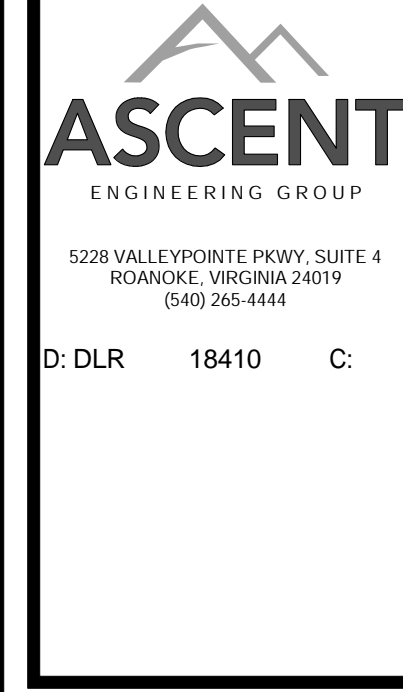


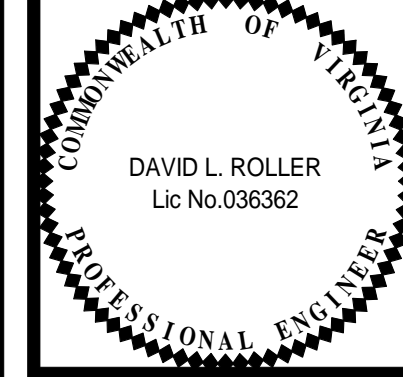


ENERGY RECOVERY UNIT:	TRANE								
	AHU-1A	AHU-2A	AHU-3A	AHU-4A	RAH-5A	AHU-6A	RAH-BB	AHU-CAF	AHU-4
MARK	INDOOR	INDOOR	INDOOR	INDOOR	ROOF	INDOOR	ROOF	INDOOR	INDOOR
INDOOR / ROOFTOP	INDOOR	INDOOR	INDOOR	INDOOR	ROOF	INDOOR	ROOF	INDOOR	INDOOR
SERVICE	MZ VAV	MZ VAV	MZ VAV	MZ VAV	MZ VAV	MZ VAV	SZ VAV	SZ VAV	SZ VAV
AREA SERVED	LOWER LEVEL	ADMIN	SOUTH ADD.	NORTH ADD.	MEDIA	CULINARY	BLACK BOX	CAFETERIA	CAF / KITCHEN
SUPPLY FAN									
TOTAL AIR, CFM	11,420	4,000	10,000	13,250	12,020	7,650	2,800	16,000	7,750
OUTSIDE AIR, CFM	5,950	1,870	4,800	6,800	5,700	7,650	1,250	7,625	N/A
*EXT. S.P., IN. H2O	2.00	2.00	2.00	2.00	2.00	2.00	1.25	1.75	1.00
FAN HORSEPOWER	2 @ 7.5	2 @ 3	2 @ 5	2 @ 10	2 @ 8	1 @ 8	1 @ 3	2 @ 7.5	7.5
MAXIMUM BHP	11.3	4.2	10	15.8	15.2	7.7	2.6	14.2	5.5
MAX RPM	2100	3500	2200	2350	2500	2100	2200	1830	1800
RETURN/EXHAUST FAN	EXHAUST		EXHAUST	EXHAUST	EXHAUST		RETURN		
TOTAL AIR, CFM	3,800	N/A	3,050	4,560	4,250	N/A	2,800	N/A	N/A
EXT. S.P., IN. H2O	0.5	N/A	0.5	0.5	0.5	N/A	0.5	N/A	N/A
FAN HORSEPOWER	2 @ 3	N/A	2 @ 5	2 @ 3	2 @ 6	N/A	1 @ 2	N/A	N/A
MAXIMUM BHP	4.6	N/A	6.6	5.3	11.0	N/A	1.6	N/A	N/A
MAX RPM	1700	N/A	2100	1650	2200	N/A	2100	N/A	N/A
TOTAL ENERGY WHEEL									
EXHAUST AIRFLOW, CFM	3,800	N/A	3,050	4,560	4,250	N/A	N/A	N/A	N/A
OUTSIDE AIRFLOW, CFM	5,950	N/A	4,800	6,800	5,700	N/A	N/A	N/A	N/A
SUMMER CONDITIONS									
OUTSIDE AIR EAT, DB/WB	95.0/76.0	N/A	95.0/76.0	95.0/76.0	95.0/76.0	N/A	N/A	N/A	N/A
OUTSIDE AIR LAT, DB/WB	84.2/69.3	N/A	84.2/69.2	83.6/68.9	82.6/68.2	N/A	N/A	N/A	N/A
EXHAUST AIR EAT, DB/WB	75.0/62.6	N/A	75.0/62.6	75.0/62.6	75.0/62.6	N/A	N/A	N/A	N/A
EXHAUST AIR LAT, DB/WB	91.8/73.7	N/A	92.0/73.8	92.1/73.8	91.5/73.5	N/A	N/A	N/A	N/A
WINTER CONDITIONS									
OUTSIDE AIR EAT, DB	0.0	N/A	0.0	0.0	0.0	N/A	N/A	N/A	N/A
OUTSIDE AIR LAT, DB	27.6	N/A	27.5	29.5	32.3	N/A	N/A	N/A	N/A
EXHAUST AIR EAT, DB	68.00	N/A	68.0	68.0	68.0	N/A	N/A	N/A	N/A
EXHAUST AIR LAT, DB	21.9	N/A	21.5	21.4	21.9	N/A	N/A	N/A	N/A
PREHEAT COIL									
AIRFLOW, CFM	7,995	3,905	5,425	10,050	9,130	7,650	2,800	16,000	N/A
TOTAL CAP., MBH	476.9	120.5	323.6	813.0	544.6	592.7	94	596.9	N/A
ENT. AIR, %%DDB	0.0	36.0	0.0	0.0	0.0	0.0	39.0	35.6	N/A
LV. AIR, %%DDB	55.0	55.0	55.0	55.0	55.0	55.0	70.0	70.0	N/A
GPM	25.1	6.4	17.0	42.7	28.9	29.6	5	31.4	N/A
P.D., FT. H2O	7	7	7	7	7	7	7	7	N/A
MIN. WATER VEL., FPS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	N/A
RUNOUTS, IN.	2	1	1-1/2	2-1/2	2	2	1-1/4	2	N/A
COOLING COIL									
TOTAL CAP., MBH	464.6	214.2	396.7	525.2	453.7	598.9	140.3	844.6	208.9
ENT. AIR, %%DDB	79.8	84.4	79.4	79.4	78.6	95.0	84.0	84.5	75
%%DWB	66.4	69.5	66.1	66.1	65.5	76.0	69.0	69.7	62.6
LEAV. AIR, %%DDB	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	54
%%DWB	52.9	52.9	52.9	52.9	52.9	52.9	52.9	52.9	53.3
GPM	66.2	29.6	56.5	74.8	64.6	85.3	17.0	120.3	50
P.D., FT. H2O	10	10	10	10	10	10	10	10	10
MIN. WATER VEL., FPS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RUNOUTS, IN.	2-1/2	2	2-1/2	3	2-1/2	3	1-1/2	3	2-1/2
REHEAT COIL									
AIRFLOW, CFM	N/A	N/A	N/A	N/A	N/A	N/A	2,800	16,000	N/A
TOTAL CAP., MBH	N/A	N/A	N/A	N/A	N/A	N/A	60.7	244.8	N/A
ENT. AIR, %%DDB	N/A	N/A	N/A	N/A	N/A	N/A	70.0	70.0	N/A
LV. AIR, %%DDB	N/A	N/A	N/A	N/A	N/A	N/A	90.0	84.1	N/A
GPM	N/A	N/A	N/A	N/A	N/A	N/A	3.0	12.9	N/A
P.D., FT. H2O	N/A	N/A	N/A	N/A	N/A	N/A	0.2	0.4	N/A
MIN. WATER VEL., FPS	N/A	N/A	N/A	N/A	N/A	N/A	2.0	2	N/A
RUNOUTS, IN.	N/A	N/A	N/A	N/A	N/A	N/A	3/4	1-1/2	N/A
MODEL NO.	CSAA030	CSAA010	CSAA025	CSAA030	CSAA025	CSAA017	CSAA006	CSAA035	CSAA017
FILTERS (TWO SECTIONS REQ'D)									
TYPE	PLEATED	PLEATED	PLEATED	PLEATED	PLEATED	PLEATED	PLEATED	PLEATED	PLEATED
EFFICIENCY	MERV-8	MERV-8	MERV-8	MERV-8	MERV-8	MERV-8	MERV-8	MERV-8	MERV-8
MAXIMUM WEIGHT, LBS.	10,000	4,000	8,000	10,000	11,000	4,000	6,000	7,000	2,000
CAPACITIES BASED ON:									
COOLING: EWT 44%%DF									
HEATING: EWT 180%%DF									
AHU-2A: PROVIDE ADDITIONAL DX COOLING COIL AND CONDENSING UNIT TO MATCH CHILLED WATER COIL PERFORMANCE.									
PROVIDE RATHBS ONLY IF ALTERNATE #1 IS ACCEPTED.									
AHU-4 TO HAVE OA CONNECTION FOR USE ONLY DURING ECONOMIZER MODE.									



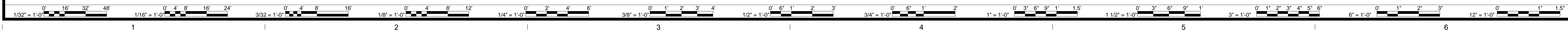
Proposal Request 01	DESCRIPTION
3/1/2020	BY
5	MARK DATE
	REVISIONS

DATE	12-09-2019	DESIGNED BY	JDC	CHECKED BY	JMS
PROJECT	15231-04	DRAWN BY	JDC		



PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING: MECHANICAL NOTES AND SCHEDULES

SHEET  
M-002

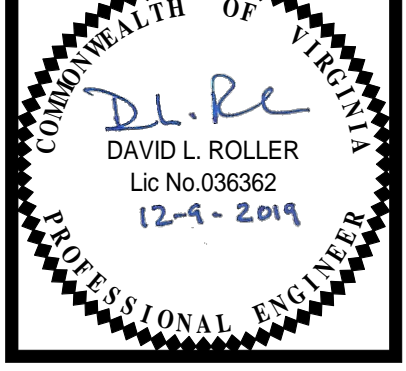


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MARK	DATE	BY	DESCRIPTION

DATE	PROJECT	DESIGNED	DRAWN	CHECKED
12-09-2019	15231-04	DLR / JDC	DLR / JDC	DLR / JMS

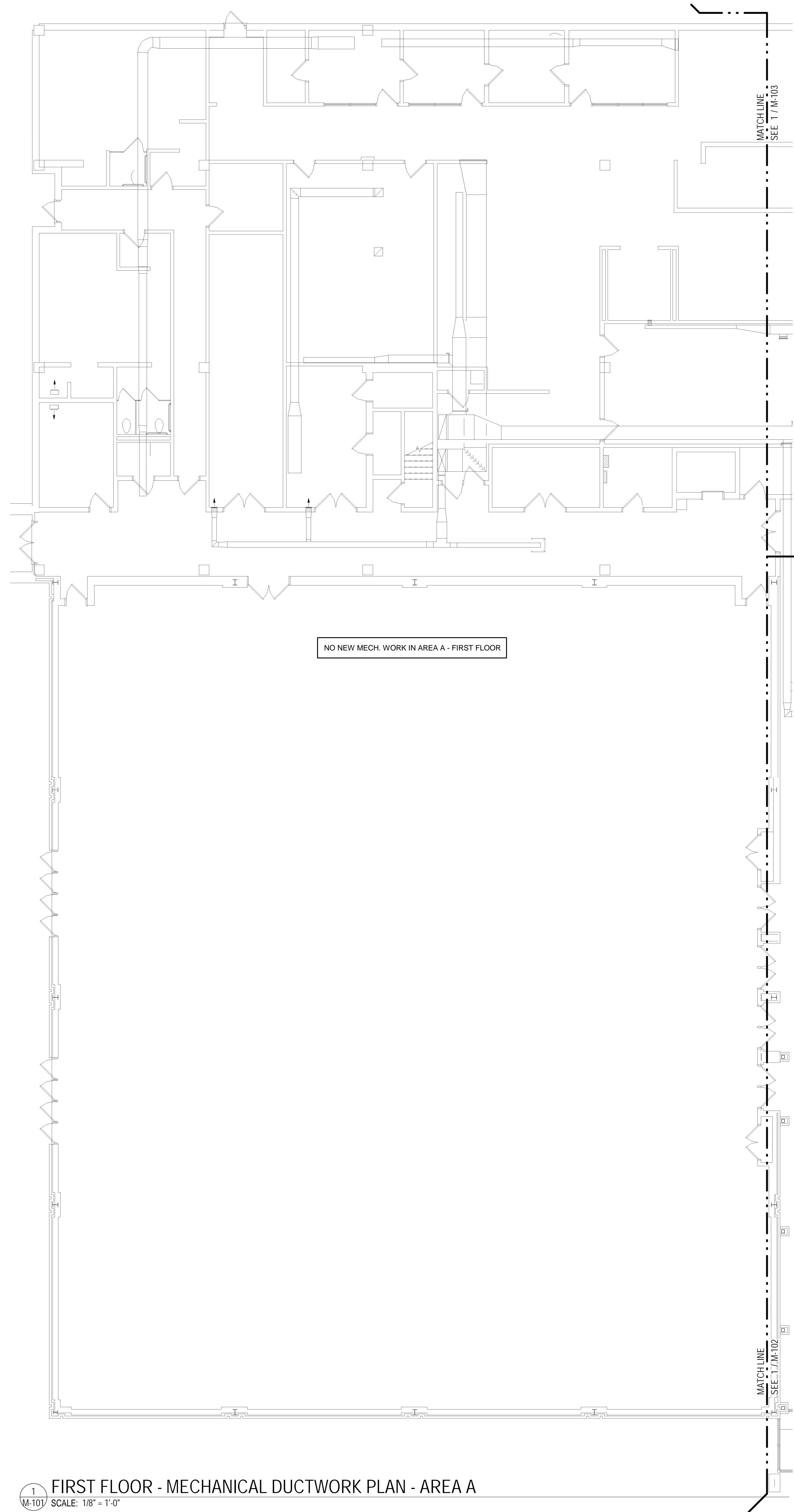
**RRMM**  
ARCHITECTS, PC  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



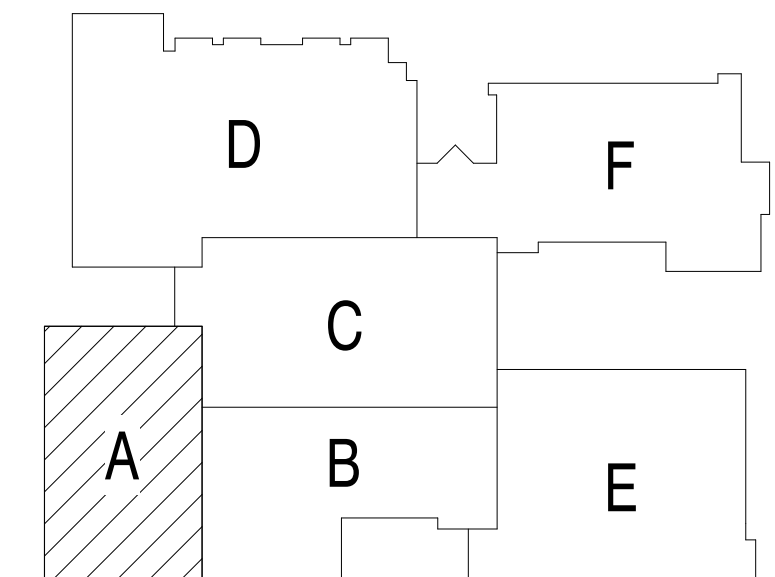
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING FIRST FLOOR - MECHANICAL DUCTWORK - AREA A

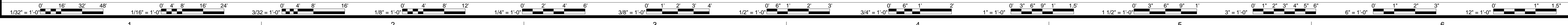
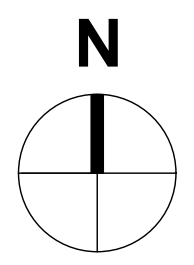
SHEET  
**M-101**

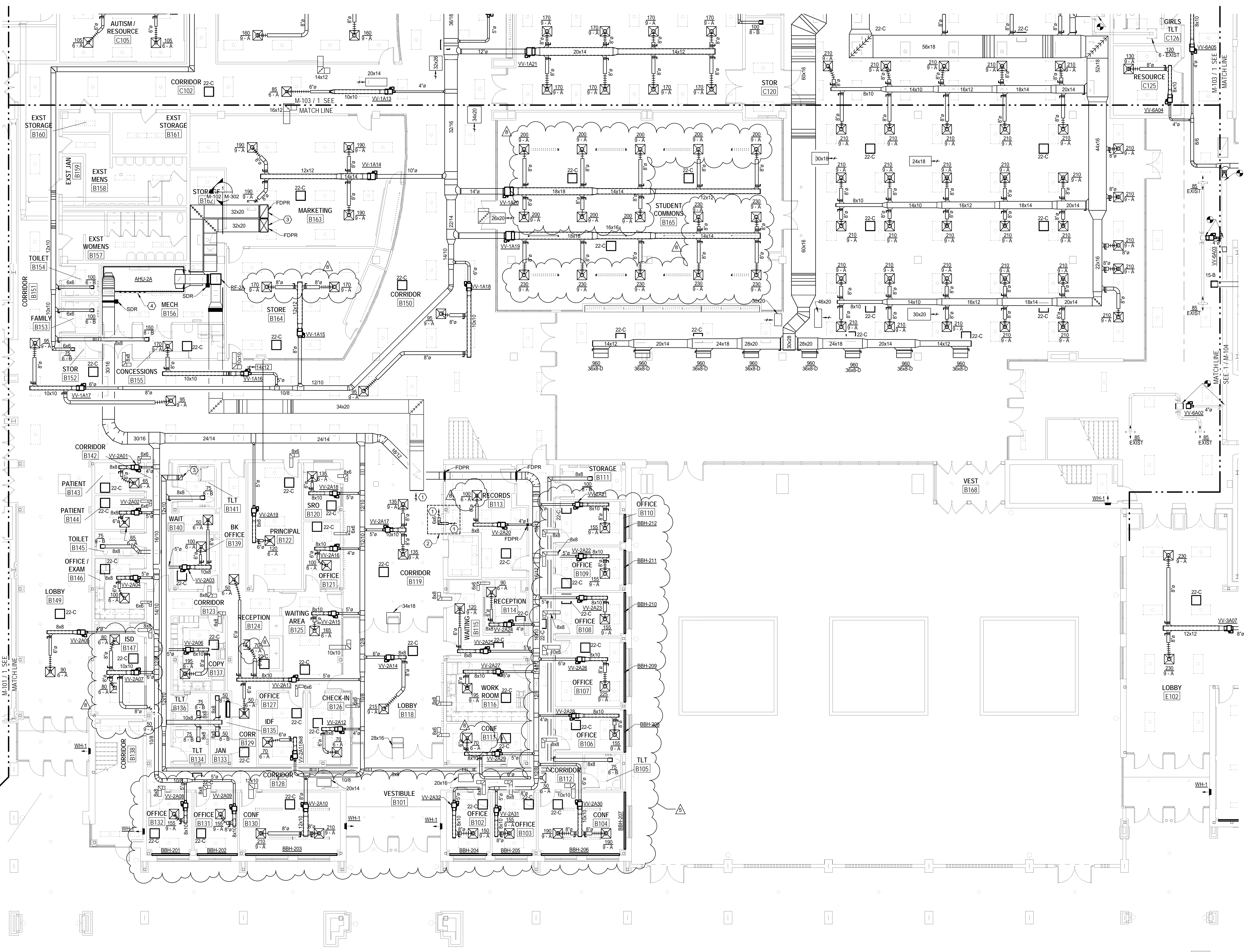


1 FIRST FLOOR - MECHANICAL DUCTWORK PLAN - AREA A  
SCALE: 1/8" = 1'-0"



KEY PLAN  
NOT TO SCALE





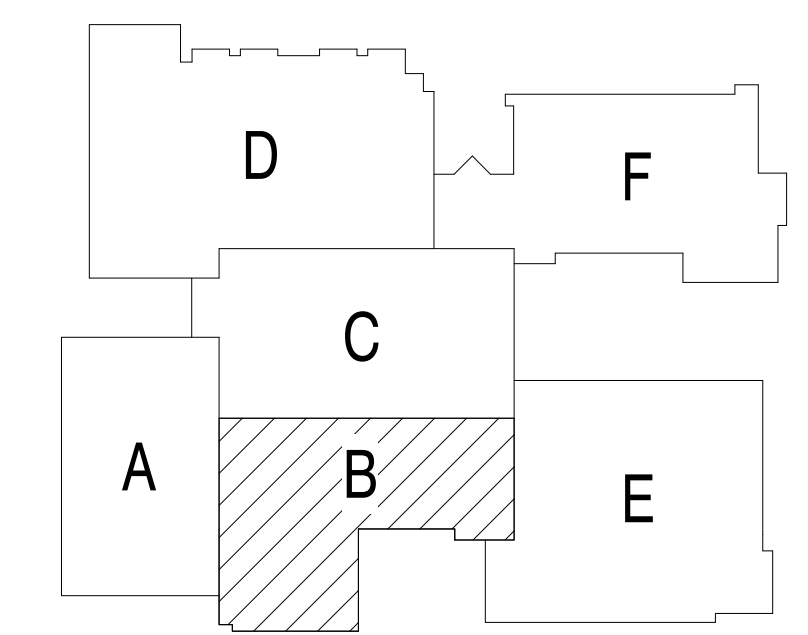
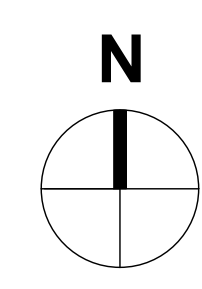
**FIRST FLOOR - MECHANICAL DUCTWORK PLAN - AREA B**  
 SCALE: 1/8" = 1'-0"

**SHEET NOTES:**

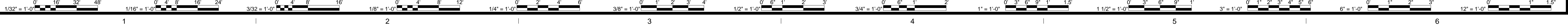
- 1 OPEN END DUCT, COVER WITH 1/2 INCH WIRE MESH.
- 2 REFER TO TRANSFER DUCT DETAIL ON SHEET M-402, TYPICAL FOR ALL NEW TRANSFER DUCTWORK.
- 3 FIRE DAMPER LOCATED IN SECOND FLOOR DUCT PENETRATION.
- 4 4 INCH CONCRETE HOUSEKEEPING PAD. REFER TO SPECIFICATIONS.

**GENERAL DUCTWORK NOTES:**

1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
3. WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
4. ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
5. ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING. REFER TO DIVISION 09.
6. ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
7. ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2 WIRE MESH.
8. REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



**KEY PLAN**  
 NOT TO SCALE



**ASCENT**  
 ENGINEERING GROUP  
 529 VALLEYPONTE PKWY, SUITE 4  
 ROANOKE, VIRGINIA 24019  
 (804) 968-4444  
 D. DLR 18410 C.

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER

**RRMM**  
 ARCHITECTS, P.C.  
 28 Church Ave SW  
 Roanoke, Virginia 24011  
 (540)344-1212

COMMONWEALTH OF VIRGINIA  
 DAVID L. ROLLER  
 Lic. No. 036362  
 08/07/2020  
 PROFESSIONAL ENGINEER

PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
 SALEM CITY SCHOOLS  
 400 SPARTAN DRIVE  
 SALEM, VA 24153

DRAWING: FIRST FLOOR - MECHANICAL DUCTWORK - AREA B

SHEET: **M-102**

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DATE	BY	DESCRIPTION
12-09-2019	15233-04	DLR / JDC	DLR / JDC	7/07/20	8	MARK REVISIONS
				8/07/20		

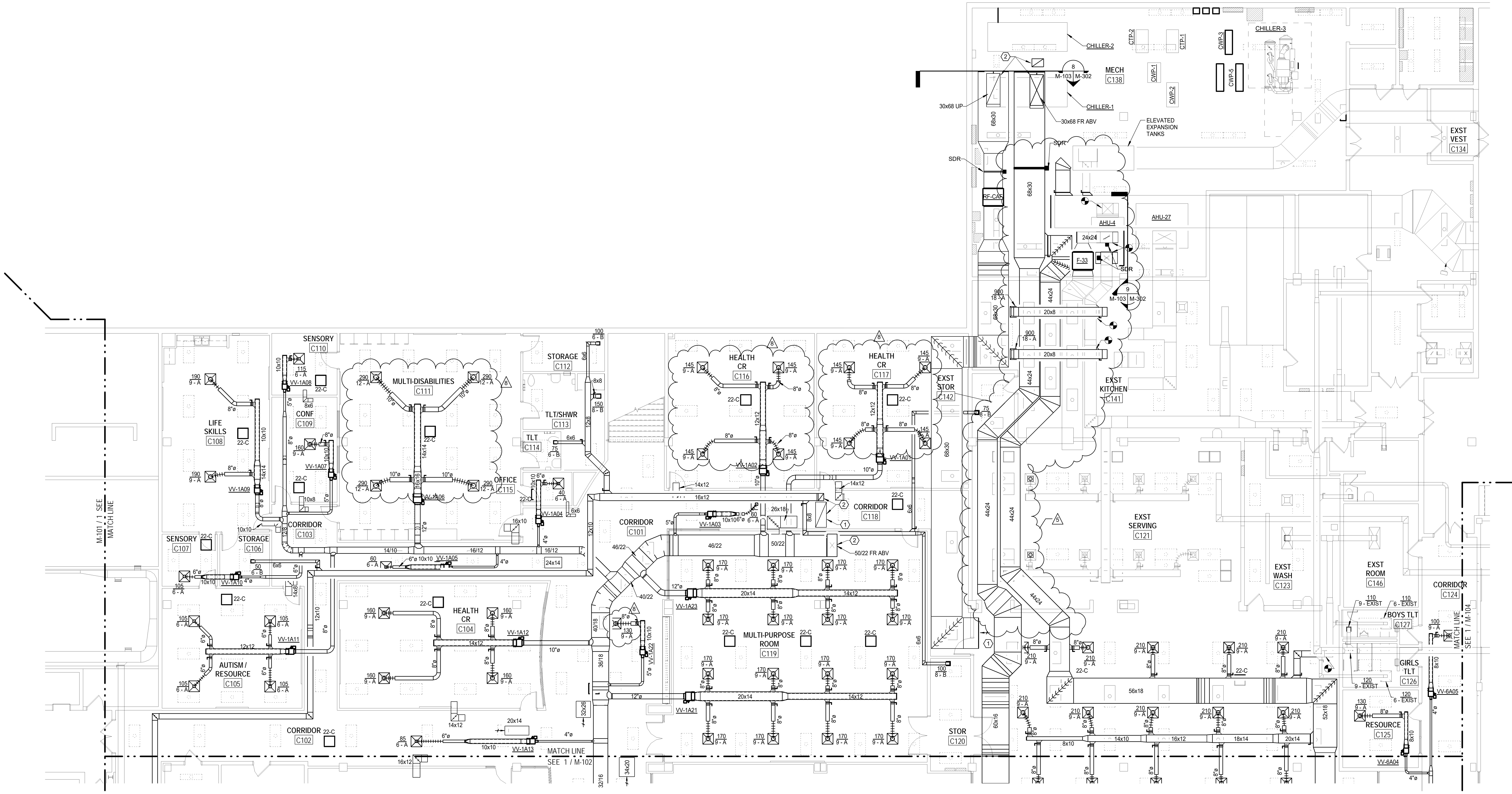
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DATE	BY	DESCRIPTION
12-09-2019	15233-04	DLR / JDC	DLR / JDC	7/07/20	8	MARK REVISIONS
				8/07/20		

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic. No. 036362  
08/07/2020  
PROFESSIONAL ENGINEER

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING FIRST FLOOR - MECHANICAL DUCTWORK - AREA C

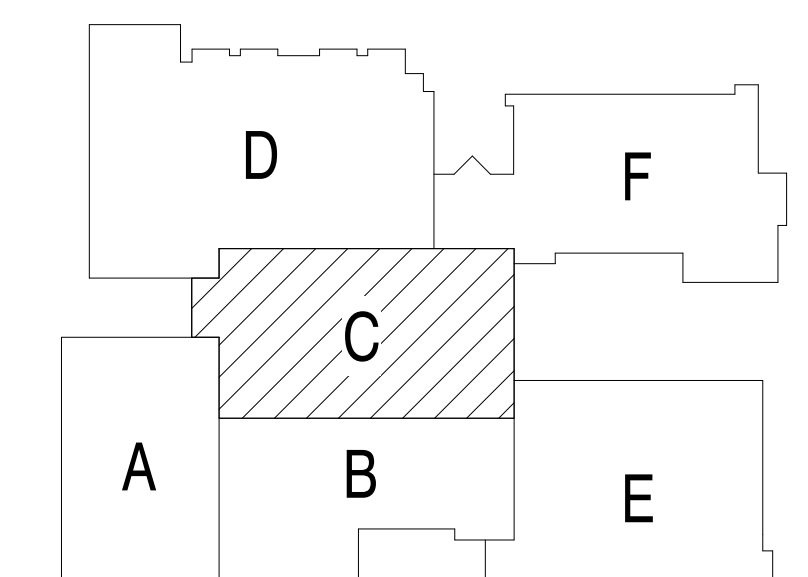
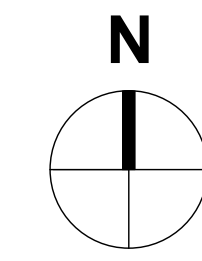
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**M-103**



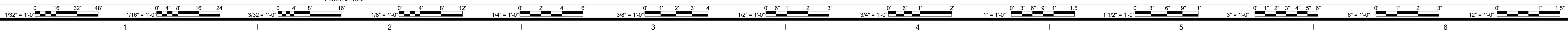
**1 FIRST FLOOR - MECHANICAL DUCTWORK PLAN - AREA C**  
M-103 SCALE: 1/8" = 1'-0"

- SHEET NOTES:**
- ① OPEN END DUCT. COVER WITH 1/2 INCH WIRE MESH.
  - ② FIRE DAMPER LOCATED IN SECOND FLOOR DUCT PENETRATION.

- GENERAL DUCTWORK NOTES:**
1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
  2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
  3. WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
  4. ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
  5. ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 09.
  6. ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
  7. ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2 WIRE MESH.
  8. REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
  9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
  10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



**KEY PLAN**  
NOT TO SCALE



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- SHEET NOTES:**
1. INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.
  2. EXHAUST DUCT UP TO FAN ON ROOF.
  3. DRYER EXHAUST VENT WITH RAIN CAP AND BACK-DRAFT DAMPERS.
  4. OPEN END DUCT, COVER WITH 1/2 INCH WIRE MESH.

- GENERAL DUCTWORK NOTES:**
1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
  2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND EXHAUSTS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
  3. WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
  4. ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
  5. ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 08.
  6. ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
  7. ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
  8. REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
  9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
  10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.

PROPOSAL REQUEST 01	DESCRIPTION
3/1/2020	BY
5	MARK DATE
	REVISIONS

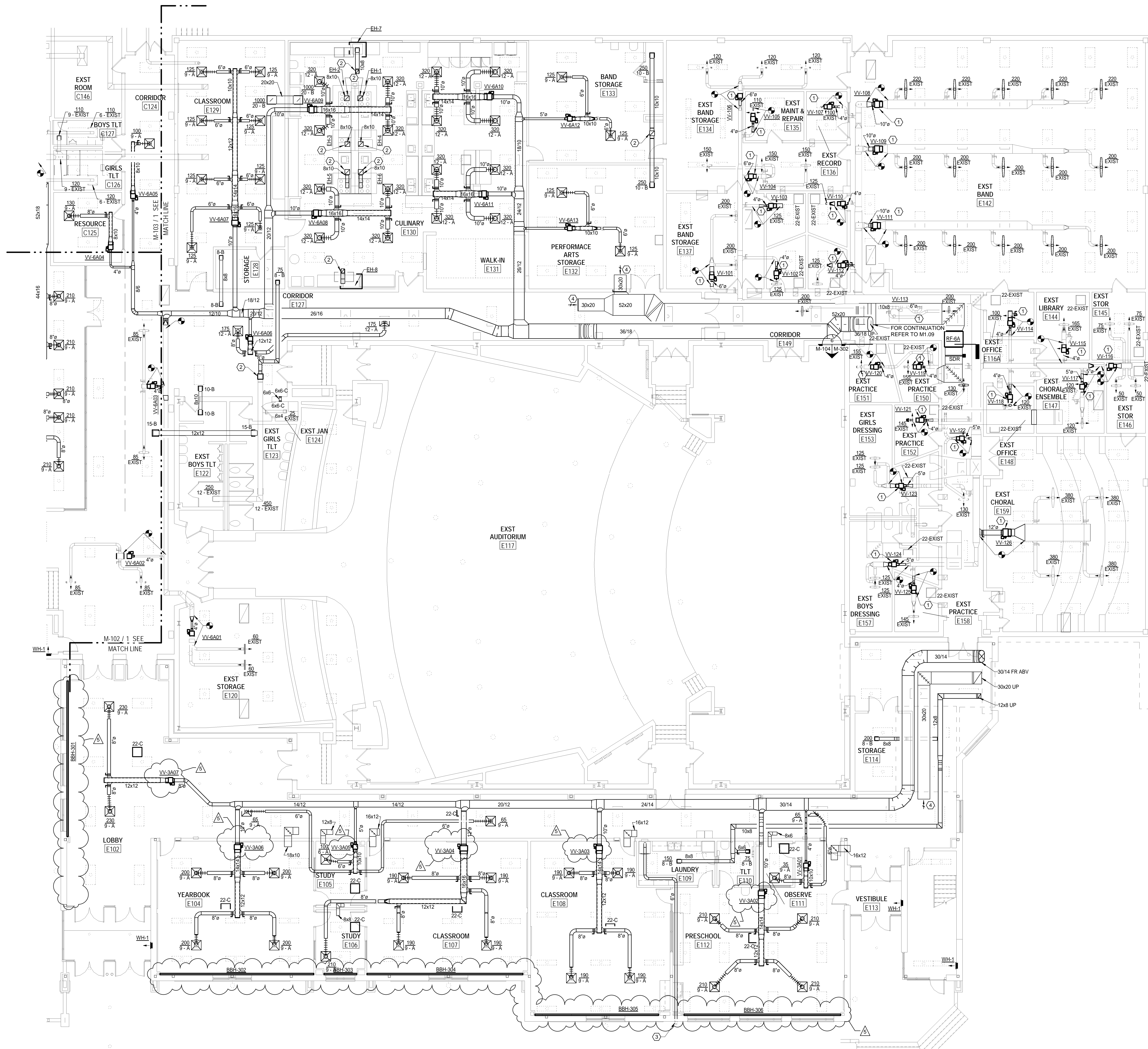
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS



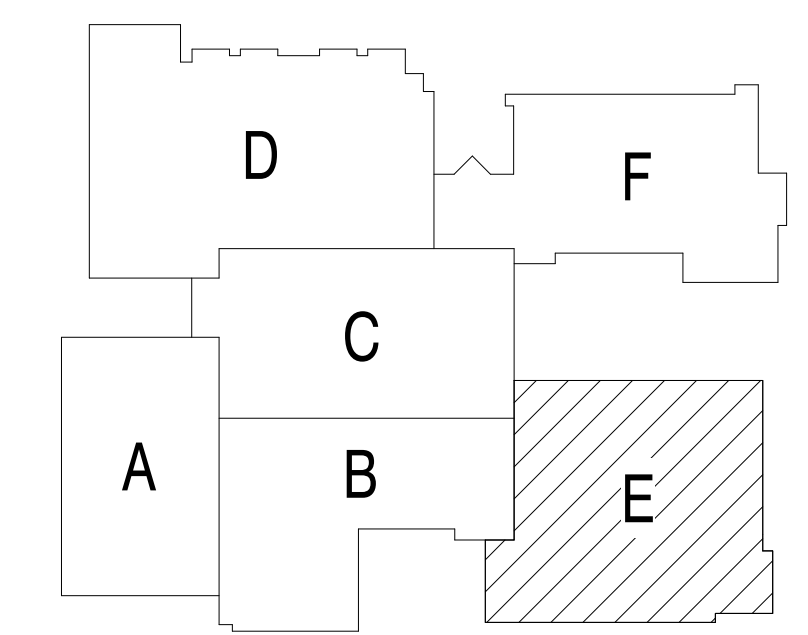
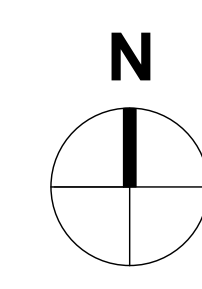
PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING: FIRST FLOOR - MECHANICAL DUCTWORK - AREA E

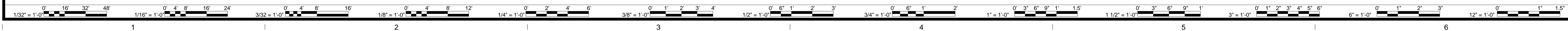
SHEET: M-104



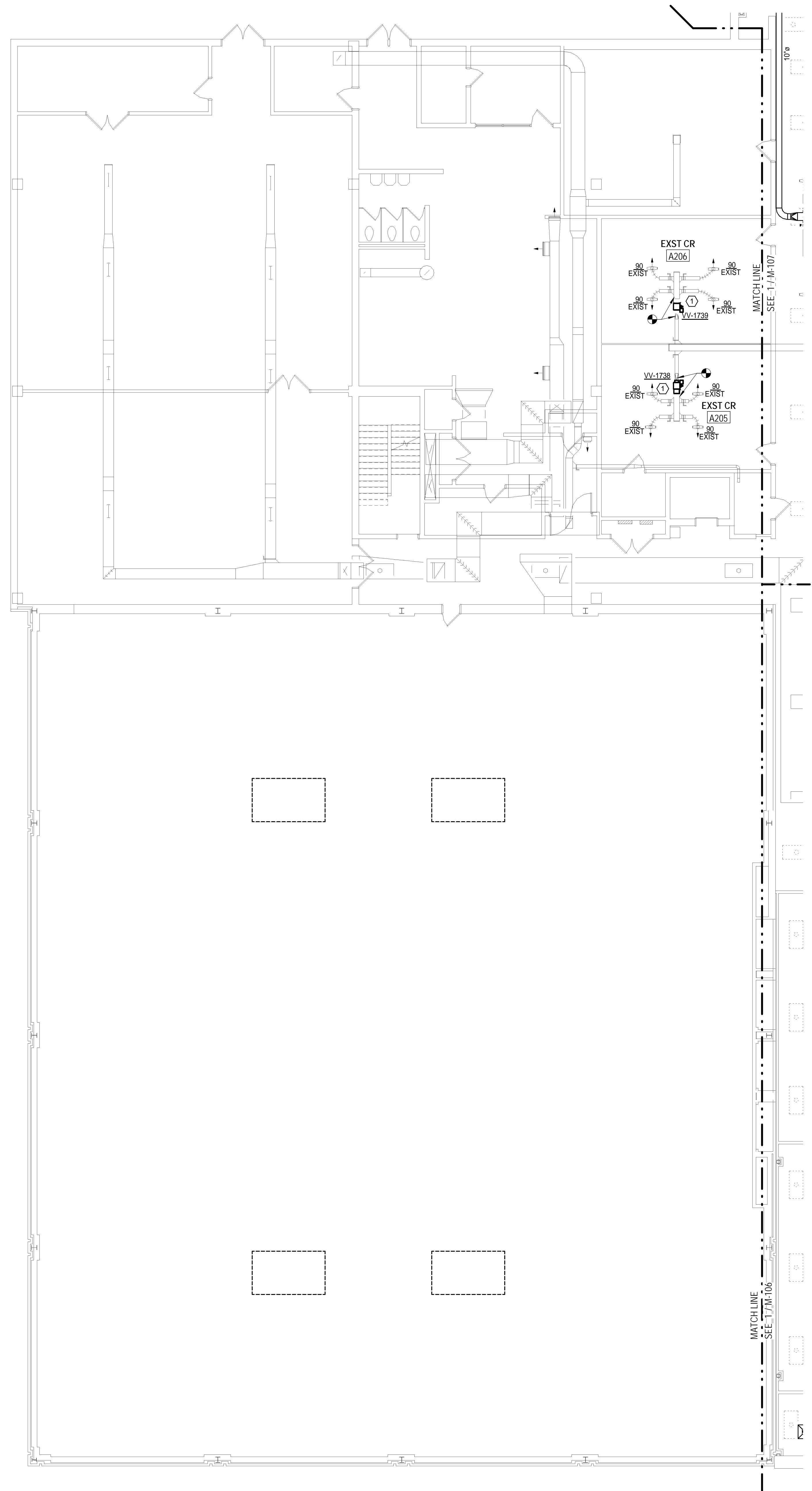
1 FIRST FLOOR - MECHANICAL DUCTWORK PLAN - AREA E  
M-104 SCALE: 1/8" = 1'-0"



KEY PLAN  
NOT TO SCALE



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**SHEET NOTE:**

- 1. INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.

**GENERAL DUCTWORK NOTES:**

- ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
- NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
- WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
- ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
- ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 09.
- ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
- ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
- REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
- REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
- ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.

