GENERAL SHEET NOTES:

1. PROVIDE ACCESS DOORS AT ALL DUCT MOUNTED EQUIPMENT.
2. DUCT PRESSURE CLASSIFICATION SHALL BE 2 IN. W.G. (500 PA). ALL DUCTS SHALL BE SEALED TO SEAL CLASS A REQUIREMENTS.
3. ARRANGE DUCTWORK LOCATED IN ATTIC SPACE SO ACCESS PANEL IS CLEAR FOR FUTURE MAINTENANCE.

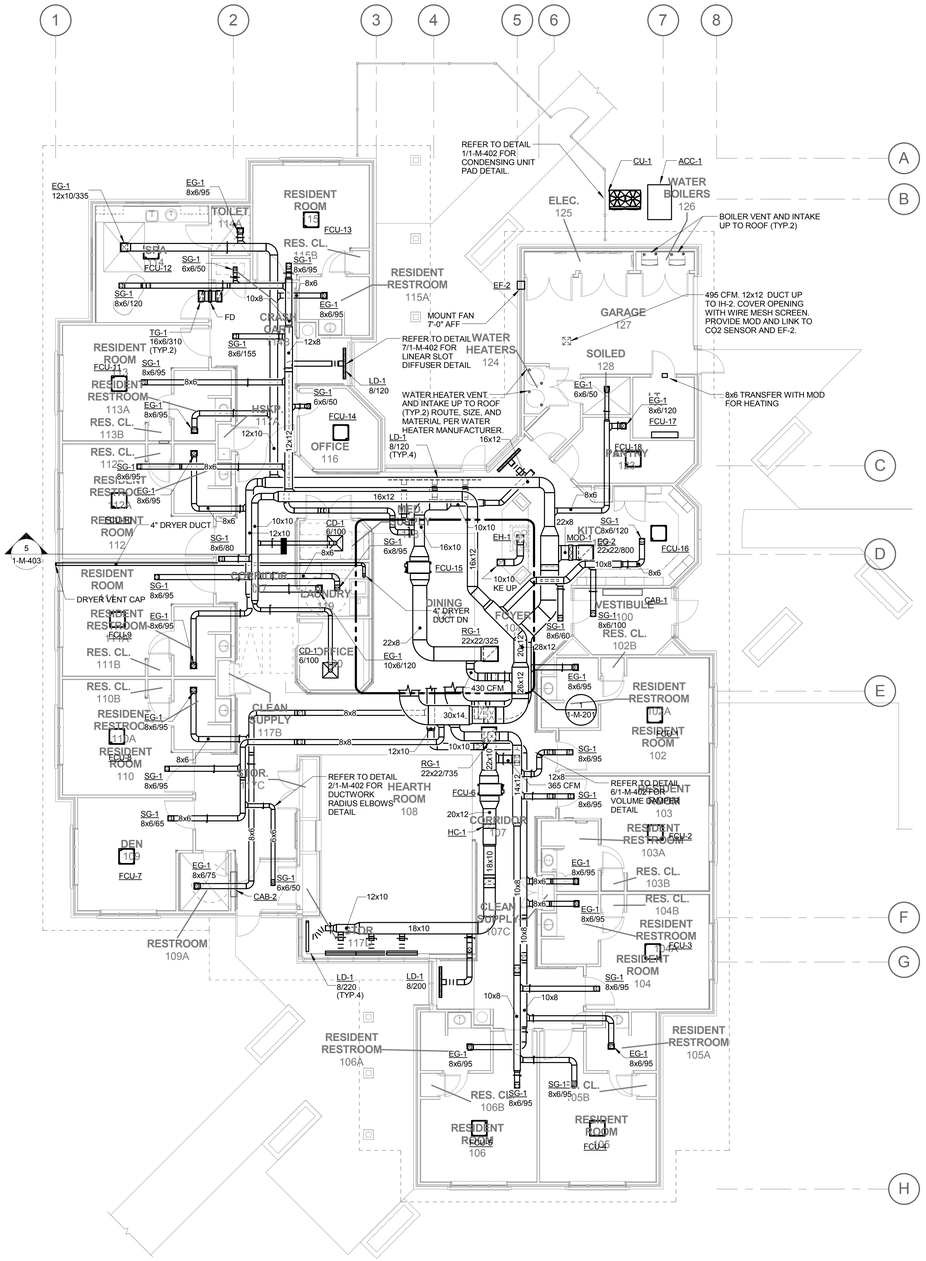
VENTILATION SYMBOL LIST

NOT ALL SYMBOLS MAY APPLY.

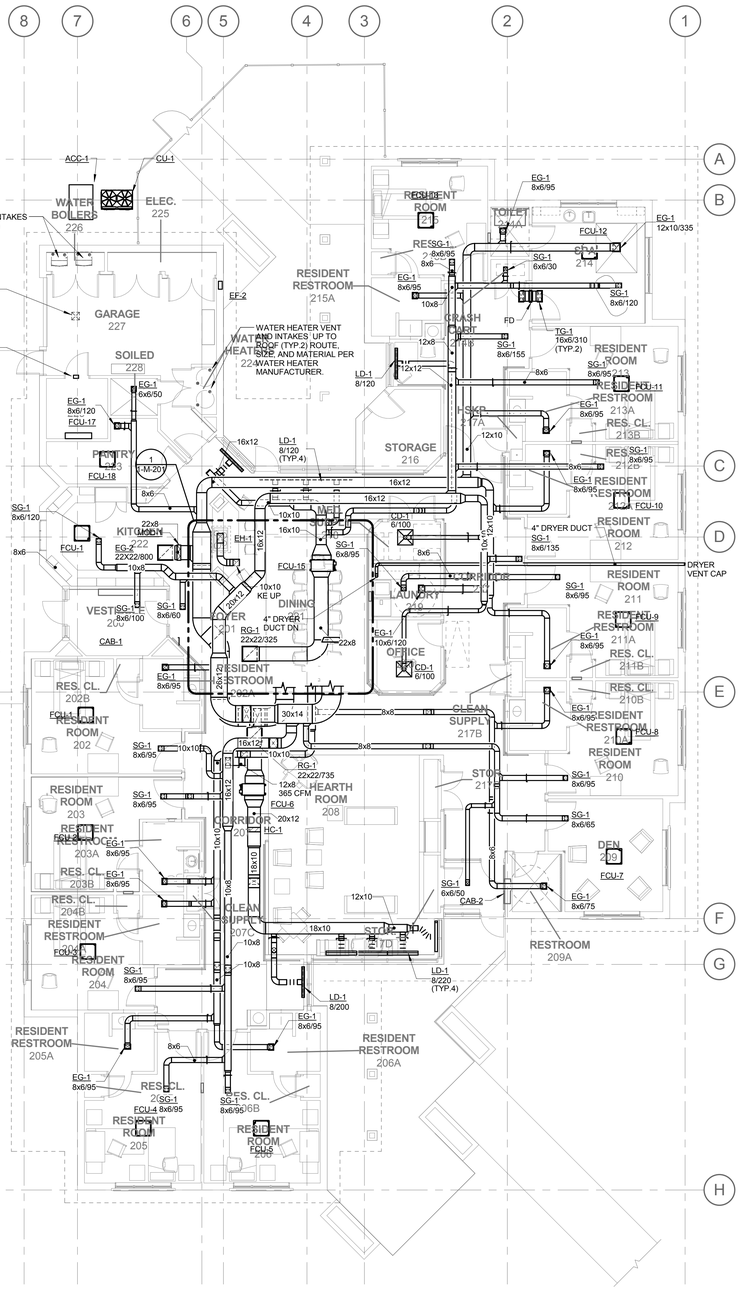
SYMBOL:	DESCRIPTION:
	DIRECTION OF AIR FLOW
	FLEXIBLE DUCT
	MANUAL VOLUME DAMPER
R	RISE IN DIRECTION OF AIR FLOW
D	DROP IN DIRECTION OF AIR FLOW
	DUCT CAP
	DUCT DOWN
	DUCT UP
	SUPPLY/OUTSIDE AIR DUCT SECTION
	EXHAUST/RELIEF AIR DUCT SECTION
CD-1 6/115	AIR TERMINAL PROPERTIES SYMBOL NECK SIZE/CFM

VENTILATION ABBREVIATION KEY

ABBR:	DESCRIPTION:
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
CFSD	CONTROL/FIRE/SMOKE DAMPER
EA	EXHAUST/RELIEF AIR
FD	FIRE DAMPER
FSD	FIRE/SMOKE DAMPER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
OA	OUTSIDE AIR
SA	SUPPLY AIR
SD	SMOKE DAMPER
T.C.C.	TEMPERATURE CONTROL CONTRACTOR
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE



1 **FIRST FLOOR MECHANICAL VENTILATION PLAN - BLDG. 411**
1/8" = 1'-0"



2 **FIRST FLOOR MECHANICAL VENTILATION PLAN - BLDG. 412**
1/8" = 1'-0"

Construction Documents

Revisions:	Date

CONSULTANTS:

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **FIRST FLOOR MECHANICAL VENTILATION PLANS - BLDG. 411 & 412**

Location: **TOMAH VAMC 500 E. VETERANS STREET TOMAH, WI. 54660**

Project Name: **VA Tomah CLC Homes**

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Project Number: **676-324**

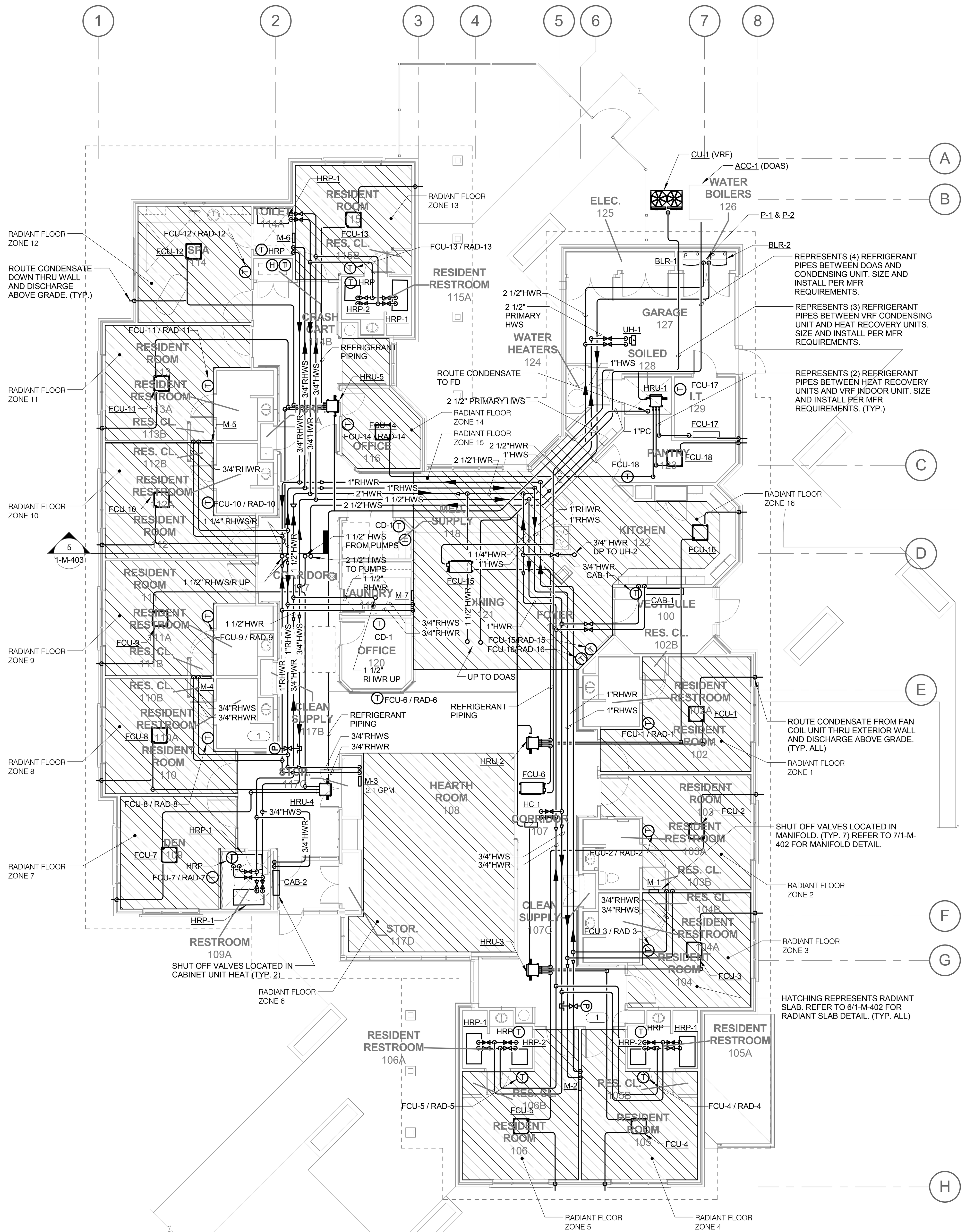
Date: 12/16/2016

Drawing Number: **1-M-001**

Dwg.

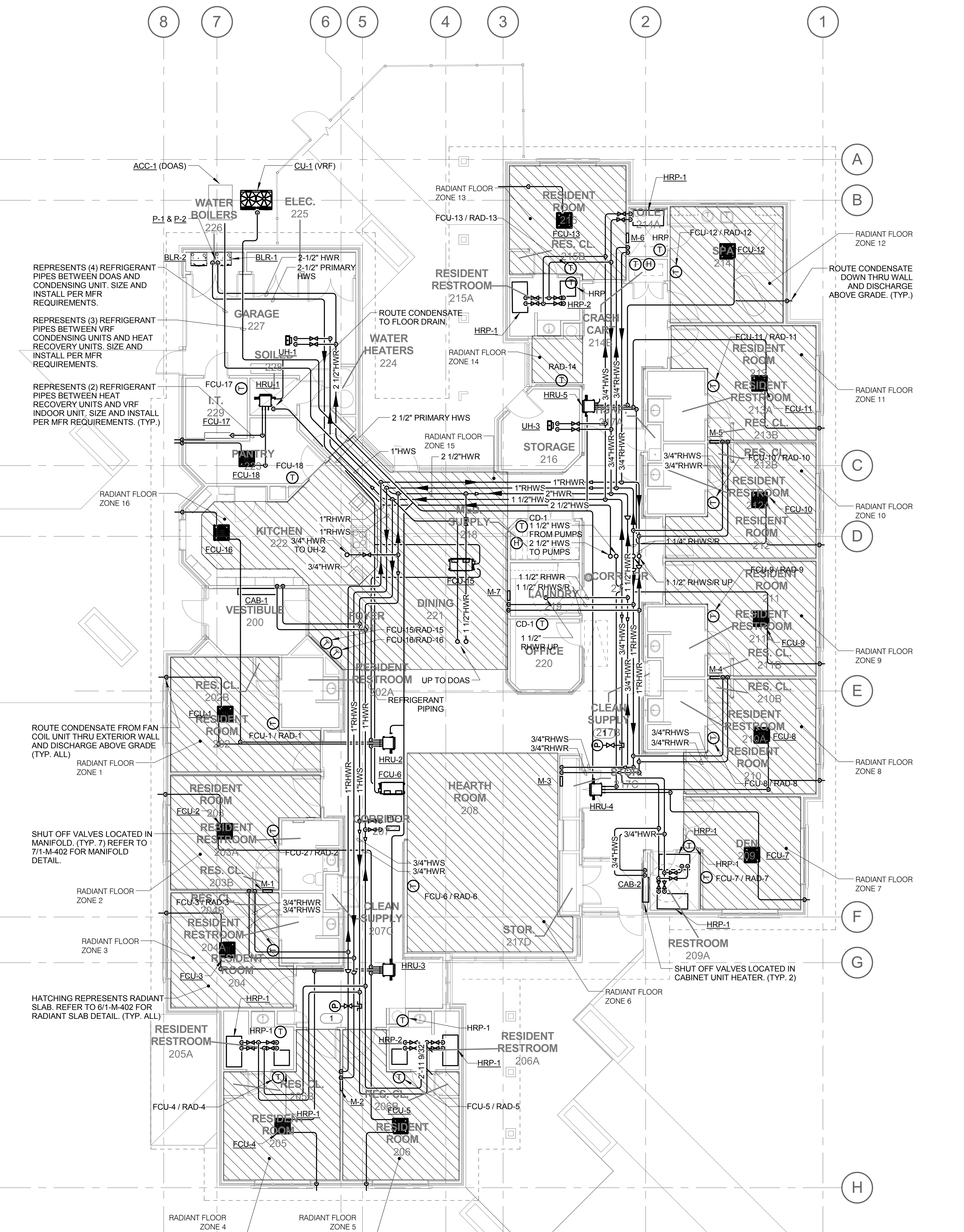
Office of Construction and Facilities Management

VA FORM 08-6231



FIRST FLOOR MECHANICAL PIPING PLAN - BLDG. 411

1/8" = 1'-0"



FIRST FLOOR MECHANICAL PIPING PLAN BLDG. 412

1/8" = 1'-0"

GENERAL SHEET NOTES:

1. ALIGN TEMPERATURE SENSORS WITH LIGHT SWITCHES AND WHEN IN CLOSE PROXIMITY TO EACH OTHER.
2. ALL HWS/R BRANCHES TO EQUIPMENT ARE 3/4" DIAMETER UNLESS NOTED OTHERWISE.
3. ARRANGE HYDRONIC PIPING AND REFRIGERANT PIPING LOCATED IN ATTIC SPACE SO ACCESS PANEL IS CLEAR FOR FUTURE MAINTENANCE.
4. INSTALL VRF SYSTEM PER EQUIPMENT MANUFACTURER SPECIFICATIONS. REFER TO 23 81 45 FOR FURTHER INFORMATION.
5. VRF SYSTEM PIPING SHALL BE SIZED, ROUTED, AND CONNECTED PER EQUIPMENT MANUFACTURER SPECIFICATIONS.
6. VRF SYSTEM PIPING LAYOUT HAS BEEN COORDINATION WITH BASIS OF DESIGN SYSTEM MANUFACTURER. IF ALTERNATE ACCEPTABLE MANUFACTURER IS SELECTED, MC SHALL COORDINATE PIPE ROUTING, PIPE SIZING, PIPE LENGTHS, EQUIPMENT LOCATIONS, AND ALL NECESSARY ACCESSORIES WITH EQUIPMENT MANUFACTURER.

KEY NOTES:

1. PROVIDE DIFFERENTIAL PRESSURE SENSOR AND BYPASS FOR BOTH HOT WATER HEATING LOOP AND RADIANT HOT WATER HEATING LOOP

PIPINGSYMBOL LIST

NOT ALL SYMBOLS MAY APPLY.

