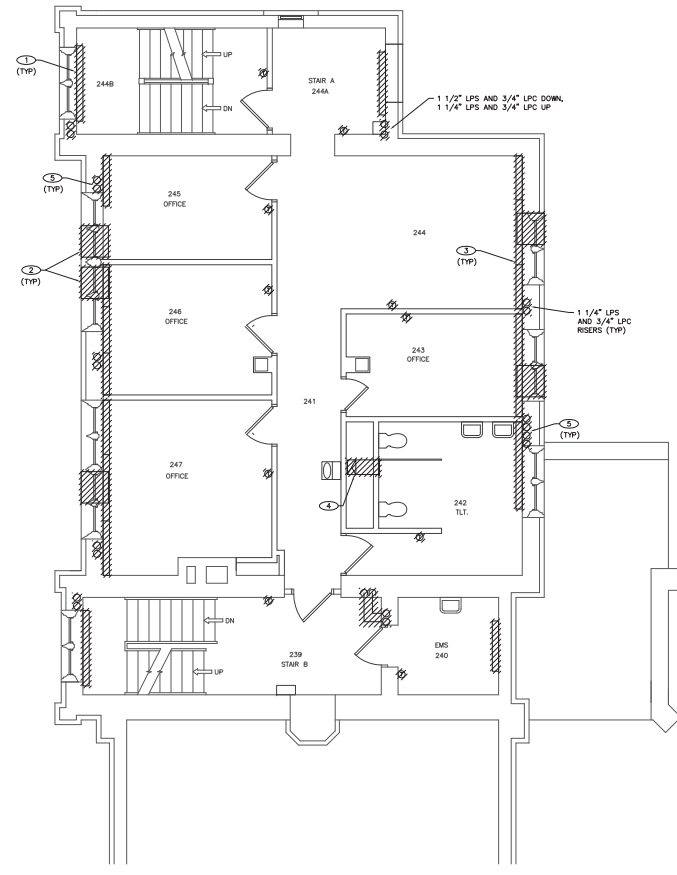
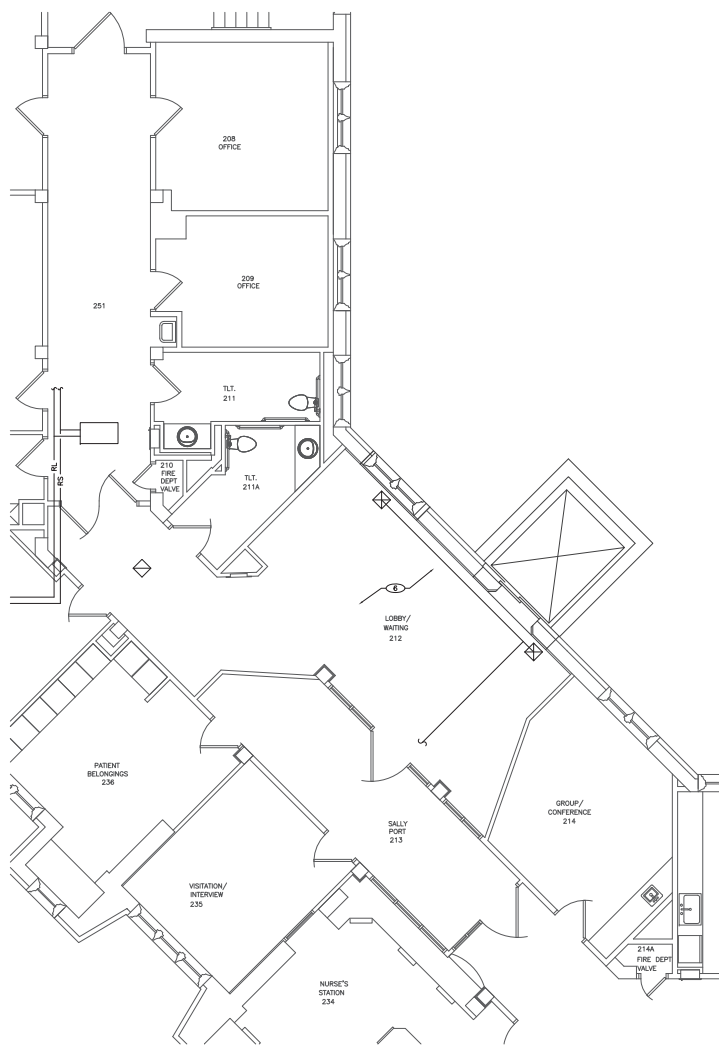
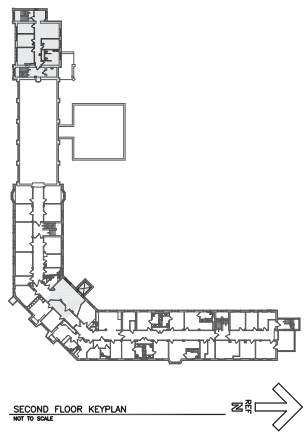


- MECHANICAL KEYNOTES: (○)**
- 1 REMOVE EXISTING FINITURE, SUPPORTS AND CONTROLS IN THEIR ENTIRETY. REMOVE ALL ASSOCIATED PIPING.
  - 2 REMOVE EXISTING PTAC, SUPPORTS AND CONTROLS IN THEIR ENTIRETY.
  - 3 REMOVE EXISTING STEAM RADIATOR, SUPPORTS AND CONTROLS IN THEIR ENTIRETY. REMOVE ALL ASSOCIATED PIPING.
  - 4 REMOVE EXISTING EXHAUST DUCTWORK, GRILLE AND SUPPORTS IN THEIR ENTIRETY.
  - 5 REMOVE EXISTING STEAM AND CONDENSATE PIPING IN ITS ENTIRETY.
  - 6 NO MECHANICAL DEMOLITION WORK REQUIRED IN THIS AREA OF SECOND FLOOR.



NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



1F ENLARGED MECHANICAL DEMOLITION PLAN - SECOND FLOOR  
SCALE: 1/4" = 1'-0"

5F ENLARGED MECHANICAL DEMOLITION PLAN - SECOND FLOOR  
SCALE: 1/4" = 1'-0"

SECOND FLOOR KEYPLAN  
NOT TO SCALE

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BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revit/Revit	DWG

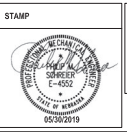
**CONSULTANT**

**FARRIS ENGINEERING**  
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FEI #: 182083  
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(402) 291-9961

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**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

Drawing Title:  
**SECOND FLOOR MECHANICAL DEMOLITION PLANS**

Approved Project Director

Phase:  
**BID DOCUMENTS**

FULLY SPRINKLERED

Project Title:  
**RENOVATE TOWER BUILDING 1**

Location:  
**Sioux Falls, SD 57105**

Issue Date:  
05/06/2019

Checked:  
JOB

Drawn:  
LMB

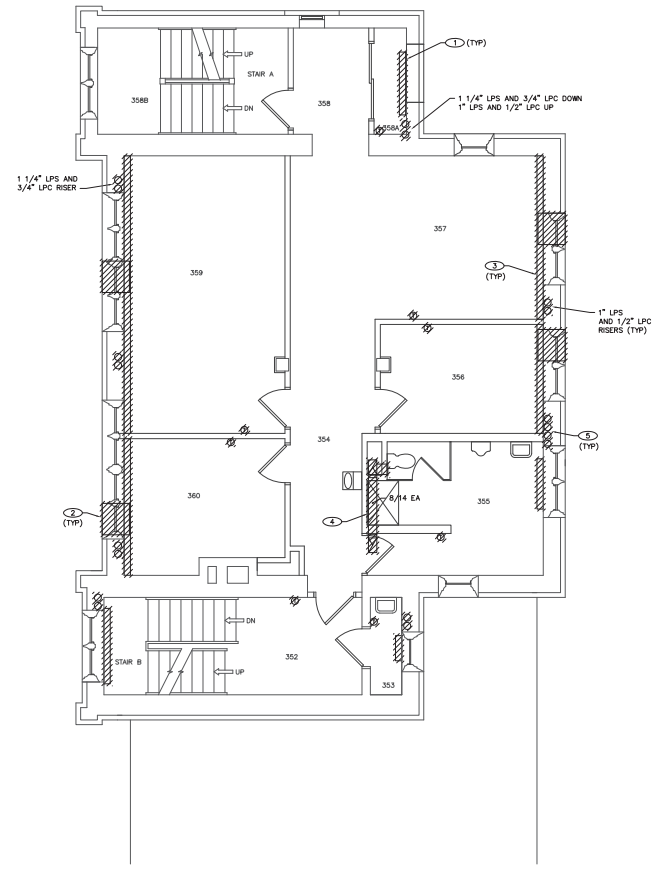
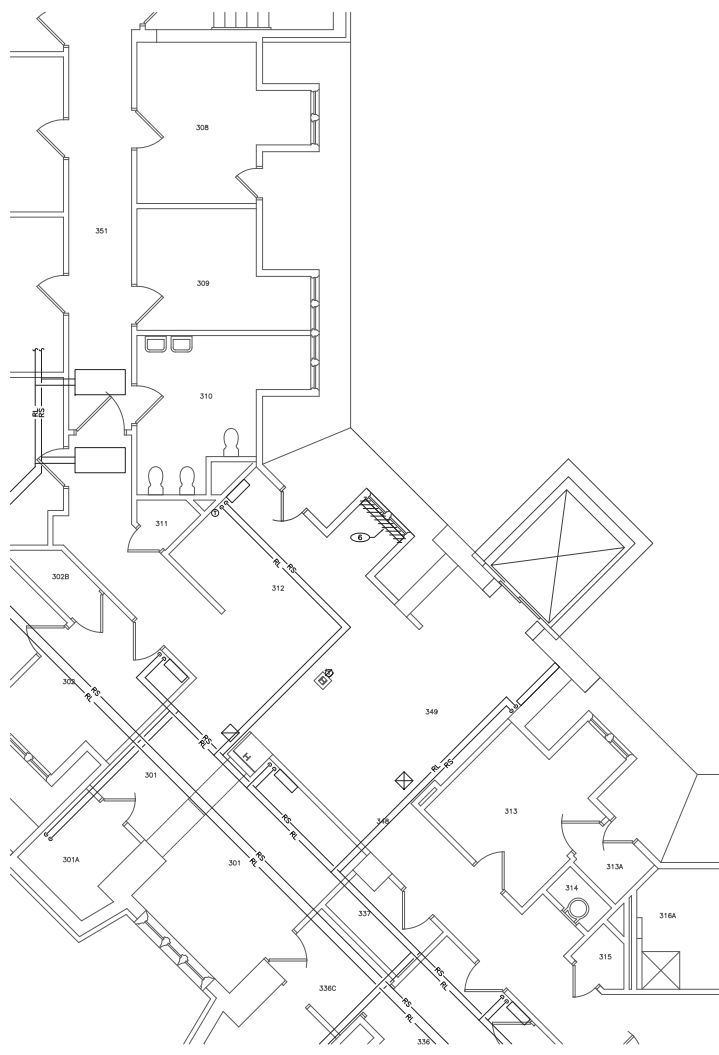
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**438-18-102**

Revision Number:  
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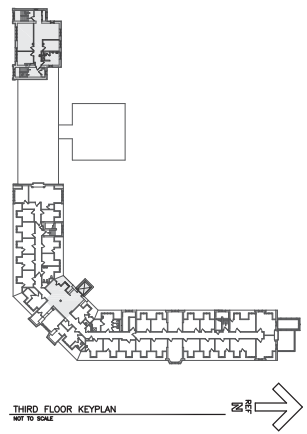
Drawing Number:  
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**MECHANICAL KEYNOTES: (○)**

- ① REMOVE EXISTING FINITURE, SUPPORTS AND CONTROLS IN THEIR ENTIRETY. REMOVE ALL ASSOCIATED PIPING.
- ② REMOVE EXISTING PTAC, SUPPORTS AND CONTROLS IN THEIR ENTIRETY.
- ③ REMOVE EXISTING STEAM RADIATOR, SUPPORTS AND CONTROLS IN THEIR ENTIRETY. REMOVE ALL ASSOCIATED PIPING.
- ④ REMOVE EXISTING EXHAUST DUCTWORK, GRILLE AND SUPPORTS IN THEIR ENTIRETY.
- ⑤ REMOVE EXISTING STEAM AND CONDENSATE PIPING IN ITS ENTIRETY.
- ⑥ REMOVE EXISTING RADIATOR, SUPPORTS AND CONTROLS IN THEIR ENTIRETY. REMOVE PIPING BACK TO MAIN AND CAP.



NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



1F ENLARGED MECHANICAL DEMOLITION PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"

5F ENLARGED MECHANICAL DEMOLITION PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"

THIRD FLOOR KEYPLAN  
NOT TO SCALE

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VA FORM 08-4221

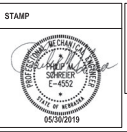
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Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revisions:	Danc

**CONSULTANT**

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CORPORATE: 402.491.8283

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Office of Construction and Facilities Management  
VA U.S. Department of Veterans Affairs

Drawing Title  
**THIRD FLOOR MECHANICAL DEMOLITION PLANS**  
Approved Project Director

Phase  
**BID DOCUMENTS**

FULLY SPRINKLERED

Project Title  
**RENOVATE TOWER BUILDING 1**

Location  
StouX Falls, SD 57105

Issue Date  
05/06/2019

Checked  
JOB

Drawn  
LMB

Project Number  
438-18-102

Drawing Number  
1

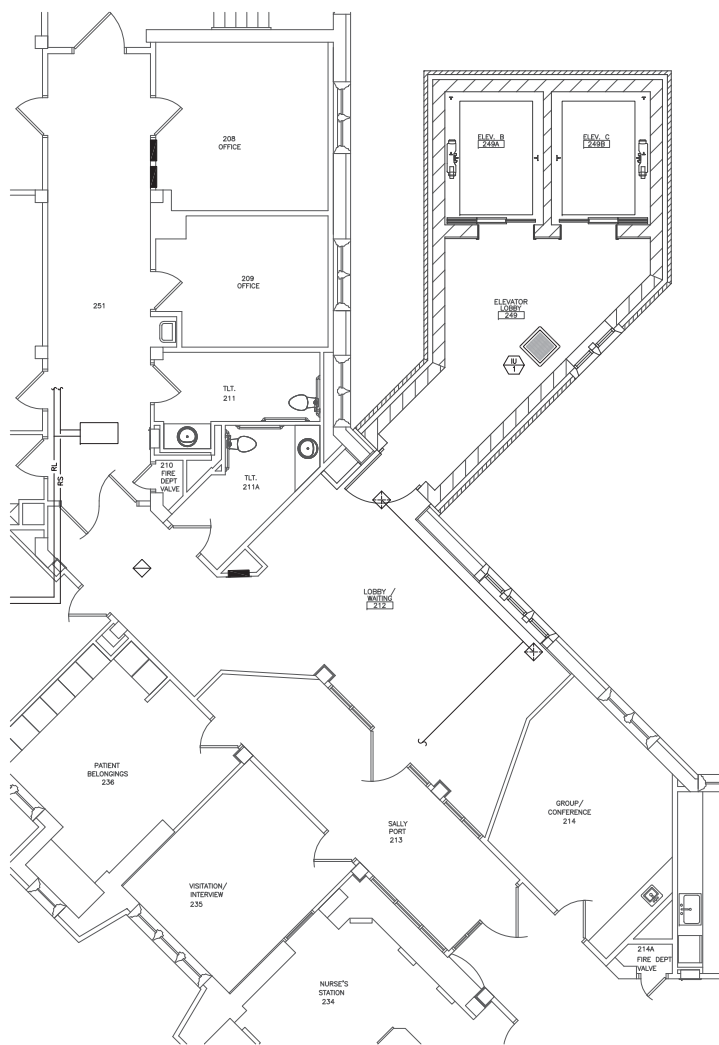
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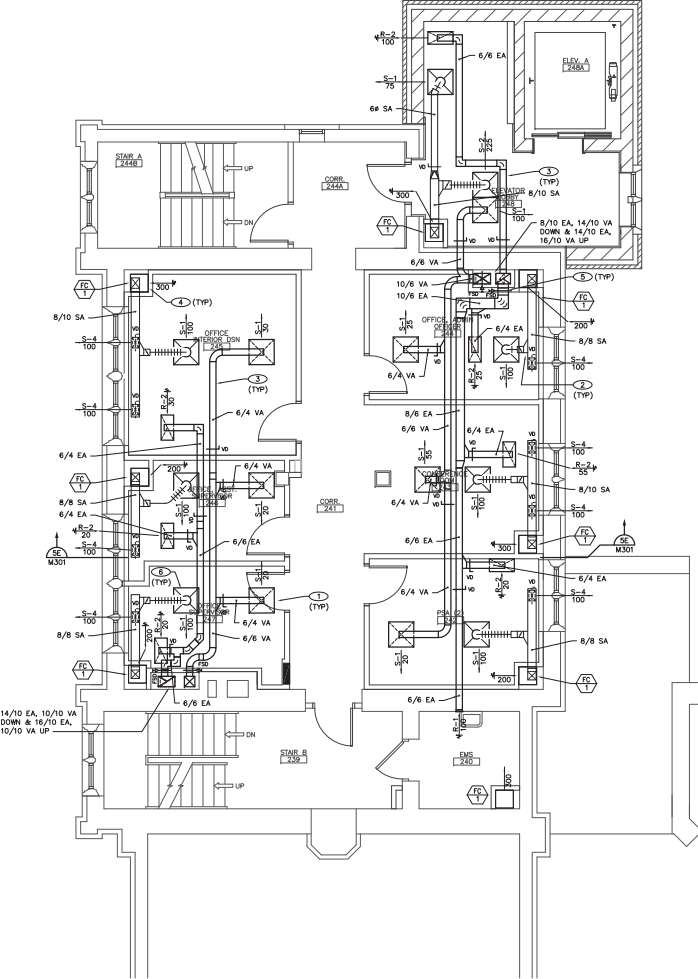




- MECHANICAL KEYNOTES:** (○)
- ① REFER TO DIFFUSER CONNECTION DETAIL 1/M501.
  - ② REFER TO TYPICAL LOW PRESSURE DUCT DETAIL 2/M501.
  - ③ REFER TO DUCTWORK HANGERS DETAIL 3/M501.
  - ④ RETURN GRILLE INTEGRAL WITH FAN COIL UNIT.
  - ⑤ REFER TO FIRE DAMPER INSTALLATION DETAIL 3/M502 AND ACCESS DOOR DETAIL 4/M502.
  - ⑥ BRANCH DUCT SIZE SHALL MATCH DIFFUSER NECK SIZE, UNLESS NOTED OTHERWISE.