**ASCENT**  
ENGINEERING GROUP  
5228 VALLEYFORD HWY, SUITE 4  
ROANOKE, VIRGINIA 24019  
(800) 360-4444  
D:DLR 18410 C:

MARK	DATE	BY	DESCRIPTION

DATE	12-09-2019	PROJECT	15231-04
DESIGNED	DLR / JDC	DRAWN	DLR / JDC
CHECKED	DLR / JMS		

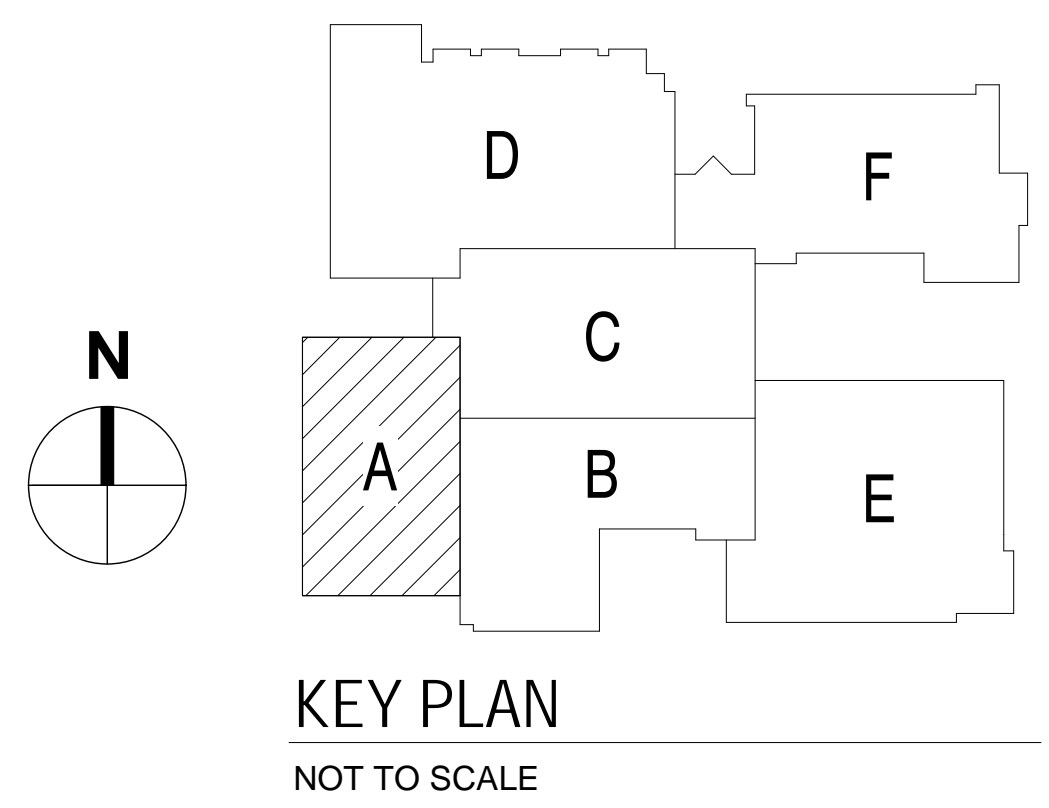
**RRMM**  
ARCHITECTS, PC  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic No 038582  
12-9-2019  
PROFESSIONAL ENGINEER

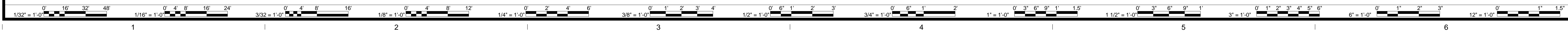
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING SECOND FLOOR - MECHANICAL DUCTWORK - AREA A

SHEET  
**M-105**

1 SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA A  
SCALE: 1/8" = 1'-0"



12/4/2019 5:26:55 PM BW 360718231-04 Salem HS18410 MEP Central 2019.rvt



DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DATE	DESCRIPTION
12-09-2019	15233-04	DLR / JDC	DLR / JDC	3/1/2020	PROPOSAL REQUEST 01
5					REVISIONS

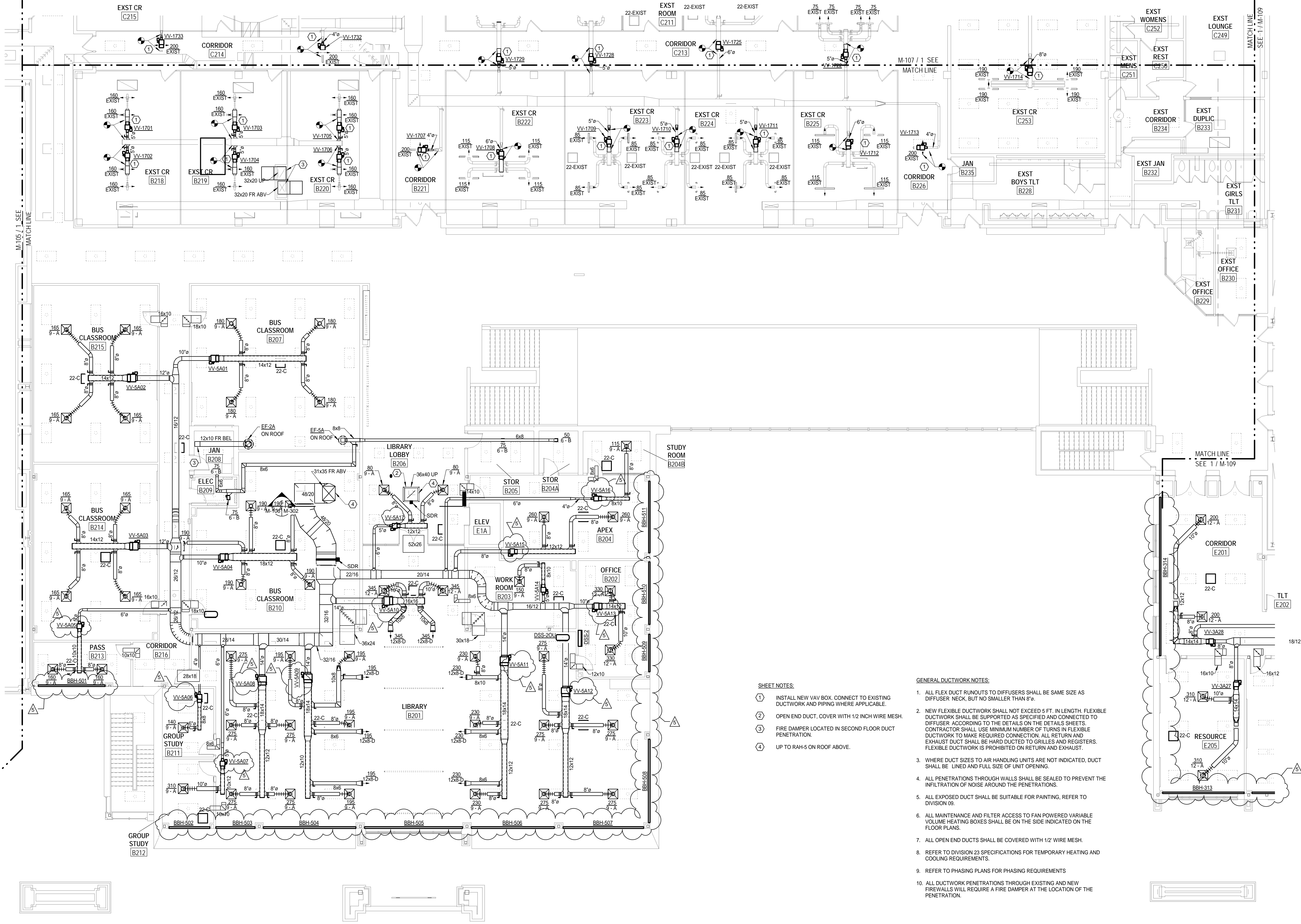
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DATE	DESCRIPTION
12-09-2019	15233-04	DLR / JDC	DLR / JDC	3/1/2020	PROPOSAL REQUEST 01
5					REVISIONS

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

DAVID L. ROLLER  
Lic No. 036362  
PROFESSIONAL ENGINEER

SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING  
**SECOND FLOOR - MECHANICAL DUCTWORK - AREA B**

SHEET  
**M-106**



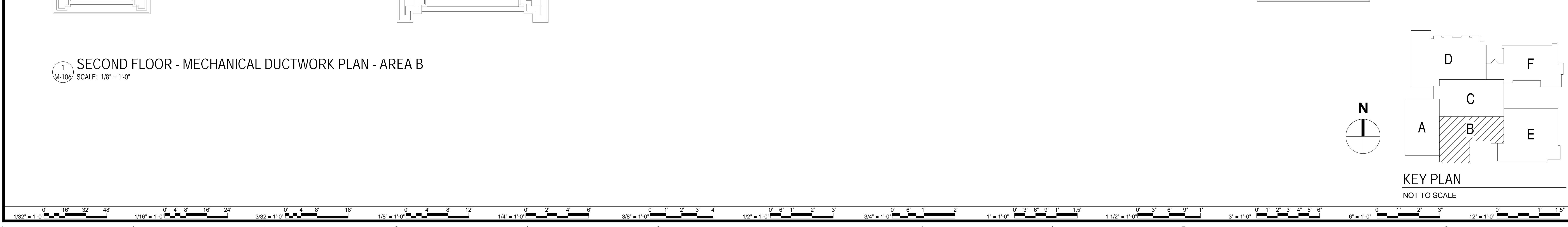
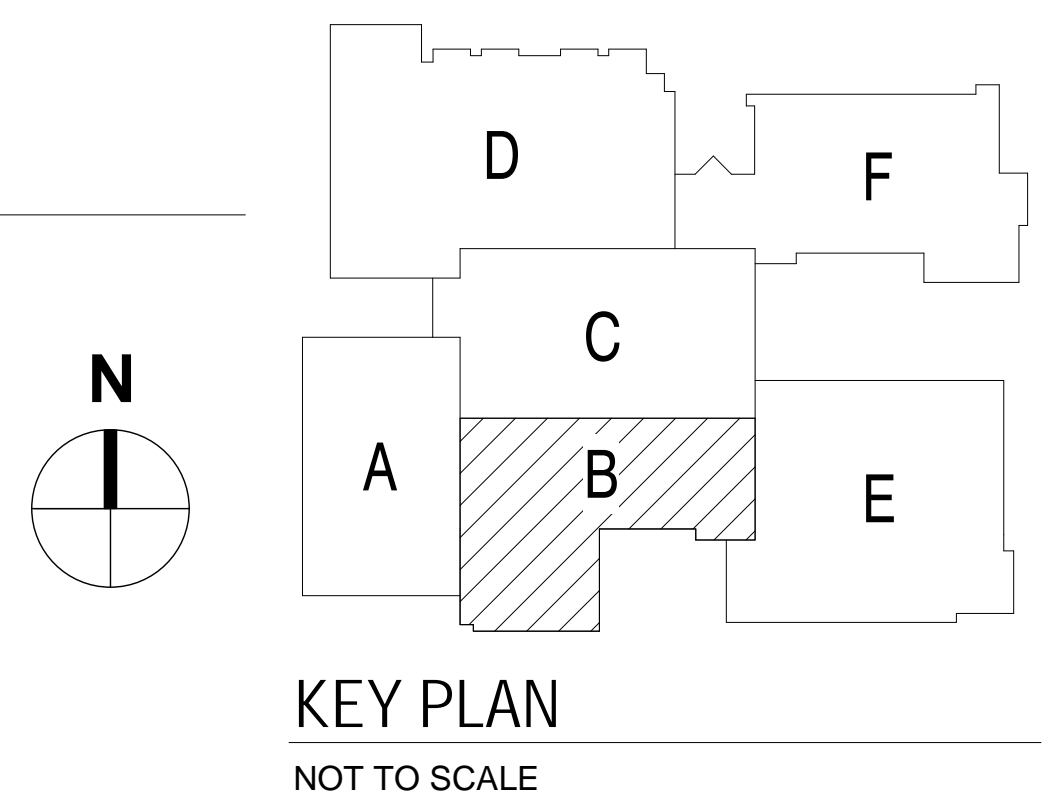
**SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA B**  
SCALE: 1/8" = 1'-0"

**SHEET NOTES:**

1. INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.
2. OPEN END DUCT, COVER WITH 1/2 INCH WIRE MESH.
3. FIRE DAMPER LOCATED IN SECOND FLOOR DUCT PENETRATION.
4. UP TO RAH-5 ON ROOF ABOVE.

**GENERAL DUCTWORK NOTES:**

1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
3. WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
4. ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
5. ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 09.
6. ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
7. ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
8. REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS
10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



3/12/2020 5:05:48 PM BIM 360//18231-04 Salem HS18410 MEP Central 2019.rvt



DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER

DATE	DESCRIPTION
12-09-2019	15231-04

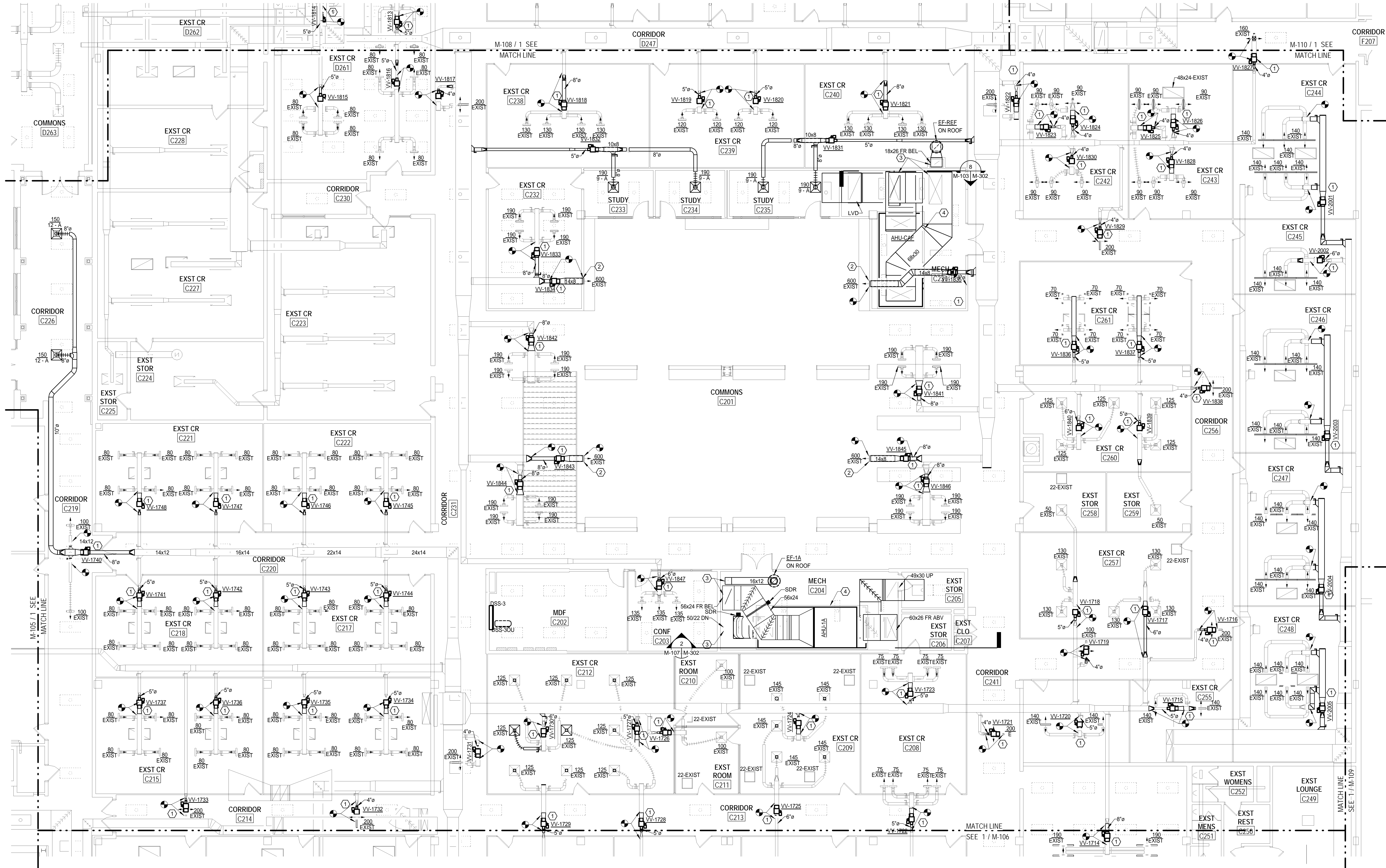
**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

DAVID L. ROLLER  
Lic No. 038362  
12-4-2019  
PROFESSIONAL ENGINEER

PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING: SECOND FLOOR - MECHANICAL DUCTWORK - AREA C

SHEET: M-107



**1 SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA C**

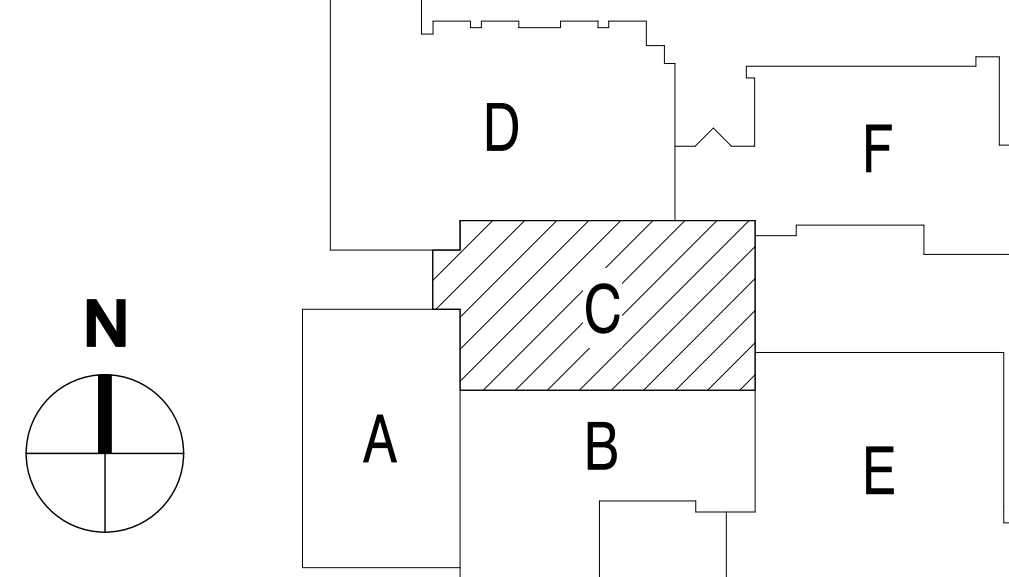
M-107 SCALE: 1/8" = 1'-0"

**SHEET NOTES:**

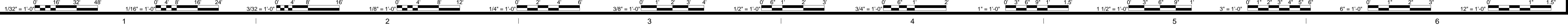
1. INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.
2. UTILIZE EXISTING BEAM PENETRATION AND DIFFUSER FOR NEW SUPPLY AIR.
3. FIRE DAMPER LOCATED IN SECOND FLOOR DUCT PENETRATION.
4. 4 INCH CONCRETE HOUSEKEEPING PAD. REFER TO SPECIFICATIONS.

**GENERAL DUCTWORK NOTES:**

1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSERS NECK, BUT NO SMALLER THAN 8".
2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
3. WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
4. ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
5. ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING. REFER TO DIVISION 09.
6. ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
7. ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
8. REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



KEY PLAN  
NOT TO SCALE



Proposal Request 01	DESCRIPTION
DATE 12-09-2019	BY
PROJECT 15233-04	MARK
DESIGNED/DLR / JDC	DATE
DRAWN DLR / JDC	REVISIONS
5	

DATE 12-09-2019	PROJECT 15233-04
DESIGNED/DLR / JDC	DRAWN DLR / JDC
CHECKED DLR / JMS	

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

DAVID L. ROLLER  
Lic No. 036362

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING SECOND FLOOR - MECHANICAL DUCTWORK - AREA D

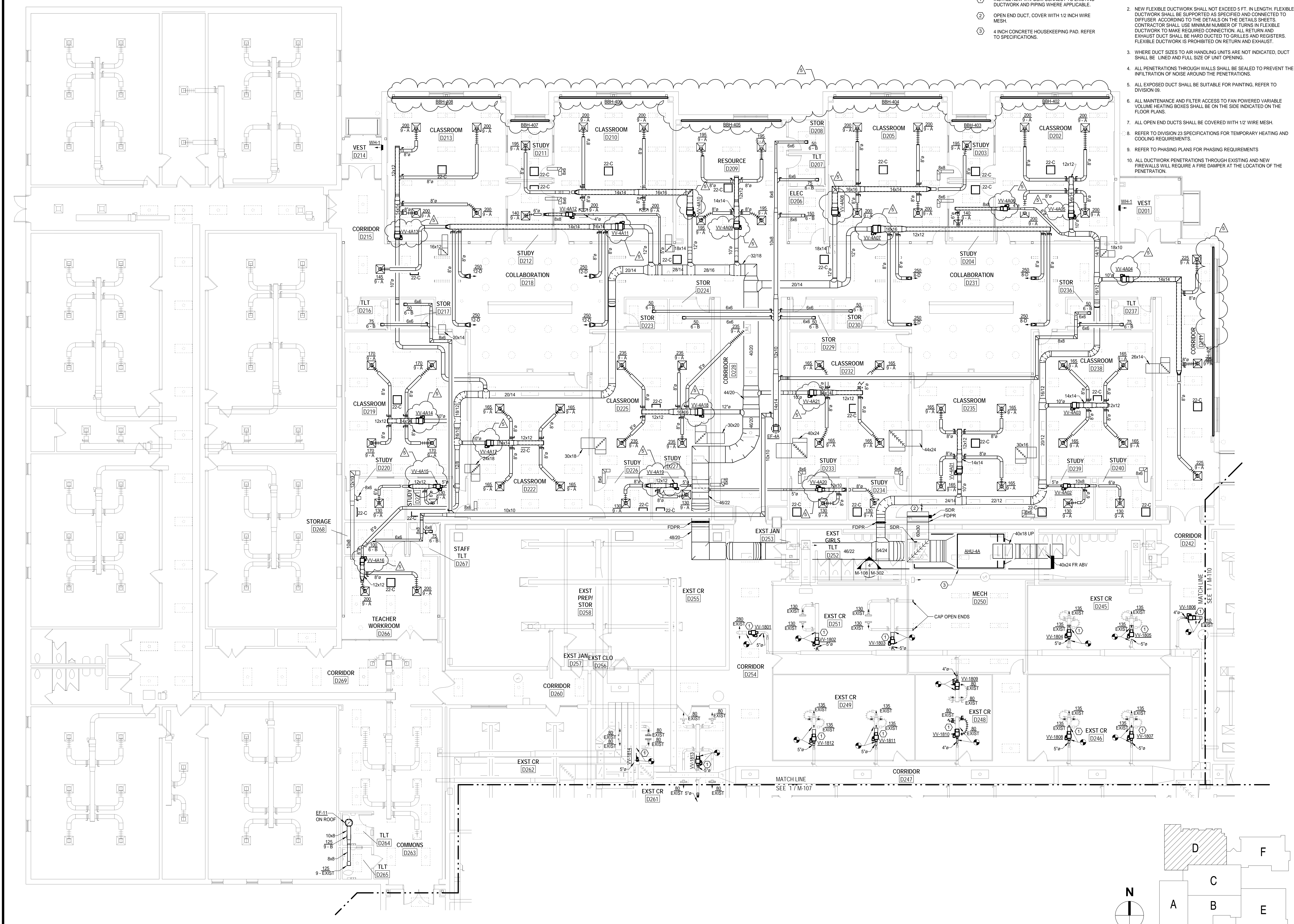
SHEET  
**M-108**

**SHEET NOTES:**

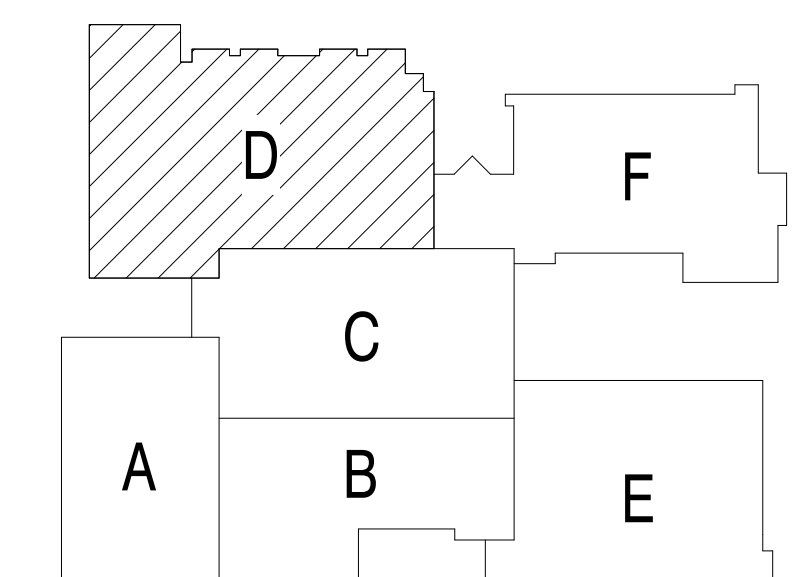
- INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.
- OPEN END DUCT, COVER WITH 1/2 INCH WIRE MESH.
- 4 INCH CONCRETE HOUSEKEEPING PAD, REFER TO SPECIFICATIONS.

**GENERAL DUCTWORK NOTES:**

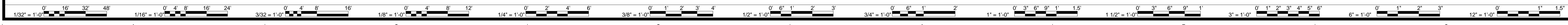
- ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
- NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 8 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSERS ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
- WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
- ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
- ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 09.
- ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
- ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
- REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
- REFER TO PHASING PLANS FOR PHASING REQUIREMENTS
- ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



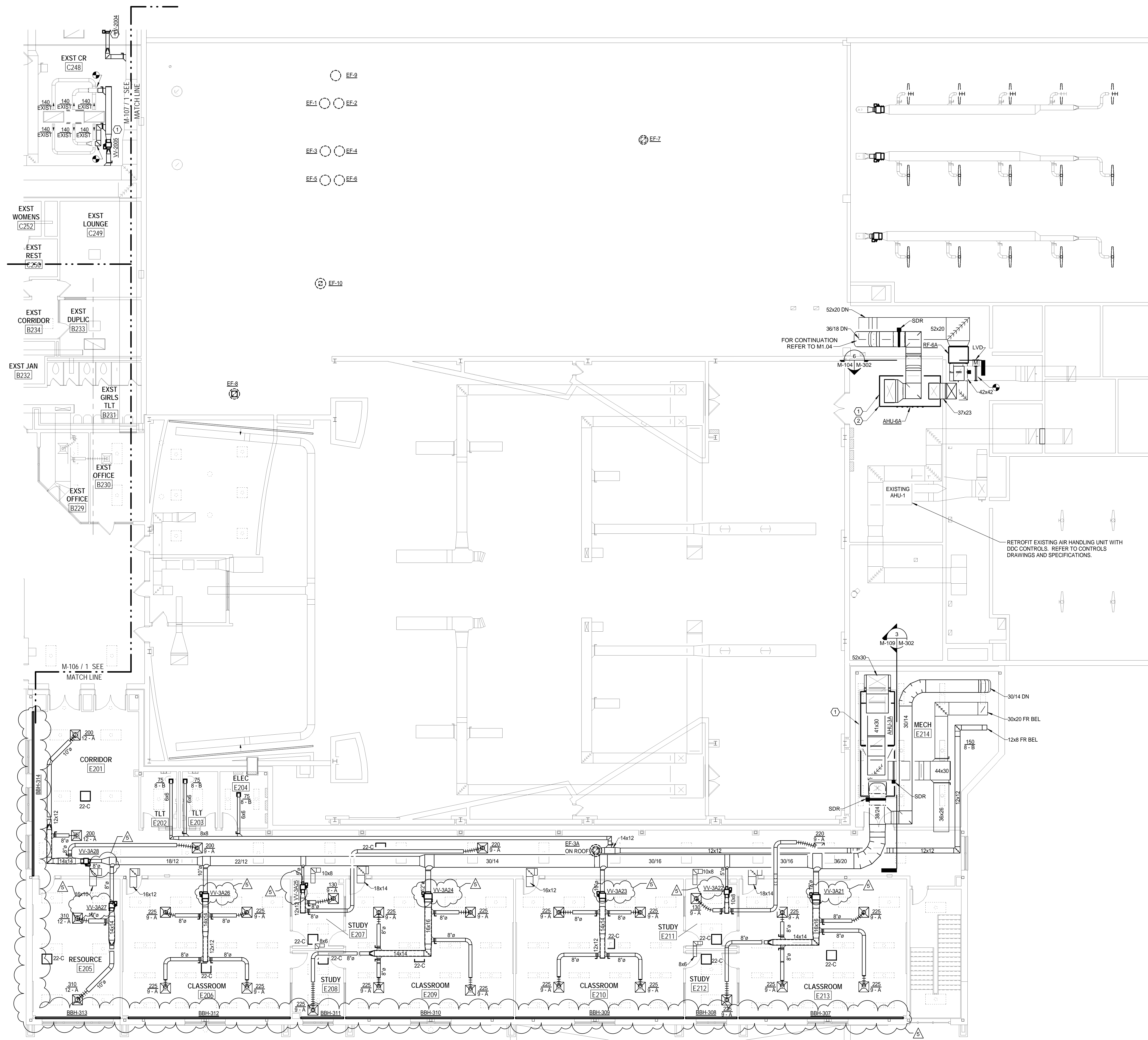
**SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA D**  
SCALE: 1/8" = 1'-0"



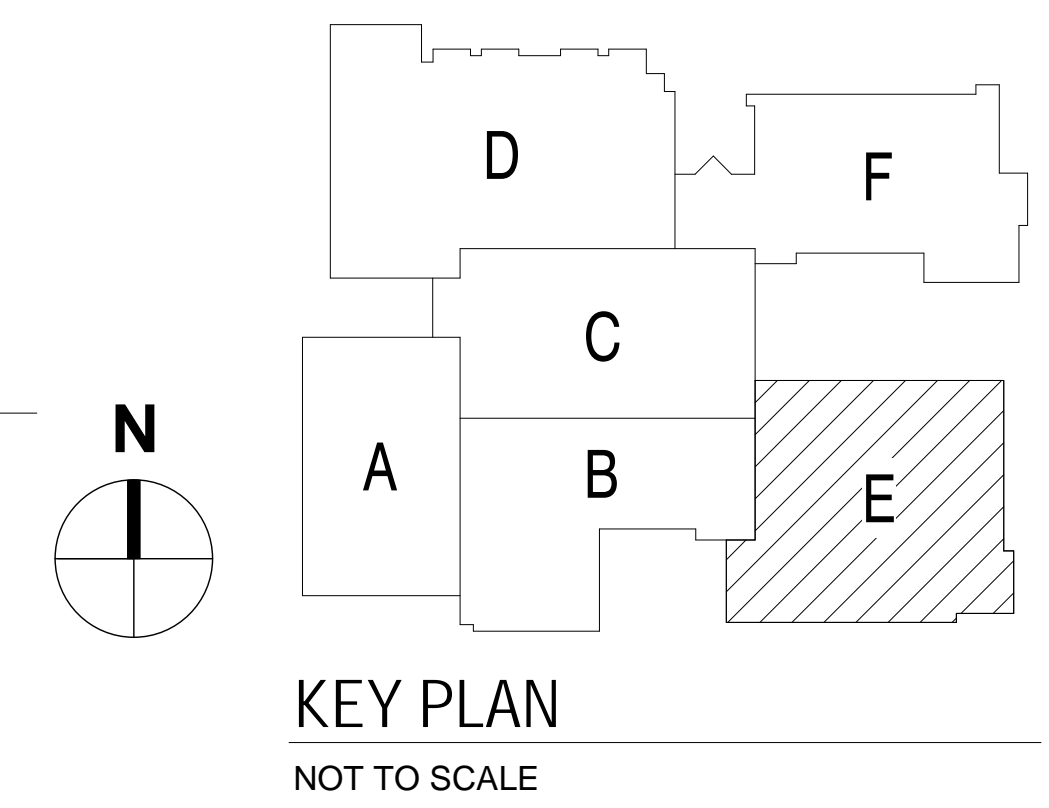
**KEY PLAN**  
NOT TO SCALE



3/12/2020 5:09:49 PM B:\360718321-04 Salem HS18410 MEP Central 2019.rvt



1 SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA E  
 M-109 SCALE: 1/8" = 1'-0"



KEY PLAN  
 NOT TO SCALE

- SHEET NOTES:**
- 4 INCH CONCRETE HOUSEKEEPING PAD. REFER TO SPECIFICATIONS.
  - EXTEND EXISTING CONCRETE PAD TO ACCOMMODATE FOOTPRINT OF NEW UNIT.

- GENERAL DUCTWORK NOTES:**
- ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
  - NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
  - WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
  - ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF MOISTURE AROUND THE PENETRATIONS.
  - ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 05.
  - ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
  - ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
  - REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
  - REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
  - ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.

RETROFIT EXISTING AIR HANDLING UNIT WITH DDC CONTROLS. REFER TO CONTROLS DRAWINGS AND SPECIFICATIONS.

**ASCENT**  
 ENGINEERING GROUP  
 5228 VALLEYFRONT PKWY, SUITE 4  
 ROANOKE, VIRGINIA 24019  
 (804) 344-4444  
 D: DLR 18410 C:

PROPOSAL REQUEST 01	DESCRIPTION
DATE: 12-09-2019	BY:
PROJECT: 15233-04	DATE: 3/1/2020
DESIGNED/DLR / JDC	MARK:
DRAWN: DLR / JDC	REVISIONS:
CHECKED: DLR / JDC	5

**RRMM**  
 ARCHITECTS, PC  
 28 Church Ave SW  
 Roanoke, Virginia 24011  
 (540)344-1212

DAVID L. ROLLER  
 Lic No. 036362  
 PROFESSIONAL ENGINEER

PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
 SALEM CITY SCHOOLS  
 400 SPARTAN DRIVE  
 SALEM, VA 24153

DRAWING: SECOND FLOOR - MECHANICAL DUCTWORK - AREA E

SHEET: M-109

3/12/2020 5:11:11 PM BIM 360//16231-04 Salem HS18410 MEP Central 2019.rvt

MARK	DATE	BY	DESCRIPTION

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DLR / JDC	DLR	DLR	DLR	JMS

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING: SECOND FLOOR - MECHANICAL DUCTWORK - AREA F

SHEET: M-110

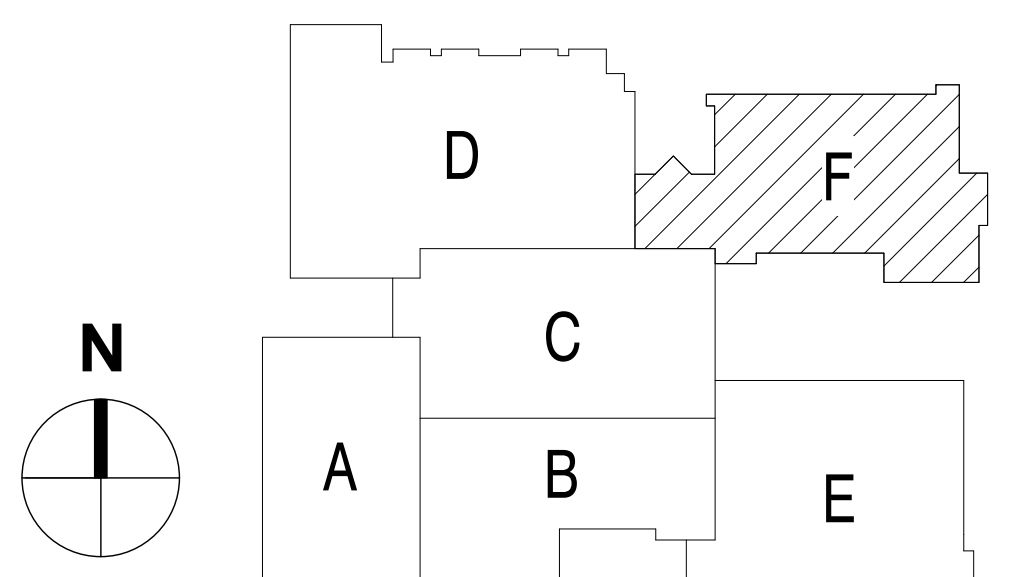


**1 SECOND FLOOR - MECHANICAL DUCTWORK PLAN - AREA F**  
SCALE: 1/8" = 1'-0"

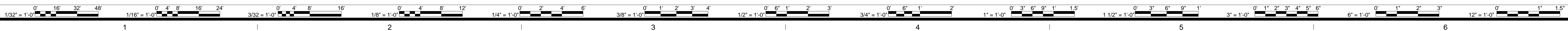
**SHEET NOTES:**  
① INSTALL NEW VAV BOX. CONNECT TO EXISTING DUCTWORK AND PIPING WHERE APPLICABLE.

**GENERAL DUCTWORK NOTES:**

- ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
- NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 5 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
- WHERE DUCT SIZES TO AIR HANDLING UNITS ARE NOT INDICATED, DUCT SHALL BE LINED AND FULL SIZE OF UNIT OPENING.
- ALL PENETRATIONS THROUGH WALLS SHALL BE SEALED TO PREVENT THE INFILTRATION OF NOISE AROUND THE PENETRATIONS.
- ALL EXPOSED DUCT SHALL BE SUITABLE FOR PAINTING, REFER TO DIVISION 09.
- ALL MAINTENANCE AND FILTER ACCESS TO FAN POWERED VARIABLE VOLUME HEATING BOXES SHALL BE ON THE SIDE INDICATED ON THE FLOOR PLANS.
- ALL OPEN END DUCTS SHALL BE COVERED WITH 1/2" WIRE MESH.
- REFER TO DIVISION 23 SPECIFICATIONS FOR TEMPORARY HEATING AND COOLING REQUIREMENTS.
- REFER TO PHASING PLANS FOR PHASING REQUIREMENTS
- ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.



**KEY PLAN**  
NOT TO SCALE



**GENERAL DUCTWORK NOTES:**

1. ALL FLEX DUCT RUNOUTS TO DIFFUSERS SHALL BE SAME SIZE AS DIFFUSER NECK, BUT NO SMALLER THAN 8".
2. NEW FLEXIBLE DUCTWORK SHALL NOT EXCEED 6 FT. IN LENGTH. FLEXIBLE DUCTWORK SHALL BE SUPPORTED AS SPECIFIED AND CONNECTED TO DIFFUSER ACCORDING TO THE DETAILS ON THE DETAILS SHEETS. CONTRACTOR SHALL USE MINIMUM NUMBER OF TURNS IN FLEXIBLE DUCTWORK TO MAKE REQUIRED CONNECTION. ALL RETURN AND EXHAUST DUCT SHALL BE HARD DUCTED TO GRILLES AND REGISTERS. FLEXIBLE DUCTWORK IS PROHIBITED ON RETURN AND EXHAUST.
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9. REFER TO PHASING PLANS FOR PHASING REQUIREMENTS.
10. ALL DUCTWORK PENETRATIONS THROUGH EXISTING AND NEW FIREWALLS WILL REQUIRE A FIRE DAMPER AT THE LOCATION OF THE PENETRATION.

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED DLR / JMS	DESCRIPTION
12-09-2019	15231-04					

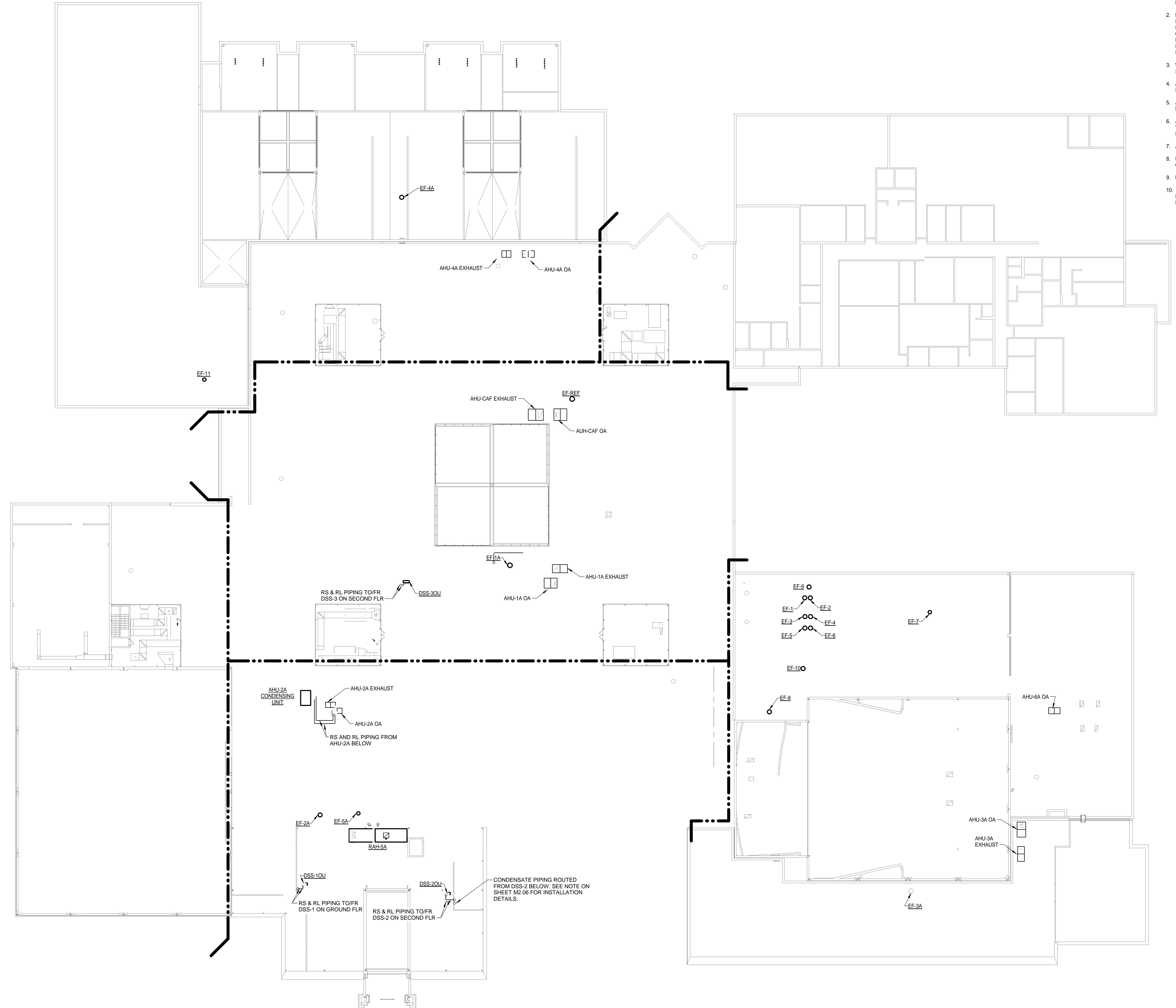
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED DLR / JMS
12-09-2019	15231-04				

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

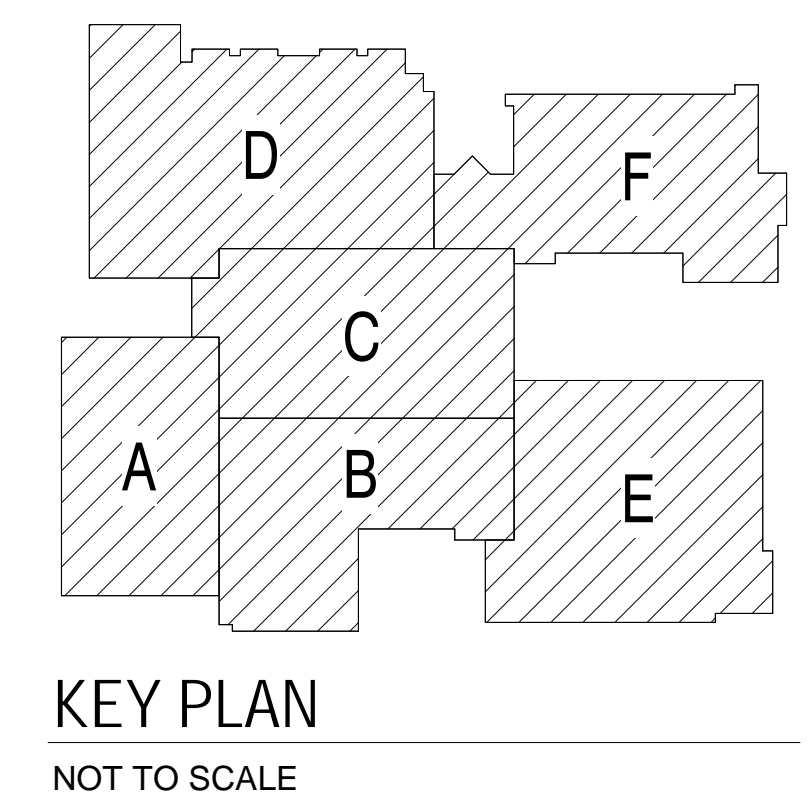
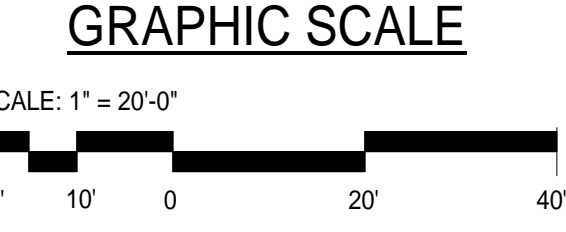
DAVID L. ROLLER  
Lic No 036382  
12-4-2019  
PROFESSIONAL ENGINEER

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING PENTHOUSE AND ROOF PLAN

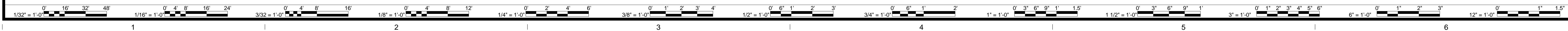
SHEET  
**M-111**



**1 PENTHOUSE LEVEL - MECHANICAL DUCTWORK PLAN**  
SCALE: 1" = 20'-0"



12/9/2019 11:02:08 AM BIM 360//18231-04 Salem HS18410 MEP Central 2019.rvt



MARK	DATE	BY	DESCRIPTION

DATE	PROJECT	DESIGNED	DRAWN	CHECKED
12-09-2019	15231-04	DLR / JDC	DLR / JDC	DLR / JMS

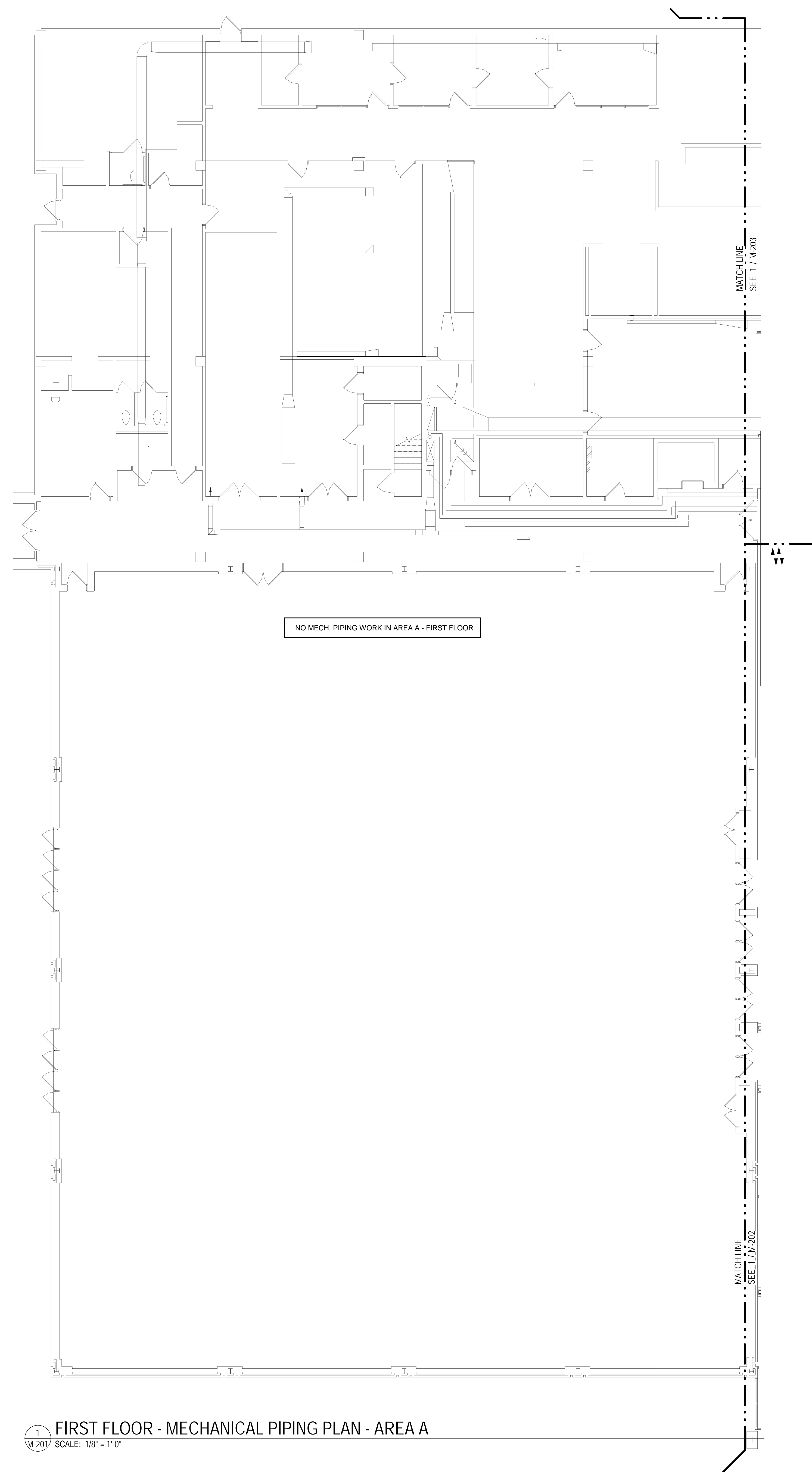
**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING: FIRST FLOOR - MECHANICAL PIPING - AREA A