SYMBOL:	DESCRIPTION:
H	HUMIDISTAT SENSOR
T	THERMOSTAT/SENSOR
D	DRAIN LINE
G	NATURAL GAS
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
PC	PUMPED CONDENSATE
	PIPE CAP
	PIPE DOWN
	PIPE UP OR UP/DOWN
	DIRECTION OF FLOW IN PIPE
	SHUTOFF VALVE NORMALLY OPEN
	SHUTOFF VALVE NORMALLY CLOSED
	MIXING VALVE
	CONTROL VALVE (THREE-WAY)
	CONTROL VALVE (TWO-WAY)
	SOLENOID VALVE
	PRESSURE REDUCING VALVE (LIQUID/GAS)
	"WYE" - STRAINER
	FLEXIBLE CONNECTION
	REDUCER - REFERENCE SPECIFICATION FOR CONCENTRIC/ECCENTRIC AND FOT/FOB
M	METER
T	TEMPERATURE SENSOR WITH WELL

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON 0062-044086 REGISTERED PROFESSIONAL ENGINEER STATE OF ILLINOIS
EXP. 11/30/2017

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **FIRST FLOOR MECHANICAL PIPING PLANS - BLDG. 411 & 412**

Location: **TOMAH VAMC, 500 E. VETERANS STREET, TOMAH, WI. 54660**

Project Name: **VA Tomah CLC Homes**

Building Number	Checked	Drawn
411 & 412	RHC	MAG

Project Number: **676-324**

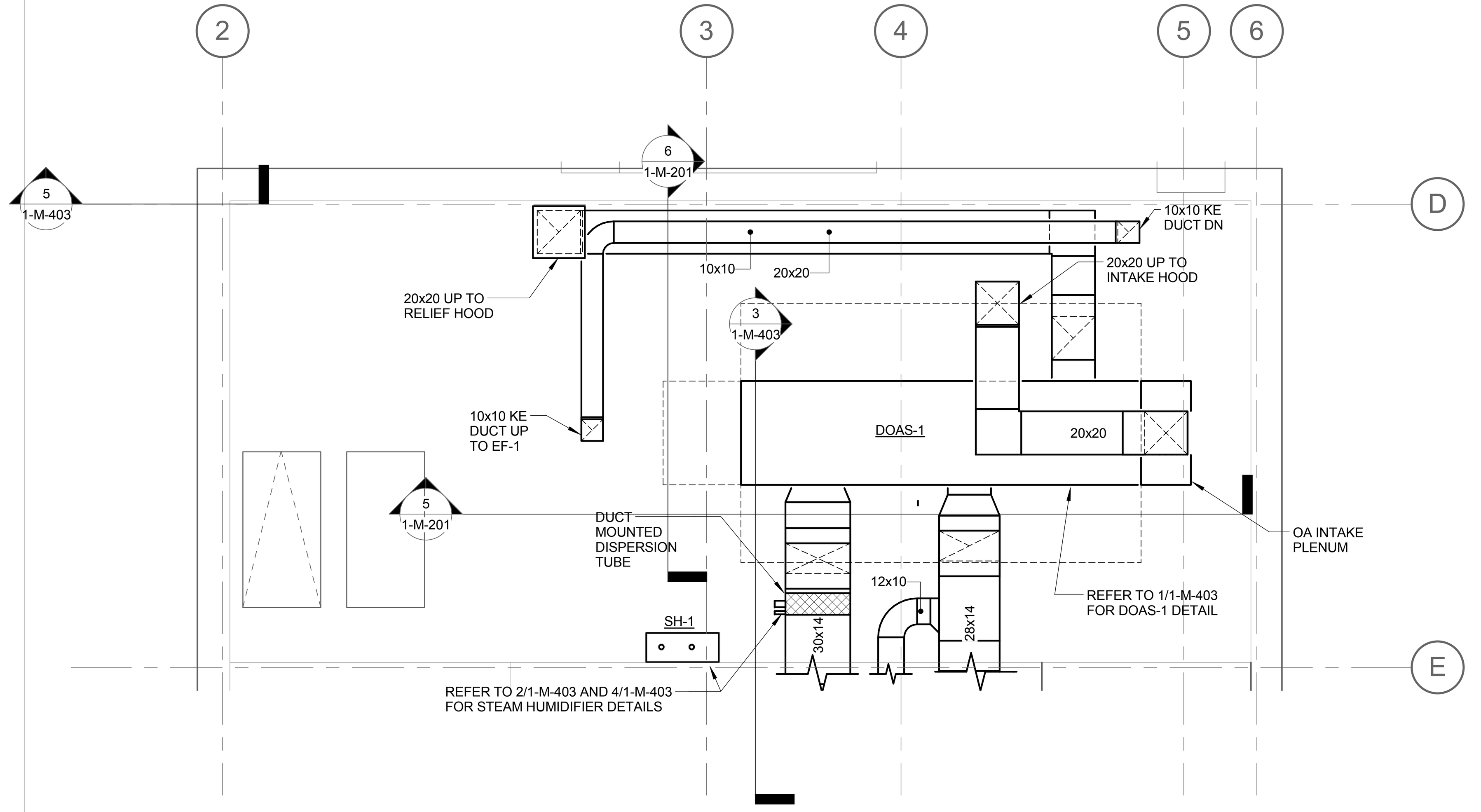
Date: 12/16/2016

Drawing Number: **1-M-101**

Dwg.

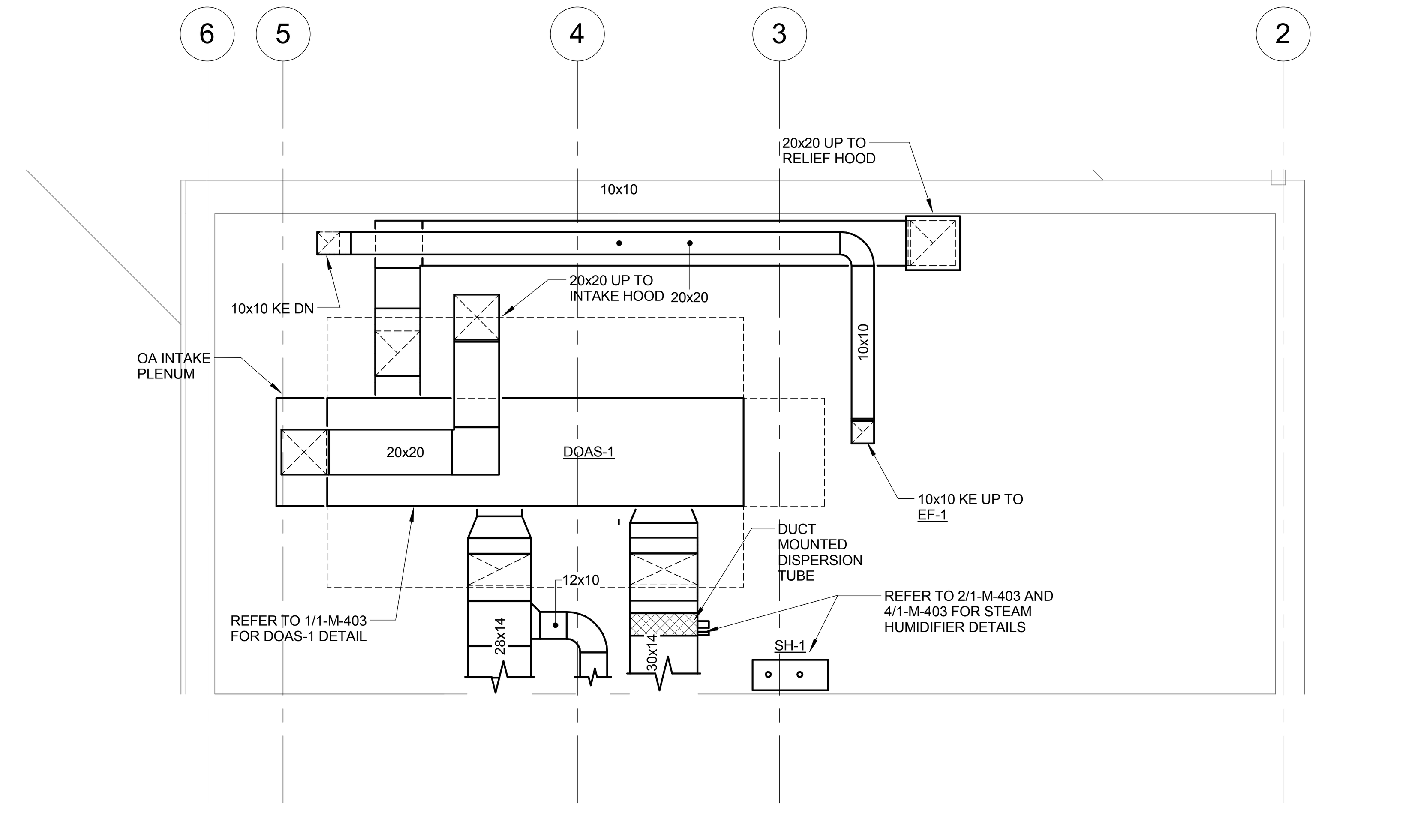
Office of Construction and Facilities Management

VA FORM 08-6231



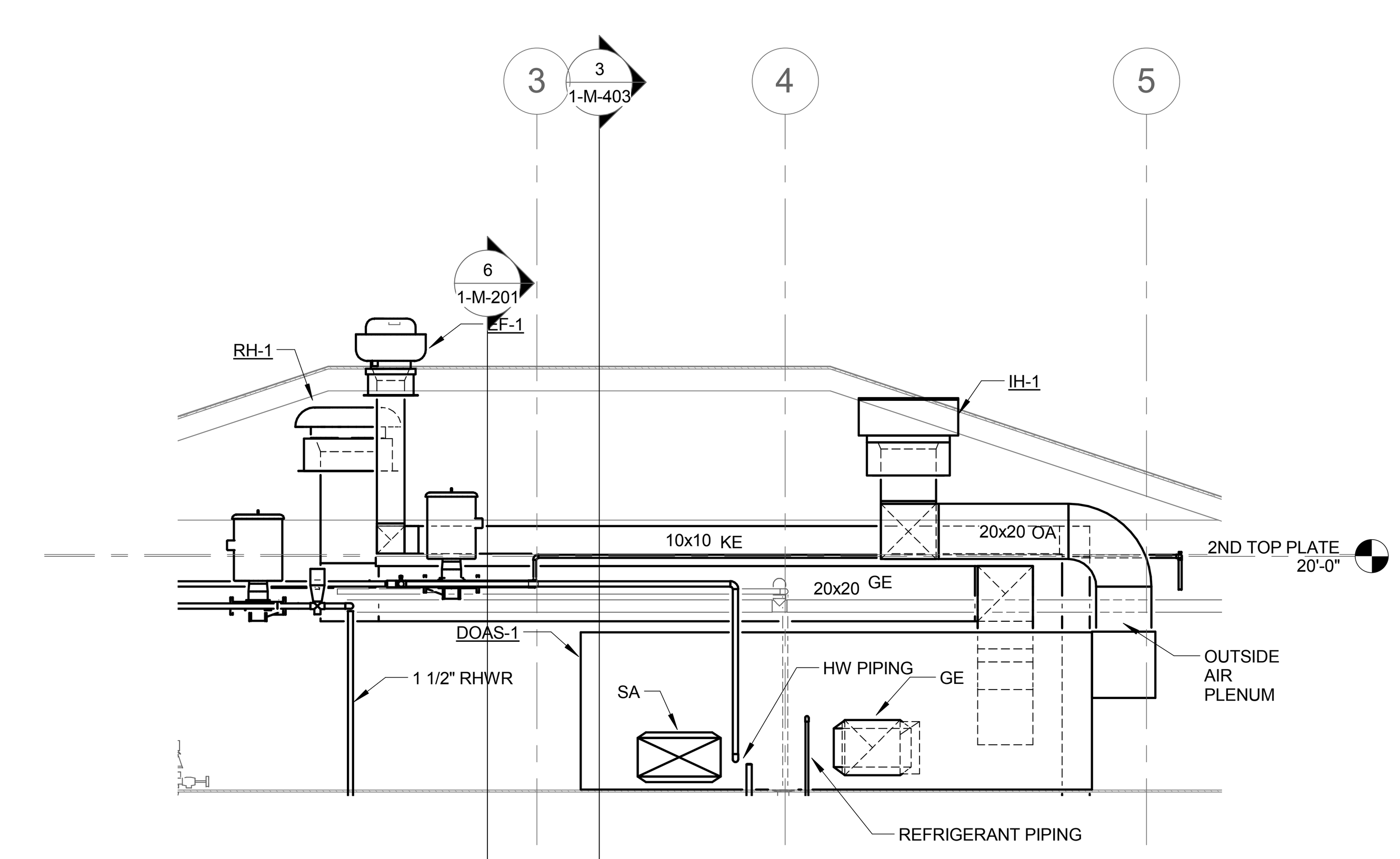
1 MECHANICAL VENTILATION ATTIC PLAN - BLDG. 411

1/4" = 1'-0"



3 MECHANICAL VENTILATION ATTIC PLAN - BLDG. 412

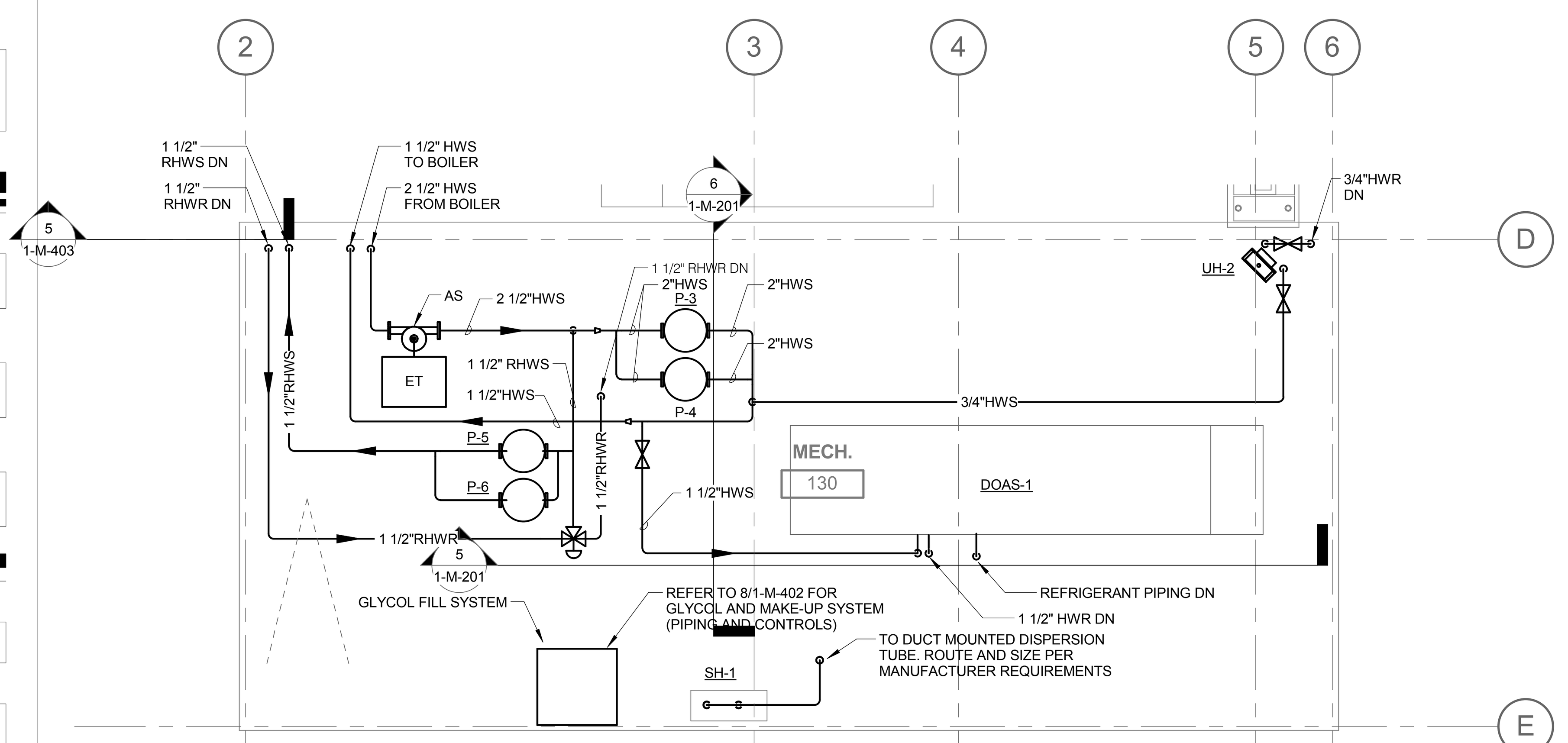
1/4" = 1'-0"



5 MECHANICAL ROOM SECTION - EAST TO WEST

1/4" = 1'-0"

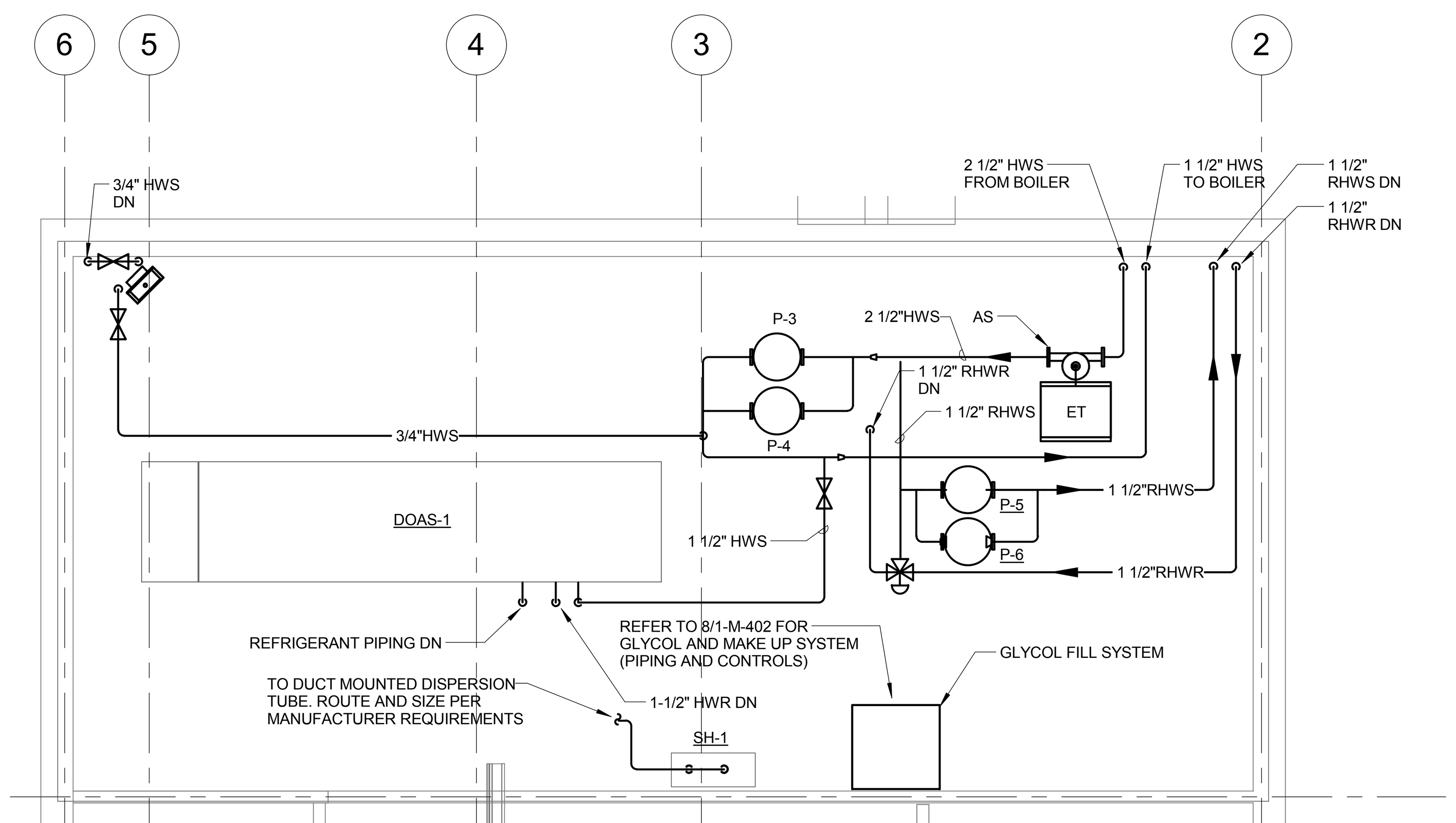
NOTES: ONLY BUILDING 411 SHOWN. BUILDING 412 IS A MIRROR IMAGE OF BUILDING 411.



2 MECHANICAL PIPING ATTIC PLAN - BLDG. 411

1/4" = 1'-0"

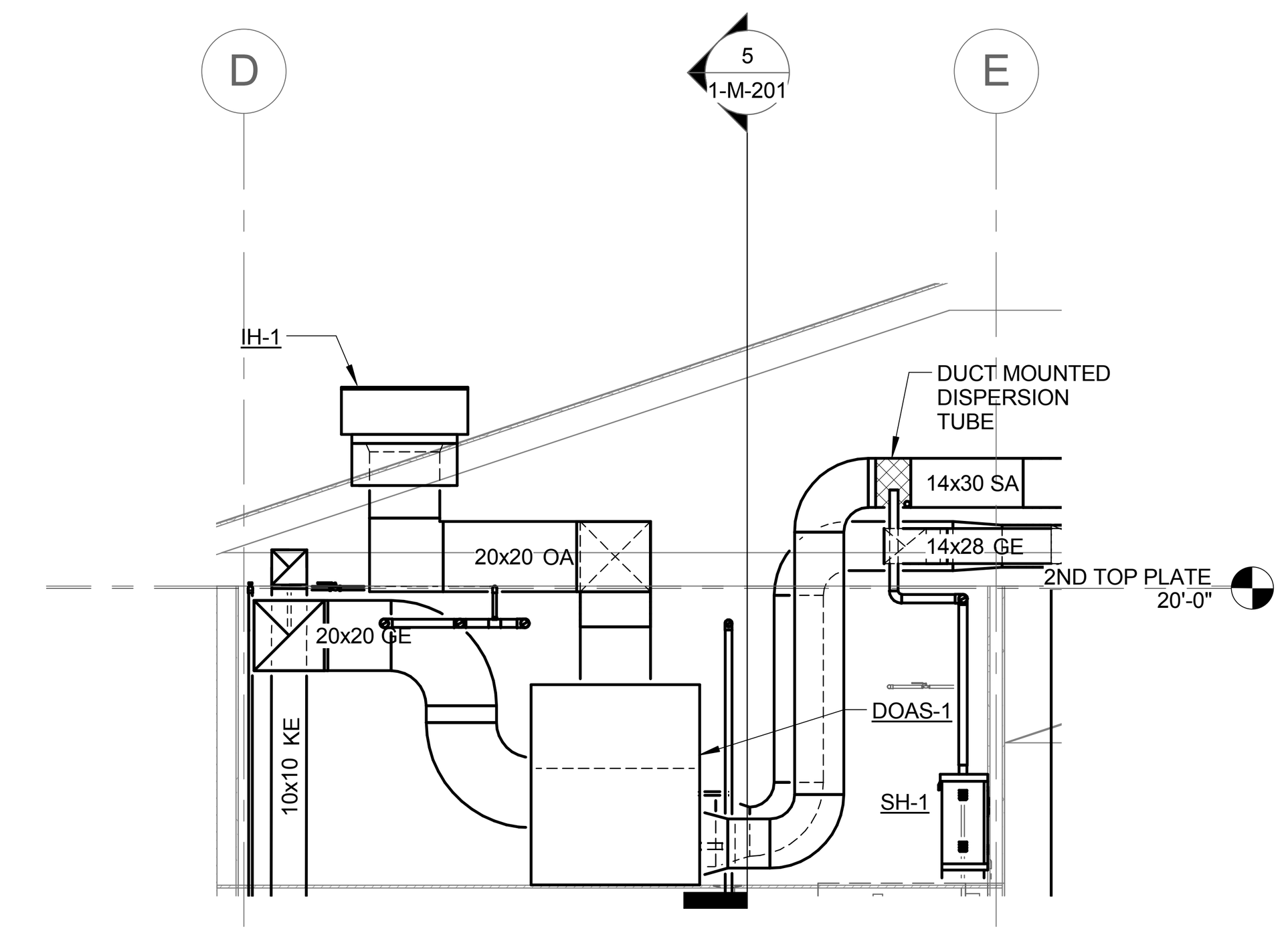
NOTES: REFER TO HOT WATER FLOW DIAGRAM ON 1-M-503.



