



REVISIONS	DATE
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Vancouver School District
**FRANKLIN
ELEMENTARY
SCHOOL**

1698, 5206 NW Franklin St.
Vancouver, WA 98663

JOB NO: 1806
ISSUE DATE: 8/19/2016

Stamp Area

**MECHANICAL
LEGEND**

M0.01

GENERAL: THESE NOTES ARE MEANT TO AUGMENT THE SPECIFICATIONS. CONTRACTOR SHALL CONFORM TO BOTH PLANS & SPECIFICATIONS.

- WHERE USED, THE TERM "PROVIDE" SHALL MEAN "FURNISH AND INSTALL".
- COORDINATE MECHANICAL WORK WITH ELECTRICAL, ARCHITECTURAL, STRUCTURAL, CIVIL AND LANDSCAPE WORK SHOWN ON OTHER CONTRACT DOCUMENTS. PROVIDE ADDITIONAL OFFSETS FOR COORDINATED INSTALLATION WHERE REQUIRED.
- COORDINATE HVAC, PLUMBING AND FIRE PROTECTION WORK PRIOR TO INSTALLATION. DUCTWORK AND EQUIPMENT ACCESS TAKES PRECEDENCE OVER ALL PIPING EXCEPT GRAVITY SYSTEMS FOR AVAILABLE SPACE. GRAVITY SYSTEMS SHALL BE COORDINATED OUT OF MECHANICAL DUCT PATHS TO THE GREATEST EXTENT POSSIBLE.
- COORDINATE EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
- LOCATIONS AND SIZES OF FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH OTHER TRADES INVOLVED. INCLUDE IN THE COST OF MECHANICAL WORK, CUTTING, CORING, PATCHING AND PAINTING OF EXISTING WALLS, CEILINGS, FLOORS AND ROOFS AS REQUIRED TO ACCOMMODATE WORK AS INDICATED IN THE MECHANICAL CONTRACT DOCUMENTS, UNLESS SPECIFICALLY SHOWN ON ARCHITECTURAL DRAWINGS.
- CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT. BEFORE SUBSTANTIAL COMPLETION, CLEAN EQUIPMENT, FIXTURES, EXPOSED DUCTS, PIPING AND SIMILAR ITEMS.
- PROVIDE EQUIPMENT THAT FITS INTO THE SPACE ALLOTTED AND ALLOWS ADEQUATE ACCEPTABLE CLEARANCE FOR INSTALLATION, REPLACEMENT, SERVICING AND MAINTENANCE. COORDINATE WITH OTHER TRADES TO ENSURE NO CONFLICT WITH REQUIRED CLEARANCES.
- CONTRACTOR SHALL OBTAIN & PAY FOR ALL PERMITS AND CONSTRUCTION FEES. FURNISH FINAL CERTIFICATE TO OWNER SHOWING COMPLIANCE WITH CODE REQUIREMENTS.
- REFER TO TYPICAL DETAILS PROVIDED IN THIS DRAWING SET FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION. CONTRACTOR IS RESPONSIBLE FOR CONFORMANCE WITH DETAILS.
- A SHORT DASH IN A SCHEDULE TABLE CELL INDICATES THAT THE COLUMN HEADING IS NOT USED OR NOT APPLICABLE TO THAT SCHEDULED ITEM.
- PROVIDE COMMISSIONING PER SECTION C408 OF THE WASHINGTON STATE ENERGY CODE - COMMERCIAL PROVISIONS.
- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH NFPA 70 STANDARDS AND LOCAL REQUIREMENTS.
- ALL FIELD WIRING SHALL REQUIRE AN ELECTRICAL PERMIT AND SHALL BE PERFORMED BY A LICENSED ELECTRICIAN.
- PROVIDE 4" MINIMUM CONCRETE BASES (HOUSEKEEPING PADS) UNDER FLOOR MOUNTED MECHANICAL EQUIPMENT. THIS INCLUDED, BUT IS NOT LIMITED TO BOILER AND FAN COILS. COMPLY WITH REQUIREMENTS FOR EQUIPMENT BASES AND FOUNDATIONS SPECIFIED IN DIVISION 03.
- LOCATE VALVES, WATER HAMMER ARRESTERS, CLEANOUTS, DAMPERS, CONTROLS AND SIMILAR COMPONENTS SO THAT THEY ARE ACCESSIBLE. PROVIDE ACCESS DOORS FOR MECHANICAL EQUIPMENT INSTALLED BEHIND WALLS, ABOVE INACCESSIBLE CEILINGS AND BELOW FLOORS. COORDINATE ACCESS DOOR LOCATIONS WITH ARCHITECT/ENGINEER. INSTALL TAG ON CEILING GRID FRAME TO INDICATE LOCATION AND TYPE OF EQUIPMENT THAT REQUIRES MAINTENANCE. PROVIDE 16 GA. STEEL, FLUSH TYPE ACCESS DOOR WITH CONCEALED HINGE AND SLOT SCREWDRIVER TYPE CAM LATCH. PROVIDE FACTORY PRIMED IN PAINTED SURFACE AREAS FOR FIELD PAINTING. PROVIDE STAINLESS STEEL FOR ALL OTHER AREAS.
- VERIFY LOCATIONS AND DIMENSIONS OF EQUIPMENT AND COORDINATE WORK PRIOR TO START OF CONSTRUCTION.
- CONTRACTORS ARE RESPONSIBLE TO VISIT THE SITE AND DETERMINE THE EXACT EXTENT OF WORK, COORDINATION, DEMOLITION, ETC. NECESSARY TO COMPLETE THE PROJECT AS INDICATED IN THE CONTRACT DOCUMENTS.
- FURNISH LABOR, MATERIALS, EQUIPMENT, APPURTENANCES REQUIRED FOR A COMPLETE WORKING AND COORDINATED SYSTEM. MATERIALS, EQUIPMENT AND APPURTENANCES SHALL MATCH EXISTING BUILDING STANDARDS IN QUALITY, TYPE AND FINISH, UNLESS OTHERWISE NOTED.
- VERIFY PHYSICAL DIMENSIONS OF EQUIPMENT. COORDINATE THE EXACT LOCATIONS OF NEW MECHANICAL AND PLUMBING EQUIPMENT WITH THE LOCATIONS OF LIGHTING FIXTURES, PIPING, AND OTHER CONSTRUCTION TO ALLOW FOR PROPER ACCESS TO SERVICE AND MAINTAIN EQUIPMENT PRIOR TO START OF CONSTRUCTION.
- COORDINATE THE LOCATION OF DUCTWORK AND PIPING WITH OTHER TRADES. PROVIDE OFFSETS IN DUCTWORK AND PIPING AS REQUIRED AT NO ADDITIONAL COST TO OWNER.
- SUPPORT CONDUIT, PIPING, AND DUCTWORK INDEPENDENTLY. IN NO INSTANCE SHALL ANY TRADE HANG OR SUPPORT EQUIPMENT, CEILING WIRES, LIGHT FIXTURE HANGERS, ETC., FROM HVAC EQUIPMENT, DUCTWORK, OR PIPING. SUPPORT SHALL BE FROM THE EXISTING STRUCTURE OR FROM STRUCTURAL MEMBERS ADDED BY THIS CONTRACTOR TO PROVIDE SUPPORT OF NEW EQUIPMENT AND COMPONENTS SUCH AS DUCTWORK, PIPING, ETC. DO NOT SUPPORT OR BRACE COMPONENTS FROM THE ROOF DECK.
- SEISMIC ANCHORING OF EQUIPMENT AND SEISMIC BRACING OF MECHANICAL COMPONENTS SHALL MEET SMACNA AND ASCE REQUIREMENTS.

PLUMBING:

- DOMESTIC WATER TUBE, PIPE, FITTINGS, JOINING MATERIALS, SPECIAL TIES, PLUMBING EQUIPMENT, PLUMBING FIXTURES, PLUMBING FITTINGS AND ALL OTHER APPURTENANCES IN CONTACT WITH DRINKING WATER SHALL BE LEAD-FREE EXCEPT THOSE EXPLICITLY EXEMPTED IN SECTION 3874 OF THE SAFE WATER DRINKING ACT. LEAD-FREE SHALL MEAN (A) NOT CONTAINING MORE THAN 0.2 PERCENT LEAD WHEN USED WITH RESPECT TO SOLDER AND FLUX; AND (B) NOT MORE THAN A WEIGHTED AVERAGE OF 0.25 PERCENT LEAD WHEN USED WITH RESPECT TO DOMESTIC WATER TUBE, PIPE, FITTINGS, JOINING MATERIALS, SPECIAL TIES, PLUMBING EQUIPMENT, PLUMBING FIXTURES, AND PLUMBING FITTINGS.
- PROVIDE WATER HAMMER ARRESTERS IN DOMESTIC WATER PIPING IN ACCORDANCE WITH PDI-WH201.
- INSULATE HOT WATER CIRCULATION AND DOMESTIC HOT WATER PIPING PER WASHINGTON STATE ENERGY CODE C404.6.
- DISCHARGE TEMPERATURE OF PUBLIC LAVATORIES SHALL BE 105 DEGREES FAHRENHEIT.
- VALVES, EXPANSION FITTINGS/LOOPS, AND PIPING SPECIALTIES SHALL BE FULL SIZE OF PIPE UNLESS NOTED OTHERWISE.
- UNLESS OTHERWISE NOTED ALL WASTE PIPING TO BE SLOPED AT 1/4" PER FOOT (2%).
- MINIMUM DOMESTIC HOT WATER, COLD WATER, AND HOT WATER CIRCULATION PIPE SIZE SHALL BE 3/4". HOT WATER PIPING TO LAVATORIES FROM MAINS SHALL BE 1/2", AND NOT EXCEED 2' IN LENGTH. REFER TO DETAILS. HOT WATER PIPING FROM MAINS TO OTHER FIXTURES AND SHALL NOT EXCEED 21' IN LENGTH. REFER TO SCHEDULES FOR CHANGE IN PIPING SIZE TO CONNECT TO FIXTURE.

PIPING:

- INSULATE PIPING PER WASHINGTON STATE ENERGY CODE SECTION C403.2.9.
- ALL PRESSURES LISTED ARE GAGE PRESSURES UNLESS OTHERWISE NOTED.
- PROVIDE MANUAL AIR VENTS AT ALL LOCAL HIGH POINTS FOR HYDRONIC SYSTEMS. PIPE VENT TO NEAREST DRAIN.
- PROVIDE COMPLETE CONDENSATE DRAINAGE SYSTEM FOR ALL INDOOR AIR HANDLING UNITS AND GAS FIRED APPLIANCES. FIELD ROUTE DRAINAGE PIPING FROM EQUIPMENT TO NEAREST DRAIN LOCATION (SUCH AS SERVICE SINK, FUNNEL DRAIN, ETC.). SLOPE NON-PRESSURIZED DRAIN PIPING TO DRAIN LOCATION. PIPING & FITTINGS SHALL BE PVC OR COPPER. MINIMUM PIPE SIZE SHALL BE 3/4". INCREASE PIPE SIZE WHERE APPLICABLE PER IMC 307.2.2
- PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF RISERS AND LOW POINTS.
- VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
- PROVIDE UNIONS AND/OR FLANGES AT EACH PIECE OF EQUIPMENT, AT EACH CONTROL VALVE, IN BYPASSES, AND IN LONG PIPING RUNS (100 FEET OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION AND REPAIRS.
- VALVES, EXPANSION FITTINGS/LOOPS, AND PIPING SPECIAL TIES SHALL BE FULL SIZE OF PIPE UNLESS NOTED OTHERWISE.

HVAC/SHEET METAL:

- THE FIRST FIGURE OF DUCT SIZE CALLOUTS INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS. PROVIDE ANY APPLICABLE DUCT LINING AND INSULATION PER THESE PLANS AND SPECIFICATIONS.
- TOTAL STATIC PRESSURE NOTED IN SCHEDULES SHALL BE ASSUMED TO INCLUDE DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
- AIR TERMINAL SIZES SHOWN ON PLANS ARE NECK SIZES. PROVIDE ADDITIONAL PANS, HARDWARE, ETC., REQUIRED TO INSTALL AIR TERMINAL IN CEILING SYSTEM.
- DUCTWORK SHALL BE 2.0" PRESSURE CLASS UNLESS OTHERWISE NOTED ON THESE DRAWINGS.
- CONSTRUCT DUCTWORK ACCORDING TO WASHINGTON STATE ENERGY CODE SECTION C403.2.8.3.
- PROVIDE TURNING VANES IN ALL MITERED RECTANGULAR DUCT ELBOWS & TEES.
- PROVIDE MOTORIZED DAMPERS ON OUTDOOR AIR SUPPLY, AND EXHAUST OPENINGS. DAMPERS SHALL HAVE A MAXIMUM LEAKAGE RATE OF 3 CFM PER SQUARE FOOT AT 1" W.C.
- RELIEF GRAVITY DAMPERS SHALL HAVE A MAXIMUM LEAKAGE RATE OF 20 CFM PER SQUARE FOOT AT 1" W.C. DAMPERS SMALLER THAN 24" IN EITHER DIRECTION SHALL HAVE A MAXIMUM LEAKAGE RATE OF 40 CFM PER SQUARE FOOT AT 1" W.C. SEE FLOW DIAGRAMS FOR LOCATIONS.
- ALL SUPPLY AND RETURN DUCTWORK SHALL BE INSULATED PER WASHINGTON STATE ENERGY CODE SECTION C403.2.8.2.
- PROVIDE EACH ZONE WITH THERMOSTATIC CONTROLS THAT PROVIDE A DEADBAND OF AT LEAST 5 DEGREES FAHRENHEIT IN WHICH HEATING OR COOLING ENERGY IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM. THERMOSTAT SHALL BE CAPABLE OF THERMOSTATIC SETBACK, AUTOMATIC SETBACK AND SHUTDOWN, AND AUTOMATIC START CAPABILITIES PER WASHINGTON STATE ENERGY CODE SECTION C403.2.4.

NON-STRUCTURAL MECHANICAL COMPONENTS:

- SEISMIC BRACING AND/OR GRAVITY SUPPORT AND ANCHORAGE OF ALL MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF WASHINGTON, EXCEPT FOR ELEMENTS SPECIFICALLY SHOWN AND DETAILED ON THE STRUCTURAL DRAWINGS. THE MECHANICAL CONTRACTOR MUST HIRE THE ENGINEER AND IS RESPONSIBLE FOR ALL COSTS RELATED TO THE PURCHASE AND INSTALLATION OF NECESSARY SUPPORTS, BRACING, AND ANCHORAGE. SEISMIC BRACING AND ANCHORAGE DESIGN AND CONSTRUCTION SHALL COMPLY WITH CHAPTER 13 OF ASCE 7-10. SEE SECTION 23 05 48 FOR ADDITIONAL INFORMATION.