SHEET: **M-201**

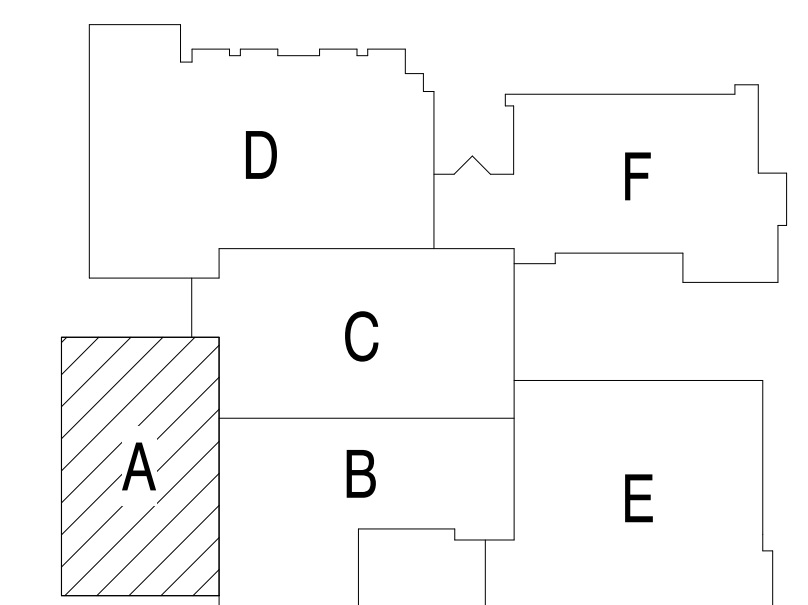
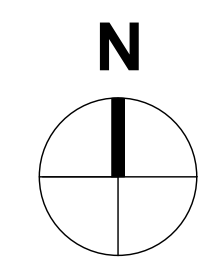


NO MECH. PIPING WORK IN AREA A - FIRST FLOOR

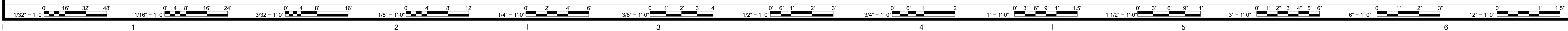
MATCHLINE  
SEE 1 / M-203

MATCHLINE  
SEE 1 / M-202

1 FIRST FLOOR - MECHANICAL PIPING PLAN - AREA A  
M-201 SCALE: 1/8" = 1'-0"



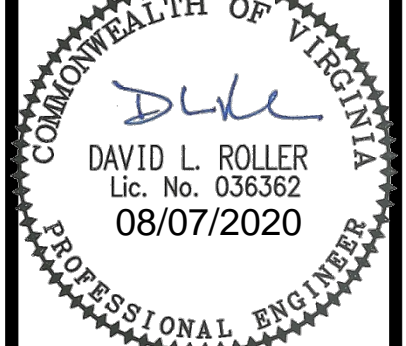
KEY PLAN  
NOT TO SCALE



Change Order #	DATE	PROJECT	DESIGNED BY	DRAWN BY	CHECKED BY	DESCRIPTION	
5	7/07/20	12-09-2019	15231-04	DLR	DLR	JDC	REVISIONS

DATE	PROJECT	DESIGNED BY	DRAWN BY	CHECKED BY
12-09-2019	15231-04	DLR	DLR	JDC

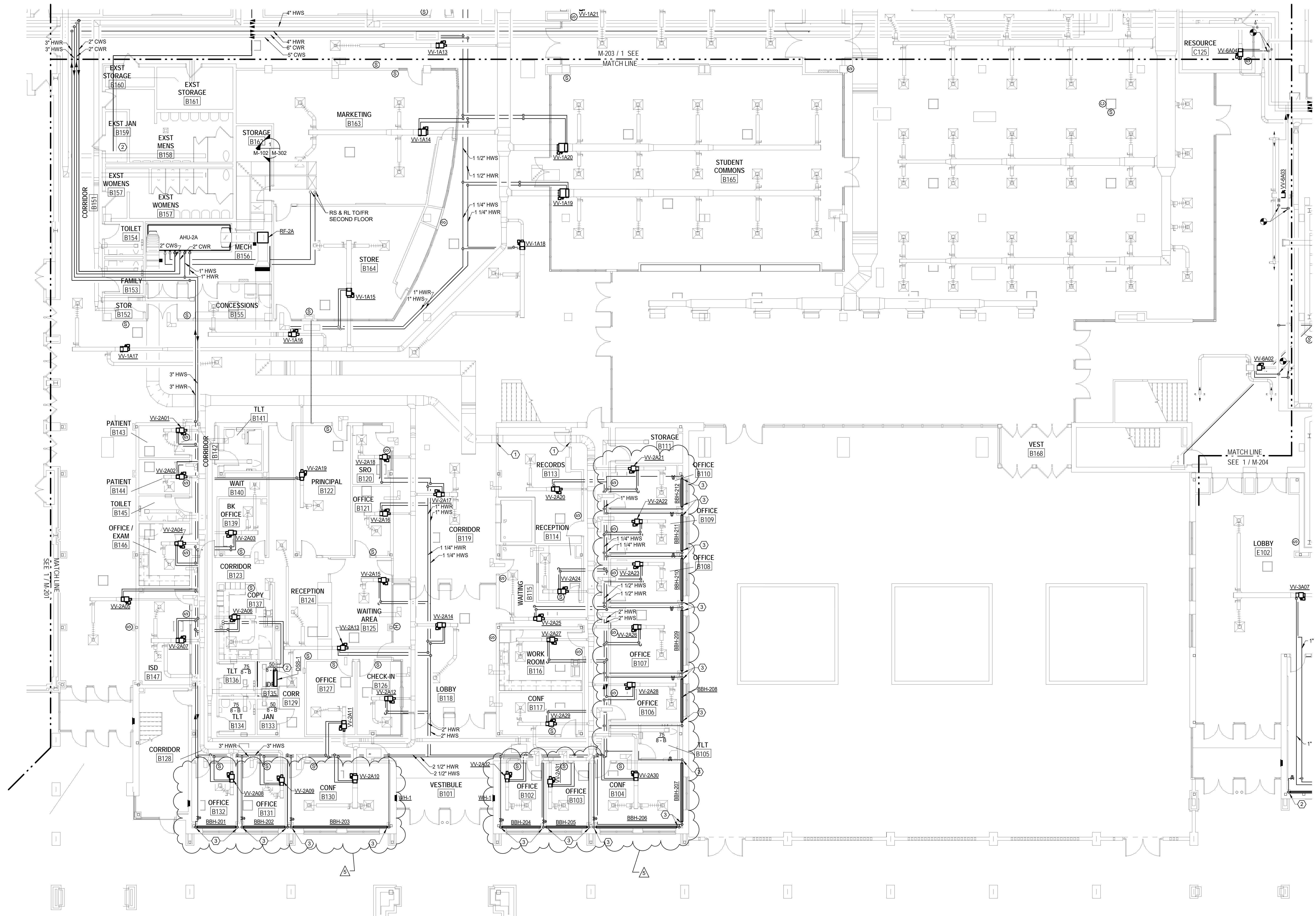
**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING: FIRST FLOOR - MECHANICAL PIPING - AREA B

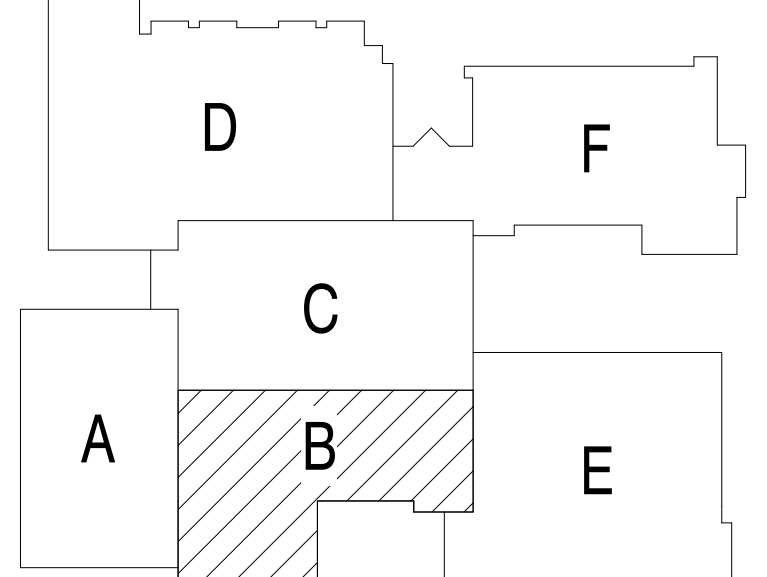
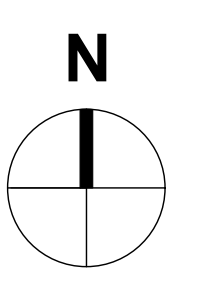
SHEET: M-202



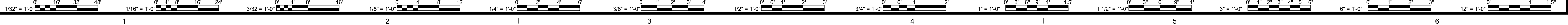
1 FIRST FLOOR - MECHANICAL PIPING PLAN - AREA B  
M-202 SCALE: 1/8" = 1'-0"

- SHEET NOTES:**
- FIRE DAMPER LOCATED IN FIREWALL DUCTWORK PENETRATION.
  - ROUTE DUCTLESS SPLIT SYSTEM CONDENSATE LINE TO VAPOR SINK IN JANITOR CLOSET.
  - PIPING DOWN TO AND FROM BASEBOARD HEAT LOCATED IN CHASE.

- GENERAL PIPING NOTES:**
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE .3/4" FOR 3.0 GPM AND LESS, 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.



KEY PLAN  
NOT TO SCALE



8/10/2020 3:35:26 PM BIM 360//16231-04 Salem HS18410 MEP Central 2019.rvt

PROPOSAL REQUEST 01	DESCRIPTION
5	3/1/2020
MARK DATE	BY
REVISIONS	

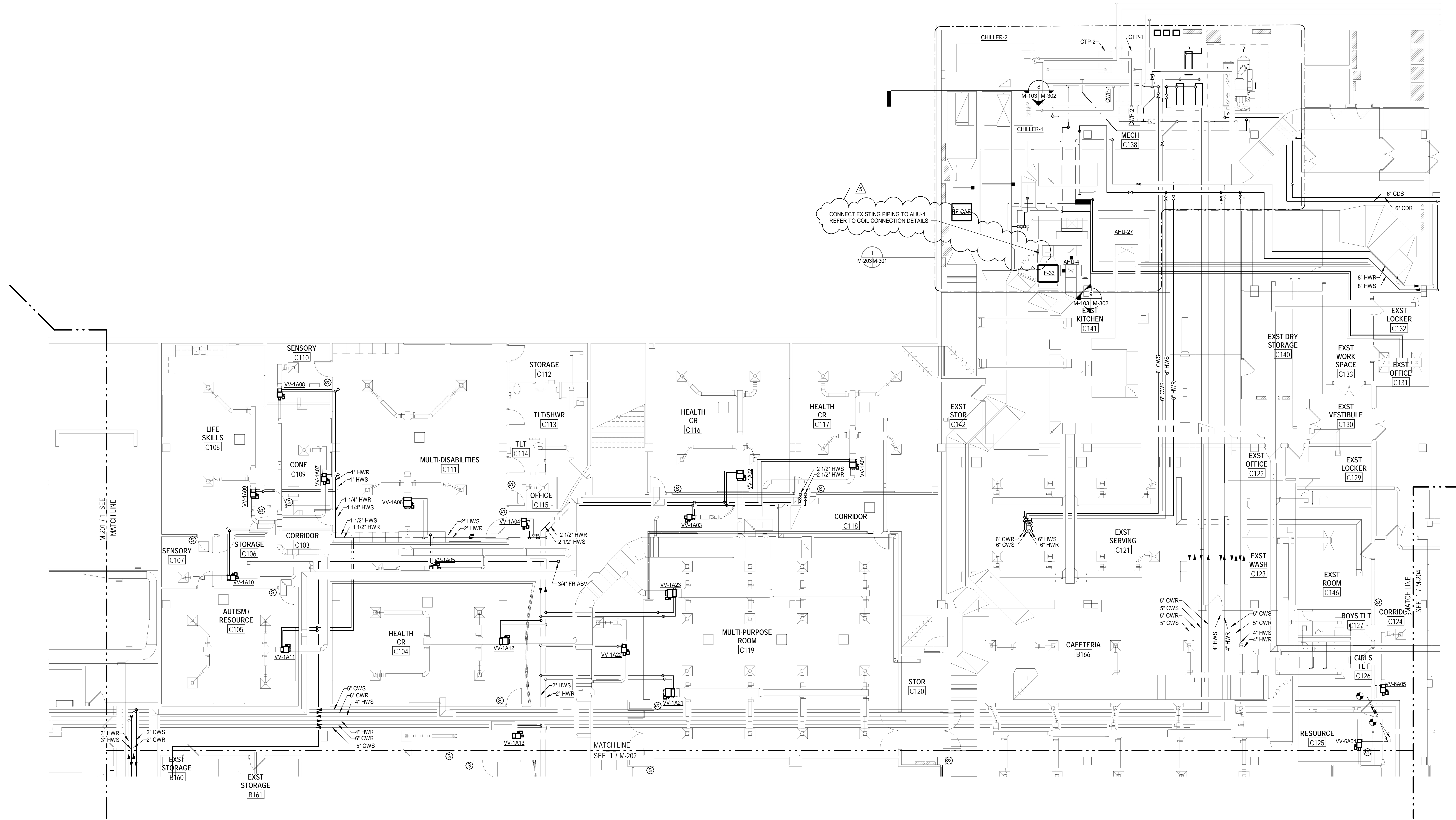
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JDC
12-09-2019	15231-04	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JDC

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



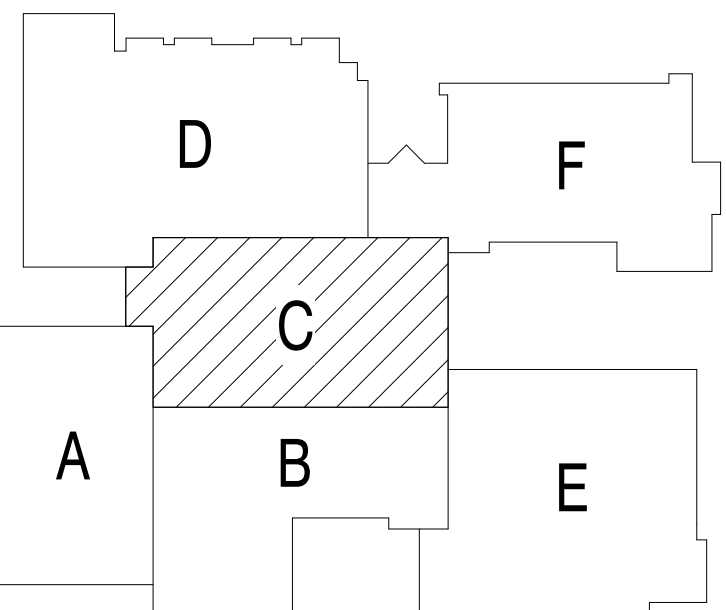
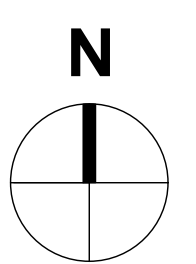
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING FIRST FLOOR - MECHANICAL PIPING - AREA C

SHEET  
**M-203**

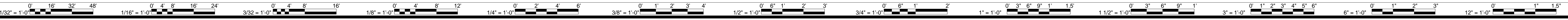


**1** FIRST FLOOR - MECHANICAL PIPING PLAN - AREA C  
SCALE: 1/8" = 1'-0"

- GENERAL PIPING NOTES:
1. ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE: 3/4" FOR 3.0 GPM AND LESS; 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  2. BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.



KEY PLAN  
NOT TO SCALE



3/12/2020 5:17:09 PM BIN 360718231-04 Salem HS18410 MEP Central 2019.rvt



Change Order	DESCRIPTION
02	

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER

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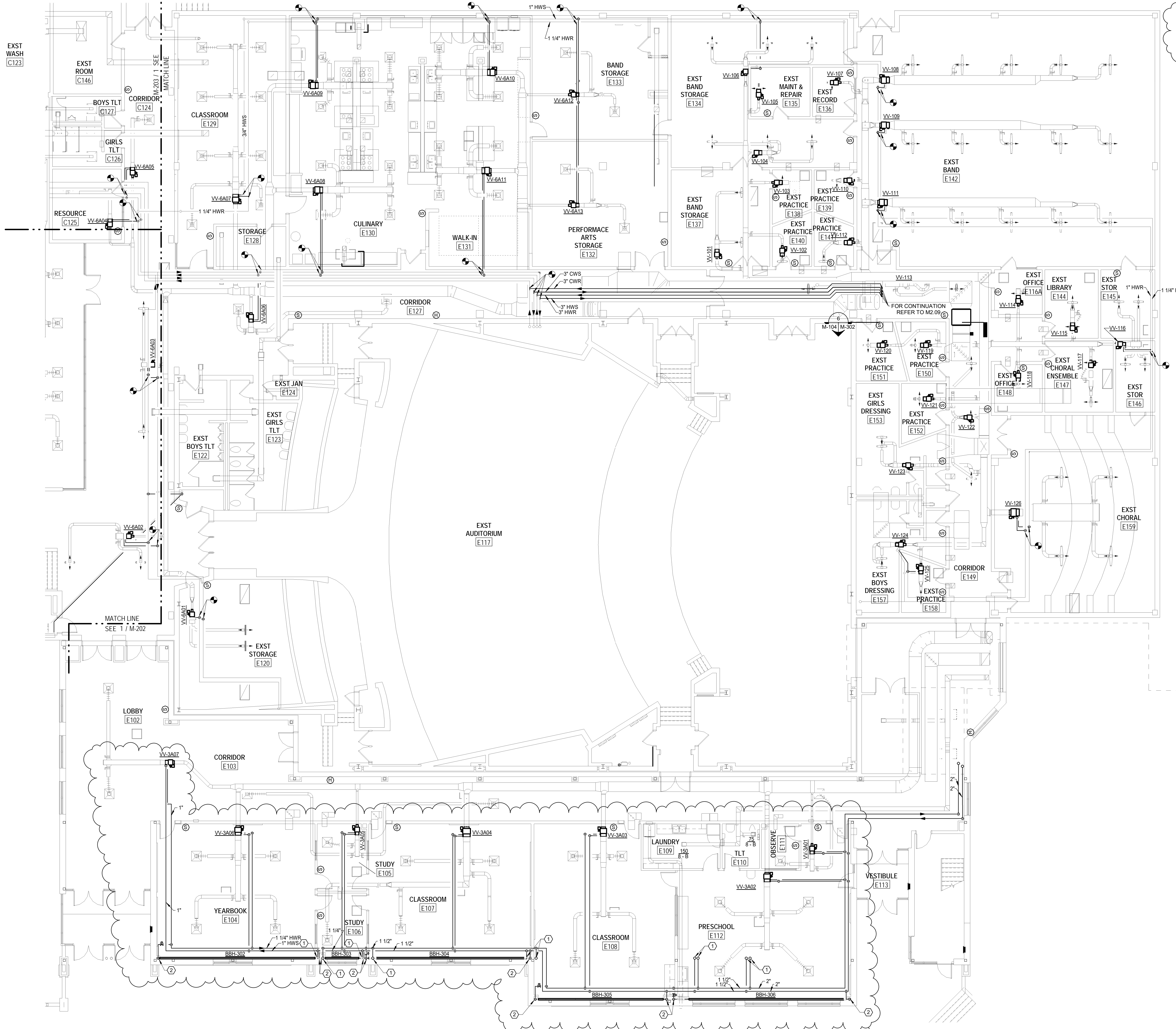


PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

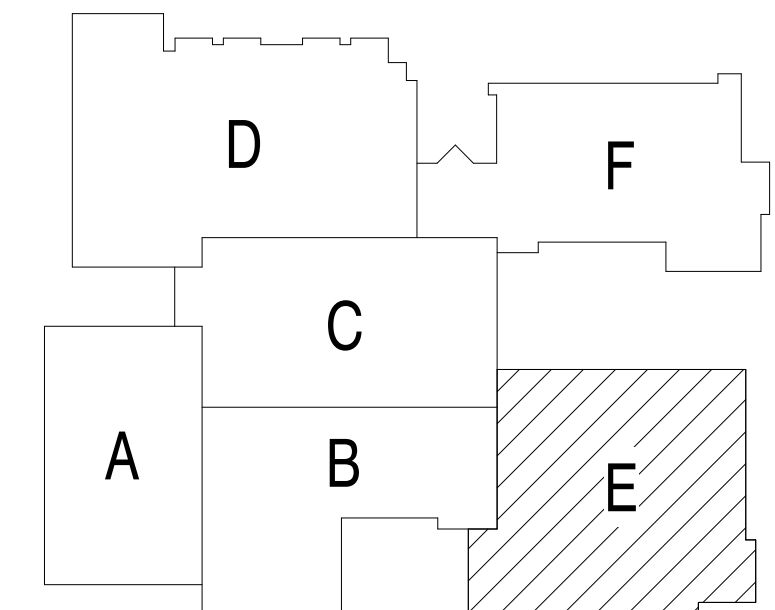
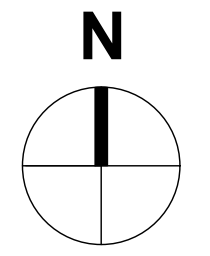
DRAWING: FIRST FLOOR - MECHANICAL PIPING - AREA E

SHEET: M-204

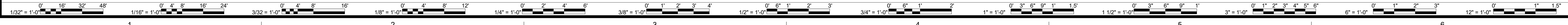
- SHEET NOTES:**
- BASEBOARD HEAT PIPING UP AND FROM ABOVE.
  - PIPING DOWN TO AND FROM BASEBOARD HEAT LOCATED IN CHASE.
- GENERAL PIPING NOTES:**
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE 3/4" FOR 3.0 GPM AND LESS, 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.

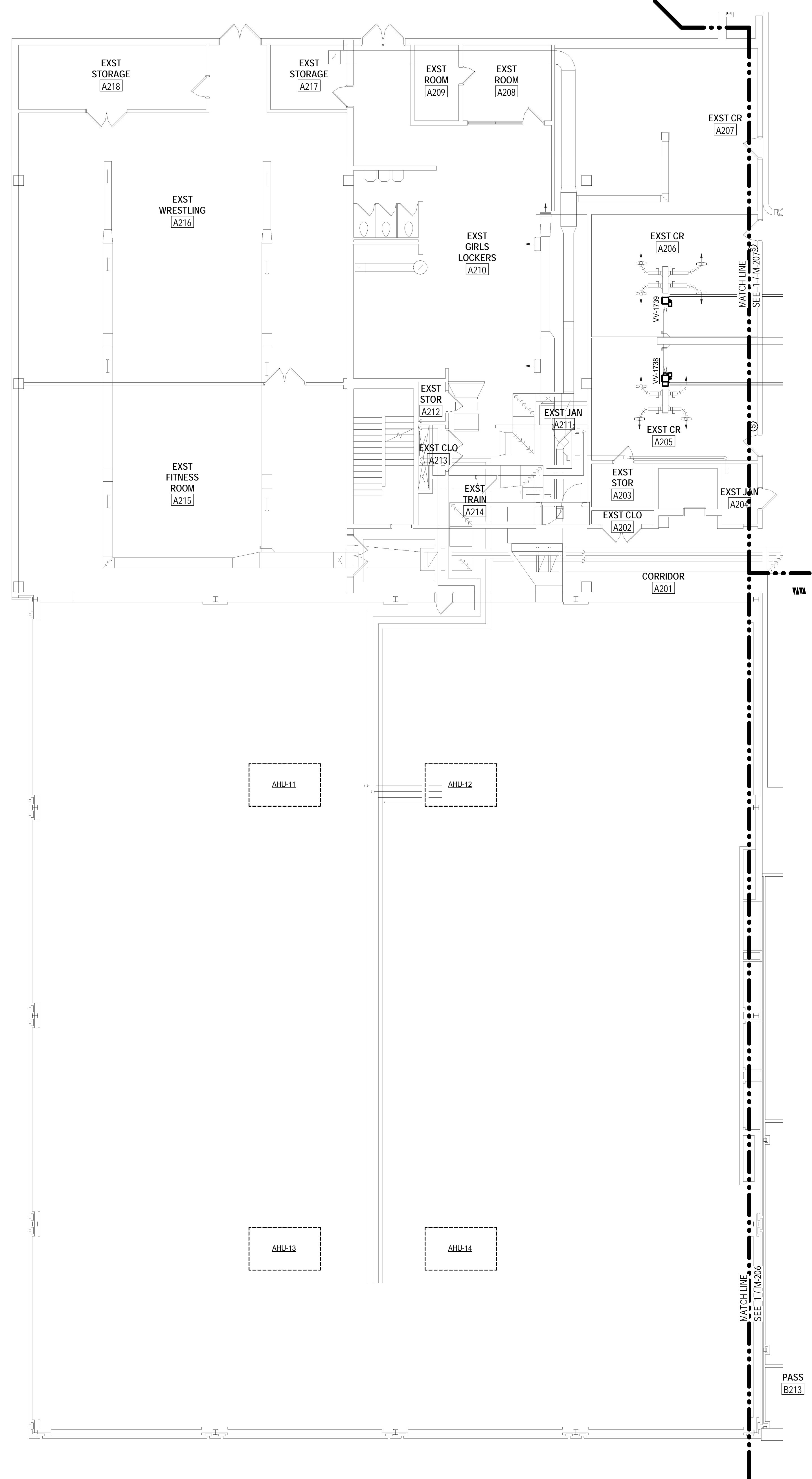


1 FIRST FLOOR - MECHANICAL PIPING PLAN - AREA E  
M-204 SCALE: 1/8" = 1'-0"



KEY PLAN  
NOT TO SCALE





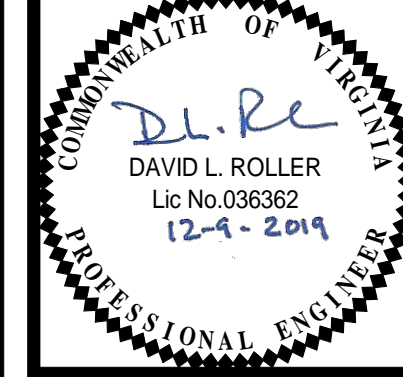
- GENERAL PIPING NOTES:
1. ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE: 3/4" FOR 3.0 GPM AND LESS, 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  2. BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.

**ASCENT**  
ENGINEERING GROUP  
5228 VALLEYFRONT PKWY, SUITE 4  
ROANOKE, VIRGINIA 24019  
(540) 963-4444  
D:DLR 18410 C:

MARK	DATE	BY	DESCRIPTION

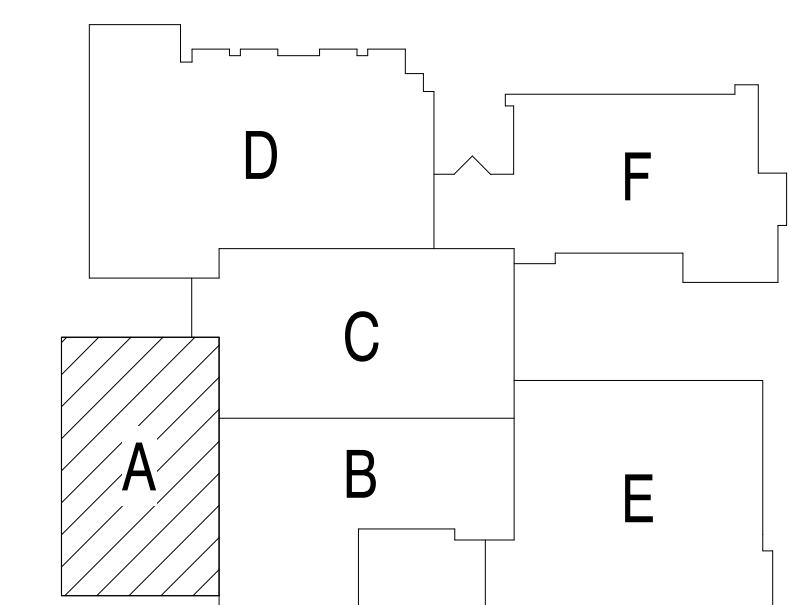
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED DLR / JMS
12-09-2019	15231-04	DLR	DLR	DLR	JMS

**RRMM**  
ARCHITECTS, P.C.  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



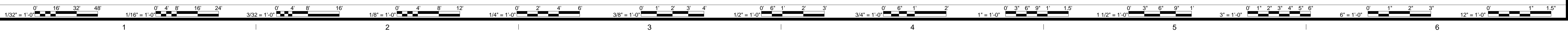
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING SECOND FLOOR - MECHANICAL PIPING - AREA A



KEY PLAN  
NOT TO SCALE

1 SECOND FLOOR - MECHANICAL PIPING PLAN - AREA A  
SCALE: 1/8" = 1'-0"



PROPOSAL REQUEST 01	DESCRIPTION
AS1 01	

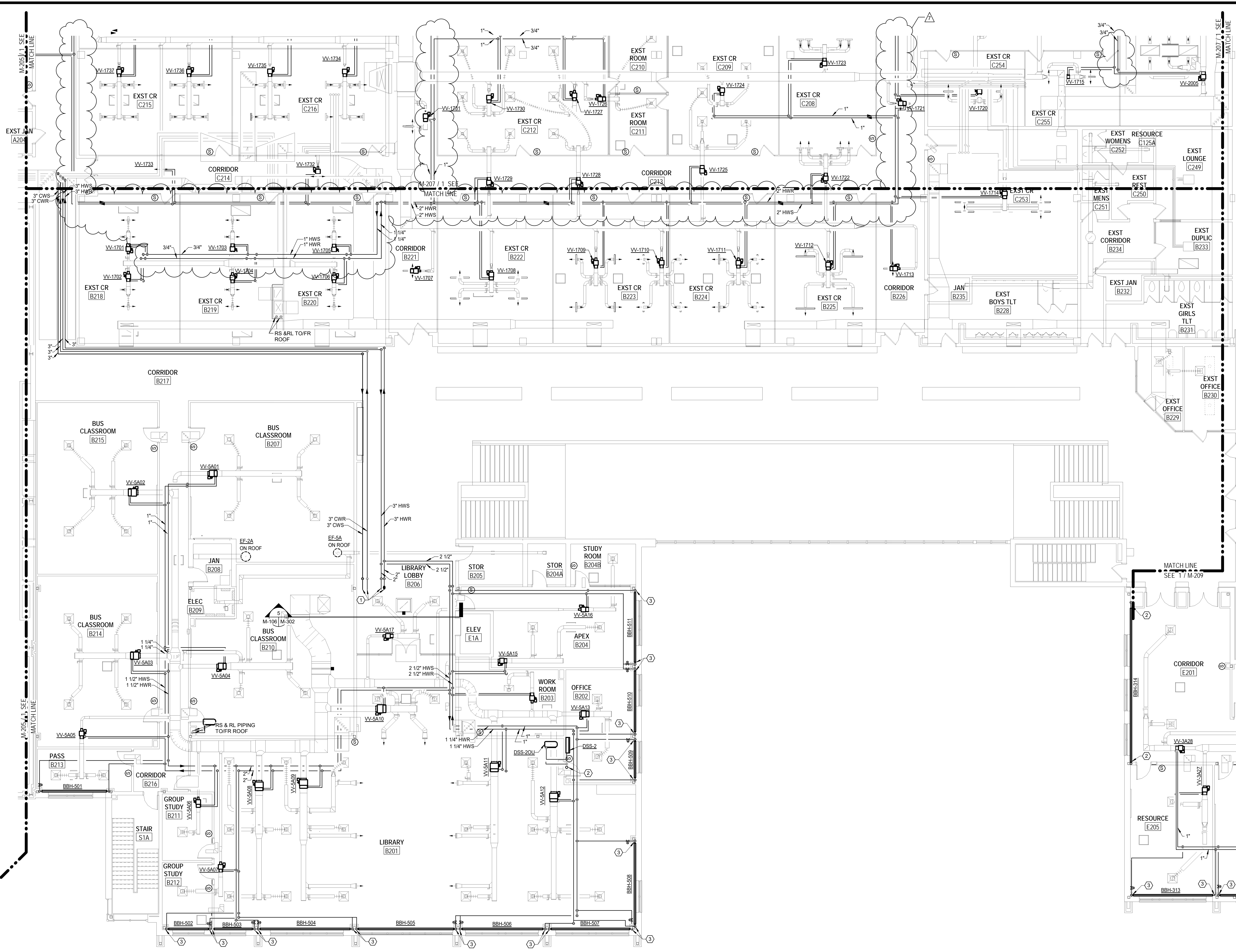
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JDC
12-09-2019	15233-04	DAVID L. ROLLER	D. DLR	D. DLR	D. DLR	D. DLR
3/12/20						
4/29/20						

**RRMM ARCHITECTS, P.C.**  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

COMMONWEALTH OF VIRGINIA  
*David L. Roller*  
Lic. No. 036362  
04-29-2020  
PROFESSIONAL ENGINEER

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING SECOND FLOOR - MECHANICAL PIPING - AREA B

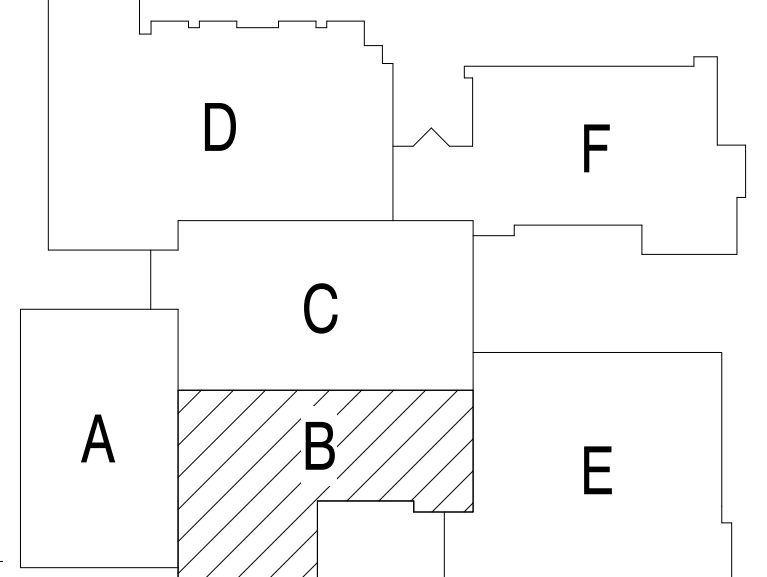
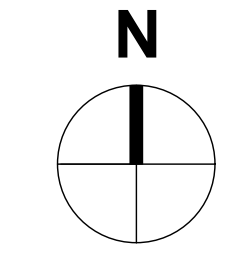
SHEET M-206



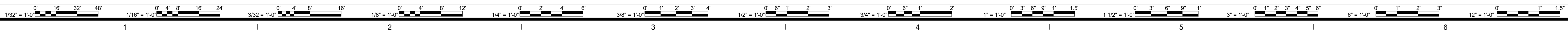
1 SECOND FLOOR - MECHANICAL PIPING PLAN - AREA B  
M-206 SCALE: 1/8" = 1'-0"

- SHEET NOTES:**
- ① UP TO RAHS ON ROOF.
  - ② 3/4" CONDENSATE PIPE FROM UNIT MOUNTED PUMP ROUTE UP THROUGH ROOF AND TURN CONDENSATE DRAIN DOWN AND DISCHARGE MINIMUM 4" FROM ROOF SURFACE. COVER OPENING WITH INSECT SCREEN.
  - ③ PIPING DOWN TO AND FROM BASEBOARD HEAT LOCATED IN CHASE.

- GENERAL PIPING NOTES:**
- 1. ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE: 3/4" FOR 3.0 GPM AND LESS; 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - 2. BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.



KEY PLAN  
NOT TO SCALE



4/29/2020 10:36:32 AM BIM 360//18231-04 Salem HS19410 MEP Central 2019.rvt

PROPOSAL REQUEST 01	DESCRIPTION
ASI 01	
3/12/20	BY
4/29/20	DATE
5	MARK
7	REVISIONS

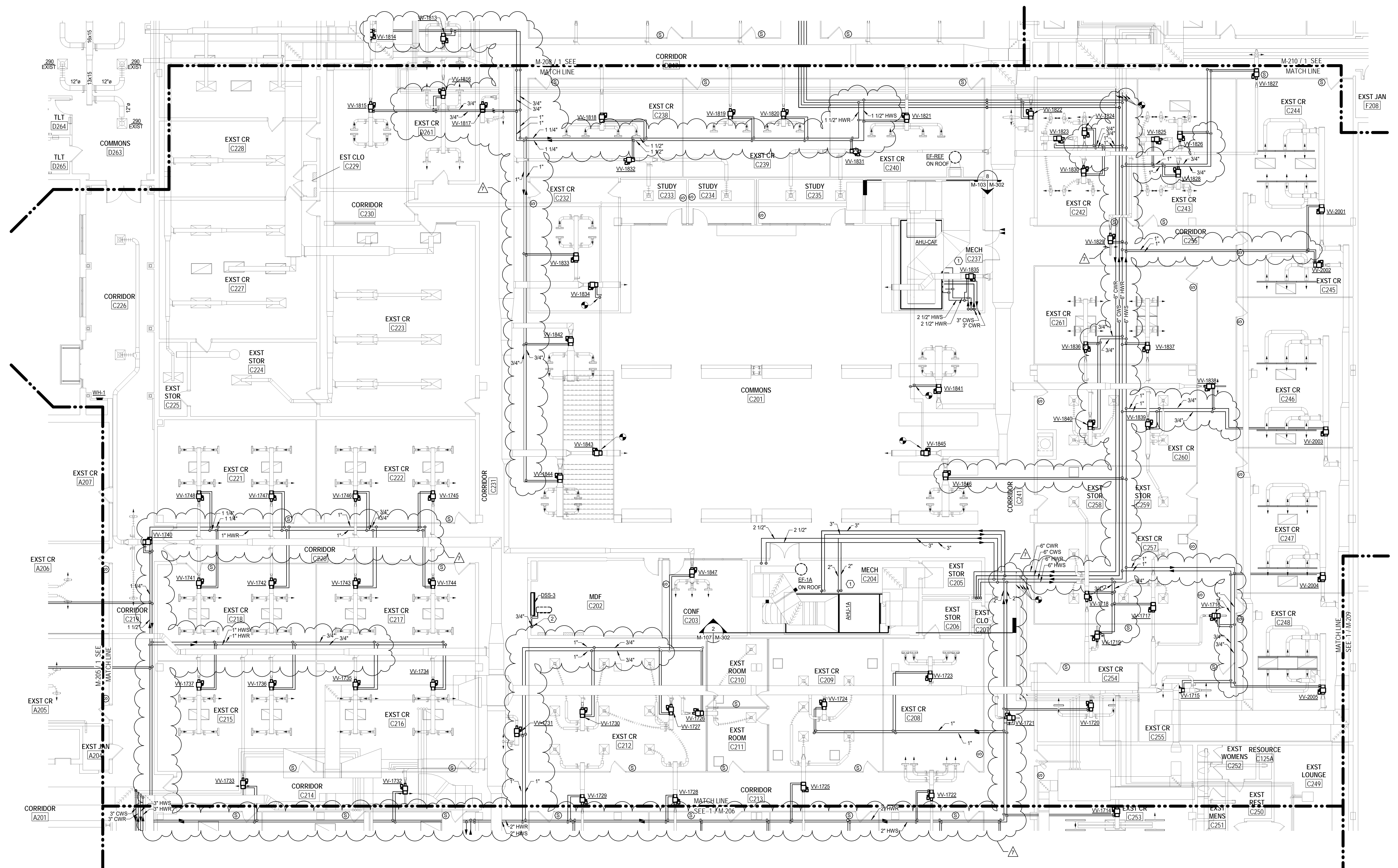
12-09-2019  
PROJECT 15231-04  
DESIGNED/DLR / JDC  
DRAWN DLR / JDC  
CHECKED DLR / JMS

**RRMM**  
ARCHITECTS, P.C.  
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Roanoke, Virginia 24011  
(540)344-1212

COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic. No. 036362  
04-29-2020  
PROFESSIONAL ENGINEER

SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING SECOND FLOOR - MECHANICAL PIPING - AREA C

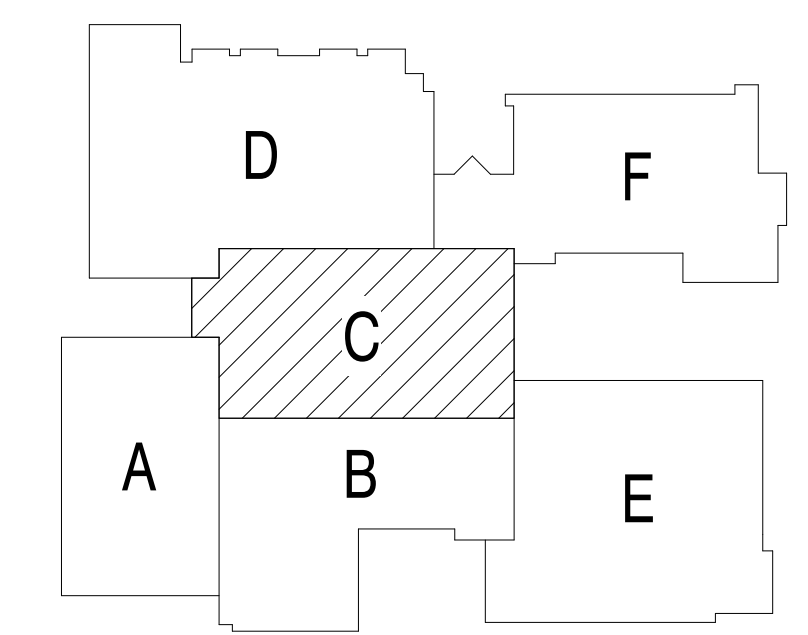
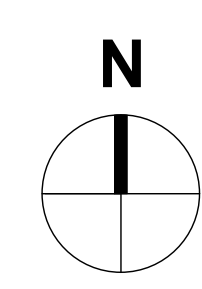
SHEET  
**M-207**



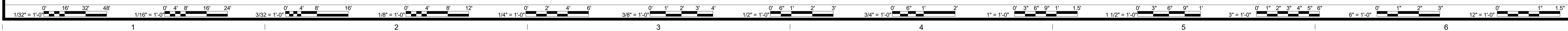
**1**  
M-207  
SECOND FLOOR - MECHANICAL PIPING PLAN - AREA C  
SCALE: 1/8" = 1'-0"

- GENERAL PIPING NOTES:
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE: 3/4" FOR 3.0 GPM AND LESS; 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.

- SHEET NOTES:
- ROUTE CONDENSATE PIPING TO OPEN SITE DRAIN. REFER TO PLUMBING PLANS FOR EXACT DRAIN LOCATION.
  - ROUTE CONDENSATE TO FLOOR BELOW, FOR CONTINUATION SEE SHEET M2.03.



KEY PLAN  
NOT TO SCALE



4/29/2020 10:37:39 AM B:\300718231-04 Salem HS18410 MEP Central 2019.rvt

Change Order	DATE	PROJECT	DESIGNED BY	DRAWN BY	CHECKED BY	DESCRIPTION
02	7/07/20	12-09-2019	15233-04	DLR / JDC	DLR / JDC	
5						

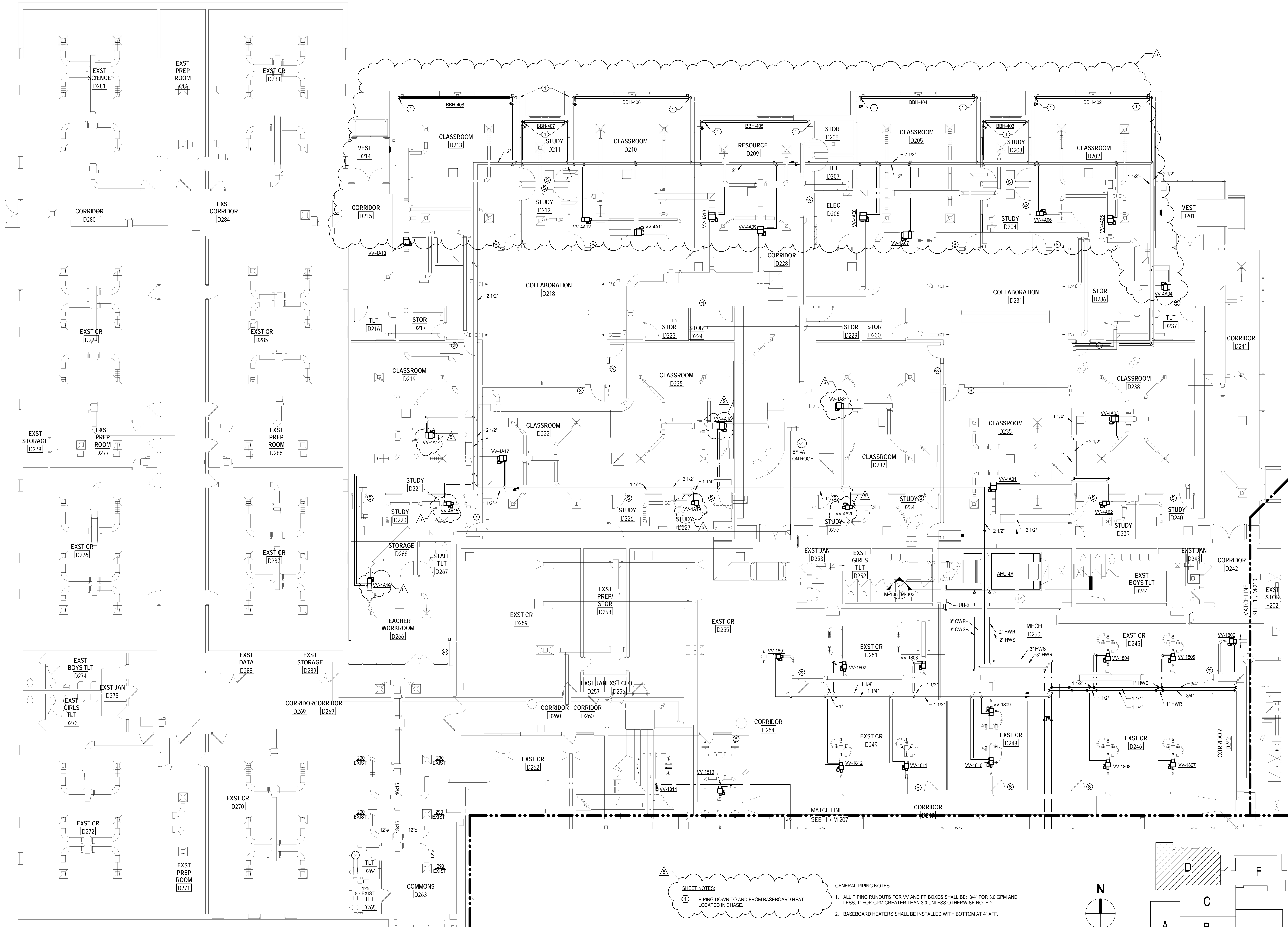
DATE	PROJECT	DESIGNED BY	DRAWN BY	CHECKED BY
12-09-2019	15233-04	DLR / JDC	DLR / JDC	DLR / JDC

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Roanoke, Virginia 24011  
(540) 344-1212

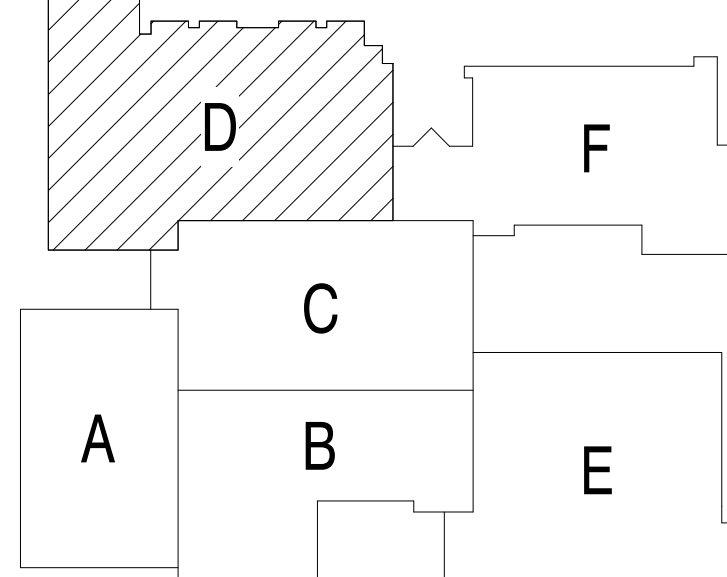
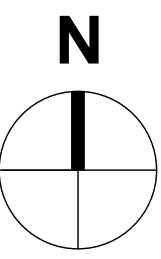
COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic. No. 036362  
08/07/2020  
PROFESSIONAL ENGINEER

PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING: SECOND FLOOR - MECHANICAL PIPING - AREA D

SHEET: M-208

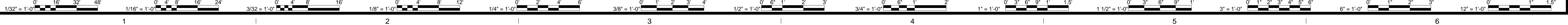


- SHEET NOTES:**
- (1) PIPING DOWN TO AND FROM BASEBOARD HEAT LOCATED IN CHASE.
- GENERAL PIPING NOTES:**
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE: 3/4" FOR 3.0 GPM AND LESS; 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.