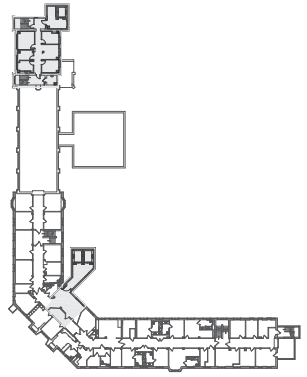


1F ENLARGED HVAC PLAN - SECOND FLOOR  
SCALE: 1/4" = 1'-0"



5F ENLARGED HVAC PLAN - SECOND FLOOR  
SCALE: 1/4" = 1'-0"

NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



SECOND FLOOR KEYPLAN  
NOT TO SCALE

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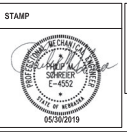
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Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revised:	Date:

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farris-engineering.com  
FEI # 182083

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**Chilcote Hill**  
3102 North 20th Street  
Elkhorn, Nebraska 68022  
(402) 291-9961



**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

Drawing Title:  
**SECOND FLOOR HVAC PLANS**

Approve: Project Director

Phase:  
**BID DOCUMENTS**

FULLY SPRINKLERED

Project Title:  
**RENOVATE TOWER BUILDING 1**

Location:  
Stoux Falls, SD 57105

Project Number:  
438-18-102

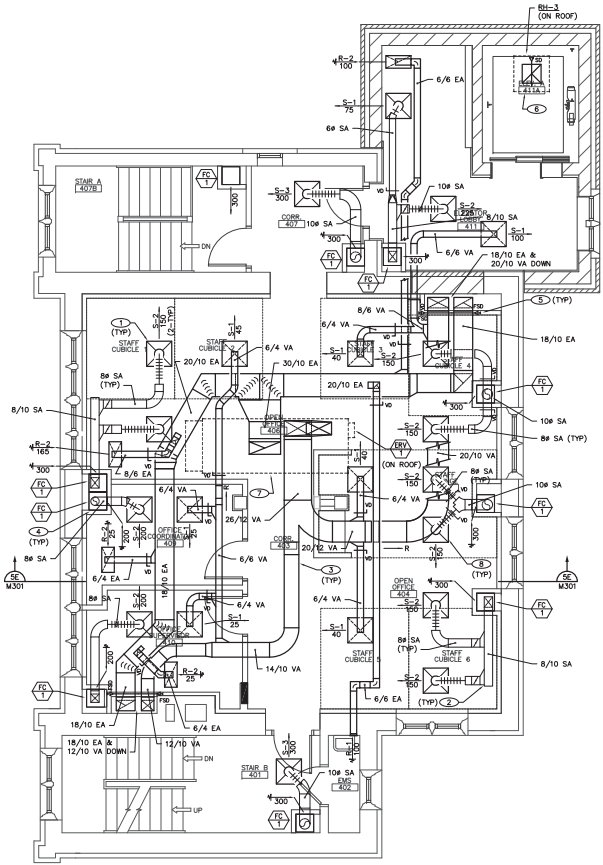
Drawing Number:  
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MH102



**MECHANICAL KEYNOTES:** (○)

- ① REFER TO DIFFUSER CONNECTION DETAIL 1/M501.
- ② REFER TO TYPICAL LOW PRESSURE DUCT DETAIL 2/M501.
- ③ REFER TO DUCTWORK HANGERS DETAIL 3/M501.
- ④ RETURN GRILLE INTEGRAL WITH FAN COIL UNIT.
- ⑤ REFER TO FIRE DAMPER INSTALLATION DETAIL 3/M502 AND ACCESS DOOR DETAIL 4/M502.
- ⑥ RELIEF HOOD FOR ELEVATOR SHAFT. REFER TO RELIEF HOOD DETAIL 6/M501.
- ⑦ REFER TO ROOFTOP UNIT SOUND ATTENUATION DETAIL 13/M501.
- ⑧ BRANCH DUCT SIZE SHALL MATCH DIFFUSER NECK SIZE, UNLESS NOTED OTHERWISE.



NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



ENLARGED HVAC PLAN - FOURTH FLOOR  
SCALE: 1/4" = 1'-0"

FOURTH FLOOR KEYPLAN  
NOT TO SCALE

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BM Documents	05/30/2019																												
Contract Documents 100% Submittal (CD)	05/14/2019																												
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Schematic Design (SD)	10/05/2018																												
Revisions:	Date:																												
								<p>Checked: JOB</p>		<p>Drawn: LMB</p>																			

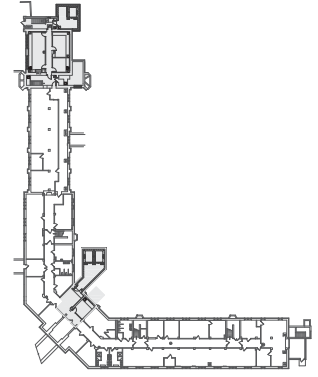
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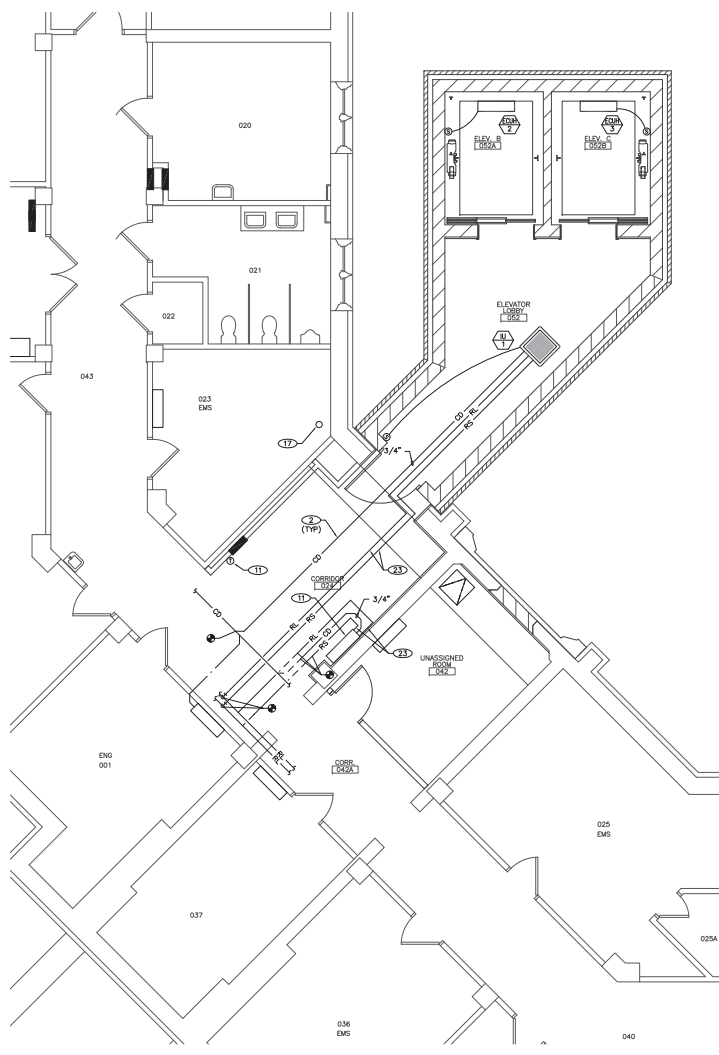
**MECHANICAL KEYNOTES: (C)**

- 1 REFER TO CONDENSATE DRAIN DETAIL 5/M502.
- 2 PROVIDE AND INSTALL CLEANOUTS FOR THE CONDENSATE PIPING AT EVERY 50 FEET AND AT EVERY CHANGE IN DIRECTION.
- 3 REFER TO PIPE INSULATION DETAIL 4/M501.
- 4 REFER TO FAN COOL PIPING INSTALLATION DETAIL 5/M501.
- 5 REFER TO STEAM TO HOT WATER CONVERTER DETAIL 7/M501.
- 6 REFER TO BASE MOUNTED END SUCTION PUMP DETAIL 8/M501.
- 7 REFER TO HOT WATER EXPANSION TANK & AIR SEPARATOR DETAIL 9/M501.
- 8 REFER TO MAKE-UP WATER CONNECTION DETAIL 11/M501.
- 9 REFER TO POT FEEDER DETAIL 12/M501.
- 10 REFER TO HOT WATER HEATING PIPING SCHEMATIC 1/M502.
- 11 RELOCATE EXISTING VEV UNIT AND CONTROLS TO LOCATION SHOWN. EXTEND CONDENSATE AND REFRIGERANT PIPING, AS REQUIRED.
- 12 ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR SERVING FAN COIL INSIDE WALL AND DOWN TO FAN COIL. PROVIDE AND INSTALL SHUTOFF VALVES AT EACH FAN COIL UNIT.
- 13 PIPING TO SERVE FAN COIL ABOVE ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR UP THIS FLOOR TO FAN COIL.
- 14 SENSOR PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR COORDINATE WITH ALL TRACES. SENSOR SHALL BE ADJUSTABLE BY OCCUPANT. VERIFY WITH COR PRIOR TO SHOP DRAWINGS.
- 15 SEE HOT WATER HEATING PIPING SCHEMATIC 1/M502 FOR ADDITIONAL INFORMATION.
- 16 PROVIDE END OF LINE DRIP. REFER TO END OF STEAM LINE DRIP TRAP DETAIL 12/M502 FOR ADDITIONAL INFORMATION.
- 17 RELOCATE EXISTING STEAM CONTROL VALVE IN TUNNEL.
- 18 INSTALL CONCRETE EQUIPMENT PAD. COORDINATE WITH GENERAL CONTRACTOR.
- 19 PROVIDE AND INSTALL TEMPERATURE CONTROL PANEL.
- 20 SEE HOT WATER UNIT HEATER DETAIL 2/M502 FOR ADDITIONAL INFORMATION.
- 21 SEE DETAILS 6,7,8,9,10,11/M502 FOR HYDRONIC ACCESSORIES.
- 22 INSTALL FAN COIL PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL SERVICE CLEARANCES.
- 23 SIZE AND ROUTE RS/RP PIPING PER MANUFACTURER'S RECOMMENDATIONS.
- 24 REFER TO TYPICAL FLOOR PENETRATION DETAIL 13/M502.
- 25 REFER TO TYPICAL MECHANICAL PAD DETAIL 14/M502.
- 26 ROUTE 1 1/4" CONDENSATE DRAIN TO FLOOR DRAIN IN MECHANICAL ROOM.
- 27 REFER TO CHILLER PIPING DETAIL 10/M501.
- 28 COORDINATE WITH GENERAL CONTRACTOR FOR EQUIPMENT PAD.
- 29 DASHED LINE INDICATED MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL CLEARANCES.
- 30 PROVIDE ELECTRIC HEAT TRACE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. COORDINATE WITH ELECTRICAL CONTRACTOR.
- 31 PROVIDE PIPE SUPPORT PER SPECIFICATIONS. SUPPORT PIPING FROM CONCRETE PAD.
- 32 PROVIDE CHILLED WATER BYPASS VALVE. MINIMUM FLOW SHALL BE 30 GPM.

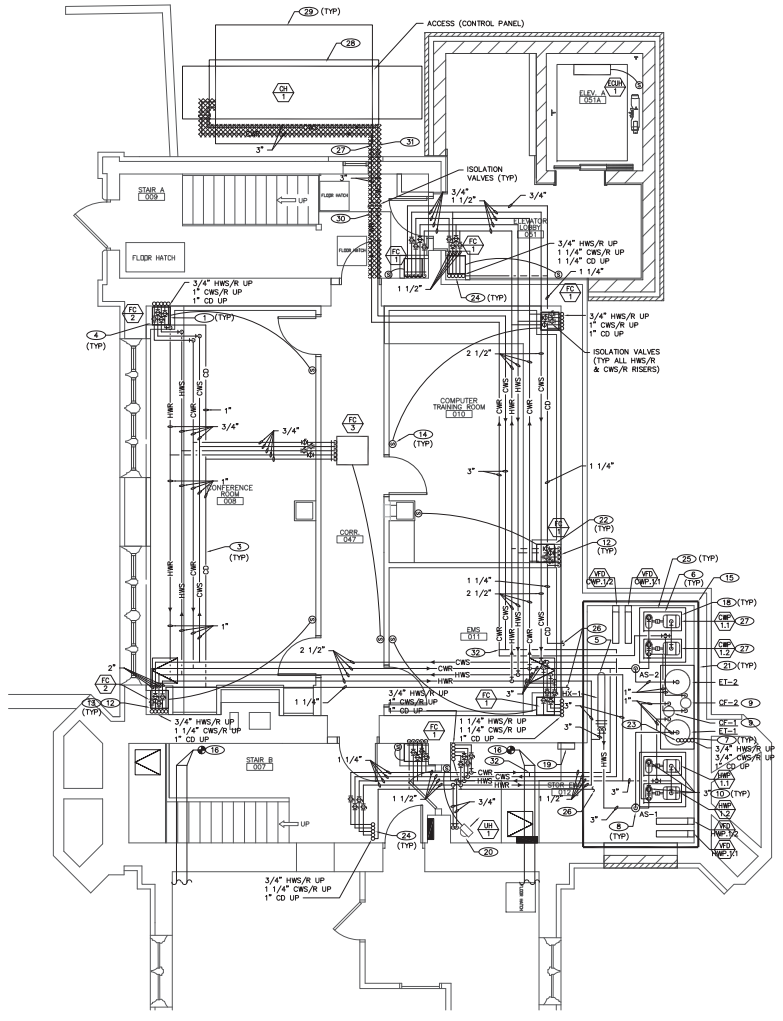
NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



**BASEMENT KEYPLAN**  
HP TO SCALE



**1F ENLARGED MECHANICAL PIPING PLAN - BASEMENT**  
SCALE: 1/4" = 1'-0"



**5F ENLARGED MECHANICAL PIPING PLAN - BASEMENT**  
SCALE: 1/4" = 1'-0"

BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revisions	Date

**CONSULTANT**

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Contract # FEI # 182083

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**Office of Construction and Facilities Management**

**VA** U.S. Department of Veterans Affairs

**BASEMENT MECHANICAL PIPING PLANS**

Approved Project Director

**BID DOCUMENTS**

**FULLY SPRINKLERED**

**RENOVATE TOWER BUILDING 1**

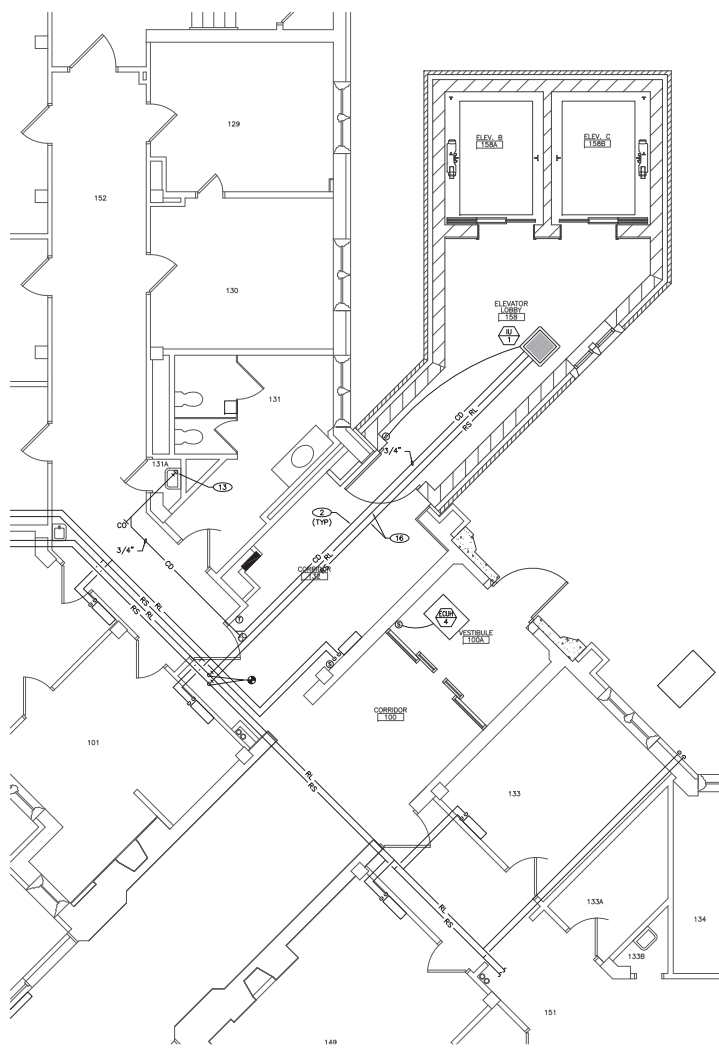
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Revision Number: 1  
Drawing Number: MP100