MECHANICAL LEGEND

HVAC

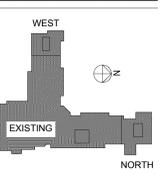
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SUPPLY DUCT UP		FLEXIBLE DUCT
	SUPPLY DUCT DOWN		VOLUME DAMPER (VD)
	RETURN, RELIEF, TRANSFER, OSA DUCT UP		MOTORIZED DAMPER
	RETURN, RELIEF, TRANSFER, OSA DUCT DOWN		FLEXIBLE CONNECTION (DUCT)
	EXHAUST DUCT UP		TURNING VANES (TV)
	EXHAUST DUCT DOWN		BACKDRAFT DAMPER (BD)
	RECTANGULAR DUCT SQUARE ELBOW UP		THERMOSTAT (TSTAT)
	RECTANGULAR DUCT, RADIUS ELBOW UP		THERMOSTAT WITH GUARD OR FLAT PLATE SEE SPECIFICATIONS
	RECTANGULAR DUCT, SQUARE ELBOW DOWN		SPACE PRESSURE SENSOR
	RECTANGULAR DUCT, RADIUS ELBOW DOWN		CARBON DIOXIDE SENSOR
	ROUND DUCT ELBOW UP		ROUND DUCT
	ROUND DUCT ELBOW DOWN		OVAL DUCT
	CEILING AIR TERMINAL - SQUARE		AIR TERMINAL SIZE, TYPE & CFM
	SQUARE DUCT		

PLUMBING/HYDRONIC

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CHILLED WATER SUPPLY		DOMESTIC COLD WATER (CW)
	CHILLED WATER RETURN		DOMESTIC HOT WATER (HW)
	HEATING WATER SUPPLY		DOMESTIC HOT WATER CIRCULATING (HWC)
	HEATING WATER RETURN		SOIL, WASTE (S, W)
	HYDRONIC WATER SUPPLY		VENT (V), OR HIDDEN BELOW WASTE
	HYDRONIC WATER RETURN		NATURAL GAS PIPING
	GATE VALVE (GV)		WASTE OR VENT UP
	GLOBE VALVE		WALL CLEANOUT
	BUTTERFLY VALVE		FLUSH CLEANOUT (FCO/SCO)
	PRESSURE REDUCING VALVE (PRV)		CLEAN OUT (CO)
	CHECK VALVE (CV)		IN LINE WASTE CONNECTION
	FLOW CONTROL VALVE		P-TRAP
	TEMP./PRESS. RELIEF VALVE (T&PRV)		BRANCH PIPE DOWN
	BALL VALVE		BRANCH PIPE UP
	BALANCING COCK (BC)		TEE & UP
	2-WAY CONTROL VALVE		TEE
	3-WAY CONTROL VALVE		ELBOWS, 90° & 45°
	PIPE DOWN		CAP
	PIPE UP		PUMP
	BRANCH-TOP CONNECTION		WALL HYDRANT
	BRANCH-BOTTOM CONNECTION		THERMOMETER
	BRANCH-SIDE CONNECTION		PRESSURE GAGE
	FLOW DIRECTION		FLOOR DRAIN
	VALVE IN RISER / DROP		FLOOR FUNNEL DRAIN
	PIPE ANCHOR		CROSSING LINES, NON CONNECTING
	PIPE GUIDE		PIPE CONTINUATION
	FLEXIBLE CONNECTION (PIPE)		FLOOR SINK
	REDUCER		MECHANICAL CONTRACTOR
	STRAINER		ELECTRICAL CONTRACTOR
	UNION		GENERAL CONTRACTOR
	THRUST BLOCK (TB)		POINT OF CONNECTION
	VACUUM BREAKER		BELOW FINISHED FLOOR
	DRAIN VALVE		ABOVE FINISHED FLOOR
	TRAP PRIMER WITH ACCESS PANEL		GAS COCK



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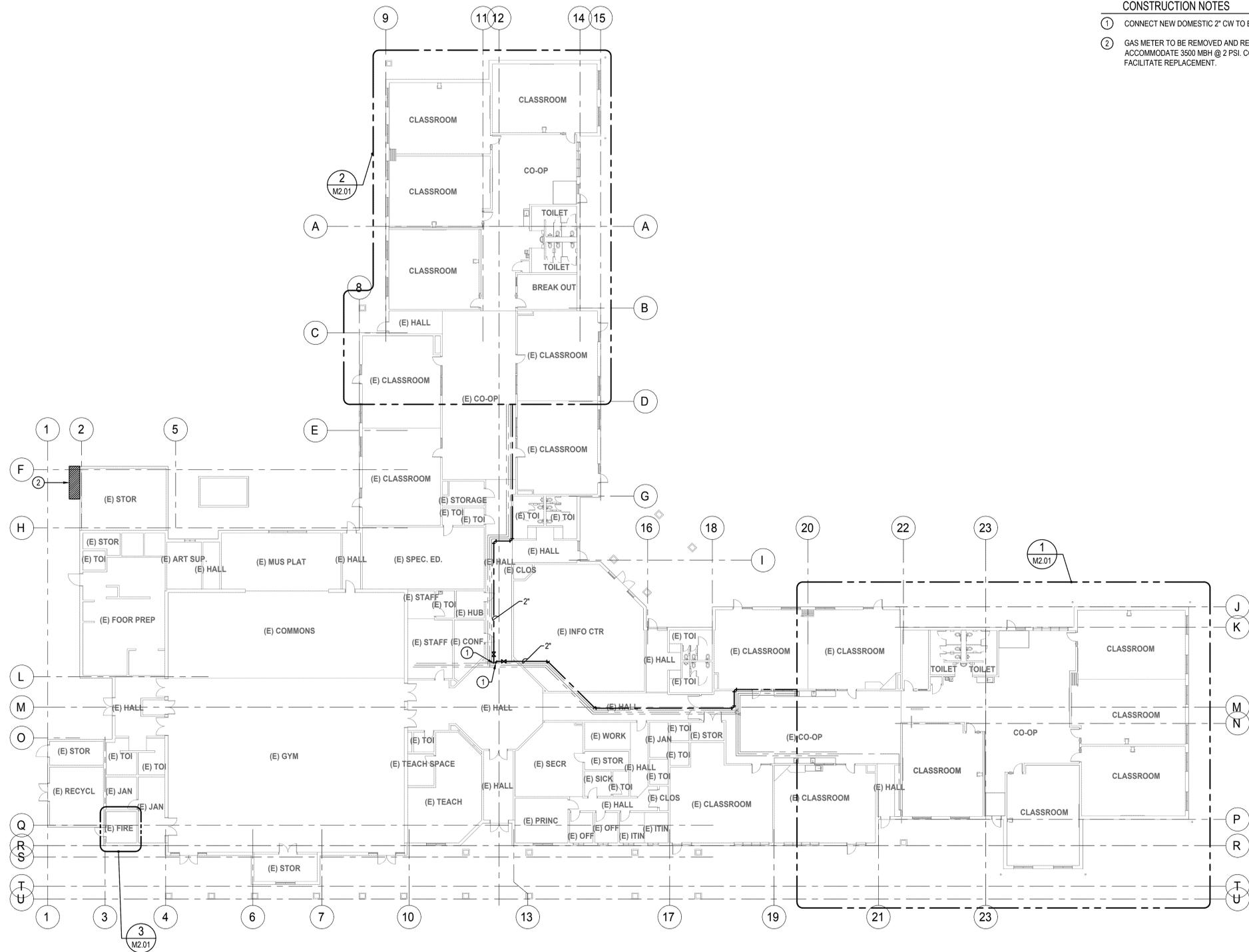
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GENERAL NOTES

1. PIPING AND EQUIPMENT SHOWN LIGHT IS EXISTING TO REMAIN. PIPING AND EQUIPMENT SHOWN DARK IS NEW WORK.
2. PIPING & EQUIPMENT SHOWN IS SCHEMATIC IN NATURE. CONTRACTOR TO PROVIDE ADDITIONAL OFFSETS AND TRANSITIONS AS NECESSARY TO FACILITATE SYSTEM AND EQUIPMENT INSTALLATION.

CONSTRUCTION NOTES

1. CONNECT NEW DOMESTIC 2" CW TO EXISTING 3" CW MAIN.
2. GAS METER TO BE REMOVED AND REPLACED BY GAS PURVEYOR. NEW METER TO ACCOMMODATE 3500 MBH @ 2 PSI. CONTRACTOR SHALL COORDINATE AND FACILITATE REPLACEMENT.

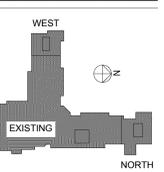


1 PLUMBING COMPOSITE FLOOR PLAN
1/16" = 1'-0"





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**EXISTING FAN COIL
BALANCING TABLE**

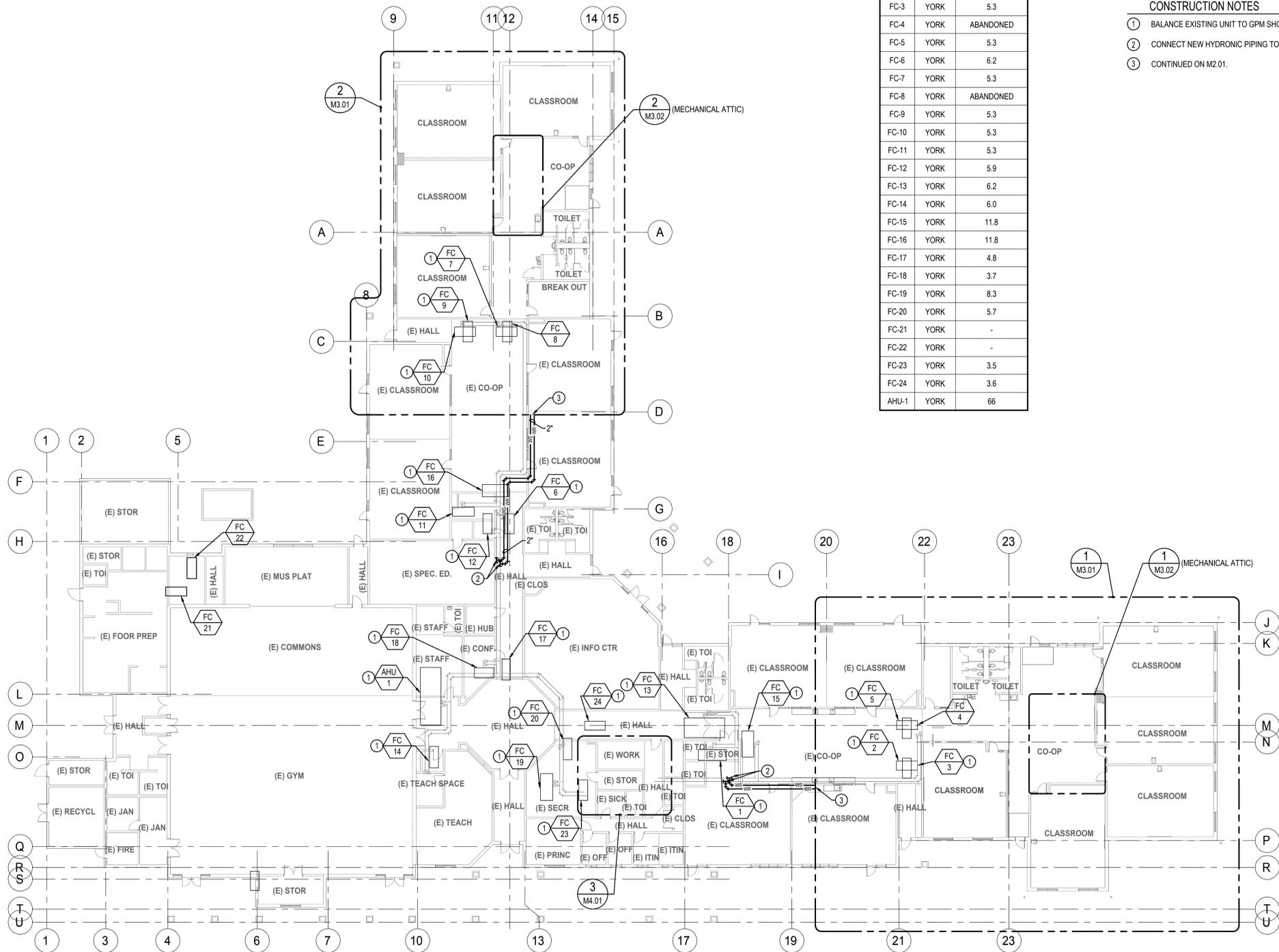
UNIT NO.	MFR.	GPM
FC-1	YORK	5.3
FC-2	YORK	5.3
FC-3	YORK	5.3
FC-4	YORK	ABANDONED
FC-5	YORK	5.3
FC-6	YORK	6.2
FC-7	YORK	5.3
FC-8	YORK	ABANDONED
FC-9	YORK	5.3
FC-10	YORK	5.3
FC-11	YORK	5.3
FC-12	YORK	5.9
FC-13	YORK	6.2
FC-14	YORK	6.0
FC-15	YORK	11.8
FC-16	YORK	11.8
FC-17	YORK	4.8
FC-18	YORK	3.7
FC-19	YORK	8.3
FC-20	YORK	5.7
FC-21	YORK	-
FC-22	YORK	-
FC-23	YORK	3.5
FC-24	YORK	3.6
AHU-1	YORK	66

GENERAL NOTES

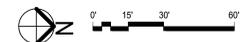
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2. PIPING & EQUIPMENT SHOWN IS SCHEMATIC IN NATURE. CONTRACTOR TO PROVIDE ADDITIONAL OFFSETS AND TRANSITIONS AS NECESSARY TO FACILITATE SYSTEM AND EQUIPMENT INSTALLATION.

CONSTRUCTION NOTES

1. BALANCE EXISTING UNIT TO GPM SHOWN ON AHU BALANCING TABLE THIS SHEET.
2. CONNECT NEW HYDRONIC PIPING TO EXISTING 3" WS/WR.
3. CONTINUED ON M2.01.



1 HVAC COMPOSITE FLOOR PLAN
1/16" = 1'-0"

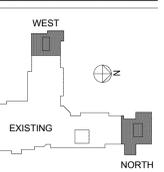


**HVAC
COMPOSITE
FLOOR PLAN**

M1.01



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**PLUMBING
UNDERGROUND
PLANS**