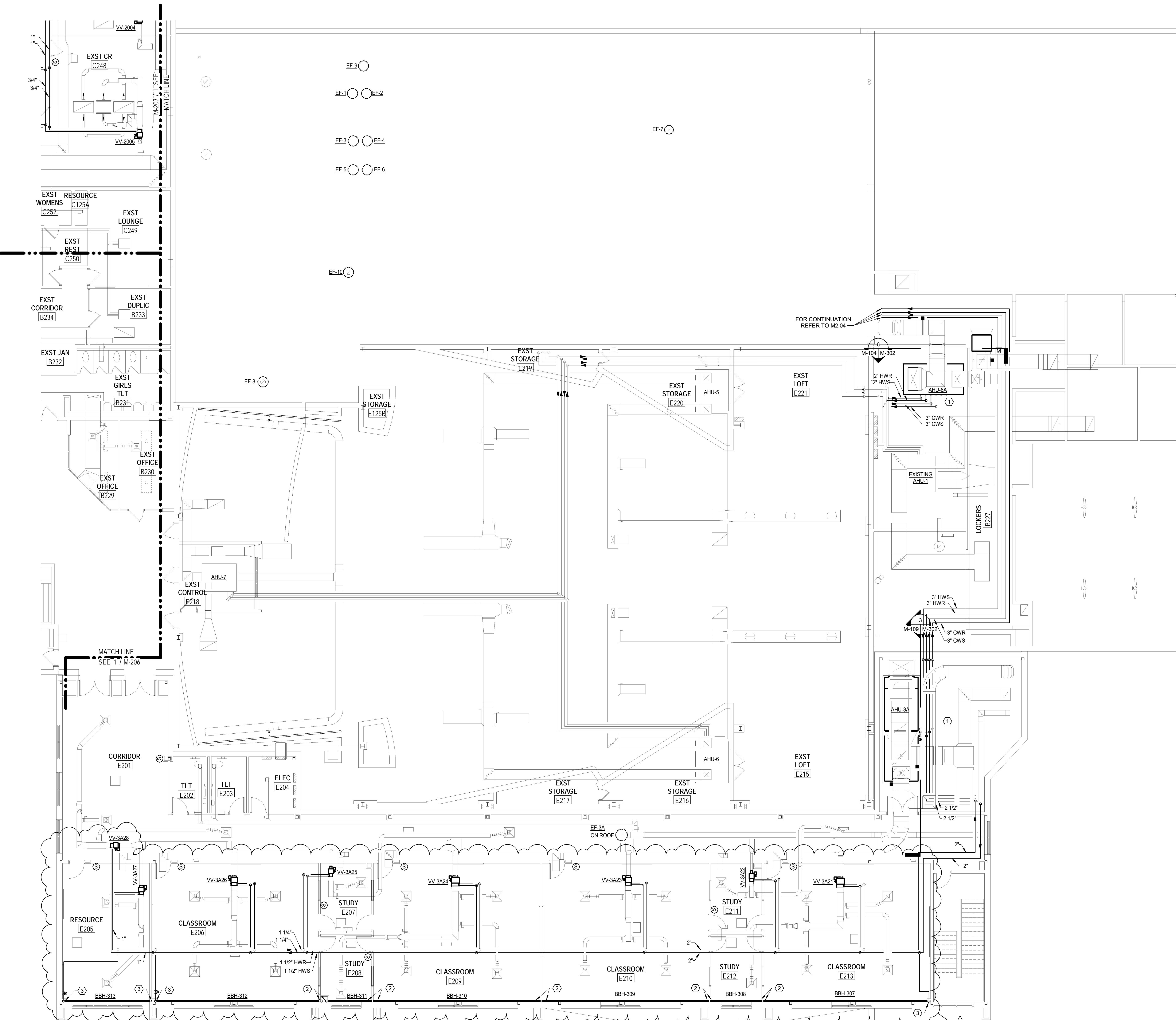


KEY PLAN  
NOT TO SCALE

1 SECOND FLOOR - MECHANICAL PIPING PLAN - AREA D  
SCALE: 1/8" = 1'-0"



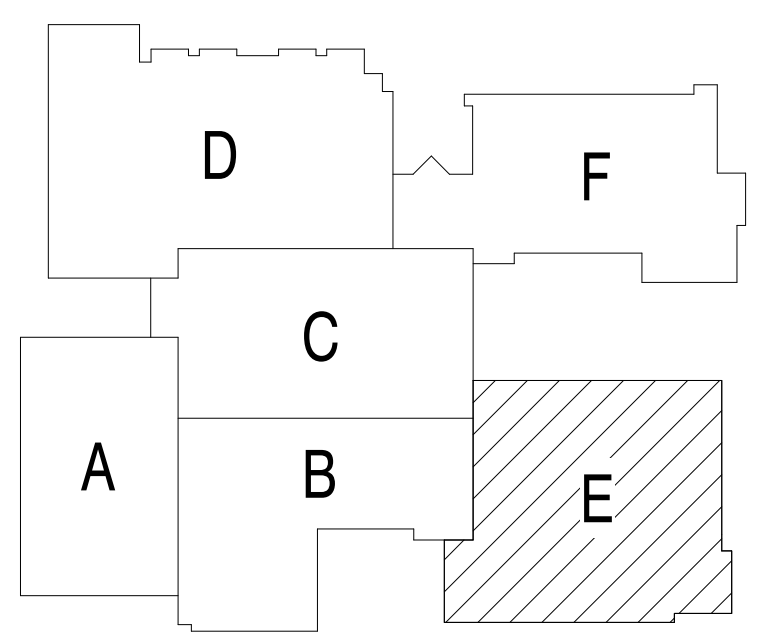
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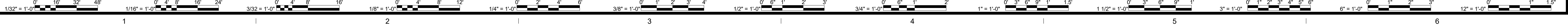
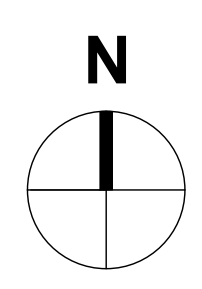
1 SECOND FLOOR - MECHANICAL PIPING PLAN - AREA E  
 M-209 SCALE: 1/8" = 1'-0"

- SHEET NOTES:**
- ROUTE CONDENSATE TO OPEN SITE DRAIN, REFER TO PLUMBING DRAWINGS FOR EXACT LOCATION OF DRAIN. CONTRACTOR TO SIZE CONDENSATE PIPING.
  - BASEBOARD HEATER PIPING TO AND FROM BELOW.
  - PIPING DOWN TO AND FROM BASEBOARD HEAT LOCATED IN CHASE.

- GENERAL PIPING NOTES:**
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE 3/4" FOR 3.0 GPM AND LESS, 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.



KEY PLAN  
 NOT TO SCALE



**ASCENT**  
 ENGINEERING GROUP  
 5228 VALLEYFRONT PKWY, SUITE 4  
 ROANOKE, VIRGINIA 24019  
 (804) 963-4444  
 D: DLR 18410 C:

Change Order	DATE	BY	DESCRIPTION
02	7/07/20		
5			

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04					

**RRMM**  
 ARCHITECTS, P.C.  
 28 Church Ave SW  
 Roanoke, Virginia 24011  
 (540)344-1212

COMMONWEALTH OF VIRGINIA  
 DAVID L. ROLLER  
 Lic. No. 036362  
 08/07/2020  
 PROFESSIONAL ENGINEER

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
 SALEM CITY SCHOOLS  
 400 SPARTAN DRIVE  
 SALEM, VA 24153  
 DRAWING SECOND FLOOR - MECHANICAL PIPING - AREA E

SHEET  
**M-209**

8/10/2020 3:46:23 PM BIM 360//16231-04 Salem HS19410 MEP Central 2019.rvt

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS	MARK	DATE	DESCRIPTION
12-09-2019	15231-04	DLR / JDC	DLR	DLR / JDC	DLR	JMS			

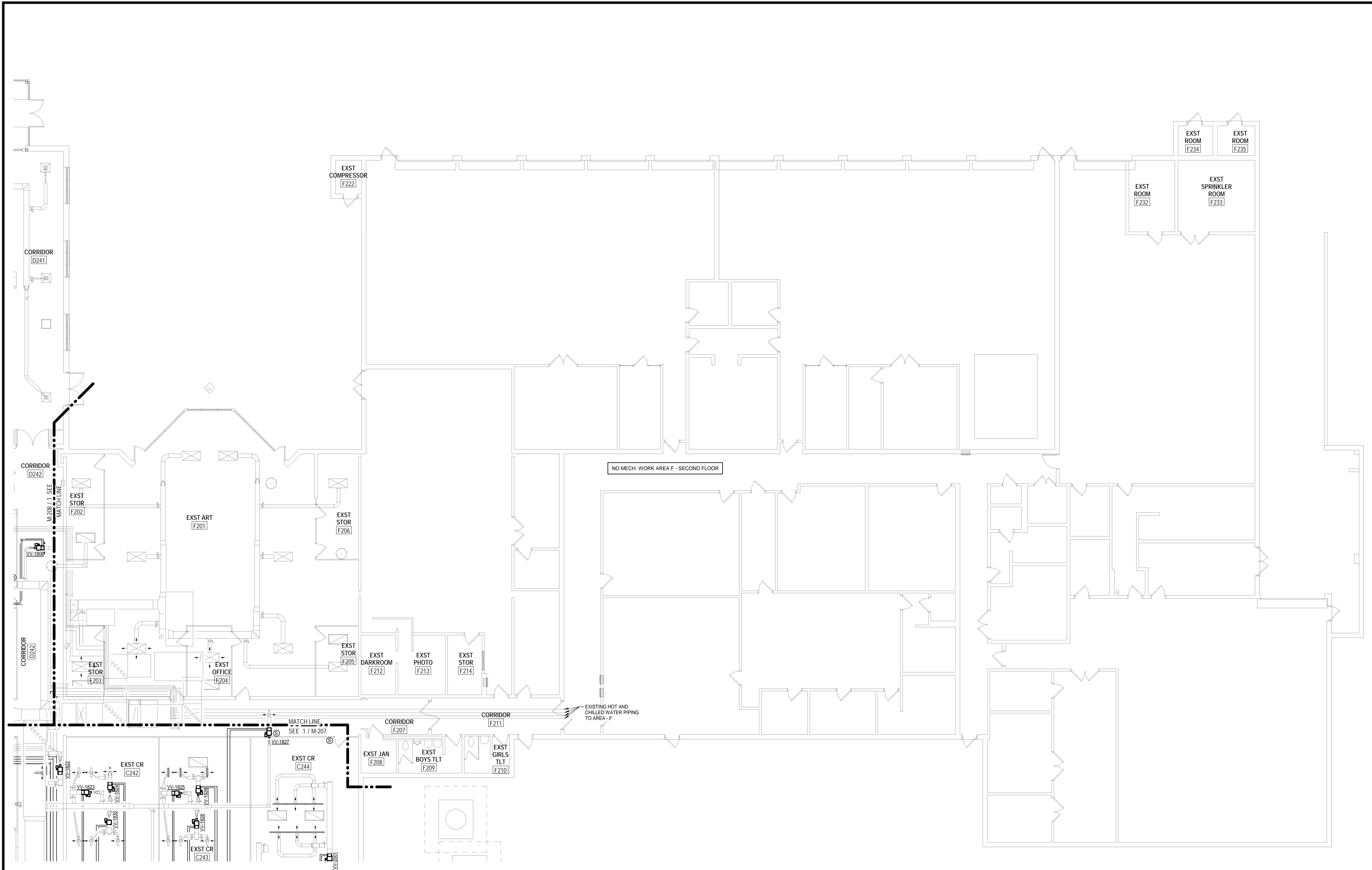
DATE	12-09-2019
PROJECT	15231-04
DESIGNED/DLR / JDC	DLR / JDC
DRAWN	DLR
CHECKED	DLR / JMS

**RRMM**  
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28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



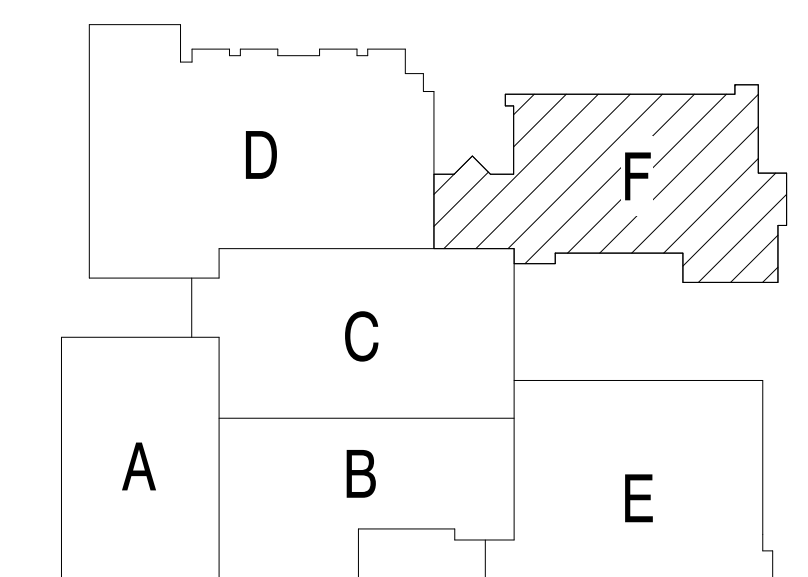
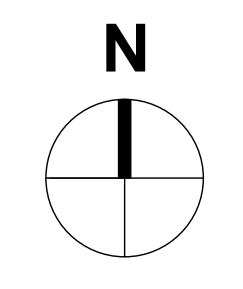
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING SECOND FLOOR - MECHANICAL PIPING - AREA F

SHEET  
**M-210**

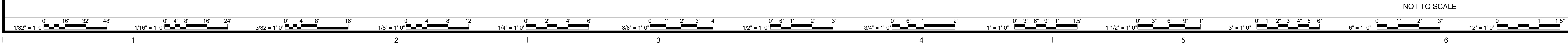


**SECOND FLOOR - MECHANICAL PIPING PLAN - AREA F**  
M-210 SCALE: 1/8" = 1'-0"

- GENERAL PIPING NOTES:
- ALL PIPING RUNOUTS FOR VV AND FP BOXES SHALL BE 3/4" FOR 3.0 GPM AND LESS; 1" FOR GPM GREATER THAN 3.0 UNLESS OTHERWISE NOTED.
  - BASEBOARD HEATERS SHALL BE INSTALLED WITH BOTTOM AT 4" AFF.



KEY PLAN  
NOT TO SCALE



12/9/2019 11:26:34 AM B:\360718231-04 Salem HS18410 MEP Central 2019.rvt

MARK	DATE	BY	DESCRIPTION

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED/DLR / JMS
12-09-2019	15231-04	DLR	DLR	DLR	JMS

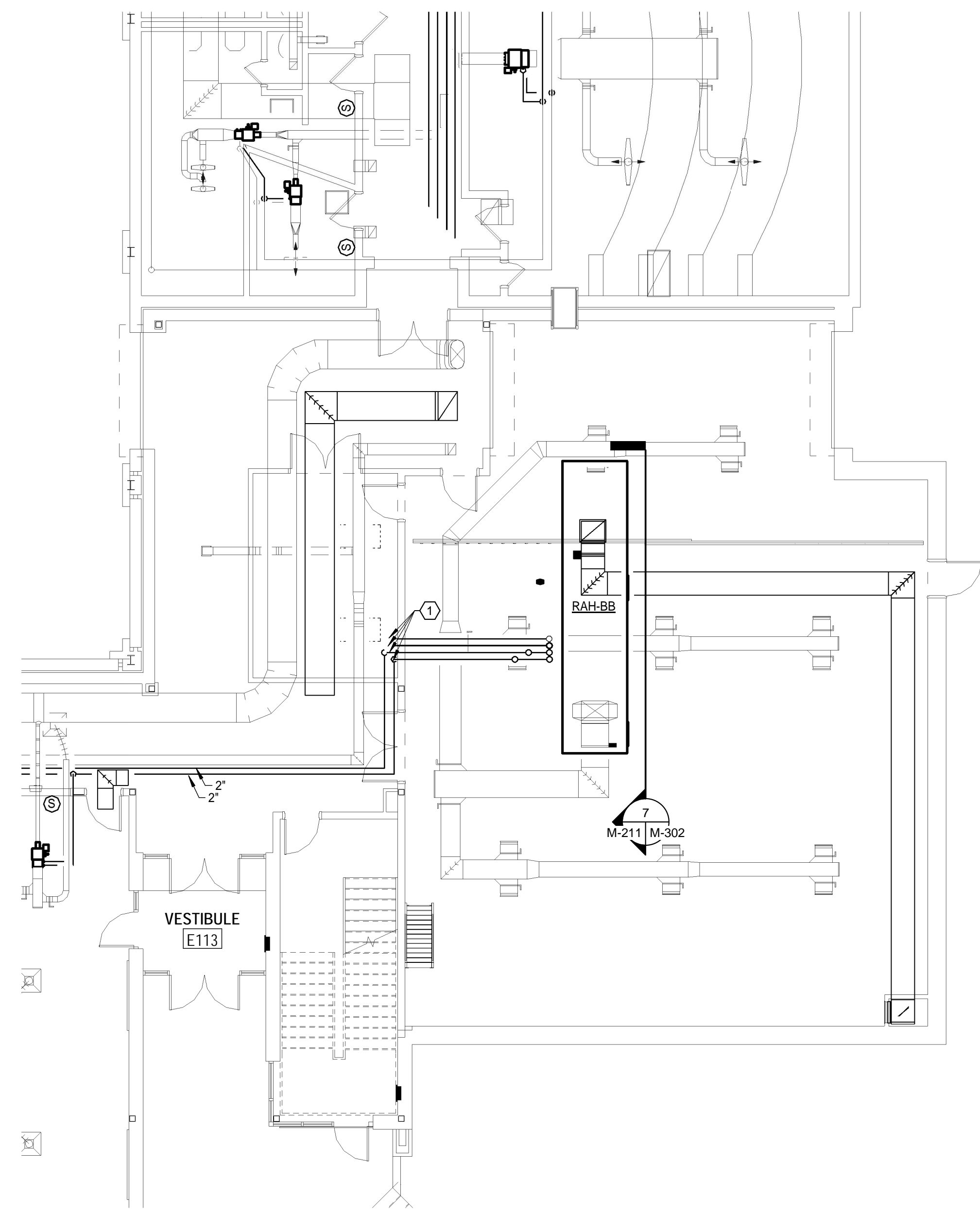
**RRMM**  
ARCHITECTS, PC  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic No. 038382  
12-4-2019  
PROFESSIONAL ENGINEER

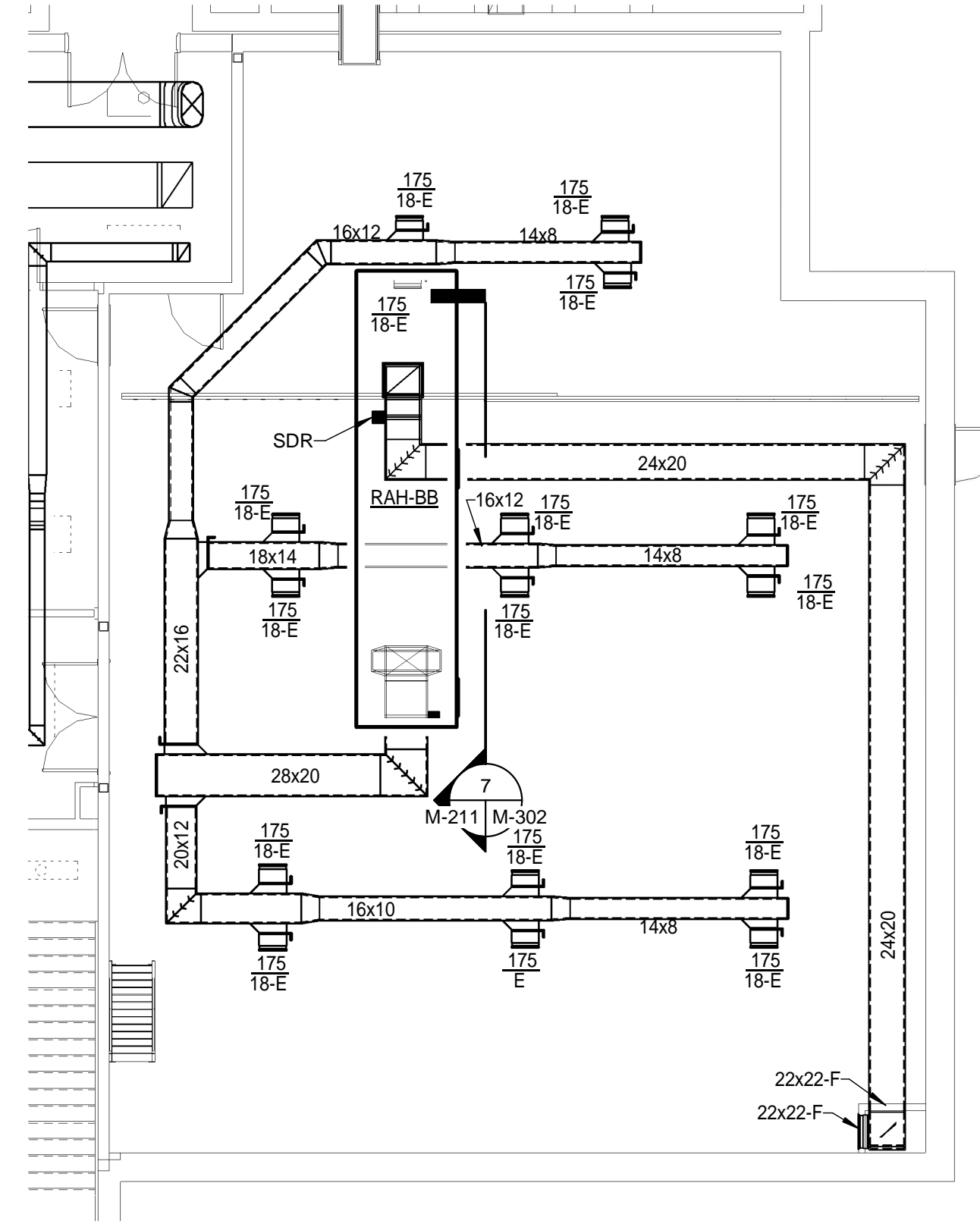
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING BID ALTERNATE #1 - BLACK BOX THEATRE -  
MECHANICAL

SHEET  
**M-211**

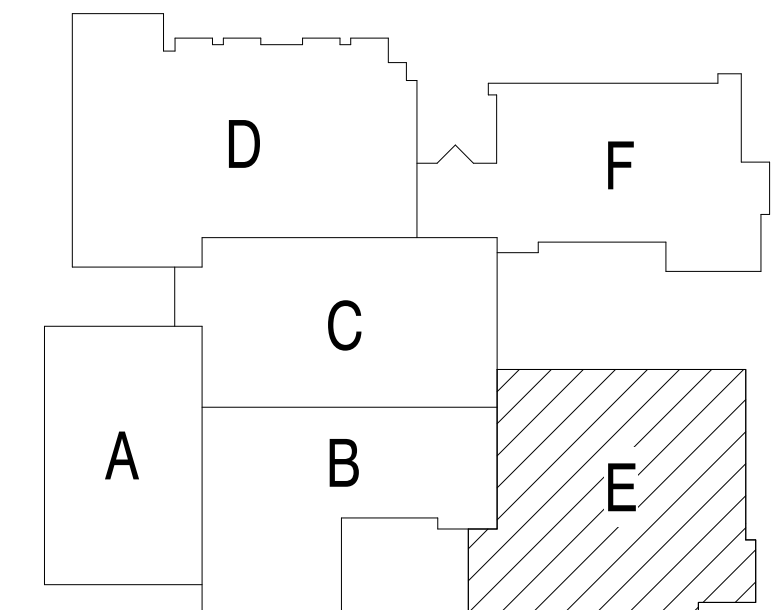
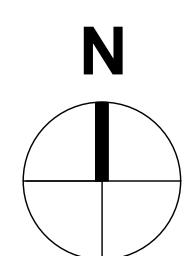
SHEET NOTES:  
① PIPING UP TO MECH. ROOM ON SECOND FLOOR.  
CONNECT INTO SOUTHEAST ADDITION MAIN LINES.



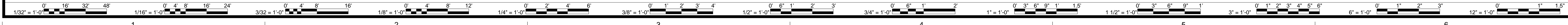
② FIRST FLOOR - MECHANICAL PIPING PLAN - BID ALT  
M-211 SCALE: 1/8" = 1'-0"



① FIRST FLOOR - MECHANICAL DUCTWORK PLAN - BID ALT  
M-211 SCALE: 1/8" = 1'-0"



KEY PLAN  
NOT TO SCALE





DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS	MARK	DATE	DESCRIPTION
12-09-2019	15231-04	DLR / JDC	DLR	DLR / JDC	DLR	JDC			

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DLR / JDC	DLR	DLR / JDC	DLR	JDC

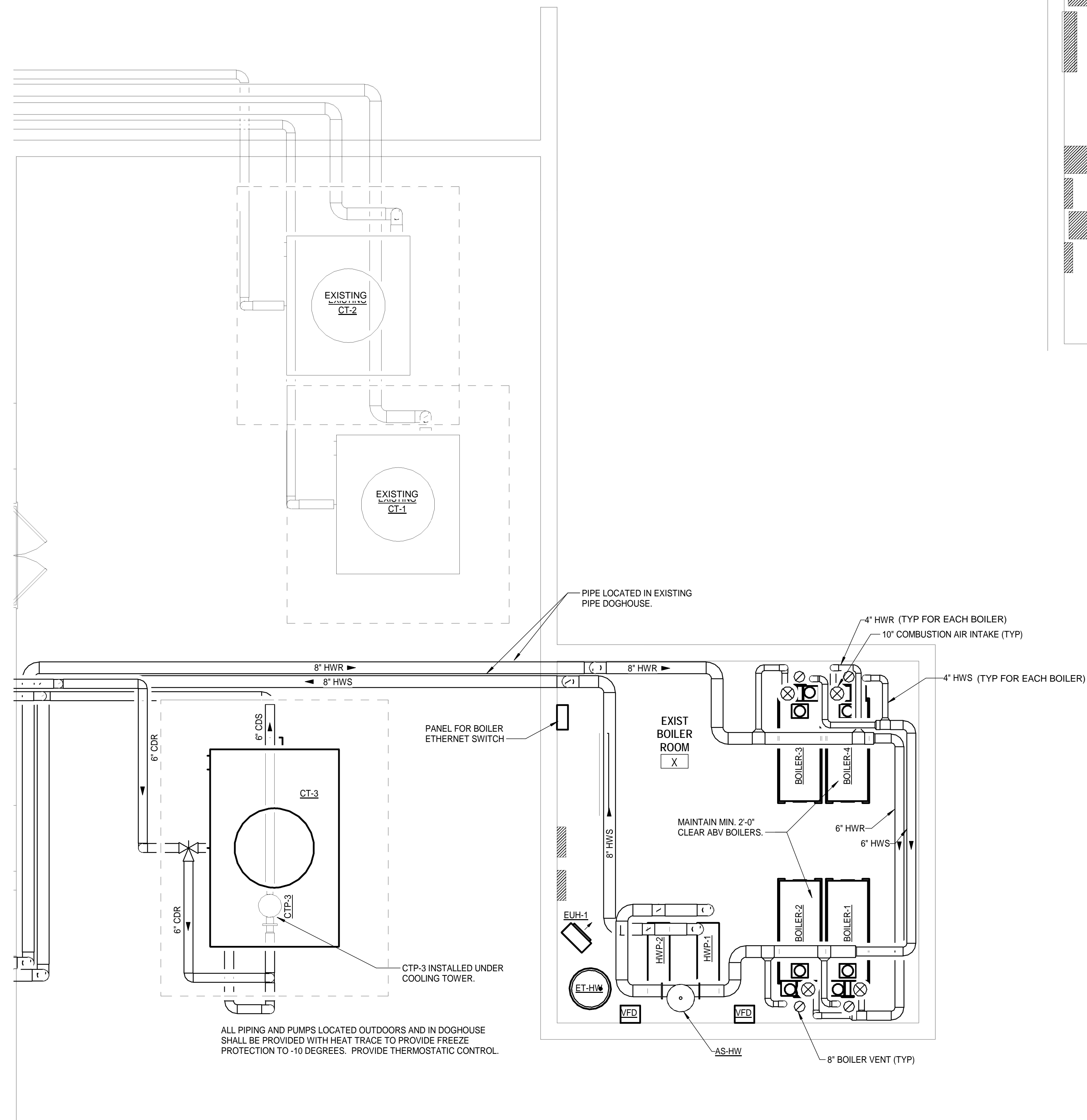
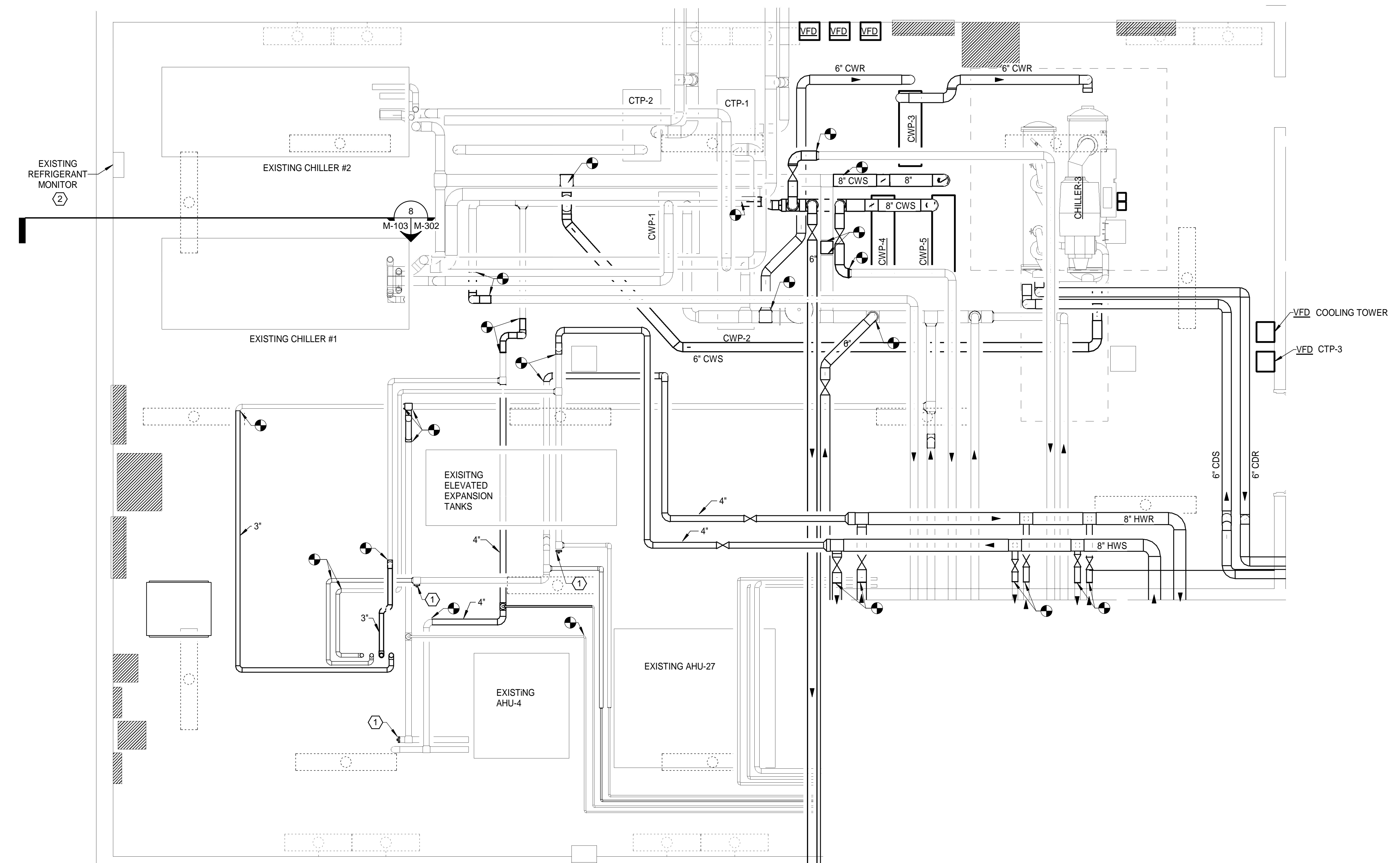
**RRMM**  
ARCHITECTS, PC  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212



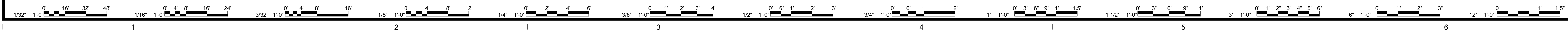
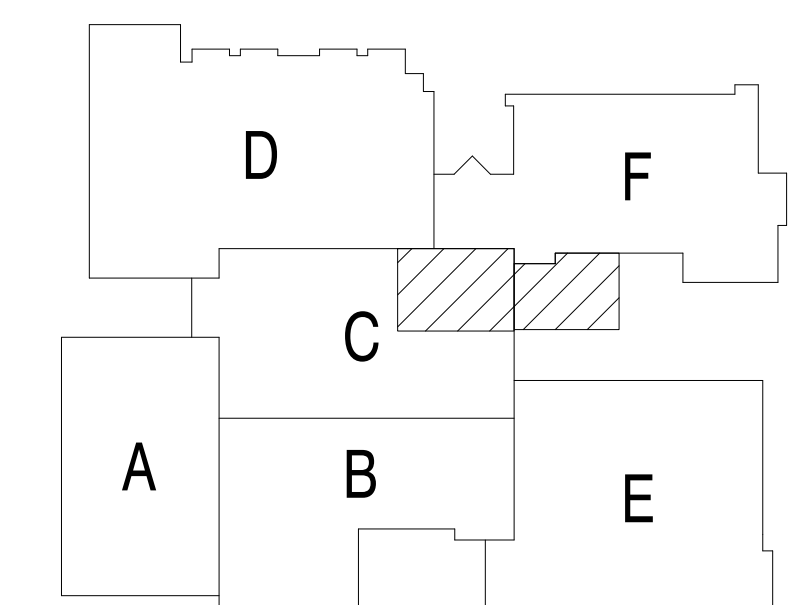
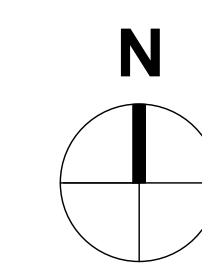
PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING MECHANICAL ENLARGED PLANS

SHEET  
**M-301**



- SHEET NOTES:**
- ① CAP PIPE WHERE EXISTING PIPE CONNECTION HAS BEEN REMOVED.
  - ② EXISTING REFRIGERANT MONITOR PANEL SHALL REMAIN. PROGRAM NEW ZONE FOR CHILLER-3. SELECT THE APPROPRIATE REFRIGERANT FROM THE REFRIGERANT LIBRARY TO MATCH THAT SUPPLIED FOR CHILLER-3. PROVIDE TWO ADDITIONAL COMPATIBLE SENSORS AND ASSOCIATED SAMPLING TUBES. LOCATE NEW SENSORS ADJACENT TO CHILLER-3.



12/4/2019 3:38:09 PM BIM 360//15231-04 Salem HS15410 MEP Central 2019.rvt

PROPOSAL REQUEST 01	DESCRIPTION
5	3/1/2020
MARK	DATE
REVISIONS	BY

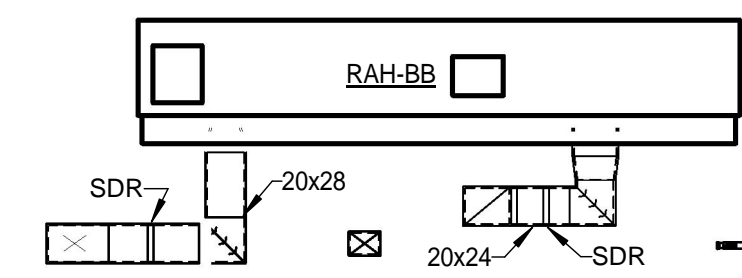
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED/DLR / JMS
12-09-2019	15231-04				

**RRMM**  
ARCHITECTS, PC  
28 Church Ave SW  
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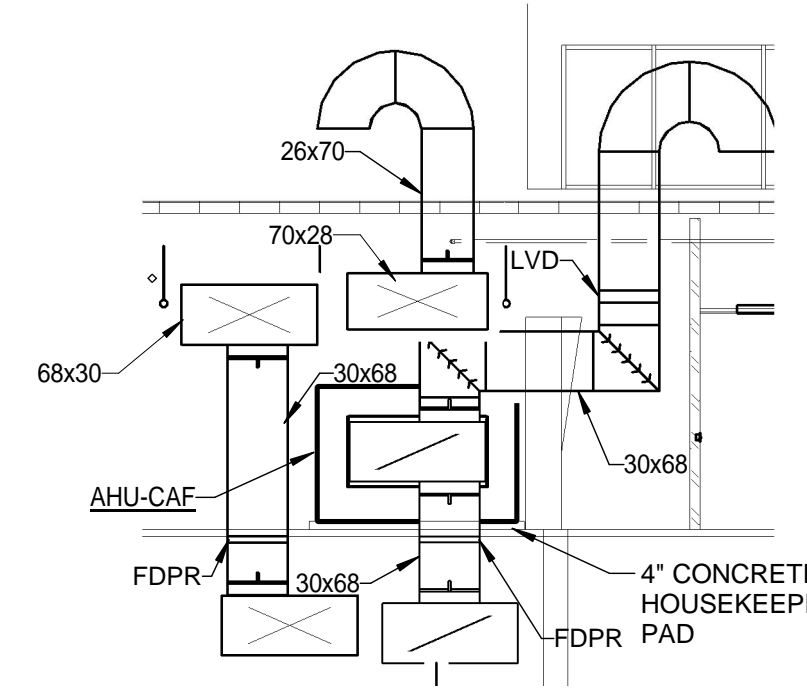
COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic No. 036362  
PROFESSIONAL ENGINEER

PROJECT: SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING: MECHANICAL SECTIONS

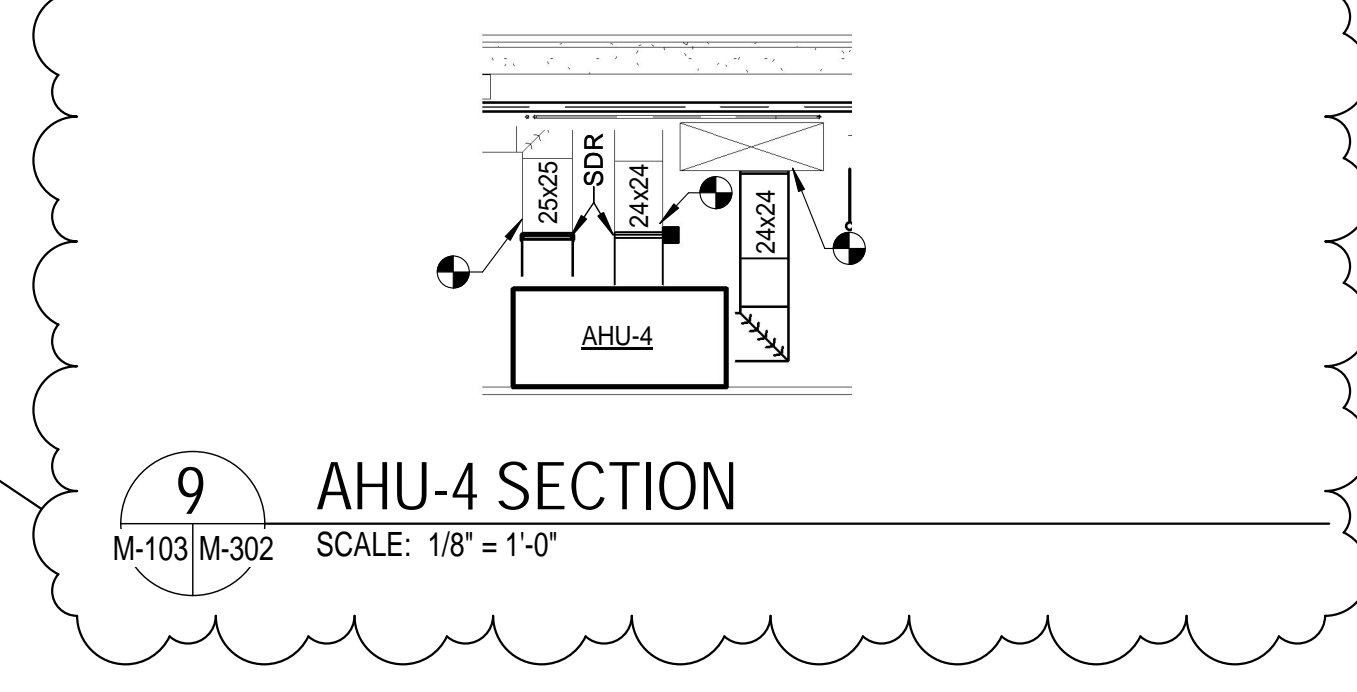
SHEET  
**M-302**



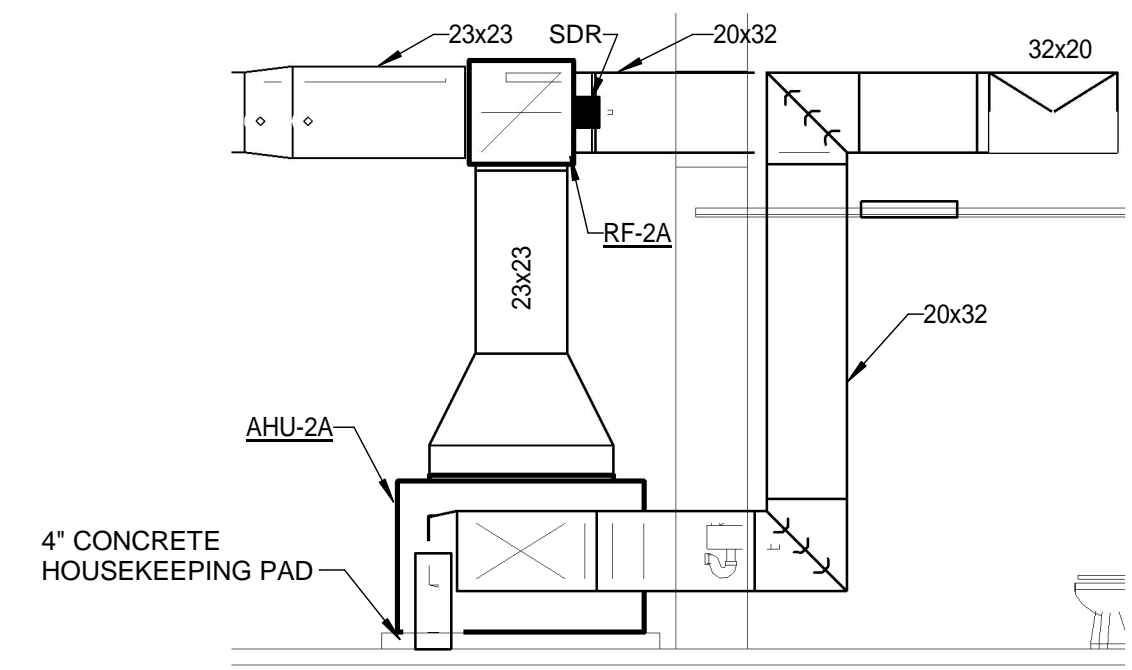
**7 RAH-BB SECTION**  
M-211/M-302 SCALE: 1/8" = 1'-0"