Location: Sioux Falls, SD 57105  
Issue Date: 05/30/2019  
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Drawn: LMB

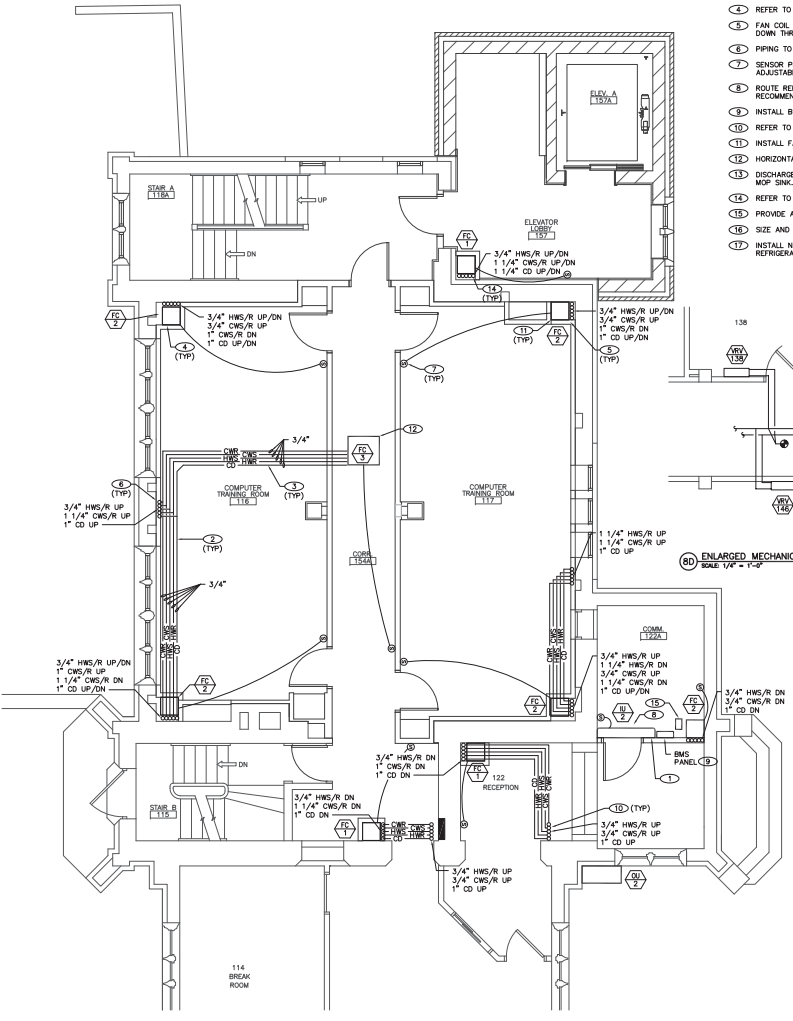
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**MECHANICAL KEYNOTES:** (C)

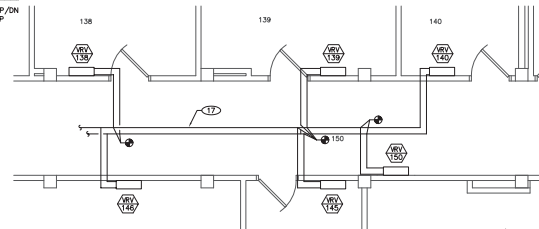
- 1 INSTALL FACTORY CONTROLLER FOR INDOOR UNIT. COORDINATE LOCATION AND INSTALLATION WITH ALL TRADES.
- 2 PROVIDE AND INSTALL CLEANOUTS FOR THE CONDENSATE PIPING AT EVERY 50 FEET AND AT EVERY CHANGE IN DIRECTION.
- 3 REFER TO PIPE INSULATION DETAIL 4/M501.
- 4 REFER TO FAN COIL PIPING INSTALLATION DETAIL 5/M501.
- 5 FAN COIL SERVED FROM BELOW. ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR SERVING FAN COIL INSIDE WALL AND DOWN THRU FLOOR. PROVIDE AND INSTALL SHUTOFF VALVES AT EACH FAN COIL UNIT.
- 6 PIPING TO SERVE FAN COIL ABOVE. ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR UP THRU FLOOR TO FAN COIL.
- 7 SENSOR PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR COORDINATE WITH ALL TRADES. SENSOR SHALL BE ADJUSTABLE BY OCCUPANT. VERIFY WITH COR PRIOR TO SHOP DRAWINGS.
- 8 ROUTE REFRIGERANT PIPING FROM LL TO QLL. SIZE AND ROUTE REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS.
- 9 INSTALL BUILDING MANAGEMENT SENSOR FOR ROOM TEMPERATURE MONITORING/ALARMS.
- 10 REFER TO TYPICAL FLOOR PENETRATION DETAIL 13/M502.
- 11 INSTALL FAN COIL PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL SERVICE CLEARANCES.
- 12 HORIZONTAL FAN COILS SHALL BE INSTALLED WITH SPRING ISOLATORS AND FLEXIBLE CONNECTIONS.
- 13 DISCHARGE CONDENSATE PIPING INTO MOP SINK IN JANITOR'S CLOSET. PROVIDE 1" AIR GAP ABOVE FLOOD RIM OF MOP SINK.
- 14 REFER TO CONDENSATE DRAIN DETAIL 5/M502.
- 15 PROVIDE AND INSTALL TEMPERATURE CONTROL PANEL.
- 16 SIZE AND ROUTE R5/R6 PIPING PER MANUFACTURER'S RECOMMENDATIONS.
- 17 INSTALL NEW REFRIGERANT PIPING, SIZED AND ROUTED PER MANUFACTURER'S RECOMMENDATIONS. RECHARGE REFRIGERANT SYSTEM.



1F ENLARGED MECHANICAL PIPING PLAN - FIRST FLOOR  
SCALE: 1/4" = 1'-0"

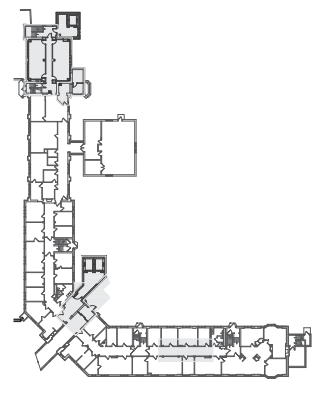


5F ENLARGED MECHANICAL PIPING PLAN - FIRST FLOOR  
SCALE: 1/4" = 1'-0"



6D ENLARGED MECHANICAL DEMOLITION PLAN - FIRST FLOOR  
SCALE: 1/4" = 1'-0"

NOTICE:  
REFER TO DRAWING GI-110 FOR PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



FIRST FLOOR KEYPLAN  
NOT TO SCALE

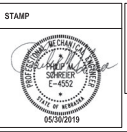
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Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revit/Revit	DWG

**CONSULTANT**

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FEL # 182083

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**Calvin Hill**  
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Elkhorn, Nebraska 68022  
(402) 291-9961



**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

Drawing Title  
**FIRST FLOOR MECHANICAL PIPING PLANS**

Approve Project Director

Phase  
**BID DOCUMENTS**

FULLY SPRINKLERED

Project Title  
**RENOVATE TOWER BUILDING 1**

Location  
**Stoux Falls, SD 57105**

Project Number  
**438-18-102**

Drawing Number  
**MP101**

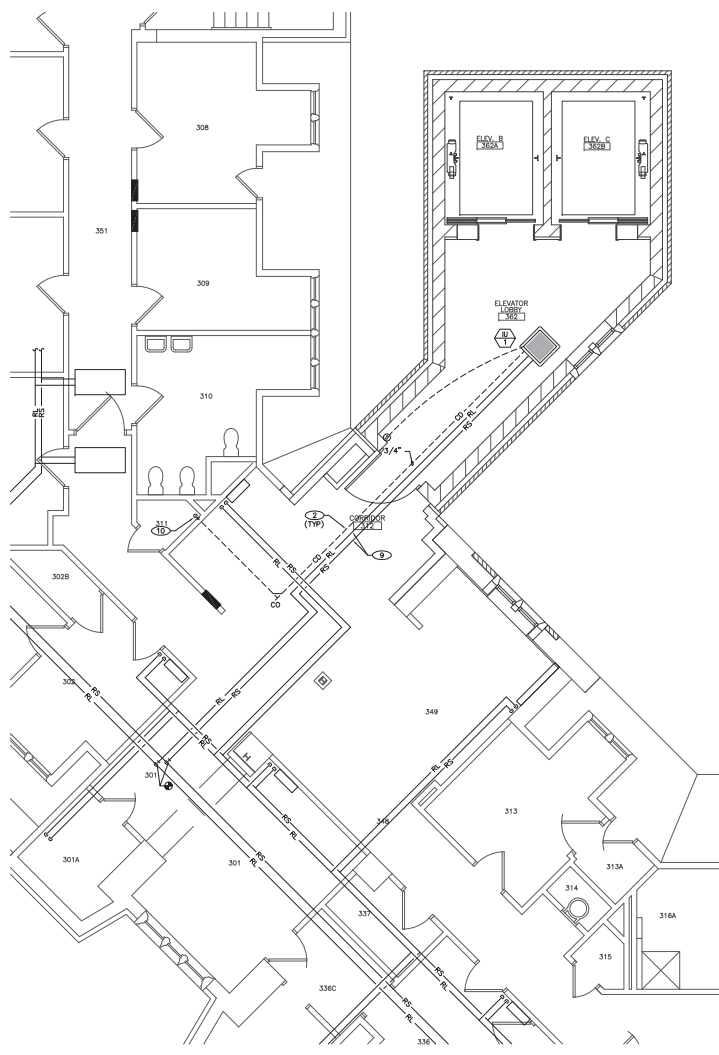


**MECHANICAL KEYNOTES:** (○)

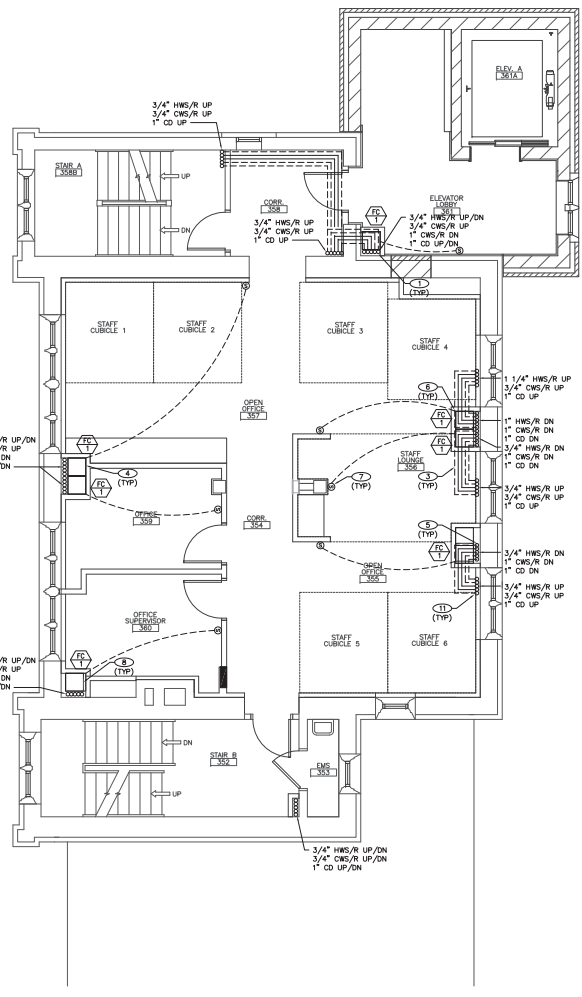
- 1 REFER TO CONDENSATE DRAIN DETAIL 5/M502.
- 2 PROVIDE AND INSTALL CLEANOUTS FOR THE CONDENSATE PIPING AT EVERY 50 FEET AND AT EVERY CHANGE IN DIRECTION.
- 3 REFER TO PIPE INSULATION DETAIL 4/M501.
- 4 REFER TO FAN COIL PIPING INSTALLATION DETAIL 5/M501.
- 5 FAN COIL SERVED FROM BELOW: ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR SERVING FAN COIL INSIDE WALL AND DOWN THRU FLOOR. PROVIDE AND INSTALL SHUTOFF VALVES AT EACH FAN COIL UNIT.
- 6 PIPING TO SERVE FAN COIL ABOVE: ROUTE 3/4" HWS/HWR AND 3/4" CWS/CWR UP THRU FLOOR TO FAN COIL.
- 7 SENSOR PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR COORDINATE WITH ALL TRADES. SENSOR SHALL BE ADJUSTABLE BY OCCUPANT. VERIFY WITH COR PRIOR TO SHOP DRAWINGS.
- 8 INSTALL FAN COIL PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL SERVICE CLEARANCES.
- 9 SIZE AND ROUTE RS/RL PIPING PER MANUFACTURER'S RECOMMENDATIONS.
- 10 DISCHARGE CONDENSATE PIPING INTO MOP SINK IN JANITOR'S CLOSET. PROVIDE 1" AIR GAP ABOVE FLOOD RIM OF MOP SINK.
- 11 REFER TO TYPICAL FLOOR PENETRATION DETAIL 13/M502.

NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.

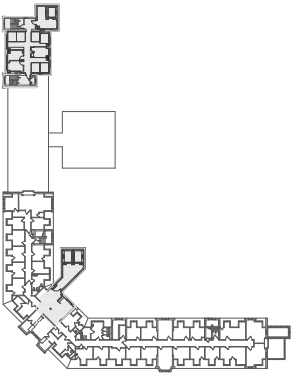
THIRD FLOOR KEYPLAN  
NOT TO SCALE



1F ENLARGED MECHANICAL PIPING PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"



5F ENLARGED MECHANICAL PIPING PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"



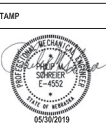
BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revisions	Date

**CONSULTANT**

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FEL # 182083

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Elkhon, Nebraska 68022  
(402) 291-9961



Office of Construction and Facilities Management  
VA U.S. Department of Veterans Affairs

Drawing Title  
**THIRD FLOOR MECHANICAL PIPING PLANS**  
Approve Project Director

Phase  
**BID DOCUMENTS**

Project Title  
**RENOVATE TOWER BUILDING 1**

Location  
**Stoux Falls, SD 57105**

Issue Date  
**05/06/2019**

Checked  
**JOB**

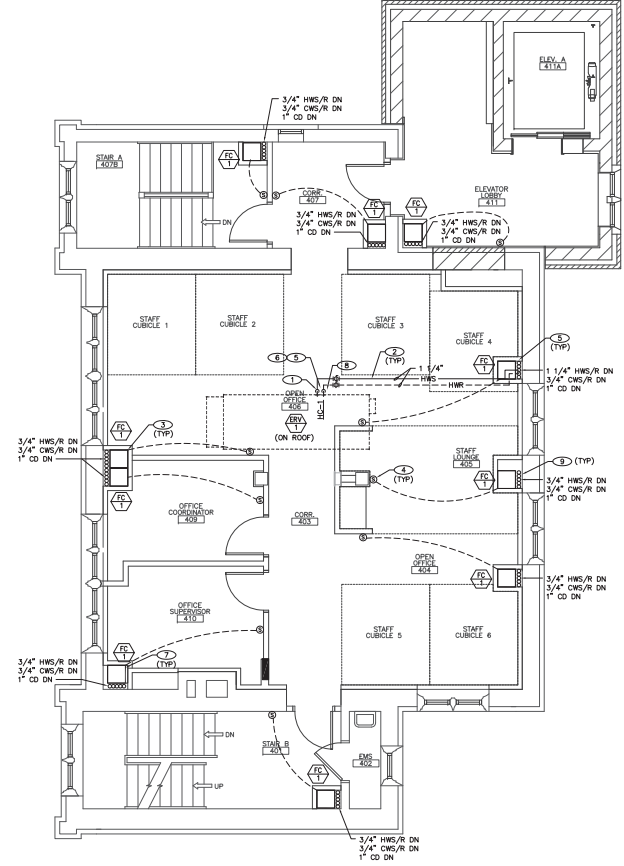
Drawn  
**LMB**

Project Number  
**438-18-102**

Revision Number  
**1**

Drawing Number  
**MP103**

- MECHANICAL KEYNOTES:** (C)
- 1 PIPING ROUTED UP THRU ROOF CURB. SEAL PENETRATION WATER TIGHT.
  - 2 REFER TO PIPE INSULATION DETAIL 4/M501.
  - 3 REFER TO FAN COIL PIPING INSTALLATION DETAIL 5/M501.
  - 4 SENSOR PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR. COORDINATE WITH ALL TRADES. SENSOR SHALL BE ADJUSTABLE BY OCCUPANTS. VERIFY WITH COR PRIOR TO SHOP DRAWINGS.
  - 5 REFER TO CONDENSATE DRAIN DETAIL 5/M502.
  - 6 ROUTE FULL SIZE CONDENSATE TO NEAREST ROOF DRAIN.
  - 7 INSTALL FAN COIL PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL SERVICE CLEARANCES.
  - 8 REFER TO HEATING COIL CONNECTION DETAIL 15/M502. LOCATE ALL VALVES, STRAINERS AND ACCESSORIES IN THE CEILING OF THE 4TH FLOOR.
  - 9 REFER TO TYPICAL FLOOR PENETRATION DETAIL 13/M502.