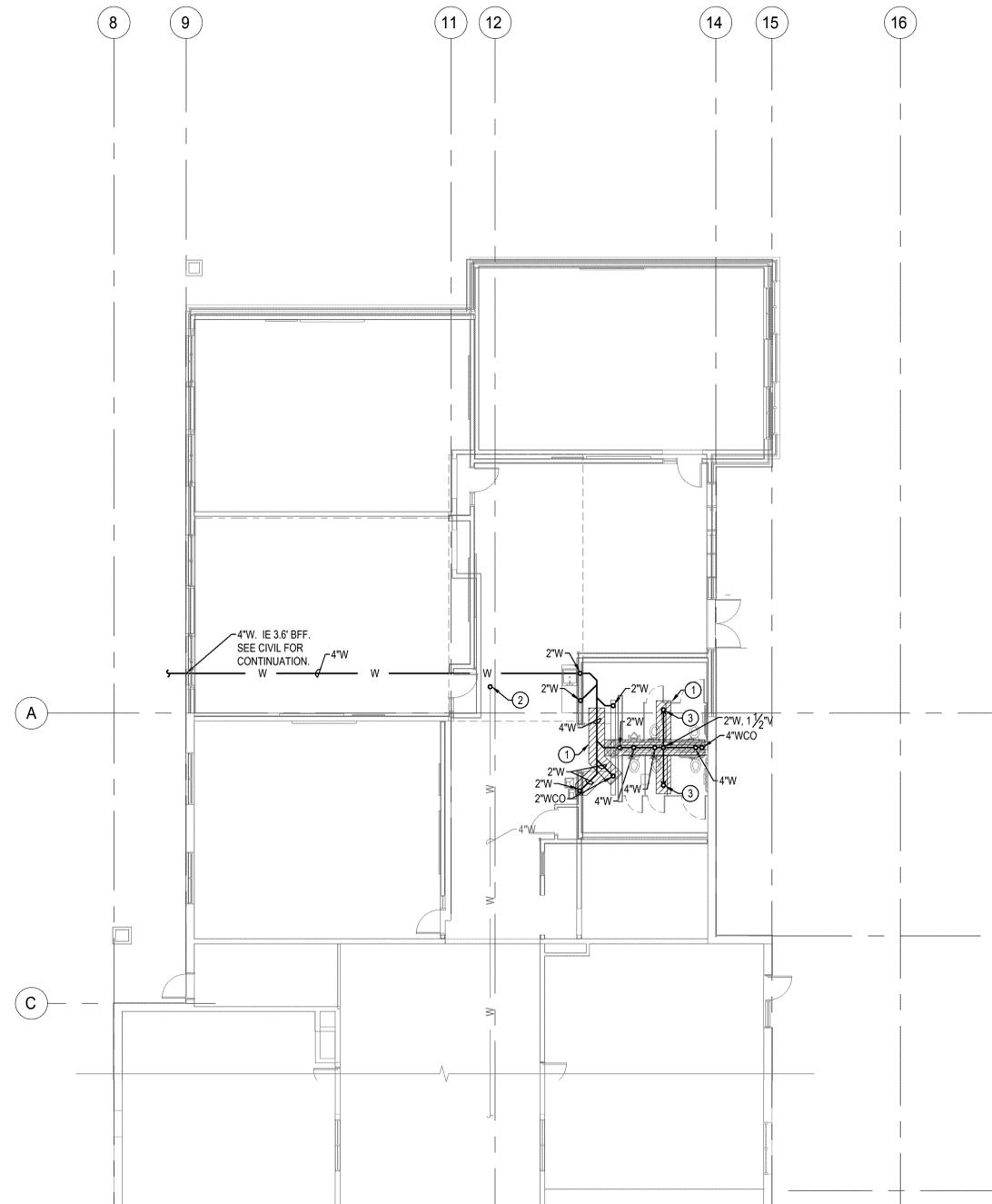
M2.00

GENERAL NOTES

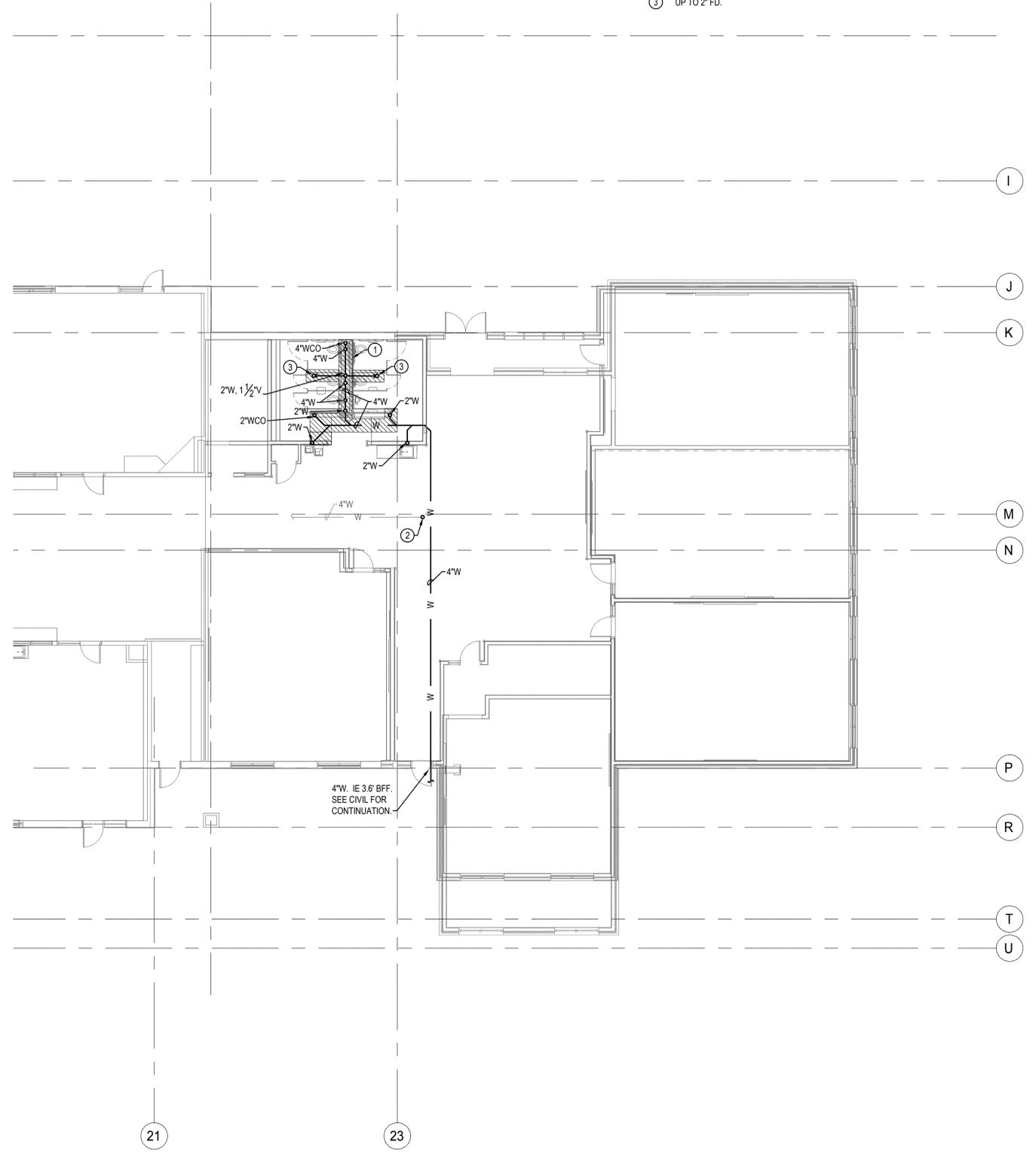
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2. EQUIPMENT & PIPING SHOWN IS SCHEMATIC IN NATURE. CONTRACTOR TO PROVIDE ADDITIONAL OFFSETS AND TRANSITIONS AS NECESSARY TO FACILITATE SYSTEM AND EQUIPMENT INSTALLATION.
3. INSTALL ALL SANITARY WASTE PIPING AT 1/4" PER 1'-0" SLOPE.

CONSTRUCTION NOTES

1. SAW CUT EXISTING SLAB TO ACCOMMODATE INSTALLATION OF WASTE PIPING. SEE ARCHITECTURAL DRAWINGS FOR SLAB PATCHING.
2. EXTEND EXISTING CLEANOUT FROM GRADE UP TO NEW FINISHED FLOOR ELEVATION.
3. UP TO 2" FD.



2 PLUMBING UNDERGROUND - WEST PLAN
1/8" = 1'-0"

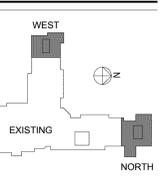


1 PLUMBING UNDERGROUND - NORTH PLAN
1/8" = 1'-0"





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**PIPING FIRST
FLOOR PLANS**

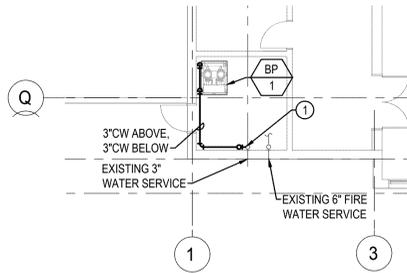
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GENERAL NOTES

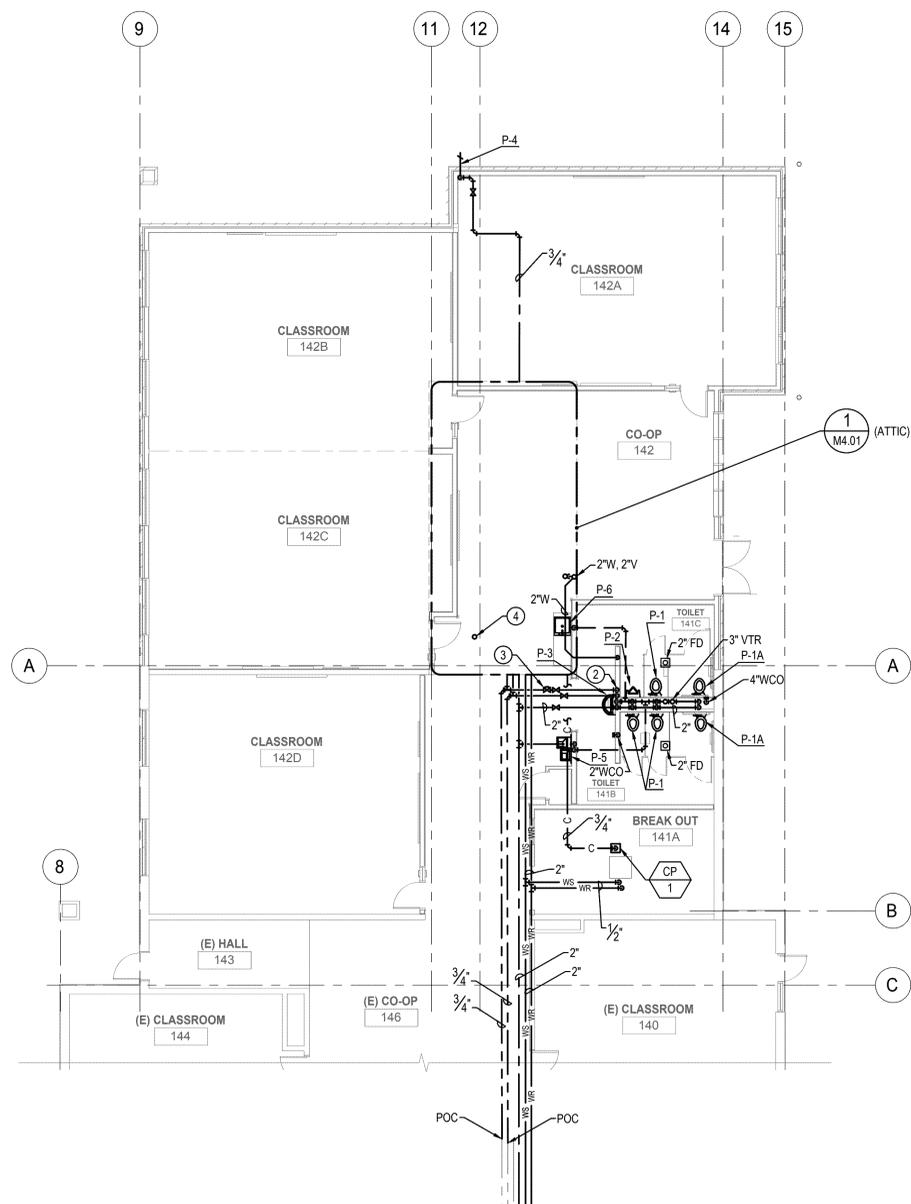
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CONSTRUCTION NOTES

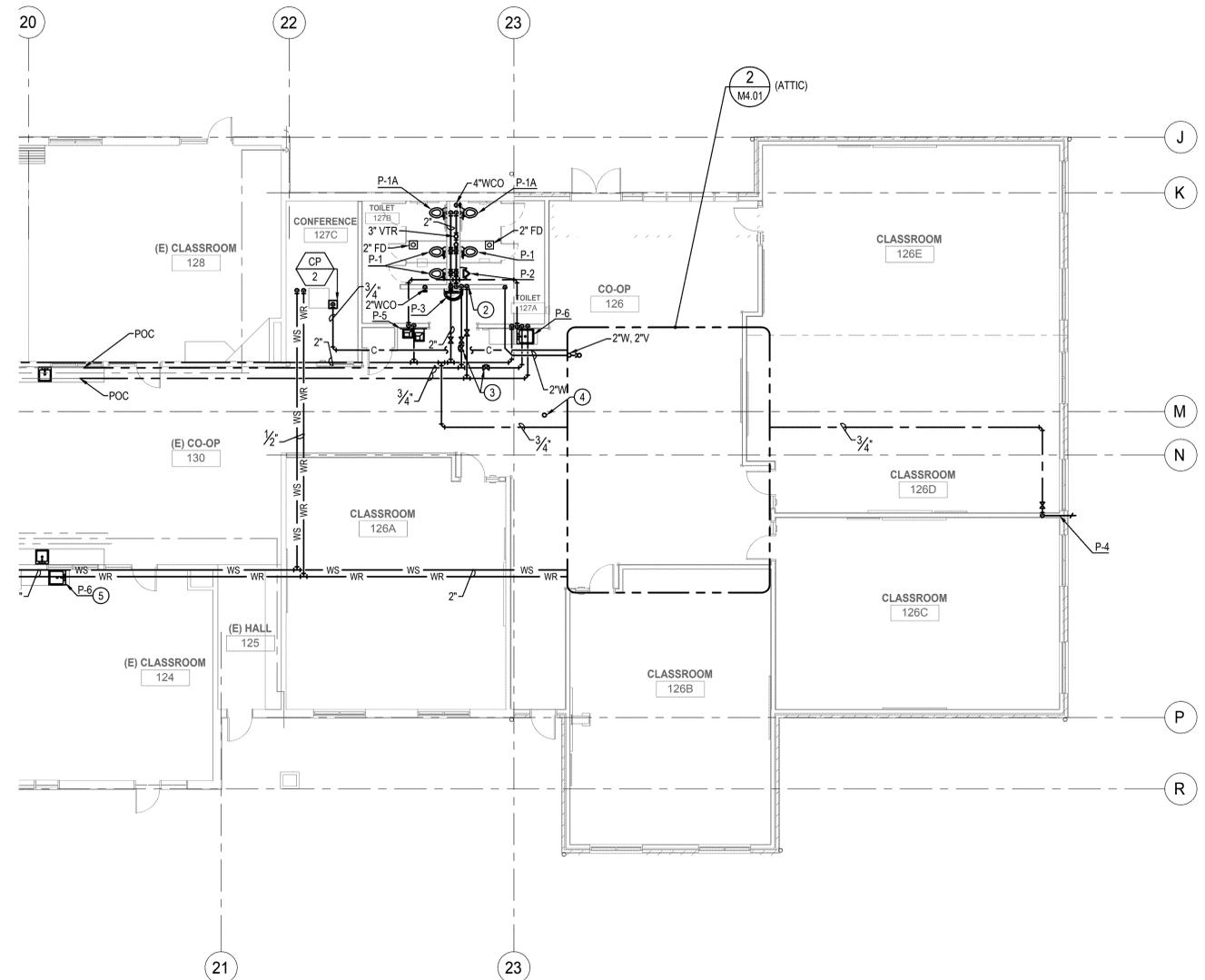
1. CONNECT DOMESTIC 3" CW TO EXISTING 3" CW MAIN. SEE DIAGRAM ON SHEET M5.01 FOR CONNECTION DETAILS.
2. ROUTE HW DOWN TO FIXTURE P-3. SEE DETAIL 2 ON SHEET M5.01.
3. PROVIDE THERMOSTATIC BALANCING VALVE.
4. 4" FCO EXTENDED FROM SANITARY SEWER SERVING EXISTING BUILDING.
5. CONNECT TO EXISTING CW, HW, WASTE, AND VENT SERVING ADJACENT SINK.