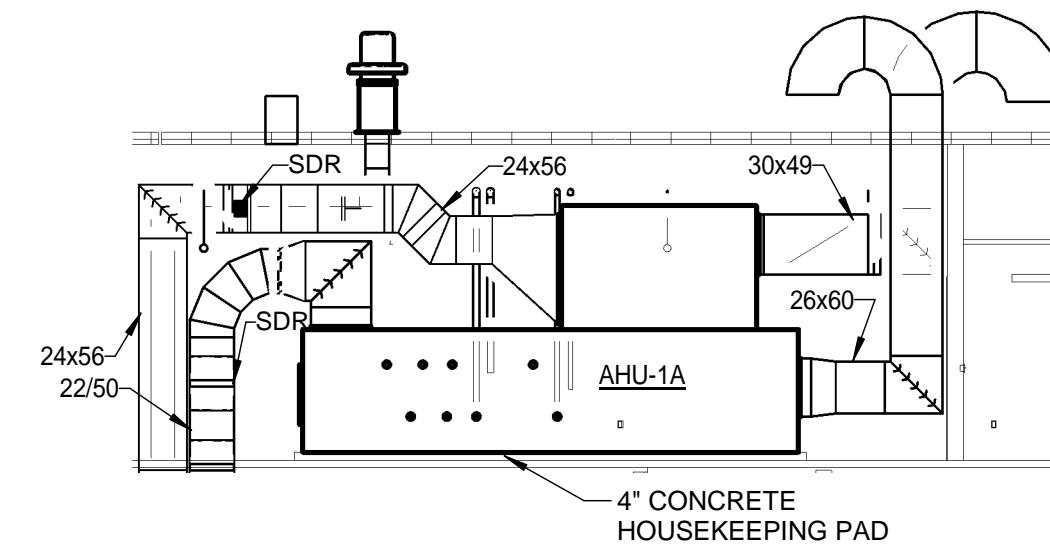
**8 AHU-CAF SECTION**  
M-103/M-302 SCALE: 1/8" = 1'-0"



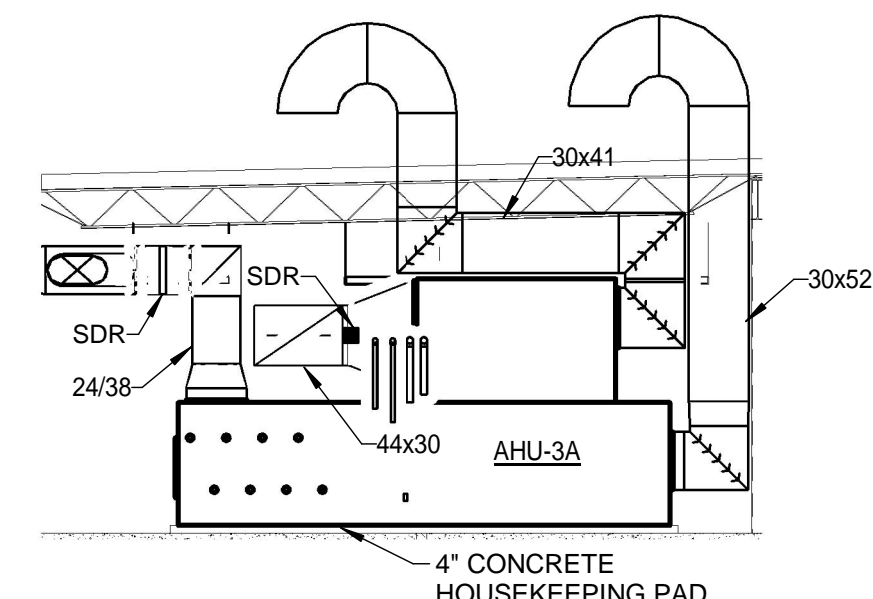
**9 AHU-4 SECTION**  
M-103/M-302 SCALE: 1/8" = 1'-0"



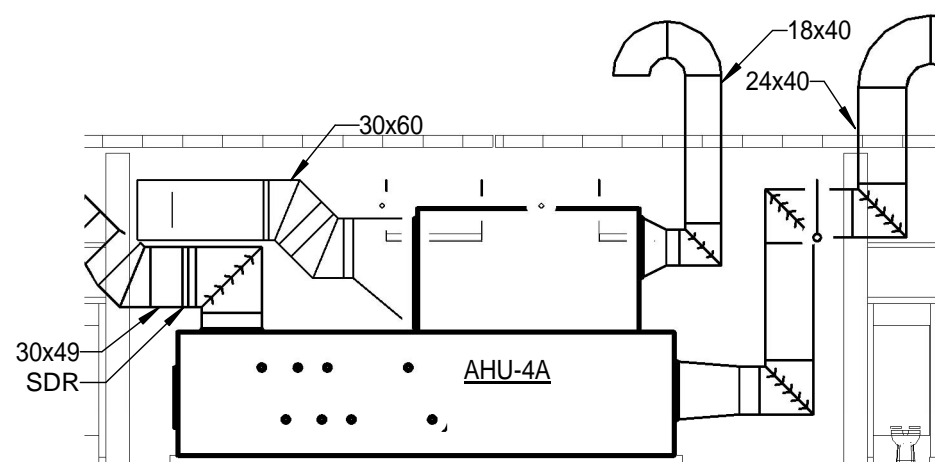
**1 AHU-2A SECTION**  
M-102/M-302 SCALE: 1/4" = 1'-0"



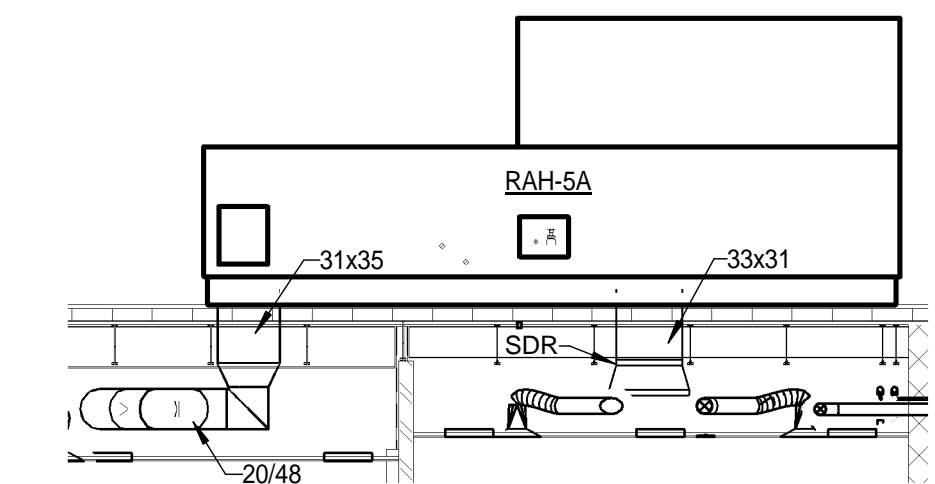
**2 AHU-1A SECTION**  
M-107/M-302 SCALE: 1/8" = 1'-0"



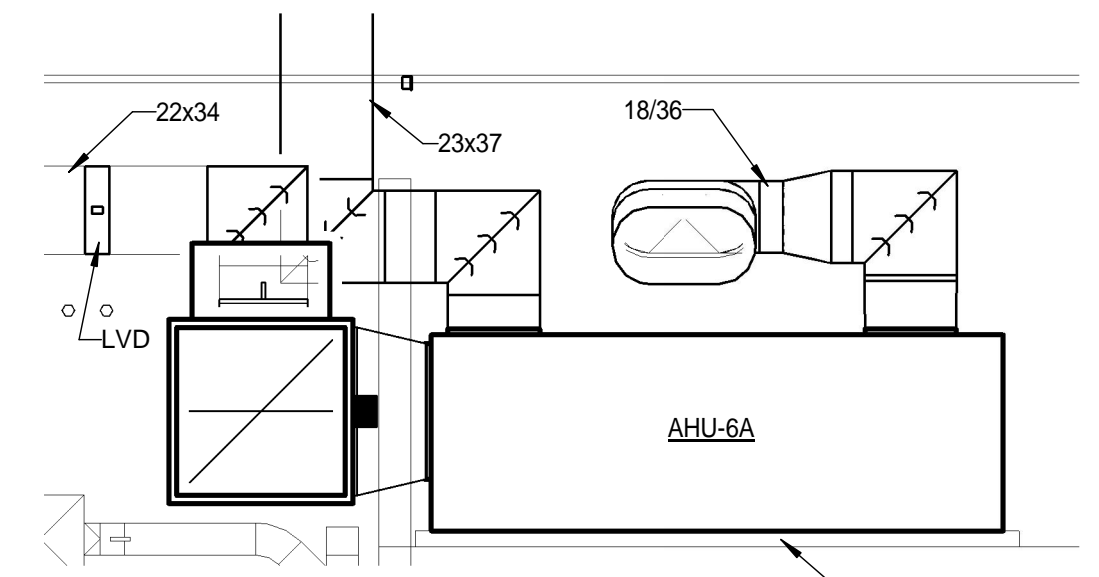
**3 AHU-3A SECTION**  
M-109/M-302 SCALE: 1/8" = 1'-0"



**4 AHU-4A SECTION**  
M-108/M-302 SCALE: 1/8" = 1'-0"

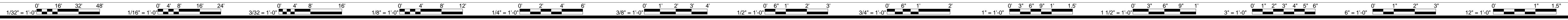


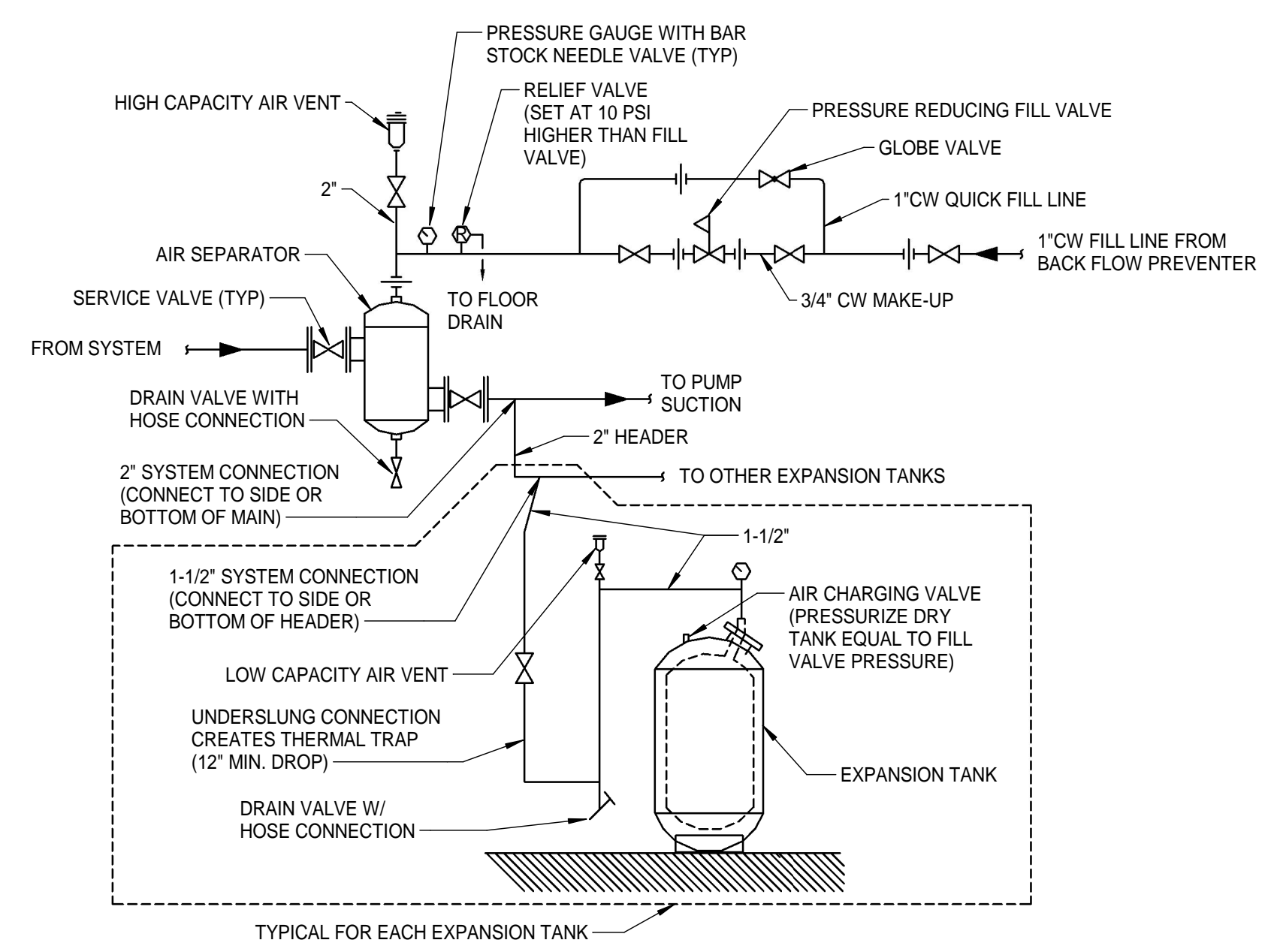
**5 RAH-5A SECTION**  
M-106/M-302 SCALE: 1/8" = 1'-0"



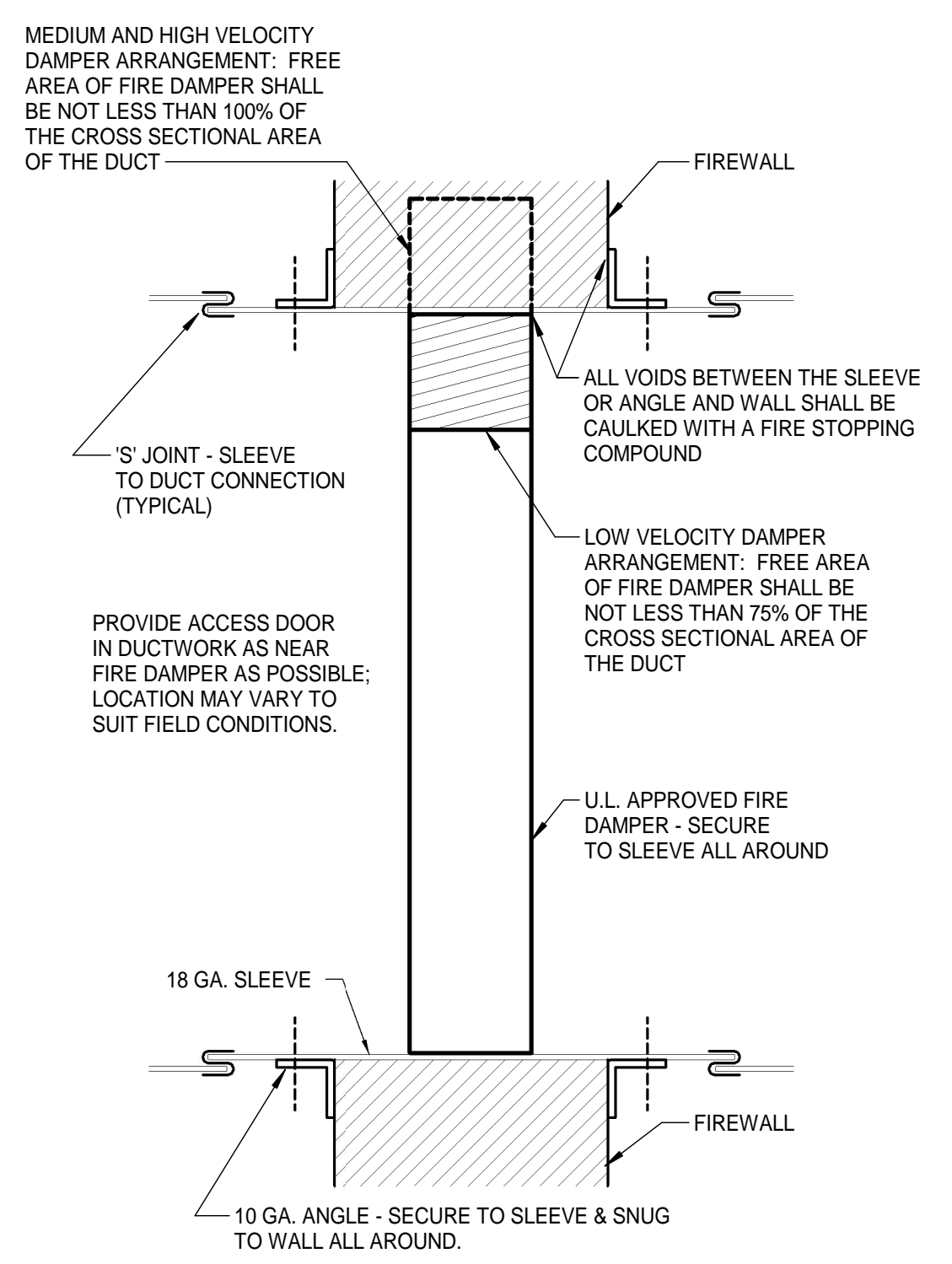
**6 AHU-6A SECTION**  
M-104/M-302 SCALE: 1/4" = 1'-0"

MODIFY EXISTING CONCRETE SLAB TO ACCOMMODATE FOOTPRINT OF NEW UNIT

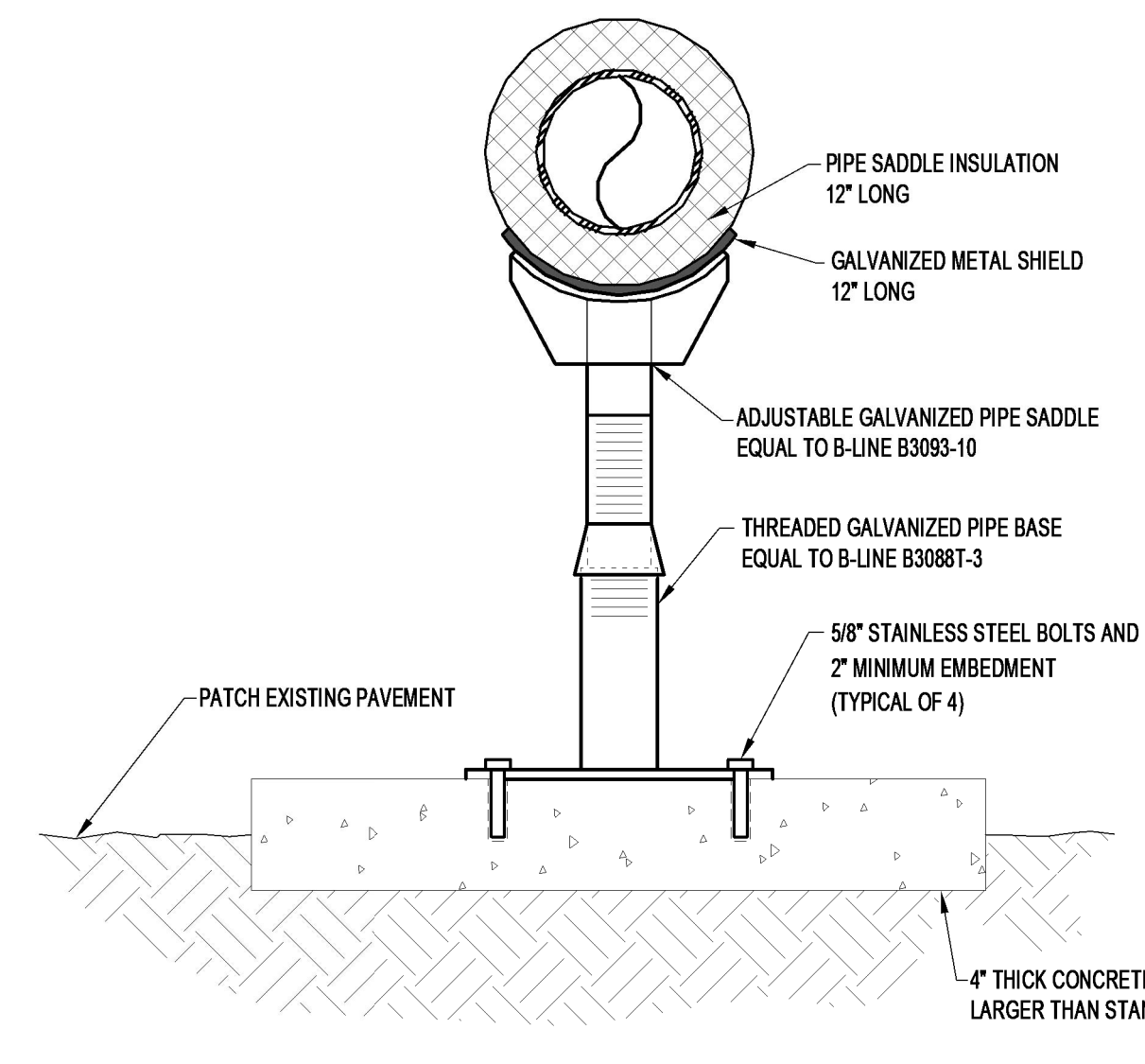




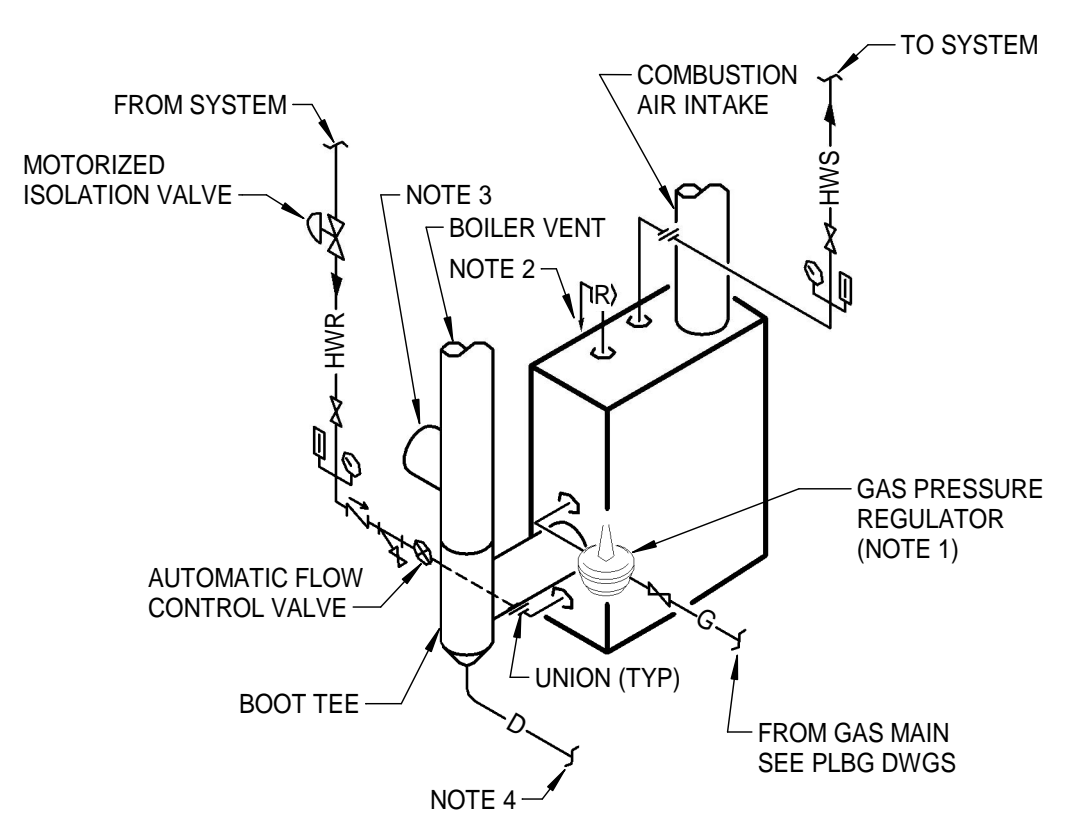
**EXPANSION TANK DETAIL**  
SCHEMATIC



**FIRE DAMPER INSTALLATION**  
SCHEMATIC

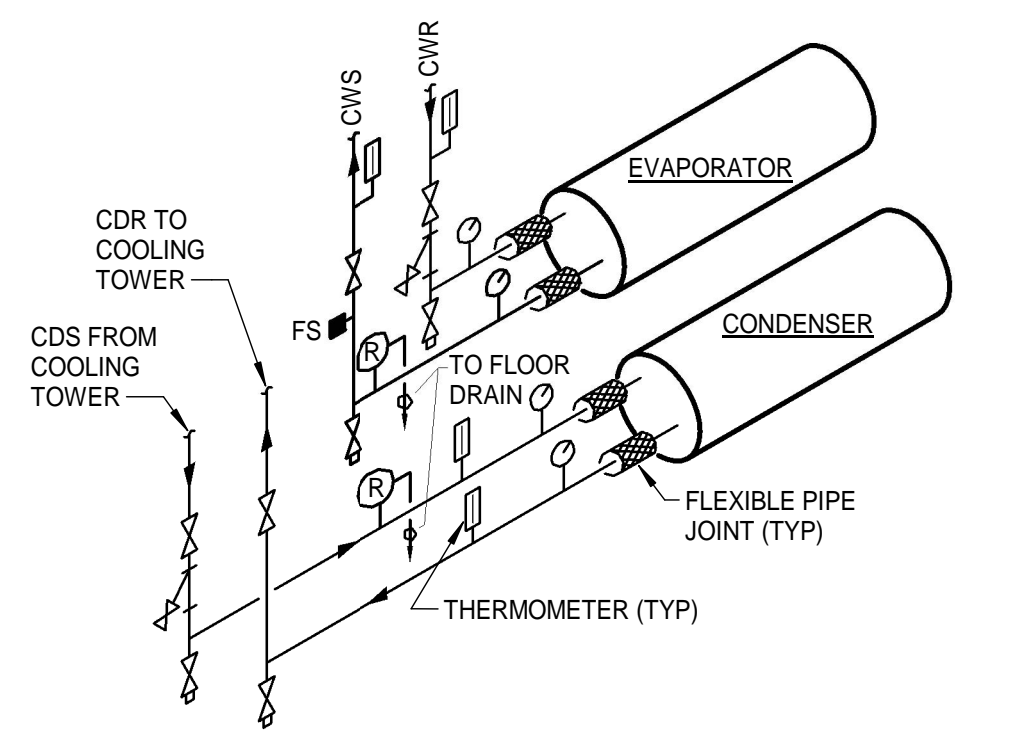


**PIPE SUPPORT STAND DETAIL**  
NO SCALE

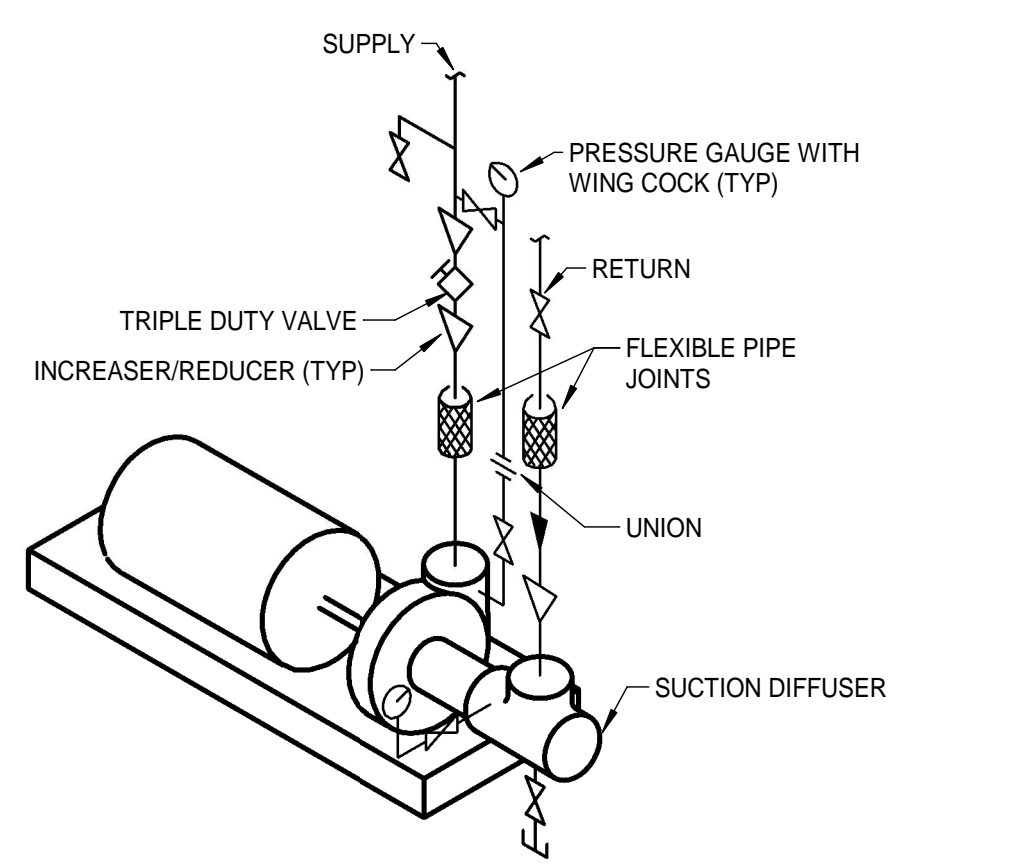


**BOILER CONNECTIONS**  
SCHEMATIC

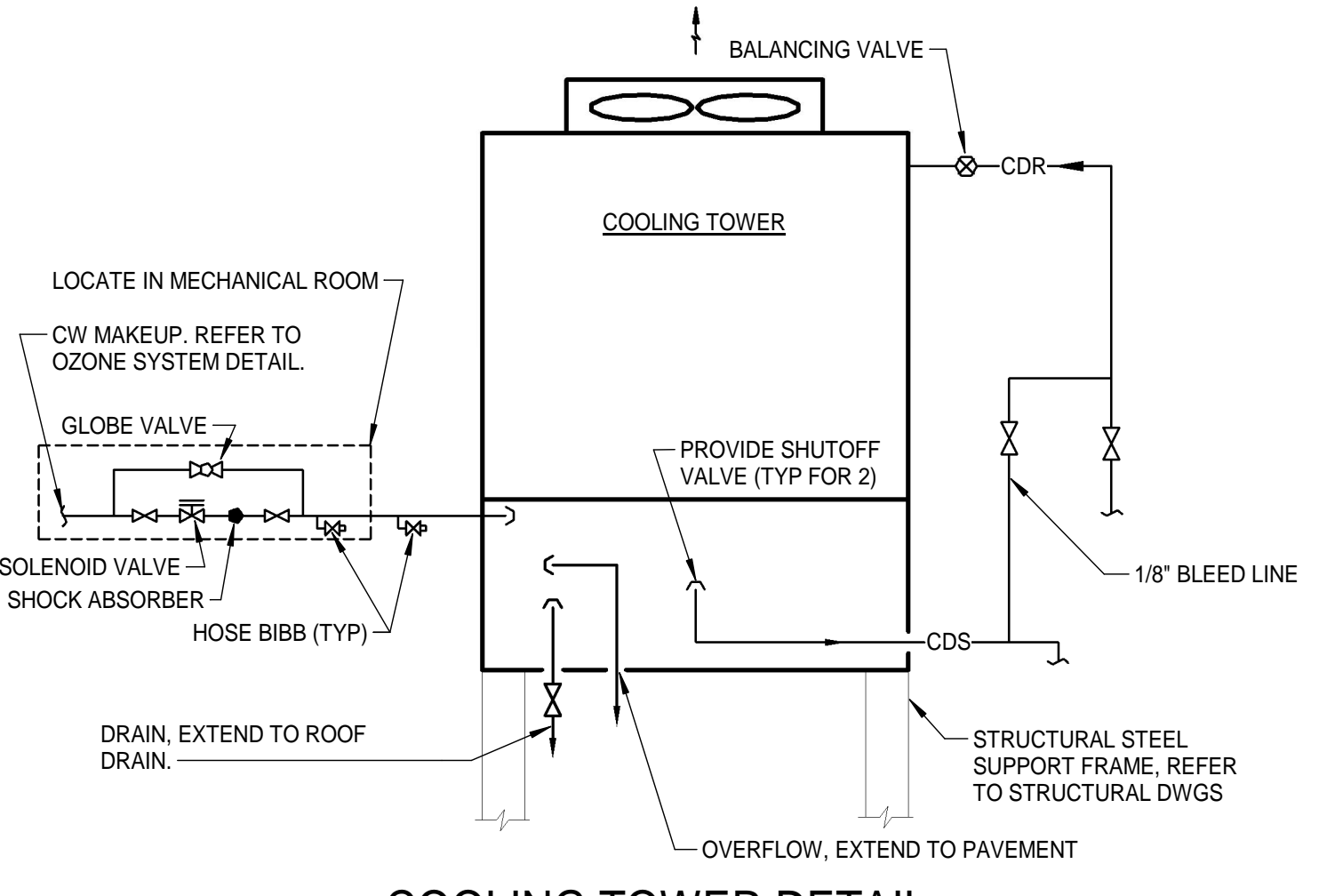
- NOTES:**
1. GAS TRAIN PROVIDED BY BOILER MANUFACTURER AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  2. EXTEND RELIEF VALVE DISCHARGE TO FLOOR.
  3. BAROMETRIC DAMPER IF RECOMMENDED BY BOILER MANUFACTURER.
  4. CONDENSATE DRAIN LINE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, EXTEND TO NEUTRALIZER KIT PROVIDED WITH BOILER, THEN TO FLOOR DRAIN.



**CHILLER CONNECTIONS**  
SCHEMATIC

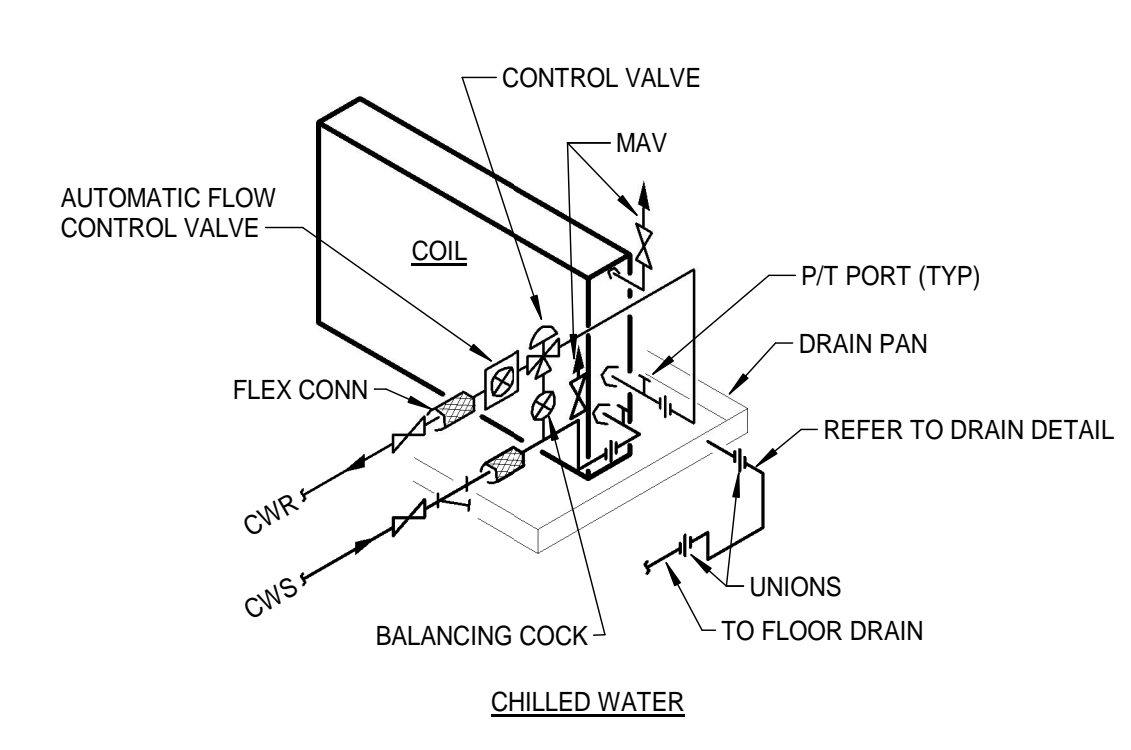


**PUMP CONNECTIONS**  
NO SCALE

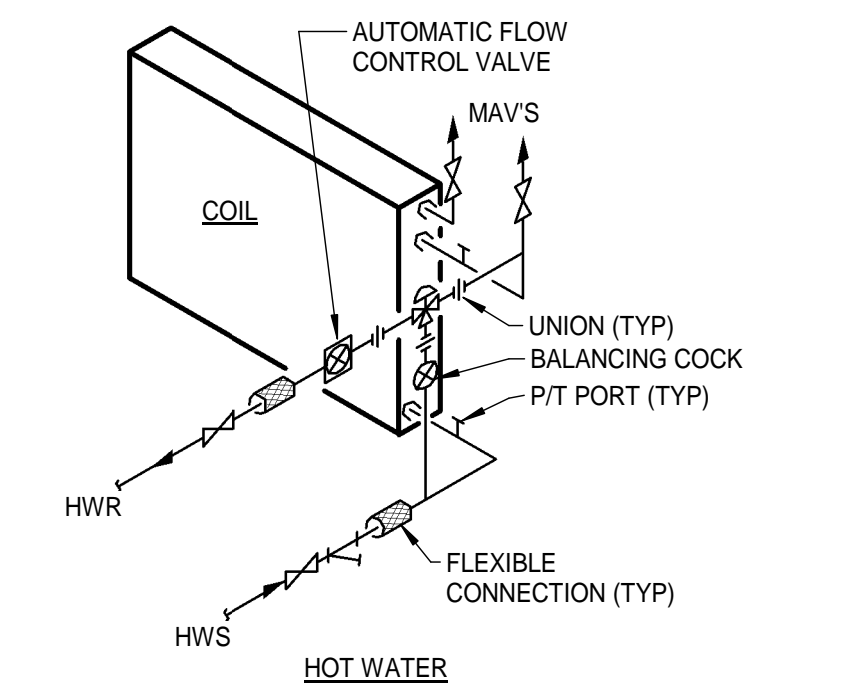


**COOLING TOWER DETAIL**  
NO SCALE

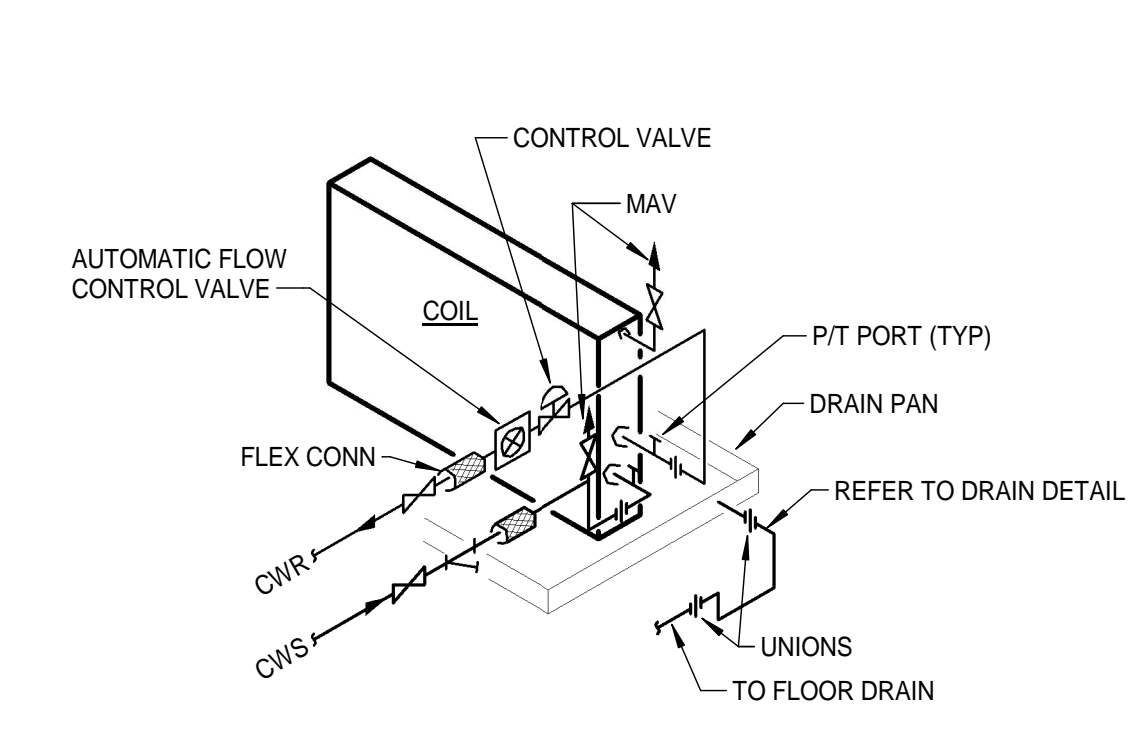
- NOTES:**
1. VERIFY AIR GAP BETWEEN CW MAKE-UP OUTLET AND TOP OF BASIN OVERFLOW.
  2. DRAIN & OVERFLOW PIPING SHALL BE FULL SIZE OF UNIT CONNECTION.
  3. INSTALL CDR & CDS PIPING TO ALLOW CLEAR SERVICE AREA FOR FANS & MOTOR.
  4. EXTERIOR PIPING SHALL BE HEAT TRACED.



