VALVE SYMBOLS

- GATE VALVE - THREADED/FLANGED
- GLOBE VALVE - THREADED/FLANGED
- GATE VALVE WITH 3/4" HOSE ADAPTER
- CHECK VALVE
- WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)
- WYE STRAINER WITH VALVED DRAIN AND QUICK-COUPLE HOSE CONNECTOR
- FLEXIBLE CONNECTION
- ANGLE GLOBE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- MODULATING CONTROL VALVE
- MODULATING CONTROL BUTTERFLY VALVE
- TWO POSITION CONTROL VALVE
- THREE-WAY MODULATING CONTROL VALVE
- THREE-WAY TWO POSITION CONTROL VALVE
- PRESSURE REGULATING VALVE
- PRESSURE SAFETY VALVE
- AUTOMATIC BALANCING CONTROL VALVE
- WATER BALANCE DEVICE
- CIRCUIT SETTER VALVE
- GATE VALVE WITH GLOBE-VALVED BYPASS
- PLUG VALVE
- CONTROL VALVE (CV) - FLOAT-OPERATED
- PRESSURE REDUCING VALVE (PRV)
- LC — WATER LEVEL CONTROLLER
- M — FLOW METER

CONTROLS SYMBOLS

- T — ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT
- M — ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT
- TT — TEMPERATURE TRANSMITTER
- TT — TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
- MT — MOISTURE (HUMIDITY) TRANSMITTER
- PT — PRESSURE TRANSMITTER
- SPS — STATIC PRESSURE SENSOR
- FT — FLOW TRANSMITTER
- IT — CURRENT TRANSMITTER
- CT — CONDUCTIVITY TRANSMITTER
- SD — SMOKE DETECTOR
- PDT — PRESSURE DIFFERENTIAL TRANSMITTER
- PDS — PRESSURE DIFFERENTIAL SWITCH
- HS — HAND SWITCH (HAND-OFF-AUTO SWITCH)
- ZC — VALVE OR DAMPER POSITION CONTROLLER
- KR — LOCAL RECORDING TIME CLOCK (RUNTIME)
- TSL — TEMPERATURE SWITCH, LOW (FREEZESTAT)
- TSH — TEMPERATURE SWITCH, HIGH (FREEZESTAT)
- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- EPT — ELECTRONIC TO PNEUMATIC TRANSDUCER
- AT CO — CARBON MONOXIDE TRANSMITTER
- AT OC — OCCUPANCY SENSOR
- LTCP — LOCAL TEMPERATURE CONTROL PANEL
- HVAC — HVAC CONTROL PANEL
- VSMC — VARIABLE SPEED MOTOR CONTROLLER
- ECC — INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
- TC — TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
- PC — PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
- SC — SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
- FC — FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
- FSH — FLOW SWITCH HIGH
- FSL — FLOW SWITCH LOW
- TEMPERATURE SENSING ELEMENT FOR TRANSMITTING TEMPERATURE TO EMCS (PROVIDE 12 INCHES [200mm] MINIMUM LENGTH IN DUCT WHEN SPACE PERMITS.)
- A — SENSOR WITH AVERAGING ELEMENT TO TRANSMIT TEMPERATURE TO EMCS
- MOTOR STARTER
- M — ELECTRIC OPERATED CONTROL DAMPER/OR VALVE

AIR TERMINAL SYMBOLS

- TERMINAL UNIT WITH REHEAT COIL
- MB — DOUBLE DUCT MIXING BOX.
- FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL.

TERMINAL UNIT SYMBOLS

- CONVECTOR OR RADIATOR (RECESSED)
- CONVECTOR OR RADIATOR (WALL HUNG)
- UNIT HEATER (HORIZONTAL)
- UNIT HEATER (VERTICAL)
- 2'X2' RADIANT CEILING PANEL
- 2'x4' RADIANT CEILING PANEL

GENERAL PIPING SYMBOLS

- DIRECTION OF PIPE PITCH (DOWN)
- DIRECTION OF FLOW
- ANCHOR
- REDUCER OR INCREASER
- ECCENTRIC REDUCER
- TOP CONNECTION, 45° OR 90°
- BOTTOM CONNECTION, 45° OR 90°
- SIDE CONNECTION
- CAPPED OUTLET
- RISE OR DROP IN PIPE
- UNION
- PIPE UP
- PIPE DOWN
- INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- THERMOMETER
- PRESSURE GAGE
- FE — FLOW ELEMENT
- REFRIGERANT SIGHT GLASS
- TEST PLUG (PRESSURE/TEMPERATURE)
- AV — AUTOMATIC AIR VENT
- MV — MANUAL AIR VENT
- C — QUICK-COUPLE HOSE CONNECTOR

PIPING SYMBOLS

- HPS — HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
- HPR — HIGH PRESSURE STEAM CONDENSATE RETURN
- MPS — MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
- MPR — MEDIUM PRESSURE STEAM CONDENSATE RETURN
- LPS — LOW PRESSURE STEAM (15 PSIG AND BELOW)
- LPR — LOW PRESSURE STEAM CONDENSATE RETURN
- PC — CONDENSATE PUMP DISCHARGE
- HWS — HOT WATER HEATING SUPPLY
- HWR — HOT WATER HEATING RETURN
- CHS — CHILLED WATER SUPPLY
- CHR — CHILLED WATER RETURN
- D — DRAIN LINE
- V — VENT LINE
- X — EXISTING PIPE TO BE REMOVED
- RH — ROLLER-TYPE HANGER
- SH — VARIABLE SPRING-TYPE HANGER (TYPE 51)*
- SCH — SPRING CUSHION-TYPE HANGER (TYPE 48 OR 49)*
- CLEVIS-TYPE HANGER
- TH — TRAPEZE HANGER (PROVIDE U-BOLT PIPE ATTACHMENT TO TRAPEZE EXCEPT WHERE RH ARE INDICATED)
- PS — FLOOR-SUPPORTED PIPE STAND
- RC — RISER CLAMP (TYPE 42)*
- WB — WALL BRACKET (TYPE 31, 32, 33)*
- CSH — CONSTANT SUPPORT HANGER (TYPE 54, 55, 56)*
- SS — SLIDING SUPPORTS (TYPE 35)*