4 MECHANICAL PIPING ATTIC PLAN - BLDG. 412

1/4" = 1'-0"

NOTES: REFER TO HOT WATER FLOW DIAGRAM ON 1-M-503.



6 MECHANICAL ROOM SECTION - NORTH TO SOUTH

1/4" = 1'-0"

NOTES: ONLY BUILDING 411 SHOWN. BUILDING 412 IS A MIRROR IMAGE OF BUILDING 411.

Construction Documents

Revisions: | Date

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: MECHANICAL ATTIC PLANS - BLDG. 411 & 412

Project Name: VA Tomah CLC Homes

Project Number: 676-324

Date: 12/16/2016

Location: TOMAH VAMC 500 E. VETERANS STREET TOMAH, WI. 54660

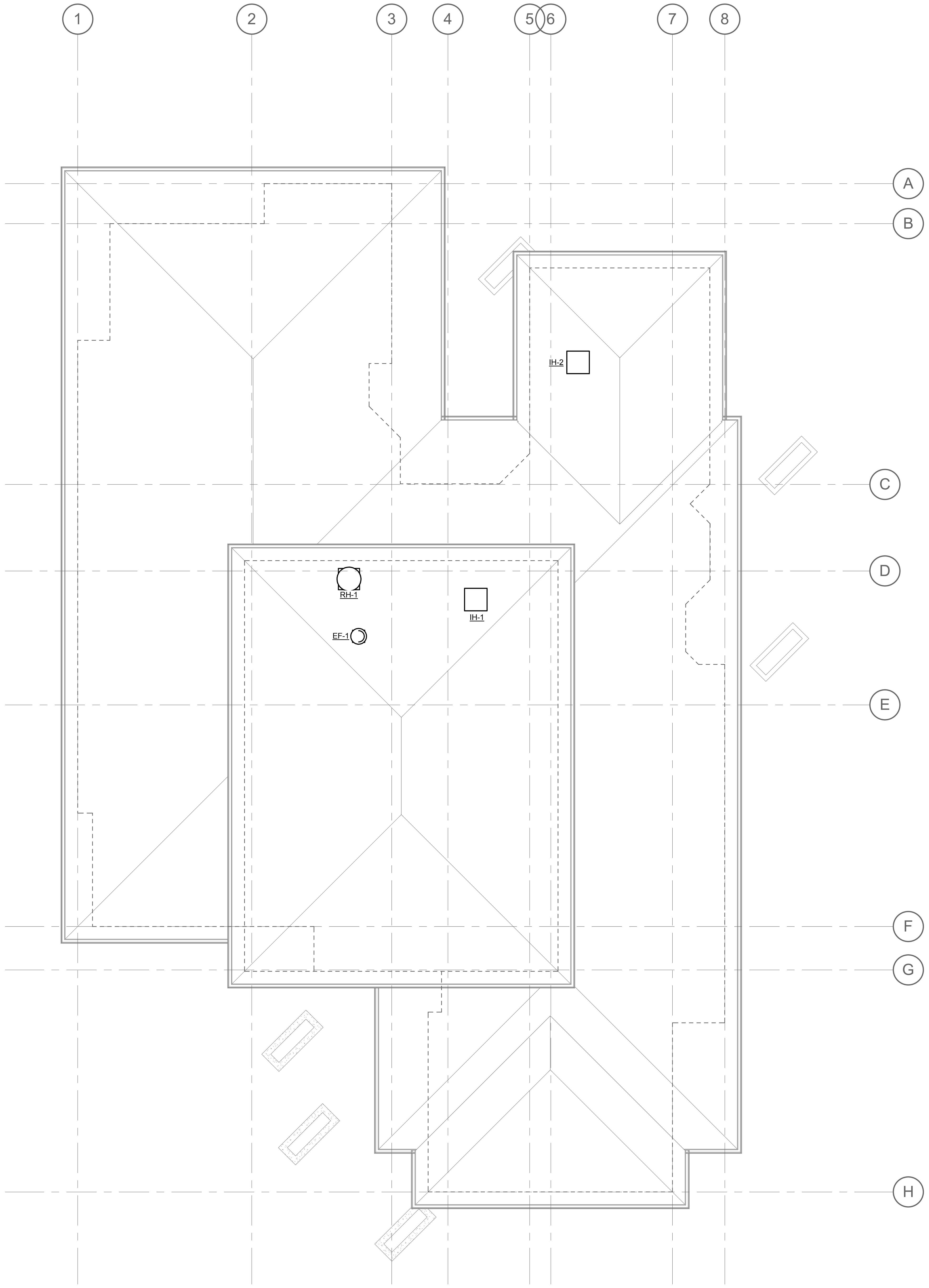
Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Drawing Number: 1-M-201

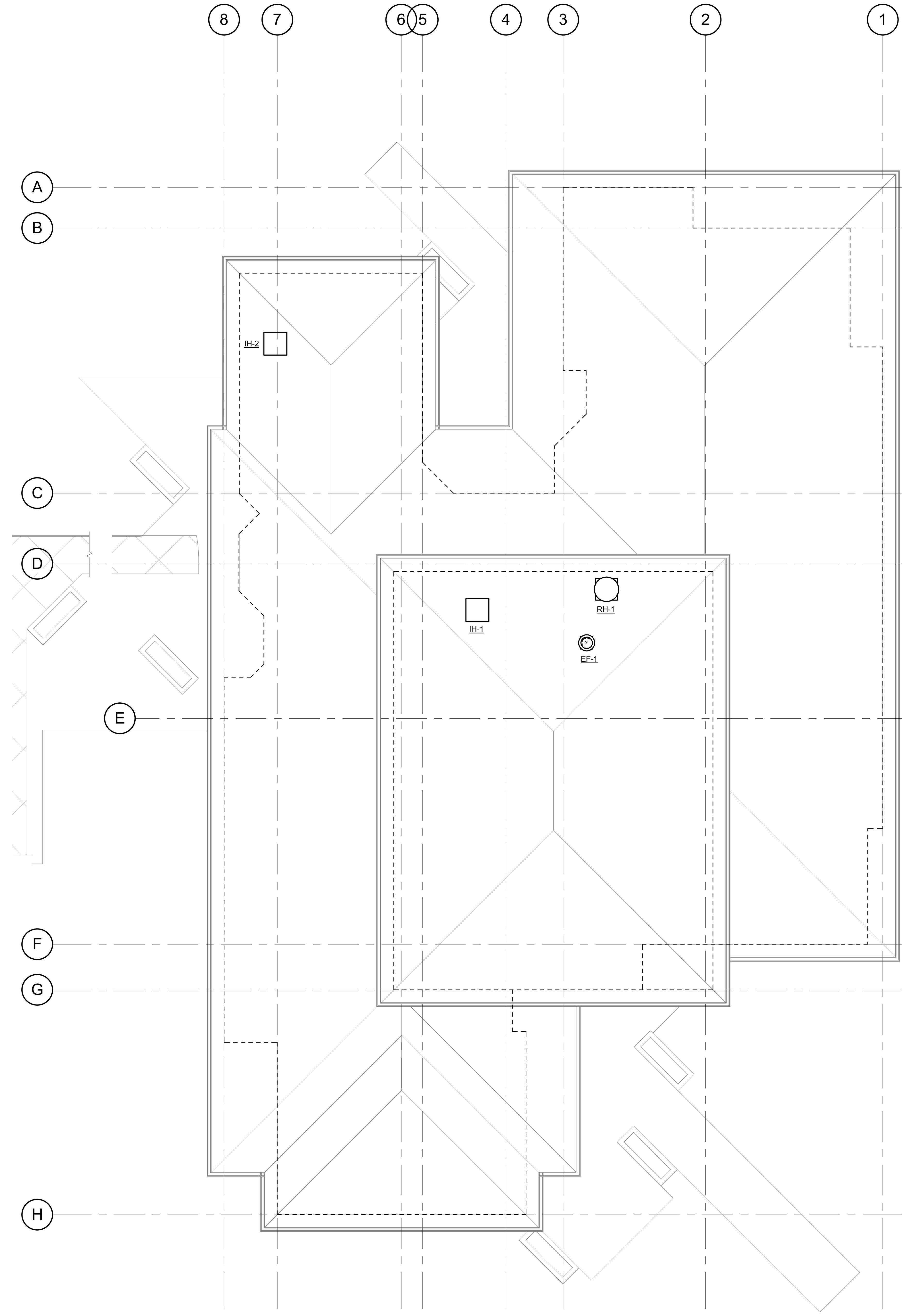
Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231



NORTH 1 **MECHANICAL ROOF PLAN - BLDG. 411**
1/8" = 1'-0"



NORTH 2 **MECHANICAL ROOF PLAN - BLDG. 412**
1/8" = 1'-0"

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Revisions: | Date

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title
MECHANICAL ROOF PLANS - BLDG. 411 & 412

Location
TOMAH VAMC
500 E. VETERANS STREET
TOMAH, WI. 54660

Project Name
VA Tomah CLC Homes

Building Number	Checked	Drawn
411 & 412	RHC	MAG

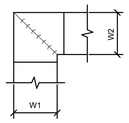
Project Number
676-324

Date
12/16/2016

Drawing Number
1-M-301
Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231

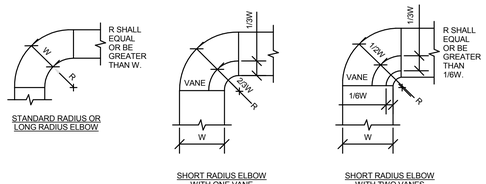


1 DUCTWORK SQUARE VANE ELBOWS

NO SCALE

NOTE:

1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SAMCNA.
2. WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE REGARDLESS OF W DIMENSION.
3. ALL SINGLE THICKNESS VANES SHALL HAVE A 2" [50mm] RADIUS, 1 1/2" [40mm] MAXIMUM SPACE BETWEEN VANES AND A 3/4" [20mm] TRAILING EDGE.
4. WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" [500mm] VANES SHALL BE DOUBLE VANE TYPE.
5. NOT PERMITTED FOR KE.

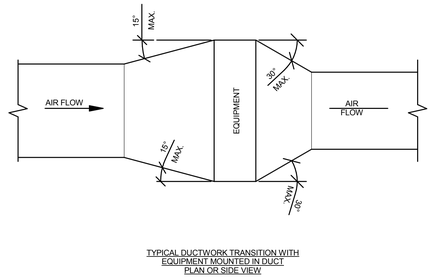


2 DUCTWORK RADIUS ELBOWS

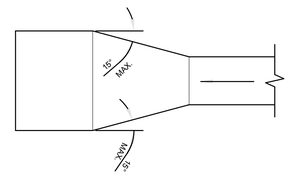
NO SCALE

NOTE:

1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.
3. ONLY STANDARD RADIUS ALLOWED FOR KE.



TYPICAL DUCTWORK TRANSITION WITH EQUIPMENT MOUNTED IN DUCT PLAN OR SIDE VIEW



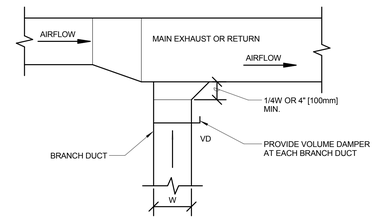
TYPICAL DUCTWORK TRANSITION PLAN OR SIDE VIEW

3 DUCTWORK TRANSITIONS (WITH EQUIPMENT MOUNTED IN DUCT)

NO SCALE

NOTE:

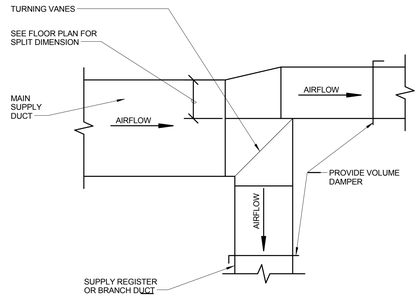
UNLESS OTHERWISE INDICATED ON PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.



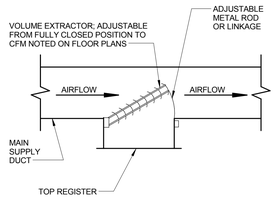
PLAN VIEW

4 EXHAUST OR RETURN BRANCH DUCTWORK

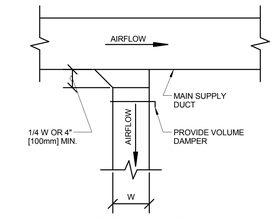
NO SCALE



AIR SPLIT DUCT TAKE-OFF PLAN VIEW



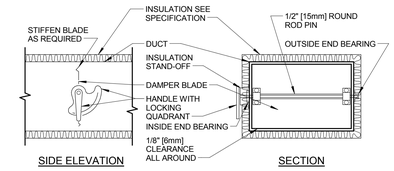
SUPPLY REGISTER TAKE-OFF PLAN VIEW



BRANCH DUCT TAKE-OFF PLAN VIEW

5 SUPPLY DUCTWORK TAKE-OFFS

NO SCALE

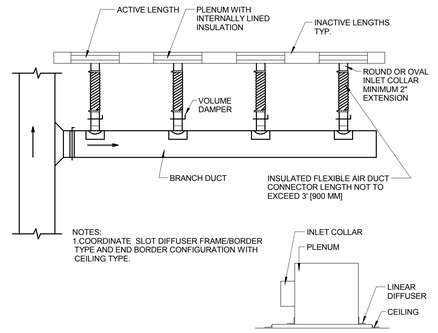


NOTE:

1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

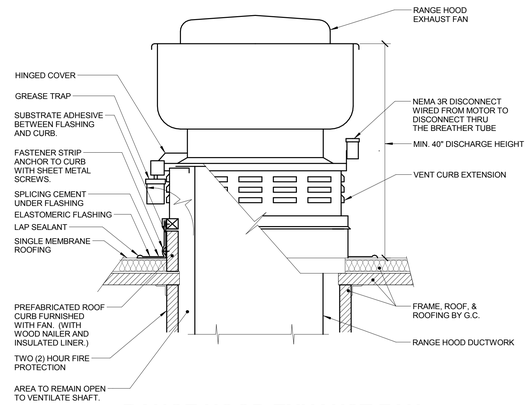
6 VOLUME DAMPER DETAIL

NO SCALE



7 LINEAR SLOT DIFFUSER

NO SCALE



8 RANGE HOOD EXHAUST FAN

NO SCALE

NOTES:

1. ALL ROOF FLASHING SHALL BE PER ROOFING MANUFACTURERS RECOMMENDATIONS.

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON 062-044083 REGISTERED PROFESSIONAL ENGINEER STATE OF ILLINOIS
EXP. 11/30/2017

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bcox@coxdesignassociates.com

Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL DETAILS**

Location: **TOMAH VAMC**
500 E. VETERANS STREET
TOMAH, WI. 54660

Project Name: **VA Tomah CLC Homes**

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Project Number: **676-324**

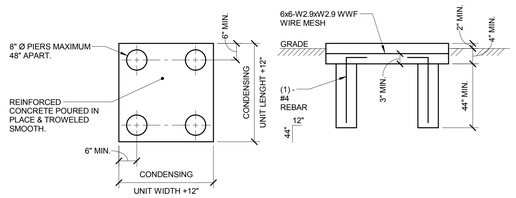
Date: 12/16/2016

Drawing Number: **1-M-401**

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231

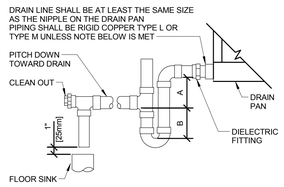


1 CONDENSING UNIT PAD DETAIL

NO SCALE

NOTE:

1. COORDINATE WITH VA, STRUCTURAL, CIVIL, AND ARCHITECTURAL.



UNIT TYPE	A	B
DRAW THRU	2" 50mm] PLUS X	X
BLOW THRU	1" [25mm] MINIMUM	2X

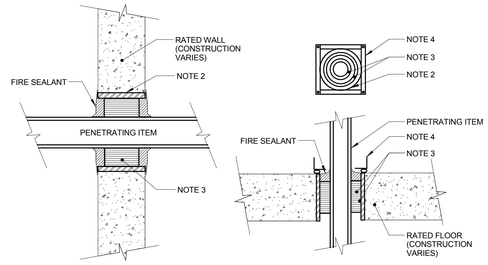
WHERE X = STATIC PRESSURE IN PAN

5 AIR HANDLING UNIT DRAIN TRAP DETAIL

NO SCALE

NOTE:

1. CPVC PIPE MAY BE USED ONLY IF APPROVED BY LOCAL VA AND IS INDOORS AND DOES NOT PASS THROUGH RATED BARRIERS.
2. DIELECTRIC FITTING TO BE USED WHEN TWO DISSIMILAR METALS ARE TO BE CONNECTED.

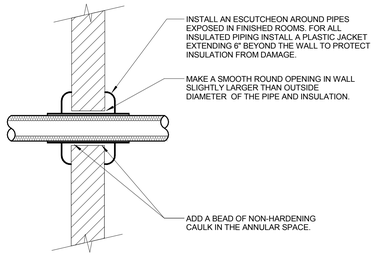


2 RATED FIRE BARRIER PENETRATION

NO SCALE

NOTES:

1. THIS GENERAL DETAIL APPLIES TO ALL ITEMS PENETRATING FIRE RATED WALLS OR FLOORS. THEINTENT IS TO MAINTAIN THE FIRE RATING AND TO ALLOW LONGITUDINAL MOVEMENT. REFER TO SPECIFICATION SECTION 07840 (07 84 00) (15080) (SECTION 21 05 03 - FIRE PROTECTION, SECTION 22 05 03 - PLUMBING , SECTION 23 05 03 - HVAC) FOR SELECTION OF THROUGH PENETRATION FIRE STOPPING.
2. SCHEDULE 5 PIPE SLEEVE EMBEDDED IN WALL OR FLOOR, OR SMOOTH CORE DRILL. EACH CONTRACTOR FURNISHES SLEEVE TO G.C., COORDINATES SLEEVE LOCATIONS AND DEBURS SLEEVE. G.C. BUILDS SLEEVE INTO WALL OR FLOOR ALLOWING NO GAP AROUND SLEEVE. IF SLEEVE IS NOT PROVIDED WHEN WALL OR FLOOR IS BUILT, CONTRACTOR SHALL INSTALL SLEEVE. SLEEVE SIZE SHALL ALLOW ANNULAR SPACE REQUIRED BY THE SELECTED FIRE STOP SYSTEM.
3. INSTALL BACKING MATERIAL, SUCH AS MINERAL WOOL SAFING, AS REQUIRED FOR FIRE STOP SYSTEM. INSTALL IN ACCORDANCE WITH FIRE STOP SYSTEM APPLICATION LISTING. SECURE TO WALL OR FLOOR TO ALLOW LONGITUDINAL MOVEMENT OF PENETRATING ITEM WITHOUT MOVEMENT OF FIRE BARRIER.
4. WATERTIGHT WELDED 1"x1" 20 GAUGE MINIMUM GALVANIZED SHEET METAL ANGLE FRAME, BY CONTRACTOR IN EQUIPMENT ROOMS FOR WATER STOP. PLACE A BEAD OF WATERPROOF SEALANT BETWEEN FLOOR AND BOTTOM OF ANGLE FRAME. SECURE TO FLOOR WITH MASONRY ANCHORS IN CORNERS AND ON 12" MAXIMUM CENTERS. MULTIPLE PENETRATING ITEMS MAY BE ENCLOSED IN ONE FRAME.