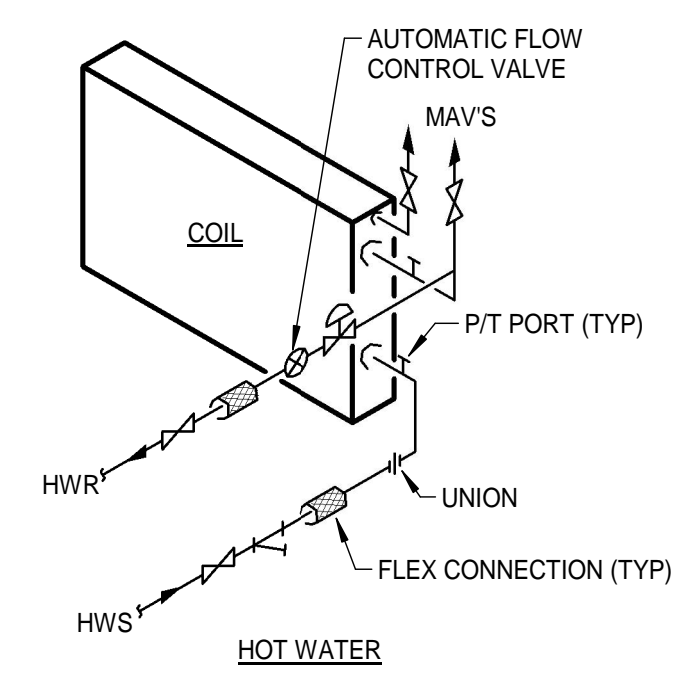
**COIL CONNECTIONS**  
SCHEMATIC



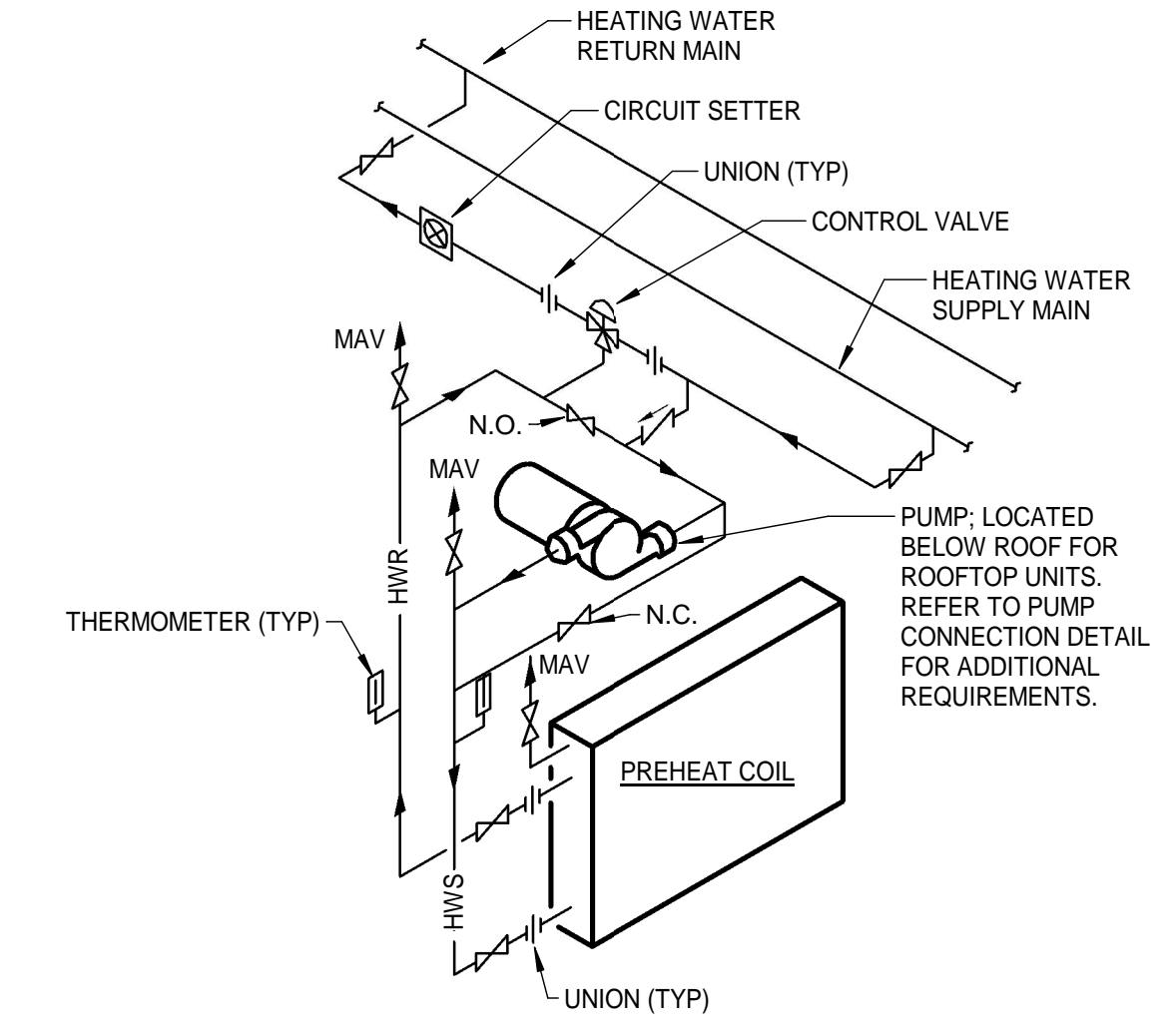
**COIL CONNECTIONS**  
SCHEMATIC



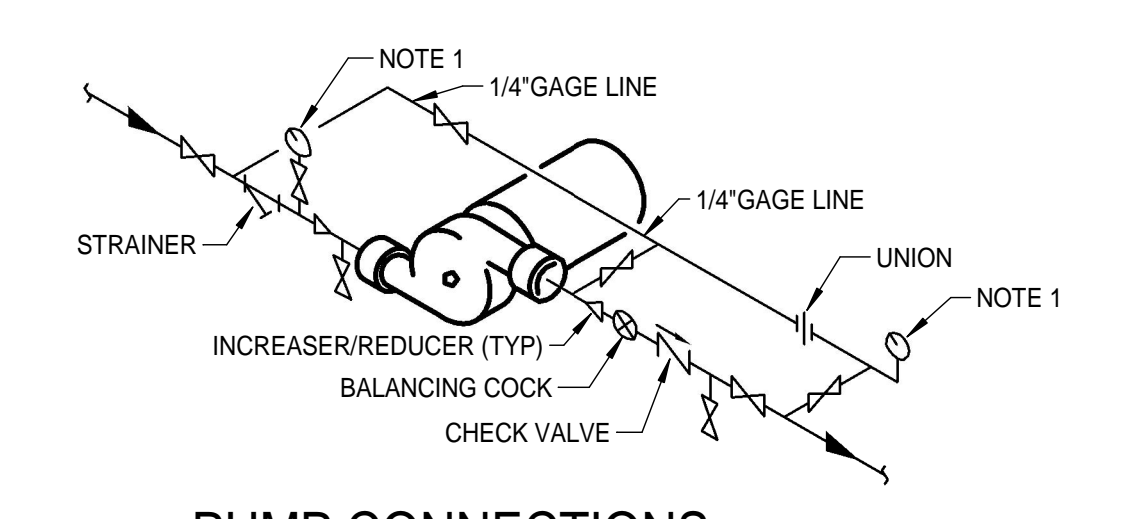
**COIL CONNECTIONS**  
SCHEMATIC



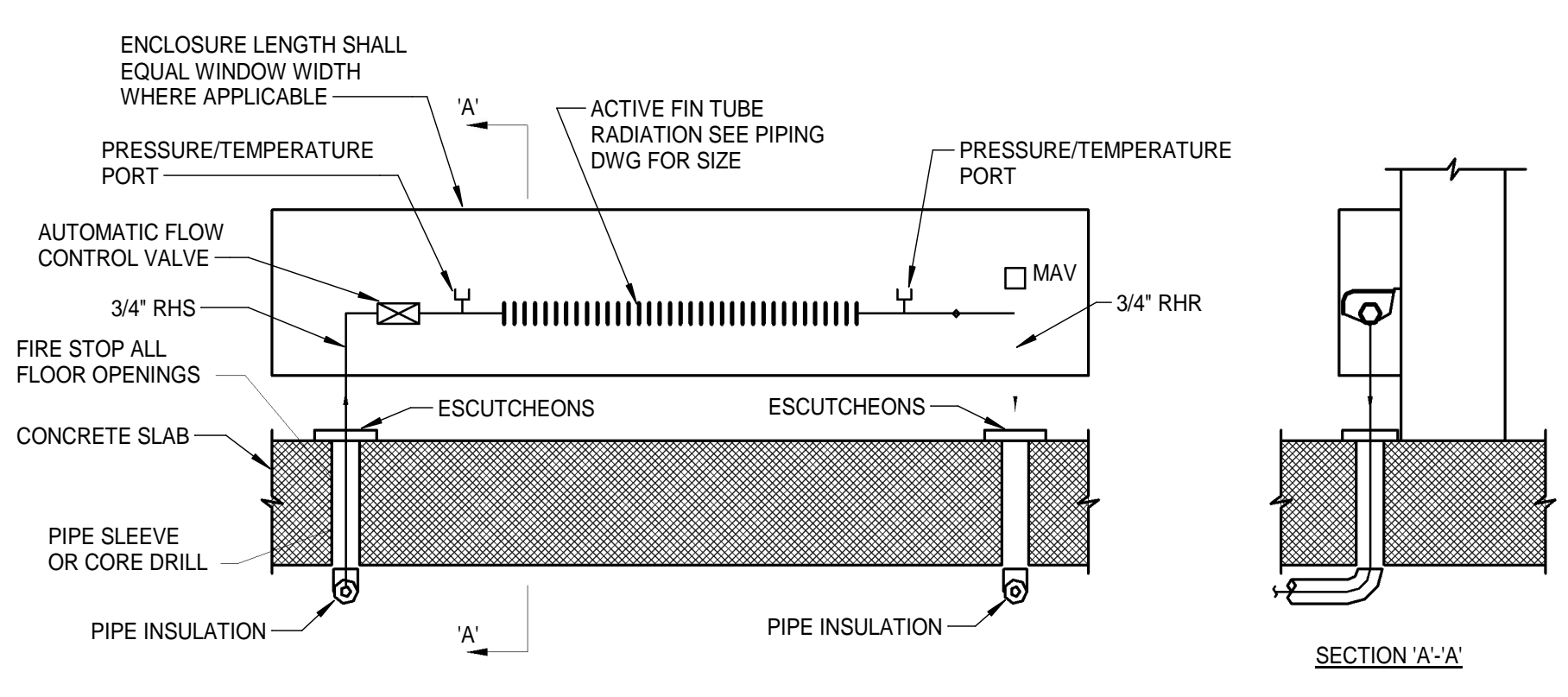
**COIL CONNECTIONS**  
SCHEMATIC



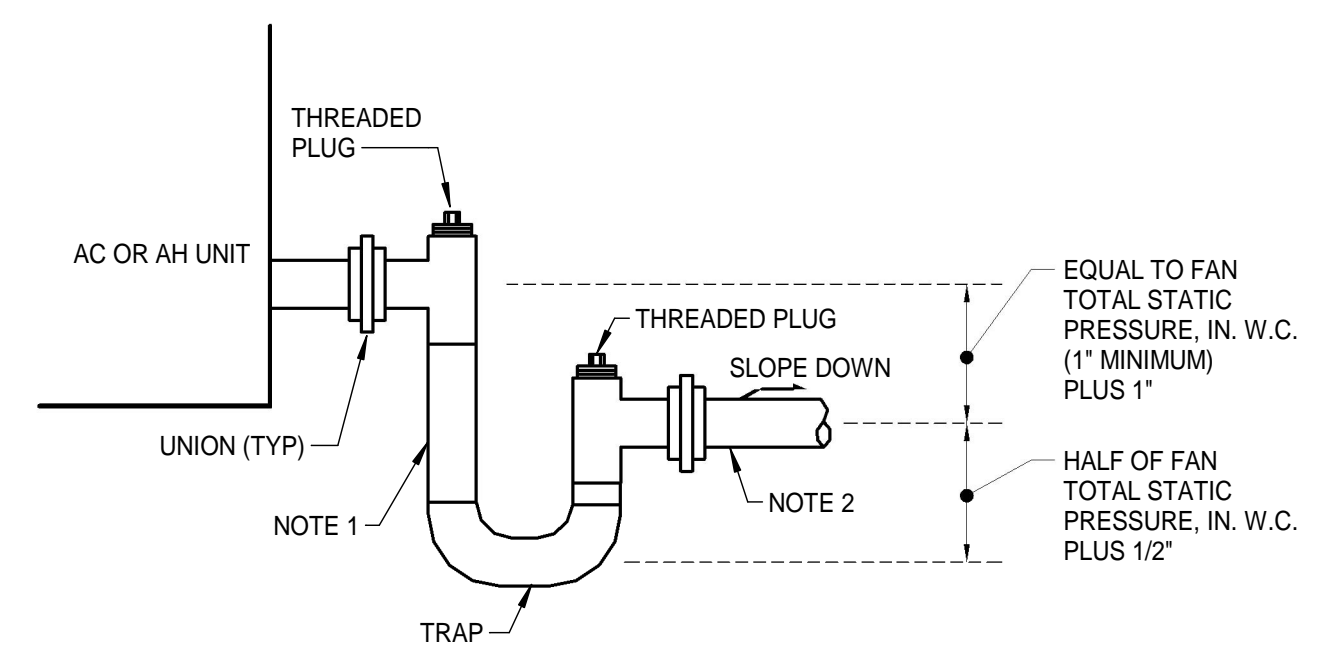
**AH UNIT PREHEAT COIL CONNECTIONS**  
SCHEMATIC



**PUMP CONNECTIONS**  
NO SCALE  
**NOTES:**  
1. PRESSURE GAGE WITH WING COCK

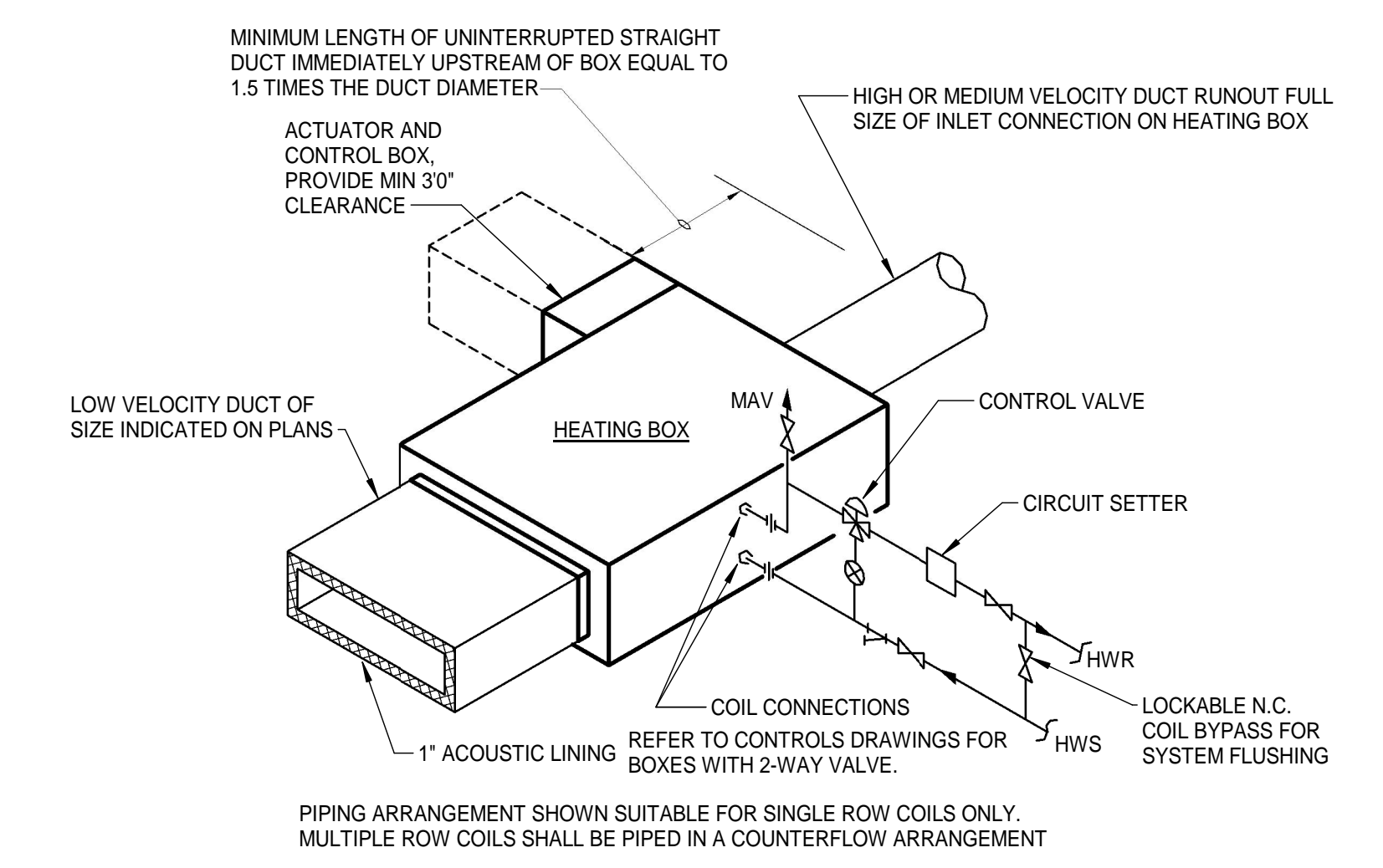


**HYDRONIC BASEBOARD HEATERS**  
NO SCALE

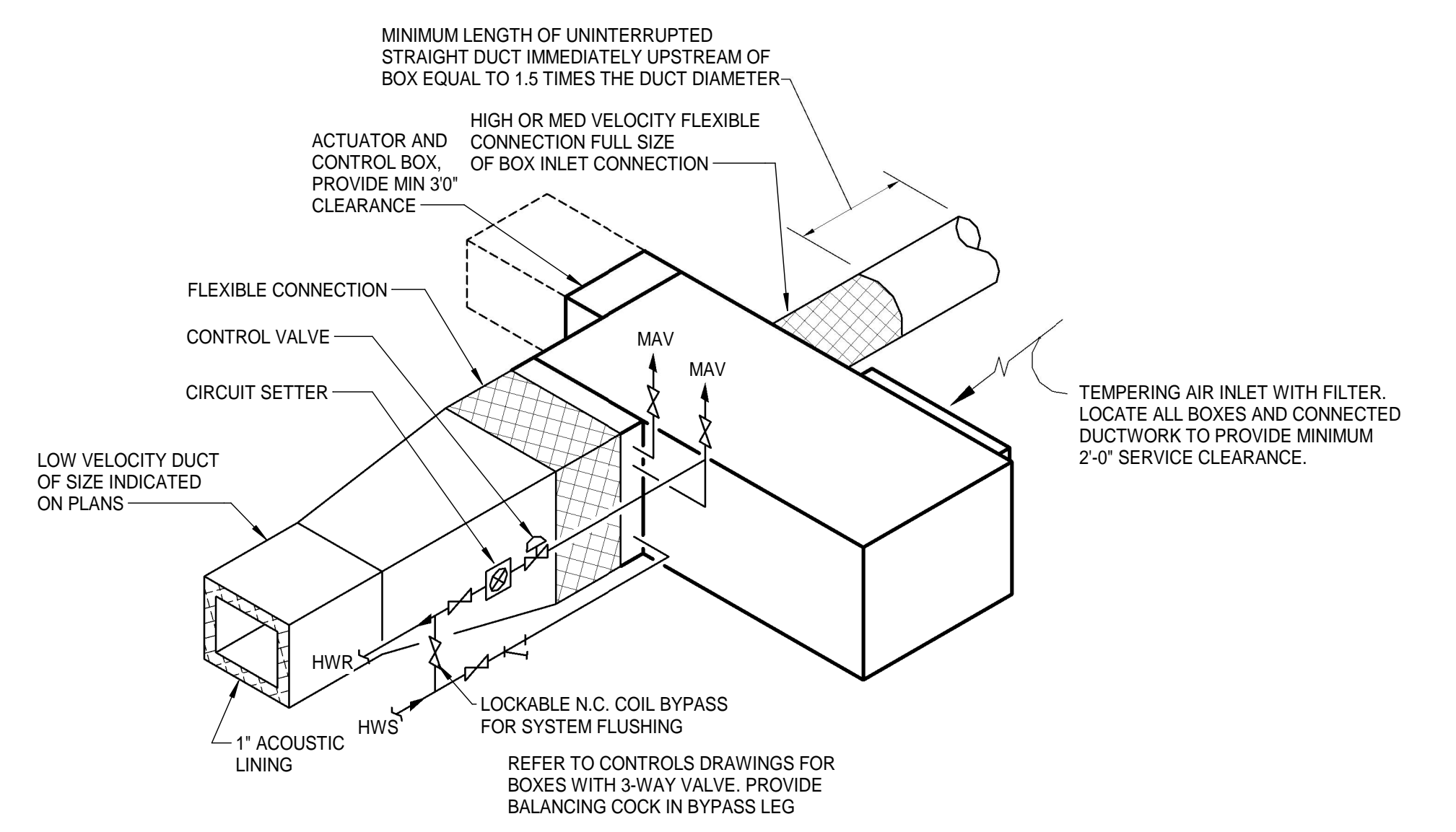


**COOLING COIL CONDENSATE DRAIN**  
NO SCALE

- NOTES:**
1. DRAIN LINE SHALL BE FULL SIZE OF UNIT CONNECTION, BUT NO SMALLER THAN 3/4\"/>



**SHUTOFF VARIABLE VOLUME HEATING BOX CONNECTIONS**  
NO SCALE



**PARALLEL FAN POWERED VARIABLE VOLUME HEATING BOX CONNECTIONS**  
SCHEMATIC

**ASCENT**  
ENGINEERING GROUP  
5228 VALLEYFRONT PKWY, SUITE 4  
ROANOKE, VIRGINIA 24019  
(800) 260-4444  
D. DLR 18410 C.

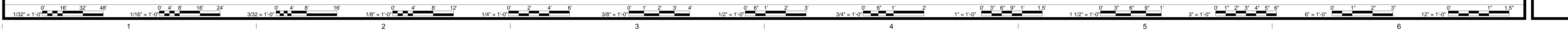
DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS	DESCRIPTION
12-09-2019	15231-04	SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	DAVID L. ROLLER	MECHANICAL DETAILS

**RRMM**  
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(540)344-1212

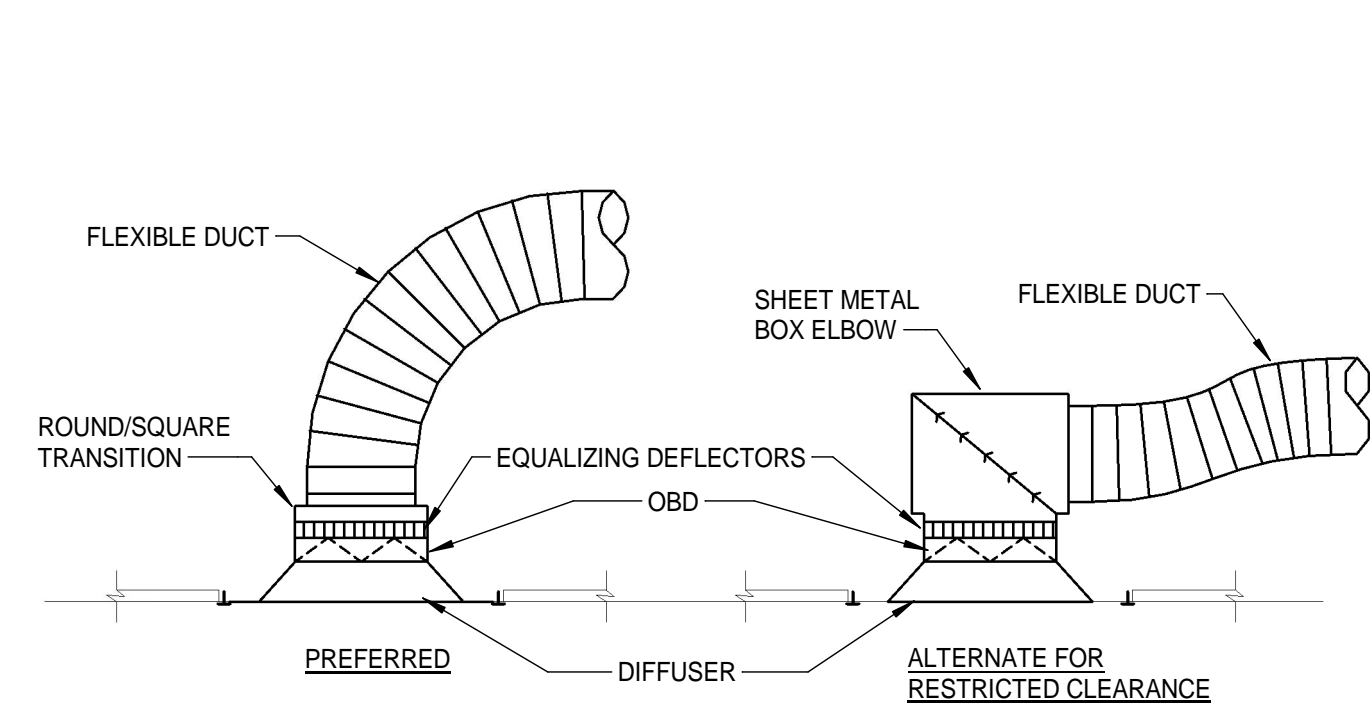
**DAVID L. ROLLER**  
DAVID L. ROLLER  
Lic No. 036362  
12-4-2019  
PROFESSIONAL ENGINEER

**SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS**  
**SALEM CITY SCHOOLS**  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING

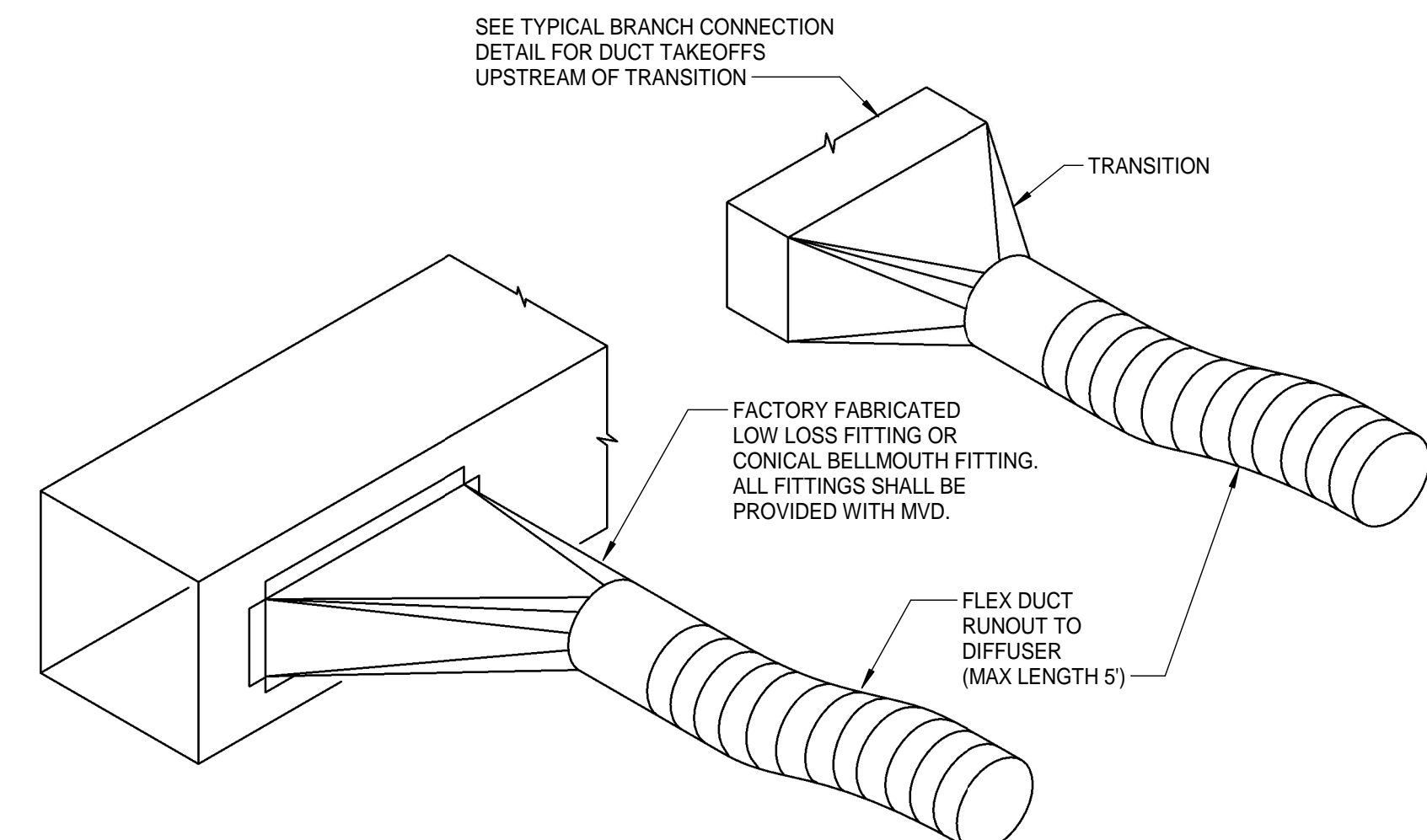
SHEET  
**M-401**



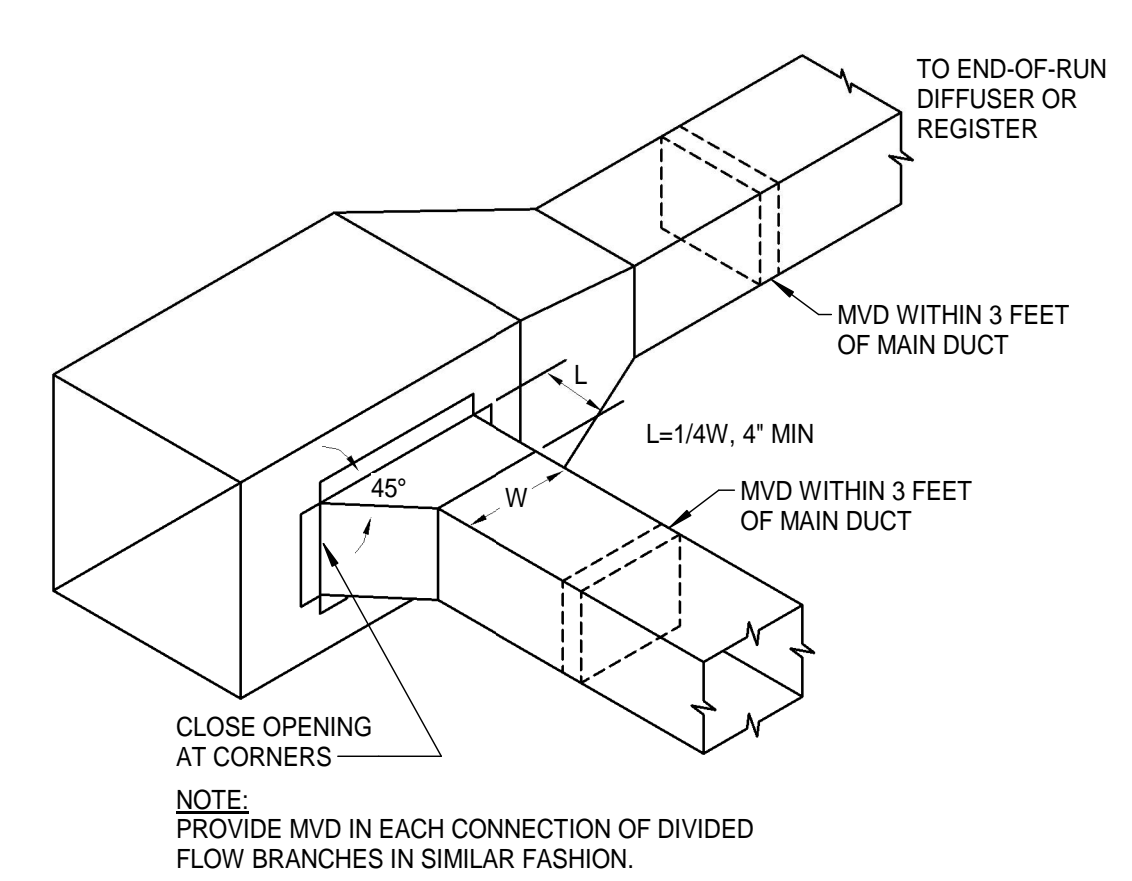
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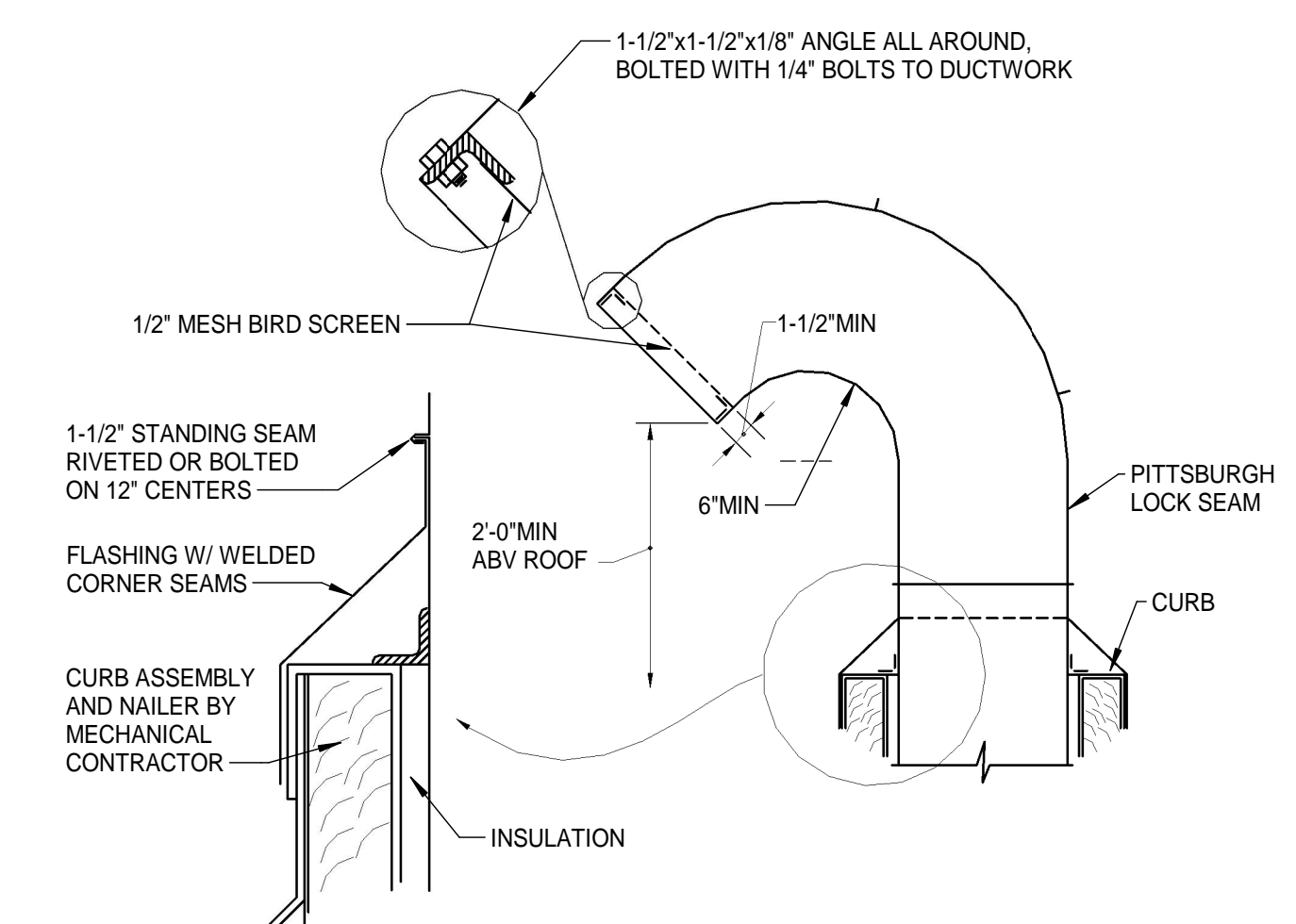
**DIFFUSER CONNECTION DETAIL**  
NO SCALE



**CONNECTIONS FOR FLEX DUCT (TYP)**  
SCHEMATIC

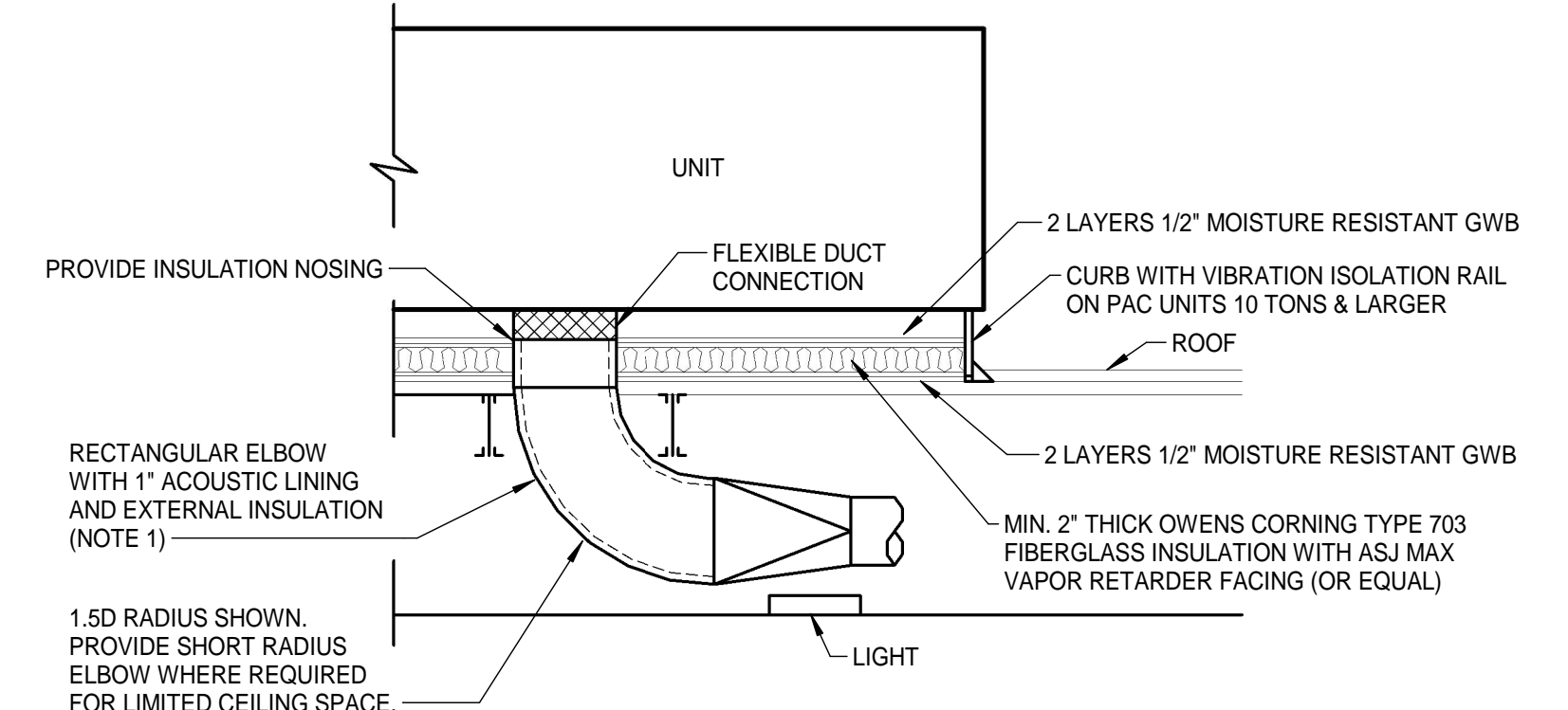


**BRANCH CONNECTIONS DETAIL FOR SUPPLY, RETURN & EXHAUST DUCT (TYP)**  
SCHEMATIC



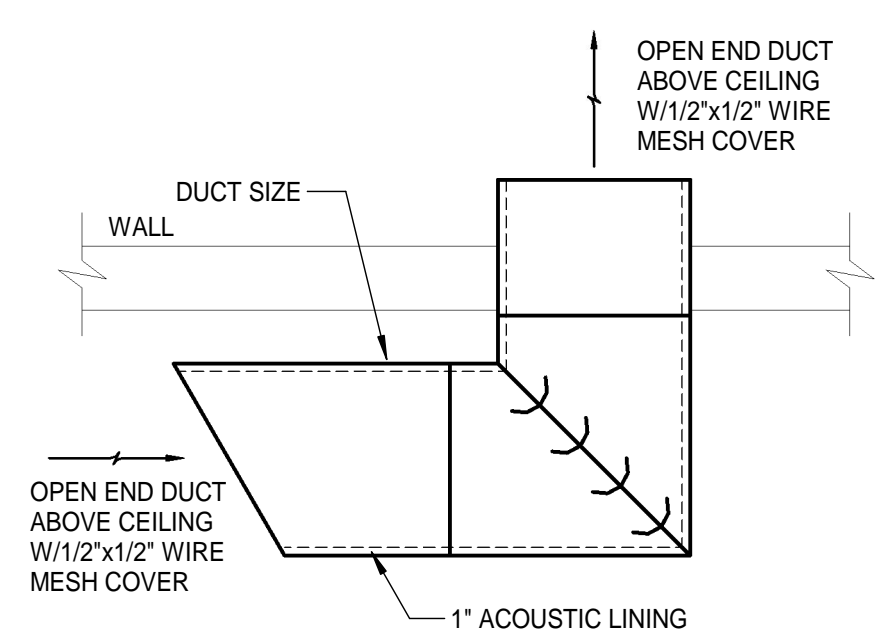
**GOOSENECK DETAIL**  
NO SCALE

- NOTES:**
- SUPPLEMENTAL WIND BRACING MAY BE REQUIRED ON LARGER GOOSENECKS.
  - WHERE OUTSIDE AIR INTAKES OCCUR WITHIN 10' OF RELIEF DISCHARGE, RELIEF SHALL TERMINATE 2' ABOVE OUTSIDE AIR INTAKE.



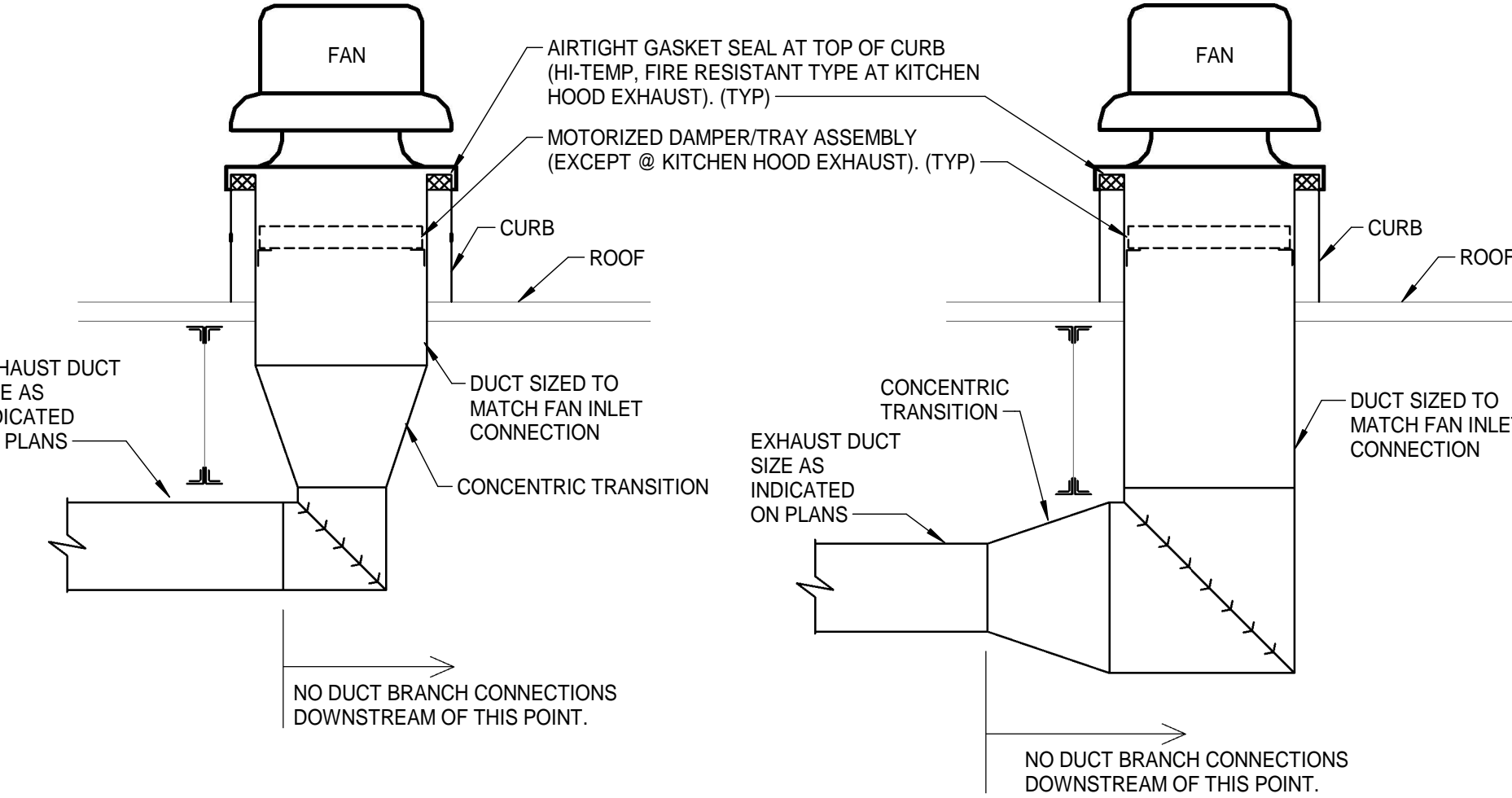
**ROOFTOP AIR HANDLING UNIT DETAIL**  
SCHEMATIC

- NOTE:**
- 12 GAGE SHEETMETAL ELBOW FOR MEDIUM/HIGH PRESSURE SYSTEMS. 16 GAGE SHEETMETAL ELBOW FOR LOW PRESSURE SYSTEMS.

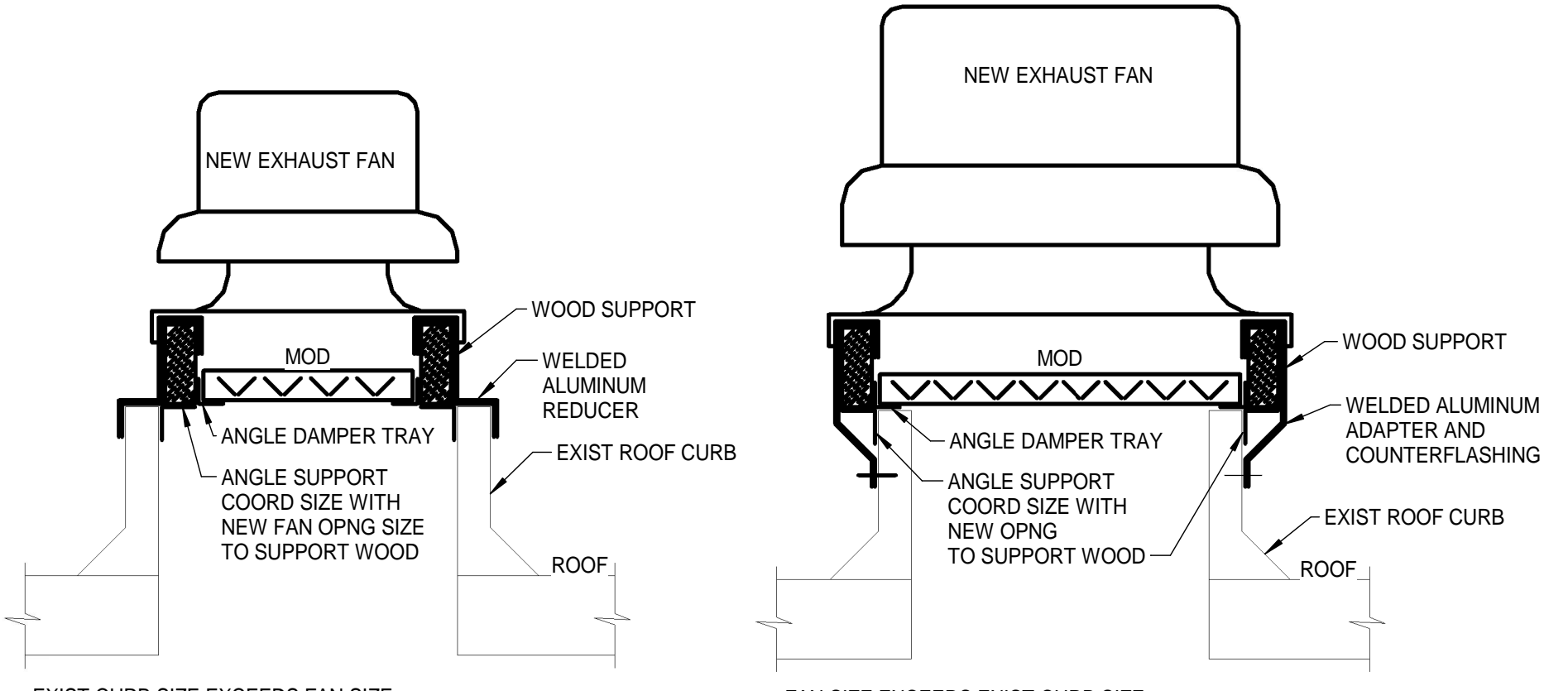


**TRANSFER DUCT (TD) DETAIL**  
NO SCALE

- NOTES:**
- UNLESS OTHERWISE INDICATED, ALL TRANSFER DUCTS SHALL BE 18x16.
  - REFER TO PLANS FOR ACTUAL DUCT CONFIGURATION, LENGTH, NUMBER OF ELBOWS, ETC.
  - PENETRATION AT WALL SHALL BE COMPLETELY SEALED TO MITIGATE THE TRANSMISSION OF SOUND.



