE ROOFCAP INSTALLATION AND CURB CAP SIZE WITH ROOFING CONTRACTOR FLASHING MEMBRANE AND PREFINISHED SHEET METAL FLASHING

8 M1.00 ROOFCAP DETAIL

DIAGRAMMATIC

MECHANICAL EQUIPMENT SCHEDULE

SYMBOL	DESCRIPTION	AREA SERVED	CONTROL	ELECTRICAL
(1) UV-1 (1) UV-2 (1) UV-3 (1) UV-4 (1) UV-5	UNIT VENTILATOR, VERTICAL, FLOOR MOUNTED STYLE - 1,250 CFM SUPPLY AIR, 895 CFM RETURN AIR, 355 CFM OUTSIDE AIR, 98" LONG X 17" WIDE X 30" HIGH, CONNECTION TO EXISTING OUTSIDE AIR LOUVER SLEEVE, SINGLE CHANGEOVER HEATING / COOLING WATER COIL, DISCHARGE AIR GRILLE, MOTORIZED RA / OSA DAMPER, FILTER, END CAPS - VERIFY COIL CONNECTION LOCATION COOLING: 32 MBH SENSIBLE / 42 MBH TOTAL, 42 °F ENTERING WATER TEMPERATURE, 7 GPM HEATING: 60 MBH, 180 °F ENTERING WATER TEMPERATURE, 3 GPM 5-FT MAX. COIL WATER PRESSURE DROP, 3-WAY VALVE - SEE DETAIL 1/M1.00 BASIS OF DESIGN: DAIKIN MODEL UAVV9H15 OPERATING WEIGHT: 575 LBS	LIBRARY CLASSROOMS (TYP)	DDC	6.3 MCA 15 MOCP 120 V, 1 PH
(1) AH-1	AIR HANDLING UNIT - HORIZONTAL STYLE, VERTICAL DISCHARGE, 3000 CFM AT 1.5-INCHES EXTERNAL STATIC PRESSURE, 2280 CFM RETURN AIR, 720 CFM OSA, SUPPLY FAN, MERV 8 FILTER SECTION W/ GAUGE, RETURN AIR / OUTSIDE AIR MIXING BOX FOR ECONOMIZER, VFD (BALANCE), SPRING ISOLATION - SEE 5/M1.00 FOR SCHEMATIC DIAGRAM COIL (WATER): 112 MBH TOTAL / 93 MBH SENSIBLE AT 80 °F DB / 64 °F WB ENTERING, 51.6 °F DB / 51.1 °F WB LEAVING AIR TEMPERATURE, 42 °F ENTERING / 56 °F LEAVING WATER TEMPERATURE, 16 GPM, 1-1/2" PIPING RUNOUTS BASIS OF DESIGN: DAIKIN CAH009GDGM OPERATING WEIGHT: 1550 LBS	LIBRARY, HALLWAY	DDC	1.5 HP 240 V, 3 PH
(1) FC-1 (1) FC-2	FAN COIL, VERTICAL, FLOOR MOUNTED STYLE - 400 CFM SUPPLY AIR, 375 CFM RETURN AIR, 25 CFM OUTSIDE AIR, 46" LONG X 10" WIDE X 25" HIGH, CONNECTION TO EXISTING OUTSIDE AIR LOUVER SLEEVE, SINGLE CHANGEOVER HEATING / COOLING WATER COIL, DISCHARGE AIR GRILLE, FILTER, DRAIN PAN, END CAPS - VERIFY COIL CONNECTION LOCATION COOLING: 13 MBH SENSIBLE / 15 MBH TOTAL, 42 °F ENTERING WATER TEMPERATURE, 3 GPM HEATING: 20 MBH, 180 °F ENTERING WATER TEMPERATURE, 1.5 GPM 5-FT MAX. COIL WATER PRESSURE DROP, 3-WAY VALVE - SEE DETAIL 1/M1.00 BASIS OF DESIGN: DAIKIN MODEL FCVC104 OPERATING WEIGHT: 125 LBS	OFFICES	DDC	15 MOCP 120 V, 1 PH
 (1) WF-1 (1) HP-1	SPLIT SYSTEM AIR CONDITIONING WALL MOUNT FAN COIL UNIT - 300 CFM AIR DELIVERY THROUGH INTEGRAL DIFFUSER, DX REFRIGERANT COIL TO MATCH RESPECTIVE CONDENSING UNIT BASIS OF DESIGN: DAIKIN FTXO9NMVJU OPERATING WEIGHT = 20 LBS HEAT PUMP UNIT, AIR COOLED: 9 MBH TOTAL COOLING AT 95 °F ENTERING HEAT PUMP UNIT, 80 °F DB, 67 °F WB ENTERING INDOOR COIL, 6MBH TOTAL HEATING AT 17 °F ENTERING HEAT PUMP UNIT, 300 CFM EVAPORATOR AIRFLOW, R-410A REFRIGERANT EFFICIENCY: 19 SEER, 9 HSPF BASIS OF DESIGN: DAIKIN RX09NMVJU OPERATING WEIGHT = 60 LBS NOTE - FAN COIL IS ELECTRICALLY CONNECTED THROUGH THE CONDENSING UNIT - COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR PROPER WIRING - VERIFY WITH MANUFACTURER	STORAGE	PACKAGE	 21 WATTS 12.1 MCA 15 FUSE/BRKR 208 V, 1 PH

(1) OWNER FURNISHED - CONTRACTOR INSTALLED

STANDARD CASE: ASHRAE 62.1-2019-2016 MECHANICAL STATE ENERGY CODE													DESIGN CASE FOR		
OCCUPANCY CATEGORY	OCCUPANCY CATEGORY	ZONE POP	AREA SQ. FT.	PEOPLE OUTDOOR AIR RATE CFM/PERSON	AREA OUTDOOR AIR RATE CFM/SQ. FT.	OCCUPANT DENSITY #/1000 SQFT	BREATHING ZONE OSA FLOW RATE (Pz*Rp+Az*Ra)	ZONE AIR DISTR EFFECTIVENESS	ZONE OUTDOOR AIR ZONE Voz (CFM)	TABLE 6-3 SYSTEM VENT EFFICIENCY	MINIMUM OUTDOOR AIR INTAKE FLOW (CFM)	ZONE PRIMARY AIRFLOW	SYSTEM OSA CFM SUPPLIED	**EXHAUST RATE CFM**	
		(Pz)	(Az)	(Rp)	(Ra)	-	Vbz (CFM)	(Ez)	Vbz/Ez	Ev	Vot= Vbz/Ez	Vpz/(CFM)			
CLASSROOM	CLASSROOM	27	750	5	0.12	35	225	0.8	281	0.8	352	1000	355		
UV-1			**750**						**281**		**352**	**1000**	**355**	**0**	
CLASSROOM	CLASSROOM	27	750	5	0.12	35	225	0.8	281	0.8	352	1000	355		
UV-2			**750**						**281**		**352**	**1000**	**355**	**0**	
CLASSROOM	CLASSROOM	27	750	5	0.12	35	225	0.8	281	0.8	352	1000	355		
UV-3			**750**						**281**		**352**	**1000**	**355**	**0**	
CLASSROOM	CLASSROOM	27	750	5	0.12	35	225	0.8	281	0.8	352	1000	355		
UV-4			**750**						**281**		**352**	**1000**	**355**	**0**	
CLASSROOM	CLASSROOM	27	750	5	0.12	35	225	0.8	281	0.8	352	1000	355		
UV-5			**750**						**281**		**352**	**1000**	**355**	**0**	
LIBRARY	LIBRARY	27	2700	5	0.12	10	459	0.8	574	0.8	717	2000	720		
XX			**2700**						**574**		**717**	**2000**	**720**	**0**	

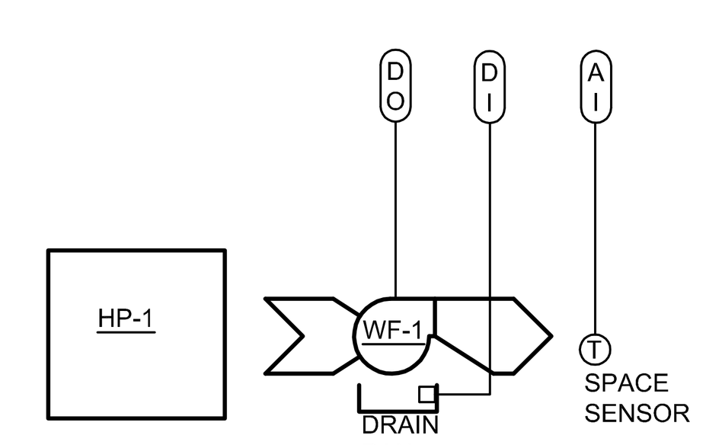
CONTROL SCHEMATIC LEGEND

GENERAL NOTE - PROVIDE ALL DEVICES AND POINTS REQUIRED IN ADDITION TO THOSE NOTED TO ACCOMPLISH THE SEQUENCE OF OPERATION NOTED IN THE SPECIFICATIONS

M	MOTORIZED DAMPER ACTUATOR	T	SENSOR / THERMOSTAT	SF	SUPPLY FAN
D/I	A / D - ANALOG / DIGITAL 1 / O - INPUT / OUTPUT	S	DDC TEMPERATURE SENSOR	RF	RETURN FAN
				EF	EXHAUST FAN
Ms	MOTOR STARTER		CONTROL VALVE	SMK	DUCT MOUNTED SMOKE DETECTOR
R	RELAY		MOTORIZED DAMPER	CO2	CARBON DIOXIDE SENSOR
Ct	CURRENT TRANSFORMER		TEMPERATURE SENSOR		

MECHANICAL SEISMIC DESIGN CRITERIA

BUILDING SYSTEM	OCCUPANCY CLASSIFICATION	SEISMIC DESIGN CATAGORY	COMPONENT IMPORTANCE FACTOR (Ip)
OTHER HVAC COMPONENTS	III	D	1.5



CONTROL FUNCTION	POINT
SPACE TEMPERATURE	AI
DRAIN PAN OVERFLOW SWITCH	DI
WALL FAN / HEAT PUMP ENABLE	DO

9 M1.00 SPLIT SYSTEM CONTROL SCHEMATIC

DIAGRAMMATIC

MECHANICAL LEGEND

HCS	HEATING / CHILLED WATER SUPPLY
HCR	HEATING / CHILLED WATER RETURN
C	COOLING CONDENSATE
	BALL VALVE
BAL	BALANCING FITTING (CIRCUIT SETTER)
	UNION
	CAP OR PLUG
DV	HOSE END DRAIN VALVE
	SUPPLY AIR RISER
	RETURN, EXHAUST AIR RISER
30° MAX.	TRANSITION
15° MAX.	TRANSITION
	SQUARE TO ROUND TRANSITION
T	WALL MOUNTED THERMOSTAT

RADIUS ELBOW (W, R, R=W)

GRILLE/DIFFUSER DESIGNATION (NECK SIZE, THROW PATTERN OR TYPE, 8x8-4W / 150, CFM)

MITER ELBOW (TURNING VANES)

BRANCH TAP (0.25W & 4"MIN, 45°, W)

VD — MANUAL VOLUME DAMPER

MOTORIZED DAMPER NOTE: ACTUATOR SYMBOL IS DIAGRAMMATIC ONLY - EXACT LOCATION OF ACTUATOR TO BE FIELD COORDINATED FOR PROPER SERVICE ACCESS