3 PLUMBING FIRST FLOOR - ROOM FIRE 162 PLAN
1/8" = 1'-0"



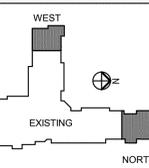
2 PIPING FIRST FLOOR - WEST PLAN
1/8" = 1'-0"



1 PIPING FIRST FLOOR - NORTH PLAN
1/8" = 1'-0"



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ADDITION**

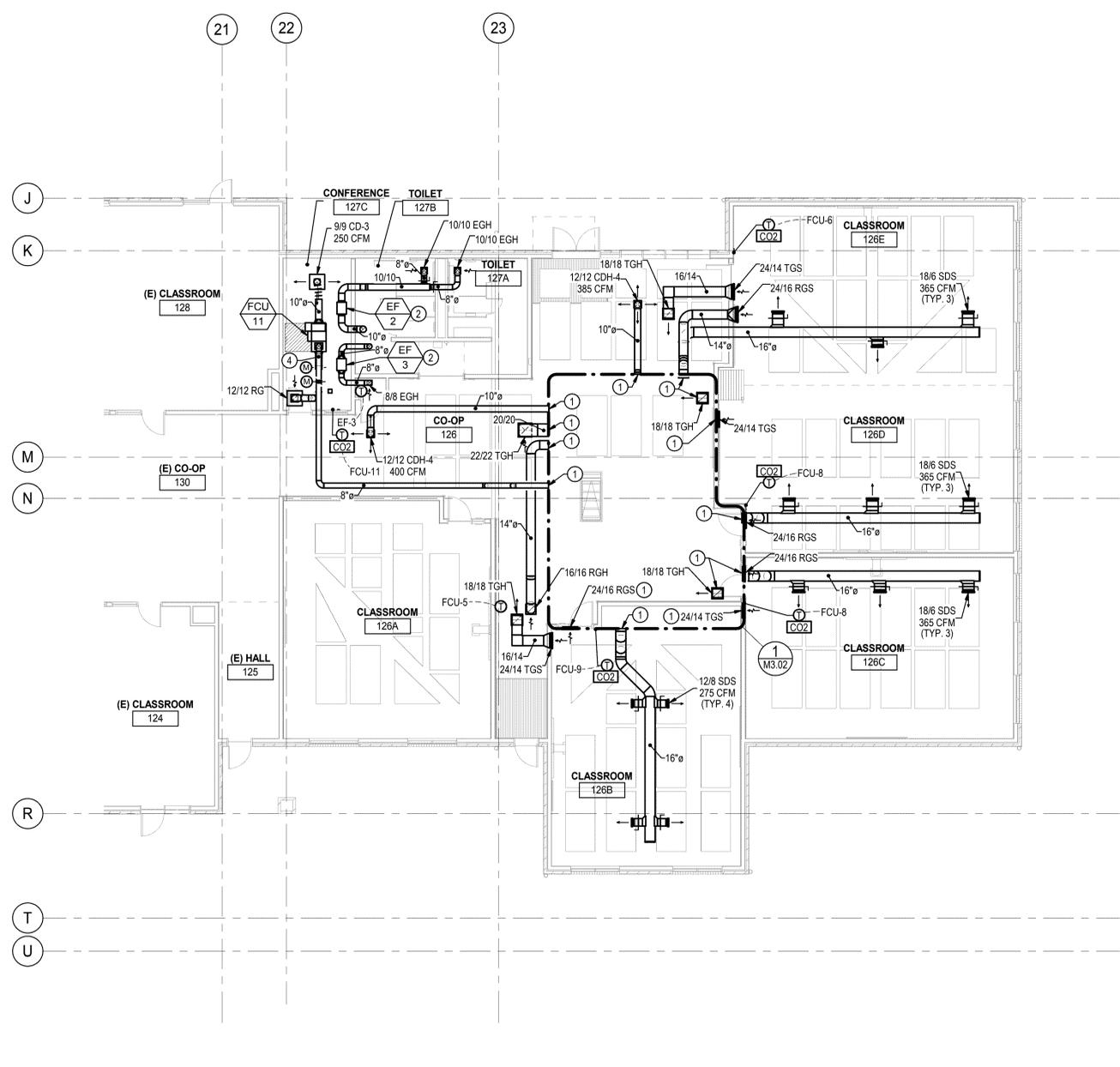
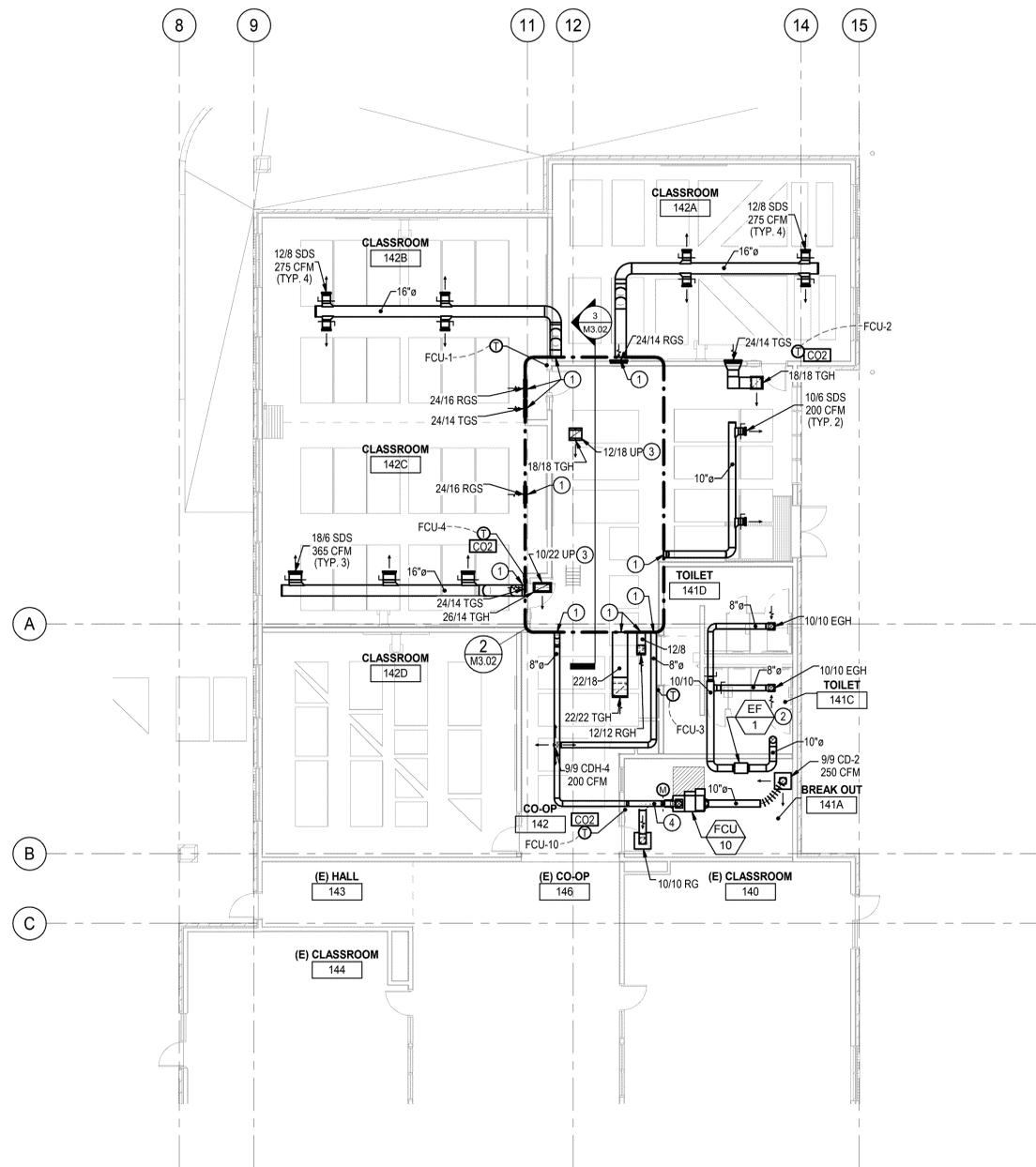
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**HVAC FLOOR
PLANS**

CONSTRUCTION NOTES

- ① CONTINUED ON SHEET M3.02.
- ② EXHAUST TO ROOF VENT CAP. PROVIDE MOTORIZED DAMPER AT BUILDING EXIT.
- ③ TRANSFER DUCT UP TO ATTIC. CONTINUED ON SHEET M3.02.
- ④ 8" OSA DUCT ABOVE AND 10" RETURN DUCT BELOW. PROVIDE MOTORIZED DAMPER AT EACH DUCT. CONNECT OSA AND RETURN AIR AT FAN COIL MIXING BOX.

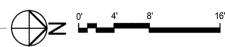


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② HVAC FIRST FLOOR - WEST PLAN
1/8" = 1'-0"



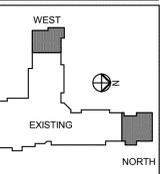
① HVAC FIRST FLOOR - NORTH PLAN
1/8" = 1'-0"



BID SET



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Vancouver School District
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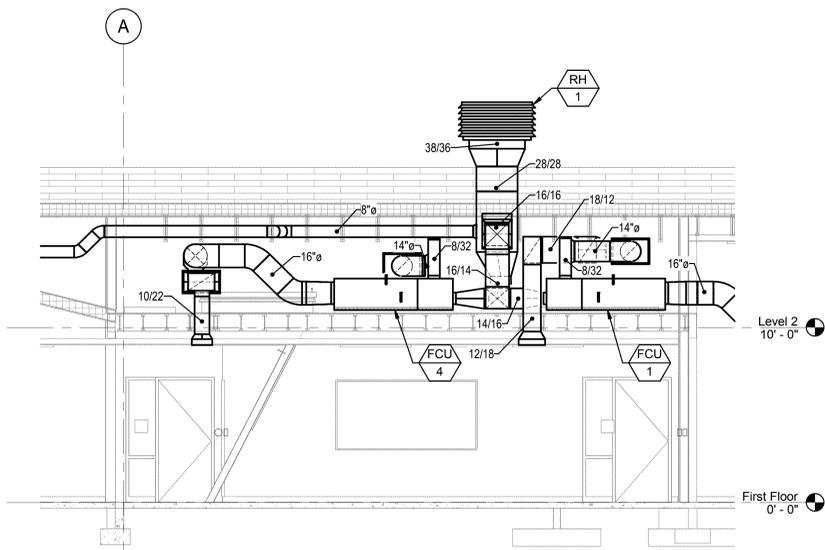
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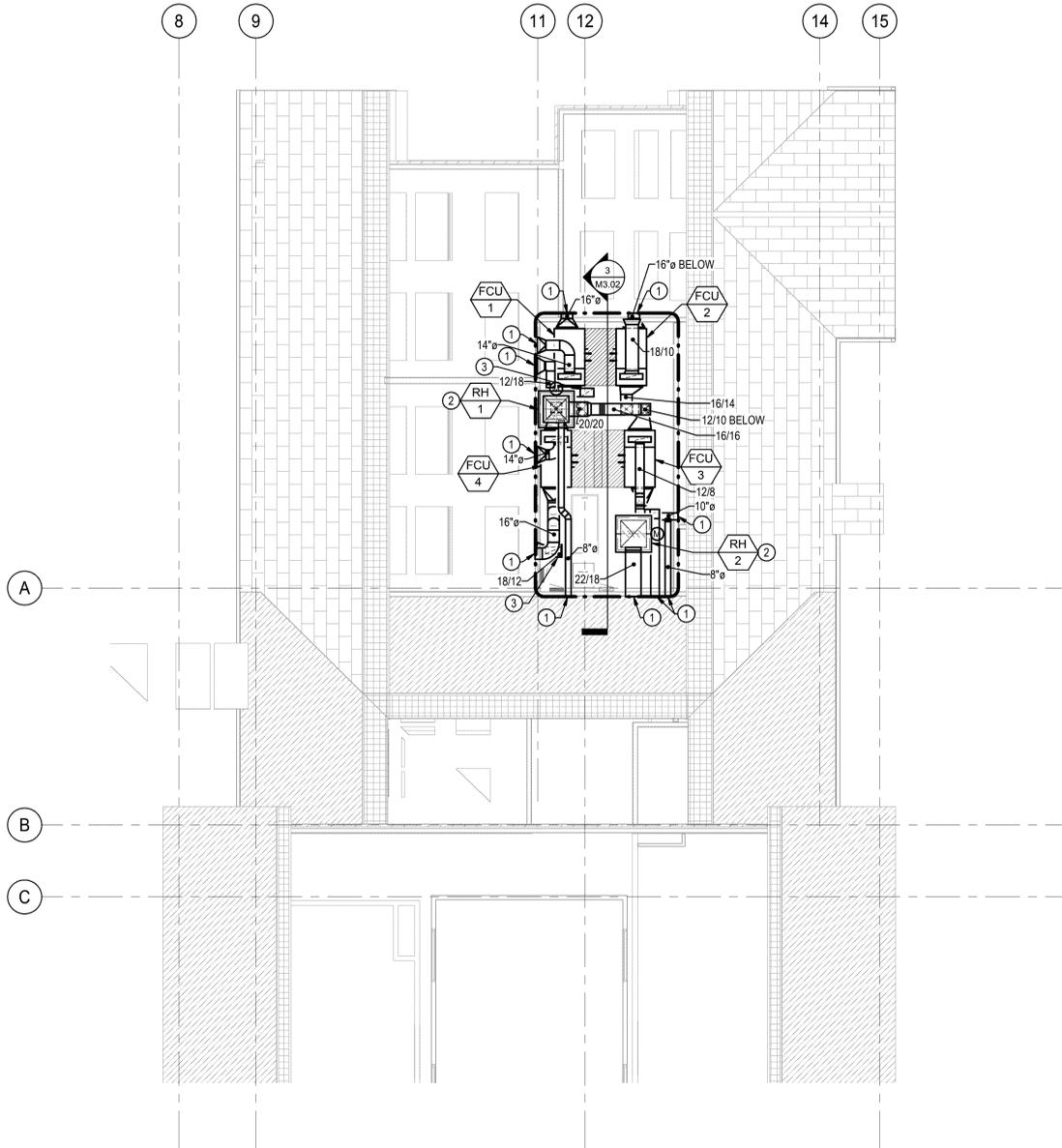
**HVAC ATTIC
PLANS**

CONSTRUCTION NOTES

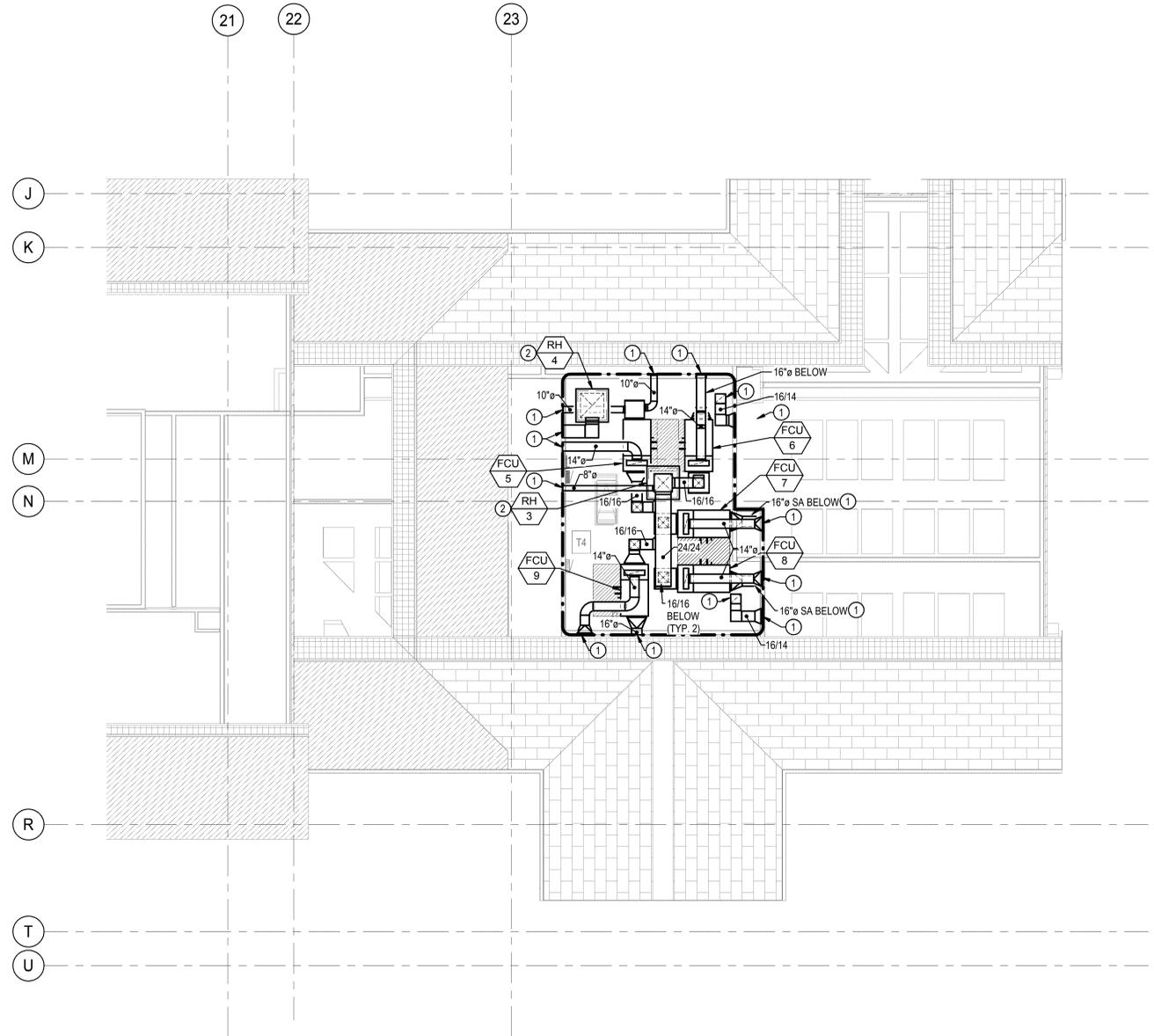
- ① CONTINUED ON SHEET M3.01.
- ② INSTALL MOTORIZED DAMPER AND COUNTER-BALANCED BACKDRAFT DAMPER SET TO 0.05" W.C. IN SPACE.
- ③ TRANSFER DUCT DOWN TO FIRST FLOOR. CONTINUED ON SHEET M3.01.