**TYPICAL ROOF FAN CONNECTION DETAIL**  
NO SCALE

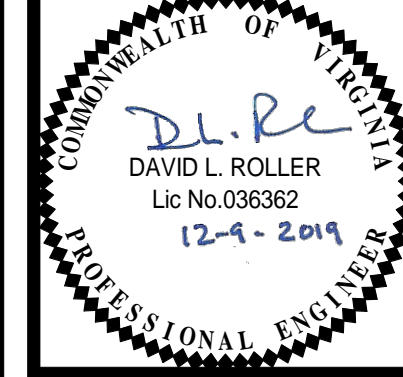


**FAN RENOVATION CURB DETAIL**  
NO SCALE

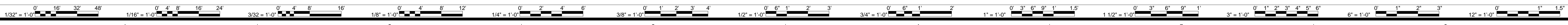
- NOTES:**
- ALL ANGLES SHALL BE GALVANIZED STEEL.
  - ARRANGEMENT SHOWN SHALL ONLY BE USED WHERE NEW FAN IS INSTALLED ON EXISTING CURB. ALL OTHER FANS SHALL HAVE NEW CURB.

DATE	PROJECT	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS
12-09-2019	15231-04	DESIGNED/DLR / JDC	DRAWN	DLR / JDC	CHECKED	DLR / JMS

DATE	DESCRIPTION	BY	MARK	DATE	REVISIONS



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**CHILLED WATER SYSTEM:** AT A PREDETERMINED OUTSIDE AIR TEMPERATURE AND UPON A CALL FOR COOLING OR DEHUMIDIFICATION, THE DDC SHALL ENABLE CHILLER OPERATION BASED ON HOURS RUN THROUGH ITS RESPECTIVE FLOW SWITCHES AND OPERATING AND SAFETY CONTROLS TO MAINTAIN CHILLED WATER LEAVING TEMPERATURE. EACH CHILLER SHALL ENABLE ITS RESPECTIVE CHILLER PUMP (CWP-1, CWP-2, OR CWP-3). WHEN ANY CHILLER IS ENABLED THE DDC SHALL ALSO ENERGIZE THE LEAD CHILLED WATER DISTRIBUTION PUMP, CWP-4 OR CWP-5. THE LEAD PUMP SHALL BE SELECTED WEEKLY (OR OTHERWISE DICTATED BY THE OWNER) BASED ON RUN HOURS. WHEN THE LEAD CHILLED WATER DISTRIBUTION PUMP IS ENERGIZED, THE DDC SHALL SLOWLY RAMP UP THE SPEED THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTERS P-1 THROUGH P-5 LOCATED AT COILS AT THE END OF EACH ZONE PIPING. THE DDC SHALL ENERGIZE THE ADDITIONAL CHILLER AND CHILLER PUMP BASED ON SYSTEM SUPPLY TEMPERATURE, AS SENSED BY TE-1, WITH MULTIPLE CHILLERS OPERATING, THE DDC SHALL DEENERGIZE CHILLERS WHEN BASED ON INDIVIDUAL CHILLER RLA, MINIMUM ON AND OFF TIMES SHALL BE PROVIDED BY THE DDC AND SHALL BE AS RECOMMENDED BY THE CHILLER MANUFACTURER.

**SYSTEM MONITORING:** IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS INDICATED ON THE SCHEMATIC DIAGRAMS

**CONDENSER WATER SYSTEM (CONSTANT FLOW):** EACH CHILLER SHALL ENABLE ITS RESPECTIVE CONDENSER WATER PUMP. UPON A CALL FOR CHILLED WATER, THE DDC SHALL ENABLE THE COOLING TOWER FAN TO OPERATE. THE DDC SHALL MONITOR THE CHILLER REFRIGERANT HEAD PRESSURE AND CONTROL COOLING TOWER FAN SPEED (PRIMARY) AND CONDENSER WATER BYPASS VALVE (SECONDARY) TO MAINTAIN MINIMUM AND MAXIMUM PRESSURES OF ANY OPERATING CHILLER AS RECOMMENDED BY THE CHILLER MANUFACTURER. THE DDC SHALL OVERRIDE THE HEAD PRESSURE SIGNAL IF REQUIRED TO MAINTAIN MAXIMUM 85°F CONDENSER WATER ENTERING THE CHILLER AS SENSED BY TE-9. REFRIGERANT HEAD PRESSURE SHALL BE CONTROLLED TO MINIMUM RECOMMENDED BY CHILLER MANUFACTURER FOR GREATEST ENERGY EFFICIENCY.

**SYSTEM MONITORING:** IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS INDICATED ON THE SCHEMATIC DIAGRAMS

**HEATING WATER SYSTEM:** UPON A CALL FOR HEAT OR REHEAT, THE DDC SHALL ENERGIZE HWP-1 OR HWP-2 AND SEND A SIGNAL TO THE BOILERS THROUGH THE INTERNAL BOILER MANAGEMENT PANEL. THE LEAD HOT WATER PUMP SHALL BE SELECTED WEEKLY (OR OTHERWISE DICTATED BY THE OWNER) BASED ON RUN HOURS. THE DDC SHALL SLOWLY RAMP UP THE SPEED OF THE OPERATING PUMP THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTERS P-1 THROUGH P-4 LOCATED AT COILS AT THE END OF THE ZONE PIPING. THE BOILER MANAGEMENT CONTROL PANEL SHALL SEQUENCE THE BOILERS AND OPERATE THE BOILER ISOLATION VALVES TO MAINTAIN MOST EFFICIENT OPERATION. WHEN BOILERS ARE NOT ENERGIZED, THEIR RESPECTIVE ISOLATION VALVE SHALL BE CLOSED. HOT WATER SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE.

**SYSTEM MONITORING:** IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS AS INDICATED ON THE CONTROLS SCHEMATICS. ALL POINTS AVAILABLE FROM THE BOILER MANAGEMENT SYSTEM SHALL BE MAPPED TO THE DDC USER INTERFACE.

**CONTROL LEGEND**

HOLDING COILS	COMBINATION FUSIBLE MOTOR STARTER RELAY	
MOTOR	MOTOR PROTECTIVE SWITCH	
DISCONNECT SWITCH (FUSED)	DISCONNECT	
PILOT LIGHT	T*STAT OR RELAY	
SET POINT-CLOSE BELOW 65°F	SET POINT-CLOSE ABOVE 65°F	
CONTROL AIR TUBING	ELECTRICAL WIRING, ABOVE 100 VOLT	
TWIST SHIELDED PAIR, 24 VOLT	CURRENT RELAY	
	CONTROL RELAY	
	DIRECT DIGITAL	
	ELECTRIC PNEUMATIC	
	FAN RELAY	
	FREESTOP PROTECTION	

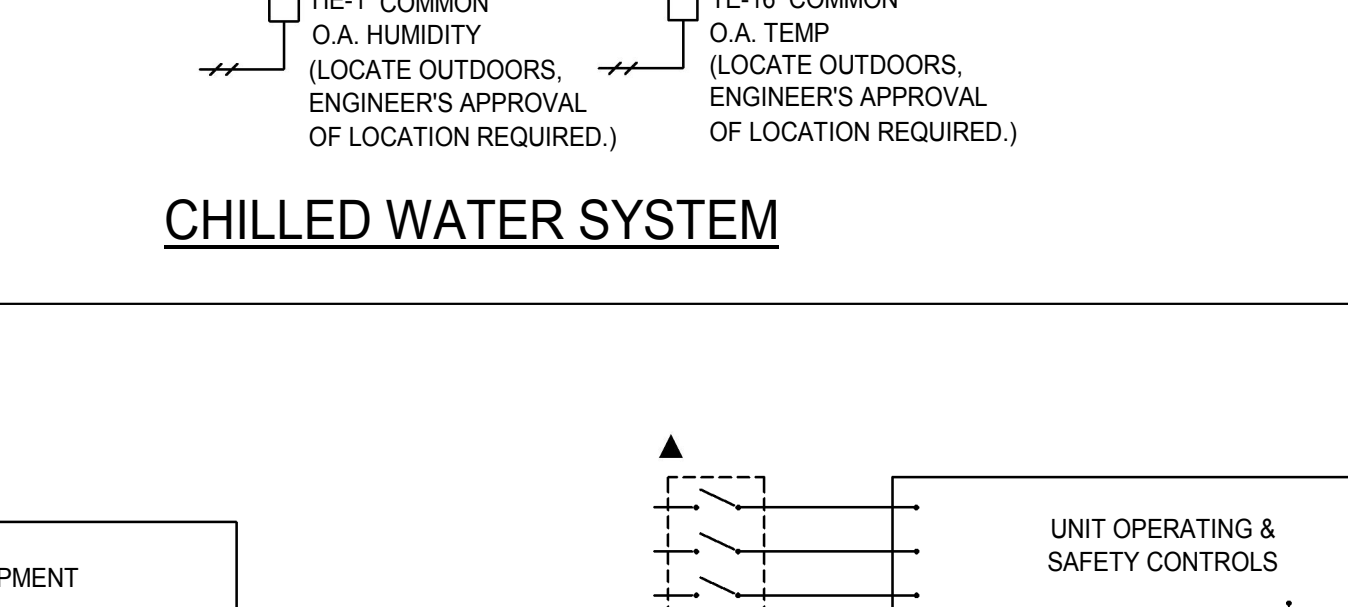
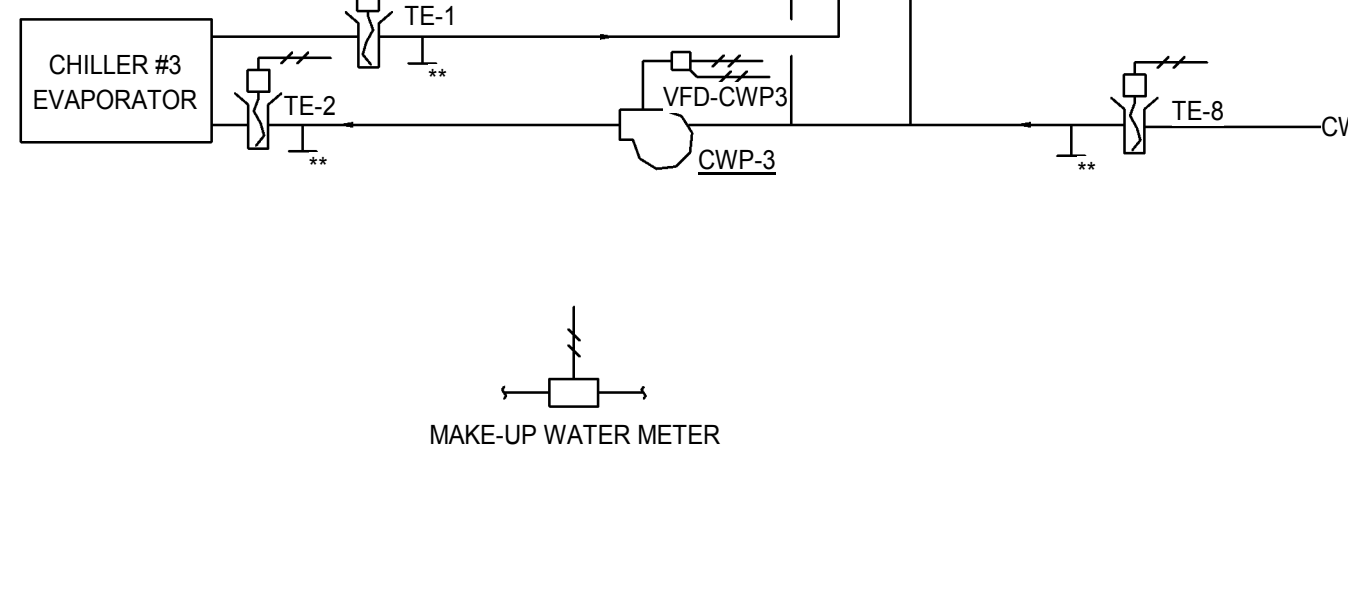
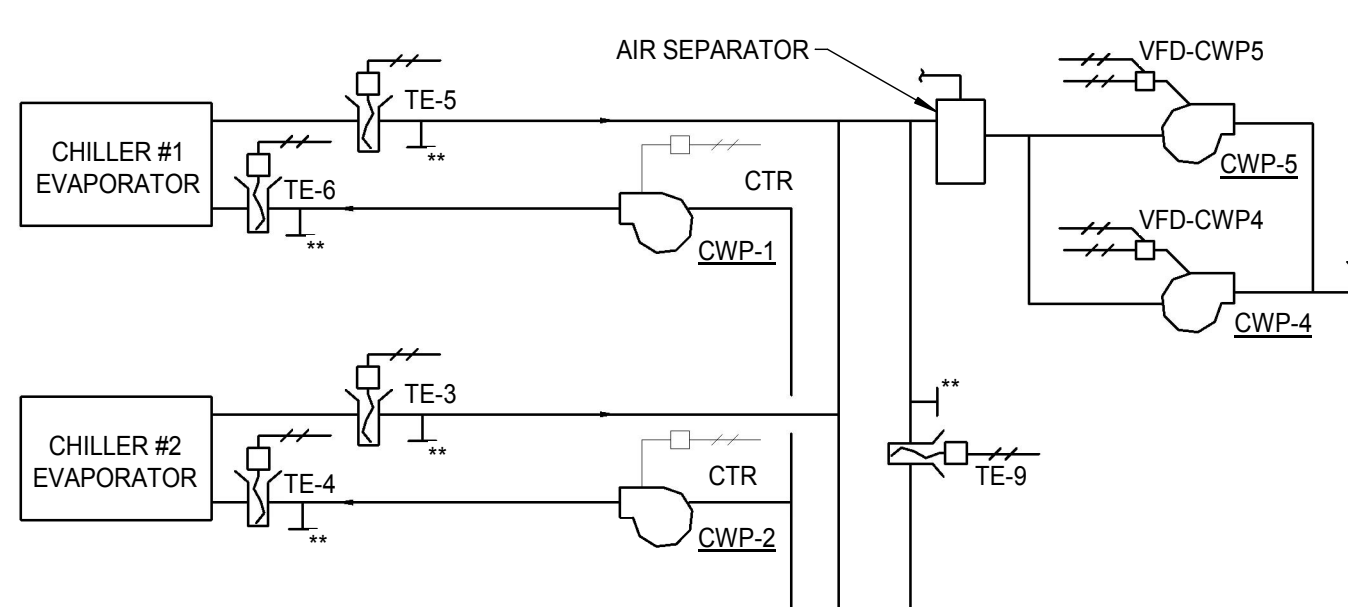
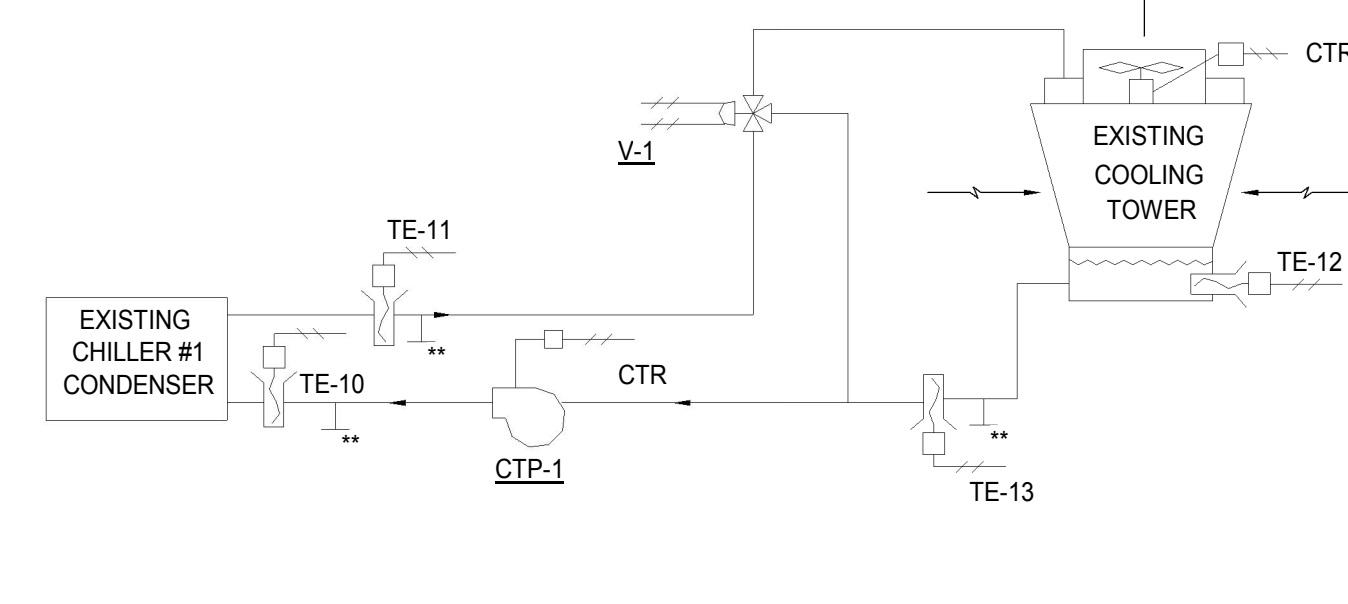
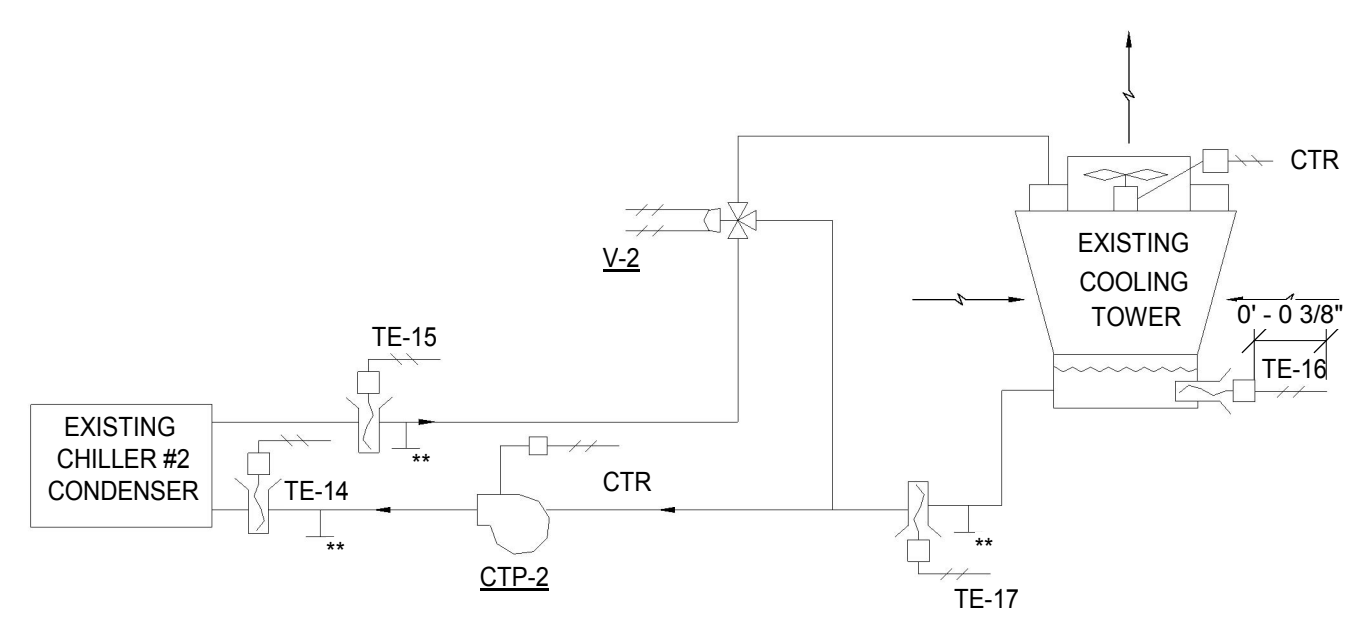
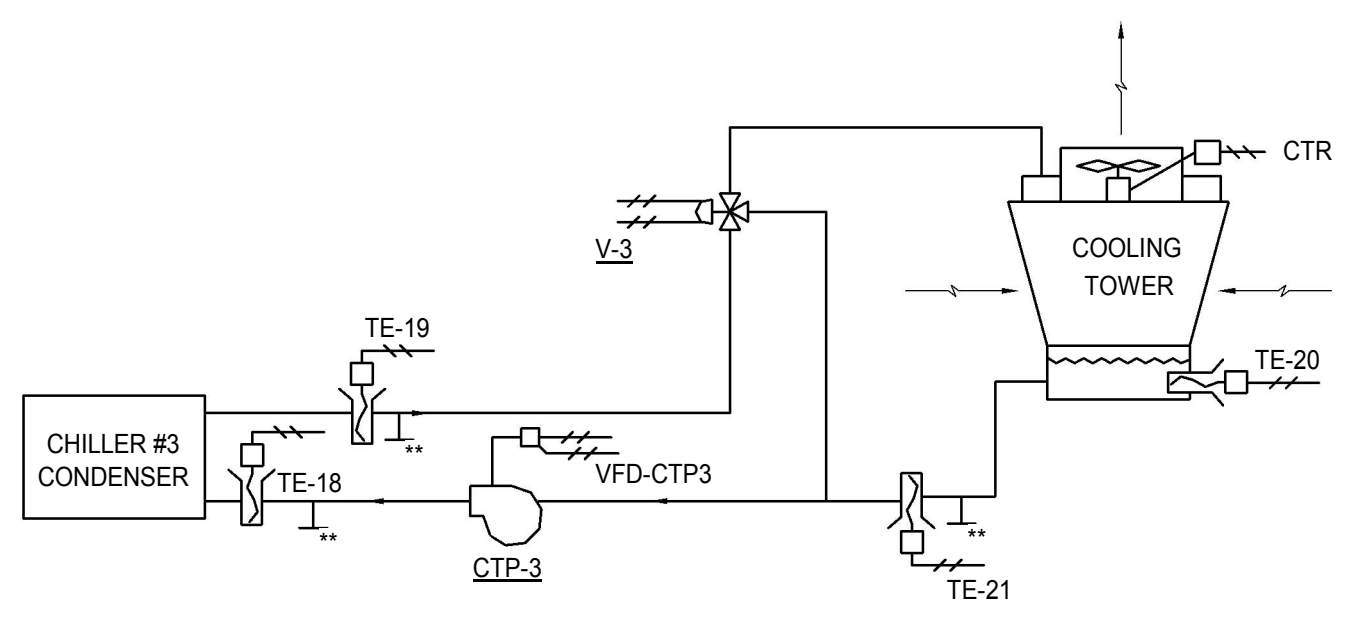
ALL ITEMS SHOWN ON CONTROL DIAGRAMS AND WIRING 100 VOLTS OR LESS SHALL BE INCLUDED AS A PART OF SECTION 230900 EXCEPT POWER WIRING OVER 100 VOLTS. ITEMS MARKED ▲ OR ITEMS SPECIFIED TO BE FURNISHED WITH EQUIPMENT. WIRING OVER 100 VOLTS AND ITEMS MARKED ▲ SHALL BE FURNISHED AS A PART OF DIVISION 26. ALL OVERLOADS, HOA SWITCHES, AUXILIARY CONTACTS AND PILOT LIGHTS SHALL BE INTEGRAL WITH THE MOTOR STARTERS UNLESS SHOWN OTHERWISE.

ALL WIRING SHOWN ON OTHER SEQUENCE CONTROLS SHALL BE OVER 100 VOLTS UNLESS NOTED OTHERWISE. RELAYS FROM THE CONTROL SYSTEM SHALL BE LOCATED ADJACENT TO THE CONTROLLED DEVICE (MOTOR OR MOTOR STARTER) AND MAY BE LOCATED WITHIN STARTER HOUSINGS WHERE SPACE IS AVAILABLE AND WHERE APPROVED BY NEC.

CONTROL ITEMS MARKED WITH "VENTILATION-ON-OFF" SHALL HAVE PLATE ENGRAVED WITH THE WORDING CONTAINED WITHIN THE QUOTE "...". MARKS PLUS EQUIPMENT IDENTIFICATION.

\*QTY AS REQUIRED/INDICATED ON PLANS.

\*\*PIT PORT PROVIDED BY DIV. 23. INSTALLED BY DIV. 23. INSTALL WITHIN 6" OF ASSOCIATED SENSOR.



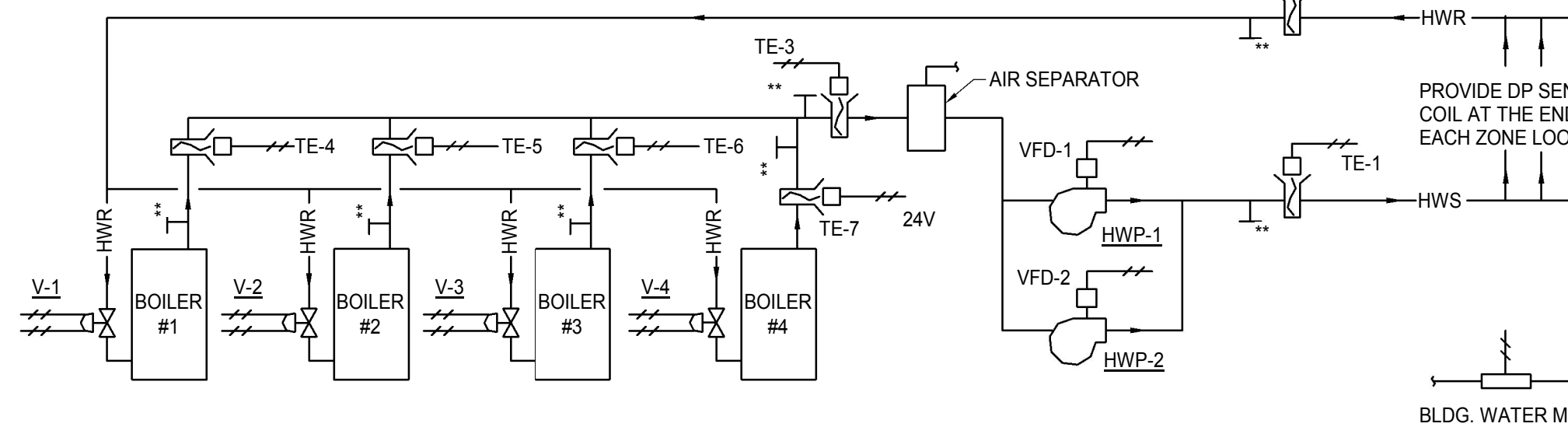
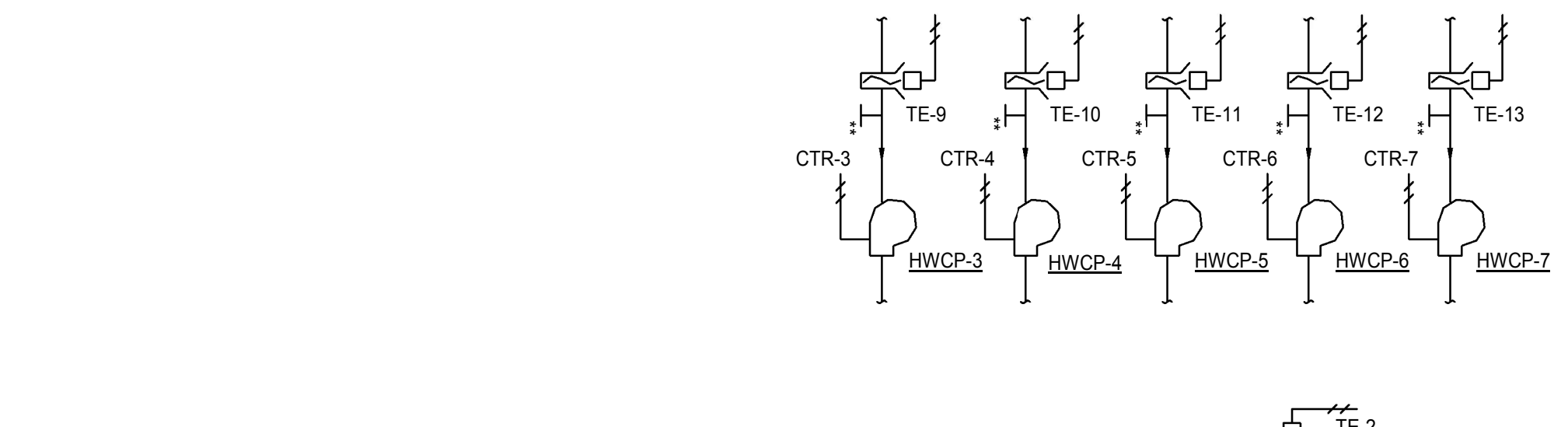
TE-1	CHILLER#1 S/S
TE-2	CHILLER#1 COMPR RUN TIME (QTY. AS REQD.)
TE-7	CHILLER#1 ALARM
TE-8	CTP-1 CTR
TE-9	CHILLER#1 SYSTEM PRESSURE SENSOR
TE-10	CHILLER#1 REFRIG HEAD PRESSURE
TE-11	CHILLER#1 CONDENSER FLOW SWITCH OVERRIDE
TE-12	CHILLER#1 RELIEF VALVE ALARM
TE-13	CHILLER#1 RLA
TE-14	COOLING TOWER FAN CTR
TE-15	
TE-16	CHILLER#2 S/S
TE-17	CHILLER#2 COMPR RUN TIME (QTY. AS REQD.)
TE-18	CHILLER#2 ALARM
TE-19	CTP-2 CTR
TE-20	CHILLER#2 SYSTEM PRESSURE SENSOR
TE-21	CHILLER#2 REFRIG HEAD PRESSURE
V-1	CHILLER#2 CONDENSER FLOW SWITCH OVERRIDE
V-2	CHILLER#2 RELIEF VALVE ALARM
V-3	CHILLER#2 RLA
	COOLING TOWER FAN CTR
	CHILLER#3 S/S
	CHILLER#3 COMPR RUN TIME (QTY. AS REQD.)
	CHILLER#3 ALARM
	CTP-3 S/S
	CHILLER#3 SYSTEM PRESSURE SENSOR
	CHILLER#3 REFRIG HEAD PRESSURE
	CHILLER#3 CONDENSER FLOW SWITCH OVERRIDE
	CHILLER#3 RELIEF VALVE ALARM
	CHILLER#3 RLA
	COOLING TOWER FAN CTR
	REFRIGERANT MONITOR
	POWER PHASE LOSS
	POWER LOSS

ALL DEVICES INDICATED SHALL BE NEW, EVEN WHERE INDICATED AT EXISTING EQUIPMENT. ALL VALVES AND ACTUATORS SHALL BE PROVIDED NEW. GRAPHICS SHALL BE UPDATED TO INCLUDE ALL EQUIPMENT, DEVICES AND SENSORS, WHETHER NEW OR EXISTING.

HE-1 COMMON O.A. HUMIDITY (LOCATE OUTDOORS, ENGINEER'S APPROVAL OF LOCATION REQUIRED.)

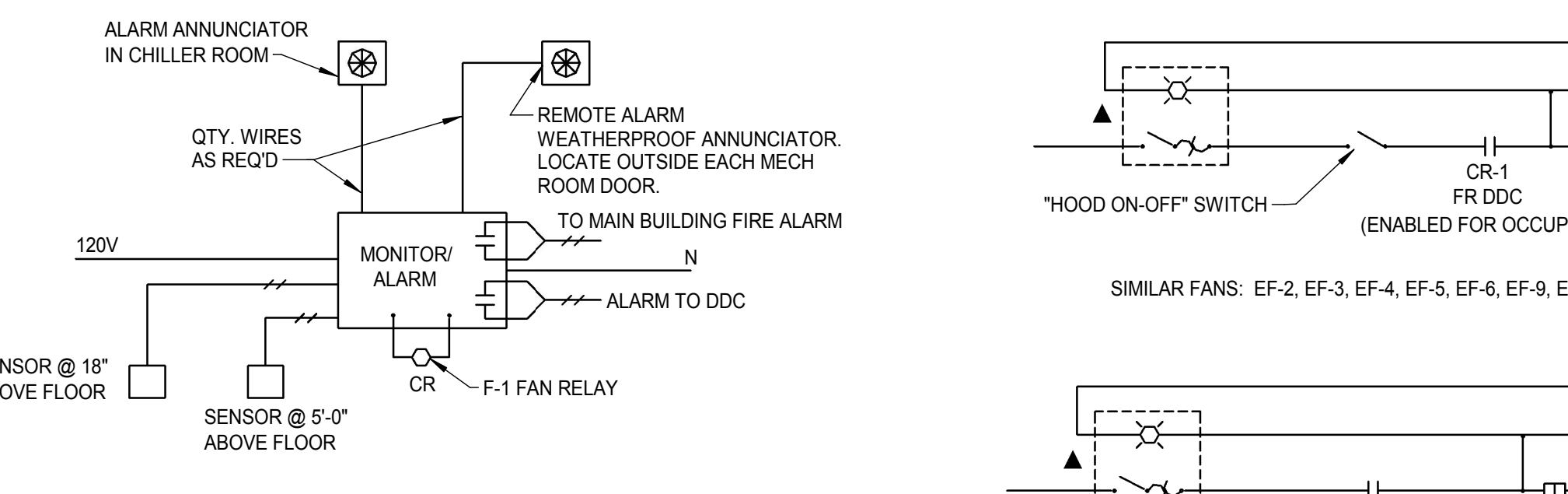
TE-16 COMMON O.A. TEMP (LOCATE OUTDOORS, ENGINEER'S APPROVAL OF LOCATION REQUIRED.)

**CHILLED WATER SYSTEM**



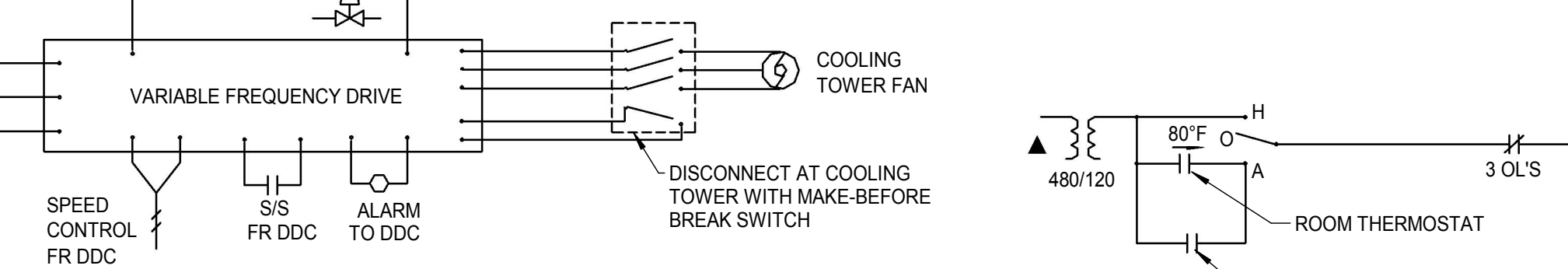
HWP-1	S/S	TE-1
SPEED	VFD	TE-2
ALARM	S/S	TE-3
HWP-2	S/S	TE-4
SPEED	VFD	TE-5
ALARM	S/S	TE-6
HWCP-1	S/S	TE-7
HWCP-2	S/S	TE-8
HWCP-3	S/S	TE-9
HWCP-4	S/S	TE-10
HWCP-5	S/S	TE-11
HWCP-6	S/S	TE-12
HWCP-7	S/S	TE-13
BOILER ENABLE		V-1
		V-2
GENERATOR STATUS		V-3
		CTR-1
		CTR-2
		CTR-3
		CTR-4
		CTR-5
		CTR-6
		P-1
		CTR-7
		TE-13
		TOTAL BUILDING WATER METER

**HEATING WATER SYSTEM**



NOTE: PROVIDE AUXILIARY RELAYS AS REQUIRED.

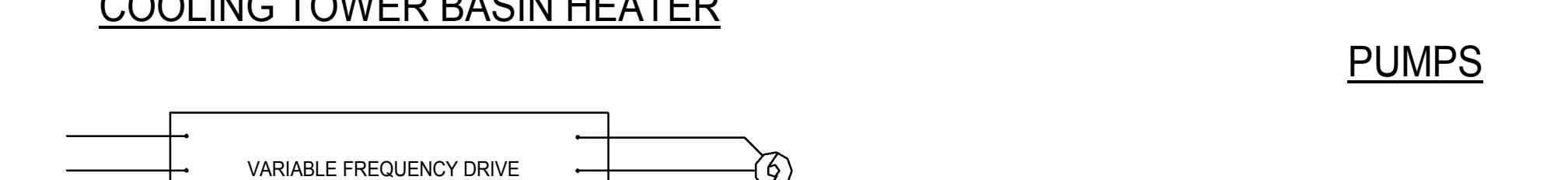
**REFRIGERANT MONITOR/ALARM**



**COOLING TOWER FAN**



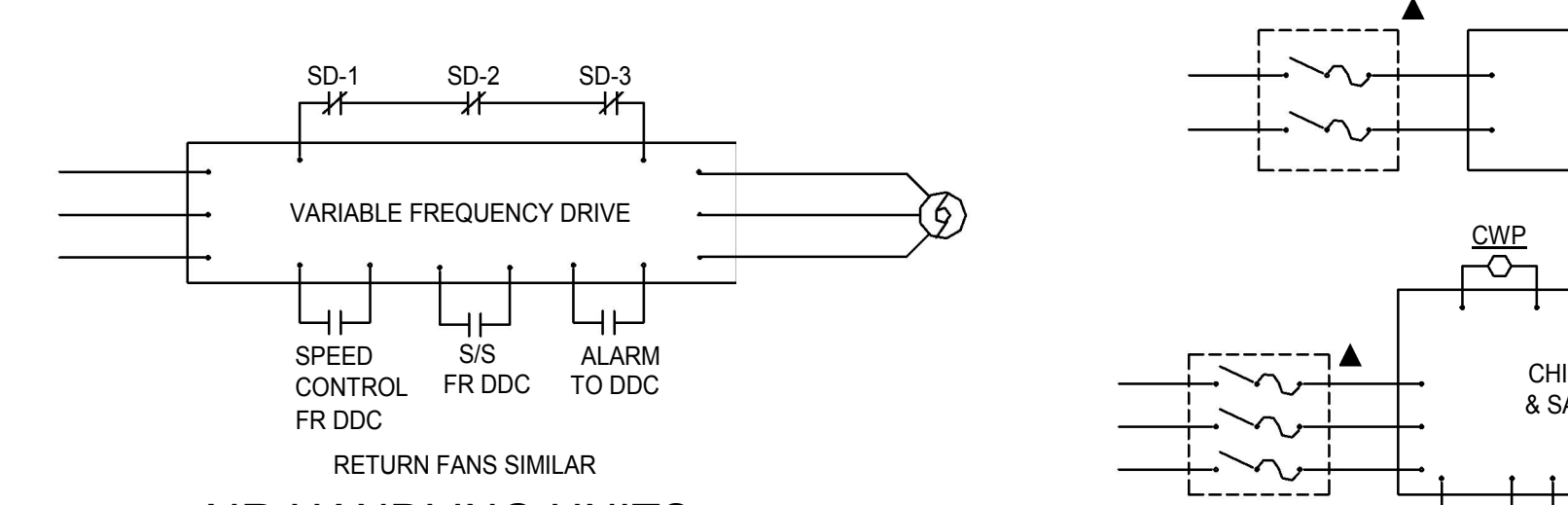
**FANS**



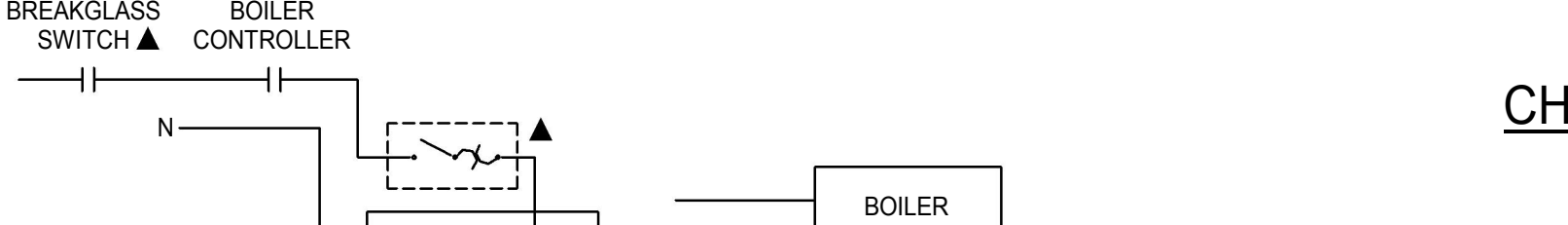
**COOLING TOWER BASIN HEATER**



CTP-3 SHALL BE PROVIDED WITH MAKE-BEFORE-BREAK DISCONNECT SIMILAR TO COOLING TOWER FAN



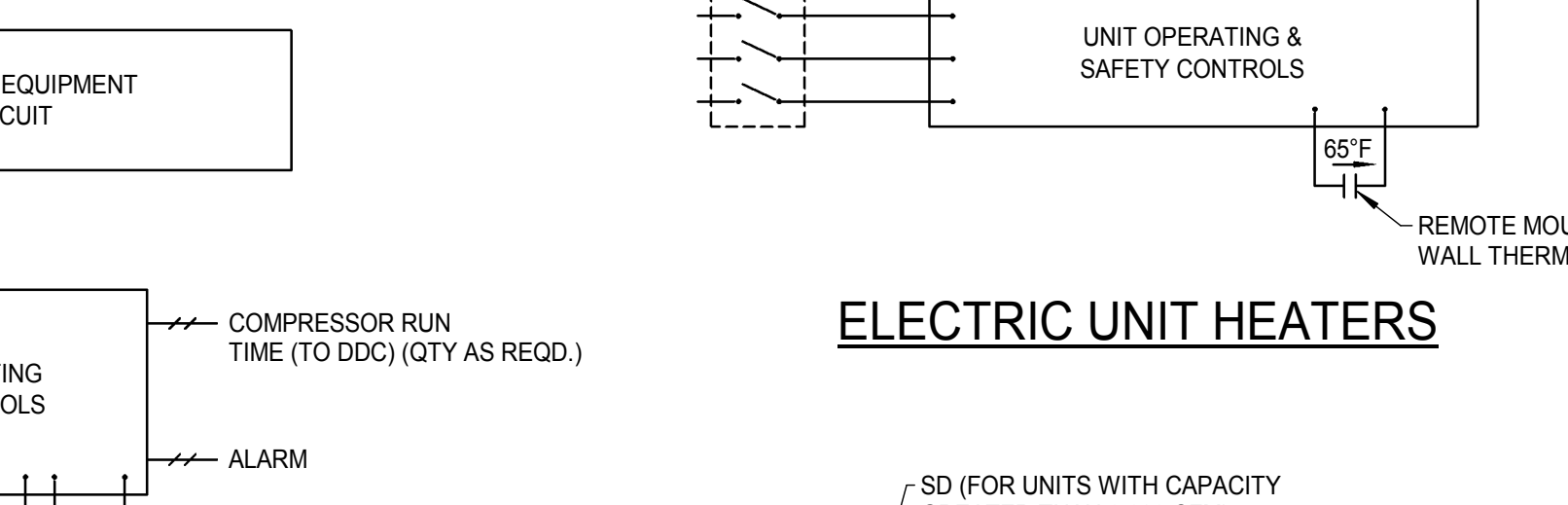
**AIR HANDLING UNITS**



**CHILLERS**



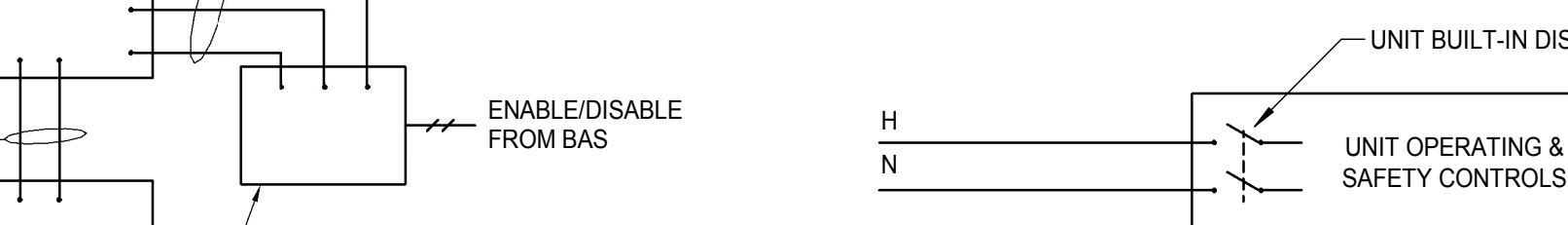
**BOILERS**



**ELECTRIC UNIT HEATERS**



**FAN POWERED VARIABLE VOLUME BOXES**



**WALL HEATERS**



**DUCTLESS SPLIT SYSTEM AIR CONDITIONER**

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**ASCENT**  
ENGINEERING GROUP  
5228 VALLEYFRONT PARKWAY, SUITE 4  
ROANOKE, VIRGINIA 24019  
(800) 260-4444  
D. DLR 18410 C.