**NOTICE:**  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



5F ENLARGED MECHANICAL PIPING PLAN - FOURTH FLOOR  
SCALE: 1/4" = 1'-0"

FOURTH FLOOR KEYPLAN  
NOT TO SCALE

BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revisions:	Date:

**CONSULTANT**

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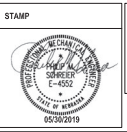
Contract  
FEE # 182083

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**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

Drawing Title:  
**FOURTH FLOOR MECHANICAL PIPING PLANS**

Approve: Project Director

Phase:  
**BID DOCUMENTS**

FULLY SPRINKLERED

Project Title:  
**RENOVATE TOWER BUILDING 1**

Location:  
Sioux Falls, SD 57105

Issue Date:  
05/06/2019

Checked:  
JOB

Drawn:  
LMB

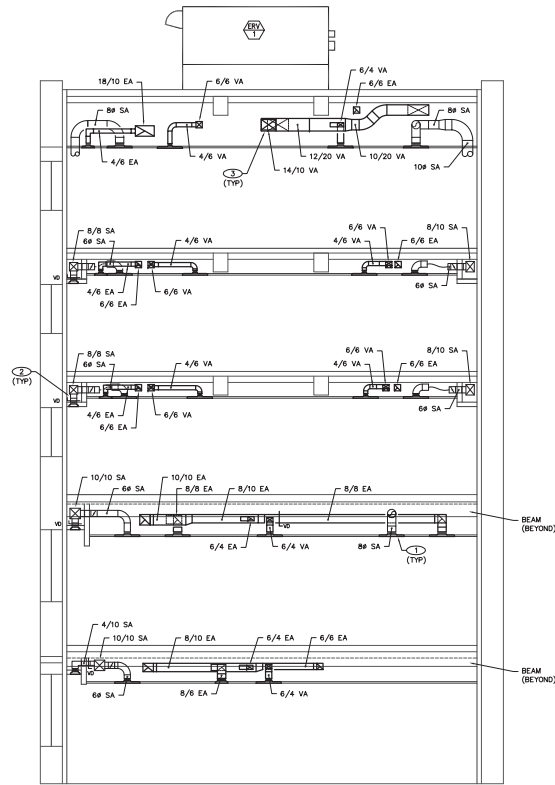
Project Number:  
438-18-102

Revision Number:  
1

Drawing Number:  
**MP104**

13/2019 (REVISED)

- MECHANICAL KEYNOTES:** (○)
- ① REFER TO DIFFUSER CONNECTION DETAIL 1/M301.
  - ② REFER TO TYPICAL LOW PRESSURE DUCT DETAIL 2/M301.
  - ③ REFER TO DUCTWORK HANGERS DETAIL 3/M301.



**MECHANICAL SECTION**  
SCALE: 1/4" = 1'-0"

11/20/2019 10:30 AM

BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/10/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revisions:	Date:

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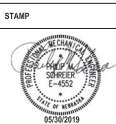
Contract  
FEI # 182083

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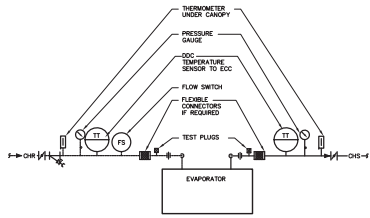
**Office of Construction and Facilities Management**

**VA** U.S. Department of Veterans Affairs

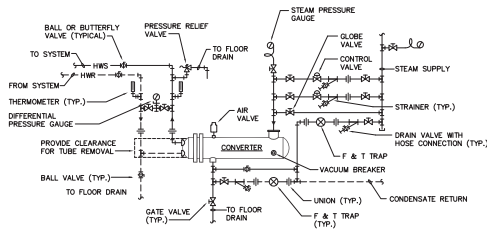
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Approved Project Director	

Phase	<b>BID DOCUMENTS</b>
Project Title	<b>RENOVATE TOWER BUILDING 1</b>
Location	<b>Sioux Falls, SD 57105</b>
Issue Date	05/06/2019
Checked	JOB
Drawn	LMB

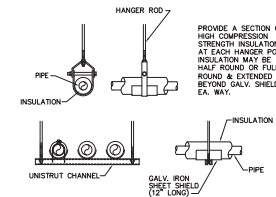
Project Number	438-18-102
Drawing Number	1
Drawing Number	M301



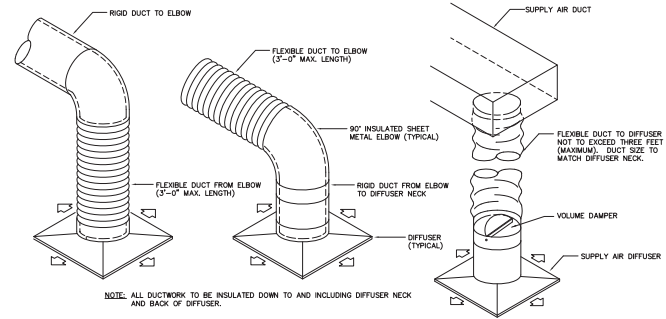
**AIR COOLED CHILLER — PIPING CONNECTIONS** (10)  
NO SCALE



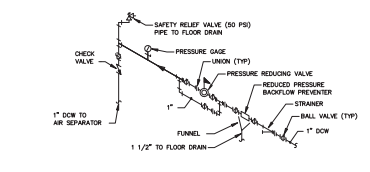
**STEAM TO HOT WATER CONVERTER DETAIL** (7)  
NO SCALE



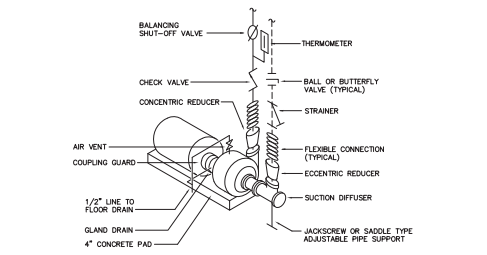
**PIPE INSULATION DETAIL** (4)  
NO SCALE



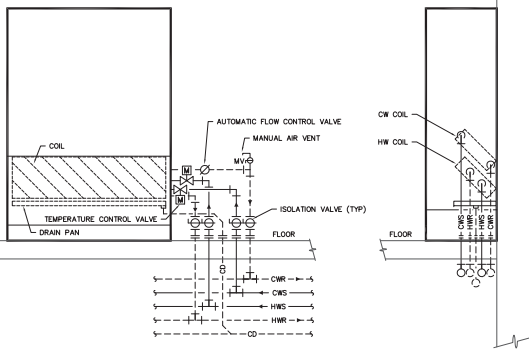
**DIFFUSER CONNECTION DETAIL** (1)  
NO SCALE



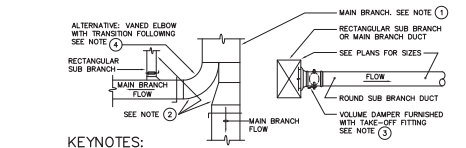
**MAKE-UP WATER CONNECTION DETAIL** (11)  
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**BASE MOUNTED PUMP DETAIL** (8)  
NO SCALE

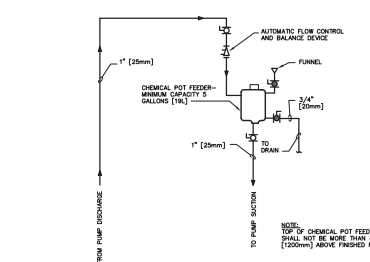


**FAN COIL PIPING INSTALLATION DETAIL** (5)  
NO SCALE

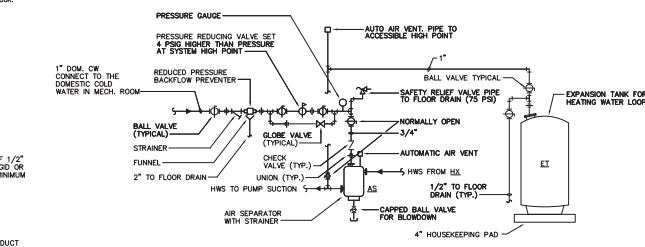


- KEYNOTES:**
- DUCT SPLITS TO DIVIDE FLOW SHALL BE PROPORTIONATE TO SUM TOTAL OF BRANCH DUCT CFM SHOWN ON FLOOR PLANS.
  - ELBOW RADIUS, TAKE-OFF ANGLE AND TRANSITION SHALL BE PER SMACNA RECOMMENDATIONS.
  - ROUND DUCT TAKE-OFFS FROM RECTANGULAR DUCTS SHALL BE MADE WITH A HIGH EFFICIENCY FLANGED AND GASKETED FITTING. THE MOUNTING GROOVE SHALL BE SO CONSTRUCTED AS TO ENSURE CONSTANT FIT CONTROL. BALANCING DAMPERS SHALL BE FACTORY INSTALLED WITH SPRING LOADED RETRACTABLE BEARINGS AND A POSITIVE LOCKING WING NUT FOR EASY READJUSTMENT WHEN NEEDED. FITTING SHALL BE FULLY GASKETED ON ALL FLANGES AND CORNERS FOR HIGH EFFICIENCY TAKE-OFF FITTINGS.
  - ALL ELBOWS SHALL BE RADIUS TYPE, EXCEPT WHERE SPACE RESTRICTIONS NECESSITATE USING 90° MITERED VANED ELBOWS.
  - VOLUME DAMPERS SHALL BE PROVIDED ON ALL LOW PRESSURE SUPPLY DUCT BRANCHES AND ON ALL RETURN AND EXHAUST DUCT BRANCHES.

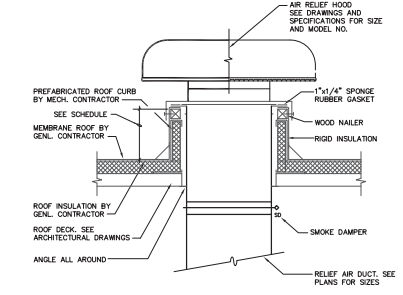
**TYPICAL LOW PRESSURE DUCT DETAIL** (2)  
NO SCALE



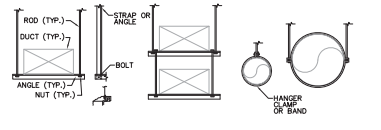
**POT FEEDER DETAIL** (12)  
NO SCALE



**HOT WATER EXPANSION TANK & AIR SEPARATOR DETAIL** (9)  
NO SCALE

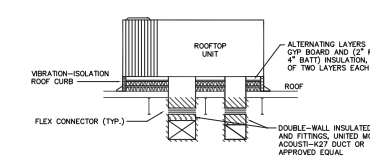


**RELIEF HOOD DETAIL** (6)  
NO SCALE



- NOTES:**
- DO NOT EXCEED ALLOWABLE LOAD LIMITS OF ANY OR ALL OF THE INDIVIDUAL TRAPEZE PARTS.
  - DO NOT PENETRATE DUCT OR DUCT INSULATION VAPOR BARRIER WHEN SECURING HANGERS TO DUCTWORK. ESSENTIALLY THE PENETRATIONS WILL LEAK.
  - USE HANGER CLAMPS OR BANDS FOR ROUND DUCT AS ROUND DUCT TENDS TO DEFORM ON TRAPEZE HANGERS.
  - TEARS, PUNCTURES, ETC. SHALL BE REPAIRED WITH TAPE OR MASTIC TO MAINTAIN THE INTEGRITY OF THE VAPOR BARRIER.
  - DO NOT USE ANY STRAP HANGERS WITH SCREWS ON ANY DUCTWORK THAT IS EXTERNALLY WRAPPED.

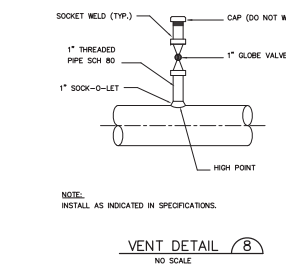
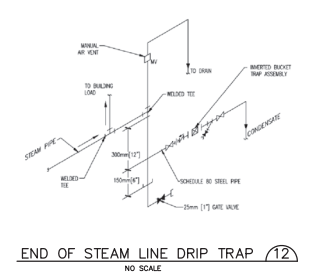
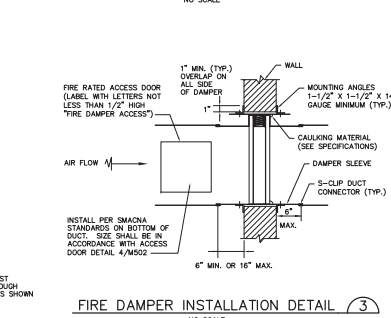
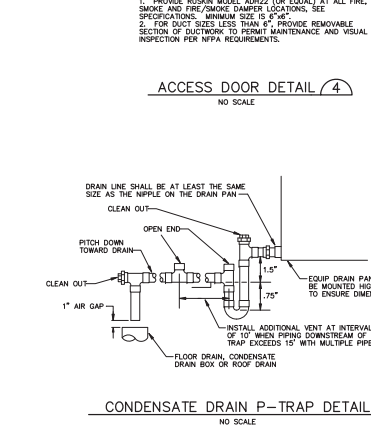
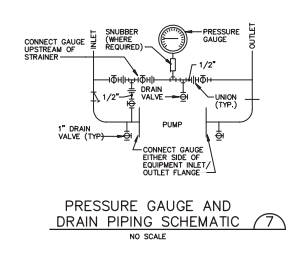
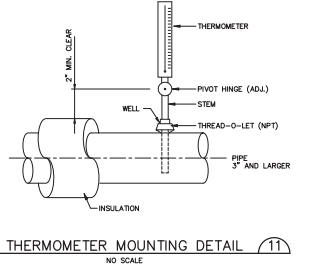
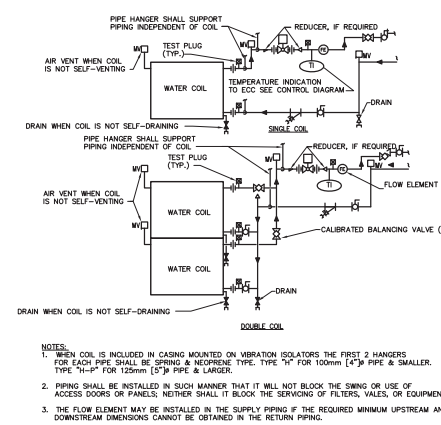
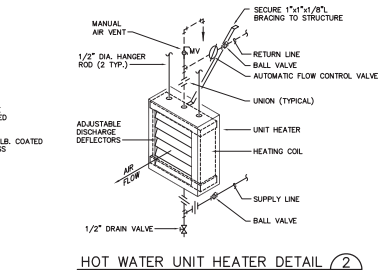
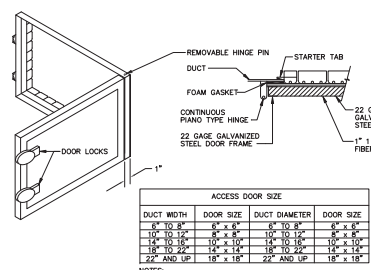
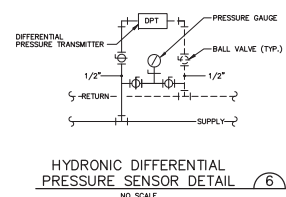
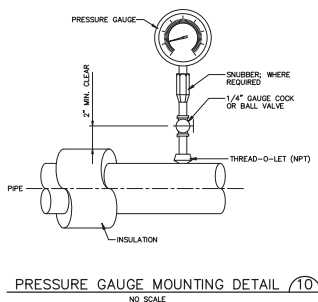
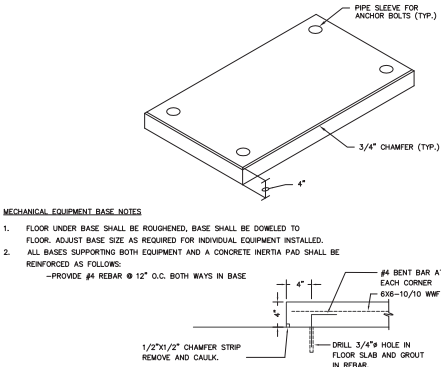
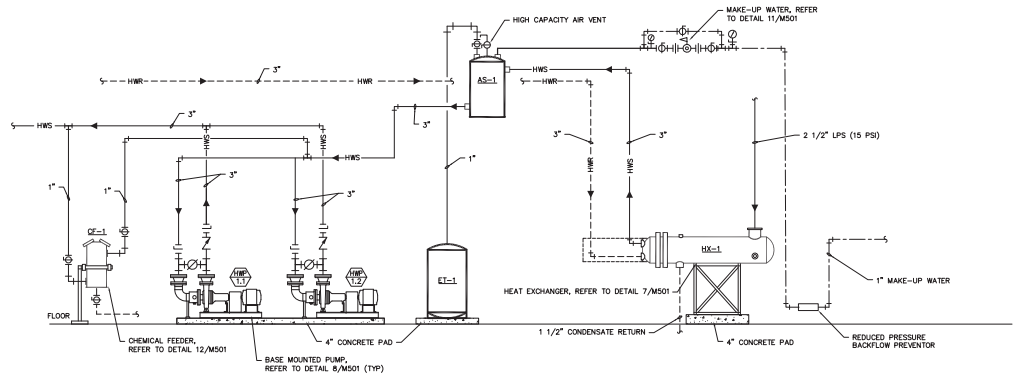
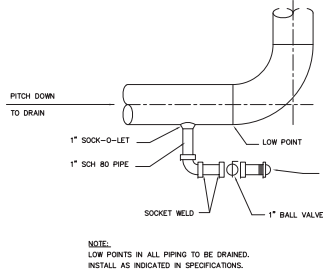
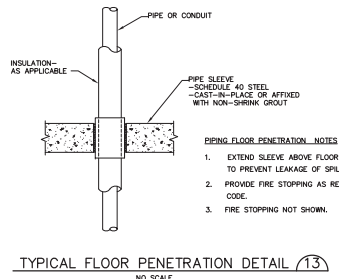
**DUCTWORK HANGERS** (3)  
NO SCALE