ABBREVIATIONS

8Ø	ROUND DUCT DIAMETER, INCHES	OSA	OUTSIDE AIR
12X8	RECTANGULAR DUCT SIZE, INCHES	PLEN	PLENUM
M	MOTORIZED DAMPER	RA	RETURN AIR
DN	DOWN	SA	SUPPLY AIR
EA	EXHAUST AIR	TYP	TYPICAL
N.C.	NORMALLY CLOSED	W.C.	WATER COLUMN
N.O.	NORMALLY OPEN	MAV	MANUAL AIR VENT
OBD	OPPOSED BLADE DAMPER		

SYMBOLS

(A)	ABANDON	(P)	CAP OR PLUG
(C)	CONNECT TO EXISTING	(X)	REMOVE EXISTING
(E)	EXISTING TO REMAIN		

EQUIPMENT CONTROL FUNCTIONS

EQUIPMENT	CONTROL FUNCTION	BSD SYMBOL	DI	DO	AI	AO	ALARM
UNIT VENTILATOR	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	CO2 SENSOR	CO2-LVL			X		
	HIGH CO2 LEVEL						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	DRAIN PAN OVERFLOW SWITCH		X				X
	HEAT / COOL VALVE POSITION	HTG-O COOL-O				X	
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	RETURN AIR DAMPER POSITION	DPR-O				X	
	OUTSIDE AIR DAMPER POSITION	DPR-0				X	
FAN COIL	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	DRAIN PAN OVERFLOW SWITCH		X				X
	HEAT / COOL VALVE POSITION	HTG-O COOL-O				X	
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	OUTSIDE AIR DAMPER POSITION	DPR-0		X			
AIR HANDLING UNIT	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	CHANGEOVER VALVE POSITION	HTG-O COOL-O				X	
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	CO2 SENSOR - LIBRARY ONLY	CO2-LVL			X		
	HIGH CO2 LEVEL						X
	SMOKE DETECTOR ALARM	RA-SMK	X				
	SMOKE DETECTOR ACTIVATED						X
	RETURN AIR DAMPER POSITION	DPR-O				X	
	OUTSIDE AIR DAMPER POSITION	DPR-O				X	
	RELIEF AIR POSITION	DPR-O				X	
SPLIT SYSTEM	SYSTEM STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DRAIN PAN OVERFLOW SWITCH		X				X

SYSTEM DESIGN CONSULTANTS INC.
333 SE SECOND AVE, SUITE 100
PORTLAND, OREGON 97214
503-248-0227 FAX 248-0240

BEAVERTON SCHOOL DISTRICT
BARNES ELEMENTARY SCHOOL
13730 SW WALKER ROAD, BEAVERTON, OR 97006

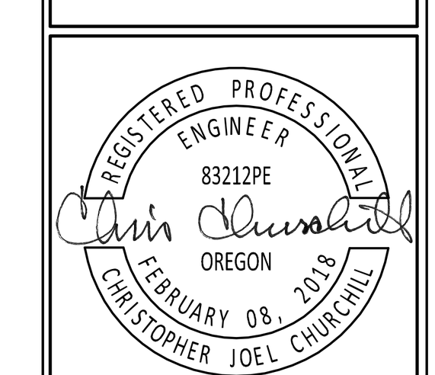
KEYPLAN

Drawn:	GCB
Date:	05/15/2020
Check:	CJC

REVISIONS

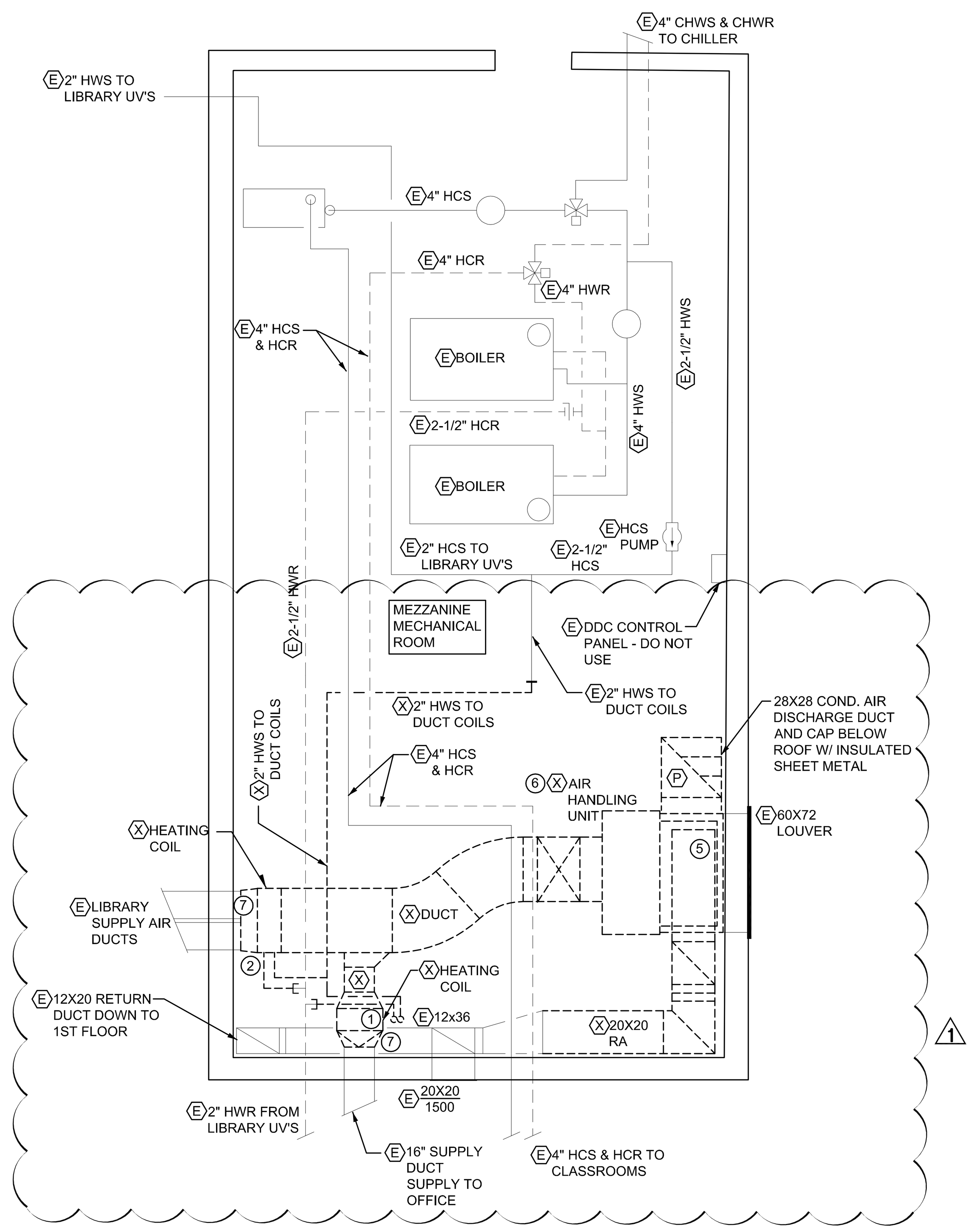
NO.	DESCRIPTION	DATE
1	ADDENDUM #1	07/02/20

Sheet Title
MECHANICAL SCHEDULES & DETAILS

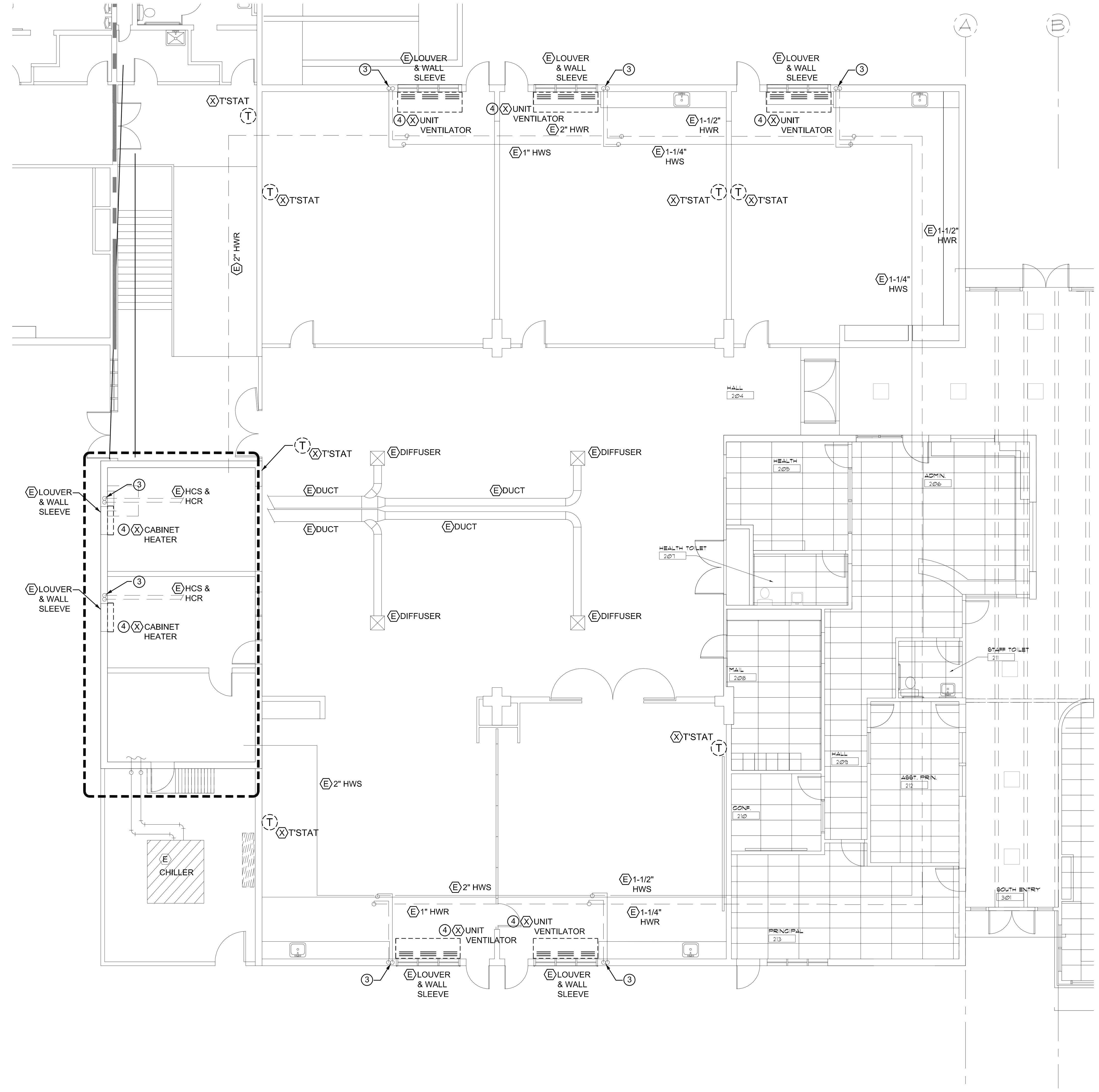


M1.00

Job No: BSD1901



2 MECHANICAL MEZZANINE DEMOLITION FLOOR PLAN
1/4" = 1'-0"



1 MAIN LEVEL - MECHANICAL DEMO FLOOR PLAN
1/8" = 1'-0"

SHEET NOTES

1. REMOVE EXISTING HOT WATER COIL, VALVES AND 3/4-INCH CONNECTION PIPING - REMOVE RUNOUT PIPING AND CAP AS NOTED
2. REMOVE EXISTING HOT WATER COIL, VALVES AND 1-INCH CONNECTION PIPING - REMOVE RUNOUT PIPING AND CAP AS NOTED
3. EXISTING RUNOUT SUPPLY AND RETURN PIPING - PROTECT WATER PIPING FOR CONNECTION OF NEW UNIT VENTILATOR / FAN COIL
4. REMOVE EXISTING UNIT VENTILATOR / FAN COIL - PROTECT WALL SLEEVE AND EXTERIOR LOUVER FOR USE WITH NEW UNIT VENTILATOR INSTALLATION
5. REMOVE OUTSIDE AIR DUCT, RETURN AIR DUCT AND CONDENSER INTAKE DUCT - PROTECT LOUVER AND SLEEVE FOR REUSE
6. EXISTING AIR HANDLING UNIT HAS INTEGRAL COMPRESSOR / CONDENSER / REFRIGERATION SYSTEM - BEAVERTON SCHOOL DISTRICT WILL EVACUATE THE REFRIGERANT - INCLUDE COST IN THE BID PRICE FOR VERIFICATION THAT REFRIGERANT IS REMOVED IN COMPLIANCE WITH CURRENT CODES AND DISPOSAL OF OIL AND REMAINING REFRIGERATION COMPONENTS FROM THE EQUIPMENT AND REMOVAL FROM SITE
7. REMOVE EXISTING COIL TRANSITION DUCTWORK AND PROTECT DOWNSTREAM DUCTWORK IN THE MECHANICAL ROOM FOR FUTURE CONNECTIONS