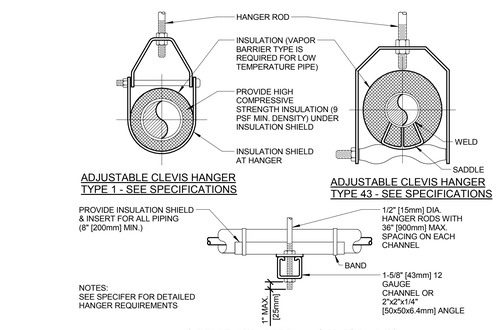


3 PIPE THROUGH NON-FIRE RATED WALL

NO SCALE

NOTES:

1. THIS DETAIL APPLIES TO ALL PIPES. THE INTENTION IS TO CONTINUE THE INSULATION AND VAPOR BARRIER THROUGH ALL PENETRATIONS. PERMIT THERMAL EXPANSION WITHOUT DAMAGING INSULATION, AND TO SEAL AIRTIGHT AROUND INSULATED AND UNINSULATED PIPES FOR NOISE TRANSMISSION CONTROL.
2. FLOOR OPENINGS ARE SIMILAR SEE SPECIFICATION SECTION 15140 (SECTION 22 05 29 - PLUMBING, SECTION 23 05 29 - HVAC) FOR DIFFERENCES BETWEEN FLOOR AND WALL PENETRATIONS.
3. SEE SPECIFICATION SECTIONS 15080 (SECTION 21 05 03 - FIRE PROTECTION, SECTION 22 05 03 - PLUMBING, SECTION 23 05 03 - HVAC) AND 15140 (SECTION 22 05 29 - PLUMBING, SECTION 23 05 29 - HVAC) FOR ADDITIONAL INFORMATION.

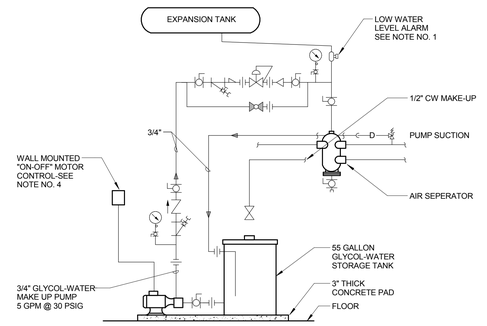


SIDE VIEW TRAPEZE HANGER FOR UP TO
1000 LB. [453KG] UNIFORM LOAD

MAXIMUM PIPE/TUBING SUPPORT SPACING																	
NOM. SIZE	IN. [mm]	THRU 3/4 THRU [20]	1 [25]	1 1/4 [32]	1 1/2 [40]	2 [50]	2 1/2 [65]	3 [75]	4 [100]	5 [125]	6 [150]	8 [200]	10 [250]	12 [300]	14 [350]	16 [400]	18 [450]	20 [500]	24 [600]
PIPE	FT. [mm]	7 [2100]	7 [2100]	7 [2100]	9 [2700]	10 [3000]	11 [3400]	12 [3700]	14 [4100]	16 [4900]	17 [5200]	19 [5800]	22 [6700]	23 [7000]	25 [7600]	27 [8200]	28 [8500]	30 [9100]	32 [9600]
TUBING	FT. [mm]	5 FT [1500]	6 [1800]	7 [2100]	8 [2400]	8 [2400]	9 [2700]	10 [3000]	12 [3700]	13 [4000]	14 [4100]	16 [4900]	-	-	-	-	-	-	-
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.																			

4 PIPE HANGERS

NO SCALE

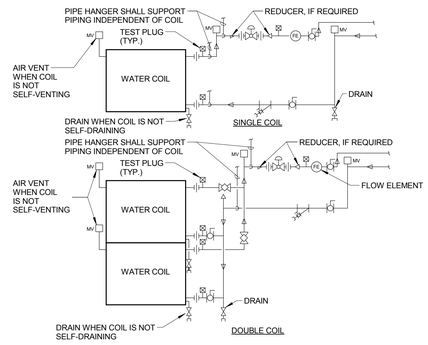


INDIRECT GLYCOL MAKE-UP SYSTEM (PIPING AND CONTOLS)

8 NO SCALE

NOTES:

1. PROVIDE LOW WATER LEVEL ALARM. PROVIDE A LOW WATER LEVEL AT ECC. RELIEF VALVE DRAIN SHALL RETURN TO TANK AS SHOWN ON THIS DETAIL.
2. MAKE-UP PIPING SYSTEM DOES NOT REQUIRE INSULATION.
3. OPERATE PUMP MANUALLY AS REQUIRED TO FILL.

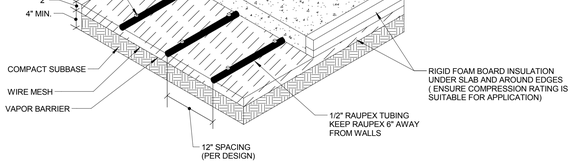


WATER COILS (DOAS AND FCUS) - PIPING CONNECTIONS

9 NO SCALE

NOTE:

1. WHEN COIL IS INCLUDED IN CASING MOUNTED ON VIBRATION ISOLATORS THE FIRST 2 HANGERS FOR EACH PIPE SHALL BE SPRING & NEOPRENE TYPE. TYPE "H" FOR 4" [100mm] PIPE & SMALLER. TYPE "H-P" FOR 5" [125mm] PIPE & LARGER.
2. PIPING SHALL BE INSTALLED IN SUCH MANNER THAT IT WILL NOT BLOCK THE SWING OR USE OF ACCESS DOORS OR PANELS; NEITHER SHALL IT BLOCK THE SERVICING OF FILTERS, VALES, OR EQUIPMENT.
3. THE FLOW ELEMENT MAY BE INSTALLED IN THE SUPPLY PIPING IF THE REQUIRED MINIMUM UPSTREAM AND DOWNSTREAM DIMENSIONS CANNOT BE OBTAINED IN THE RETURN PIPING.

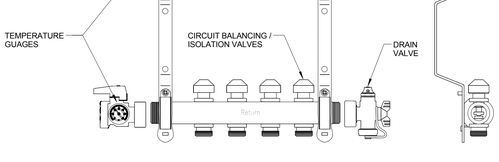


6 RADIANT SLAB DETAIL

NO SCALE

NOTES:

1. DETAIL SHOWN IS FOR BASIN OF DESIGN MANUFACTURER, REHAU. FINAL INSTALL SHALL BE PER RADIANT FLOOR MANUFACTURER REQUIREMENTS.

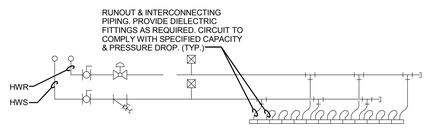


7 RADIANT SLAB PIPING MANIFOLD DETAIL

NO SCALE

NOTES:

1. DETAIL SHOWN IS FOR BASIS OF DESIGN, REHAU. FINAL INSTALL SHALL BE PER RAIANT MANUFACTURER REQUIREMENTS.
2. PROVIDE LOCKABLE ACCESS PANEL IN WALL IN FRONT OF MANIFOLD.



NOTE:

1. MINIMUM FLOW SHALL BE NO LESS THAN 0.5 GPM.

HYDRONIC RADIANT CEILING PANELS - PIPING CONNECTIONS

10 NO SCALE

Construction Documents

Revisions:	Date

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STATE OF ILLINOIS
EXP. 11/30/2017

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL DETAILS**

Project Name: **VA Tomah CLC Homes**

Location: **TOMAH VAMC**
500 E. VETERANS STREET
TOMAH, WI. 54660

Building Number	Checked	Drawn
411 & 412	RHC	MAG

Project Number: **676-324**

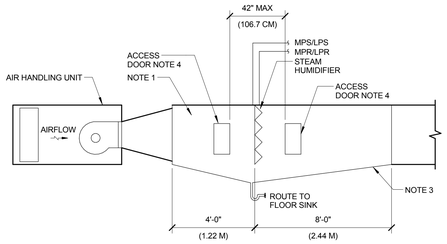
Date: 12/16/2016

Drawing Number: **1-M-402**

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231



2 DUCT MOUNTED HUMIDIFIER

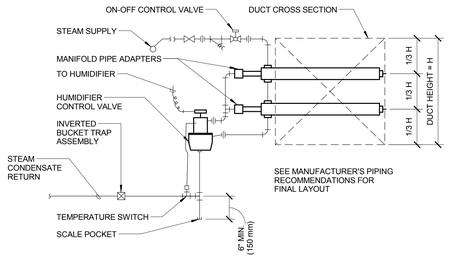
NO SCALE

NOTES:

1. TRANSITION WELDED STAINLESS STEEL 4'(1.22M) UPSTREAM OF HUMMIDIFIER AND 8' (2.44M) DOWNSTREAM OF HUMIDIFIER.
2. DETAIL ONLY APPLICABLE TO AHU'S WITHOUT AFTER FILTER DOWNSTREAM OF THE SUPPLY AIR FAN.
3. INTEGRAL STAINLESS STEEL DRAIN PAN SLOPE FROM ALL DIRECTIONS TO DRAIN CONNECTION. SLOPE .125" PER 1'-0" (0.3 CM PER 0.3M).
4. PROVIDE MIN. 18" (45 CM) WIDE ACCESS DOOR, DIRECTLY UPSTREAM AND DOWNSTREAM OF HUMIDIFIER.

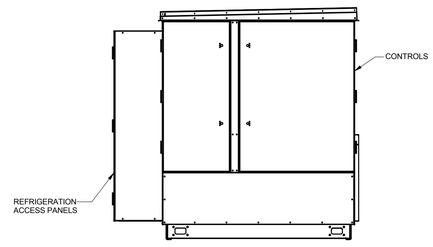
NOTE:

PROVIDE 70 LBS/HR ELECTRIC STEAM HUMIDIFIER

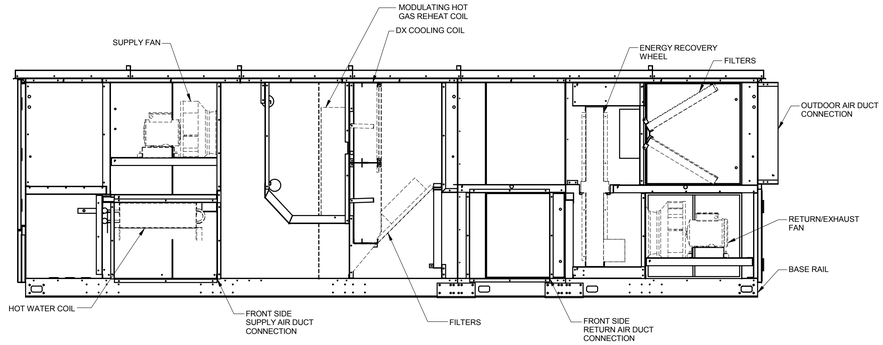


4 STEAM HUMIDIFIER - PIPING CONNECTIONS (MULTIPLE DISPERSION TUBES)

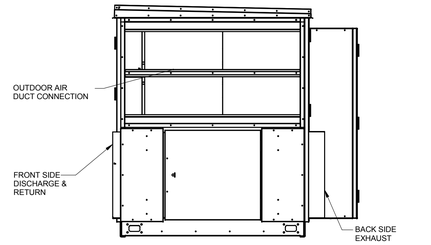
NO SCALE



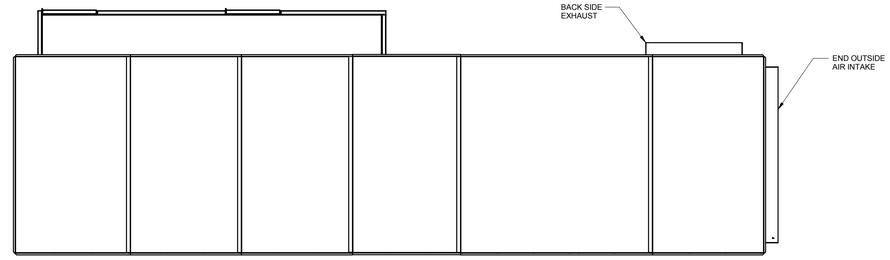
SIDE VIEW



ELEVATION



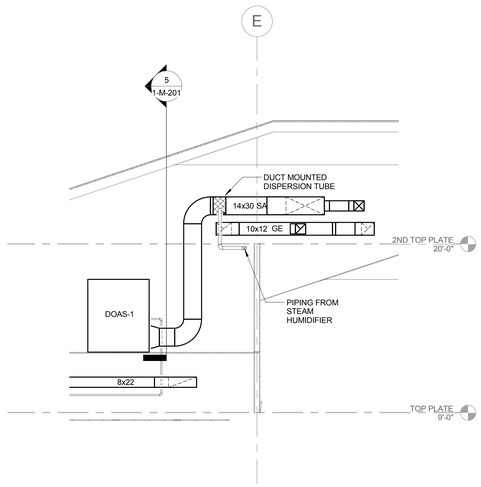
END VIEW



TOP

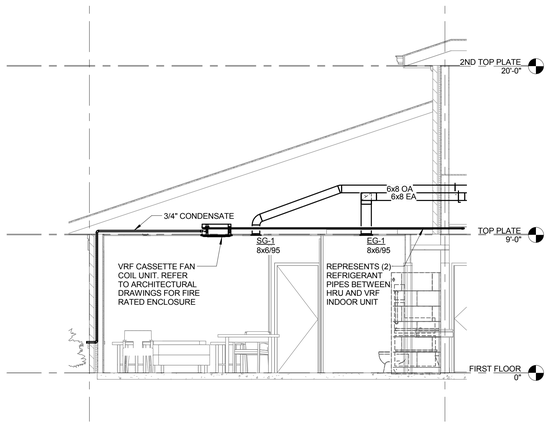
1 DOAS-1 DETAIL

NO SCALE



3 MAIN DUCTS FROM MECHANICAL ROOM

1/4" = 1'-0"



5 TYPICAL RESIDENT ROOM DUCTING

1/4" = 1'-0"

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON
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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL DETAILS**

Location: **TOMAH VAMC**
500 E. VETERANS STREET
TOMAH, WI. 54660

Project Name: **VA Tomah CLC Homes**

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Project Number: **676-324**

Date: 12/16/2016

Drawing Number: **1-M-403**

Dwg.

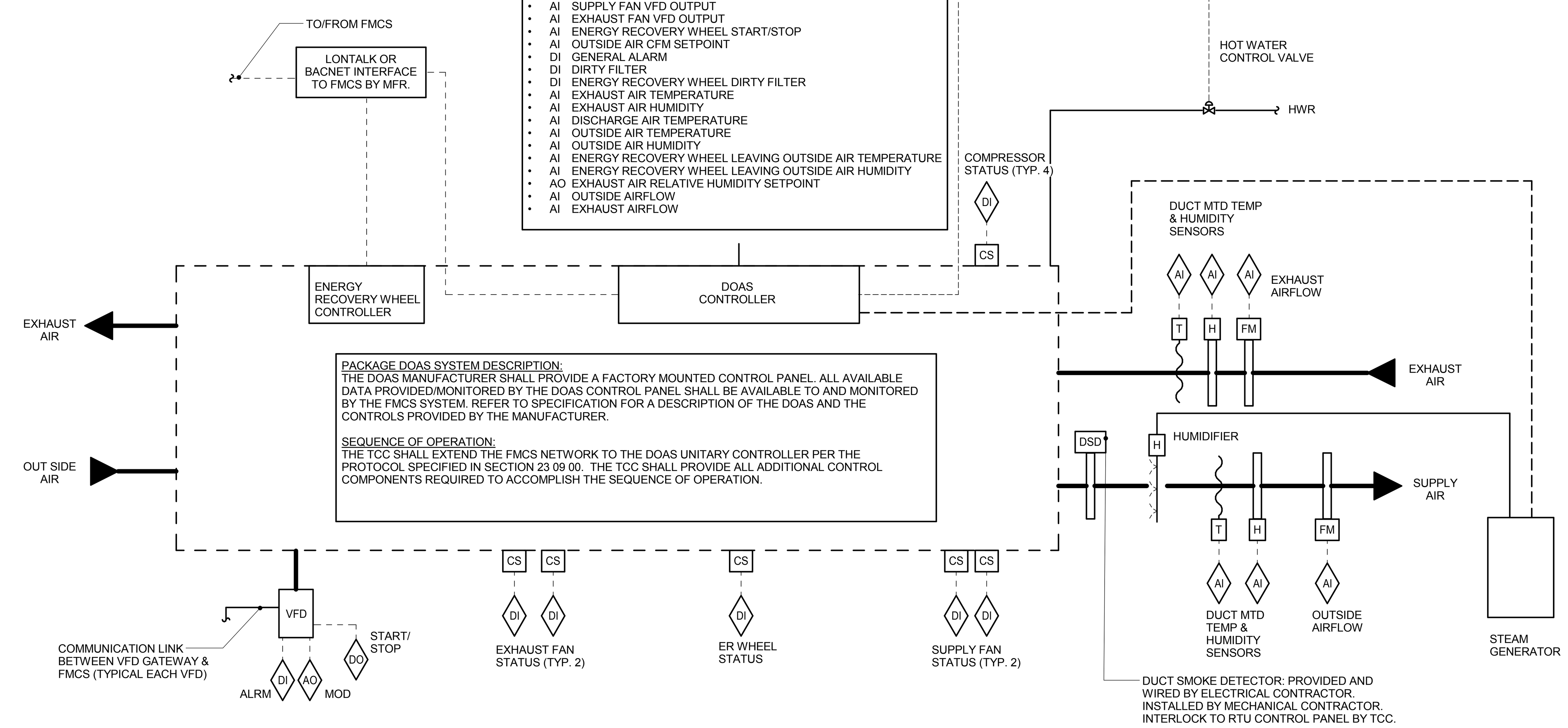
Office of Construction and Facilities Management

VA FORM 08-6231

DDC INPUT/OUTPUT SUMMARY TABLE	HARDWARE														SOFTWARE						
VA TOMAH: BLDG. 411 AND BLDG. 412	OUTPUT					INPUT									ALARM			APPLICATION PROGRAMS			
	DIGITAL			ANALOG		DIGITAL			ANALOG						DIGITAL	ANALOG					
OCCUPIED TIME: 24 HOURS/DAY POINT DESCRIPTION	CONTROL RELAY	ENABLE/DISABLE	THRU INTERFACE	0-10-VDC	THRU INTERFACE	CURRENT SENSING SWITCH	AUXILARY CONTACT	ON / OFF SWITCH	TEMPERATURE	DIFFERENTIAL PRESSURE	PH LEVEL / TDS	CO LEVEL	RESIDUAL CHLORINE	FLOW	EQUIPMENT STATUS	HIGH LIMIT	LOW LIMIT	TOTALIZATION	TREND	HW/OA RESET	REMARKS
OUTSIDE AIR TEMP									X										X	X	NOTE 1
BOILER SYSTEM ENABLE		X													X						
P-3 S/S & SPEED	X			X																	
P-3 STATUS						X									X			X	X	X	
P-4 S/S & SPEED	X			X																	
P-4 STATUS						X									X			X	X	X	
P-5 S/S & SPEED	X			X																	
P-5 STATUS						X									X			X	X	X	
P-6 S/S & SPEED	X			X																	
P-6 STATUS						X									X			X	X	X	
HW SUPPLY TEMP SECONDARY & RADIANT									X							X	X		X	X	
HW RETURN TEMP									X										X		
RADIANT HW CONTROL VALVE				X																	
RADIANT HW DIFFERENTIAL PRESSURE (QTY. 2)										X							X		X		
HW DIFFERENTIAL PRESSURE (QTY. 2)										X							X		X		
INCOMING DOMESTIC WATER									X	X	X		X						X		
DOMESTIC COLD WATER FLUSH SYSTEM		X							X							X			X		
DOMESTIC HOT WATER SUPPLY TO MIXING VALVE									X						X				X		
DOMESTIC HOT WATER HEATER															X						
DOMESTIC HOT WATER SUPPLY TO BUILDING									X							X			X		
DOMESTIC HOT WATER RECIRCULATION									X								X		X		
DOMESTIC HOT WATER RECIRCULATION PUMP						X									X						
GENERAL EXHAUST MOD-1	X																				
KITCHEN EXHAUST FAN, EF-1		X				X									X						
KITCHEN EXHAUST HOOD TEMP.SENSOR									X												
KITCHEN HOOD S/S SWITCH								X													
GYCOL FEED STATION						X									X						
WATER METER														X					X	X	
GAS METER														X					X	X	
GARAGE CO SENSOR												X				X					
GARAGE EXHAUST FAN	X					X									X						
GARAGE TEMP.									X								X				
GARAGE OA DAMPER	X																				
PENTHOUSE TEMP.									X								X				
PENTHOUSE UNIT HEATER FAN	X																				
PENTHOUSE UNIT HEATER CONTROL VALVE	X								X								X				
STORAGE 216 TEMP.																					
STORAGE 216 UNIT HEATER FAN	X																				
STORAGE 216 UNIT HEATER CONTROL VALVE	X																				
DOAS ENABLE / DISABLE		X																			
DOAS DISCHARGE AIR SETPOINT					X																
DOAS EXHAUST AIR HUMDITY SETPOINT					X																
DOAS ALARM															X						SPECIFIC ALARMS AVAILABLE THRU INTERFACE
DOAS KE FAN STATUS			X																		
MEDICAL SUPPLY ROOM TEMP.									X							X	X				
MEDICAL SUPPLY ROOM HUMIDITY									X							X	X				
CRASH CART TEMP.									X							X	X				
CRASH CART HUMIDITY									X							X	X				