**ROOFTOP UNIT SOUND ATTENUATION DETAIL** (13)  
NO SCALE

<b>CONSULTANT</b> <b>FARRIS ENGINEERING</b> ONYX   INCON   SENET   COONADO SPRINGS 10000 S. W. 10TH AVE. SUITE 100 MIAMI, FL 33156 TEL: 305.444.1111 FAX: 305.444.1112 WWW.FARRIS-ENG.COM		<b>ARCHITECT/ENGINEER OF RECORD</b> <b>Chih Lin Architects</b> 3102 North 20th Street Elkhon, Nebraska 68022 (402) 201-9461		<b>STAMP</b> 	<b>Office of Construction and Facilities Management</b> U.S. Department of Veterans Affairs	<b>Drawing Title</b> <b>MECHANICAL DETAILS</b>  Approved Project Director	<b>Phase</b> <b>BID DOCUMENTS</b>  <b>FULLY SPRINKLERED</b>	<b>Project Title</b> <b>RENOVATE TOWER BUILDING 1</b>	<b>Project Number</b> <b>438-18-102</b> <b>Revision Number</b> <b>1</b> <b>Drawing Number</b> <b>M501</b>
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13/2019 10:50 AM



BM Documents	05/30/2019
Contract Documents 100% Submittal (CD)	05/14/2019
Contract Documents 95% Submittal (CD)	04/11/2019
Contract Documents 35% Submittal (CD)	02/18/2019
Design Development (DD)	12/10/2018
Schematic Design (SD)	10/05/2018
Revit/Revit	Danz

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**STAMP**

Professional Engineer  
FARRIS ENGINEERING  
05/30/2019

**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

**MECHANICAL DETAILS**

Approve Project Director

**BID DOCUMENTS**

**FULLY SPRINKLERED**

**RENOVATE TOWER BUILDING 1**

Stouff Falls, SD 57105

**Project Number 438-18-102**

**Revision Number 1**

**Drawing Number M502**

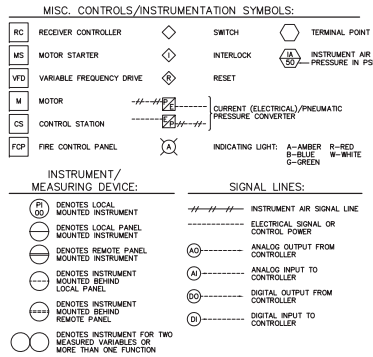
15/2019/10/20/AM



DEVICE TYPE ABBREVIATIONS:

AARP	ALARM ACKNOWLEDGE RESET PUSHBUTTON	H	HUMIDITY/HAMIDITY SENSOR
AD	AUTOMATIC CONTROL DAMPER	HC	HAND CONTROL
AEDAS	ANALYSIS SENSOR AIR SUPPLY	HOA	HAND-OFF-AUTO
AEOX	ANALYSIS SENSOR OXYGEN	HOS	HIGH SET-FRONT
AF	AIR FLOW SWITCH	HSP	HIGH HIGH SET-POINT
AFS	AIR FLOW SENSOR	IA	INSTRUMENT AIR
AI	ANALOG INPUT	IFD	IGNITER FLAME DETECTION
ALIN	ALARM INHIBIT	IFR	IGNITER FUEL FAILURE RELAY
ALNR	ALARM NORMAL RELAY	IFPH	IGNITER FUEL PRESSURE HIGH
ALM	ALARM	IFPL	IGNITER FUEL PRESSURE LOW
AO	ANALOG OUTPUT	IPSH	IGNITER PRESSURE SWITCH-HIGH (NO CONTACT/OPEN AT HIGH PRESSURE)
AOR	AUTO ON RELAY	IPSL	IGNITER PRESSURE SWITCH-LOW (NO CONTACT/OPEN AT NORMAL PRESSURE)
AUR	ALARM RELAY	ISSV	IGNITER SAFETY SHUTOFF VALVE
ASBP	ALARM SILENCE PUSHBUTTON	ISV	IGNITER SAFETY SHUTOFF VENT VALVE
BFCV	BURNER GAS FLOW CONTROL VALVE	ISW	IGNITER SAFETY SHUTOFF VENT VALVE
BFR	BURNER FLAME FAILURE RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BPH	BURNER FUEL PRESSURE HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BPL	BURNER FUEL PRESSURE LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BPR	BURNER FUEL PRESSURE RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BPS	BURNER PRESSURE SWITCH-HIGH (NO CONTACT/OPEN AT HIGH PRESSURE)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BPSL	BURNER PRESSURE SWITCH-LOW (NO CONTACT/OPEN AT NORMAL PRESSURE)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BRD	BURNER REGISTER OPEN (LIMIT SWITCH)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BSR	BURNER STOP RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BSS	BURNER SELECTION SWITCH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BSSV	BURNER SAFETY SHUTOFF VALVE	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
BSSVV	BURNER SAFETY SHUTOFF VENT VALVE	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
CAFL	COMBUSTION AIR FLOW LOW (NO CONTACT/OPEN AT NORMAL AIR FLOW)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
CE	CONDUCTIVITY ELEMENT	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
COZE	CO2 ELEMENT (SENSOR)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
OR	CONTROL RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
CV	CONTROL VALVE	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
CW	CONTROL WIRE	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DA	DAMPER ACTUATOR	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DI	DIGITAL INPUT	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DO	DIGITAL OUTPUT	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPAL	DIFFERENTIAL PRESSURE ALARM HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPC	DIFFERENTIAL PRESSURE ALARM LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPC	DIFFERENTIAL PRESSURE CONTROLLER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPE	DIFFERENTIAL PRESSURE SENSOR	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPI	DIFFERENTIAL PRESSURE INDICATOR	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPS	DIFFERENTIAL PRESSURE SWITCH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPSH	DIFFERENTIAL PRESSURE SWITCH HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPSL	DIFFERENTIAL PRESSURE SWITCH LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
DTC	DATA TERMINAL CABINET	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ESDR	EMERGENCY SHUTDOWN RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ESPB	EMERGENCY STOP PUSHBUTTON	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ESR	EMERGENCY STOP RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ESPB	EMERGENCY STOP RESET PUSHBUTTON	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ETW4H	EXPANSION TANK WATER LEVEL HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
ETW4L	EXPANSION TANK WATER LEVEL LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FD	FORCED DRAFT	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FDPC	FORCED DRAFT FAN DAMPER CLOSED	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FDPS	FORCED DRAFT FAN SELECTION SWITCH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FDMSR	FORCED DRAFT FAN MOTOR STARTER RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FDVDO	FORCED DRAFT FAN VANES OPEN (LIMIT SWITCH)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FE	FLOW ELEMENT (SENSOR)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FSR	FUE GAS RECIRCULATION DAMPER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FORD	FUE GAS RECIRCULATION DAMPER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FI	FLOW INDICATOR	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FC	FLOW INDICATOR CONTROLLER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FIT	FLOW INDICATOR TRANSMITTER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FLD	FLUE DAMPER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FLS	FLAME SCANNER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FM	FLOW METER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FPHR	FURNACE PRESSURE HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FPL	FURNACE PRESSURE HIGH/LOW RELAY	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FPL	FURNACE PRESSURE LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FQIT	FLOW QUANTITY INDICATING TRANSMITTER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FS	FLOW SWITCH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FSH	FLOW SWITCH-HIGH (NO CONTACT/OPEN ON HIGH FLOW)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FSL	FLOW SWITCH-LOW (NO CONTACT/CLOSE ON RISE TO NORMAL FLOW)	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FT	FLOW TRANSMITTER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
FT	FLOW TRANSDUCER	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GPH	GENERATOR PRESSURE HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GRD	GROUND	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GSL	GAS SUPPLY PRESSURE LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GSH	GAS SUPPLY PRESSURE HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GSHV	GAS SHUTOFF VALVE	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GSV	GENERATOR WATER FLOW LOW	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GWH	GENERATOR WATER FLOW HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE
GWH	GENERATOR WATER TEMPERATURE HIGH	ISWV	IGNITER SAFETY SHUTOFF VENT VALVE

CONTROLS/INSTRUMENTATION SUPPLEMENTAL LEGEND



INSTALLATION NOTES

1. THE CONTROL SYSTEM MAIN CONTROL PANEL SHALL BE LOCATED AND INSTALLED BY JO WITH OWNER'S REPRESENTATIVE.
2. CONTROL POINTS IN AND AROUND THE MAIN BUILDING MECHANICAL ROOM SHALL BE TIED TO THE CONTROL SYSTEM DIRECTLY THROUGH THE MAIN CONTROL PANEL OR THROUGH THE USE OF APPLICATION SPECIFIC CONTROLLERS OR UNITARY CONTROLLERS. CONTROLLERS SHALL BE ACCESSIBLE TO OPERATOR AND MOUNTED WITHIN 72-INCHES FROM OPERATING FLOOR, PLATFORM OR MEZZANINE.
3. CONTROL OF EQUIPMENT, CONTROL DAMPERS, ETC. BY PROGRAMMABLE CONTROLLERS LOCATED IN THE VICINITY OF THE EQUIPMENT AND NETWORKED TO THE MAIN CONTROLLER.

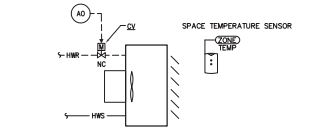
ABBREVIATIONS

CALC = CALCULATION	RM = ROOM	TRAN = TRANSMITTER
TRND = TRENCH	EXH = EXHAUST	CH = CHILLER
COND = CONDENSER	DIFF = DIFFERENTIAL	BLU = BLUE
EFFC = EFFICIENCY	PRESS = PRESSURE	STM = STEAM
TOTAL = TOTALIZATION	SW = SWITCH	STM COND = STEAM CONDENSATE
CD = CONTROL DAMPER	AHU = AIR HANDLING UNIT	ERV = ENERGY RECOVERY VENTILATOR

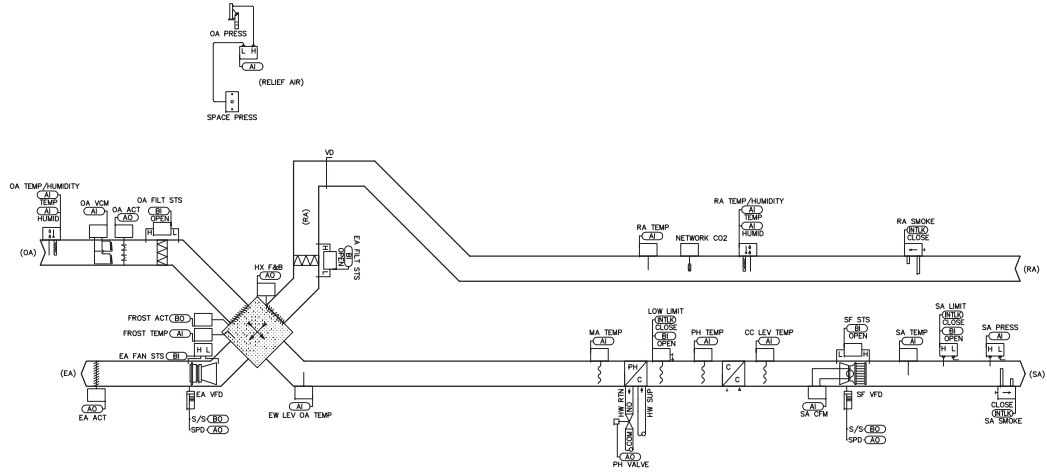
13/2016 (REVISED)

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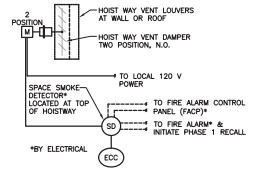
<p><b>Contract Documents</b></p> <p>100% Submittal (CD) 05/30/2019</p> <p>35% Submittal (CD) 01/11/2019</p> <p>Design Development (DD) 12/10/2018</p> <p>Schematic Design (SD) 10/05/2018</p> <p>Revit/Revit</p>	<p><b>CONSULTANT</b></p> <p><b>FARRIS ENGINEERING</b></p> <p>ONEWA   INDCO   SENE   COOADO SPRINGS</p> <p>ONEWA.COM</p> <p>FE # 182083</p> <p>1818 North 20th Street Elkhon, Nebraska 68022 (402) 291-9961</p>	<p><b>ARCHITECT/ENGINEER OF RECORD</b></p> <p><b>CLH</b></p> <p>3102 North 20th Street Elkhon, Nebraska 68022 (402) 291-9961</p>	<p><b>STAMP</b></p>	<p><b>Office of Construction and Facilities Management</b></p> <p>VA U.S. Department of Veterans Affairs</p>	<p><b>Drawing Title</b></p> <p><b>MECHANICAL CONTROL DIAGRAMS</b></p> <p>Approve Project Director</p>	<p><b>Phase</b></p> <p><b>BID DOCUMENTS</b></p>	<p><b>Project Title</b></p> <p><b>RENOVATE TOWER BUILDING 1</b></p>	<p><b>Project Number</b></p> <p><b>438-18-102</b></p> <p><b>Revision Number</b></p> <p><b>1</b></p>	
							<p><b>Location</b></p> <p><b>Sioux Falls, SD 57105</b></p>	<p><b>Drawing Number</b></p> <p><b>M601</b></p>	
							<p><b>Issue Date</b></p> <p>05/30/2019</p>	<p><b>Checked</b></p> <p>JOB</p>	<p><b>Drawn</b></p> <p>LMB</p>



**CABINET/UNIT HEATER CONTROL DIAGRAM**  
NO SCALE

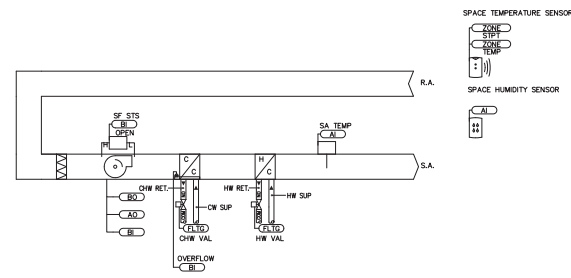


**ERV CONTROL DIAGRAM**  
NO SCALE

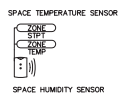


- NOTES:**
1. THE DAMPER SHALL REMAIN CLOSED DURING NORMAL OPERATION AND OPEN UPON LOSS OF POWER FROM A SIGNAL FROM THE SMOKE DETECTOR, LOCATED AT THE TOP OF THE HOISTWAY. COORDINATE NUMBER OF CONTACTS WITH THE ELECTRICAL AND FIRE PROTECTION DESIGNS.
  2. SHOW DAMPER LOCATION AND SIZE ON THE DRAWINGS.
  3. PROVIDE A BINARY EDC POINT TO SOUND AN ALARM AT EDC.
  4. REMOTE ALARM SHALL BE ACTIVATED WHEN THE HOISTWAY SMOKE DETECTOR DETECTS SMOKE.