SYSTEM DESIGN CONSULTANTS INC.
333 SE SECOND AVE, SUITE 100
PORTLAND OREGON 97214
503-248-0227 FAX 248-0240
CONTACT: GARY BARNES

BEAVERTON SCHOOL DISTRICT
BARNES ELEMENTARY SCHOOL
13730 SW WALKER ROAD, BEAVERTON, OR 97006

KEYPLAN

N

Drawn: GCB
Date: 05/15/2020
Check: CJC

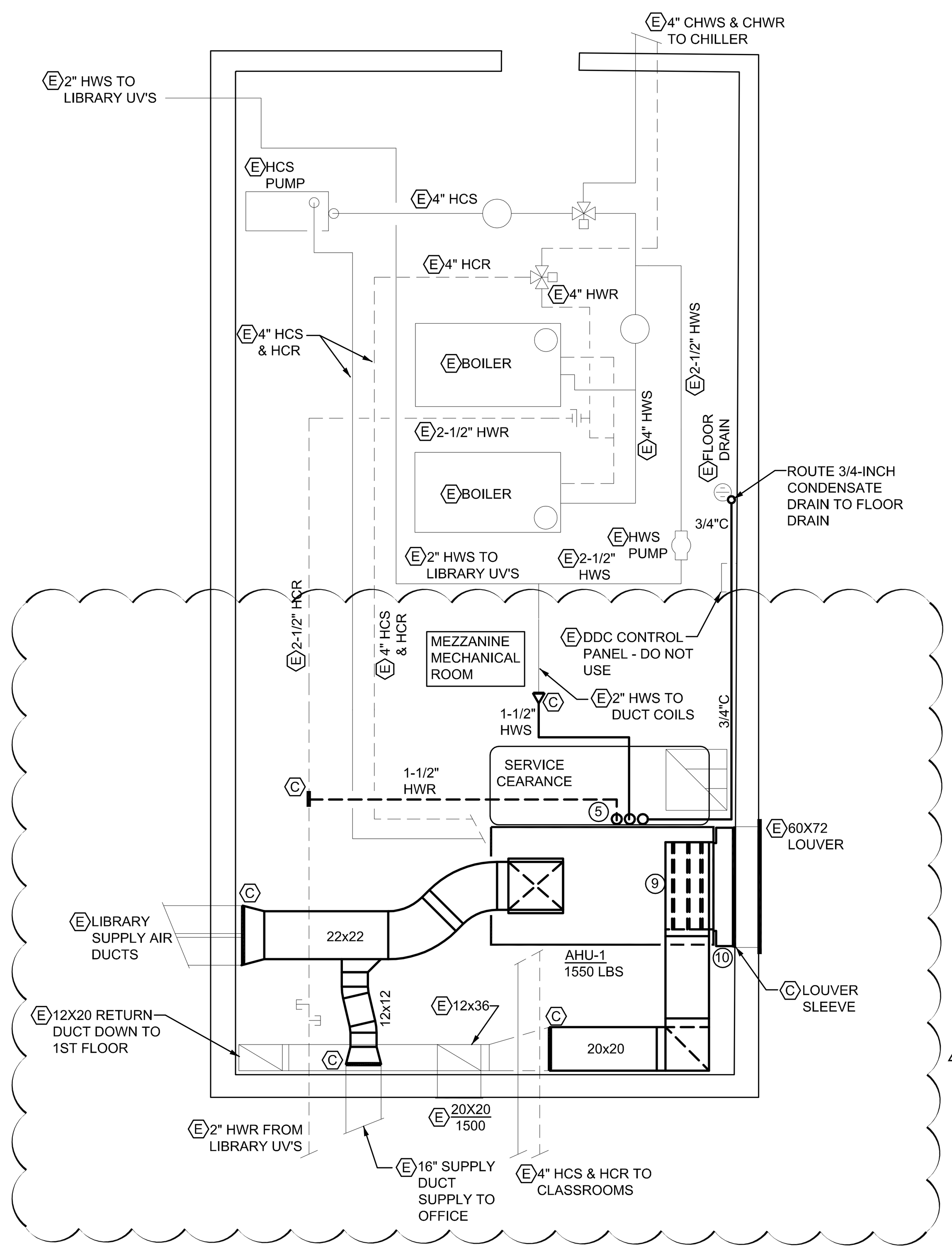
REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	07/02/20

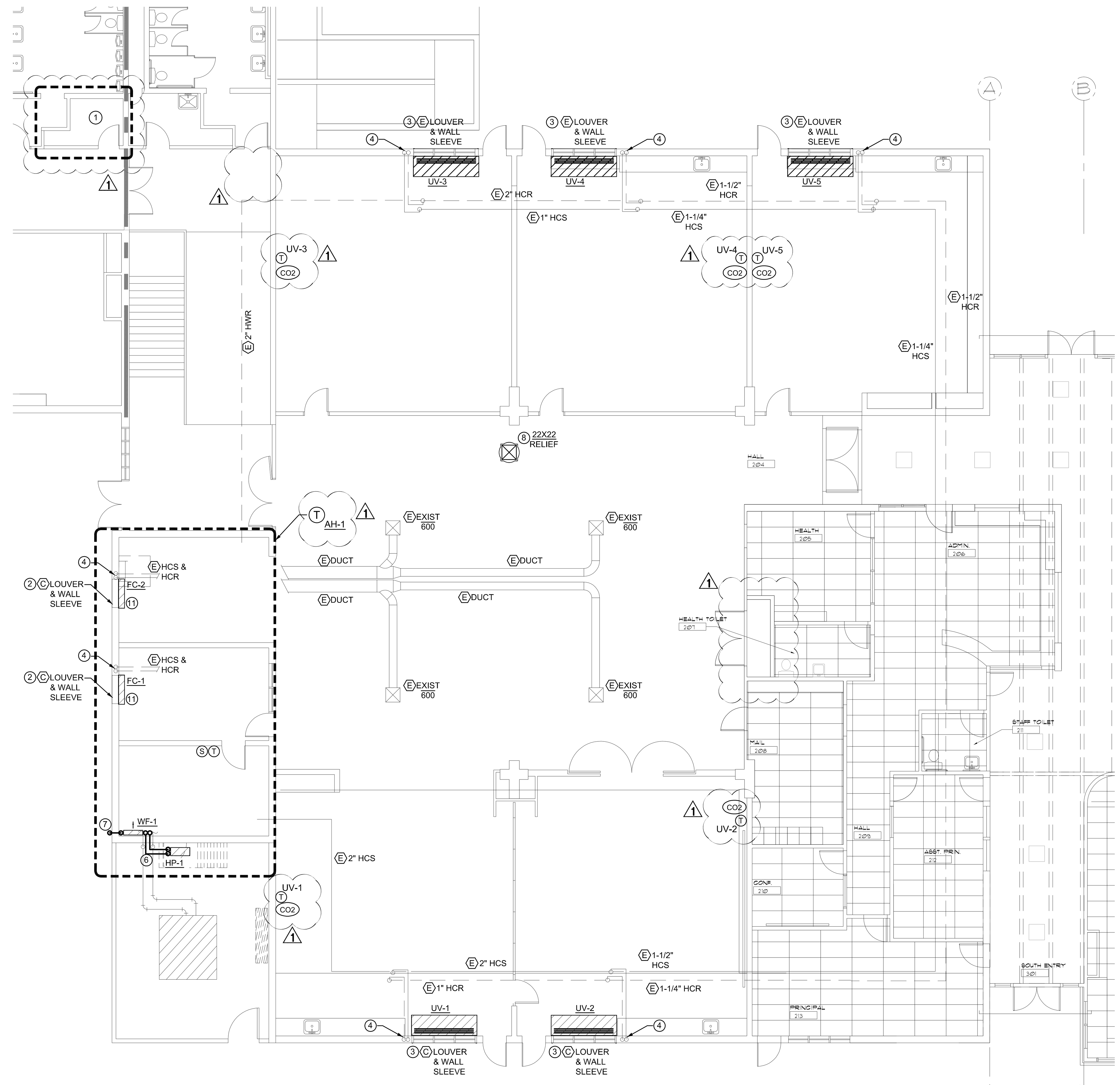
Sheet Title
MECHANICAL DEMO FLOOR PLANS

REGISTERED PROFESSIONAL ENGINEER
83212PE
OREGON
FEBRUARY 08, 2018
CHRISTOPHER JOEL CHURCHILL
EXPIRES 12/31/21

M1.10
Job No: BSD1901



2 MECHANICAL MEZZANINE NEW FLOOR PLAN
1/4" = 1'-0"



1 MAIN LEVEL - MECHANICAL NEW FLOOR PLAN
1/8" = 1'-0"

GENERAL NOTES

PIPING IS DIAGRAMMATIC - CONTRACTOR IS TO SITE VERIFY PRIOR TO SITE WORK.