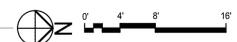
③ MECHANICAL SECTION - WEST ATTIC
1/4" = 1'-0"



② HVAC ATTIC - WEST PLAN
1/8" = 1'-0"



① HVAC ATTIC - NORTH PLAN
1/8" = 1'-0"

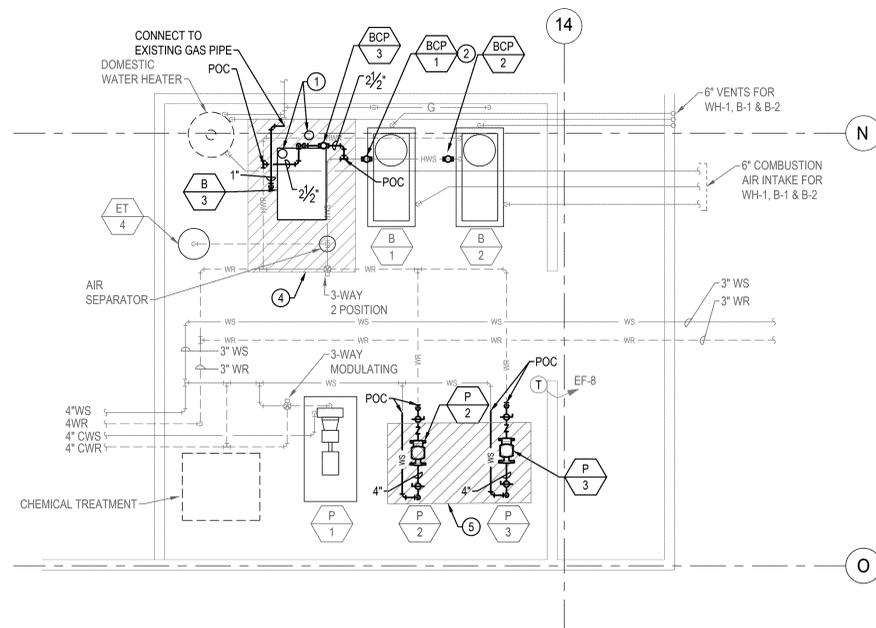


GENERAL NOTES

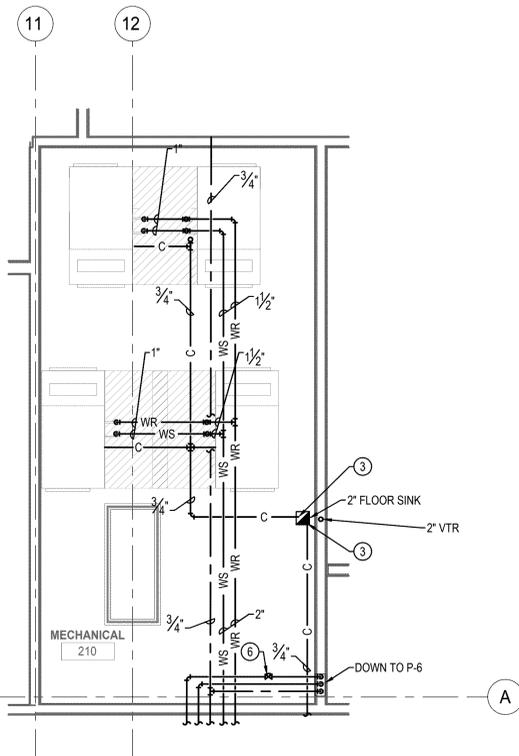
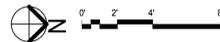
1. PIPING AND EQUIPMENT SHOWN LIGHT IS EXISTING TO REMAIN. PIPING AND EQUIPMENT SHOWN DARK IS NEW WORK.
2. PIPING & EQUIPMENT SHOWN IS SCHEMATIC IN NATURE. CONTRACTOR TO PROVIDE ADDITIONAL OFFSETS AND TRANSITIONS AS NECESSARY TO FACILITATE SYSTEM AND EQUIPMENT INSTALLATION.

CONSTRUCTION NOTES

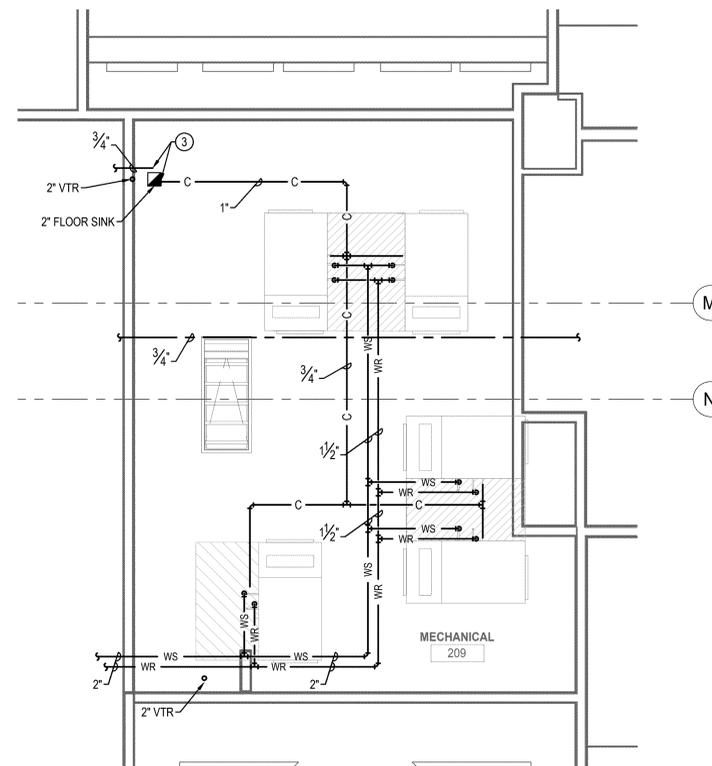
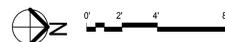
1. 6" COMBUSTION AIR AND 6" VENT FLUE FOR BOILER INSTALLED THROUGH ROOF PER MANUFACTURER REQUIREMENTS.
2. PUMP INSTALLED IN RETURN PIPE TO BOILER 1.
3. TERMINATE CONDENSATE PIPE INDIRECTLY AT FLOOR SINK.
4. PROVIDE A NEW 4" CONCRETE HOUSEKEEPING PAD.
5. EXISTING CONCRETE HOUSEKEEPING PADS TO REMAIN.
6. PROVIDE THERMOSTATIC BALANCING VALVE.



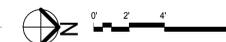
3 HVAC AND PIPING PLAN BOILER ROOM
1/4" = 1'-0"



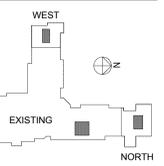
2 PIPING ATTIC - WEST PLAN
1/4" = 1'-0"



1 PIPING ATTIC PLAN - NORTH PLAN
1/4" = 1'-0"



#	REVISIONS	DATE



Vancouver School District
**FRANKLIN
ELEMENTARY
SCHOOL**

1698, 5206 NW Franklin St.
Vancouver, WA 98663

JOB NO: 1806
ISSUE DATE: 8/19/2016
Stamp Area

**ENLARGED
PIPING PLANS**

M4.01



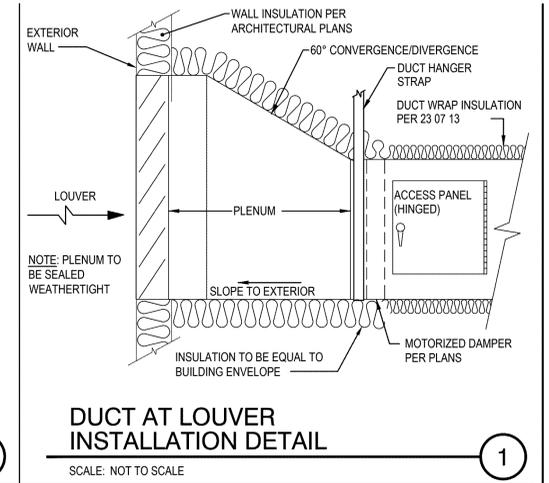
REVISIONS DATE

Vancouver School District
**FRANKLIN
ELEMENTARY
SCHOOL**

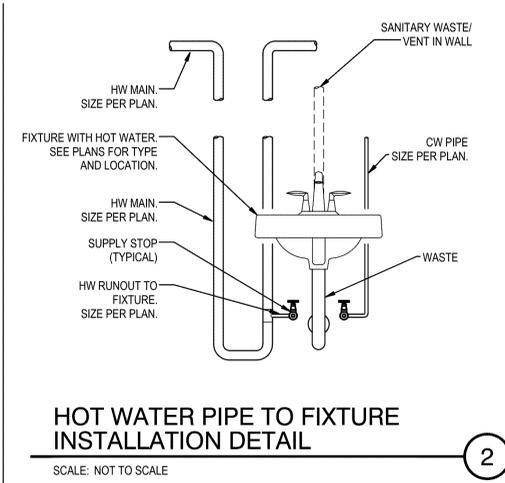
1698, 5206 NW Franklin St.
Vancouver, WA 98663

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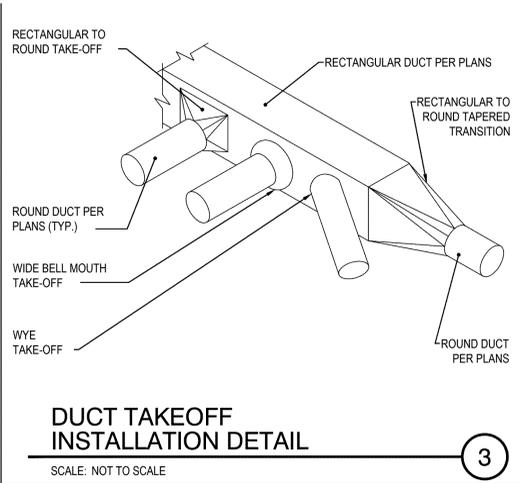
MECHANICAL
DETAILS



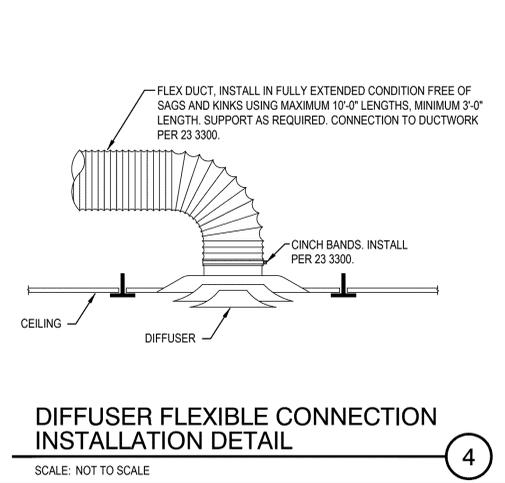
**DUCT AT LOUVER
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



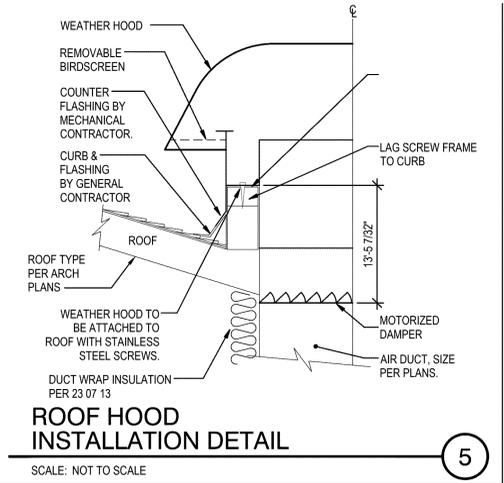
**HOT WATER PIPE TO FIXTURE
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



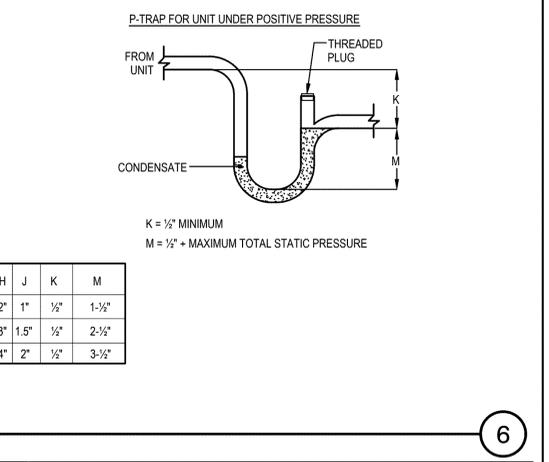
**DUCT TAKEOFF
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



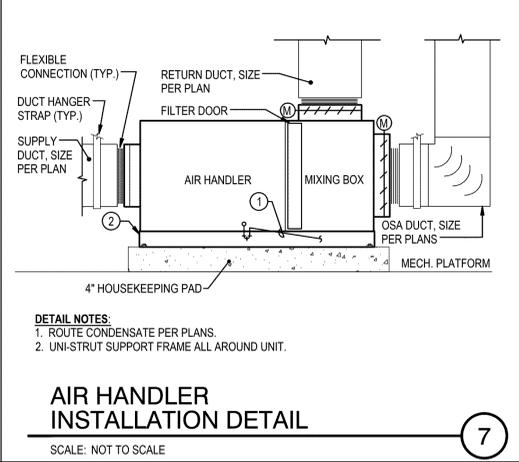
**DIFFUSER FLEXIBLE CONNECTION
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



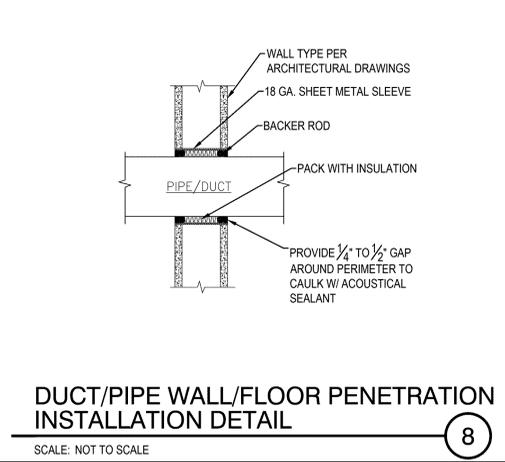
**ROOF HOOD
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



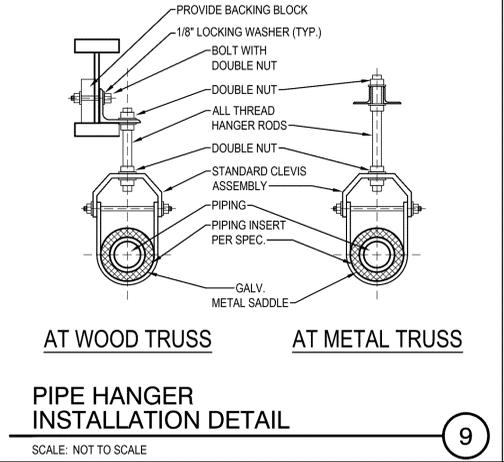
**CONDENSATE P-TRAP
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



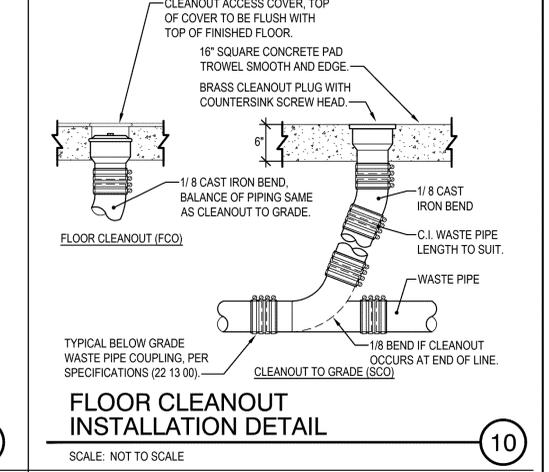
**AIR HANDLER
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