1. GLOBALLY SHARED POINT

2. DOAS-1, BOILER SYSTEM AND VRF SYSTEM CONNECT THRU BACNET INTERFACE. REFER TO SPECIFIC DIAGRAMS AND SPECIFICATIONS FOR FULL LIST OF AVAILABLE POINTS



POINTS PROVIDED WITH DOAS CONTROLLER:
POINTS WILL BE MADE AVAILABLE TO FMCS OVER INTERFACE CARD

- DO KITCHEN FAN STATUS
- DO DOAS ENABLE/DISABLE
- AO DISCHARGE AIR TEMPERATURE SETPOINT ADJUST
- AI SUPPLY FAN VFD OUTPUT
- AI EXHAUST FAN VFD OUTPUT
- AI ENERGY RECOVERY WHEEL START/STOP
- AI OUTSIDE AIR CFM SETPOINT
- DI GENERAL ALARM
- DI DIRTY FILTER
- DI ENERGY RECOVERY WHEEL DIRTY FILTER
- AI EXHAUST AIR TEMPERATURE
- AI EXHAUST AIR HUMIDITY
- AI DISCHARGE AIR TEMPERATURE
- AI OUTSIDE AIR TEMPERATURE
- AI OUTSIDE AIR HUMIDITY
- AI ENERGY RECOVERY WHEEL LEAVING OUTSIDE AIR TEMPERATURE
- AI ENERGY RECOVERY WHEEL LEAVING OUTSIDE AIR HUMIDITY
- AO EXHAUST AIR RELATIVE HUMIDITY SETPOINT
- AI OUTSIDE AIRFLOW
- AI EXHAUST AIRFLOW

PACKAGE DOAS SYSTEM DESCRIPTION:
THE DOAS MANUFACTURER SHALL PROVIDE A FACTORY MOUNTED CONTROL PANEL. ALL AVAILABLE DATA PROVIDED/MONITORED BY THE DOAS CONTROL PANEL SHALL BE AVAILABLE TO AND MONITORED BY THE FMCS SYSTEM. REFER TO SPECIFICATION FOR A DESCRIPTION OF THE DOAS AND THE CONTROLS PROVIDED BY THE MANUFACTURER.

SEQUENCE OF OPERATION:
THE TCC SHALL EXTEND THE FMCS NETWORK TO THE DOAS UNITARY CONTROLLER PER THE PROTOCOL SPECIFIED IN SECTION 23 09 00. THE TCC SHALL PROVIDE ALL ADDITIONAL CONTROL COMPONENTS REQUIRED TO ACCOMPLISH THE SEQUENCE OF OPERATION.

DOAS CONTROL PANEL SEQUENCE OF OPERATION:
THE FMCS SHALL SEND A SIGNAL TO START THE DOAS. IN GENERAL DOAS RUNS 24HRS/DAY, 365 DAYS/YR.
SUPPLY FAN OPERATION:
DOAS CONTROL PANEL SHALL MODULATE SIGNAL TO SUPPLY FAN VFD AS REQUIRED TO MAINTAIN SCHEDULED OUTSIDE AIR CFM AS MEASURED BY AIRFLOW MEASURING STATION.

EXHAUST FAN OPERATION:
EXHAUST FAN SHALL BE INDEXED TO RUN WHENEVER THE SUPPLY FAN IS INDEXED TO RUN. DOAS CONTROL PANEL SHALL MODULATE SIGNAL TO EXHAUST FAN VFD AS REQUIRED TO MAINTAIN THE AIRFLOW OF 1700 CFM WHEN KE FAN IS ON AND 2500 WHEN KE FAN IS OFF.
FMCS SHALL COMMUNICATE STATUS OF KE FAN TO DOAS CONTROLLER.
VENTILATION CONTROL:
WHENEVER THE UNIT IS IN OCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY OPEN.

DISCHARGE AIR TEMPERATURE CONTROL:
DISHCHARGE AIR TEMPERATURE SHALL BE 68°F, ADJUSTABLE THRU THE OPERATOR WORKSTATION.
AT FULL HEATING THE ENERGY RECOVERY WHEEL SHALL BE ROTATING AT FULL SPEED AND THE HOT WATER CONTROL VALVE MODULATING TO MAINTAIN SETPOINT. WHENEVER THE DISCHARGE AIR TEMPERATURE IS ABOVE SETPOINT THE FOLLOWING SHALL OCCUR:
- THE HOT WATER COIL SHALL MODULATE OFF.
- THE ENERGY RECOVERY WHEEL VFD SHALL MODULATE SPEED OF WHEEL TO MAINTAIN SETPOINT.
- THE ENERGY RECOVERY WHEEL SHALL BE DISABLED.
- THE DOAS COMPRESSORS SHALL MODULATE TO MAINTAIN SETPOINT.
- THE ENERGY RECOVERY WHEEL SHALL TURN ON TO FULL SPEED WHEN THE TEMPERATURE DIFFERENCE FROM THE RETURN AIR TO THE OUTSIDE AIR IS 5°F (ADJ.) OR GREATER FOR MORE THAN 20 MINUTES (ADJ.).
- THE DOAS COMPRESSORS SHALL CONTINUE TO MODULATE TO MAINTAIN SETPOINT.

AT FULL COOLING THE ENERGY RECOVERY WHEEL SHALL BE ROTATING AT FULL SPEED AND THE DOAS COMPRESSORS MODULATING TO MAINTAIN SETPOINT. WHENEVER THE DISCHARGE AIR TEMPERATURE IS BELOW SETPOINT THE FOLLOWING SHALL OCCUR:
- THE DOAS COMPRESSORS SHALL CONTINUE TO MODULATE TO MAINTAIN SETPOINT.
- THE ENERGY RECOVERY WHEEL SHALL BE DISABLED WHEN THE TEMPERATURE DIFFERENCE FROM THE RETURN AIR AND OUTSIDE AIR IS 5°F (ADJ.) OR LESS.
- THE DOAS COMPRESSORS SHALL TURN OFF. THE DOAS COMPRESSORS SHALL BE DISABLED BELOW 50°F (ADJ.)
- THE ENERGY RECOVERY WHEEL SHALL BE ENABLED AND THE BYPASS DAMPERS SHALL CLOSE.
- THE ENERGY RECOVERY WHEEL SHALL MODULATE SPEED OF WHEEL TO MAINTAIN SETPOINT.
- ONCE THE ENERGY RECOVERY WHEEL IS AT FULL SPEED THE HOT WATER CONTROL VALVE SHALL MODULATE OPEN.

DEHUMIDIFICATION:
WHEN SPACE RH IS ABOVE 60% (ADJ.) COMPRESSORS SHALL MODULATE TO MAIN 55°F (ADJ.) COOLING COIL LEAVING AIR TEMP. AND HOT GAS REHEAT COIIL SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT UNTIL SPACE RH REACHES (50%).

HUMIDIFICATION:
WHEN EXHAUST AIR RH<30% DOAS CONTROLLER SHALL MODULATE HUMIDIFIER STEAM GENERATOR TO MAINTAIN 30% RH. IF SA RH>90% TURN OFF HUMIDIFIER FOR 5 MIN.

ENERGY RECOVERY WHEEL CONTROL:
DEFROST CONTROL: OVERRIDE THE HEATING WHEEL SPEED CONTROL TO LIMIT THE LEAVING EXHAUST AIR TEMPERATURE FROM THE WHEEL TO 15°F (ADJ.) AT A RETURN AIR RELATIVE HUMIDITY OF 30% RH AND RESET TO 5°F (ADJ.) AT 20% RH.

PURGE CONTROL: WHEN THE HEAT WHEEL IS DEACTIVATED, THE WHEEL SHALL RUN FOR 20 SECONDS AT MINIMUM SPEED EVERY 30 MINUTES TO KEEP THE ROTOR SURFACE CLEAN.

ALARMS, INTERLOCKS AND SAFETIES:
SEND AN ALARM TO THE FMCS FOR THE FOLLOWING:
- SUPPLY FAN VFD FAULT
- EXHAUST FAN VFD FAULT
- ENERGY RECOVERY WHEEL VFD FAULT
- DIFFERENTIAL PRESSURE SWITCH ACROSS ANY PRE-FILTER (30%) BANK EXCEEDS 0.6 INCHES W.G. (ADJ.)
- IF DISCHARGE AIR TEMPERATURE IS MORE THAN 10°F (ADJ.) ABOVE OR BELOW SETPOINT.
- IF THE FIRE ALARM SYSTEM IS ACTIVATED
- EMERGENCY STOP

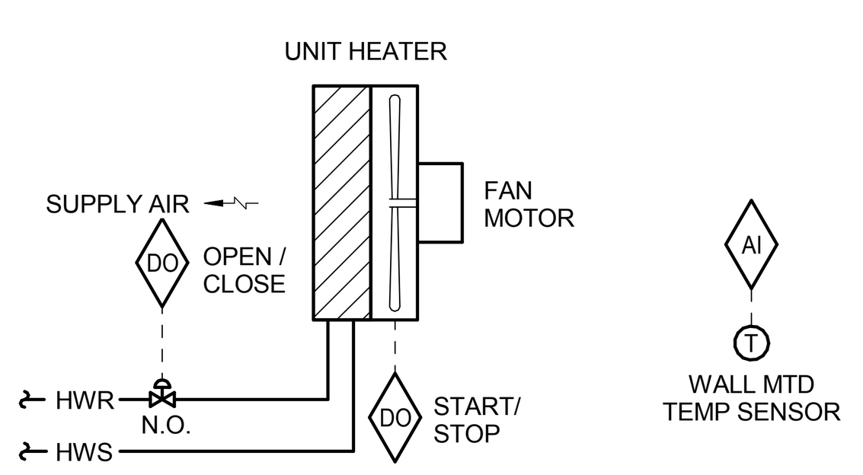
WHENEVER DOAS IS SHUTDOWN THE DOAS CONTROLLER SHALL COMMAND THE FOLLOWING TO OCCUR:
- SUPPLY FAN AND EXHAUST FAN VFDS SHALL BE DE-ENERGIZED.
- OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL FULLY CLOSE.
- HEATING AND COOLING SHALL BE DISABLED.
- THE ENERGY RECOVERY WHEEL SHALL STOP.

DOAS REPORT GENERATION:
DDC FMCS SHALL MONITOR THE FOLLOWING POINTS ON 10 MINUTE (ADJ.) INTERVALS WITHIN A SINGLE TREND. THE TREND SHALL RUN FOR A 100-DAY (ADJ.) DURATION AT WHICH POINT THE NEWEST VALUES SHALL AUTOMATICALLY OVERWRITE THE OLDEST VALUES:

- DATE
- TIME
- GLOBAL OUTSIDE AIR TEMP [°F]
- GLOBAL OUTSIDE AIR HUMIDITY [%RH]
- SUPPLY AIRFLOW [CFM]
- SUPPLY AIR TEMP (SAT) [°F]
- SUPPLY AIR TEMP SETPOINT [°F]
- SUPPLY AIR RELATIVE HUMIDITY [%]
- EXHAUST AIRFLOW [CFM]
- EXHAUST AIR TEMP ENTERING UNIT (EAT) [°F]
- EXHAUST AIR RELATIVE HUMIDITY ENTERING UNIT [%]
- ENERGY RECOVERY WHEEL EXHAUST AIR LEAVING AIR TEMPERATURE [°F]
- ENERGY RECOVERY WHEEL EXHAUST AIR LEAVING RELATIVE HUMIDITY [°F]
- OUTSIDE AIRFLOW [CFM]
- FILTER LOADING [STATUS]
- SUPPLY FAN VFD OUTPUT [% FULL SPEED]
- EXHAUST FAN VFD OUTPUT [% FULL SPEED]
- OUTSIDE AIR DAMPER POSITION [% OPEN]
- EXHAUST AIR DAMPER POSITION [% OPEN]
- ENERGY RECOVERY WHEEL VFD OUTPUT [% FULL SPEED]

THIS INFORMATION SHALL BE ACCESSIBLE TO VIEW IN GRAPHICAL FORM ON THE FMCS OPERATOR WORKSTATION.

DOAS REPORT GENERATION
TYPICAL FOR DOAS-1



SEQUENCE OF OPERATION:

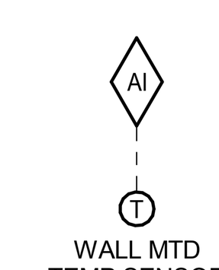
WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE 40°F (ADJ.), TEMPERATURE SENSOR SHALL MODULATE THE CONTROL VALVE AND CYCLE THE UNIT FAN TOGETHER TO MAINTAIN A SPACE TEMPERATURE OF 70°F (ADJ.).

WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW 40°F (ADJ.), TEMPERATURE SENSOR SHALL MODULATE THE CONTROL VALVE TO MAINTAIN A SPACE TEMPERATURE OF 70°F (ADJ.) AND THE UNIT FAN SHALL RUN CONTINUOUSLY.

IN LOCATIONS WITH MULTIPLE UNIT HEATERS, STAGE THE UNIT HEATERS ON/OFF BY SETTING INDIVIDUAL TEMPERATURE SENSORS 2ºF APART.

ALARMS, INTERLOCKS & SAFETIES:

SEND AN ALARM TO THE FMCS OPERATOR INTERFACE IF SPACE TEMPERATURE FALLS 10°F (ADJ.) BELOW SETPOINT.



2 UNIT HEATER CONTROL - HYDRONIC
NO SCALE

4 RADIANT CEILING PANEL
NO SCALE

3 PACKAGED DOAS UNIT WITH ENERGY RECOVERY WHEEL CONTROL - DOAS-1
12" = 1'-0"

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON 0062-044086 REGISTERED PROFESSIONAL ENGINEER STATE OF ILLINOIS
EXP. 11/30/2017

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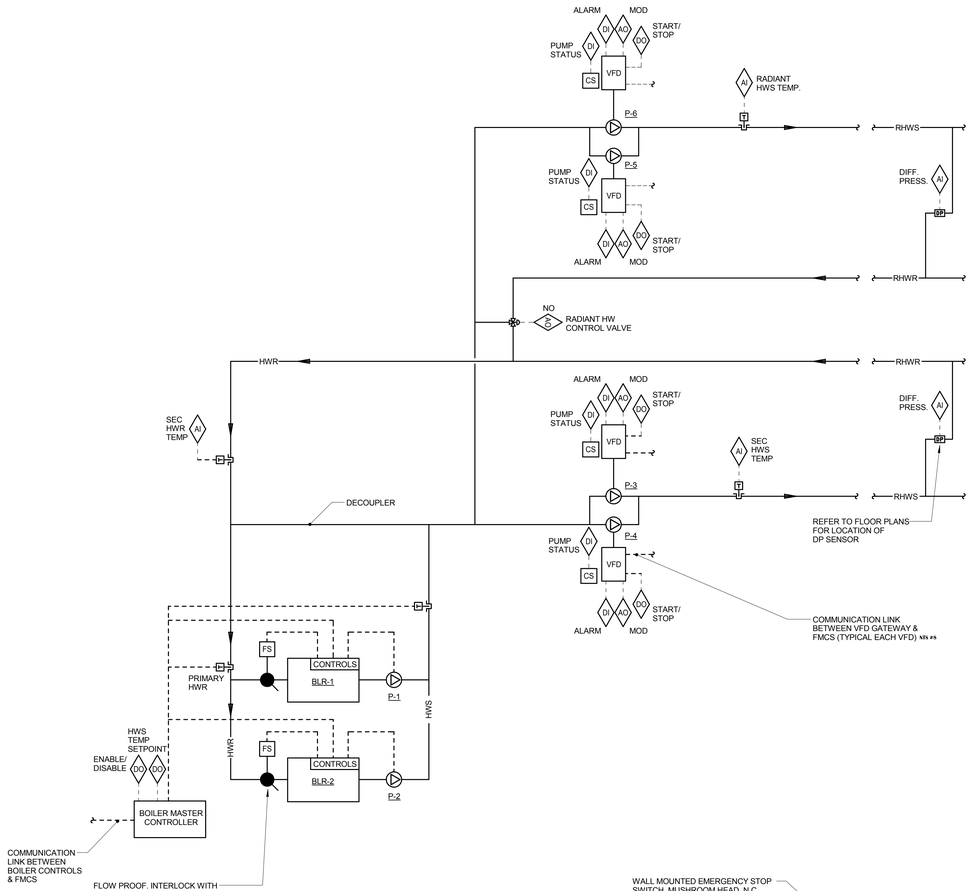
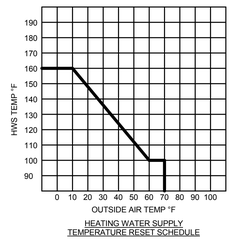
Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

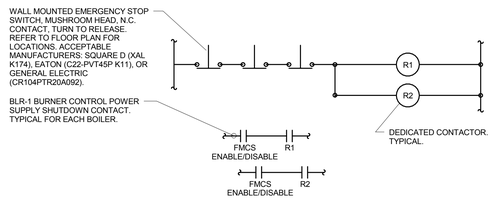
Drawing Title: MECHANICAL CONTROLS DIAGRAM
Project Name: VA Tomah CLC Homes
Project Number: 676-324
Date: 12/16/2016
Location: TOMAH VAMC, 500 E. VETERANS STREET, TOMAH, WI. 54660
Building Number: 411 & 412
Checked: RHC
Drawn: MAG
Drawing Number: 1-M-501
Dwg.
Office of Construction and Facilities Management

VA FORM 08-6231





HEATING WATER SUPPLY TEMPERATURE RESET SCHEDULE



ALARMS, INTERLOCKS, AND SAFETIES:
TCC SHALL PROVIDE EMERGENCY BOILER SHUTDOWN SWITCH AT BOILER ROOM EXIT MEETING CSD-1 REQUIREMENTS .ACTIVATION OF SWITCH SHALL INTERRUPT POWER TO ALL BOILER CONTROLS VIA BOILER SAFETY SHUTDOWN CONTACTS.

TYPICAL FOR BLR-1, BLR-2

EMERGENCY BOILER SHUTDOWN

1 NON-CONDENSING HEATING WATER BOILER CONTROL - PRIMARY/SECONDARY

NO SCALE

SEQUENCE OF OPERATION:
HEATING WATER BOILERS SHALL HAVE UNIT MOUNTED CONTROLS AND A BOILER MANAGEMENT CONTROL PANEL PROVIDED BY THE BOILER MANUFACTURER. TCC SHALL INTERFACE WITH BOILER MANUFACTURER CONTROLS AS DESCRIBED IN THIS SEQUENCE OF OPERATION. BOILER MANUFACTURER SHALL PROVIDE A GATEWAY INTERFACE CARD THAT IS COMPATIBLE WITH THE COMMUNICATION PROTOCOL OF THE FMCS NETWORK. SEQUENCES OF OPERATION FOR BOTH BOILER CONTROL SYSTEM AND FMCS SHALL BE AS FOLLOWS:

BOILER CONTROL PANEL SEQUENCE OF OPERATION:
WHEN THE FMCS ENABLES THE BOILER MASTER CONTROLLER TO RUN, THE BOILER MASTER CONTROLLER SHALL ENABLE THE LEAD BOILER. WHEN BOILER IS ENABLED THE ASSOCIATED CIRCULATING PUMP SHALL RUN CONTINUOUSLY , EVEN IF BOILER BURNER IS CYCLED OFF.