SHEET NOTES

1. ESTABLISH COMMUNICATION TO THE NEW EQUIPMENT THROUGH BACNET IP PROTOCOL VIA THE EXISTING MSTP CONTROLLERS IN THIS AREA. DO NOT ESTABLISH COMMUNICATION THROUGH THE EXISTING N2 CONTROLLER(S) IN THE MEZZANINE MECHANICAL ROOM. BRING THE SYSTEM DDC POINTS INTO THE DISTRICT SERVER AND INTEGRATE THE SYSTEM GRAPHICS TO MATCH BEAVERTON SCHOOL DISTRICT (BSD) STANDARDS
2. SEE DETAIL 7/M1.00. BLANK OFF LOUVER AREA NOT USED FOR NEW OUTSIDE AIR INTAKE WITH SHEET METAL AND RIGID INSULATION (R21). PROVIDE A MOTORIZED DAMPER IN THE OUTSIDE AIR DUCT SLEEVE WITH ACCESSIBLE ACTUATOR
3. SEE DETAIL 7/M1.00. EXISTING LOUVER USED FOR OUTSIDE AIR AND INTEGRAL REFRIGERATION SYSTEM AIR DISCHARGE - BLANK OFF LOUVER AREA NOT USED FOR NEW OUTSIDE AIR INTAKE WITH SHEET METAL AND RIGID INSULATION (R21)
4. CONNECT NEW HCS AND HCR RUNOUT PIPING TO THE NEW UNIT VENTILATOR / FAN COIL - SEE DETAIL 1/M1.00
5. SEE DETAIL 1/M1.00 FOR DUCT COIL CONNECTION DETAIL - SEE AIR HANDLING UNIT SCHEDULE FOR RUNOUT PIPING SIZES
6. ROUTE REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS FROM HEAT PUMP TO FAN COIL
7. ROUTE 3/4-INCH CONDENSATE FROM WF-1 THROUGH WALL AND DOWN TO 12-INCHES ABOVE FINISHED GRADE
8. ROUTE 22X22 LINED RELIEF DUCT UP TO ROOFCAP WITH MOTORIZED DAMPER - INSTALL DAMPER / ACTUATOR IN ROOFCAP NECK ACCESSIBLE FROM ROOF THROUGH HINGED ROOFCAP . SEE DETAIL 8/M1.00
9. CONNECT RETURN DUCT TO RETURN AIR DAMPER ASSEMBLY
10. PR0VIDE A LINED PLENUM BOX FOR CONNECTION OF UNIT OUTSIDE AIR DAMPER TO EXISTING LOUVER SLEEVE
11. INSTALL FAN COIL UNITS TO ALLOW NEC CLEARANCE FOR ELECTRICAL BOX ACCESS

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KEYPLAN

N

Drawn:	GCB
Date:	05/15/2020
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REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM #1	07/02/20

Sheet Title

MECHANICAL NEW FLOOR PLANS

REGISTERED PROFESSIONAL ENGINEER
83212PE
OREGON
FEBRUARY 08, 2018
CHRISTOPHER JOEL CHURCHILL
EXPIRES 12/31/21

M1.11

Job No: BSD1901

Specification Revisions

TESTING, ADJUSTING AND BALANCING FOR HVAC (Addendum #1)

PART 1 - GENERAL

1.1 SUMMARY

A Work Included: Providing system balance work as specified.

1.2 OPERATION AND MAINTENANCE DATA

A. Provide O&M data in accordance with Section 23 00 00.

B. O&M data shall include copies of system balance data.

1.3 QUALITY ASSURANCE

A. Conduct the systems balance work in accordance with standard procedures and recognized practices outlined by ASH RAE and SMACNA. Record all actual equipment nameplate and operating data at the site. Test and balance to be performed by an independent air balance company certified by NEBB or AABC.

B. Contract with Pacific Coast Air Balancing, Neudorfer Engineers Inc., Accurate Balancing Agency Inc., Air Balancing Specialty Inc., Precision Test and Balance Inc., Northwest Engineering Service, Inc. or approved equal to perform the system balance work on this project.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 GENERAL

A. Install new air filters in the units before the start of testing and balancing.

B. Provide ladders, scaffolding, and access to each system for proper testing and balancing.

C. Confirm in writing that all wiring and controls for mechanical equipment have been installed, completed and tested.

D. Preparation: Prior to test run, Contractor shall have performed a rough balance and the following:
1. Verify correct rotation of all fans.
2. Check for excessive vibration and noise.
3. Verify filter installation in filter assembly.
4. Check proper calibration and settings of controls.
5. Confirm that ductwork has been sealed.

E. Air handling Unit ~~/ **Duct Coils**~~:
1. Assure that air filters are clean, if not new, prior to beginning air balance work.
2. Adjust the fan drive to obtain fan speed required for air volumes. Speed shall be set to the minimum to provide required air volume at furthest run without excessive static pressure.
3. Adjust minimum outside air volume to that shown on the plans.
4. Include the following in the logs:
   a. Supply, return and outside air volumes.
   b. Static pressure drops across the air handling unit.
   c. Total pressure drops for supply and return system.

d. Fan speed or RPM.
e. Actual motor voltage, amperage, RPM and overload heater sizes.

F. Air Distribution System:
1. Adjust air volumes at diffusers and grilles to within plus or minus 5% of the values shown on the plans.
2. Adjust diffusers and grilles for proper direction and throw.
3. Log all readings taken.
4. Mark final position of all balancing dampers.

G. Hydronic Systems (**Air Handling Unit**, ~~**Duct Coils,**~~ Unit Ventilators, Fan Coils): Adjust circuit setters / balancing valves to obtain flows noted on drawings and note the flows and pressure drops in the balancing log.

H Controls and Sequence Commissioning
1. Cycle the air handling unit,~~ **duct coils,**~~ unit ventilators and fan coil units control systems through the entire range of functions and verify proper operation and sequencing of heating, cooling, thermostat operation, etc.
2. Coordinate with the DDC controls contractor for scheduling and system operation support.
3. Provide the following as a separate portion of the test and balance log:
a. Type and characteristics of the individual controls serving each unique system in the building.
b. Written verification that the equipment controls and sequencing appears to be correct and functioning properly at the time of performance of the system test and balance work.

END OF SECTION

INSTRUMENTATION AND CONTROL FOR HVAC (Addendum #1)

PART 1 - GENERAL

1.1 SCOPE DESCRIPTION

A. Furnishing and installing all control hardware and software necessary for a complete DDC control system revision as specified.

B. Furnish all modules, temperature sensors, flow sensors, control valves, control valve actuators, damper actuators and any other items necessary for a complete system and sequence of control

C. Final installation will allow all school control components to be monitored / controlled at a single point by district personnel through the existing district interface.
   1. Final graphics for the completed project must be consistent with the graphics for the areas of the school not in the project scope.
   2. Final user interface spaces tree for the completed project must be consistent with the areas of the school not in the project scope.
   3. Final control graphics and user interface spaces tree for the project areas and school areas not in scope should be identical in construction and appearance. Navigation of the control system throughout the entire school by school district personnel should be seamless with no distinction between the new project areas and the school areas outside the project scope.

D. Coordinate the installation of temperature sensors, dampers and actuators with the mechanical contractor to assure all work required for a complete system is included in the base bid.

E. Establish communication to the new equipment through BACnet IP protocol via the existing MSTP controllers in the **janitor / storage ~~classroom~~** area as noted on the drawing. Do not establish communication through the existing N2 controller(s) in the boiler room. Bring the system DDC points into the district server and integrate the system graphics to match Beaverton School District (BSD) standards.

F. Commissioning Support.
   1. Furnish a time allowance for a controls technician familiar with the system operations to operate the DDC controls while the air balance contractor visually observes the system components are functioning / sequencing as appropriate.
   2. Coordinate scheduling with the air balance contractor to perform the controls commissioning.

1.2 QUALITY ASSURANCE

A. Provide control work by a single company with licensed journeymen specialists in the type of work required, so that only one supplier is responsible for all control work for the project.

B. Provide coordination with other contractors and subcontractors for work required by other trades for control work accomplishment.

1.3 SUBMITTALS

A. In diagrams, show complete piping or ductwork system schematics with DDC, electrical and pneumatic control devices, tubing and wiring superimposed.

B. Completely identify all control devices with manufacturer's type, number, and functional description.

C. Show all electric and hydronic connections of the control system to equipment furnished by others, complete to terminal points specifically identified with manufacturer's terminal designation.

D. Provide a bill of material and catalog data on all control device types, including control operation description, technical parameters and connection identifications. Describe the complete sequence of operation containing all information necessary for clarity and understanding of device function and system sequence of operation.

E. Furnish a list of connected data points, including connected control unit and input device.

F. Include a spreadsheet for the user interface showing relationships between spaces and equipment. This should document the final room numbers and names used in the building. Equipment names should match tags on units in the field as installed and be consistent with the remaining areas of the building.

1.4 OPERATING AND MAINTENANCE DATA:

A. O&M Manuals in PDF format.

B. Include a complete set of control Shop Drawings indicating as built and operating changes.

C. Include operating and maintenance data on all equipment requiring periodic or incidental services or adjustment. Include a summary schedule for all maintenance tasks. Describe troubleshooting procedures for anticipated problems.

D. Controls Systems Commissioning:
1. Submit a complete, dated, and initialed record of all system adjustment for components of the control system.
2. Indicate deviations from the specified temperatures, pressures, flows, setpoints, etc.
3. Include a copy of the completed commissioning worksheets in each copy of the Operating and Maintenance Data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND SYSTEMS

A. Johnson controls by the local factory branch, Northwest Controls Company (NCC), or Automated Controls (Kirkland / Redmond, Washington).

2.2 CONTROL WIRING / COORDINATION WITH LINE VOLTAGE CONTROL

A. Provide control wiring to all control modules, sensors and actuators required to provide the project sequences of operation.

B. Provide control interface air handling units, unit ventilators and accessory equipment as required.

C. All control wiring exposed in occupied areas to be in conduit. Coordinate exposed control wiring in normally occupied spaces with the school district project manager

D. Provide all control system related conduit within mechanical room or at equipment locations unless specifically shown to be in other divisions work.

E. Control wiring in non-accessible ceilings, walls or floors shall be in conduit.

F. All wiring not in conduit or control cabinets shall be rated for plenum installation.

G. Provide conduit where required between the zone temperature sensor locations and the zone equipment. Provide all wiring / conduit in the base bid necessary for a complete operating control system.

2.3 AUTOMATION SYSTEM / DDC CONTROL DEVICES

A. All control devices to be standard products of the specified control system and accessory devices utilized by the controls installer consistent with Beaverton School District standards.

B. Zone sensors:
1. Include set point adjustments subject to a programmable range.
2. Sensors to also include a timed local override to allow the occupant to override the schedule for an adjustable period of time (programmable from the global school control). At the expiration of the time , control of the unit will automatically return to the default schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Single source responsibility of supplier shall be the complete installation and proper operation of the building automation system and control system and shall include debugging and proper calibration of each component in the entire system.

B. Provide all controllers to accomplish the control sequences specified herein.

C. Provide / coordinate the installation of; sensors, pipe wells, relays and any other devices and materials required to accomplish the functions described herein.

D. Establish communication to the new equipment through BACnet IP protocol via the existing MSTP controllers in the classroom area as noted on the drawing. Do not establish communication through the existing N2 controller(s) in the boiler room. Bring the system DDC points into the district server and integrate the system graphics to match Beaverton School District (BSD) standards.

E. Furnish all software, device installation, programming, technical assistance to the school district and product licenses required for complete operating control systems throughout the entire facility.

F. All control identification points and HVAC systems graphics to conform to Beaverton School district naming standards – Verify with BSD project manager prior to initiation of programming and graphics development.

G. Provide all temperature sensors, flow sensors, humidity sensors, IAQ sensors, control valves, control valve actuators, dampers, damper actuators, programming and other items necessary for a complete system and sequence of control for new equipment as identified in the contract drawings.

H. All new equipment to have points as noted on Contract Drawing M1.00.

I. Program all control diagrams and sequences of operation into the system graphics to allow visual review of diagrams / sequence when viewing system programming.

J. Furnishing and installing all control hardware and software necessary for a complete DDC control system as specified.

K. Final installation will allow all school control components to be monitored / controlled at a single point by district personnel through a single user interface.

L. Coordinate the installation of automatic control valves, dry wells for fluid temperature sensors, dampers and actuators with the mechanical contractor to assure all work required for a complete system is included in the base bid.