MARK	DATE	REVISIONS	DESCRIPTION

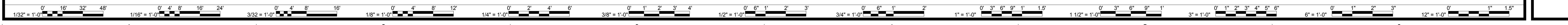
DATE	12-09-2019	DESIGNED/DLR / JDC	
PROJECT	15231-04	DRAWN	DLR / JDC
		CHECKED	DLR / MUS

**RRMM ARCHITECTS, PC**  
28 Church Ave SW  
Roanoke, Virginia 24011  
(540)344-1212

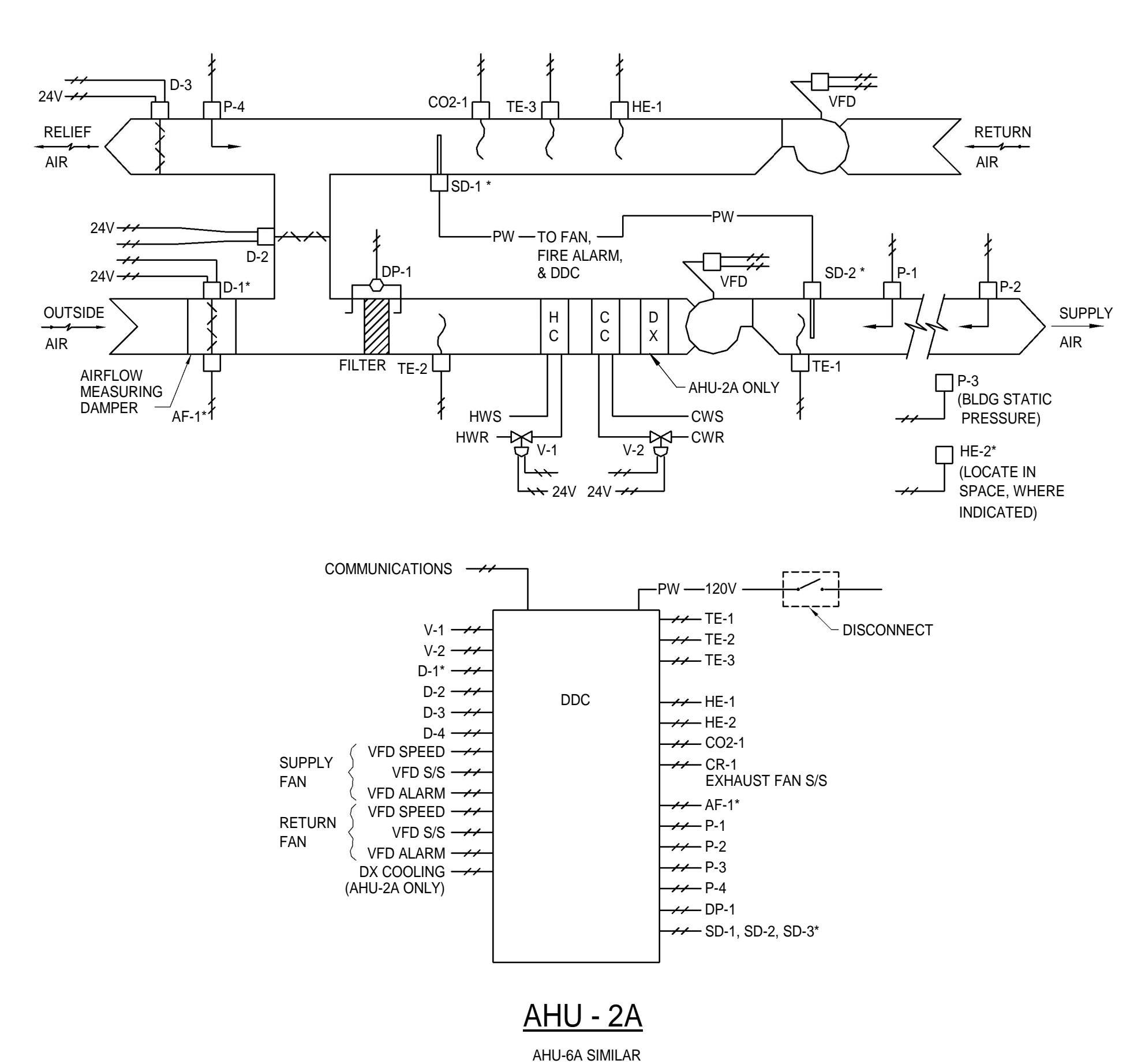
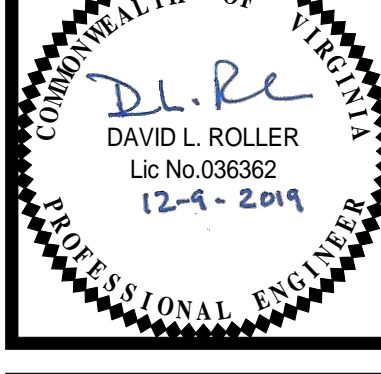
COMMONWEALTH OF VIRGINIA  
DAVID L. ROLLER  
Lic No 038382  
12-4-2019  
PROFESSIONAL ENGINEER

PROJECT SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS  
SALEM CITY SCHOOLS  
400 SPARTAN DRIVE  
SALEM, VA 24153  
DRAWING MECHANICAL CONTROLS

SHEET M-501

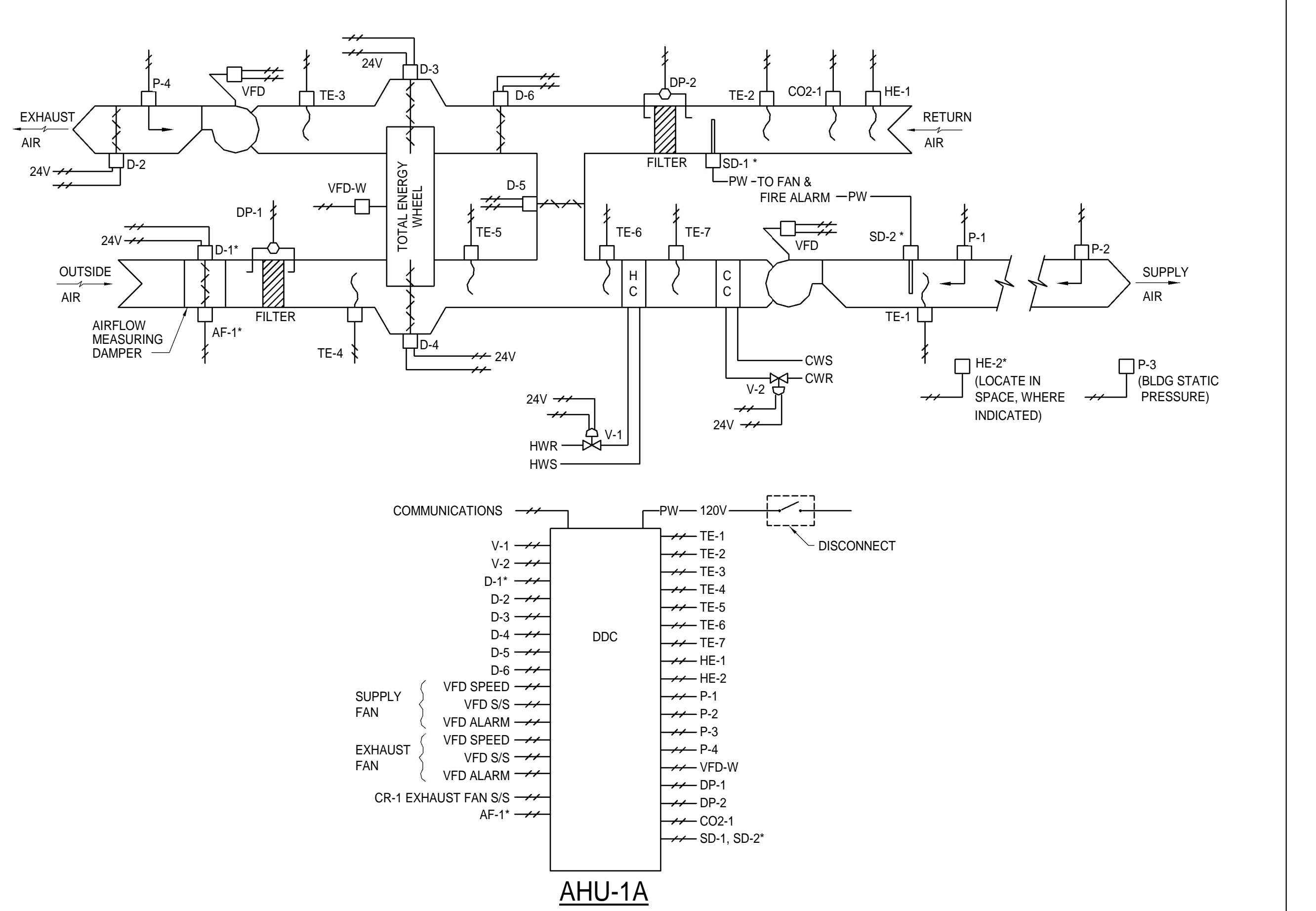


DATE	PROJECT	DESIGNED BY	DRAWN BY	CHECKED BY	MARK	DATE	REVISIONS
12-09-2019	15231-04	JDC	DLR	JDC			



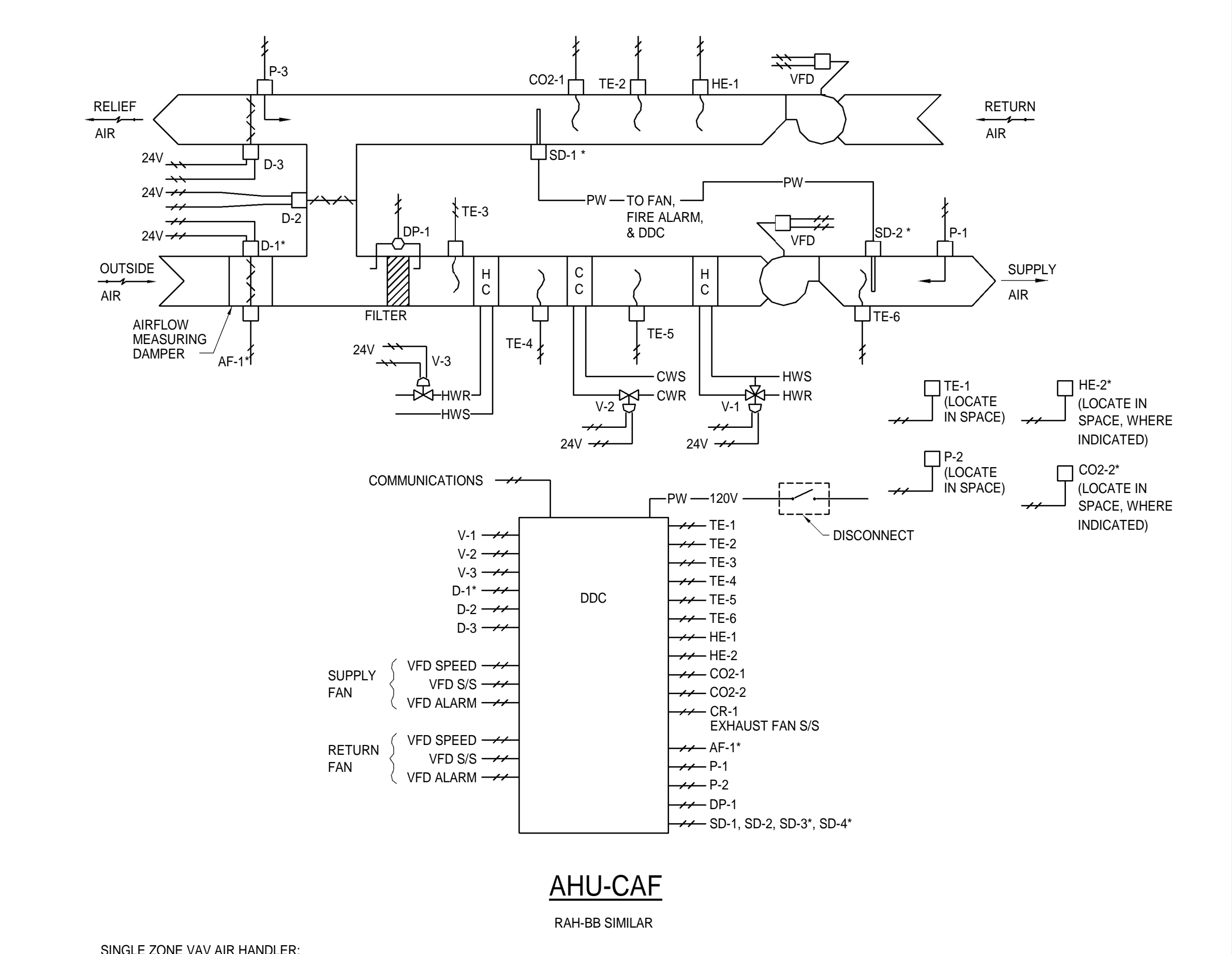
**AHU-2A**  
AHU-6A SIMILAR

- VAV AIR HANDLER:
- MORNING WARM-UP/COOL-DOWN: AT A PREDETERMINED OPTIMAL TIME CALCULATED BY THE DDC, THE DDC SHALL ENERGIZE THE UNIT SUPPLY FAN. THE OUTSIDE AIR DAMPER D-1 SHALL REMAIN CLOSED, RETURN AIR DAMPER D-2 SHALL REMAIN OPEN, AND ASSOCIATED BUILDING EXHAUST FANS SHALL REMAIN OFF THRU CR-1.
  - OCCUPIED CONTROL: DURING OCCUPANCY D-1 SHALL BE OPENED TO ITS MINIMUM POSITION (AS REQUIRED TO MAINTAIN MINIMUM OUTDOOR AIR FLOW), THE UNIT EXHAUST FAN SHALL BE ENERGIZED, AND THE INTERLOCKED BUILDING EXHAUST FANS SHALL BE ENERGIZED.
  - TEMPERATURE CONTROL: ON A RISE IN UNIT DISCHARGE AIR TEMPERATURE ABOVE 55°F (ADJUSTABLE) AS SENSED BY TE-1, THE DDC SHALL MODULATE CHILLED WATER VALVE V-2 OPEN TO THE COIL. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE THE DDC SHALL MODULATE HOT WATER VALVE V-1 OPEN. SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE.
  - SUPPLY FAN CONTROL - CRITICAL ZONE PRESSURE RESET: WHEN THE UNIT SUPPLY FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED OF THE SUPPLY FAN THROUGH ITS VFD TO AN INITIAL DOWNSTREAM STATIC SETPOINT AS SENSED BY P-2 LOCATED 2/3 DOWN THE LONGEST SUPPLY DUCT RUN. THE DDC SHALL CONSTANTLY MONITOR THE AIR VALVE POSITION OF ALL VAV TERMINAL UNITS SERVED BY THE UNIT AND DETERMINE WHICH AIR VALVE IS OPERATING AT THE HIGHEST PERCENTAGE OPEN (CRITICAL ZONE). WHEN THE CRITICAL ZONE DAMPER POSITION IS 85% OPEN OR LESS, THE DDC SHALL RESET THE DOWNSTREAM STATIC PRESSURE SETPOINT LOWER BY 0.10 INCHES AT 15-MINUTE INTERVALS. WHEN THE CRITICAL ZONE DAMPER POSITION EXCEEDS 95% OPEN, THE DDC SHALL RESET THE DOWNSTREAM STATIC PRESSURE HIGHER BY 0.10 INCHES AT 15-MINUTE INTERVALS. THE SEQUENCE SHALL ALLOW FOR USER DEFINED VAV BOXES TO BE EXCLUDED FROM THE PRESSURE RESET LOGIC. P-1 SHALL SERVE AS A HIGH LIMIT STATIC PRESSURE OVERRIDE.
  - RETURN FAN AND RELIEF DAMPER CONTROL: WHEN UNIT RETURN FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED TO THE RETURN FAN THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTER P-4 LOCATED IN THE RELIEF PLENUM. THE DDC SHALL MODULATE DAMPER D-3 TO MAINTAIN A 0.05 IN. W.C. (ADJUSTABLE) POSITIVE PRESSURE IN THE SPACE AS SENSED BY P-3.
  - ECONOMIZER OPERATION: WHEN OUTSIDE AIR ENTHALPY IS LOWER THAN RETURN AIR ENTHALPY, ECONOMIZER OPERATION SHALL PREVAIL. OUTSIDE AIR DAMPER D-1 AND RETURN AIR DAMPER D-2 SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. THE CHILLED WATER VALVE SHALL BE MODULATED OPEN TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT.
  - DUCT SMOKE DETECTORS: WHEN PRODUCTS OF COMBUSTION ARE SENSED BY SD-1, SD-2, OR ADDITIONAL DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.
  - SYSTEM MONITORING: IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS AS INDICATED ON THE CONTROLS SCHEMATICS.
  - QA DAMPER CONTROL (AHU-6A ONLY): A PRESSURE SENSOR SHALL BE PROVIDED IN THE CULINARY ARTS LABORATORY. QA DAMPER SHALL BE MODULATED ABOVE MINIMUM OUTSIDE AIR POSITION TO MAINTAIN THE SPACE PRESSURE SLIGHTLY NEGATIVE (0.05" W.G.) (ADJUSTABLE).



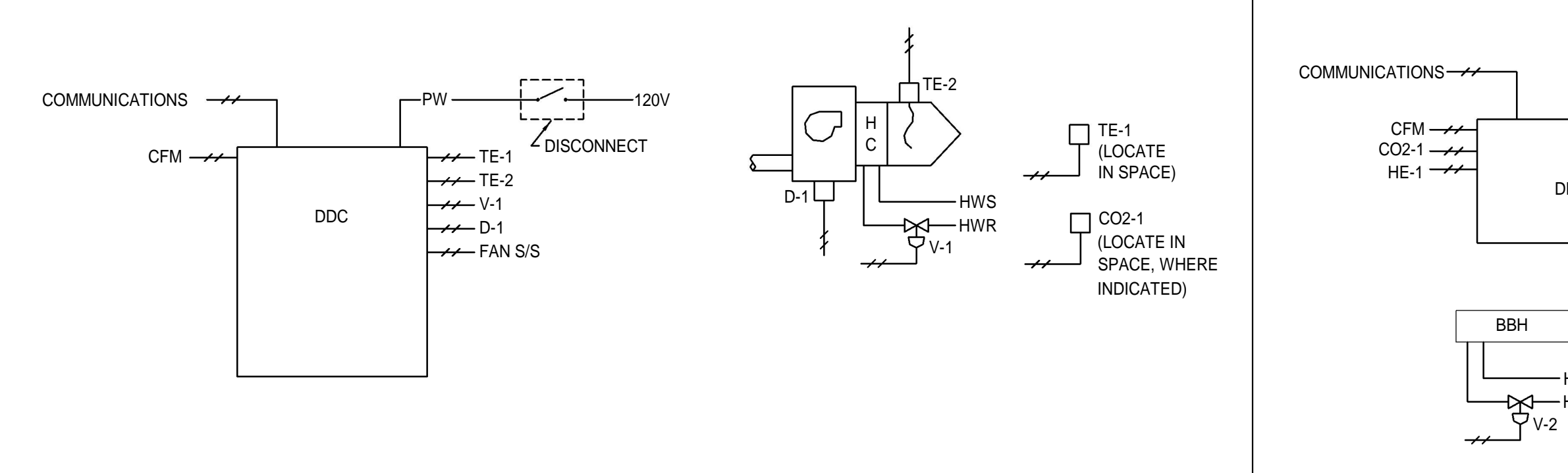
**AHU-1A**  
AHU-3A, AHU-4A, AND RAH-5A SIMILAR

- VAV AIR HANDLER W/ ENERGY RECOVERY:
- MORNING WARM-UP/COOL-DOWN: AT A PREDETERMINED OPTIMAL TIME CALCULATED BY THE DDC, THE DDC SHALL ENERGIZE THE UNIT SUPPLY FAN. THE OUTSIDE AIR DAMPER D-1 SHALL REMAIN CLOSED, RETURN AIR DAMPER D-5 SHALL REMAIN OPEN, AND ASSOCIATED BUILDING EXHAUST FANS SHALL REMAIN OFF THRU CR-1.
  - OCCUPIED CONTROL: DURING OCCUPANCY D-1 SHALL BE OPENED TO ITS MINIMUM POSITION (AS REQUIRED TO MAINTAIN MINIMUM OUTDOOR AIR FLOW), THE UNIT EXHAUST FAN SHALL BE ENERGIZED, AND THE INTERLOCKED BUILDING EXHAUST FANS SHALL BE ENERGIZED.
  - TEMPERATURE CONTROL: ON A RISE IN UNIT DISCHARGE AIR TEMPERATURE ABOVE 55°F (ADJUSTABLE) AS SENSED BY TE-1, THE DDC SHALL MODULATE CHILLED WATER VALVE V-2 OPEN TO THE COIL. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE THE DDC SHALL MODULATE HOT WATER VALVE V-1 OPEN. SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE.
  - SUPPLY FAN CONTROL - CRITICAL ZONE PRESSURE RESET: WHEN THE UNIT SUPPLY FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED OF THE SUPPLY FAN THROUGH ITS VFD TO AN INITIAL DOWNSTREAM STATIC SETPOINT AS SENSED BY P-2 LOCATED 2/3 DOWN THE LONGEST SUPPLY DUCT RUN. THE DDC SHALL CONSTANTLY MONITOR THE AIR VALVE POSITION OF ALL VAV TERMINAL UNITS SERVED BY THE UNIT AND DETERMINE WHICH AIR VALVE IS OPERATING AT THE HIGHEST PERCENTAGE OPEN (CRITICAL ZONE). WHEN THE CRITICAL ZONE DAMPER POSITION IS 85% OPEN OR LESS, THE DDC SHALL RESET THE DOWNSTREAM STATIC PRESSURE SETPOINT LOWER BY 0.10 INCHES AT 15-MINUTE INTERVALS. WHEN THE CRITICAL ZONE DAMPER POSITION EXCEEDS 95% OPEN, THE DDC SHALL RESET THE DOWNSTREAM STATIC PRESSURE HIGHER BY 0.10 INCHES AT 15-MINUTE INTERVALS. THE SEQUENCE SHALL ALLOW FOR USER DEFINED VAV BOXES TO BE EXCLUDED FROM THE PRESSURE RESET LOGIC. P-1 SHALL SERVE AS A HIGH LIMIT STATIC PRESSURE OVERRIDE.
  - ENERGY WHEEL CONTROL: DURING OCCUPIED PERIODS, THE ENERGY WHEEL SHALL BE ENERGIZED AND BYPASS DAMPERS, D-3 AND D-4 SHALL BE CLOSED. THE DDC SHALL MONITOR WHEEL ROTATION THROUGH RS-1.
  - EXHAUST FAN AND RELIEF DAMPER CONTROL: WHEN UNIT EXHAUST FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED TO THE RETURN FAN THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTER P-4 LOCATED IN THE RELIEF PLENUM. THE DDC SHALL MODULATE DAMPER D-2 TO MAINTAIN A 0.05 IN. W.C. (ADJUSTABLE) POSITIVE PRESSURE IN THE SPACE AS SENSED BY P-3.
  - ECONOMIZER OPERATION: WHEN OUTSIDE AIR ENTHALPY IS LOWER THAN RETURN AIR ENTHALPY, ECONOMIZER OPERATION SHALL PREVAIL. THE ENERGY WHEEL SHALL BE DEENERGIZED, AND BYPASS DAMPERS D-3 AND D-4 SHALL BE OPENED. OUTSIDE AIR DAMPER D-1 AND RETURN AIR DAMPER D-5 SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. IF FULL ECONOMIZER IS INSUFFICIENT TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT, THE CHILLED WATER VALVE SHALL BE MODULATED OPEN TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT.
  - AIRFLOW MEASURING: THE DDC SHALL VERIFY MINIMUM OUTSIDE AIR FLOWS AS SENSED BY AF-1 AND MODULATE DAMPER D-1 AS NECESSARY TO MAINTAIN THE MINIMUM OUTSIDE AIR SETPOINT AS INDICATED ON THE DRAWINGS.
  - DUCT SMOKE DETECTORS: WHEN PRODUCTS OF COMBUSTION ARE SENSED BY SD-1, SD-2, OR ADDITIONAL DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.
  - SYSTEM MONITORING: IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS AS INDICATED ON THE CONTROLS SCHEMATICS.
  - PREHEAT COIL CIRCULATION PUMP (RAH-5A ONLY): THE PREHEAT COIL CIRCULATION PUMP SHALL BE ENERGIZED ANY TIME THERE IS A CALL FOR PREHEAT COIL HEATING AND DURING FREEZE PROTECTION MODES AS OUTLINED IN THE GENERAL SEQUENCES.



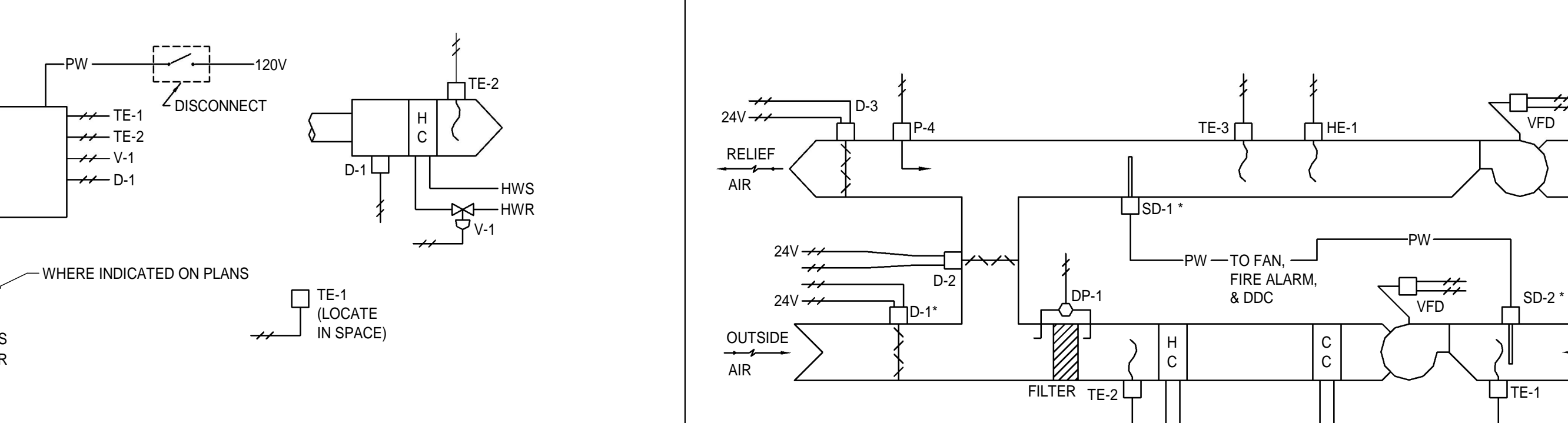
**AHU-CAF**  
RAH-BB SIMILAR

- SINGLE ZONE VAV AIR HANDLER:
- MORNING WARM-UP/COOL-DOWN: AT A PREDETERMINED OPTIMAL TIME CALCULATED BY THE DDC, THE DDC SHALL ENERGIZE THE UNIT SUPPLY FAN. THE OUTSIDE AIR DAMPER D-1 SHALL REMAIN CLOSED, RETURN AIR DAMPER D-2 SHALL REMAIN OPEN, AND ASSOCIATED BUILDING EXHAUST FANS SHALL REMAIN OFF THRU CR-1.
  - OCCUPIED CONTROL: DURING OCCUPANCY D-1 SHALL BE OPENED TO ITS LOW MINIMUM POSITIONS AND THE INTERLOCKED BUILDING EXHAUST FANS SHALL BE ENERGIZED.
  - SUPPLY FAN CONTROL: WHEN UNIT SUPPLY FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED OF THE SUPPLY FAN THROUGH ITS VFD AND CONTROL TO A SETTING THAT CORRESPONDS WITH A SUPPLY AIRFLOW OF 35% (ADJUSTABLE) OF MAXIMUM FOR COOLING AND 75% (ADJUSTABLE) OF MAXIMUM FOR HEATING. P-1 LOCATED AT FAN DISCHARGE SHALL PROVIDE HIGH LIMIT STATIC PRESSURE OVERRIDE.
  - COOLING OPERATION IS CONSTANT TEMPERATURE, VARIABLE VOLUME. THE DDC SHALL CONTROL TO A CONSTANT LEAVING AIR TEMPERATURE DURING COOLING MODE AND VARY THE FAN SPEED. ON A RISE IN DISCHARGE AIR TEMPERATURE ABOVE 55°F (ADJUSTABLE) AS SENSED BY TE-4, THE DDC SHALL MODULATE CHILLED WATER VALVE V-2 OPEN TO THE COIL. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE, THE DDC SHALL MODULATE HOT WATER VALVE V-1 OPEN TO THE COIL. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE THE DDC SHALL MODULATE HOT WATER VALVE V-1 OPEN. SUPPLY AIR TEMPERATURE SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE.
  - TEMPERATURE CONTROL: HEATING OPERATION IS CONSTANT VOLUME, VARIABLE TEMPERATURE. AT ANY TIME MIXED AIR TEMPERATURE, AS SENSED BY TE-2, FALLS BELOW 45°F (ADJUSTABLE), THE DDC SHALL MODULATE OPEN PREHEAT VALVE, V-3, TO MAINTAIN 45°F, AS SENSED BY TE-1. THE DDC SHALL CONTROL TO A CONSTANT SPACE TEMPERATURE DURING HEATING MODE WITH CONSTANT FAN AIRFLOW (75% OF FULL AIRFLOW, ADJUSTABLE), STARTING FROM A ROOM NEUTRAL DISCHARGE AIR TEMPERATURE. ON A FALL IN SPACE TEMPERATURE THE DDC SHALL MODULATE PREHEAT VALVE, V-3, OPEN TO MAINTAIN SPACE TEMPERATURE. ON A FURTHER FALL IN SPACE TEMPERATURE THE DDC SHALL MODULATE REHEAT VALVE, V-1, OPEN TO MAINTAIN SPACE TEMPERATURE. ON A RISE IN SPACE AIR TEMPERATURE, THE REVERSE SHALL OCCUR.
  - CARBON DIOXIDE CONTROL: WHEN SPACE CARBON DIOXIDE LEVEL EXCEEDS THE SETPOINT, AS SENSED BY CO2, THE DDC SHALL MODULATE D-1 OPEN TO ITS HIGH MINIMUM POSITION WHILE PROPORTIONALLY CLOSING D-2 TO MAINTAIN CO2 LEVELS BELOW 1000 PPM (ADJUSTABLE). IF AFTER 12 CONSECUTIVE HOURS, THE SPACE CO2 LEVEL REMAINS 10% (ADJUSTABLE) OR MORE ABOVE SETPOINT, THE AIR HANDLER SHALL ALARM THE DDC. THE DDC SHALL NOT ALLOW D-1 TO OPEN TO A POSITION THAT EXCEEDS THE HIGH MINIMUM POSITION UNLESS ECONOMIZER CONDITIONS PREVAIL.
  - RETURN FAN AND RELIEF DAMPER CONTROL: WHEN UNIT RETURN FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED TO THE RETURN FAN THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTER P-4 LOCATED IN THE RELIEF PLENUM. THE DDC SHALL MODULATE DAMPER D-3 TO MAINTAIN A 0.05 IN. W.C. (ADJUSTABLE) POSITIVE PRESSURE IN THE SPACE AS SENSED BY P-2.
  - ECONOMIZER OPERATION: WHEN OUTSIDE AIR ENTHALPY IS LOWER THAN RETURN AIR ENTHALPY, ECONOMIZER OPERATION SHALL PREVAIL. OUTSIDE AIR DAMPER D-1 AND RETURN AIR DAMPER D-2 SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. IF FULL ECONOMIZER IS INSUFFICIENT TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT, THE CHILLED WATER VALVE SHALL BE MODULATED OPEN TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT.
  - HUMIDITY CONTROL: AT ANY TIME RETURN AIR RELATIVE HUMIDITY EXCEEDS 60% (ADJUSTABLE), THE DDC SHALL MODULATE THE CHILLED WATER VALVE, V-2, OPEN TO THE COOLING COIL TO MAINTAIN SUPPLY AIR TEMPERATURE AT 53°F (ADJUSTABLE); THE DDC SHALL MODULATE THE REHEAT HOT WATER VALVE, V-1, TO TRIM AS NECESSARY TO MAINTAIN SPACE TEMPERATURE.
  - DUCT SMOKE DETECTORS: WHEN PRODUCTS OF COMBUSTION ARE SENSED BY SD-1, SD-2, OR ADDITIONAL DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.
  - SYSTEM MONITORING: IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS AS INDICATED ON THE CONTROLS SCHEMATICS.
  - PREHEAT COIL CIRCULATION PUMP (RAH-BB ONLY): THE PREHEAT COIL CIRCULATION PUMP SHALL BE ENERGIZED ANY TIME THERE IS A CALL FOR PREHEAT COIL HEATING AND DURING FREEZE PROTECTION MODES AS OUTLINED IN THE GENERAL SEQUENCES.



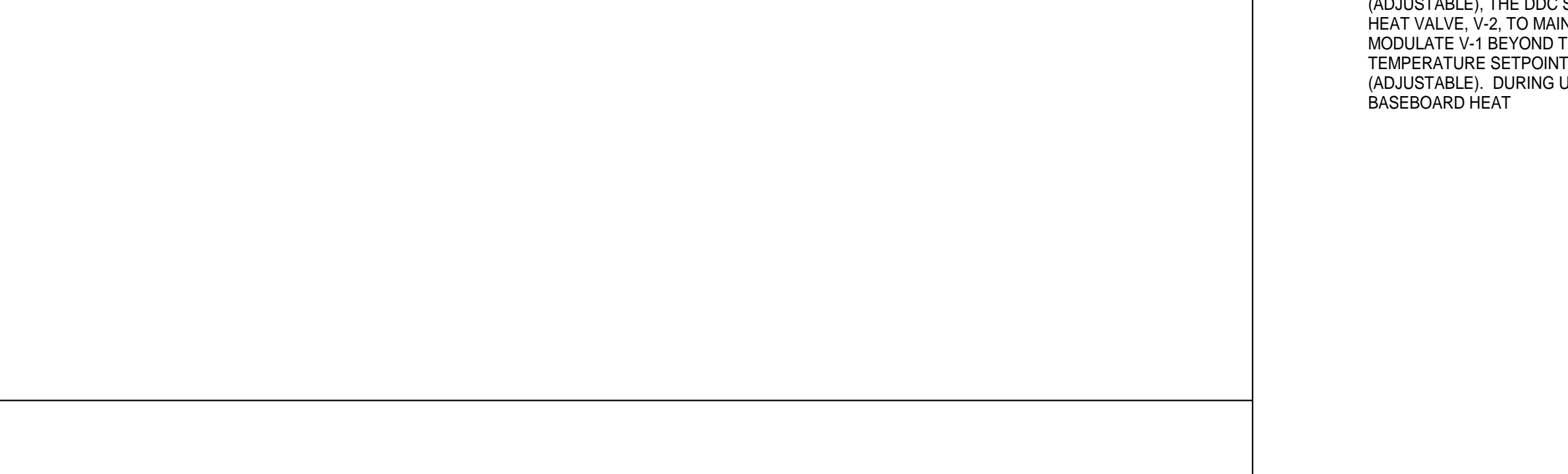
**FAN POWERED VARIABLE VOLUME HEATING BOXES**

PARALLEL FAN POWERED VARIABLE VOLUME HEATING BOX: ON A FALL IN SPACE TEMPERATURE AS SENSED BY TE-1, THE BOX DAMPER D-1 SHALL MODULATE CLOSED TO ITS MINIMUM POSITION. UPON A FURTHER FALL IN SPACE TEMPERATURE, THE HEATING WATER VALVE V-1 SHALL BE INDEXED 10% (ADJUSTABLE) OPEN. UPON A FURTHER FALL IN SPACE TEMPERATURE, THE DDC SHALL ENERGIZE THE UNIT FAN AND MODULATE HEATING WATER VALVE V-1 SHALL OPEN TO THE HEATING COIL. ON A RISE IN TEMPERATURE THE REVERSE SHALL OCCUR. DURING NIGHT OPERATION, THE FAN SHALL BE CYCLED AND TE-1 SHALL BE INDEXED TO MAINTAIN A REDUCED NIGHT TEMPERATURE.



**VARIABLE VOLUME HEATING BOXES**

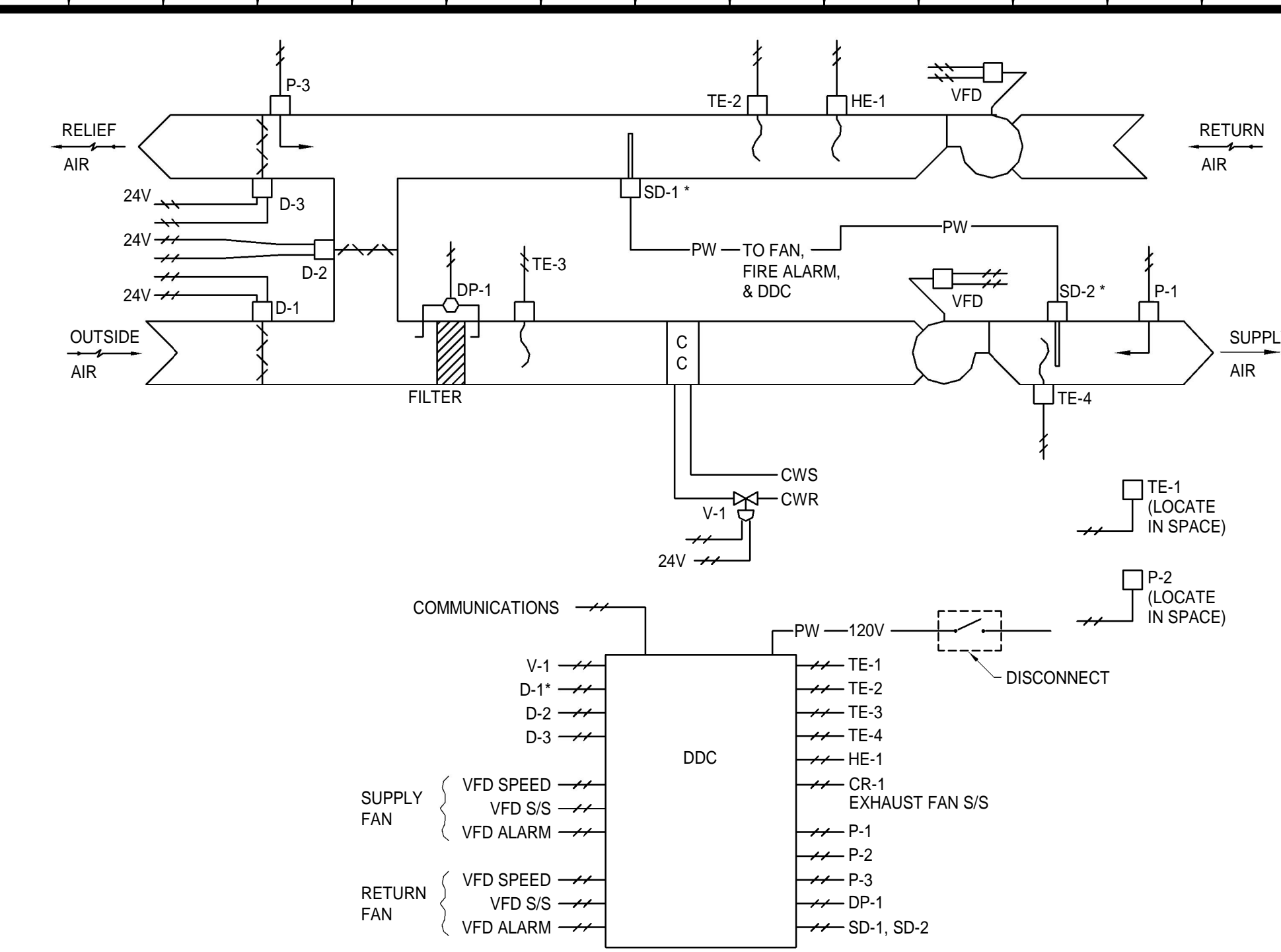
VARIABLE VOLUME HEATING BOX: ON A FALL IN SPACE TEMPERATURE AS SENSED BY TE-1, THE BOX DAMPER D-1 SHALL MODULATE CLOSED TO ITS MINIMUM POSITION. ON A FURTHER FALL IN SPACE TEMPERATURE, V-1 SHALL MODULATE OPEN TO THE HEATING COIL. DUAL MINIMUMS SHALL BE PROVIDED: AT OUTSIDE AIR TEMPERATURES AT OR BELOW 45°F (ADJUSTABLE), THE DDC SHALL MAINTAIN LEAVING AIR TEMPERATURE AT 70°F AND CYCLE TWO POSITION BASED ON HEAT VALVE, V-2, TO MAINTAIN SPACE TEMPERATURE. UPON A FURTHER FALL IN SPACE TEMPERATURE, THE DDC SHALL MODULATE V-1 BEYOND THAT REQUIRED FOR A 70° F LEAVING AIR TEMPERATURE AS NECESSARY TO SATISFY SPACE TEMPERATURE SETPOINT. THE DDC SHALL DISABLE BASEBOARD HEAT AT OUTSIDE AIR TEMPERATURES ABOVE 50°F (ADJUSTABLE). DURING UNOCCUPIED OPERATION, THE DDC SHALL MAINTAIN A REDUCED NIGHT SETTING THROUGH BASEBOARD HEAT



**EXISTING AHU - 1**

- \* REFER TO PLANS FOR MINIMUM QUANTITIES.





**AHU-4**

**SINGLE ZONE VAV AIR HANDLER:**

- MORNING COOL-DOWN:** AT A PREDETERMINED OPTIMAL TIME CALCULATED BY THE DDC, THE DDC SHALL ENERGIZE THE UNIT SUPPLY FAN. THE OUTSIDE AIR DAMPER D-1 SHALL REMAIN CLOSED, RETURN AIR DAMPER D-2 SHALL REMAIN OPEN, AND ASSOCIATED BUILDING EXHAUST FANS SHALL REMAIN OFF THRU CR-1.
- OCCUPIED CONTROL:** DURING OCCUPANCY UPON A CALL FOR COOLING, THE UNIT SHALL BE ENERGIZED.
- SUPPLY FAN CONTROL:** WHEN UNIT SUPPLY FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED OF THE SUPPLY FAN THROUGH ITS VFD AND CONTROL TO A SETTING THAT CORRESPONDS WITH A SUPPLY AIRFLOW OF 33% (ADJUSTABLE) OF MAXIMUM FOR COOLING. P-1 LOCATED AT FAN DISCHARGE SHALL PROVIDE HIGH LIMIT STATIC PRESSURE OVERRIDE.
- COOLING OPERATION IS CONSTANT TEMPERATURE, VARIABLE VOLUME.** THE DDC SHALL CONTROL TO A CONSTANT LEAVING AIR TEMPERATURE DURING COOLING MODE AND VARY THE FAN SPEED. ON A RISE IN DISCHARGE AIR TEMPERATURE ABOVE 53°F (ADJUSTABLE) AS SENSED BY TE-4, THE DDC SHALL MODULATE CHILLED WATER VALVE V-1 OPEN TO THE COIL. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A RISE IN SPACE TEMPERATURE, AS SENSED BY TE-1, THE DDC SHALL SLOWLY RAMP UP THE SUPPLY FAN SPEED IN 5 Hz INCREMENTS (ADJUSTABLE), WAITING 10 MINUTES (ADJUSTABLE) AT EACH INCREMENT FOR SUPPLY AIR TEMPERATURE TO RESPOND OR CONTINUE RISING. AT EACH INCREMENT THE DDC SHALL TRIM DAMPERS AND CONTROL VALVES TO MAINTAIN CONSTANT LEAVING AIR TEMPERATURE. ON A FALL IN SPACE TEMPERATURE THE REVERSE SHALL OCCUR AND THE FAN SHALL BE REDUCED TO MINIMUM SPEED. ON A FURTHER FALL IN SPACE TEMPERATURE AND HUMIDITY LEVELS BELOW 80% (ADJUSTABLE) THE DDC SHALL MODULATE CHILLED WATER VALVE, V-2, CLOSED TO ALLOW DISCHARGE AIR TEMPERATURE TO RISE TO SATISFY SPACE AIR TEMPERATURE SETPOINT, THE DDC SHALL RESET THE DISCHARGE AIR TEMPERATURE HIGHER BY 1°F AT 15 MINUTE INCREMENTS TO A MAXIMUM OF 65°F (ADJUSTABLE). AT ANY TIME THE OUTSIDE AIR ENTHALPY, AS SENSED BY THE DDC, EXCEEDS THE RETURN AIR ENTHALPY, THE DDC SHALL CLOSE DAMPER D-1 TO ITS CLOSED POSITION, AND OPEN D-2.
- RETURN FAN AND RELIEF DAMPER CONTROL:** WHEN UNIT RETURN FAN IS STARTED, THE DDC SHALL SLOWLY RAMP UP THE SPEED TO THE RETURN FAN THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY STATIC PRESSURE TRANSMITTER P-3 LOCATED IN THE RELIEF FLENUM. THE DDC SHALL MODULATE DAMPER D-3 TO MAINTAIN A SLIGHTLY NEGATIVE PRESSURE IN THE SPACE AS SENSED BY P-2.
- ECONOMIZER OPERATION:** WHEN OUTSIDE AIR ENTHALPY IS LOWER THAN RETURN AIR ENTHALPY, ECONOMIZER OPERATION SHALL PREVAIL. OUTSIDE AIR DAMPER D-1 AND RETURN AIR DAMPER D-2 SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. IF FULL ECONOMIZER IS INSUFFICIENT TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT, THE CHILLED WATER VALVE SHALL BE MODULATED OPEN TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT.
- DUCT SMOKE DETECTORS:** WHEN PRODUCTS OF COMBUSTION ARE SENSED BY SD-1, SD-2, OR ADDITIONAL DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.
- SYSTEM MONITORING:** IN ADDITION TO ALL POINTS LISTED ABOVE, THE DDC SHALL MONITOR ALL POINTS AS INDICATED ON THE CONTROLS SCHEMATICS.

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Proposal Request 01	DESCRIPTION
5	3/1/2020
MARK	DATE
REVISIONS	BY

DATE	PROJECT	DESIGNED	DLR/JDC	DRAWN	DLR/JDC	CHECKED	DLR
12-09-2019	15231-04						

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PROJECT **SALEM HIGH SCHOOL ADDITIONS AND RENOVATIONS**  
**SALEM CITY SCHOOLS**  
400 SPARTAN DRIVE  
SALEM, VA 24153

DRAWING **MECHANICAL CONTROLS**

SHEET **M-503**