THE BOILER MANAGEMENT CONTROL PANEL SHALL STAGE ON ADDITIONAL BOILERS AND SHALL MODULATE BURNER FIRING RATE AS REQUIRED TO MAINTAIN THE SYSTEM HEATING WATER SUPPLY TEMPERATURE SETPOINT COMMUNICATED THRU FMCS AND TO MAXIMIZE EFFICIENCY. BOILER MANAGEMENT CONTROL PANEL SHALL START/STOP BOILERS ON A FIRST ON/FIRST OFF BASIS TO EQUALIZE RUN TIME BETWEEN BOILERS. BOILER CIRCULATING PUMP OPERATION SHALL BE CONTROLLED BY THE BOILER CONTROL PANEL OF THE RESPECTIVE BOILER THEY SERVE. BOILER CIRCULATION PUMP FOR LAG BOILER SHALL CONTINUE TO OPERATE FOR 5 MINUTE (ADJ.) AFTER RESPECTIVE BOILER HAS BEEN DISABLED.BOILER PUMP SPEED SHALL BE CONTROLLED DIRECTLY BY BOILER CONTROLLER.

THE FOLLOWING BOILER CONTROL PANEL POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE CONTROLLED BY THE FMCS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:
- BOILER SYSTEM STATUS: ENABLE/DISABLE
- BOILER OUTLET WATER TEMP SETPOINT: [°F]

THE FOLLOWING BOILER CONTROL PANEL POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE MONITORED BY THE FMCS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:
- BOILER STATUS: DISABLED/STANDBY/MANUAL OPERATION/REMOTE OPERATION/AUTO/FAULT
- FIRING RATE INPUT: [0 - 100%]
- FIRING RATE OUTPUT: [0 - 100%]
- BOILER OUTLET WATER TEMP: [°F]
- SYSTEM PRIMARY HWR TEMP: [°F]
- SYSTEM PRIMARY HWS TEMP: [°F]
- FAULT MESSAGE DISPLAY CODE: [NUMERICAL]
- RUN CYCLES: [NUMERICAL]
- RUN HOURS: [NUMERICAL]

ALARMS, INTERLOCKS & SAFETIES:
BOILER CONTROLS SHALL BE PROGRAMMED TO MAINTAIN CONSTANT SETPOINT (LAST KNOWN VALUE) IN THE EVENT THE FMCS NETWORK COMMUNICATION SIGNAL IS LOST.

FMCS SEQUENCE OF OPERATION:
FMCS SHALL ENABLE HEATING WATER SYSTEM WHEN OUTSIDE TEMPERATURE FALLS BELOW 65°F (ADJ.) AND BE DISABLED AT 70°F (ADJ.). LEAD RADIANT PUMP SHALL RUN CONTINUOUSLY WHEN THERE IS A CALL FOR HEATING FROM A RADIANT HEATING ZONE. LEAD SECONDARY PUMP SHALL RUN CONTINUOUSLY, WHEN SYSTEM IS ENABLED.

ONLY ONE SECONDARY HEATING WATER PUMP AND ONE RADIANT HEATING WATER PUMP SHALL RUN AT TIME. THE SECOND HEATING WATER PUMP IS FULLY REDUNDANT. FMCS SHALL AUTOMATICALLY ROTATE THE LEAD HEATING WATER PUMP ONCE/WEEK (10:00 AM EACH TUESDAY, ADJ.) TO EQUALIZE RUN TIME BETWEEN PUMPS. PROVIDE GRAPHICAL BUTTON ON OPERATOR WORKSTATION GRAPHICAL SCREEN TO ALLOW FMCS OPERATOR TO SWITCH LEAD PUMP TO NEXT ROTATION IN THE EVENT THE CURRENT LEAD PUMP REQUIRES MAINTENANCE.

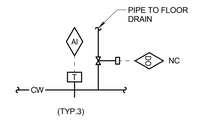
FMCS SHALL MODULATE SIGNAL TO LEAD PUMP VFD AS REQUIRED TO MAINTAIN HEATING WATER DIFFERENTIAL PRESSURE (DP) SETPOINT. SETPOINT TO BE ESTABLISHED DURING T&B.
ALL CONTROLLED AND MONITORED POINTS LISTED IN THE BOILER CONTROL PANEL SEQUENCE ABOVE SHALL BE DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN.

ALARMS, INTERLOCKS & SAFETIES:
TCC SHALL COORDINATE ALL SAFETY AND INTERLOCK REQUIREMENTS WITH BOILER MANUFACTURER. TCC SHALL COORDINATE AND PROVIDE THE INSTALLATION AND WIRING OF BOILER WATER DIFFERENTIAL PRESSURE/FLOW SWITCHES AND OTHER COMPONENTS PROVIDED WITH THE BOILER AS REQUIRED FOR PROPER OPERATION. TCC SHALL PROVIDE AND TERMINATE ALL SAFETY AND INTERLOCK WIRING WITH BOILER CONTROL PANELS AS REQUIRED.

FMCS SHALL AUTOMATICALLY ENABLE THE LAG HEATING WATER PUMP TO RUN IN THE EVENT THE LEAD HEATING WATER PUMP FAILS TO OPERATE.

AN ALARM SHALL BE INDICATED TO THE FMCS OPERATOR WORKSTATION IN THE EVENT ANY OF THE FOLLOWING OCCUR:
- PRIMARY HWS TEMPERATURE RISES MORE THAN 10°F (ADJ.) ABOVE SETPOINT (AUTO RESET).
- PRIMARY HWS TEMPERATURE DROPS MORE THAN 10°F (ADJ.) BELOW SETPOINT (AUTO RESET).
- AN ALARM IS INDICATED AT ANY BOILER ALARM PANEL.
- AN ALARM IS INDICATED AT ANY PUMP VFD
- SHOULD THE FMCS COMMAND THE LEAD HEATING WATER PUMP TO OPERATE AND THE PUMP FAILS TO DO SO AS DETERMINED BY THE VFD STATUS, AN ALARM SHALL BE INDICATED AT THE FMCS OPERATOR WORKSTATION AND THE LAG HW PUMP SHALL AUTOMATICALLY START.
- FMCS SHALL COMMUNICATE PRIMARY HWS SETPOINT TO BOILER CONTROL PANEL BASED ON THE RESET SCHEDULE ABOVE.FMCS OPERATOR SHALL BE ABLE TO OVERRIDE RESET SCHEDULE AND SET HWS SETPOINT.

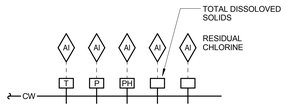
FMCS SHALL MODULATE RADIENT HW CONTROL VALVE TO MAINTAIN RADIANT HOT WATER SUPPLY TEMP. OF 20°F LESS THAN PRIMARY HWS SET POINT.



2 DOMESTIC COLD WATER FLUSH SYSTEM

NO SCALE

NOTES:
FMCS SHALL MONITOR CW TEMPERATURE AND OPEN DUMP VALVE WHEN WATER TEMPERATURE EXCEEDS SETPOINT FOR MORE THAN 5 MINUTES. DUMP VALVE SHALL REMAIN OPEN FOR 15 SECONDS (ADJ.). THE DUMP CYCLE SHALL OCCUR AT MOST, ONCE IN 12 HOURS.



3 INCOMING WATER SERVICE WATER QUALITY SENSORS

NO SCALE

NOTES:
FMCS SHALL MONITOR TEMPERATURE, PH, TOTAL DISSOLVED SOLIDS, RESIDUAL CHLORINE AND PRESSURE

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON, 062-064083, REGISTERED PROFESSIONAL ENGINEER, STATE OF ILLINOIS, EXP. 11/30/2017

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL CONTROLS DIAGRAMS**

Project Name: **VA Tomah CLC Homes**

Location: **TOMAH VAMC**
500 E. VETERANS STREET
TOMAH, WI. 54660

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Project Number: **676-324**

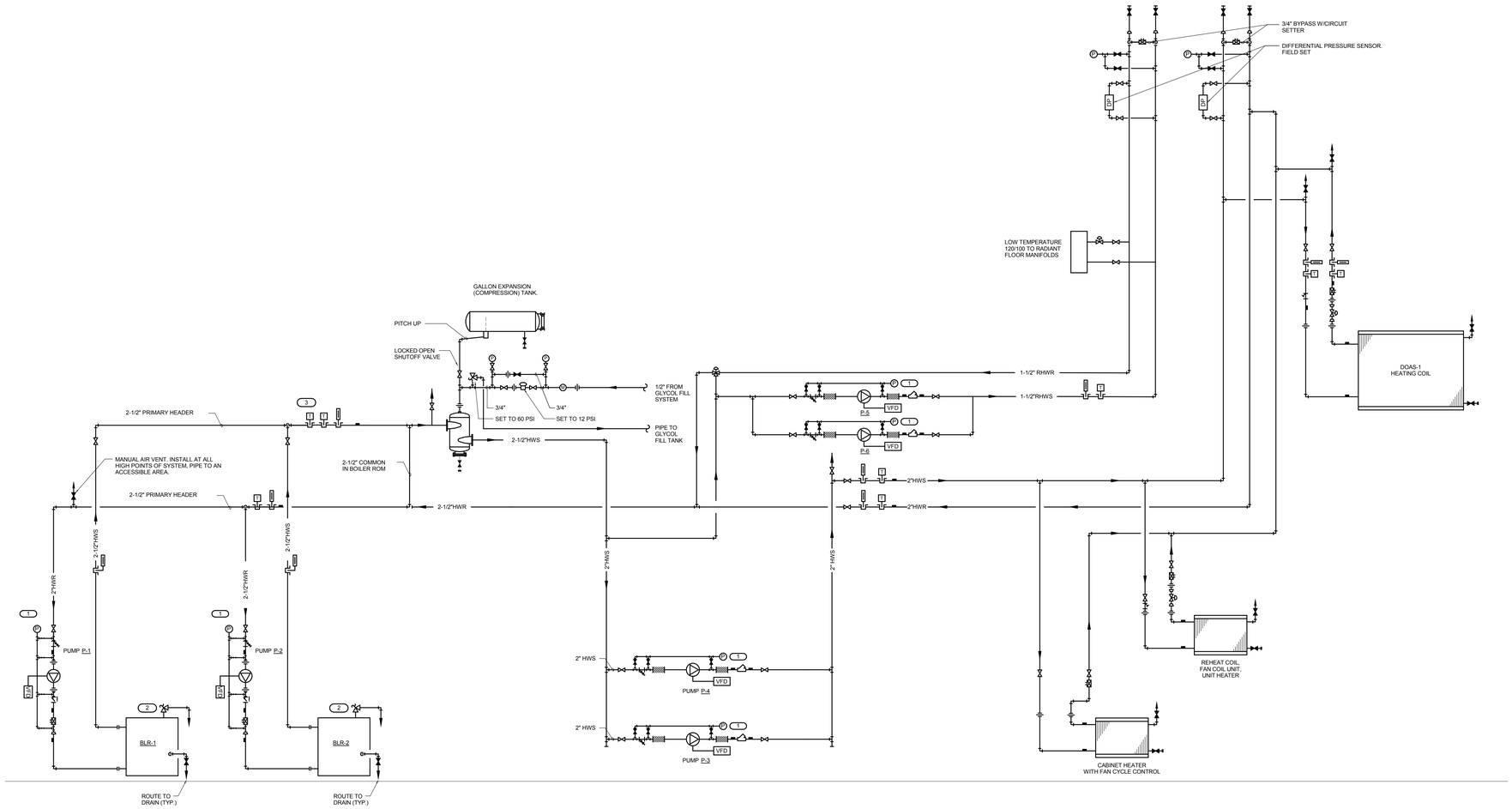
Date: 12/16/2016

Drawing Number: **1-M-502**

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231



HEATING WATER FLOW DIAGRAM SYMBOL LIST

SYMBOL:	DESCRIPTION:	SYMBOL:	DESCRIPTION:
HWS	REHEATING WATER SUPPLY		THROTTLING VALVE
HWR	REHEATING WATER RETURN		CHECK VALVE
CW	COLD WATER - POTABLE		UNION/FLANGE
	PITCH PIPE IN DIRECTION		REDUCER
	DIRECTION OF FLOW IN PIPE		AUTOMATIC AIR VENT
	METER		MANUAL AIR VENT
	PRESSURE GAUGE (FURNISHED WITH BALL VALVE)		DRAIN VALVE WITH HOSE CONNECTION AND CAP
	TEMPERATURE SENSOR WITH WELL		RELIEF VALVE
	THERMOMETER WITH WELL (FILLED TYPE)		PRESSURE REDUCING VALVE (LIQUID/GAS)
	"WYE" - STRAINER		PRESSURE/TEMPERATURE TEST PLUG
	"WYE" - STRAINER W/SHUTOFF VALVE AND HOSE CONNECTION WITH CAP		CONTROL VALVE (TWO-WAY)
	FLEXIBLE CONNECTION		CONTROL VALVE (THREE-WAY)
	BALANCING VALVE		BACKFLOW PREVENTER
	SHUTOFF VALVE		SUCTION DIFFUSER WITH SUPPORT FOOT
	NORMALLY CLOSED VALVE		

KEYNOTES

1. PRESSURE GAUGE WITH SNUBBER PER SECTION 23 09 13. INSTALL WITH MOUNTING ON WALL, STAND, OR VIBRATION-FREE PIPE ABOVE BRACKET PUMP FLEXIBLE CONNECTOR. INSTALL FLEXIBLE COPPER TUBING TO PIPING CONNECTIONS TO AVOID VIBRATION DAMAGE TO THE GAUGE. PREFERRED CONNECTION LOCATIONS ARE:

   (1) JUST UPSTREAM OF STRAINER.
   (2) GAUGE PORT ON SUCTION DIFFUSER OR BETWEEN STRAINER AND PUMP INLET.
   (3) GAUGE TAPPING ON PUMP INLET FLANGE.
   (4) GAUGE TAPPING ON PUMP OUTLET FLANGE.

2. INSTALL SAFETY RELIEF VALVE PROVIDED BY BOILER MANUFACTURER. PIPE TO DRAIN. SUPPORT SOLIDLY.

3. TEMPERATURE SENSOR PROVIDED BY BOILER MANUFACTURER, WIRED TO BOILER/BOILER CONTROL PANEL.

3 HOT WATER FLOW DIAGRAM

NO SCALE

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON, 062-064088, REGISTERED PROFESSIONAL ENGINEER, STATE OF ILLINOIS, EXP. 11/30/2017

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL HOT WATER FLOW DIAGRAM**

Project Name: **VA Tomah CLC Homes**

Project Number: **676-324**

Date: 12/16/2016

Location: **TOMAH VAMC, 500 E. VETERANS STREET, TOMAH, WI. 54660**

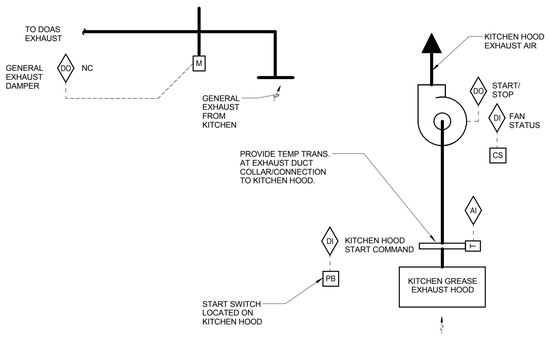
Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Drawing Number: **1-M-503**

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231

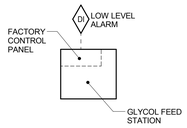


KITCHEN HOOD EXHAUST FAN OPERATION:
KITCHEN HOOD EXHAUST FANS SHALL START FROM EITHER OF THE TWO FOLLOWING INPUTS:
- SWITCH ON KITCHEN HOOD TURNED TO ON POSITION.
- EXHAUST DUCT MOUNTED TEMP TRANSMITTER/SWITCH DETECTS AIR ABOVE SETPOINT (100° F ADJ.).

ONCE A KITCHEN HOOD EXHAUST FAN IS ENERGIZED (VIA ANY INPUT) THE EXHAUST FAN SHALL CONTINUE TO OPERATE FOR A MIN. 20 MINUTE (ADJ.) TIME DURATION TO PREVENT SHORT CYCLING.
WHEN THE KITCHEN HOOD FAN STARTS, THE NC GENERAL EXHAUST DAMPER SHALL CLOSE. WHEN FAN IS OFF, DAMPER SHALL BE OPEN.

ALARMS, INTERLOCKS AND SAFETIES:
AN ALARM SHALL BE GENERATED AT THE FMCS OPERATOR WORKSTATION IN THE EVENT THE FMCS COMMANDS THE EXHAUST FAN TO OPERATE AND THE CURRENT SENSING RELAY DETECTS INSUFFICIENT CURRENT DRAW.

1 KITCHEN FAN CONTROL - FAN-X
NO SCALE



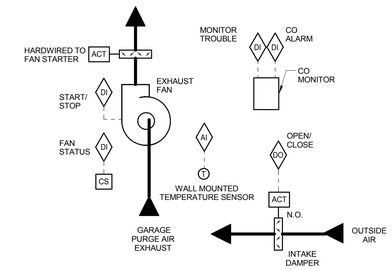
SEQUENCE OF OPERATION:

THE GLYCOL FEED SYSTEM CONTROLLER SHALL OPERATE THE SYSTEM TO MAINTAIN THE SPECIFIED PRESSURE IN THE WATER SYSTEM.

ALARMS, INTERLOCKS, AND SAFETIES:

AN ALARM SHALL BE GENERATED AT THE FMCS OPERATOR INTERFACE IF THE GLYCOL CONTROLLER INDICATES AN ALARM.

2 GLYCOL FEED STATION CONTROL DIAGRAM
NO SCALE



SEQUENCE OF OPERATION:
EXHAUST FAN SHALL BE STARTED AND STOPPED BY THE FMCS .

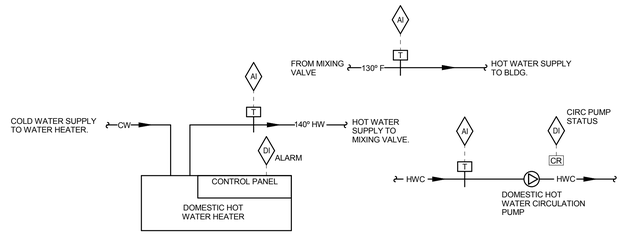
EXHAUST FAN PURGE FAN SHALL BE CONTROLLED AS FOLLOWS:
- WHEN SPACE TEMP RISES ABOVE 85°F (ADJ.) FMCS SHALL COMMAND INTAKE AIR DAMPER TO FULLY OPEN AND FAN MOTOR SHALL BE ENERGIZED AFTER A 30 SECOND DELAY TO ALLOW FOR OPENING OF THE DAMPER. IF OUTSIDE TEMP. IS BELOW 35°F, FAN WILL NOT BE STARTED FOR COOLING.
- WHEN SPACE TEMP DROPS BELOW 75°F (ADJ.) FAN MOTOR SHALL BE DE-ENERGIZED AND THE INTAKE AIR DAMPER SHALL FULLY CLOSE.
- IN THE EVENT THE CO MONITOR DETECTS ELEVATED LEVELS OF CO, FMCS SHALL COMMAND THE INTAKE AIR DAMPER TO FULLY OPEN AND FAN MOTOR SHALL BE ENERGIZED. FAN OPERATION SHALL CONTINUE UNTIL CO LEVELS ARE WITHIN AN ACCEPTABLE RANGE.

ONCE ENERGIZED, EXHAUST FAN SHALL CONTINUE TO RUN FOR MIN. 5 MINUTES (ADJ.) TO PREVENT SHORT CYCLING.

WHEN FAN IS ENERGIZED, 2-POSITION DAMPER SHALL FULLY OPEN. WHEN FAN IS DE-ENERGIZED, 2-POSITION DAMPER SHALL FULLY CLOSE.

ALARMS, INTERLOCKS AND SAFETIES:
AN ALARM SHALL BE GENERATED AT THE FMCS OPERATOR WORKSTATION IN THE FOLLOWING EVENTS:
- THE CO MONITOR INDICATES A HIGH CO LEVEL.
- THE FMCS COMMANDS THE EXHAUST FAN TO OPERATE AND THE CURRENT SENSING RELAY DETECTS INSUFFICIENT CURRENT DRAW.

3 EXHAUST FAN CONTROL - GARAGE - FAN-2
NO SCALE



SEQUENCE OF OPERATION:
DOMESTIC WATER HEATER CONTROL PANEL SHALL MODULATE THE GAS BURNER TO MAINTAIN 140°F (ADJ.) DOMESTIC HOT WATER.

FMCS SHALL MONITOR THE TEMPERATURE AT THE CIRCULATION PUMP AND PUMP STATUS. THE CIRCULATION PUMP SHALL RUN CONTINUOUSLY.