**HOISTWAY VENT DAMPER (HVD) CONTROLS**  
NO SCALE



**FAN COIL CONTROL DIAGRAM**  
NO SCALE



<b>CONSULTANT</b> <b>FARRIS ENGINEERING</b> OMAHA   LINCOLN   DENVER   COLORADO SPRINGS 3102 North 203rd Street, Elkhorn, Nebraska 68022 (402) 291-9961		<b>ARCHITECT/ENGINEER OF RECORD</b> <b>CH2M HILL</b> 3102 North 203rd Street, Elkhorn, Nebraska 68022 (402) 291-9961		<b>STAMP</b> 	<b>Office of Construction and Facilities Management</b> VA U.S. Department of Veterans Affairs	<b>Drawing Title</b> <b>MECHANICAL CONTROL DIAGRAMS</b> Approve: Project Director	<b>Phase</b> <b>BID DOCUMENTS</b>	<b>Project Title</b> <b>RENOVATE TOWER BUILDING 1</b>	<b>Project Number</b> <b>438-18-102</b>
<b>Issue Date</b> 05/06/2019		<b>Checked</b> JOB		<b>Drawn</b> LMB		<b>Location</b> Sioux Falls, SD 57105		<b>Drawing Number</b> <b>M602</b>	

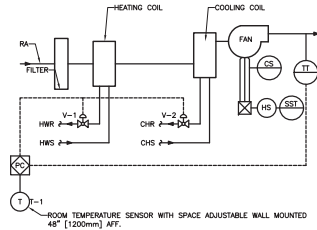
15/2019 (REVISED)

CONTROLLER		FAN COIL - 2 FLOW - SYSTEM POINTS LIST										ALARMS		NOTES			
SYSTEM POINT DESCRIPTION		GRAPHIC	HARDWARE INPUT	HARDWARE OUTPUT	SOFTWARE POINT	HARDWARE INTERLOCK	WIRELESS	NETWORK	DEFAULT VALUE	HIGH RANGING LIMIT	LOW RANGING LIMIT	BINARY	LATCH/DIAGNOSTIC		SENSOR VAL	COMMUNICATED VAL	DIAGNOSTIC
SPACE HUMIDITY SENSOR LOCAL		X	AI								X						
SPACE TEMPERATURE LOCAL		X	AI				X				X			X			
SPACE TEMPERATURE SETPOINT LOCAL		X	AI								X						
SUPPLY AIR TEMPERATURE LOCAL		X	AI								X			X			
CONDENSATE OVERFLOW DETECTION LOCAL		X	BI								X						
SUPPLY FAN STATUS		X	BI								X		X				
SUPPLY FAN START/STOP		X	BO								X		X				MAINTENANCE REQUIRED
COOLING VALVE		X	FLTG														
HEATING VALVE		X	FLTG														
OCCUPIED COOLING SETPOINT			X								74.0 deg. F						
OCCUPIED HEATING SETPOINT			X								70.0 deg. F						
OCCUPIED STANDBY COOLING SETPOINT			X								80.0 deg. F						
OCCUPIED STANDBY HEATING SETPOINT			X								65.0 deg. F						
UNOCCUPIED COOLING SETPOINT			X								85.0 deg. F						
UNOCCUPIED HEATING SETPOINT			X								60.0 deg. F						
OCCUPIED BYPASS TIMER			X								2 HRS						
DISCHARGE AIR TEMPERATURE CONTROL POINTS		X	X								45.0 deg. F-150.0 deg. F	35.0 deg. F					
BAS COMMUNICATION STATES		X	X											X			
MAINTENANCE REQUIRED			X								800 HRS						MAINTENANCE REQUIRED
CONTROLLER SPARE HARDWARE POINTS																	
ANALOG INPUT(S)			6														
BINARY INPUT(S)			5														
UNIVERSAL INPUT(S)			1														
BINARY OUTPUT(S)				5													
GENERAL NOTES																	

**FAN COIL SEQUENCE OF OPERATION (PATIENT ROOMS)**

FAN COIL UNIT SHALL OPERATE ON A SCHEDULE AS SET BY THE EDC. FAN SHALL RUN CONTINUOUSLY. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE GENERATED IN THE EVENT THE UNIT FAILS TO RUN. THE ADJUSTABLE ROOM TEMP SET POINT WILL BE 70-75 WITH OLS HEATING/COOLING OFFSETS. VALVE V-1 & V-2 WILL NOT BE OPEN SIMULTANEOUSLY. ROOM OCCUPANT WILL HAVE ABILITY OF ADJUSTING ROOM TEMPERATURE BETWEEN 70-75.

**FAN COIL SEQUENCE OF OPERATION (NONPATIENT ROOMS)**  
 FAN COIL SHALL OPERATE ON A SCHEDULE AS SET BY EDC. FAN SHALL RUN CONTINUOUSLY IN OCCUPIED MODE. FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE GENERATED IN THE EVENT THE UNIT FAILS TO RUN. THE ADJUSTABLE ROOM TEMP SET POINT WILL BE 70-75 WITH OLS HEATING/COOLING OFFSETS. VALVE V-1 & V-2 SHALL BE CLOSED. UPON RISE IN TEMPERATURE ABOVE 75 °F ALL SHALL MODULATE OPEN TO MAINTAIN 75 °F UPON FALL IN TEMPERATURE BELOW 70 °F HEATING VALVE V-1 SHALL MODULATE TO OPEN TO MAINTAIN 70 °F.



**FOUR PIPE FAN COIL UNIT CONTROLS**  
NO SCALE

**HOT WATER UNIT HEATERS**

- A WALL MOUNTED DDC SENSOR SHALL CYCLE UNIT FAN MOTOR AND MODULATE HOT WATER VALVE TO MAINTAIN ADJUSTABLE HEATING SETPOINT. SETPOINT ADJUSTMENT BY DDC SYSTEM ONLY.
- PROVIDE SWITCH FOR SUMMER FAN OPERATION.

BUILDING NO.	1	SYSTEMS	HOT WATER UNIT HEATER	GRAPHIC DISPLAY	POINT DESCRIPTION	HOT WATER UNIT HEATERS	SPACE TEMPERATURE	UNIT STATUS	FAN STATUS	HOT WATER VALVE	REMARKS

**ELECTRIC CABINET UNIT HEATER**

- A WALL MOUNTED DDC SENSOR SHALL CYCLE ON THE FAN AND HEATER TO MAINTAIN SETPOINT.

BUILDING NO.	1	SYSTEMS	ELECTRIC CABINET UNIT HEATER	GRAPHIC DISPLAY	POINT DESCRIPTION	ELECTRIC CABINET HEATERS	SPACE TEMPERATURE	REMARKS

**SEQUENCE OF OPERATIONS**

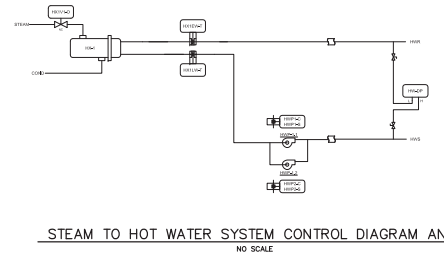
**FAN COIL**  
 BUILDING AUTOMATION SYSTEM INTERFACE:  
 THE BUILDING AUTOMATION SYSTEM (BAS) WILL SEND THE CONTROLLER OCCUPIED BYPASS, MORNING WARM-UP / PRE-COOL, UNOCCUPIED COOLING MODES. IF A BMS IS NOT PRESENT OR COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER WILL OPERATE USING DEFAULT MODES AND SETPOINTS.  
**OCCUPIED MODE**  
 DURING OCCUPIED PERIODS THE SUPPLY FAN WILL RUN CONTINUOUSLY. THE CHILLED WATER AND HOT WATER VALVE WILL MODULATE TO MAINTAIN AN ACTIVE SPACE TEMPERATURE SETPOINT.  
**UNOCCUPIED MODE**  
 WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT OF 60.0 DEG. F (ADJ.) THE SUPPLY FAN WILL START AND THE HOT WATER VALVE WILL OPEN. WHEN THE SPACE TEMPERATURE RISES ABOVE 75.0 DEG. F (ADJ.) THE SUPPLY FAN WILL STOP AND THE HOT WATER VALVE WILL CLOSE. UNOCCUPIED COOLING MODES BEYOND 75.0 DEG. F (ADJ.) WATER VALVE WILL OPEN. IF THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.) THE SUPPLY FAN WILL START AND THE CHILLED WATER VALVE WILL OPEN. WHEN THE SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.) MINUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN WILL STOP. THE CHILLED WATER VALVE WILL CLOSE.  
**OPTIMAL START:**  
 THE BAS WILL MONITOR THE SCHEDULED OCCUPIED TIME, OCCUPIED SPACE SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL START OCCURS.  
**MORNING WARM-UP MODE:**  
 DURING OPTIMAL START IF THE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT A MORNING WARM-UP MODE WILL BE ACTIVATED. WHEN MORNING WARM-UP IS INITIATED THE UNIT WILL ENABLE THE HEATING AND SUPPLY FAN. WHEN THE SPACE TEMPERATURE REACHES THE OCCUPIED HEATING SETPOINT (ADJ.) THE UNIT WILL TRANSITION TO THE OCCUPIED MODE.  
**PRE-COOL MODE:**  
 THE BAS WILL MONITOR THE SCHEDULED UNOCCUPIED TIME, OCCUPIED SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL STOP OCCURS. WHEN THE OPTIMAL STOP MODE IS ACTIVE THE UNIT CONTROLLER WILL MAINTAIN THE SPACE TEMPERATURE TO THE SPACE TEMPERATURE OFFSET SETPOINT.  
**OPTIMAL STOP:**  
 THE BAS WILL MONITOR THE STATUS OF THE 'ON' AND 'CANCEL' BUTTONS OF THE SPACE TEMPERATURE SENSOR. WHEN AN OCCUPIED STOP OCCURS, WHEN THE OPTIMAL STOP MODE IS ACTIVE THE UNIT CONTROLLER WILL MAINTAIN THE SPACE TEMPERATURE TO THE SPACE TEMPERATURE OFFSET SETPOINT.  
**OCCUPIED BYPASS:**  
 THE BAS WILL MONITOR THE STATUS OF THE 'ON' AND 'CANCEL' BUTTONS OF THE SPACE TEMPERATURE SENSOR. WHEN AN OCCUPIED STOP OCCURS, WHEN THE OPTIMAL STOP MODE IS ACTIVE THE UNIT CONTROLLER WILL MAINTAIN THE SPACE TEMPERATURE TO THE SPACE TEMPERATURE OFFSET SETPOINT.  
**SPACE TEMPERATURE CONTROL:**  
 ZONE TEMPERATURE CONTROL CAN BE USED IN THE OCCUPIED, OCCUPIED BYPASS, AND OCCUPIED STANDBY MODES. IT MAINTAINS ZONE TEMPERATURE BY CONTROLLING THE DISCHARGE AIR TEMPERATURE TO CONTROL THE ZONE TEMPERATURE. THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED COOLING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED COOLING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED HEATING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED HEATING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED COOLING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED COOLING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED HEATING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED HEATING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED COOLING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED COOLING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED HEATING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED HEATING MODE.  
**OCCUPIED HUMIDITY CONTROL:**  
 IF THE RELATIVE HUMIDITY IS GREATER THAN THE HUMIDITY SETPOINT, THE CHILLED WATER VALVE WILL MODULATE TO MAINTAIN SPACE RELATIVE HUMIDITY AND THE REHEAT VALVE WILL MODULATE TO MAINTAIN THE SPACE TEMPERATURE. IF THE RELATIVE HUMIDITY IS LESS THAN THE HUMIDITY SETPOINT, THE CHILLED WATER VALVE WILL MODULATE TO MAINTAIN SPACE RELATIVE HUMIDITY AND THE REHEAT VALVE WILL MODULATE TO MAINTAIN THE SPACE TEMPERATURE. IF THE RELATIVE HUMIDITY IS GREATER THAN THE HUMIDITY SETPOINT, THE CHILLED WATER VALVE WILL MODULATE TO MAINTAIN SPACE RELATIVE HUMIDITY AND THE REHEAT VALVE WILL MODULATE TO MAINTAIN THE SPACE TEMPERATURE. IF THE RELATIVE HUMIDITY IS LESS THAN THE HUMIDITY SETPOINT, THE CHILLED WATER VALVE WILL MODULATE TO MAINTAIN SPACE RELATIVE HUMIDITY AND THE REHEAT VALVE WILL MODULATE TO MAINTAIN THE SPACE TEMPERATURE.  
**SUPPLY FAN OPERATION:**  
 THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED COOLING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED COOLING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED HEATING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED HEATING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED COOLING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED COOLING MODE. WHEN THE CONTROLLER IS IN THE UNOCCUPIED HEATING MODE, THE SUPPLY FAN WILL CYCLE ON DEMAND DURING THE UNOCCUPIED HEATING MODE.  
**CONDENSATE OVERFLOW MONITORING:**  
 IF THE CONDENSATE LEVEL REACHES THE TRIP POINT, A CONDENSATE OVERFLOW MONITORING WILL BE ANNOUNCED AT THE BAS. PREVENTIVE MAINTENANCE SHOULD BE SCHEDULED IMMEDIATELY TO PREVENT OVERFLOW AND CAUSING WATER DAMAGE TO THE BUILDING. THE FAN WILL BE DISABLED AND THE CHILLED WATER VALVE WILL CLOSE.  
**FILTER TIMER:**  
 THE FAN-RUN TIME (HRS) WILL BE COMPARED TO THE FILTER MAINTENANCE TIMER SETPOINT. ONCE THE SETPOINT IS REACHED A FILTER TIMER ALARM DIAGNOSTIC WILL BE ANNOUNCED AT THE BAS. WHEN THE DIAGNOSTIC IS CLEARED, THE FILTER-MAINTENANCE TIMER IS RESET TO ZERO AND THE TIMER BEGINS ACCUMULATING FAN-RUN TIME AGAIN.

**ENERGY RECOVERY VENTILATOR**

- ENERGY RECOVERY VENTILATOR:  
 1. GENERAL: ENERGY RECOVERY VENTILATOR CONTROLS ARE DEFINED IN SECTION 23 7200. BMS CONTRACTOR SHALL INSTALL ALL DEVICES NOT FACTORY INSTALLED. ALL REQUIRED CONTROL DEVICES NOT FURNISHED UNDER SECTION 23 7200 SHALL BE FURNISHED UNDER THIS SECTION.  
 2. UNIT SHALL PROVIDE ROOM NEUTRAL AIR WITH 55 DEG F LEAVING AIR TEMPERATURE AT THE DIRECT EXPANSION (DX) COIL AND 70 DEG F LEAVING AIR TEMPERATURE AT THE HOT-GAS REHEAT COIL IN COOLING MODE. MICROPROCESSOR CONTROLLER SHALL STAGE COMPRESSORS AND REHEAT COILS AS REQUIRED. IN HEATING MODE, THE HOT WATER HEATING COIL SHALL MODULATE AS REQUIRED TO MAINTAIN ADJUSTABLE DISCHARGE AIR SET POINT. THE MAXIMUM RELATIVE HUMIDITY OF THE SUPPLY AIR SHALL BE 50% (ADJUSTABLE).  
 3. AIR-COOLED CONDENSER FAN SHALL ENERGIZE TO MAINTAIN COMPRESSOR HEAD PRESSURE WITHIN MANUFACTURER'S RECOMMENDATIONS.  
 4. SEVEN-DAY PROGRAMMING SHALL BE PROVIDED TO ENABLE FANS THROUGH THE BUILDING DDC SYSTEM ACCORDING TO OWNER'S SCHEDULE.  
 a. OCCUPIED OPERATION: ERV FANS SHALL BE ENABLED TO OPERATE CONTINUOUSLY, AND COMPRESSORS, HEATING COILS AND REHEAT COILS SHALL BE STAGED TO MAINTAIN OCCUPIED COOLING OR HEATING SET POINT AS INDICATED BY BMS DISCHARGE AIR SENSOR. THE OUTSIDE AIR DAMPER AND EXHAUST DAMPER SHALL OPEN DURING OCCUPIED PERIODS.  
 b. UNOCCUPIED OPERATION: ERV FANS SHALL CYCLE, AND COMPRESSORS, HEATING COILS AND REHEAT COILS SHALL BE STAGED TO MAINTAIN UNOCCUPIED COOLING OR HEATING SET POINT AS INDICATED BY BMS DISCHARGE AIR SENSOR. THE OUTSIDE AIR DAMPER AND EXHAUST DAMPER SHALL REMAIN CLOSED DURING UNOCCUPIED PERIODS.  
 5. WHEN OUTSIDE AIR TEMPERATURE IS BELOW 35 DEG F SUPPLY FAN SHALL NOT START UNTIL THE EXHAUST FAN HAS OPERATED FOR 5 MINUTES (ADJUSTABLE).  
 6. WHEN THE ERV UNIT IS OPERATING IN AN OUTSIDE AIR COOLING MODE, THE HEAT RECOVERY WHEEL SHALL ROTATE AS LONG AS THE OUTSIDE AIR ENTHALPY IS HIGHER THAN THE EXHAUST/RELIEF ENTHALPY. IF OUTSIDE AIR ENTHALPY IS EQUAL OR LOWER THAN THE EXHAUST/RELIEF ENTHALPY, THE WHEEL SHALL NOT ROTATE.  
 7. WHEN THE ERV UNIT IS OPERATING IN AN OUTSIDE AIR HEATING MODE, THE HEAT RECOVERY WHEEL SHALL ROTATE AS LONG AS THE OUTSIDE AIR TEMPERATURE IS LOWER THAN THE EXHAUST/RELIEF AIR TEMPERATURE. IF OUTSIDE AIR TEMPERATURE IS EQUAL OR HIGHER THAN THE EXHAUST/RELIEF AIR TEMPERATURE, THE WHEEL SHALL NOT ROTATE.  
 8. A FACTORY-INSTALLED FROST PROTECTION SYSTEM SHALL BE ENABLED WHEN EXHAUST AIR TEMPERATURE FALLS BELOW 35 DEG F. AN ALARM SHALL ACTIVATE IF EXHAUST AIR TEMPERATURE FALLS BELOW 32 DEG F.  
 9. INTERLOCK CONTROLS:  
 a. OUTSIDE DAMPER SHALL BE FULLY OPEN BEFORE SUPPLY FAN WILL START.  
 b. EXHAUST/RELIEF DAMPER SHALL BE FULLY OPEN BEFORE EXHAUST/RELIEF FAN WILL START.  
 c. DIRTY FILTER SWITCH: PROVIDE PRESSURE SWITCH TO INDICATE DIRTY FILTER AT EACH UNIT.