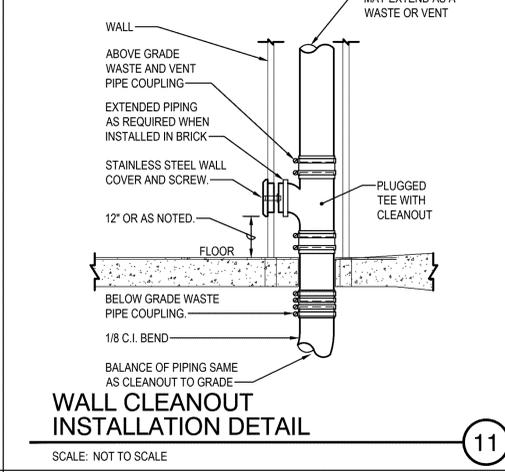
**DUCT/PIPE WALL/FLOOR PENETRATION
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



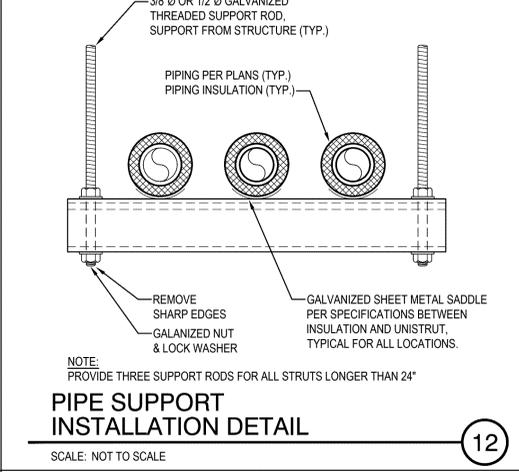
**PIPE HANGER
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



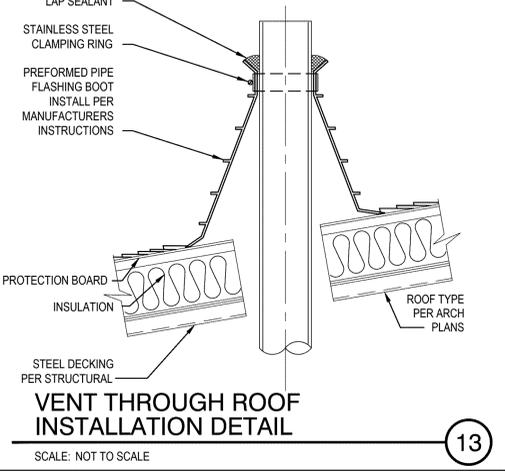
**FLOOR CLEANOUT
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



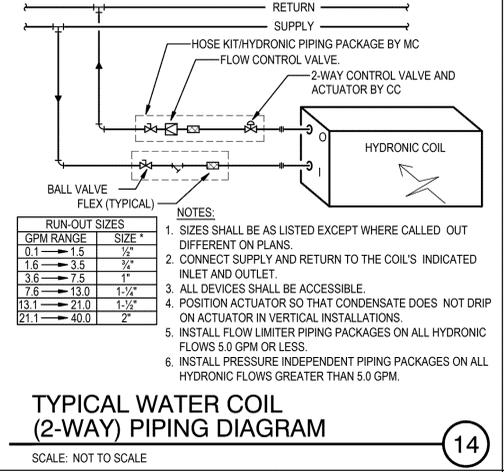
**WALL CLEANOUT
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



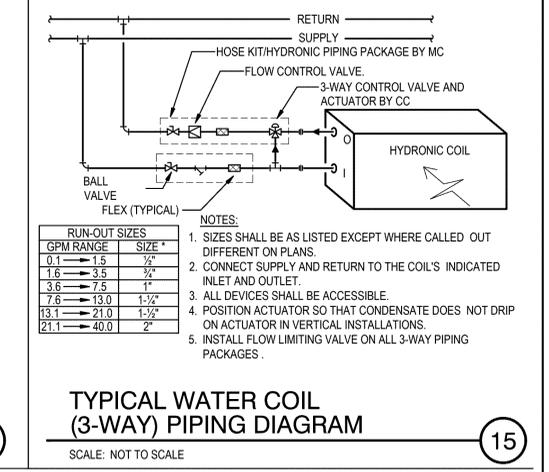
**PIPE SUPPORT
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



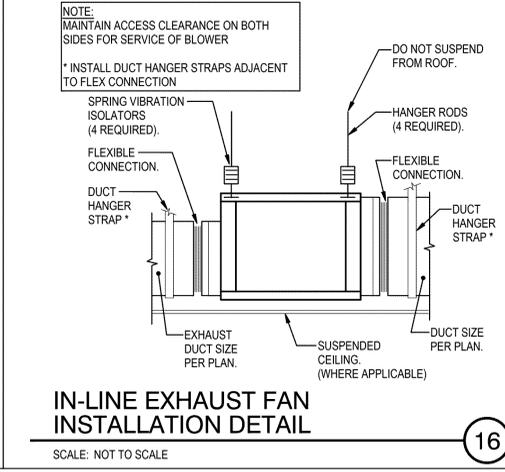
**VENT THROUGH ROOF
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



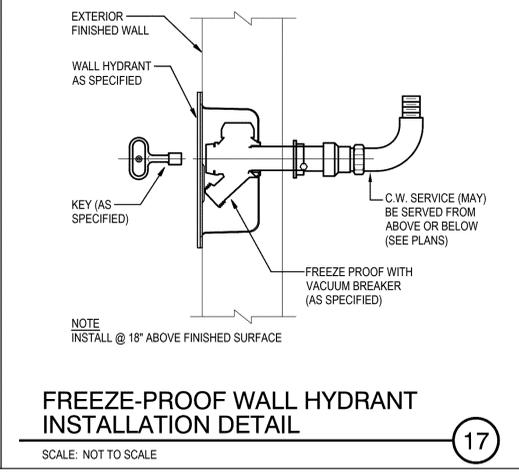
**TYPICAL WATER COIL
(2-WAY) PIPING DIAGRAM**
SCALE: NOT TO SCALE



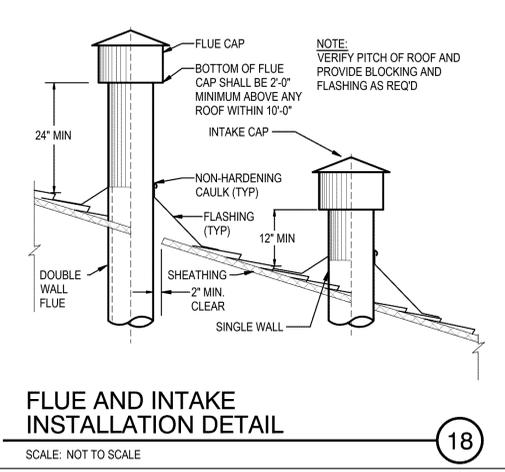
**TYPICAL WATER COIL
(3-WAY) PIPING DIAGRAM**
SCALE: NOT TO SCALE



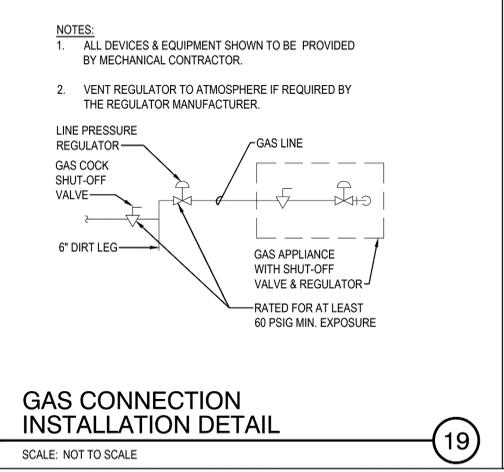
**IN-LINE EXHAUST FAN
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



**FREEZE-PROOF WALL HYDRANT
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



**FLUE AND INTAKE
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



**GAS CONNECTION
INSTALLATION DETAIL**
SCALE: NOT TO SCALE



#	REVISIONS	DATE

Vancouver School District
**FRANKLIN
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SCHOOL**

1698, 5206 NW Franklin St.
Vancouver, WA 98663

JOB NO: 180E
ISSUE DATE: 8/19/2016
Stamp Area

**HYDRONIC
DIAGRAM**

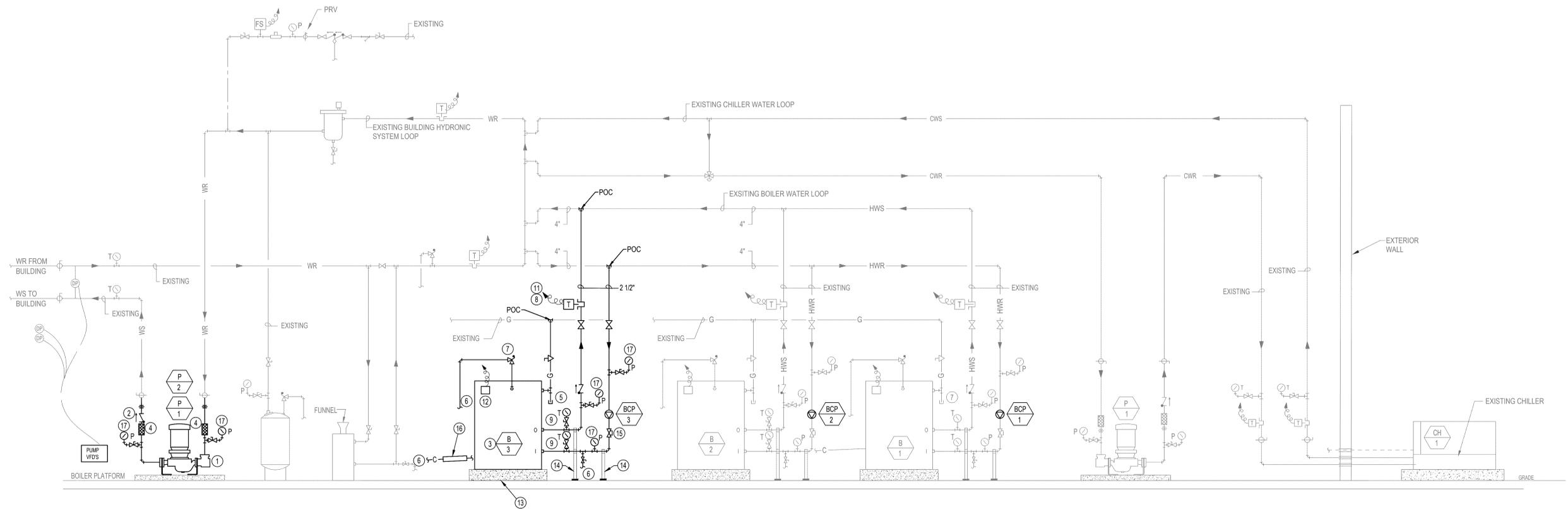
M6.01

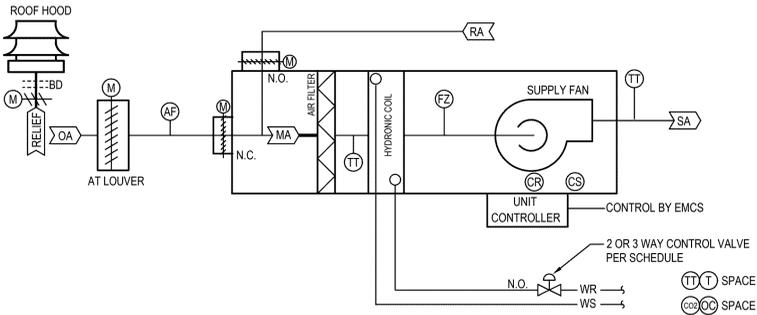
HYDRONIC DIAGRAM GENERAL NOTES

1. ALL ITEMS SHOWN DARK REPRESENT NEW WORK. ALL ITEMS SHOWN LIGHT REPRESENT EXISTING TO REMAIN.
2. ALL PIPING ON DIAGRAM IS FULL SIZE UNLESS OTHERWISE NOTED.
3. WS & WR IS DEFINED AT THE SYSTEM PUMPS.
4. HWS & HWR IS DEFINED AT THE BOILERS.
5. CWS & CWR IS DEFINED AT THE CHILLER.
6. ALL GAUGES SHALL BE PROVIDED WITH ISOLATION VALVES.
7. SEE SEQUENCE OF OPERATION ON SHEET M7.01.

HYDRONIC DIAGRAM CONSTRUCTION NOTES

- 1 PROVIDE SUCTION DIFFUSER WITH STRAINER. (FULL SIZE SUCTION).
- 2 PROVIDE TIGHT SHUT-OFF BALANCING VALVE AND CHECK VALVE. TRIPLE DUTY VALVE MAY BE USED IN LIEU OF SEPARATE CHECK AND BALANCING VALVE.
- 3 FLUE AND COMBUSTION AIR INTAKE INSTALLATION PER MANUFACTURERS RECOMMENDATION.
- 4 FLEXIBLE EQUIPMENT CONNECTION.
- 5 6" LONG DIRT LEG.
- 6 PIPE TO NEAREST FLOOR DRAIN.
- 7 ASME PRESSURE RELIEF VALVE SUPPLIED W/BOILERS. (75PSI)
- 8 TEMPERATURE SENSOR BY EMCS. INSTALLED BY MC.
- 9 IMMERSION THERMOMETER AND WELL ASSEMBLY.
- 10 SYSTEM PRESSURE RELIEF VALVE. (75PSI)
- 11 TO EMCS BY CONTROLS SUB-CONTRACTOR.
- 12 BOILER OPERATING, HIGH LIMIT AND CODE REQUIRED SAFETY CONTROLS.
- 13 EQUIPMENT TO SIT ON 4" CONCRETE HOUSEKEEPING PAD.
- 14 PIPE STAND (TYP).
- 15 MANUAL CIRCUIT BALANCE VALVE.
- 16 BOILER CONDENSATE NEUTRALIZING TUBE, JIM BOILER WORKS MODEL JM-30 OR EQUAL.
- 17 PRESSURE GAUGE.





SINGLE ZONE VARIABLE VOLUME UNIT CONTROL SEQUENCE (AHU-X)

A. GENERAL

- (VAR) IS AN ABBREVIATION THAT THE PRECEDING NOUN IS AN EMCS VARIABLE VALUE.
- SPACE TEMPERATURE SENSORS SHALL BE EQUIPPED WITH PUSHBUTTONS TO PROVIDE UNOCCUPIED OVERRIDE REQUEST AND SPACE TEMPERATURE SETPOINT ADJUSTMENT AS REQUIRED. OVERRIDE RUNTIME SHALL BE 2 HOURS (VAR). NIGHT SETBACK TEMPERATURE SETPOINT SHALL BE 55°F HEATING AND 85°F COOLING (VAR).

B. AHU SUPPLY FAN

- SUPPLY FAN SHALL START VIA A SCHEDULE (VAR), WARM-UP MODE COMMAND (VAR) OR OVERRIDE COMMAND (VAR).
 - FAN SPEED MODULATES TO MAINTAIN HEATING OR COOLING SETPOINT. SPEED MODULATES FROM MINIMUM SPEED 50% (ADJUSTABLE) TO MAXIMUM SPEED 100% WHEN:
 - COOLING MODE:
 - ECONOMIZER IS FULLY OPEN (WHEN OUTSIDE AIR TEMPERATURE ≤ RETURN AIR TEMPERATURE) AND BEFORE MECHANICAL COOLING VALVE OPENS.
 - ECONOMIZER IS AT MINIMUM POSITION (WHEN OUTSIDE AIR TEMPERATURE > RETURN AIR TEMPERATURE) AND BEFORE MECHANICAL HYDRONIC VALVE OPENS.
 - HEATING MODE: HEATING COIL IS FULLY OPEN.
 - FAN SPEED REMAINS AT MINIMUM SPEED WHEN:
 - COOLING MODE: ECONOMIZER IS LESS THAN FULLY OPEN AND OUTSIDE AIR TEMPERATURE IS LESS THAN SPACE TEMPERATURE
 - HEATING MODE: HYDRONIC VALVE IS NOT FULLY OPEN.
 - DEADBAND MODE.