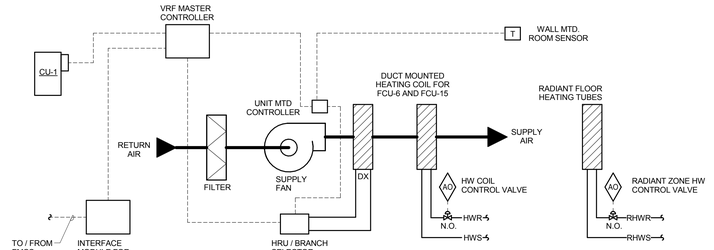
FMCS SHALL MONITOR THE OUTPUT TEMPERATURE OF THE WATER HEATERS AND THE OUTPUT TEMPERATURE DOWNSTREAM OF THE MIXING VALVES.

FMCS SHALL MONITOR AND RECORD THE FOLLOWING INFORMATION FROM THE WATER HEATER:
- DISPLAY THE TEMPERATURES ONCE EVERY 5 MINUTE (ADJ.) TIME INTERVAL AND RECORD IN A TREND THAT MAINTAINS DATA FOR A 7 DAY (ADJ.) PERIOD. AT THE END OF THE 7 DAY (ADJ.) PERIOD THE TREND SHALL AUTOMATICALLY OVERWRITE THE EARLIEST RECORDED DATA. TREND DATA SHALL INCLUDE DATE AND TIME STAMPS. THIS INFORMATION SHALL BE ACCESSIBLE TO VIEW IN EITHER TABULAR OR GRAPHICAL FORM ON THE FMCS OPERATOR WORKSTATION.
- ONCE PER MONTH, THE FMCS SHALL RECORD THE FOLLOWING INFORMATION TO A MEMORY LOCATION ON THE FMCS OPERATOR WORKSTATION THAT IS MAINTAINED (NOT AUTOMATICALLY OVERWRITTEN)

OPERATOR WORKSTATION SHALL DISPLAY PUMP CURRENT STATUS.

ALARMS, INTERLOCKS & SAFETIES:
INDICATE AN ALARM TO THE FMCS OPERATOR WORKSTATION IN THE EVENT THE FOLLOWING OCCUR:
- ANY WATER HEATER INDICATES AN ALARM CONDITION.
- ANY HOT WATER CIRCULATION PUMP INDICATES AN ALARM CONDITION.
- THE LEAVING HOT WATER TEMPERATURE IS ABOVE 145°F (ADJ.) OR BELOW 135°F (ADJ.) FOR MORE THAN 5 MINUTES.(ADJ.)
- THE MIXING VALVE LEAVING HOT WATER TEMPERATURE IS ABOVE 135°F (ADJ.) OR BELOW 125°F (ADJ.) FOR MORE THAN 5 MINUTES.(ADJ.)
- THE RECIRCULATION TEMPERATURE IS BELOW 125°F (ADL.) FOR MORE THAN 5 MINUTES (ADJ.)

4 DOMESTIC HOT WATER CONTROL
NO SCALE



NOTES:
1. WIRING BETWEEN VRF SYSTEM COMPONENTS IS PART OF VRF MANUFACTURER PROPRIETARY CONTROLS SYSTEM. PROVIDE PER MANUFACTURERS REQUIREMENT.

2. ALL DIRECT CONTROL OF VRF SYSTEM EQUIPMENT IS THRU MANUFACTURER PROVIDED CONTROL SYSTEM.FMCS SHALL MONITOR VRF SYSTEM, ADJUST SETPOINTS AND SCHEDULES THRU INTERFACE. VRF SYSTEM FAN COILS, DUCT MOUNTED HOT WATER HEATING COILS, AND HOT WATER RADIANT FLOOR HEATING SYSTEM WILL OPERATE IN CONCERT THRU FMCS TO MAXIMIZE USE OF VRF HEATING IN MILD WEATHER AND AVOID FIGHTING BETWEEN HOT WATER HEATING AND VRF COOLING.

3. GRAPHICAL INTERFACE TO BE PROVIDED ON BAS FOR EACH ZONE ON VRF SYSTEM, ASSOCIATED DUCT MOUNTED HOT WATER HEATING COILS AND HOT WATER RADIANT FLOOR HEATING SYSTEM.

VRF SYSTEM CONTROLS
SEQUENCE OF OPERATION:

FMCS SHALL CONTINUOUSLY MONITOR ROOM TEMPERATURES FOR ALL VRF ZONES, THRU INTERFACE WHEN OA TEMPERATURE IS ABOVE 30F, THE VRF SYSTEM SHALL BE THE PRIMARY HEATING SOURCE.

- THE FMCS SHALL ALLOW THE VRF SYSTEM CONTROLS TO OPERATE UNDER THE MANUFACTURER PROVIDED CONTROLS TO MAINTAIN ROOM TEMPERATURE SETPOINTS THRU COOLING OR HEATING, UTILIZING HEAT RECOVERY TO THE EXTENT POSSIBLE.
- VRF SYSTEM CONTROLS SHALL INCLUDE DIGITAL OUTPUT FOR AUXILLIARY HEATING FOR EACH ZONE. WHEN VRF SYSTEM IS UNABLE TO MAINTAIN TEMPERATURE IN HEATING MODE, IT SHALL COMMUNICATE A CALL FOR AUXILLIARY HEATING TO THE FMCS. ON A CALL FOR AUXILLIARY HEATING IN ANY ZONE, THE FMCS SHALL MODULATE RADIANT HEATING OR DUCT MOUNTED HEATING COIL CONTROL VALVE TO
- VRF SYSTEM SHALL CONTINUE TO OPERATE WHILE AUXILLIARY HEATING IS BEING PROVIDED.
- WHEN VRF SYSTEM IS ABLE TO MAINTAIN SPACE TEMPERATURE, CALL FOR AUXILLIARY HEATING SHALL BE REMOVED AND FMCS SHALL ALLOW VRF SYSTEM TO PROVIDE HEATING WHILE DISABLING AUXILLIARY.

WHEN OA TEMPERATURE IS BELOW 30F, THE HYDRONIC HEATING SHALL BE THE PRIMARY HEATING SOURCE.

- THE FMCS SHALL DISABLE COOLING IN ALL VRF ZONES AND ENABLE HEATING AS DESCRIBED BELOW.
- FMCS SHALL COMMAND VRF FAN COIL UNITS WITH DUCT MOUNTED HEATING COILS TO FAN ONLY OPERATION AND FANS SHALL RUN CONTINUOUS AT HIGH SPEED.
- FMCS SHALL MODULATE RADIANT HEATING CONTROL VALVES OR HEATING COIL CONTROL VALVES TO MAINTAIN SPACE TEMPERATURE.
- IF RADIANT HEATING IS UNABLE TO MAINTAIN SPACE TEMPERATURE (WHICH IS NOT ANTICIPATED DURING NORMAL OPERATION), FMCS SHALL COMMAND RESPECTIVE VRF ZONE FAN COIL UNIT INTO HEATING MODE AND ALLOW VRF HEATING TO OPERATE.

POINTS AVAILABLE THRU INTERFACE TO FMCS
SYSTEM LEVEL

- ENABLE/DISABLE
- CONDENSING UNIT OPERATING MODE
- COMPRESSOR STATUS
- REFRIGERANT SUCTION TEMPERATURE
- HIGH PRESSURE
- LOW PRESSURE
- LIQUID TEMPERATURE
- SYSTEM ERROR WITH DIAGNOSTIC ERROR CODES

FOR EACH ZONE:

- SPACE TEMPERATURE (AI)
- SPACE TEMPERATURE SETPOINT (AO)
- OPERATING MODE STATUS (HEATING/COOLING/FAN)
- OPERATING MODE COMMAND
- FAN SPEED STATUS
- FILTER STATUS
- FAN SPEED COMMAND
- CALL FOR AUXILLIARY HEATING
- ERROR STATUS AT ZONE LEVEL AND ERROR CODE

5 VRF CONTROL
NO SCALE

Construction Documents

Revisions:	Date

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: **MECHANICAL CONTROLS DIAGRAMS**

Location: **TOMAH VAMC**
500 E. VETERANS STREET
TOMAH, WI. 54660

Project Name: **VA Tomah CLC Homes**

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Project Number: **676-324**

Date: 12/16/2016

Drawing Number: **1-M-504**

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231

DOAS UNIT SCHEDULE

SYMBOL	DOAS-1
SERVICE	BUILDING VENTILATION AIR
SUPPLY FAN	
CFM	2,850
EXTERNAL STATIC PRESSURE	1.00
TOTAL STATIC PRESSURE	3.47
TYPE	FC CENTRIFUGAL
FAN RPM (NOTE D)	1,854
BHP (NOTE E)	2.45
MHP (NOTE E)	5
DISCONNECT BY (NOTE A)	MFR
DISCONNECT TYPE (NOTE B)	NF
CONTROLLER/STARTER BY (NOTE A)	MFR
RETURN FAN	
CFM	2,500
MINIMUM CFM	1,700
EXTERNAL STATIC PRESSURE	1.00
TOTAL STATIC PRESSURE	2.37
TYPE	FC CENTRIFUGAL
FAN RPM (NOTE D)	2,250
BHP (NOTE E)	1.51
MHP (NOTE E)	2.0
DISCONNECT BY (NOTE A)	MFR
DISCONNECT TYPE (NOTE B)	NF
CONTROLLER/STARTER BY (NOTE A)	MFR
MINIMUM OUTSIDE AIR CFM	2,850
ELECTRICAL	
VOLT-PHASE	208-3
MCA	65
MOPD	90
HEATING COIL - HOT WATER WITH 30% PROPYLENE GLYCOL	
EAT °F	-16
LAT °F	54.1
EWT °F	160
LWT °F	130
GPM	15.1
PRESSURE DROP (FT. OF WATER)	5.2
MBH	216.3
COOLING COIL - DX	
EAT °F DB	80.9
EAT °F WB	67.6
MAX. LAT °F DB	54.5
TOTAL MBH	124.0
REFRIGERANT	R-410A
FILTER	
SUPPLY	4" MERV 11 W/ MERV 8
OUTDOOR	2" MERV 8 (NO WASHABLE)
EXHAUST	2" MERV 8 (NO WASHABLE)
REMARKS	NOTES 1, 2, 3

NOTES:
1. PROVIDE SHAFT GROUNDING AS REQUIRED IN THE MOTOR SPECIFICATION 23 05 13.
2. UNIT SHALL CONTAIN AN ENERGY RECOVERY WHEEL. REFER TO ENERGY WHEEL SCHEDULE FOR REQUIREMENTS.
3. UNIT SHALL UTILIZE HOT GAS REHEAT TO REHEAT THE SUPPLY AIR DURING SUMMER OPERATION FROM 54 DB/ 53.7 WB TO 75 DB/ 61.1 WB.

INDOOR UNIT SCHEDULE - VRF

SYMBOL	AREA SERVED	NOMINAL TONNAGE	CFM	EXTERNAL STATIC (IN WG)	REFRIGERANT COIL: COIL TYPE & REFRIGERANT	REFRIGERANT COIL: BTUH COOLING	REFRIGERANT COIL: BTUH HEATING	ELECTRICAL: VOLT-PHASE	ELECTRICAL: MCA	ELECTRICAL: MOCP AMPS	ELECTRICAL: DISCONNECT BY (NOTE A)	ELECTRICAL: CONTROLLER/STARTER BY (NOTE A)	REMARKS
FCU-1	102 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-2	103 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-3	104 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-4	105 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-5	106 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-6	108 - HEARTH ROOM	3.0	1100	0.3	R410A	36,200	40,600	208-1	2.93	15	EC	MFR	NOTES 1, 2, 3, 4, 5, 6, 7
FCU-7	109 - DEN	0.75	283	0.0	R410A	9,600	10,900	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-8	110 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-9	111 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-10	112 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-11	113 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-12	114 - SPA	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-13	115 - RESIDENT ROOM	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-14	116 - OFFICE	0.6	265	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8, 9
FCU-15	121 - DINING	2.0	600	0.2	R410A	24,200	27,300	208-1	1.8	15	EC	MFR	NOTES 1, 2, 3, 4, 5, 6, 7
FCU-16	122 - KITCHEN	0.75	283	0.0	R410A	9,600	10,900	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8
FCU-17	129 - IT	1.0	336	0.0	R410A	12,300	13,600	208-1	0.3	15	EC	MFR	NOTES 1, 4, 5, 7
FCU-18	123 - PANTRY	0.6	320	0.0	R410A	7,500	8,500	208-1	0.5	15	EC	MFR	NOTES 1, 4, 5, 7, 8

NOTES:
1. INDOOR UNITS SELECTED FOR SPACE PEAK LOADS.
2. PROVIDE 30% FILTERS FOR EACH UNIT. FILTER MAY BE INTEGRAL OR SUITABLE FOR FIELD INSTALLATION IN FABRICATED FILTER ANGLES. FILTER ANGLES PROVIDED BY V.C.
3. UNIT SHALL BE PROVIDED WITH CONDENSATE PUMP.
4. REFER TO SPECIFICATION 23 81 45 FOR DESCRIPTION OF CONTROLS.
5. INDOOR UNIT CFM SELECTED AT HIGH CFM. INDOOR UNIT SHALL HAVE CAPABILITY TO ADJUST CFM FOR FINAL AIR BALANCING UP OR DOWN THROUGH FIELD ADJUSTMENT.
6. DUCTED CONCEALED UNITS SHALL BE PROVIDED WITH SUPPLY AND RETURN DUCT FLANGES.
7. ALL CONNECTIONS TO BE BRAZED, REMOVE MANUFACTURER PROVIDED FLARED FITTINGS.
8. CEILING CASSETTE UNIT SHALL BE COMPLETELY SERVICEABLE THROUGH FACE.
9. BUILDING 411 ONLY.

SCHEDULE GENERAL NOTES:

UNLESS NOTED OTHERWISE, MECHANICAL SCHEDULES ARE TYPICAL FOR BOTH BUILDINGS 411 AND 412.

A. DISCONNECT AND CONTROLLER STARTER FURNISHED AND INSTALLED BY:
- MFR = MANUFACTURER
- EC = ELECTRICAL CONTRACTOR.
- MC = FURNISHED BY MECHANICAL CONTRACTOR, INSTALLED BY ELECTRICAL CONTRACTOR
- MFR/EC = FURNISHED LOOSE BY MANUFACTURER INSTALLED BY ELECTRICAL CONTRACTOR
- ATC = AUTOMATIC TEMPERATURE CONTROL CONTRACTOR

B. DISCONNECT TYPE:
- F = FUSED
- NF = NON-FUSED

C. CONTROLLER STARTER TYPE:
- FV = FULL VOLTAGE
- WYE = WYE-DELTA
- SS = SOLID STATE (SOFT START)
- MS = MANUAL STARTER
- VFD = VARIABLE FREQUENCY DRIVE
- VFD/B = VARIABLE FREQUENCY DRIVE WITH BYPASS

D. FAN RPM SHALL NOT EXCEED 110% OF SCHEDULED VALUE, WITH THE SCHEDULED WHEEL TYPE. SUBSTITUTION OF BI OR BIA FANS FANS FOR FC IS ACCEPTABLE IF EFFICIENCY IS NOT LOWER.

E. NO EQUIPMENT SHALL BE SELECTED ABOVE 90% OF MOTOR NAME PLATE RATING.

F. MUST BE WITHIN +/- 10% OF SCHEDULED RPM.

G. CURB TYPE:
- MFR = STANDARD CURB BY MANUFACTURER
- GC = BY GENERAL CONTRACTOR
- SAC = SOUND ATTENUATOR CURB

KITCHEN HOOD

SYMBOL	TYPE	WIDTH	DEPTH	HEIGHT	CFM	EXTERNAL STATIC PRESSURE	MANUFACTURER	MODEL	NOTES
EH-1	ISLAND	60"	62"	24"	800	.41	HALTON	KVE	1 THRU 7

NOTES:
1. PROVIDE 18 GAUGE STAINLESS STEEL HOOD WITH ANSUL SYSTEM
2. HOOD SHALL BE SUPPLIED COMPLETE WITH OUTER CASING/ MAIN BODY, INNER LINER, EXHAUST DUCT, INCANDESCENT LIGHTING, GREASE FILTERS, PERIMETER DRAIN CHANNEL, COLLECTION CUP, AND ASSEMBLY BRACKETS.
3. ALL EXPOSED JOINT SHALL BE WELDED LIQUID TIGHT. ALL EXPOSED WELDS SHALL BE GOUND AND POLISHED TO MATCH ORIGINAL FINISH.
4. CANOPY ENDS SHALL BE DOUBLE SIDED WALL CONSTRUCTION. NO SINGLE WALL HOODS PERMITTED.
6. HOOD SHALL BE EQUIPPED WITH CYCLONE TYPE GREASE FILTERS MOUNTED IN THE FULL LENGTH FILTER BANK WITH CONCEALED GREASE CHANNEL. THE FILTERS SHALL BE EASILY REMOVED VIA TWO FOLDEING HANDLES.
7. THE HOOD SHALL BE UL RATED.

VRF MODULAR OUTDOOR UNIT SCHEDULE

SYMBOL	SERVICE	TYPE	REFRIGERANT	COOLING: NOMINAL MBH (NOTE 3)	COOLING: DESIGN MBH (NOTE 4)	HEATING: NOMINAL MBH (NOTE 5)	HEATING: DESIGN MBH (NOTE 6)	NUMBER OF CONNECTED INDOOR UNITS	CONNECTION RATIO (%)	EER	IEER	COP	VOLT-PHASE	MCA	MOCP	DISCONNECT BY	CONTROLLER/ STARTER BY	REMARKS
CU-1	FCU-1 THRU FCU-18	HEAT RECOVERY	R410A	168	163	189	166	18	109	11	22.5	3.44	208-3	53	70	EC	MFR	NOTES 1, 3, 4, 5, 6

NOTES:
1. UNITS SHALL BE SELECTED FOR DESIGN COOLING LOAD.
2. COORDINATE ELECTRICAL CONNECTIONS WITH MFR. IF UNIT IS SUPPLIED AS MULTIPLE MODULES, EACH MODULE REQUIRES A SEPARATE ELECTRICAL CONNECTION AND DISCONNECT.
3. NOMINAL COOLING CAPACITY RATED AT: INDOOR TEMP = 80°FDB/67°FWB, OUTDOOR TEMP = 95°FDB.
4. DESIGN COOLING CAPACITY SHALL BE RATED AT: INDOOR TEMP = 74°FDB/61.7°FWB, OUTDOOR TEMP = 95°FDB. EFFECTS OF ESTIMATED REFRIGERANT LINE LENGTHS SHALL BE INCLUDED IN COMPUTING DESIGN CAPACITY.
5. NOMINAL HEATING CAPACITY RATED AT: INDOOR TEMP = 70°FDB, OUTDOOR TEMP = 47°FDB/43°FWB.
6. DESIGN HEATING CAPACITY SHALL BE RATED AT: INDOOR TEMP = 70°FDB, OUTDOOR TEMP = 28°FDB. EFFECTS OF ESTIMATED REFRIGERANT LINE LENGTHS AND DEFROSTING SHALL BE INCLUDED IN COMPUTING DESIGN CAPACITY.
7. COORDINATE TWINNING KIT REQUIRED FOR REFRIGERATION PIPING WITH MANUFACTURER.
8. COORDINATE HEAT RECOVERY UNITS (HRU ON PLANS) WITH MANUFACTURER.

GRILLES REGISTERS & DIFFUSERS SCHEDULE

SYMBOL	MAT'L	TYPE	MARGIN (NOTE 1)	INLET SIZE (INCH)	FACE SIZE (INCH)	VOLUME DAMPER REQ'D	FINISH	REMARKS
CD-1	STEEL	PANEL FACE	LAY-IN	SEE DWG.	24x24	INTEGRAL	WHITE	NOTE 3, 5
RG-1	STEEL	35° DEFLECTION	1 1/4"	SEE DWG.	INLET +2	NO	WHITE	NOTE 4, 5
SG-1	STEEL	DOUBLE DEFLECTION	1 1/4"	SEE DWG.	INLET +2	NO	WHITE	NOTE 4, 5
EG-1	STEEL	35° DEFLECTION	1 1/4"	SEE DWG.	INLET +2	NO	WHITE	NOTE 4, 5

NOTES:
1. CONTRACTOR SHALL DETERMINE PROPER MARGIN STYLE TO MATCH CEILING CONSTRUCTION.
2. ALL RUN OUT DUCTWORK TO DIFFUSERS SHALL BE NECK SIZE UNLESS OTHERWISE NOTED.
3. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ADJUSTING HEATING/COOLING SETPOINTS AND ANY OTHER REQUIRED SETUP PROCEDURES FOR A FULLY FUNCTIONING TF SYSTEM.
4. FRONT BLADES VERTICAL UNLESS NOTED OTHERWISE
5. GRILLE/DIFFUSER SHALL HAVE 1 HOUR RATED DAMPER.