M. The Controls Contractor shall be responsible for field verification of site conditions and for gathering all necessary field data for all items to be provided under this contract prior to submitting his or her bid.

N. Where work specified under other Sections of this Specification connects to equipment or systems that are listed and described in this Section, the Controls Contractor shall coordinate with other trades to provide proper connection(s) to such equipment.

O. Identification - Provide nameplates identifying all switches, lights and starters, and each control device where the control function is not readily apparent.

3.2 SEQUENCES OF OPERATION

A. Energy Management System Point Schedule: Provide monitoring and control functions as listed herein for each piece of equipment listed below. Provide a point list that includes each hard wired, calculated and/or resettable point. **Minimum control points and alarms are listed on Drawing Sheet M1.00 and in Specification Section 23 09 00, Paragraph 3.7. Additional points are to be included as required to perform the sequence of operation noted herein.**

B. Distributed Control – The control system shall observe the concept of distributed control. Modules shall be located at each operating equipment location such that individual systems or zones shall remain functional without communication to other systems on the network.

C. All general control points noted, software PID algorithms and setpoints to be per Beaverton School District standards. Sequences noted below should be generally followed – If conflicts arise between the sequences below and Beaverton School District standard operating sequences, notify the district project manager.

D. Setpoints and values noted below are to be capable of user adjustment within generally accepted industry value ranges.

E. Energy Compliance:
1. Provide 365 day, 24 hour occupancy scheduling.
2. When controlling both heating and cooling (mechanical), provide a 5-degree deadband in which the heating energy provided to the zone is reduced to a minimum.
3. Provide optimum start controls to enable a morning warm-up cycle capable of varying the unit start time to meet occupied setpoint at scheduled time of occupancy.
4. Close outside air dampers as appropriate to the equipment when the units are off and during the warm-up period.

F. Air Handling Unit ~~/ **Duct Coils**~~.
1. System to have independent schedule capability from global, group or local schedule.
2. Unoccupied Mode:
   a. Fans off, ~~**duct**~~ coil hydronic valve~~**s**~~ closed, outside air and return air dampers indexed to full recirculation.
   b. Relief damper closed.
   c. Unoccupied Low Limit: When the space temperature drops below the night low limit set point (district standard - adjustable), enable boiler / pump operation, start the air handling unit and open the ~~**duct**~~ coil valve~~**s**~~ to full heating. Heat to continue until the space is 5-degrees above night low limit set point.
   d. Subject to the boiler outside air lockout temperature (65). When the supply fan is operational in unoccupied low limit and there is a call for heating the boiler system will be enabled.

3. Warm-up Mode:
   a. At optimum warm up start period, start fan to run continuously. Index outside air and return air ~~**indexed**~~ to full recirculation. Relief damper remains closed. Open the ~~**duct**~~ coil valve to full heating.
   b. Based on the space temperature, the optimum start/stop function starts the air handling system in warm-up mode so that the space temperature will reach set point at the scheduled occupancy time.
   c. During warm-up the dampers will remain in full circulation and will cycle to appropriate ventilation mode control at occupancy time regardless of average zone temperature.

4. Occupied Mode:
   a. The occupied sequence of operations for the units shall consist of four separate control modes: heating, economizer cooling, chilled water cooling and ventilation.
   b. The Fan runs continuously.
   c. Heating Mode (Heating Hot Water):
      1) On a call for heat, mixed air shall modulate to the minimum position allowed by outside air setting and CO2 level.
      2) If heating water is available the ~~**duct**~~ coil valve~~**s**~~ shall modulate open until the heating setpoint is attained.
   d. Cooling Mode (Economizer cycle):
      1) Actuators shall operate outside air and return dampers in accordance with system operating status, supply air, zone air temperatures, and outside air temperatures.
      2) Modulate between minimum outside air position and 100% open to meet the cooling requirements.
      3) Coil valve is closed. ~~**Duct coil valves are closed.**~~
   e. Cooling Mode (Chilled Water):
      1) On a continued call for cooling, mixed air shall modulate to the minimum position allowed by outside air setting and CO2 level.
      2) If chilled water is available, the ~~**duct**~~ coil valve~~**s**~~ shall modulate open until the cooling setpoint is attained.
5. Demand Control Ventilation Mode: The mixed air control shall modulate to control the following in the priority listed:
   a. Mixed air low limit set point (45 deg F)
   b. CO2 high limit set point: Reset the outside air according to the following adjustable setpoints -
      1) 800-ppm CO2 and below - OSA at 5% maximum supply air volume.
      2) 1200-ppm CO2 maximum - OSA at 50% maximum supply air volume.
   c. The mixed air set point shall be reset from (55) deg F at (70) deg F outside air to (65) deg F at (50) deg F based on an outside air temperature reset. If the outside air temperature is above the return air temperature the mixed air should be at minimum position as allowed by the minimum outside air setting and CO2 level.
6. Night Purge Mode.
   a. Cooling setpoint 69-degrees F (adjustable).
   b. If a night purge mode is broadcast to the system and the following conditions are present-
      1) Zone is 5 hours (adjustable) prior to occupancy.
      2) Zone is 1-degree F over night purge setpoint.
      3) Outside air temperature is above 45 degrees F and more than 10 degrees F below the zone temperature.

      The fan will start and the outside air damper will index to full open / return air damper will close and the relief damper will open.

c. Control valves will remain closed.
d. Purge mode will end one hour prior to occupancy.

7. Alarms:
   a. Individual alarms generated will be setup for the following actions. Each alarm is unique and will have the following options per the district representative.
      1) Alarm popup at district DDC central station.
      2) Send email – Request list of emails from the district representative.
      3) Send text – Request list of telephone numbers from the district representative.
   b. Alarms are set with district standard messages – Custom messages may be sent without program change or memory download.
   c. System alarms.
      1) Air handling unit run status fault.
      2) High zone CO2 level – Library only.
      3) Smoke detector activation.
      4) High space temperature ~~**(2 zones)**~~.
      5) Low space temperature ~~**(2 zones)**~~.
      6) Mixed air low limit - Freeze.
         a) In addition to the alarms generated above – The air handling unit will stop and the outside air and return air dampers shall index to full recirculation.

G. Classroom Unit Ventilators.
   1. Unit ventilators to have independent schedule capability from global, group or local schedule.
   2. Unoccupied Mode:
      a. Fans off, coil hydronic valves closed, outside air and return air dampers indexed to full recirculation.
      b. Unoccupied Low Limit: When the space temperature drops below the night low limit set point (district standard - adjustable), enable boiler / pump operation, start the unit ventilator and open the coil valves to full heating. Heat to continue until the space is 5-degrees above night low limit set point.
      c. Subject to the boiler outside air lockout temperature (65). When the unit ventilator is operational in unoccupied low limit and there is a call for heating the boiler system will be enabled.
   3. Warm-up Mode:
      a. At optimum warm up start period, start fan to run continuously. Index outside air and return air indexed to full recirculation.
      b. Based on the space temperature, the optimum start/stop function starts the unit ventilator in warm-up mode so that the space temperature will reach set point at the scheduled occupancy time.
      c. During warm-up the dampers will remain in full circulation and will cycle to appropriate ventilation mode control at occupancy time regardless of average zone temperature.
   4. Occupied Mode:
      a. The occupied sequence of operations for the units shall consist of four separate control modes: heating, economizer cooling, chilled water cooling and ventilation.
      b. The Fan runs continuously.
      c. Heating Mode (Heating Hot Water):
         1) On a call for heat, mixed air shall modulate to the minimum position allowed by outside air setting and CO2 level.

2) If heating water is available the coil valves shall modulate open until the heating setpoint is attained.

d. Cooling Mode (Economizer cycle):
   1) Actuators shall operate outside air and return dampers in accordance with system operating status, supply air, zone air temperatures, and outside air temperatures.
   2) Modulate between minimum outside air position and 100% open (adjustable) to meet the cooling requirements.
   3) Duct coil valves are closed.

e. Cooling Mode (Chilled Water):
   1) On a continued call for cooling, mixed air shall modulate to the minimum position allowed by outside air setting and CO2 level.
   2) If chilled water is available, the coil valves shall modulate open until the cooling setpoint is attained.

5. Demand Control Ventilation Mode: The mixed air control shall modulate to control the following in the priority listed:
   a. Mixed air low limit set point (45 deg F)
   b. CO2 high limit set point: Reset the outside air according to the following adjustable setpoints -
      1) 800-ppm CO2 and below - OSA at 5% maximum supply air volume.
      2) 1200-ppm CO2 maximum - OSA at 50% maximum supply air volume.
   c. The mixed air set point shall be reset from (55) deg F at (70) deg F outside air to (65) deg F at (50) deg F based on an outside air temperature reset. If the outside air temperature is above the return air temperature the mixed air should be at minimum position as allowed by the minimum outside air setting and CO2 level.
6. Night Purge Mode.
   a. Cooling setpoint 69-degrees F (adjustable).
   b. If a night purge mode is broadcast to the system and the following conditions are present-
      1) Zone is 5 hours (adjustable) prior to occupancy.
      2) Zone is 1-degree F over night purge setpoint.
      3) Outside air temperature is above 45 degrees F and more than 10 degrees F below the zone temperature.

      The fan will start and the outside air damper will index to full open / return air damper will close and the relief damper will open.
   c. Control valves will remain closed.
   d. Purge mode will end one hour prior to occupancy.
7. Alarms:
   a. Individual alarms generated will be setup for the following actions. Each alarm is unique and will have the following options per the district representative.
      1) Alarm popup at district DDC central station.
      2) Send email – Request list of emails from the district representative.
      3) Send text – Request list of telephone numbers from the district representative.
   b. Alarms are set with district standard messages – Custom messages may be sent without program change or memory download.
   c. System alarms.
      1) High space temperature.
      2) Low space temperature.
      3) High space CO2 level.
      4) Unit ventilator fan run status fault.
      5) Drain pan overflow switch activated.

6) Mixed air low limit - Freeze.
   a) In addition to the alarms generated above – The unit ventilator will stop and the outside air and return air dampers shall index to full recirculation.

H. Fan Coils.
1. Fan coil Units to have independent schedule capability from global, group or local schedule.
2. Unoccupied Mode:
   a. Fans off, coil hydronic valves closed, outside air damper closed.
   b. Unoccupied Low Limit: When the space temperature drops below the night low limit set point (district standard - adjustable), enable boiler / pump operation, start fan coil and open the coil valves to full heating. Heat to continue until the space is 5-degrees above night low limit set point.
   c. Subject to the boiler outside air lockout temperature (65). When the unit ventilator is operational in unoccupied low limit and there is a call for heating the boiler system will be enabled.
3. Warm-up Mode:
   a. At optimum warm up start period, start fan to run continuously. Outside air damper remains close.
   b. Based on the space temperature, the optimum start/stop function starts the fan coil in warm-up mode so that the space temperature will reach set point at the scheduled occupancy time.
   c. During warm-up the outside air damper will remain closed and will cycle to preset position at occupancy time regardless of average zone temperature.
4. Occupied Mode:
   a. The occupied sequence of operations for the units shall consist of two separate control modes: heating and chilled water cooling.
   b. The Fan runs continuously.
   c. Heating Mode (Heating Hot Water): On a call for heat, if heating water is available the coil valves shall modulate open until the heating setpoint is attained.
   d. Cooling Mode (Chilled Water): On a continued call for cooling, if chilled water is available, the coil valves shall modulate open until the cooling setpoint is attained.
5. Alarms:
   a. Individual alarms generated will be setup for the following actions. Each alarm is unique and will have the following options per the district representative.
      1) Alarm popup at district DDC central station.
      2) Send email – Request list of emails from the district representative.
      3) Send text – Request list of telephone numbers from the district representative.
   b. Alarms are set with district standard messages – Custom messages may be sent without program change or memory download.
   c. System alarms.
      1) High space temperature.
      2) Low space temperature.
      3) Unit ventilator fan run status fault.
      4) Drain pan overflow switch activated.
      5) Mixed air low limit - Freeze.
         a) In addition to the alarms generated above – The unit ventilator will stop and the outside air damper will close.