WARM-UP MODE COMMAND IS GENERATED BY AN EMCS OPTIMIZATION ROUTINE. OVERRIDE COMMAND IS TRIGGERED BY SPACE TEMPERATURE SENSOR UNOCCUPIED OVERRIDE REQUEST, SPACE TEMPERATURE SENSOR CALLING FOR NIGHT SETBACK CONDITIONING, OR BY EMCS USER INTERFACE. SEE SCHEDULES FOR HEATING AND COOLING AIRFLOWS.

2. FAN ALARMS:

- FAN ALARM ACTIVATES IF FAN STATUS FAILS TO ACTIVATE AFTER FAN HAS BEEN STARTED. EMCS RECORDS FAN ALARM. SOFTWARE FAN SHUTDOWN UPON LOW LIMIT ALARM ACTIVATION. EMCS RECORDS LOW LIMIT ALARM. AUTO RESET THREE TIMES PRIOR TO A SOFTWARE RESET TO PREVENT RECYCLING.
- HARDWARE FAN SHUTDOWN UPON ACTIVATION OF FIRE/SMOKE ALARM. EMCS RECORDS FIRE/SMOKE ALARM HARDWIRED FAN SHUTDOWN UPON ACTIVATION OF FREEZESTAT ALARM. FREEZESTAT SHALL HAVE AUTOMATIC RESET. ALARM SHALL BE LOGGED AT EACH FREEZESTAT TRIP.

C. AHU ECONOMIZER

- ECONOMIZER CONSISTS OF THE RETURN AIR DAMPER AND OUTSIDE AIR DAMPER WORKING IN OPPOSITION. OUTSIDE AIR DAMPER SPRINGS NORMALLY CLOSED AND RETURN AIR DAMPER SPRINGS NORMALLY OPEN.
- ECONOMIZER IS CLOSED WHEN FAN IS OFF, THE SYSTEM IS IN WARM-UP MODE OR THE SYSTEM IS IN NIGHT SETBACK MODE.
- MODULATE MINIMUM DAMPER POSITION FOR CO2 CONTROL. GENERATE ALARM IF SPACE CO2 RISES ABOVE 1000 PPM (VAR).
- ECONOMIZER CLOSES TO MINIMUM DAMPER POSITION (VAR) IN HEATING MODE. ESTABLISH POSITION BASED ON SCHEDULED AIRFLOW AND AIRFLOW MONITORING STATION MEASUREMENTS.
- ECONOMIZER MODULATES AS FIRST STAGE OF COOLING TO MAINTAIN SPACE TEMPERATURE SETPOINT (VAR).
- ECONOMIZER CLOSES TO MINIMUM DAMPER POSITION WHEN THE OUTSIDE AIR TEMPERATURE EXCEEDS THE RETURN AIR TEMPERATURE.
- ECONOMIZER CLOSES COMPLETELY VIA A MIXED AIR LOW LIMIT AIR TEMPERATURE SETPOINT OF 40°F (VAR).

D. OUTSIDE AIRFLOW MONITORING

- OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE MINIMUM OUTSIDE AIR QUANTITY LISTED VIA THE AIRFLOW MONITORING STATION.
- OPERATION SHALL BE OVERRIDDEN BY ECONOMIZER AND DEMAND CONTROL VENTILATION MODES. VENTILATION AIR SHALL NOT MINIMUM DCV VALUE LISTED ON THE SCHEDULE DURING OCCUPIED MODES.

E. HYDRONIC COIL (HEATING MODE)

- HYDRONIC VALVE SPRINGS NORMALLY OPEN TO THE COIL AND IS CLOSED WHEN FAN IS OFF.
- HYDRONIC VALVE MODULATES TO MAINTAIN ROOM TEMPERATURE SETPOINT (VAR).

F. HYDRONIC COIL (COOLING MODE)

- HYDRONIC VALVE IS CLOSED WHEN THE FAN IS OFF.
- HYDRONIC VALVE MODULATES AS SECOND STAGE OF COOLING TO MAINTAIN ROOM TEMPERATURE SETPOINT (VAR).
- HYDRONIC VALVE TO REMAIN CLOSED IF HYDRONIC WATER TEMPERATURE IS GREATER THAN 70°F.

G. OCCUPANCY SENSOR CONTROL

OCCUPIED MODE IS OVERRIDDEN BY OCCUPANCY SENSOR IF SPACE IS UNOCCUPIED (I.E. LIGHTS ARE OFF VIA SPACE OCCUPANCY SENSOR). THE OUTSIDE AIR DAMPER SHALL CLOSE AND ONLY OPEN TO MAINTAIN TEMPERATURE 5°F HIGHER THAN COOLING SETPOINT AND 5°F.

H. TEMPERATURE SETPOINT

- ROOM AIR TEMPERATURE SETPOINT IS 70°F (VAR) FOR HEATING CONTROL AND 75°F (VAR) FOR COOLING CONTROL.
- SUPPLY AIR TEMPERATURE TO REMAIN BETWEEN 55°F AND 95°F (VAR). SUPPLY AIR LOW LIMIT IN HEATING OR DEADBAND MODE SHALL BE 70°F (VAR).

I. FIRE ALARM SHUTDOWN

- UPON A GENERAL FIRE ALARM ALL AIR HANDLING EQUIPMENT SHALL SHUTDOWN. THE AIR HANDLERS HAVE SMOKE DETECTORS THAT SHUTDOWN THAT SPECIFIC UNIT IF SMOKE IS SENSED IN THE DUCTWORK AND THE DDC SYSTEM SHALL COMMAND A SOFTWARE SHUTDOWN OF ALL AIR HANDLING EQUIPMENT.

J. FAULT DETECTION AND DIAGNOSTICS: THE SINGLE ZONE VAV UNIT CONTROLLER SHALL BE CAPABLE OF THE FOLLOWING:

- THE OPERATION OF EACH COMPONENT (FANS, ECONOMIZER, ETC.) CAN BE MANUALLY INITIATED SO THEY MAY BE TESTED AND VERIFIED.
- OUTSIDE AIR DAMPER FAILURE BY PERFORMING THE FOLLOWING ONCE A MONTH: COMMAND DAMPER CLOSED AND VERIFY OUTSIDE AIR GOES TO ZERO. COMMAND OUTSIDE DAMPER FULL OPEN AND VERIFY THE UNIT IS CONTROLLING TO WITHIN 10% OF DESIGN AIRFLOW.
- CONTROLLER SHALL BE CONFIGURED TO REPORT THE FOLLOWING FAULTS:
 - AIR TEMPERATURE SENSOR FAILURE
 - NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING.
 - ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING.
 - OUTDOOR AIR OR RETURN AIR DAMPER NOT MODULATING.
 - EXCESS OUTDOOR AIR

K. ROOF HOOD

- MOTORIZED DAMPER SHALL BE OPEN WHEN ANY ASSOCIATED FCU IS ENABLED AND CLOSED WHEN ALL AHU'S ASSOCIATED FCU'S ARE OFF.

INFORMATION AT THE TERMINAL

ZONE TEMPERATURE
 ZONE TEMPERATURE SETPOINT
 UNIT COMMANDED MODE (OCCUPIED/UNOCCUPIED, HEATING/COOLING)
 SUPPLY AIR TEMPERATURE
 MIXED AIR TEMPERATURE
 HYDRONIC COIL VALVE POSITION (% COMMANDED OPEN)
 PRIMARY/RETURN DAMPER POSITIONS (% COMMANDED OPEN)
 OUTSIDE AIRFLOW
 ECONOMIZER (FREE COOLING) AVAILABLE
 FAN ON/OFF STATUS (BY CURRENT SENSING RELAY)

FAN SPEED
 FAN RUNTIME TOTALIZATION
 OVERRIDE STATUS
 OVERRIDE TIMER VALUE
 SETPOINTS
 CO2 LEVEL/SETPOINT/ALARM
 EMCS GENERATED FAULTS AND ALARMS
 FREEZESTAT ALARM
 HYDRONIC WATER TEMPERATURE
 ROOF HOOD DAMPER POSITION

2 PIPE CHANGE-OVER HYDRONIC SYSTEM CONTROL SEQUENCE

MODE SETTING

- SET TO HEATING MODE AT 12:00 AM (MIDNIGHT). START 4 HOUR TIMER. COOLING MODE CANNOT START WITHIN 4 HOURS.
- WHEN BOILERS ARE DISABLED, RECORD OUTSIDE AIR TEMPERATURE. COOLING MODE CANNOT START UNTIL OUTSIDE AIR TEMPERATURE IS GREATER THAN RECORDED TEMPERATURE PLUS 14 DEGREES.
- COOLING MODE CANNOT START UNTIL HYDRONIC WATER TEMPERATURE IS 80°F OR LESS.
- SET TO COOLING MODE WHEN MORE THAN ONE ZONE DOES NOT MEET ITS COOLING SETPOINT. START 4 HOUR TIMER. HEATING MODE CANNOT START WITHIN 4 HOURS.

HEATING SYSTEM SEQUENCE OF OPERATION

- BUILDING LOOP PUMP START/STOP:
 - START LEAD BUILDING PUMP IF ANY HYDRONIC VALVE IS MORE THAN 50% OPEN (ADJUSTABLE) AND COOLING MODE IS OFF.
 - START LAG BUILDING PUMP IF LEAD BUILDING PUMP IS IN ALARM.
 - SWITCH LEADLAG VIA SCHEDULE. DO NOT INTERRUPT SYSTEM ACTIVITY TO SWITCH LEADLAG.
 - STOP LOOP PUMP WHEN BOTH BOILERS HAVE BEEN OFF FOR 30 MINUTES (ADJUSTABLE) AND CHILLER IS NOT ACTIVE.
- BOILER AND BOILER PUMP START/STOP:
 - ENABLE LEAD BOILER (B-3) IF BUILDING PUMP IS PROVED ON AND ANY HYDRONIC VALVE IS OPEN.
 - ENABLE PRIMARY LAG BOILER AND ASSOCIATED PUMP IF LEAD BOILER IS ON AND CANNOT MAINTAIN HYDRONIC SUPPLY TEMPERATURE SETPOINT FOR 10 MINUTES (ADJUSTABLE) OR IF LEAD BOILER OR PUMP IS IN ALARM.
 - ENABLE SECONDARY LAG BOILER AND ASSOCIATED PUMP IF LEAD BOILER AND PRIMARY LAG BOILER ARE ON AND CANNOT MAINTAIN HYDRONIC SUPPLY TEMPERATURE SETPOINT FOR 10 MINUTES (ADJUSTABLE).
 - DISABLE PRIMARY AND SECONDARY LAG BOILERS AND ASSOCIATED PUMP WHEN HYDRONIC LOOP TEMPERATURE DELTA IS LESS THAN 10 F (ADJUSTABLE) FOR 10 MINUTES (ADJUSTABLE).
 - DISABLE LEAD BOILER IF ALL HYDRONIC VALVES HAVE BEEN CLOSED FOR 10 MINUTES (ADJUSTABLE).
 - DISABLE BOILER PUMP IF ASSOCIATED BOILER HAS BEEN OFF FOR 5 MINUTES (ADJUSTABLE).
 - ROTATE PRIMARY AND SECONDARY LAG BOILERS AFTER EVERY USE (ADJUSTABLE).
- HW LOOP TEMPERATURE CONTROL:
 - BOILER SUPPLY TEMPERATURE SHALL BE CONTROLLED VIA EMCS 0-10 VDC CONTROL SIGNAL CONNECTED TO BOILER CONTROLLERS.
 - SETPOINT SHALL BE BASED ON MAIN LOOP SUPPLY TEMPERATURE AND SHALL BE RESET LINEARLY ON THE FOLLOWING SCHEDULE:

OSA /	SETPOINT
30 F /	140 F
57 F /	80 F
 - RESET LOOP SCHEDULE SET POINTS AND RATIOS SHALL BE EASILY CHANGED FROM AN EMCS OPERATOR INTERFACE DISPLAY.
- REQUIRED REDUNDANT BOILER OPERATING CONTROLS INCLUDE HIGH LIMIT SAFETY, FLAME FAIL DETECTION, LOW WATER LEVEL CONTROLS. CONTROLS SHALL BE PROVIDED BY MANUFACTURER AS REQUIRED BY INTERNATIONAL BUILDING CODE.
- UPON ANY OF THE FOLLOWING CONDITIONS, AN AUDIBLE AND VISUAL INDICATION THAT AN ALARM CONDITION EXISTS WILL BE GENERATED AT THE BOILER CONTROLLER INTERFACE:
 - BOILER CONTROLLER FAIL
 - LOSS OF WATER FLOW
 - BOILER PUMP FAILURE
 - HIGH SUPPLY TEMPERATURE (200 F)
 - LOW SUPPLY TEMPERATURE (20 F BELOW SET POINT)
 - BOILER ALARMS

F. EMCS SHALL PROVIDE THE FOLLOWING POINTS:

BOILER 1 ENABLE/DISABLE, STATUS, ALARM
 BOILER 2 ENABLE/DISABLE, STATUS, ALARM
 BOILER 3 ENABLE/DISABLE, STATUS, ALARM
 BOILER 1 PUMP START/STOP, STATUS
 BOILER 2 PUMP START/STOP, STATUS
 BOILER 3 PUMP START/STOP, STATUS
 BUILDING LOOP SUPPLY AND RETURN TEMPERATURES
 BOILER 1, 2 AND 3 LOOP SUPPLY TEMPERATURES
 BOILER LOOP RETURN TEMPERATURE
 OSA TEMPERATURE
 BOILER LOOP SET POINT

CHILLED WATER SYSTEM SEQUENCE OF OPERATION

IF IN COOLING MODE:

- BUILDING LOOP PUMP START/STOP:
 - START LEAD BUILDING PUMP IF ANY HYDRONIC VALVE IS MORE THAN 50% OPEN (ADJUSTABLE).
 - START LAG BUILDING PUMP IF LEAD BUILDING PUMP IS IN ALARM.
 - SWITCH LEADLAG VIA SCHEDULE. DO NOT INTERRUPT SYSTEM ACTIVITY TO SWITCH LEADLAG.
 - STOP LOOP PUMP WHEN CHILLER HAS BEEN OFF FOR 30 MINUTES (ADJUSTABLE) AND BOTH BOILERS ARE NOT ACTIVE.
- CHILLER ENABLE/DISABLE AND PUMP OPEN/CLOSE:
 - START PUMP AND ENABLE CHILLER WHEN BUILDING PUMP IS PROVED ON AND ANY HYDRONIC VALVE IS OPEN.
 - CHILLER SHALL START VIA INTERNAL CONTROLS PROVIDED BY MANUFACTURER AND START UPON PROOF OF FLOW AS SENSED BY MANUFACTURER SUPPLIED FLOW SWITCH. MC SHALL INSTALL FLOW SWITCH AND CC SHALL WIRE FLOW SWITCH.
 - DISABLE CHILLER IF ALL HYDRONIC VALVES HAVE BEEN CLOSED FOR 30 MINUTES (ADJUSTABLE).
 - STOP CHILLER PUMP AFTER CHILLER HAS BEEN OFF FOR 5 MINUTES (ADJUSTABLE).

C. CHW LOOP TEMPERATURE CONTROL:

- CHILLER SUPPLY TEMPERATURE SHALL BE CONTROLLED VIA EMCS 0-10 VDC CONTROL SIGNAL CONNECTED TO CHILLER CONTROLLER.
- SETPOINT SHALL BE BASED ON MAIN LOOP SUPPLY TEMPERATURE AND SHALL BE RESET STARTING AT A MAXIMUM OF 50 F (ADJUSTABLE) AND RANGE DOWN TO A MINIMUM OF 43 F (ADJUSTABLE) BASED ON THE HIGHEST ZONE TEMPERATURE COMPARED TO ITS COOLING SET POINT.
- RESET SET POINTS SHALL BE EASILY CHANGED FROM AN EMCS OPERATOR INTERFACE DISPLAY.