LINEAR DIFFUSER SCHEDULE

SYMBOL	MATERIAL	SLOT WIDTH	NO. SLOTS	BAR WIDTH	BAR SPACING	LENGTH FEET	PLENUM REQUIRED	PLENUM INSULATION	PLENUM INLET SIZE	PATTERN CONTROL REQUIRED	BALANCING DAMPER REQUIRED	FINISH	REMARKS
LD-1	ALUMINUM	1.5"	1	N/A	N/A	4	YES	LINED	SEE DWG.	YES	NOTE 4	WHITE	NOTE 1, 2 & 3

NOTES:
1. CONTRACTOR SHALL DETERMINE PROPER MARGIN STYLE TO MATCH CEILING CONSTRUCTION.
2. PROVIDE WITH CONCEALED FASTENERS.
3. DIFFUSERS WITH MULTIPLE SLOTS SHALL HAVE THE INNER MOST SLOT DIRECTED TOWARDS THE INTERIOR OF THE BUILDING, THE REMAINING SHALL BE DIRECTED TOWARDS THE EXTERIOR UNLESS NOTED OTHERWISE.

HEAT RECOVERY WHEEL SCHEDULE

SYMBOL	SERVICE	OA (CFM)	EA (CFM)	SUMMER: OA TEMP ° FDB	SUMMER: OA TEMP ° FWB	SUMMER: RA TEMP ° FDB	SUMMER: RA TEMP ° FWB	SUMMER: TEMPERED AIR ° FDB	SUMMER: TEMPERED AIR ° FWB	WINTER: OA TEMP ° FDB	WINTER: OA TEMP ° FWB	WINTER: RA TEMP ° FDB	WINTER: RA TEMP ° FWB	WINTER: TEMPERED AIR ° FDB	MANUFACTURER	MODEL	REMARKS
ERW-1	DOAS-1	2,850	2,500	92.0	75.0	75.0	62.5	80.9	67.6	-16.0	-16.1	70.0	46.8	37.1	SAME AS DOAS-1	INTEGRAL TO DOAS-1	

NOTES:
1. VFD SHALL BE PROVIDED BY AHU MANUFACTURER AND WIRED BY ELECTRICAL CONTRACTOR.

HOOD & LOUVERED PENTHOUSE SCHEDULE

SYMBOL	SERVICE	CFM	THROAT VELOCITY	STATIC PRESSURE (IN W.C.)	FREE AREA (FT2)	TYPE	MAX. HEIGHT (TOP OF CURB TO TOP OF EQUIPMENT)	DAMPER TYPE	CURB	REMARKS
IH-1	INTAKE	2,700	673	0.08	3.24	ROOF HOOD	18	GRAVITY	PITCHED ROOF	
IH-2	INTAKE	495	543	0.05	.82	ROOF HOOD	18	GRAVITY	PITCHED ROOF	
RH-1	EXHAUST DISCHARGE	1,650	969	0.12	2.25	ROOF HOOD	18	GRAVITY	PITCHED ROOF	

AIR COOLED CONDENSER SCHEDULE

SYMBOL	SERVICE	REFRIGERANT	AMBIENT TEMPERATURE	DESIGN TONS	NO. OF CIRCUITS	NO. OF FANS	ELECTRICAL: VOLT - PHASE	ELECTRICAL: MCA	ELECTRICAL: MOCP AMPS	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)	CONTROLLER/ STARTER BY (NOTE A)	CONTROLLER/ STARTER SCCR	MANUFACTURER	CONDENSING EER	EER	IEER	COMBINED EFFICIENCY	REMARKS
ACC-1	DOAS-1	R-410A	95 F	10	1	1	208-3	5.3	10	MFR	NF	MFR	5kA	SAME AS DOAS-1	10.9	10.4	11.7	14.7	

NOTES:
1. PROVIDE MODULATING COMPRESSORS.

FAN SCHEDULE

SYMBOL	SERVICE	CFM	S.P. IN. W.C.	WHEEL DIA. INCHES	FAN RPM (NOTE F)	DRIVE	MAX. AMCA SONES	BACKDRAFT DAMPER	CURB TYPE (NOTE G)	ELECTRICAL: BHP (NOTE E)	ELECTRICAL: MHP (NOTE E)	ELECTRICAL: VOLT-PHASE	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)	CONTROLLER/STARTER BY (NOTE A)	CONTROLLER/STARTER TYPE (NOTE C)	REMARKS
EF-1	EH-1	800	.75	19.0	2,251	BELT	14	NONE	PITCHED ROOF	0.370	0.500	120-1	MFR	NF	MFR	FV	NOTES 1, 2, 3, 4
EF-2	GARAGE	445	.5	10.0	1,550	DIRECT	11.3	MOD	N/A	105 W	0.025	120-1	MFR	NF	TCC	NOTE 5	

NOTES:
1. UNIT SHALL BE UL 762 LISTED.
2. UNIT SHALL BE CAPABLE OF HIGH HEAT OPERATION.
3. PROVIDE FAN WITH GREASE TRAP AND DRAIN.
4. FAN SHALL BE INTERLOCKED WITH DOAS-1. SEE CONTROL DIAGRAM ON SHEET 1-M-501.
5. FAN SHALL BE CONTROLLED BY WALL MOUNTED CARBON MONOXIDE SENSORS LOCATED IN GARAGE. MFR PROVIDED DAMPER, OUTLET HOOD, AND FAN BOX.

MOTOR OPERATED DAMPER SCHEDULE

SYMBOL	SERVICE	SIZE W x H (IN.)	CFM MAX.	CFM MIN.	OPPOSED OR PARALLEL BLADES	HORIZONTAL OR VERTICAL BLADES	INSULATED	ACTUATOR TYPE	ACTUATOR STYLE	POWER FAILURE POSITION	POSITIVE POSITION FEEDBACK	REMARKS
MOD-1	GENERAL EXHAUST	22 x 8	800	0	PARALLEL	HORIZONTAL	YES	ELECTRIC	2-POSITION	NO	YES	NOTE 1

NOTES:
1. COORDINATE DAMPER ACTUATOR LOCATION AND MOUNTING REQUIREMENTS WITH TEMPERATURE CONTROL CONTRACTOR.

Construction Documents

Revisions: | Date

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Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: MECHANICAL SCHEDULES

Project Name: VA Tomah CLC Homes

Project Number: 676-324

Date: 12/16/2016

Location: TOMAH VAMC
500 E. VETERANS STREET
TOMAH, WI. 54660

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Drawing Number: 1-M-601

Dwg.

Office of Construction and Facilities Management

VA FORM 08-6231

HOT WATER BOILER SCHEDULE

SYMBOL	FUEL	INLET FUEL PRESSURE	TURNDOWN RATIO	INPUT MBH	OUTPUT MBH	EWT °F	LWT °F	OPERATING PRESSURE	ELECTRICAL				AFUE	REMARKS
									AMPS	VOLT-PHASE	DISCONNECT BY (NOTE A)	CONTROLLER/STARTER BY (NOTE A)		
BLR-1	NATURAL GAS	7" WC	5:1	399	377	105	140	25	15	120-1	EC	MFR	95%	
BLR-2	NATURAL GAS	7" WC	5:1	399	377	105	140	25	15	120-1	EC	MFR	95%	

1. WALL HUNG
2. MINIMUM EFFICIENCY IS 95%
3. FACTORY PROVIDED BOILER CIRCULATION PUMP, P-1.
4. FACTORY PROVIDED BOILER CIRCULATION PUMP, P-2.
5. BASED ON 30% PROPYLENE GLYCOL
6. PROVIDE CONDENSATE NEUTRALIZER KIT.

PUMP SCHEDULE

SYMBOL	SERVICE	GPM	PUMP FT. HEAD AT DESIGN	MIMIMUM PUMP EFFICIENCY	ELECTRICAL						REMARKS
					HP (NOTE E)	RPM	VOLT-PHASE	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)	CONTROLLER/STARTER BY (NOTE A)	CONTROLLER/STARTER TYPE (NOTE C)	
P-3	HOT WATER	43.0	30	0.6	0.75	1,725	120-1	EC	NF	MFR	VFD	NOTE 1, 4, 6
P-4	HOT WATER	43.0	30	0.6	0.75	1,725	120-1	EC	NF	MFR	VFD	NOTE 1, 4, 6
P-5	RADIANT FLOOR MANIFOLDS	19.0	15	0.5	0.17	-	120-1	EC	NF	MFR	VFD	NOTES 2-6
P-6	RADIANT FLOOR MANIFOLDS	19.0	15	0.5	0.17	-	120-1	EC	NF	MFR	VFD	NOTES 2-6

NOTES:
1. PROVIDE SHAFT GROUNDING AS REQUIRED IN THE MOTOR SPECIFICATION 23 05 13.
2. CAST IRON BODY INLINE WET ROTOR CIRCULATOR
3. CAST IRON NPT FLANGE SET
4. ECM MOTOR W/ SELF CONTAINED VFD
5. PROPORTIONAL PRESSURE CONTROL
6. BASED ON 30% PROPYLENE GLYCOL

UNIT HEATER SCHEDULE - HOT WATER

SYMBOL	SERVICE	TYPE	CFM	MBH	GPM	EWT °F	LWT °F	W.P.D. FT. HEAD	ELECTRICAL					CONTROL	REMARKS
									HP	RPM	VOLT-PHASE	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)		
UH-1	GARAGE	HORIZONTAL	1,775	50.7	5.9	140	110	1.4	1/5	1,075	120-1	MFR	NF	NOTE 1	
UH-2	ATTIC MECH ROOM	HORIZONTAL	370	8.8	1.0	140	110	0.3	1/25	1,550	120-1	MFR	NF	NOTE 1	
UH-3	BUILDING 412 STORAGE ROOM	HORIZONTAL	340	6.9	0.8	140	110	0.2	1/60	1,550	120-1	MFR	NF	NOTE 1	

NOTES:
1. PROVIDE WALL MOUNTED THERMOSTAT. SEE CONTROL DIAGRAM ON 1-M-501.
2. BASED ON 30% PROPYLENE GLYCOL

CABINET HEATER SCHEDULE - HOT WATER

SYMBOL	SERVICE	TYPE	NOMINAL CFM	MBH	GPM	EWT °F	LWT °F	MAX. W.P.D. FT. HEAD	CONTROL	CABINET			ELECTRICAL				REMARKS
										H	W	D	FAN HP	VOLT/ PHASE	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)	CONTROLLER/ STARTER BY (NOTE A)	
CAB-1	VESTIBULE 100	SURFACE WALL MOUNT	450	26	3.0	140	110	2.9	NOTE 2	25	48-3/4	9-3/4	.05	120-1	MFR	NF	MFR	NOTE 1. 3
CAB-2	VESTIBULE 117	RECESSED WALL MOUNT	250	13	1.5	140	110	1.5	NOTE 2	25	38-3/4	9-3/4	.03	120-1	MFR	NF	MFR	NOTE 1, 3

NOTES:
1. COORDINATE COLOR SELECTION WITH ARCHITECT.
2. MFR. PROVIDED UNIT MOUNTED THERMOSTAT.
3. HIGH CAPACITY TWO ROW COIL
4. BASED ON 30% PROPYLENE GLYCOL

DUCT MOUNTED HOT WATER COIL

SYMBOL	SERVICE	CFM	MBH	GPM	EWT °F	LWT °F	EAT °F	LAT °F	LENGTH	WIDTH	VELOCITY	CONTROL
HC-1	FCU-6	1,000	10	0.7	140	110	72	81	20"	12"	700	NOTE 1

NOTES:
1. PROVIDE WALL MOUNTED THERMOSTAT. SEE CONTROL DIAGRAM ON 1-M-501.
2. BASED ON 30% PROPYLENE GLYCOL

HUMIDIFIER SCHEDULE - ELECTRIC

SYMBOL	SERVICE	CAPACITY LB/HR	DUCT SIZE	ELECTRICAL					REMARKS
				FLA	VOLT-PHASE	DISCONNECT BY (NOTE A)	DISCONNECT TYPE (NOTE B)	CONTROLLER/STARTER BY (NOTE A)	
SH-1	DOAS-1	70	28x14	67.0	208-3	MFR	NF	NOTE 1	NOTE 2

NOTES:
1. CONTROLLED BY DOAS-1. REFER TO CONTROL DIAGRAMS ON 1-M-501.
2. REFER TO SPEC SECTION 23 22 18 FOR MORE INFORMATION.

HYDRONIC RADIANT PANEL

SYMBOL	SERVICE	TYPE	QTY.	MBH	GPM	MATERIAL	AVERAGE WATER TEMP, °F	W.P.D. FT. HEAD	DIMENSIONS		CONTROL	REMARKS
									LENGTH	WIDTH		
HRP-1	105A, 106A, 109, 114A, 115A	SURFACE MOUNT, MODULAR	6	.7	0.5	ALUMINUM	125	0.23	4'	2'	NOTE 2	
HRP-2	105A, 106A, 115A	SURFACE MOUNT, MODULAR	3	.35	0.5	ALUMINUM	125	0.2	2'	2'	NOTE 2	

NOTES:
1. PERFORMANCE BASED ON 70°F AIR TEMPERATURE AND NATURAL CONVECTION.
2. REMOTE THERMOSTAT.
3. BASED ON 30% PROPYLENE GLYCOL

RADIANT - MANIFOLDS

SYMBOL	LOCATION	SERVING	#LOOPS	RAUPEX	LENGTH	SPACING	NOTES
M-1	SEE PLAN	ZONE 1, 2, & 3	3	1/2"	325'	12"	1-8
M-2	SEE PLAN	ZONE 4 & 5	2	1/2"	325'	12"	1-8
M-3	SEE PLAN	ZONE 6	2	1/2"	325'	12"	1-8
M-4	SEE PLAN	ZONE 7, 8, & 9	3	1/2"	325'	12"	1-8
M-5	SEE PLAN	ZONE 10, 11 & 12	3	1/2"	325'	12"	1-8
M-6	SEE PLAN	ZONE 13 & 14	2	1/2"	325'	12"	1-8
M-7	SEE PLAN	ZONE 14 & 15	3	1/2"	325'	12"	1-8

NOTES:
1. REHAU RAUPEX O2 BARRIER PEXA PIPE
2. REHAU PRO-BALANCE MANIFOLDS WITH COMPLETE AND INDIVIDUAL CIRCUIT ISOLATION AND BALANCING
3. ALL BURIED AND ADAPTER INTERCONNECTING JOINTS TO USE EVERLOC FITTING SYSTEM
4. PROVIDE POLYMER/PVC PIPE BENDS OR EVERLOC ELBOWS FOR EACH TRANSITION IN/OUT OF SLAB
5. PROVIDE MANIFOLD MOUNTED ACTUATORS FOR EACH LOOP
6. PROVIDE ZONE VALVE/ACTUATOR FOR EACH MANIFOLD
7. REHAU PROGRAMMABLE THERMOSTAT
8. LOCATE MANIFOLD WITHIN WALL CAVITY AND PROVIDE ACCESS PANEL FOR SERVICE.
9. BASED ON 30% PROPYLENE GLYCOL

ZONE	SERVICE	AREA (SF)	TYPE	INSTALL	BTU/HR	BTU/HR/SF	RAUPEX SIZE	SPACING (IN)	LOOP LENGTH (FT)	# LOOPS	GPM PER LOOP	PD (FT-HD)	MANIFOLD	NOTES
1	102,102A	322	RADIANT	SLAB	7,183	22	1/2"	12	325	1	0.7	7.1	M-1	1,2
2	103,103A	322	RADIANT	SLAB	7,183	22	1/2"	12	325	1	0.7	7.1	M-1	1,2
3	104,104A	301	RADIANT	SLAB	9,257	31	1/2"	12	325	1	0.9	10.8	M01	1,2
4	105,105A	247	RADIANT	SLAB	10,043	41	1/2"	12	250	1	1.0	10.0	M-2	1,2
5	106,106A	317	RADIANT	SLAB	10,043	32	1/2"	12	325	1	1.0	8.1	M-2	1,2
6	108_HEARTH ROOM	529	RADIANT	SLAB	28,514	40	1/2"	12	300	2	1.1	9.5	M-3	1,2
7	109_DEN	206	RADIANT	SLAB	11,312	40	1/2"	12	250	1	0.8	6.9	M-4	1,2
8	110,110A	302	RADIANT	SLAB	7,322	24	1/2"	12	325	1	0.7	7.1	M-4	1,2
9	111,111A	315	RADIANT	SLAB	7,323	23	1/2"	12	325	1	0.7	7.1	M-4	1,2
10	112,112A	319	RADIANT	SLAB	7,322	23	1/2"	12	325	1	0.7	7.1	M-5	1,2
11	113,113A	310	RADIANT	SLAB	7,723	25	1/2"	12	325	1	0.8	8.8	M-5	1,2
12	114_SPA	222	RADIANT	SLAB	10,174	40	1/2"	12	250	1	0.9	8.4	M-5	1,2
13	115,15A	223	RADIANT	SLAB	10,990	40	1/2"	12	250	1	0.9	8.4	M-6	1,2
14	116_OFFICE AND 117_NORTH_CORRIDOR	135	RADIANT	SLAB	5,769	43	1/2"	12	150	1	0.4	2.0	M-6	1,2,3
14	117_NORTH_CORRIDOR	40	RADIANT	SLAB	1,734	43	1/2"	12	100	1	0.4	2.0	M-6	1,2,4
15	121_DINING	600	RADIANT	SLAB	8,368	14	1/2"	12	325	2	0.4	2.9	M-7	1,2
16	122_KITCHEN	280	RADIANT	SLAB	6,699	24	1/2"	12	325	1	0.7	7.1	M-7	1,2

NOTES:
1. ZONE TO BE CONTROLLED VIA VRF CONTROLS AND FMCS AND HIGH LIMIT SLAB TEMPERATURE SENSOR. MAXIMUM FLOOR TEMPERATURE IS 85 F.
2. BASED ON 120 F HWS AND 30% PROPYLENE GLYCOL
3. FOR BUILDING 411
4. FOR BUILDING 412
5. TUBE SPACING, SIZE, AND LENGTH SHALL BE CALCULATED BASED ON ACTUAL INSTALLATION.

SCHEDULE GENERAL NOTES:

UNLESS NOTED OTHERWISE, MECHANICAL SCHEDULES ARE TYPICAL FOR BOTH BUILDINGS 411 AND 412.

A. DISCONNECT AND CONTROLLER STARTER FURNISHED AND INSTALLED BY:
- MFR = MANUFACTURER
- EC = ELECTRICAL CONTRACTOR.
- MC = FURNISHED BY MECHANICAL CONTRACTOR, INSTALLED BY ELECTRICAL CONTRACTOR
- MFR/EC = FURNISHED LOOSE BY MANUFACTURER INSTALLED BY ELECTRICAL CONTRACTOR
- ATC = AUTOMATIC TEMPERATURE CONTROL CONTRACTOR

B. DISCONNECT TYPE:
- F = FUSED
- NF = NON-FUSED

C. CONTROLLER STARTER TYPE:
- FV = FULL VOLTAGE
- WYE = WYE-DELTA
- SS = SOLID STATE (SOFT START)
- MS = MANUAL STARTER
- VFD = VARIABLE FREQUENCY DRIVE
- VFD/B = VARIABLE FREQUENCY DRIVE WITH BYPASS

D. FAN RPM SHALL NOT EXCEED 110% OF SCHEDULED VALUE, WITH THE SCHEDULED WHEEL TYPE. SUBSTITUTION OF BI OR BIA FANS FANS FOR FC IS ACCEPTABLE IF EFFICIENCY IS NOT LOWER.

E. NO EQUIPMENT SHALL BE SELECTED ABOVE 90% OF MOTOR NAME PLATE RATING.

F. MUST BE WITHIN +/- 10% OF SCHEDULED RPM.

G. CURB TYPE:
- MFR = STANDARD CURB BY MANUFACTURER
- GC = BY GENERAL CONTRACTOR
- SAC = SOUND ATTENUATOR CURB

three inches = one foot
one and one half inches = one foot
one inch = one foot
three quarters inch = one foot
one half inch = one foot
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot

Construction Documents

Revisions:	Date

LEWIS D. HAMILTON 062-044083 REGISTERED PROFESSIONAL ENGINEER STATE OF ILLINOIS
EXP. 11/30/2017

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Approved: Chief of MH	Approved: Chief of FMS
Date:	Date:
Approved: Director	Approved: VA Energy Engineer
Date:	Date:

Drawing Title: MECHANICAL SCHEDULES

Project Name: VA Tomah CLC Homes

Project Number: 676-324

Date: 12/16/2016

Location: TOMAH VAMC
500 E. VETERANS STREET
TOMAH, WI. 54660

Building Number: 411 & 412 | Checked: RHC | Drawn: MAG

Drawing Number: 1-M-602

Dwg.

Office of Construction and Facilities Management

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