I. Split System Heat Pump.
   1. Provide a space temperature sensor and calibrate to the split system thermostat setpoints.
   2. Enable / disable the split system on a time schedule (adjustable) – The system will control space temperature with its package controls when in occupied and night setback modes.
   3. Program remote setpoint adjustment capability from the district server.
   4. Provide an alarm point from the drain pan overflow switch.
   5. Alarms:
      a. Individual alarms generated will be setup for the following actions. Each alarm is unique and will have the following options per the district representative.
         1) Alarm popup at district DDC central station.
         2) Send email – Request list of emails from the district representative.
         3) Send text – Request list of telephone numbers from the district representative.
      b. Alarms are set with district standard messages – Custom messages may be sent without program change or memory download.
      c. System alarms.
         1) High space temperature.
         2) Low space temperature.
         3) Run status fault.
         4) Drain pan overflow switch activated.

3.3 FIELD QUALITY CONTROL

A. Startup: Implement a logical step-by-step startup and checkout of the control system. In addition, startup assistance and coordination shall be provided during startup of the mechanical equipment. Startup shall be considered complete after the entire system is operating properly.

B. Self-commission all hardware and software provided for the project.

C. Completed field commissioning sheets shall be included with the final "as-built" O&M manuals. These sheets shall include validation check fields for all physical and LAN inputs and outputs and graphics for each operating unit or system within the facility. Each system and point shall be listed, using logical names for future reference by the owner.

D. Commissioning shall include calibration and verification of operation of each I/O and graphic field. Functional commissioning of software programming to meet sequences of operation as submitted and approved shall be verified on the field commissioning sheets.

E. At the completion of the job, in the presence of an Owner's representative, thoroughly check out the entire control system by simulating each control function and determine that the system performs in accordance with the Contract Specifications.

3.4 INSTRUCTION OF OWNER PERSONNEL

A. Provide complete list of system generated messages for system operation, including alarm messages.

B. Modify error message wording as required by the Owner's personnel.

C. Locate all control components for Operating Engineer.

3.5 RECORD DRAWINGS

A. Provide complete and accurate record drawings noting all deviations from the information furnished in the original submittals.

3.6 COMMISSIONING

A. The equipment and systems referenced in this section are to be commissioned.

B. The contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation. Include time allowance in the base bid to coordinate and participate in all commissioning activities with the designated commissioning contractor.

3.7 EQUIPMENT CONTROL FUNCTIONS

EQUIPMENT	CONTROL FUNCTION	BSD SYMBOL	DI	DO	AI	AO	ALARM
UNIT VENTILATOR	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	CO2 SENSOR	CO2-LVL			X		
	HIGH CO2 LEVEL						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	DRAIN PAN OVERFLOW SWITCH		X				X
	HEAT / COOL VALVE POSITION	HTG-O				X	
		COOL-O					
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	RETURN AIR DAMPER POSITION	DPR-O				X	
	OUTSIDE AIR DAMPER POSITION	DPR-0				X	
FAN COIL	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	DRAIN PAN OVERFLOW SWITCH		X				X
	HEAT / COOL VALVE POSITION	HTG-O				X	

		COOL-O					
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	OUTSIDE AIR DAMPER POSITION	DPR-0		X			
AIR HANDLING UNIT	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DISCHARGE AIR TEMPERATURE	DA-T			X		
	SUPPLY FAN STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	CHANGEOVER VALVE POSITION	HTG-O				X	
		COOL-O					
	MIXED AIR LOW LIMIT (FREEZE)	MA-LL	X				
	LOW TEMPERATURE						X
	CO2 SENSOR - LIBRARY ONLY	CO2-LVL			X		
	HIGH CO2 LEVEL						X
	SMOKE DETECTOR ALARM	RA-SMK	X				
	SMOKE DETECTOR ACTIVATED						X
	RETURN AIR DAMPER POSITION	DPR-O				X	
	OUTSIDE AIR DAMPER POSITION	DPR-O				X	
	RELIEF AIR POSITION	DPR-O				X	
SPLIT SYSTEM	SYSTEM STATUS	SF-S	X				
	RUN STATUS						X
	SUPPLY FAN START / STOP	SF-C		X			
	SPACE TEMPERATURE	ZN-T			X		
	HIGH SPACE TEMPERATURE						X
	LOW SPACE TEMPERATURE						X
	DRAIN PAN OVERFLOW SWITCH		X				X

END OF SECTION

Testing Report

Limited Asbestos Survey Report

Barnes Elementary School
13730 Walker Road
Beaverton, OR

Prepared for:

Beaverton School District 48J

January 2020
Project No.: 23816.018 Phase No.: 0001

4412 SW Corbett Avenue, Portland, OR 97239
503.248.1939 Main
866.727.0140 Fax
888.248.1939 Toll-Free

PBSUSA.COM

GENERAL INFORMATION

BUILDING DATA

Barnes Elementary School

13730 Walker Road

Beaverton, OR

CLIENT DATA

Beaverton School District 48J

16550 SW Merlo Rd.

Beaverton, OR 97003

(503) 591-4560

BACKGROUND INFORMATION

Two story elementary school with modern south addition and original construction north building.

SURVEY SCOPE

PBS Engineering and Environmental Inc. (PBS) has performed a limited general asbestos survey of roofing areas in accordance with OSHA in 29 CFR 1910.1001 and compiled a report with the following information:

- The type, location, and approximate quantity of suspect asbestos-containing materials
- Bulk sampling of selected suspect building materials
- Inspection summary
- Laboratory analytical data of bulk material sampled

With regard to asbestos, PBS endeavored to locate all the suspect asbestos-containing materials in the roof inspection area; however, suspect asbestos-containing materials may be present and concealed. If suspect materials are uncovered during demolition activities that are not identified in this report, testing should be performed prior to impact. Asbestos-containing materials are known to exist within the building outside of the scope of this inspection.

PBS has conducted a physical inspection of the building, compiled this report consistent with the survey scope, and certifies that the information is correct and accurate within the standards of professional quality and contractual obligations.

James Mastanduno
Project Manager/Prime Inspector
Accreditation #: IMR-20-4993B

Signature Date

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INSPECTION SUMMARY

DATES	SURVEYED BY	ACTIVITY
1/9/2020	James Mastanduno	Roofing Survey

PBS has investigated accessible areas within the scope of inspection to locate suspect asbestos-containing building materials (ACBM). Suspect materials may be present in concealed areas (e.g., behind walls and under carpet). The findings are listed below.

ASBESTOS MATERIALS

The following materials either tested positive, or, based on the experience of PBS field personnel, were not tested and should be considered asbestos-containing. Materials that had mixed results are considered positive. Materials not sampled may contain asbestos and should be tested to verify asbestos content prior to impact through demolition, renovation, etc.
(+) Tested Positive, (M) Mixed Results, (P) Presumed Positive, (T) Previously Tested Positive.

See sample inventory for specific results.

No asbestos-containing building materials were identified within the scope of this survey.

MATERIALS THAT TESTED NEGATIVE FOR ASBESTOS

The following materials tested negative based on ASHARA sampling minimums and testing by NVLAP participating laboratories. Although no asbestos was detected, it is possible that further sampling could indicate asbestos content. It may be prudent to test prior to impact through demolition, renovation, etc.

Material (type)	Location
Gravel built-up roofing field layers on wood decking	Roof areas B, C, G, and H
Flashing caulk	Throughout roofing scope of inspection
Silver paint and built up roofing field layers on wood decking	Roof area F
Silver paint and roof penetration sealants	Throughout roofing scope of inspection

INSPECTION SUMMARY

BACKGROUND

On January 9, 2020, PBS performed a limited pre-renovation asbestos survey of portions of Barnes Elementary School in Beaverton, Oregon. The survey was requested by Beaverton School District in anticipation of roof replacement or rehabilitation of the north portions of the building. This survey was limited to roofing materials in those locations.

The purpose of the survey was to locate, identify, and quantify accessible friable and non-friable asbestos-containing building materials for removal prior to roof work.

The survey is also intended to satisfy Occupational Safety and Health Administration (OSHA) hazard communication requirements as well as requirements by the Department of Environmental Quality (DEQ) to perform an asbestos inspection prior to renovation or demolition activities under Oregon Administrative Rule (OAR) 340-248-0270.

ASBESTOS SUMMARY

The roof areas were inspected by a PBS Asbestos Hazard Emergency Response Act (AHERA) accredited inspector to determine the presence, location, and approximate quantity of asbestos-containing materials (ACM). Eleven bulk samples of building materials, suspected of containing asbestos, were collected and submitted under chain of custody to Lab/Cor Portland Inc. of Portland, Oregon, for polarized light microscopy (PLM) analysis.

No materials were found to contain asbestos within the scope of inspection. Asbestos-containing materials are known to exist in the building outside the scope of this survey.

Please refer to the asbestos bulk sample inventory for more sample details.

Asbestos Regulations

Oregon DEQ, Environmental Protection Agency (EPA), and OSHA regulations require proper removal and handling of ACM by licensed and trained asbestos abatement contractors prior to building renovations or demolition.

The EPA, DEQ, and OSHA all define ACM as any material containing more than 1% asbestos. Although materials equal to or less than 1% are not considered by regulatory agencies to be an ACM, they still have some asbestos content, and Oregon OSHA has specific requirements for situations in which workers may encounter, disturb, or remove materials containing any level of asbestos. For the sake of hazard communication, these materials are included in the asbestos-containing materials section of this report.

In 1995, Oregon OSHA adopted 29 Code of Federal Regulations (CFR) Part 1926.1101 governing asbestos under OAR 437-003-1926.1101. The regulation has made significant changes in work procedures and how asbestos materials are managed. OSHA believes that the single biggest risk of asbestos exposure is to workers who unknowingly or improperly disturb ACM. Hazard communication, training, personal protection, work practices, exposure monitoring, and recordkeeping are all major components of the regulation.

DEQ's OAR 340, Division 248 also covers asbestos abatement requirements, removal notifications, licensing, and certifications for contractors.

For more information regarding the removal of asbestos-containing materials, please refer to the following:

1. Oregon Occupational Safety and Health Administration, OAR 437-003-1926.1101

INSPECTION SUMMARY

2. Department of Environmental Quality, OAR-340, Division 248

This report is not suitable as a bid document or an asbestos abatement design. The purpose of this report is risk hazard communication only.