BUILDING NO.	1	SYSTEMS	ENERGY RECOVERY VENTILATOR	GRAPHIC DISPLAY	POINT DESCRIPTION	ENERGY RECOVERY VENTILATOR	SUPPLY FAN	OUTSIDE AIR TEMPERATURE	WHEEL DISCHARGE AIR TEMPERATURE	WHEEL EXHAUST AIR TEMPERATURE	EXHAUST FAN	RETURN AIR TEMPERATURE	RETURN AIR RELATIVE HUMIDITY	EXHAUST AIR TEMPERATURE	DIRTY FILTER	WHEEL ROTATION	HOT WATER HEATING COIL	ABSOLUTE COMPRESSOR	REGENERATION DAMPER	OUTSIDE AIR DAMPER	EXHAUST AIR DAMPER	ENABLE/DISABLE	REMARKS

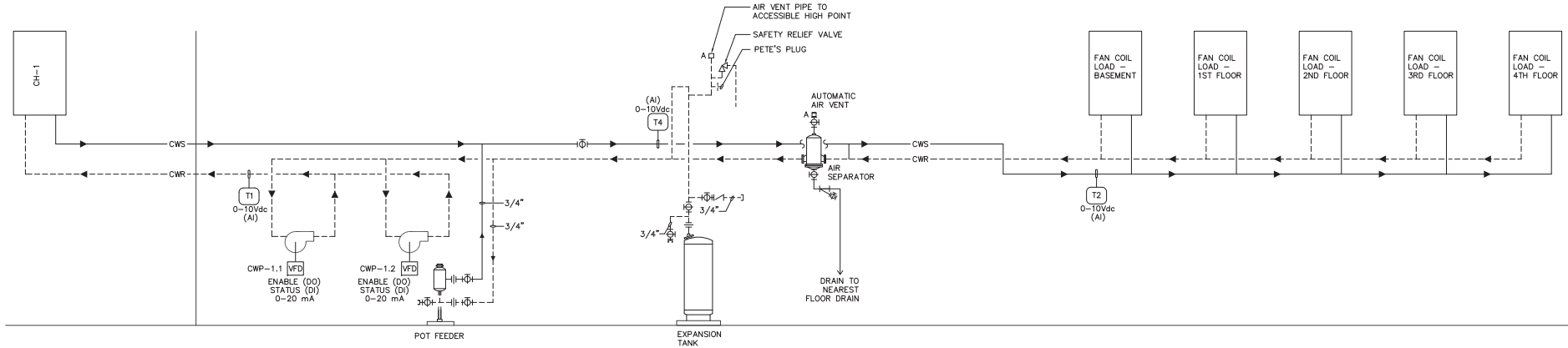
**STEAM TO HOT WATER SYSTEM CONTROL DIAGRAM AND SEQUENCE**  
NO SCALE



SYSTEM/POINT DESCRIPTION	LABEL	DEVICE TYPE	QUANTITY	GRAPHIC DISPLAY	POINT TYPE	ALARM	TREND	SAMPLE RATE (S)
<b>HOT WATER SYSTEM</b>								
Hot Water System Enable	HV_EWA	Software Point (I/O, setpoint)	1	Y	SW			
Steam Control Valve	HV_EV1	Actuator - Control Valve	1	Y	AO	X		
Hot Water Return Temperature	HV_EW-T	Sensor - Temperature (Hydronic)	1	Y	AI	X	120	
Hot Water Supply Temperature	HV_LV-T	Sensor - Temperature (Hydronic)	1	Y	AI	X	120	
Hot Water Supply Temp. Setpoint	HV_LV-SET	Software Point (I/O, setpoint)	1	Y	SW			
Hot Water Pump Start/Stop	HV_WP-S	Relay - Equipment Start/Stop	2	Y	BO	X		
Hot Water Pump Status	HV_WP-C	Sensor - Equipment Status (Current)	2	Y	BI	X	CDW	
Hot Water Differential Pressure	HV_WD-P	Sensor - Pressure (Hydronic)	1	Y	AI	X	120	
Hot Water DRP, Pressure Setpoint	HV_WD-SP	Software Point (I/O, setpoint)	1	Y	SW			

NOTES:  
 1. FIELD VERIFY EXACT QUANTITIES OF DEVICES  
 2. AN "X" UNDER THE LABEL COLUMN DENOTES AN INDIVIDUAL EQUIPMENT NUMBER  
 3. B=BINARY INPUT, BO=BINARY OUTPUT, AI=ANALOG INPUT  
 AO=ANALOG OUTPUT, SW=SOFTWARE POINT, CDW=CHANGE OF VALUE

<b>CONSULTANT</b> <b>FARRIS ENGINEERING</b> 2015 North 200th Street Elkton, Nebraska 68522 (402) 294-9441 www.farris.com FE# 182083	<b>ARCHITECT/ENGINEER OF RECORD</b> <b>Chilcote Hill</b> 3102 North 200th Street Elkton, Nebraska 68522 (402) 294-9441 www.chilcotehill.com	<b>Office of Construction and Facilities Management</b> VA U.S. Department of Veterans Affairs	<b>Mechanical Control Diagrams</b> Approved Project Director	<b>Phase</b> BID DOCUMENTS	<b>Project Title</b> RENOVATE TOWER BUILDING 1	<b>Project Number</b> 430-18-102
<b>Contract Documents 100% Submittal (CD)</b> 05/30/2019	<b>Contract Documents 95% Submittal (CD)</b> 04/11/2019	<b>Contract Documents 35% Submittal (CD)</b> 02/18/2019	<b>Design Development (DD)</b> 12/10/2018	<b>Schematic Design (SD)</b> 10/05/2018	<b>Contract Documents 100% Submittal (CD)</b> 05/30/2019	<b>Contract Documents 95% Submittal (CD)</b> 04/11/2019
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CHILLED WATER PUMPING SYSTEM - CONTROL DIAGRAM

NO SCALE

**FIRE ALARM SHUTDOWN OF FIRE/SMOKE DAMPERS AND ENERGY RECOVERY UNIT - CONTROL SEQUENCE**

THE SEQUENCE OF OPERATION SHALL BE SUCH THAT, WHEN THE FIRE ALARM SYSTEM IS ACTIVATED, FIRE ALARM RELAY(S) THROUGH ITS AUXILIARY CONTACTS SHALL CLOSE THE FIRE/SMOKE DAMPERS AND SHUT DOWN THE ENERGY RECOVERY UNIT.

WHEN THE FIRE ALARM SYSTEM IS RESET TO NORMAL OPERATION, THE FIRE/SMOKE DAMPERS SHALL RETURN TO OPEN POSITION AND THE ENERGY RECOVERY UNIT SHALL RESTART.

COORDINATE ALL INSTALLATION OF FIRE ALARM SHUTDOWN CONTROLS WITH THE ELECTRICAL CONTRACTOR.

**CHILLED WATER SYSTEM - CONTROL SEQUENCE**

**CHILLED WATER PUMP CONTROL:** THE MOTOR STARTERS FOR THE CHILLED WATER PUMPS SHALL BE CONTROLLED BY THE DDC CONTROL SYSTEM. PROVIDE A START/STOP DIGITAL OUT (DO) CONTROL POINT, AND A STATUS ALARM FOR EACH PUMP.

**HAND-OFF-AUTO:** WHEN THE SWITCH ON THE STARTER IS IN THE "OFF" POSITION, THE PUMP SHALL BE SHUT OFF. WHEN THE SWITCH IS IN THE "AUTO" POSITION, THE PUMP SHALL OPERATE AS DIRECTED BY THE DDC CONTROLLER.

CHILLED WATER PUMPS SHALL BE INTERLOCKED WITH CHILLERS.

**LOSS OF POWER:** UPON LOSS OF POWER, THE CHILLER AND ASSOCIATED CHILLED WATER PUMPS SHALL SHUT DOWN AND AN ALARM CONDITION SHALL ACTIVATE. UPON A RETURN OF POWER, OPERATORS WILL MANUALLY RESTART CHILLED WATER PUMPS AND CHILLER FROM DDC FRONT-END. THE CHILLED WATER SYSTEM IS NOT CONNECTED TO THE EMERGENCY POWER SYSTEM.

PROVIDE THREE-WAY VALVES TO MAINTAIN CONSTANT FLOW THROUGH THE ENTIRE LOOP.

**CHILLER CONTROL:** PROVIDE A BUILDING MANAGEMENT SYSTEM INTERFACE CARD FOR THE CHILLER THAT WILL GIVE THE DDC CONTROLLER THE ABILITY TO MONITOR CHILLED WATER LEAVING/ENTERING TEMPERATURES, REFRIGERANT LEAVING/ENTERING TEMPERATURES, MOTOR AMPS, GIVE THE ABILITY TO UNLOAD THE CHILLER (DEMAND LIMITING), AND MONITOR OTHER SYSTEM ALARM CONDITIONS WITHIN THE CHILLER CONTROLLER.

CHILLER WATER TEMPERATURE RESET SHALL BE PROVIDED BASED ON THE RETURN WATER TEMPERATURE. PROVIDE A STOP/START (DO) CONTROL POINT FOR THE CHILLER.

WHEN THE OUTSIDE AMBIENT TEMPERATURE EXCEEDS 55 (ADJUSTABLE) DEG F, THE DDC CONTROLLER SHALL SEND START SIGNAL TO CHILLER. THE DDC CONTROLLER SHALL START EITHER PUMP. ONCE WATER FLOW HAS BEEN PROVEN THROUGH THE FLOW SWITCH, THE CHILLER CONTROLLER SHALL START THE COMPRESSOR. THE DDC CONTROLLER SHALL ALTERNATE THE OPERATION OF THE CHILLER WATER PUMPS ON A WEEKLY BASIS.

THE CHILLER CONTROLLER SHALL MAINTAIN LEAVING CHILLED WATER TEMPERATURE OF 42 DEG F, AND ACTIVATE THE REQUIRED NUMBER OF COMPRESSORS TO MEET CHILLED WATER SET-POINT.

**FLOW SWITCH:** CONTRACTOR SHALL FIELD MOUNT AND WIRE CHILLED WATER FLOW SWITCH TO THE CHILLER.

BUILDER NO. 1	HARDWARE				SOFTWARE			
	OUTPUT		INPUT		ALARMS		APPLICATION PROGRAMS	
SYSTEMS)	DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG		
CHILLED WATER SYSTEM								
OCCUPANCY TIME								
CRITICAL ALARM DISPLAY								
GRAPHIC DISPLAY								
POINT DESCRIPTION								
CHILLED WATER PUMP								
CHILLED WATER PUMP								
CHILLED WATER SUPPLY								
CHILLED WATER RETURN								
CHILLER OIL								

**SUMP PUMP -SP-1, SP-2, SP-3 CONTROL SEQUENCE**

SP-1, SP-2, SP-3 LOCATED IN PIT. PROVIDE A STATUS ALARM POINT TO SEND A SIGNAL TO THE DDC CONTROLLER WHEN THE HIGH WATER ALARM CONDITION OCCURS. PROVIDE A WATER LEVEL SENSOR IN EACH SUMP PUMP BASIN TO SIGNAL THAT A PUMP FAILURE HAS OCCURRED DUE TO THE WATER LEVEL EXCEEDING A PREDETERMINED LEVEL.

**CHILLED WATER PUMPING SYSTEM - CONTROL SEQUENCE**

PROVIDE VARIABLE FREQUENCY DRIVES (VFD) FOR THE PUMPS. 4-20MA SIGNALS, AND VFD STATUS/ALARMS. PROVIDE A DIFFERENTIAL PRESSURE SENSOR FOR CONTROLLING THE VFD'S. PROVIDE CHILLED WATER TEMPERATURE SENSORS FOR THE CHILLED WATER LOOP.

**DUCTLESS SPLIT SYSTEM UNIT**

- UNIT SHALL BE FURNISHED WITH MANUFACTURER'S INSTALLED CONTROL PACKAGE AND A REMOTE CONTROLLER. THE CONTROLLER SHALL BE CAPABLE OF MONITORING AND SETTING DESIRED ROOM TEMPERATURE, TEMPERATURE SETPOINT, FAN ON/OFF SPEED CONTROL AND NIGHT SETBACK CONTROL.
- DDC SENSOR IN ROOM SHALL MONITOR SPACE TEMPERATURE. PROVIDE AN ALARM AT THE FRONT END IF ROOM TEMPERATURE IS OUT OF RANGE (COORDINATE WITH OWNER ON ACCEPTABLE TEMPERATURE RANGES).

BUILDER NO. 1	HARDWARE				SOFTWARE			
SYSTEMS)	DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG		
DUCTLESS SPLIT SYSTEM UNIT								
OCCUPANCY TIME								
GRAPHIC DISPLAY								
POINT DESCRIPTION								
DUCTLESS SPLIT SYSTEM UNIT								
SPACE AIR TEMPERATURE								
SPACE SETBACK								

**VARIABLE REFRIGERANT SYSTEM**

- VARIABLE REFRIGERANT SYSTEM SHALL BE PROVIDED WITH FACTORY MOUNTED CONTROLS EXCLUDING THE WALL THERMOSTAT PROVIDED BY THE TEMPERATURE CONTROL CONTRACTOR. THE WALL THERMOSTAT SHALL COMMUNICATE TO THE VRS THE WALL TEMPERATURE. THE WALL THERMOSTAT WILL CONTROL THE SEQUENCE AND OCCUPIED/UNOCCUPIED SET POINTS. THE FACTORY AND FIELD MOUNTED CONTROLS SHALL COMMUNICATE VIA BACNET MSTP TO THE BUILDING WEB BASED BUILDING MANAGEMENT SYSTEM.
- OCCUPIED OPERATION: FAN SHALL RUN CONTINUOUSLY ON A CALL FOR HEATING OR COOLING. THE HEAT PUMP UNIT SHALL CYCLE.
- UNOCCUPIED OPERATION: FAN SHALL CYCLE ON A CALL FOR HEATING OR COOLING. THE FAN SHALL CYCLE ALONG WITH THE HEAT PUMP UNIT.

BUILDER NO. 1	HARDWARE				SOFTWARE			
SYSTEMS)	DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG		
VARIABLE REFRIGERANT SYSTEM								
OCCUPANCY TIME								
GRAPHIC DISPLAY								
POINT DESCRIPTION								
VARIABLE REFRIGERANT SYSTEM								
SPACE TEMPERATURE								
SPACE PLUMBITY								
SUPPLY AIR TEMPERATURE								
HEAT COOL MODE								
FAN SPEED								
FAN CONTROL								
DEMAND/SETPOINT								

BUILDER NO. 1	HARDWARE				SOFTWARE			
SYSTEMS)	DIGITAL	ANALOG	DIGITAL	ANALOG	DIGITAL	ANALOG		
MISCELLANEOUS								
OCCUPANCY TIME								
GRAPHIC DISPLAY								
POINT DESCRIPTION								
UNIT HEATER ON/1								
PUMP PUMP-SP1								
SUMP PUMP-SP2								
SUMP PUMP-SP3								

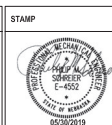
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**CONSULTANT**

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**Office of Construction and Facilities Management**