D. CHW LOOP BYPASS VALVE:

- MODULATE BYPASS VALVE SO THAT WATER ENTERING CHILLER IS ALWAYS LESS THAN 70 F (ADJUSTABLE)

E. EMCS SHALL PROVIDE THE FOLLOWING POINTS:

CHILLER ENABLE/DISABLE, STATUS, ALARM
 CHILLER LOOP SUPPLY TEMPERATURE
 CHILLER LOOP RETURN TEMPERATURE
 CHILLER SET POINT
 CHW BYPASS VALVE POSITION

BUILDING LOOP PUMP SPEED SEQUENCE OF OPERATION

A. BUILDING LOOP SPEED:

- MODULATE PUMP SPEED TO MAINTAIN ALL DIFFERENTIAL PRESSURE SET POINTS.
- SENSOR LOCATIONS ARE EXISTING.
- WATER BALANCER SHALL PROVIDE SET POINTS. INITIAL SET POINTS SHALL BE 6 PSI (ADJUSTABLE).
- PUMP SHALL HAVE A MINIMUM RUNTIME OF 30 MINUTES (ADJUSTABLE)

B. EMCS SHALL PROVIDE THE FOLLOWING POINTS:

BUILDING LOOP PUMP 1 START/STOP, SPEED, STATUS, ALARM
 BUILDING LOOP PUMP 2 START/STOP, SPEED, STATUS, ALARM
 DIFFERENTIAL PRESSURES AND SET POINTS

CONTROL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
(T)	THERMOSTAT	S/S	START/STOP
(TT)	TEMPERATURE SENSOR	VFD	VARIABLE FREQ. DRIVE
(PS)	DUCT PRESSURE SENSOR	ADJUSTABLE	VARIABLE EMCS VALUE
(SD)	SMOKE DETECTOR	AFF	ABOVE FINISHED FLOOR
(CO2)	CARBON DIOXIDE SENSOR	(S)	MANUAL SWITCH
(AF)	AIRFLOW SENSOR	POC	POINT OF CONNECTION
(OC)	OCCUPANCY SENSOR	MC	MECHANICAL CONTRACTOR
(RA)	RETURN AIR	EC	ELECTRICAL CONTRACTOR
(SA)	SUPPLY AIR	GC	GENERAL CONTRACTOR
(OA)	OUTSIDE AIR	CC	CONTROLS CONTRACTOR
(PA)	PRIMARY AIR	(CR)	CONTROL RELAY
(EA)	EXHAUST AIR	(CS)	CURRENT SENSOR
(M)	MOTORIZED DAMPER	(PS)	SPACE PRESSURE

MISCELLANEOUS CONTROLS

A. GENERAL:

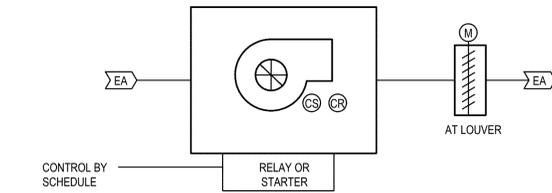
- PROVIDE AND INSTALL ALL NECESSARY DEVICES, RELAYS, SWITCHES, SENSORS, DAMPERS, CONDUIT, AND WIRING TO PROVIDE A COMPLETE AND OPERATING CONTROL SYSTEM INTEGRATED INTO EXISTING BUILDING BMS.

B. FIRE ALARM SYSTEM SHUTDOWN:

- PROVIDE NECESSARY CONDUIT, WIRING, AND ACCESSORIES TO SHUTDOWN EACH UNIT UPON ACTIVATION OF THAT UNIT'S SMOKE DETECTORS (SMOKE DETECTORS WITH DPDT ARE BY DIVISION 26). CONNECTIONS SHALL BE HARDWIRED, INDEPENDENT OF ANY CONTROL SYSTEM LOGIC. SO THAT FAILURE OF CONTROL SYSTEM OR LOSS OF CONTROL SYSTEM WILL IN NO WAY PREVENT THE ALARMED SMOKE DETECTOR SHUTDOWN OF THE SYSTEM. IN ADDITION TO SHUTTING DOWN THE UNIT WITH THE ALARMED SMOKE DETECTOR, ALL EQUIPMENT INTERLOCKED OR SERVED BY THAT UNIT SHALL BE OFF. OTHER UNITS SHALL ALSO SHUT-OFF AS REQUIRED TO AVOID BUILDING PRESSURE DIFFERENTIALS AND SIMILAR UNDESIRABLE EFFECTS. UPON RESET OF ALARMED DEVICE, SYSTEM SHALL AUTOMATICALLY RETURN TO AUTOMATIC DDC CONTROLS, PROVIDE TIME DELAY START OF EQUIPMENT TO PREVENT EXCESS LOAD STARTING AT THE SAME TIME.
- IN ADDITION TO THE ABOVE SPECIFIED HARDWIRED FIRE ALARM SHUT-DOWN (WHICH PERTAINS TO EQUIPMENT WITH SMOKE DETECTORS), PROVIDE THE FOLLOWING: SHUT-DOWN ALL AIR HANDLING EQUIPMENT WHEN THE BUILDING FIRE ALARM SYSTEM GOES INTO ALARM. ZONE CONTACTS IN THE FIRE ALARM SYSTEM ARE AVAILABLE FOR THIS PURPOSE. THIS ADDED SHUT-DOWN MAY BE ACCOMPLISHED BY USE OF CONTROL LOGIC AND IS NOT REQUIRED TO BE HARDWIRED BUT SHALL BE OF A FAIL-SAFE NATURE SO AS TO PROVIDE THE NECESSARY SHUT-DOWN IN CASE OF CONTROL FAILURE. RESET SHALL BE SAME AS THAT SPECIFIED FOR HARD-WIRED UNIT SMOKE-DETECTOR SHUT-DOWN.

C. INTERLOCKS:

- PROVIDE ALL NECESSARY EQUIPMENT, DEVICES, WIRING AND PROGRAMMING FOR INTERLOCK OF EQUIPMENT AS SHOWN ON THE EQUIPMENT SCHEDULES.

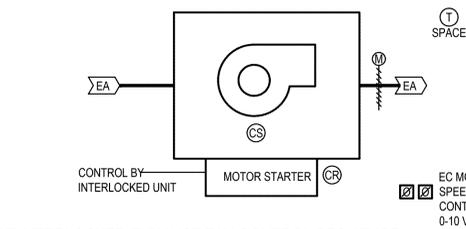


TYPICAL EXHAUST FAN CONTROL SEQUENCE

- EXHAUST FAN SHALL OPERATE BASED ON EMCS OCCUPIED SCHEDULE AND AS FOLLOWS: FAN SHALL OPERATE WHEN ITS ASSOCIATED UNIT IS COMMANDED TO RUN DURING UNOCCUPIED HOURS VIA OVERRIDE.
- DAMPER AT OUTLET TO OPEN WHEN FAN IS ON AND CLOSE WHEN FAN IS OFF.

INFORMATION TO BE AVAILABLE ON EXHAUST FAN GRAPHIC

- FAN ON/OFF STATUS
- FAN TOTAL HOURS RUN TIME
- DAMPER POSITION
- FAN START/STOP
- FAN COMMANDED ON AND FAILS TO OPERATE
- FAN ON AND NOT COMMANDED TO OPERATE



TSTAT INTERLOCKED EXHAUST FAN CONTROL SEQUENCE

A. GENERAL

- EXHAUST FAN IS CONTROLLED BY SPACE TEMPERATURE.
- DAMPERS SHALL OPEN UPON ACTIVATION AND FAN SHALL START VIA DAMPER END SWITCH. DAMPERS SHALL FAIL CLOSED.

B. OCCUPIED/UNOCCUPIED MODES:

- THE DAMPERS SHALL OPEN AND FAN SHALL START UPON SENSING A SPACE TEMPERATURE 5°F ABOVE SETPOINT (VAR). FAN SHALL STOP UPON SENSING A SPACE TEMPERATURE 5°F BELOW SETPOINT (VAR). INITIAL SPACE SETPOINT SHALL BE 85°F.

C. INFORMATION AT TERMINAL

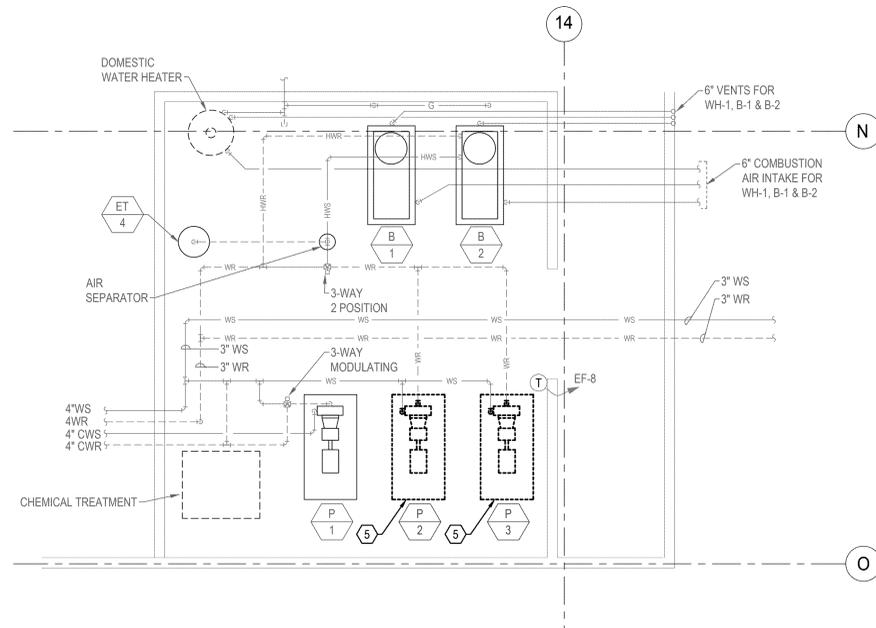
- FAN ON/OFF STATUS (BY CURRENT SENSING RELAY)
- FAN RUNTIME
- FAN FAILURE ALARM (I.E. NO CURRENT WHEN COMMANDED ON)
- DAMPER POSITIONS (% COMMANDED OPEN)
- DAMPER END SWITCH STATUS
- SPACE TEMPERATURE (°F)
- SPACE TEMPERATURE SETPOINT (°F)

GENERAL NOTES

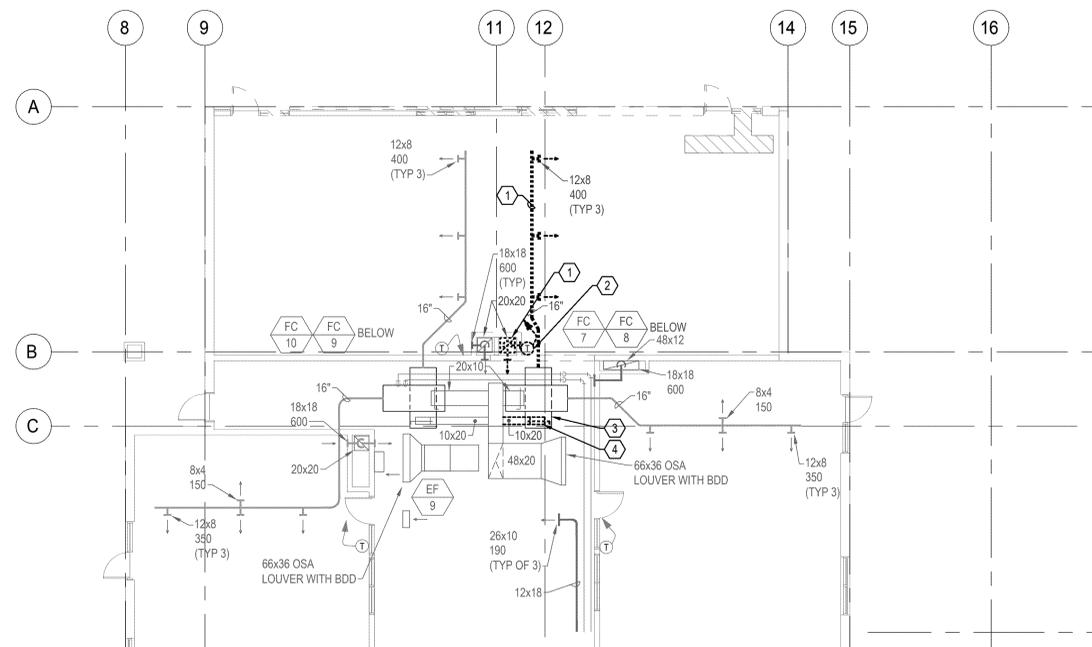
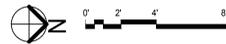
- DUCTWORK AND EQUIPMENT SHOWN LIGHT IS EXISTING TO REMAIN. DUCTWORK, AND EQUIPMENT SHOWN DARK AND DASHED TO BE REMOVED.

DEMOLITION NOTES

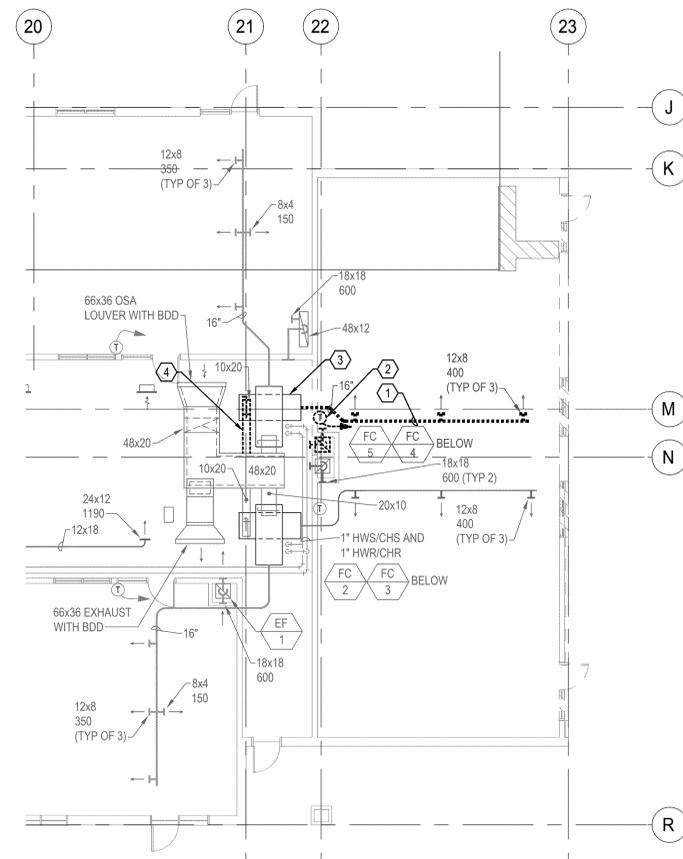
- REMOVE DUCTWORK AND ALL APPURTENANCES.
- REMOVE THERMOSTAT AND ALL APPURTENANCES.
- FAN COIL TO BE ABANDONED IN PLACE. REMOVE HYDRONIC PIPING AND ALL APPURTENANCES BACK TO MAIN. CAP HYDRONIC PIPING AT MAIN.
- REMOVE OUTSIDE AIR DUCTWORK AND ALL APPURTENANCES. CAP BRANCH DUCT AT MAIN.
- REMOVE PUMP AND ALL APPURTENANCES.



3 HVAC DEMOLITION BOILER ROOM
1/4" = 1'-0"



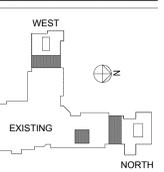
2 HVAC DEMOLITION FIRST FLOOR - WEST PLAN
1/8" = 1'-0"



1 HVAC DEMOLITION FIRST FLOOR - NORTH PLAN
1/8" = 1'-0"



REVISIONS	DATE



Vancouver School District
**FRANKLIN
ELEMENTARY
SCHOOL**

1998, 5206 NW Franklin St.
Vancouver, WA 98663

JOB NO: 1806
ISSUE DATE: 8/19/2016
Stamp Area

HVAC
DEMOLITION
FLOOR PLANS

MD1.01