Code	Material	Location	Results	Lab
23816.018-0001	Built-up Roofing (01)	Area B; east, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	rocky fibrous tar, black/gray	No Asbestos Detected	
	Layer 02	woven fibers, white with tar, black	No Asbestos Detected	
	Layer 03	woven fibers, white with tar, black	No Asbestos Detected	
	Layer 04	woven fibers, white with tar, black	No Asbestos Detected	
	Layer 05	woven fibers, white with tar, black	No Asbestos Detected	
	Layer 06	woven fibers, white with tar, black	No Asbestos Detected	
	Layer 07	compressed fibers, dark brown	No Asbestos Detected	
	Layer 08	compressed fibers, light brown	No Asbestos Detected	
	Layer 09	foam material, yellow	No Asbestos Detected	
	Layer 10	fibrous backing, black	No Asbestos Detected	
	Layer 11	compressed fibers, black	No Asbestos Detected	
	Layer 12	thick tar, black	No Asbestos Detected	
23816.018-0002	Built-up Roofing (01)	Area B; west, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	fibrous tar, black	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	fibrous tar, black	No Asbestos Detected	
	Layer 04	fibrous tar, black	No Asbestos Detected	
	Layer 05	fibrous material, brown/black, with tar	No Asbestos Detected	
	Layer 06	fibrous material, light brown	No Asbestos Detected	
	Layer 07	foam material, yellow, with paper	No Asbestos Detected	
	Layer 08	rocky fibrous tar, black	No Asbestos Detected	
	Layer 09	fibrous tar, black	No Asbestos Detected	
	Layer 10	fibrous tar, black	No Asbestos Detected	
	Layer 11	fibrous tar, black	No Asbestos Detected	
	Layer 12	fibrous tar, black	No Asbestos Detected	
23816.018-0003	Roof Penetration Sealant (01)	Area B; south, silver paint and black sealant on penetrations		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 1	paint, silver	No Asbestos Detected	
	Layer 2	tar, dark brown	No Asbestos Detected	

Code	Material	Location	Results	Lab
23816.018-0004	Built-up Roofing (01)	Area B; north upper section, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	fibrous tar, black	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	fibrous tar, black	No Asbestos Detected	
	Layer 04	compressed fibers, brown	No Asbestos Detected	
	Layer 05	fibrous backing, dark gray	No Asbestos Detected	
	Layer 06	foam, yellow	No Asbestos Detected	
	Layer 07	rocky fibrous tar, black	No Asbestos Detected	
	Layer 08	fibrous tar, black	No Asbestos Detected	
	Layer 09	fibrous tar, black	No Asbestos Detected	
	Layer 10	fibrous tar, black	No Asbestos Detected	
23816.018-0005	Built-up Roofing (01)	Area C; south, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	fibrous tar, black	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	fibrous tar, black	No Asbestos Detected	
	Layer 04	fibrous tar, black	No Asbestos Detected	
	Layer 05	fibrous tar, black	No Asbestos Detected	
	Layer 06	compressed fibers, black	No Asbestos Detected	
	Layer 07	compressed fibers, brown	No Asbestos Detected	
	Layer 08	fibrous backing, dark gray	No Asbestos Detected	
	Layer 09	foam, yellow	No Asbestos Detected	
	Layer 10	rocky fibrous tar, black	No Asbestos Detected	
	Layer 11	fibrous tar, black	No Asbestos Detected	
	Layer 12	fibrous tar, black	No Asbestos Detected	
	Layer 13	fibrous tar, black	No Asbestos Detected	
	Layer 14	fibrous tar, black	No Asbestos Detected	

Code	Material	Location	Results	Lab
23816.018-0006	Built-up Roofing (01)	Area C; north, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	fibrous tar, black	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	fibrous tar, black	No Asbestos Detected	
	Layer 04	fibrous tar, black	No Asbestos Detected	
	Layer 05	fibrous tar, black	No Asbestos Detected	
	Layer 06	fibrous material, light brown/black	No Asbestos Detected	
	Layer 07	foam material, yellow, with fibrous backing, black	No Asbestos Detected	
	Layer 08	rocky fibrous tar, black	No Asbestos Detected	
	Layer 09	fibrous tar, black	No Asbestos Detected	
	Layer 10	fibrous tar, black	No Asbestos Detected	
	Layer 11	fibrous tar, black	No Asbestos Detected	
	Layer 12	fibrous tar, black	No Asbestos Detected	
	Layer 13	fibrous tar, black	No Asbestos Detected	
23816.018-0007	Roof Penetration Sealant (01)	Area C; north, silver paint and black sealant		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 1	paint, silver	No Asbestos Detected	
	Layer 2	rubbery material, black with woven fibers, white	No Asbestos Detected	
23816.018-0008	Built-up Roofing (02)	Area F; east, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	coating, silver	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	tar, black	No Asbestos Detected	
	Layer 04	fibrous tar, black	No Asbestos Detected	
	Layer 05	tar, black	No Asbestos Detected	
	Layer 06	fibrous tar, black, with tar, black	No Asbestos Detected	
	Layer 07	compressed fibers, black	No Asbestos Detected	
	Layer 08	compressed fibers, brown	No Asbestos Detected	
	Layer 09	foam, off-white	No Asbestos Detected	
	Layer 10	fibrous material, gray/black	No Asbestos Detected	

Code	Material	Location	Results	Lab
23816.018-0009	Built-up Roofing (02)	Area F; west, built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	coating, silver	No Asbestos Detected	
	Layer 02	fibrous tar, black	No Asbestos Detected	
	Layer 03	tar, black	No Asbestos Detected	
	Layer 04	tar, black	No Asbestos Detected	
	Layer 05	tar, black	No Asbestos Detected	
	Layer 06	fibrous tar, black	No Asbestos Detected	
	Layer 07	compressed fibers, black	No Asbestos Detected	
	Layer 08	compressed fibers, brown	No Asbestos Detected	
	Layer 09	foam, off-white	No Asbestos Detected	
	Layer 10	fibrous material, gray/black	No Asbestos Detected	
23816.018-0010	Built-up Roofing (03)	Area H; built-up roofing		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 01	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 02	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 03	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 04	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 05	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 06	compressed fibers, black	No Asbestos Detected	
	Layer 07	compressed fibers, brown	No Asbestos Detected	
	Layer 08	rocky fibrous tar, black/gray	No Asbestos Detected	
	Layer 09	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 10	tar, black with woven fibers, white	No Asbestos Detected	
	Layer 11	tar, black with woven fibers, white	No Asbestos Detected	
23816.018-0011	Roof Penetration Sealant (02)	Area H; flashing caulk		Lab Cor
	Layer:	**Description:**	**Analysis:**	
	Layer 1	rubbery material, gray/tan	No Asbestos Detected	

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
P.O. No: n/a
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Client Sample ID: **23816.018-0001** **Sample ID:** S1 **Date Analyzed:** 01/15/2020
Client Sample Description: **Analyst:** Danielle de Montigny

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
compressed fibers, black	4 %	-	-	-	**NAD**
Layer 02					
woven fibers, white with tar, black	5 %	-	-	-	**NAD**
Layer 03					
woven fibers, white with tar, black	5 %	-	-	-	**NAD**
Layer 04					
woven fibers, white with tar, black	5 %	-	-	-	**NAD**
Layer 05					
woven fibers, white with tar, black	5 %	-	-	-	**NAD**
Layer 06					
woven fibers, white with tar, black	5 %	-	-	-	**NAD**
Layer 07					
compressed fibers, dark brown	10 %	-	-	-	**NAD**
Layer 08					
compressed fibers, light brown	15 %	-	-	-	**NAD**
Layer 09					
foam material, yellow	20 %	-	-	-	**NAD**
Layer 10					
fibrous backing, black	1 %	-	-	-	**NAD**
Layer 11					
rocky fibrous tar, black/gray	5 %	-	-	-	**NAD**
Layer 12					
thick tar, black	20 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	60 %	-	-	-	-	40 %
Layer 02	-	-	-	15 %	-	-	85 %
Layer 03	2 %	Trace	-	15 %	-	-	83 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

P.O. No: n/a

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Layer 04	10 %	Trace	-	5 %	-	-	85 %
Layer 05	10 %	Trace	-	8 %	-	-	82 %
Layer 06	10 %	-	-	10 %	-	-	80 %
Layer 07	-	80 %	-	-	-	-	20 %
Layer 08	-	95 %	-	-	-	-	5 %
Layer 09	-	-	-	-	-	-	100 %
Layer 10	10 %	85 %	-	-	-	-	5 %
Layer 11	5 %	Trace	-	-	-	-	95 %
Layer 12	3 %	-	-	-	-	-	97 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

P.O. No: n/a

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Client Sample ID: **23816.018-0002** **Sample ID:** S2 **Date Analyzed:** 01/15/2020
Client Sample Description: **Analyst:** Mia Gaines

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 02					
fibrous tar, black	6 %	-	-	-	**NAD**
Layer 03					
fibrous tar, black	10 %	-	-	-	**NAD**
Layer 04					
fibrous tar, black	6 %	-	-	-	**NAD**
Layer 05					
fibrous material, brown/black, with tar	10 %	-	-	-	**NAD**
Layer 06					
fibrous material, light brown	20 %	-	-	-	**NAD**
Layer 07					
foam material, yellow, with paper	10 %	-	-	-	**NAD**
Layer 08					
rocky fibrous tar, black	10 %	-	-	-	**NAD**
Layer 09					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 10					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 11					
fibrous tar, black	7 %	-	-	-	**NAD**
Layer 12					
fibrous tar, black	6 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	10 %	-	-	10 %	-	-	80 %
Layer 02	10 %	-	-	10 %	-	-	80 %
Layer 03	10 %	5 %	-	10 %	-	-	75 %
Layer 04	-	20 %	-	-	-	-	80 %
Layer 05	-	80 %	-	-	-	-	20 %
Layer 06	2 %	70 %	-	-	-	-	28 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
P.O. No: n/a
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Layer 07	-	8 %	-	2 %	-	-	90 %
Layer 08	6 %	-	-	2 %	-	-	92 %
Layer 09	6 %	2 %	-	-	-	-	92 %
Layer 10	8 %	-	-	-	-	-	92 %
Layer 11	8 %	-	-	-	-	-	92 %
Layer 12	10 %	10 %	-	-	-	-	80 %

Client Sample ID: **23816.018-0003** **Sample ID:** S3 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Danielle de Montigny

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
paint, silver	1 %	-	-	-	**NAD**
Layer 02					
tar, dark brown	99 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other	Matrix
Layer 01	-	1 %	-	-	-	99 %
Layer 02	-	2 %	-	-	-	98 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

LabCor Portland Inc
Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

P.O. No: n/a

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Client Sample ID: **23816.018-0004** **Sample ID:** S4 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Ryan Brown

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			**Percent Asbestos:**
Layer 01							
fibrous tar, black	8 %	-	-	-			**NAD**
Layer 02							
fibrous tar, black	8 %	-	-	-			**NAD**
Layer 03							
fibrous tar, black	8 %	-	-	-			**NAD**
Layer 04							
compressed fibers, brown	32 %	-	-	-			**NAD**
Layer 05							
fibrous backing, dark gray	4 %	-	-	-			**NAD**
Layer 06							
foam, yellow	6 %	-	-	-			**NAD**
Layer 07							
rocky fibrous tar, black	9 %	-	-	-			**NAD**
Layer 08							
fibrous tar, black	9 %	-	-	-			**NAD**
Layer 09							
fibrous tar, black	9 %	-	-	-			**NAD**
Layer 10							
fibrous tar, black	7 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	4 %	-	-	5 %	-	-	91 %
Layer 02	8 %	-	-	5 %	-	-	87 %
Layer 03	3 %	-	-	-	-	-	97 %
Layer 04	-	100 %	-	-	-	-	0 %
Layer 05	15 %	15 %	-	-	-	-	70 %
Layer 06	-	-	-	-	-	-	100 %
Layer 07	5 %	-	-	-	-	-	95 %
Layer 08	5 %	-	-	-	-	-	95 %
Layer 09	5 %	-	-	-	-	-	95 %
Layer 10	5 %	-	-	-	-	-	95 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Client Sample ID: **23816.018-0005** **Sample ID:** S5 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Ryan Brown