VA U.S. Department of Veterans Affairs

**MECHANICAL CONTROL DIAGRAMS**

Approved Project Director

**BID DOCUMENTS**

**FULLY SPRINKLERED**

**Project Title**  
RENOVATE TOWER BUILDING 1

**Location**  
Stouff Falls, SD 57105

**Issue Date**  
05/30/2019

**Checked**  
JOB

**Drawn**  
LMB

**Project Number**  
438-18-102

**Revision Number**  
1

**Drawing Number**  
M604

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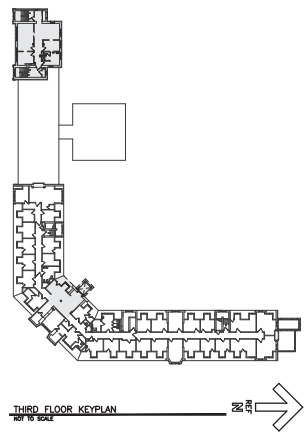
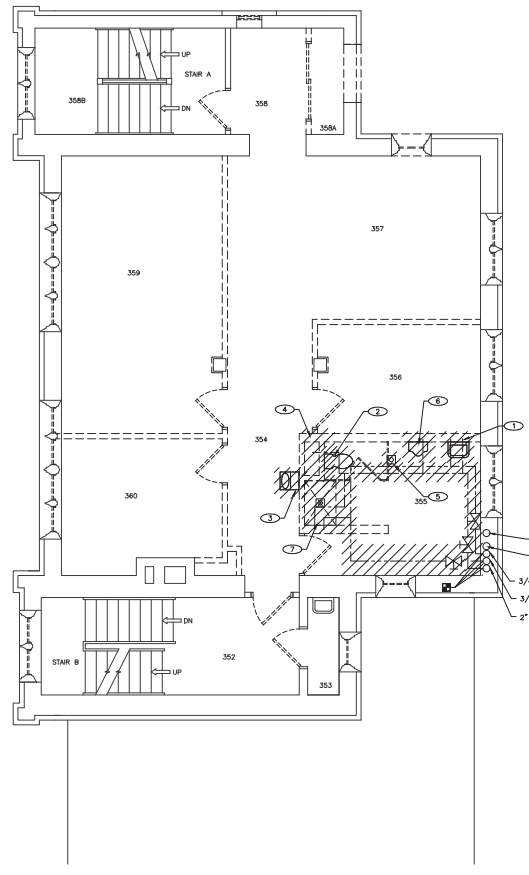
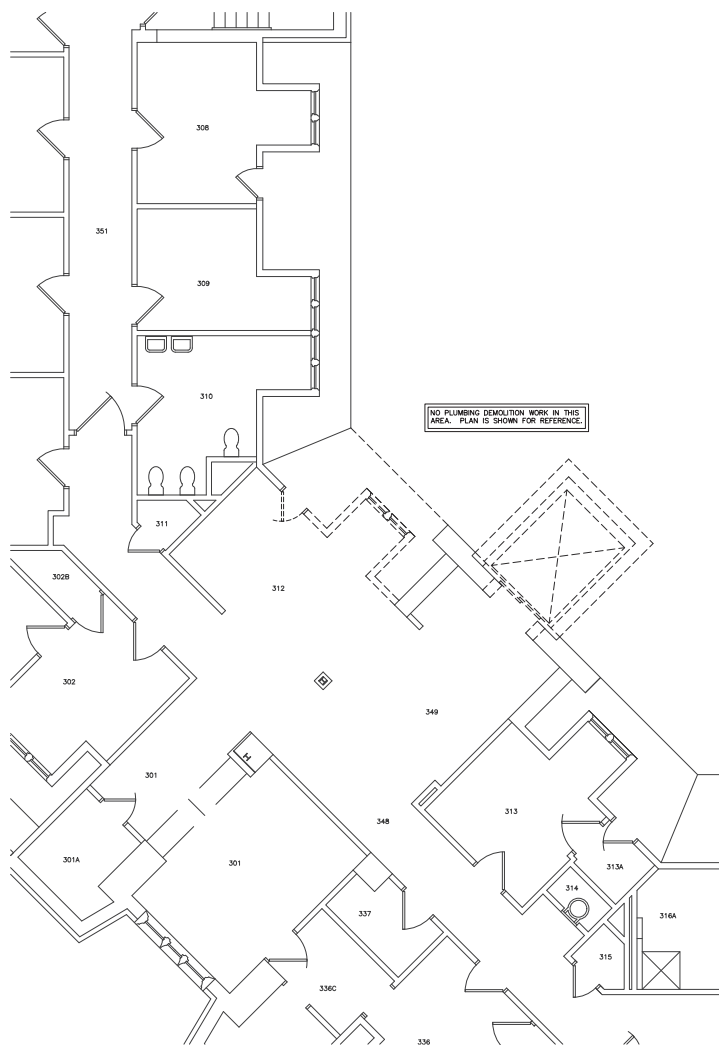


**PLUMBING KEYNOTES: (C)**

- 1 REMOVE LAVATORY, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING. CAP DOMESTIC WATER AND VENT PIPING BACK AT MAIN/RISERS.
- 2 REMOVE WATER CLOSET, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING. CAP DOMESTIC WATER AND VENT PIPING BACK AT MAIN/RISERS.
- 3 REMOVE ELECTRIC WATER COOLER, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING. CAP DOMESTIC WATER AND VENT PIPING BACK AT MAIN/RISERS.
- 4 REMOVE EXISTING PIPING IN CHASE ASSOCIATED WITH PLUMBING FIXTURES BEING REMOVED.
- 5 REMOVE FLOOR DRAIN, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING.
- 6 REMOVE URINAL, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING. CAP DOMESTIC WATER AND VENT PIPING BACK AT MAIN/RISERS.
- 7 REMOVE SHOWER, ASSOCIATED PIPING AND ACCESSORIES IN ITS ENTIRETY. CAP SANITARY PIPING BACK AT MAIN/RISERS AND PATCH FLOOR PENETRATION TO MATCH EXISTING. CAP DOMESTIC WATER AND VENT PIPING BACK AT MAIN/RISERS.

NO PLUMBING DEMOLITION WORK IN THIS AREA. PLAN IS SHOWN FOR REFERENCE.

NOTICE:  
REFER TO DRAWING G1-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



1F ENLARGED PLUMBING DEMOLITION PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"

6F ENLARGED PLUMBING DEMOLITION PLAN - THIRD FLOOR  
SCALE: 1/4" = 1'-0"

THIRD FLOOR KEYPLAN  
1/8" = 1'-0"

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Bid Documents	05/30/2019
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Contract Documents 95% Submittal (CD)	04/11/2019
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Revisions:	Date:

**CONSULTANT**

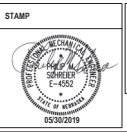
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Office of Construction and Facilities Management  
VA U.S. Department of Veterans Affairs

Drawing Title  
**THIRD FLOOR PLUMBING DEMOLITION PLANS**

Approved: Project Director

Phase  
**BID DOCUMENTS**

**FULLY SPRINKLERED**

Project Title  
**RENOVATE TOWER BUILDING 1**

Location  
**Sioux Falls, SD 57105**

Issue Date  
05/30/2019

Checked  
JOB

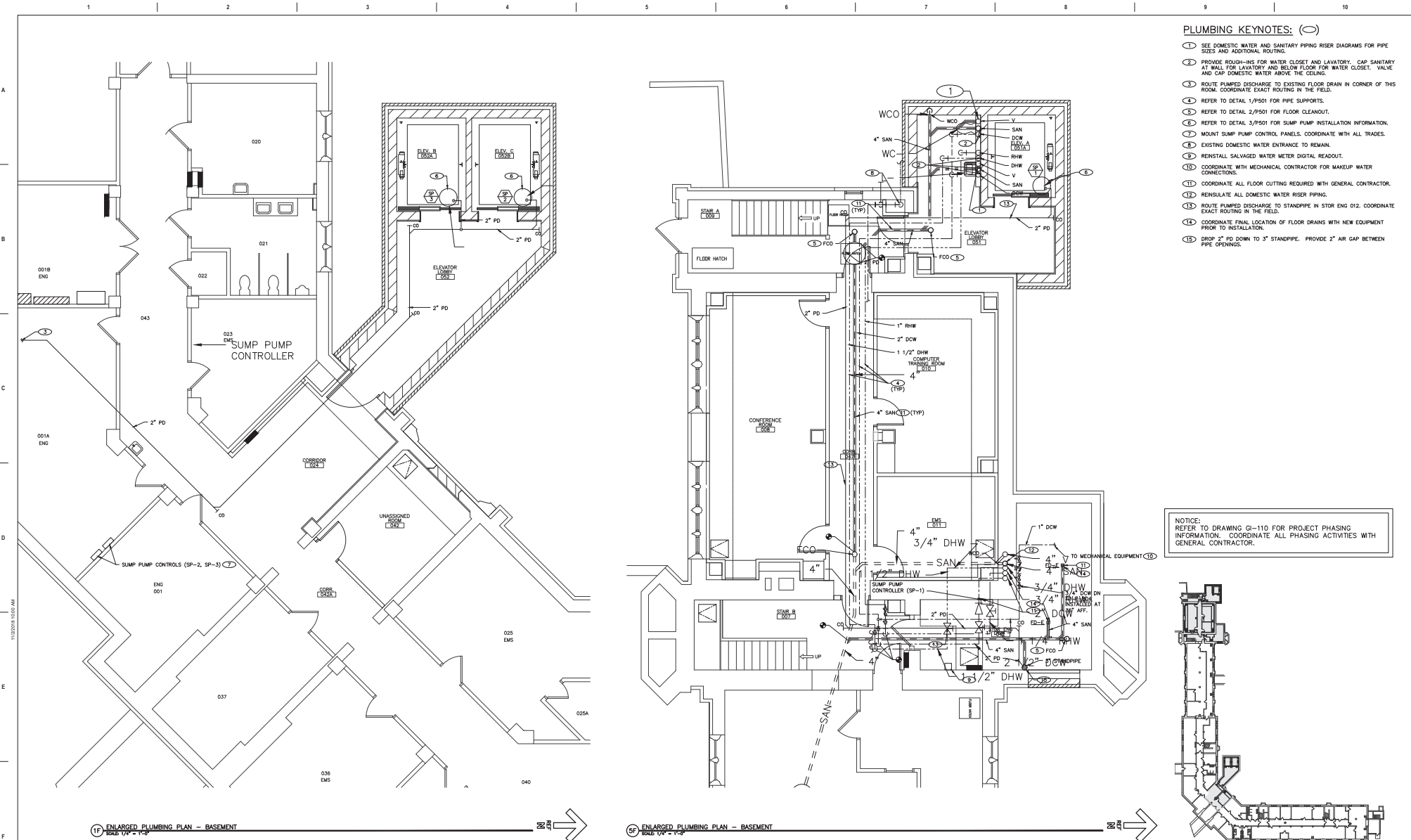
Drawn  
CJB

Project Number  
**438-18-102**

Building Number  
**1**

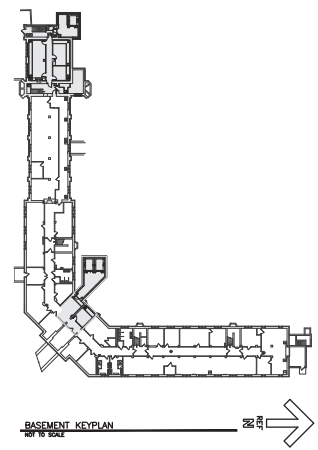
Drawing Number  
**PD103**





- PLUMBING KEYNOTES: (C)**
- 1 SEE DOMESTIC WATER AND SANITARY PIPING RISER DIAGRAMS FOR PIPE SIZES AND ADDITIONAL ROUTING.
  - 2 PROVIDE ROUGH-INS FOR WATER CLOSET AND LAVATORY. CAP SANITARY AT WALL FOR LAVATORY AND BELOW FLOOR FOR WATER CLOSET. VALVE AND CAP DOMESTIC WATER ABOVE THE CEILING.
  - 3 ROUTE PUMPED DISCHARGE TO EXISTING FLOOR DRAIN IN CORNER OF THIS ROOM. COORDINATE EXACT ROUTING IN THE FIELD.
  - 4 REFER TO DETAIL 1/P501 FOR PIPE SUPPORTS.
  - 5 REFER TO DETAIL 2/P501 FOR FLOOR CLEANOUT.
  - 6 REFER TO DETAIL 3/P501 FOR SUMP PUMP INSTALLATION INFORMATION.
  - 7 MOUNT SUMP PUMP CONTROL PANELS. COORDINATE WITH ALL TRADES.
  - 8 EXISTING DOMESTIC WATER ENTRANCE TO REMAIN.
  - 9 REINSTALL SALVAGED WATER METER DIGITAL READOUT.
  - 10 COORDINATE WITH MECHANICAL CONTRACTOR FOR MAKEUP WATER CONNECTIONS.
  - 11 COORDINATE ALL FLOOR CUTTING REQUIRED WITH GENERAL CONTRACTOR.
  - 12 REINSULATE ALL DOMESTIC WATER RISER PIPING.
  - 13 ROUTE PUMPED DISCHARGE TO STANDPIPE IN STOR ENG 012. COORDINATE EXACT ROUTING IN THE FIELD.
  - 14 COORDINATE FINAL LOCATION OF FLOOR DRAINS WITH NEW EQUIPMENT PRIOR TO INSTALLATION.
  - 15 DROP 2\"/>

NOTICE:  
REFER TO DRAWING GI-110 FOR PROJECT PHASING INFORMATION. COORDINATE ALL PHASING ACTIVITIES WITH GENERAL CONTRACTOR.



1F ENLARGED PLUMBING PLAN - BASEMENT  
SCALE 1/4" = 1'-0"

5F ENLARGED PLUMBING PLAN - BASEMENT  
SCALE 1/4" = 1'-0"

BASEMENT KEYPLAN  
1/8" = 1'-0"

<table border="1"> <tr> <td>Bid Documents</td> <td>05/30/2019</td> </tr> <tr> <td>Contract Documents 100% Submittal (CD)</td> <td>05/14/2019</td> </tr> <tr> <td>Contract Documents 95% Submittal (CD)</td> <td>04/11/2019</td> </tr> <tr> <td>Contract Documents 35% Submittal (CD)</td> <td>02/18/2019</td> </tr> <tr> <td>Design Development (DD)</td> <td>12/10/2018</td> </tr> <tr> <td>Schematic Design (SD)</td> <td>10/09/2018</td> </tr> <tr> <td>Revisions:</td> <td>Date:</td> </tr> </table>		Bid Documents	05/30/2019	Contract Documents 100% Submittal (CD)	05/14/2019	Contract Documents 95% Submittal (CD)	04/11/2019	Contract Documents 35% Submittal (CD)	02/18/2019	Design Development (DD)	12/10/2018	Schematic Design (SD)	10/09/2018	Revisions:	Date:	<b>CONSULTANT</b> <b>FARRIS ENGINEERING</b> <small>OMAHA   LINCOLN   DENVER   COLORADO SPRINGS</small> <small>FEI # 182083</small> <small>This document and the information contained hereon may not be reproduced or excerpted from without the express written permission of Farris Engineering, Inc. Unauthorized copying, distribution or construction use are prohibited by the copyright law.</small>		<b>ARCHITECT/ENGINEER OF RECORD</b>  <b>C.H. Hill</b> <small>3105 North 200th Street          Edina, Minnesota 55425          (612) 291-6941</small> <b>FARRIS ENGINEERING</b> <small>OMAHA   LINCOLN   DENVER   COLORADO SPRINGS</small> <small>05/30/2019</small>		<b>Office of Construction and Facilities Management</b>  U.S. Department of Veterans Affairs		Drawing Title <b>BASEMENT PLUMBING PLANS</b> Approved: Project Director		Phase <b>BID DOCUMENTS</b> <b>FULLY SPRINKLERED</b>		Project Title <b>RENOVATE TOWER BUILDING 1</b> Location <b>Sioux Falls, SD 57105</b> Issue Date <b>05/30/2019</b>		Project Number <b>438-18-102</b> Building Number <b>1</b> Drawing Number <b>PL100</b>	
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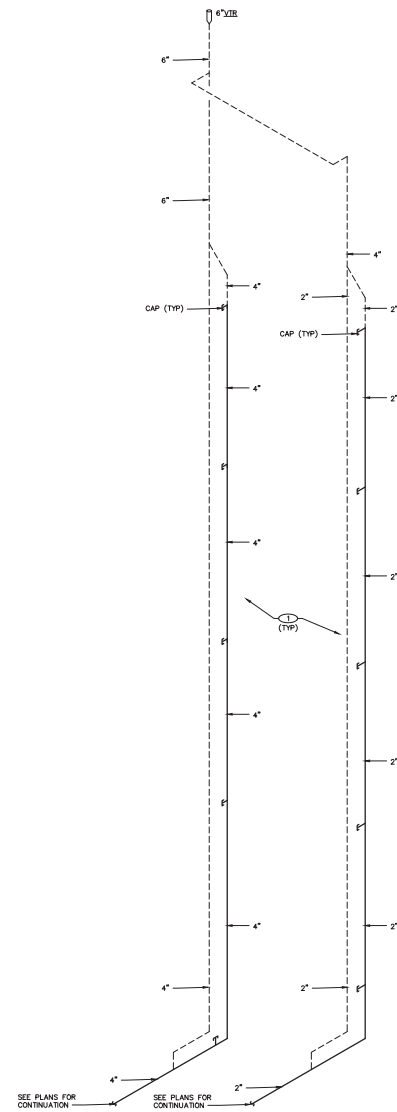
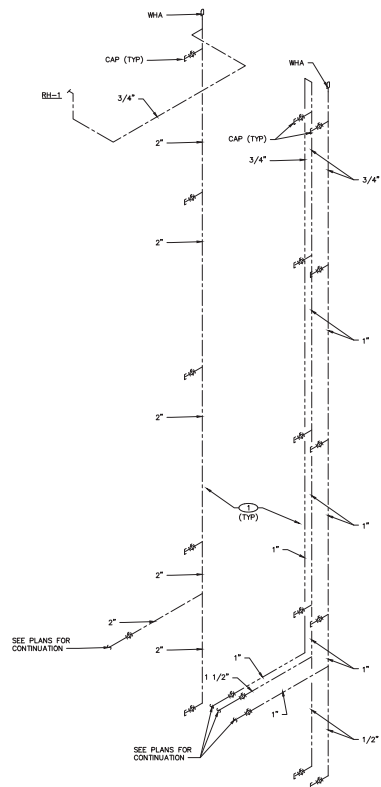






**PLUMBING KEYNOTES:** (C)

(C) SEE PLANS FOR ADDITIONAL INFORMATION. PIPING SHALL BE PREPARED FOR CONNECTION TO PLUMBING FIXTURES FOR FUTURE RESTROOMS. COORDINATE WITH ALL TRACES FOR INSTALLATION AND ROUTING OF PIPING.



**CONSULTANT**

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**STAMP**



Office of  
Construction  
and Facilities  
Management

VA U.S. Department  
of Veterans Affairs

**Drawing Title**

PLUMBING ONE-LINE RISER  
DIAGRAMS

Approved: Project Director

**Phase**

BID DOCUMENTS

FULLY SPRINKLERED

**Project Title**

RENOVATE TOWER BUILDING 1

Location  
Sioux Falls, SD 57105

Issue Date  
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Checked  
JOB

Drawn  
CJB

**Project Number**

438-18-102

Building Number  
1

Drawing Number

P601