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 02					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 03					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 04					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 05					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 06					
compressed fibers, black	21 %	-	-	-	**NAD**
Layer 07					
compressed fibers, brown	21 %	-	-	-	**NAD**
Layer 08					
fibrous backing, dark gray	2 %	-	-	-	**NAD**
Layer 09					
foam, yellow	6 %	-	-	-	**NAD**
Layer 10					
rocky fibrous tar, black	5 %	-	-	-	**NAD**
Layer 11					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 12					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 13					
fibrous tar, black	5 %	-	-	-	**NAD**
Layer 14					
fibrous tar, black	5 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	5 %	-	-	8 %	-	-	87 %
Layer 02	5 %	8 %	-	5 %	-	-	82 %
Layer 03	5 %	8 %	-	5 %	-	-	82 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

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BULK SAMPLE ASBESTOS ANALYSIS

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Client: PBS Engineering and Environmental
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Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Layer 04	8 %	5 %	-	-	-	-	87 %
Layer 05	5 %	-	-	8 %	-	-	87 %
Layer 06	-	85 %	-	-	-	-	15 %
Layer 07	-	100 %	-	-	-	-	0 %
Layer 08	15 %	15 %	-	-	-	-	70 %
Layer 09	-	-	-	-	-	-	100 %
Layer 10	8 %	-	-	-	-	-	92 %
Layer 11	8 %	-	-	-	-	-	92 %
Layer 12	8 %	-	-	-	-	-	92 %
Layer 13	8 %	-	-	-	-	-	92 %
Layer 14	8 %	-	-	-	-	-	92 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

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BULK SAMPLE ASBESTOS ANALYSIS

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Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Client Sample ID: **23816.018-0006** **Sample ID:** S6 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Mia Gaines

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			**Percent Asbestos:**
Layer 01							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 02							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 03							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 04							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 05							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 06							
fibrous material, light brown/black	30 %	-	-	-			**NAD**
Layer 07							
foam material, yellow, with fibrous backing, black	15 %	-	-	-			**NAD**
Layer 08							
rocky fibrous tar, black	5 %	-	-	-			**NAD**
Layer 09							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 10							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 11							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 12							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 13							
fibrous tar, black	5 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	10 %	-	-	8 %	-	-	82 %
Layer 02	10 %	4 %	-	8 %	-	-	78 %
Layer 03	14 %	-	-	10 %	-	-	76 %
Layer 04	-	20 %	-	-	-	-	80 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

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BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
P.O. No: n/a
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Layer 05	6 %	14 %	-	-	-	-	80 %
Layer 06	-	90 %	-	-	-	-	10 %
Layer 07	-	6 %	-	-	-	-	94 %
Layer 08	8 %	-	-	-	-	-	92 %
Layer 09	4 %	-	-	-	-	-	96 %
Layer 10	6 %	2 %	-	-	-	-	92 %
Layer 11	8 %	-	-	-	-	-	92 %
Layer 12	8 %	-	-	-	-	-	92 %
Layer 13	8 %	2 %	-	-	-	-	90 %

Client Sample ID: **23816.018-0007** **Sample ID:** S7 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Danielle de Montigny

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
paint, silver	40 %	-	-	-	**NAD**
Layer 02					
rubbery material, black with woven fibers, white	60 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other	Matrix
Layer 01	-	2 %	-	-	-	98 %
Layer 02	-	-	-	3 %	-	97 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

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BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Client Sample ID: **23816.018-0008** **Sample ID:** S8 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			**Percent Asbestos:**
Layer 01							
coating, silver	5 %	-	-	-			**NAD**
Layer 02							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 03							
tar, black	8 %	-	-	-			**NAD**
Layer 04							
fibrous tar, black	9 %	-	-	-			**NAD**
Layer 05							
tar, black	9 %	-	-	-			**NAD**
Layer 06							
fibrous tar, black, with tar, black	10 %	-	-	-			**NAD**
Layer 07							
compressed fibers, black	5 %	-	-	-			**NAD**
Layer 08							
compressed fibers, brown	20 %	-	-	-			**NAD**
Layer 09							
foam, off-white	20 %	-	-	-			**NAD**
Layer 10							
fibrous material, gray/black	9 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	Trace	-	-	-	-	100 %
Layer 02	10 %	-	-	10 %	-	-	80 %
Layer 03	-	-	-	-	-	-	100 %
Layer 04	10 %	-	-	15 %	-	-	75 %
Layer 05	-	25 %	-	-	-	-	75 %
Layer 06	10 %	10 %	-	10 %	-	-	70 %
Layer 07	-	75 %	-	-	-	-	25 %
Layer 08	-	100 %	-	-	-	-	0 %
Layer 09	-	-	-	-	-	-	100 %
Layer 10	-	90 %	-	-	-	-	10 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

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BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

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Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Client Sample ID: **23816.018-0009** **Sample ID:** S9 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			**Percent Asbestos:**
Layer 01							
coating, silver	5 %	-	-	-			**NAD**
Layer 02							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 03							
tar, black	5 %	-	-	-			**NAD**
Layer 04							
tar, black	5 %	-	-	-			**NAD**
Layer 05							
tar, black	5 %	-	-	-			**NAD**
Layer 06							
fibrous tar, black	5 %	-	-	-			**NAD**
Layer 07							
compressed fibers, black	25 %	-	-	-			**NAD**
Layer 08							
compressed fibers, brown	15 %	-	-	-			**NAD**
Layer 09							
foam, off-white	25 %	-	-	-			**NAD**
Layer 10							
fibrous material, gray/black	5 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	-	-	-	-	-	100 %
Layer 02	10 %	-	-	15 %	-	-	75 %
Layer 03	-	Trace	-	-	-	-	100 %
Layer 04	-	Trace	-	-	-	-	100 %
Layer 05	-	3 %	-	-	-	-	97 %
Layer 06	15 %	-	-	20 %	-	-	65 %
Layer 07	-	95 %	-	-	-	-	5 %
Layer 08	-	100 %	-	-	-	-	0 %
Layer 09	-	-	-	-	-	-	100 %
Layer 10	5 %	75 %	-	-	-	-	20 %

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NVLAP Lab Code: 200741-0

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4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

P.O. No: n/a

Client Sample ID: **23816.018-0010** **Sample ID:** S10 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Danielle de Montigny

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Layer 01					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 02					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 03					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 04					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 05					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 06					
compressed fibers, black	15 %	-	-	-	**NAD**
Layer 07					
compressed fibers, brown	40 %	-	-	-	**NAD**
Layer 08					
rocky fibrous tar, black/gray	5 %	-	-	-	**NAD**
Layer 09					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 10					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**
Layer 11					
tar, black with woven fibers, white	5 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	5 %	8 %	-	10 %	-	-	77 %
Layer 02	8 %	3 %	-	4 %	-	-	85 %
Layer 03	5 %	2 %	-	10 %	-	-	83 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

LabCor Portland Inc

Lab/Cor Portland, Inc.
4321 SW Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
http://www.labcorpdx.net

Client: PBS Engineering and Environmental
4412 SW Corbett Avenue
Portland, OR 97239

Report Number: 200134R01
Report Date: 01/16/2020

Job Number: **200134**
P.O. No: n/a
Project Name:
Project Number: 23816.018 Phase 0001
Project Notes:

Layer 04	5 %	-	-	15 %	-	-	80 %
Layer 05	8 %	Trace	-	15 %	-	-	77 %
Layer 06	-	60 %	-	-	-	-	40 %
Layer 07	-	95 %	-	-	-	-	5 %
Layer 08	20 %	-	-	-	-	-	80 %
Layer 09	10 %	Trace	-	-	-	-	90 %
Layer 10	10 %	Trace	-	-	-	-	90 %
Layer 11	10 %	-	-	-	-	-	90 %

Client Sample ID: **23816.018-0011** **Sample ID:** S11 **Date Analyzed:** 01/16/2020
Client Sample Description: **Analyst:** Danielle de Montigny

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	**Percent Asbestos:**
Homogeneous					
rubbery material, gray/tan	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other	Matrix
	-	-	-	-	-	100 %

This laboratory participates in the National Voluntary Laboratory Accreditation Program (NVLAP). Testing method is per 40 CFR 763 Subpart E, Appendix E, PLM. This report and the data contained therein cannot be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

- "NAD" is No Asbestos Detected.
- Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite.
- Material binders, such as those found in vinyl floor tiles, may prevent the detection of small diameter asbestos fibers. A gravimetric preparation and point-count is recommended for such samples.
- Quantitative analysis by PLM point count or TEM may be recommended for samples testing at < or = to 1% asbestos.
- The following estimate of error for this method by visual estimation of asbestos percent are as follows:
1% asbestos: >0-3% error, 5% asbestos: 1-9% error, 10% asbestos: 5-15% error, 20% asbestos: 10-30% error.
- This report pertains only to the samples listed on the report. Report considered valid only when signed by analyst.

Reviewed by:

Danielle de Montigny
TEM Technical Manager

NVLAP TESTING
NVLAP Lab Code: 200741-0

200134 1/2

TRANSMITTAL AND CHAIN OF CUSTODY FOR ASBESTOS BULK SAMPLES

Project No.: 23816.018 Phase 0001

Individuals signing this form warrant that the information provided is correct and complete. The Sender should keep a copy and send the original. The Receiver should complete the form, keep a copy and return the original to the Sender. Receiver shall report damage of package immediately to Sender.

SENDER

Date Sent: January 10, 2020

PBS Engineering and Environmental Inc.
4412 SW Corbett Avenue
Portland, OR 97239
503.248.1939, Fax: 866.727.0140

R Connoy
Name

1.10.20 900
Authorized Signature **Date** **Time**

RECEIVER

Date Received: 1/10/2020

Company: Lab Cor
Address: 4321 SW Corbett Ave Ste A
Portland, OR 97239
503-224-5055

Katie Schultz
Name

1/10/20 9:09am
Authorized Signature **Date** **Time**

Sender's ID No.	Brief Description	Receiver's ID No.
23816.018-0001		
23816.018-0002		
23816.018-0003		
23816.018-0004		
23816.018-0005		
23816.018-0006		
23816.018-0007		
23816.018-0008		
23816.018-0009		
23816.018-0010		
23816.018-0011		

PBS 200134 2/2

TRANSMITTAL AND CHAIN OF CUSTODY FOR ASBESTOS BULK SAMPLES

Please analyze the enclosed 11 sample(s) for asbestos content using PLM with dispersion staining. PBS requests prior notification if samples will be disposed.
Request verbal results by: _____ AM/PM _____Date.

Please fax and mail the results to the above address.

TURNAROUND DESIRED: **72 Hour**

SPECIAL INSTRUCTIONS:

James M

THIS IS TO CERTIFY THAT

JAMES MASTANDUNO

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ASBESTOS INSPECTOR / MANAGEMENT PLANNER REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 01/10/2020

Course Location: Portland, OR

Certificate: IMR-20-4993B

PBS

AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 01/10/2021

For verification of the authenticity of this certificate contact:
PBS Environmental
4412 SW Corbett Avenue
Portland, OR 97239
(503) 248-1939

Andy Fridley, Instructor

-END of Addendum
Peter Madaus
Contract Specialist