* TYPE NUMBERS REFER TO MANUFACTURER'S STANDARDIZATION SOCIETY STANDARD PRACTICE SP-58

DUCTWORK SYMBOLS

- UP / DN — SUPPLY DUCT (UP & DOWN)
- UP / DN — EXHAUST DUCT (UP & DOWN)
- UP / DN — RETURN DUCT (UP & DOWN)
- ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
- SQUARE 3-WAY CEILING DIFFUSERS
- SQUARE 2-WAY CEILING DIFFUSERS
- SQUARE 1-WAY CEILING DIFFUSERS
- LINEAR SLOT DIFFUSER
- SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN CEILING REGISTER OR GRILLE
- EXHAUST OR RETURN BOTTOM REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN REGISTER OR TOP GRILLE (WALL TYPE)
- VANED ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
- CONNECT NEW DUCT TO EXISTING DUCT
- R — INCLINED RISE, IN DIRECTION OF AIR FLOW
- D — INCLINED DROP, IN DIRECTION OF AIR FLOW
- LIMIT OF DEMOLITION
- FC — FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
- VANED ELBOW (SHORT RADIUS)
- STANDARD RADIUS ELBOW (LONG RADIUS)
- 10x8 — NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
- EXISTING DUCT TO REMAIN
- EXISTING DUCT TO BE REMOVED
- LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
- FLEXIBLE DUCTWORK (INSULATED)
- DUCT WITH SOUND LINING
- VD — MANUAL VOLUME DAMPER
- FD — FIRE DAMPER
- BDD — BACK DRAFT DAMPER
- F/S DPR — COMBINATION FIRE/SMOKE DAMPER
- 2 / 4 / 1:2 / N — POINT OF CHANGE IN DUCT CONSTRUCTION BY STATIC PRESSURE CLASS. THE NUMBER ASSIGNS PRESSURE CLASS (IN. OF WATER) WHICH WILL ACCOMMODATE MAXIMUM OPERATING PRESSURE IN THE DUCT SUBSECTION. THE SYMBOL CONTINUES THE ASSIGNMENT UNTIL THE DUCT TERMINATES OR ANOTHER SYMBOL APPEARS. A "N" SUPERSCRIPT INDICATES NEGATIVE PRESSURE.
- AUTOMATIC CONTROL DAMPER MODULATING
- AUTOMATIC CONTROL DAMPER TWO POSITION
- STAINLESS STEEL DUCT
- MANUAL SPLITTER DAMPER
- 45° SUPPLY / 45° RETURN — STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)
- DUCT MOUNTED COIL (HOT WATER OR STEAM COIL)

ABBREVIATIONS L-Z

L	LITER
L/h	LITERS PER HOUR (OR LITERS/HOUR)
L/m	LITERS PER MINUTE (OR LITERS/MINUTE)
L/s	LITERS PER SECOND (OR LITERS/SECOND)
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FOOT (FEET)
LH	LATENT HEAT
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
LPS	LOW PRESSURE STEAM
LPSC	LOW PRESSURE STEAM (CLEAN)
LSD	LINEAR SLOT DIFFUSER
LTCP	LOCAL TEMPERATURE CONTROL PANEL
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
M	METER, SI UNIT
M/s	METERS PER SECOND (OR METERS/SECOND)
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MIXING BOX
MBH	1000 BTUH
MCA	MINIMUM BRANCH CIRCUIT AMPACITY
MER	MECHANICAL EQUIPMENT ROOM
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE STEAM
MTD	MEAN TEMPERATURE DIFFERENCE
MVD	MANUAL VOLUME DAMPER
NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOAA	NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM	NOMINAL
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAG	OUTSIDE AIR GRILLE
OAI	OUTSIDE AIR INTAKE
OD	OUTSIDE DIAMETER
OR	OPERATING ROOM
P	PUMP
PA	PASCAL
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PF	PRE-FILTER
PG	PRESSURE GAGE
PHC	PREHEAT COIL
PPM	PARTS PER MILLION
PRS	PRESSURE REGULATING (VALVE) STATION
PRV	PRESSURE REGULATING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAGE
PSS	PRIMARY SECONDARY SYSTEM
PSV	PRESSURE SAFETY VALVE
R/E	RETURN OR EXHAUST
RA	RETURN AIR
RAF	RADIO FREQUENCY
RAT	RETURN AIR TEMPERATURE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RFF	RETURN FAN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RRLA	RUN LOAD AMPERE
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
SA	SUPPLY AIR
SAD	SOUND ATTENUATING DEVICE
SAT	SUPPLY AIR TEMPERATURE
SC	SHADING COEFFICIENT
SCFM	STANDARD CUBIC FEET PER MINUTE
SD	SMOKE DETECTOR
SD	SUPPLY AIR DIFFUSER
SD-1	SCHEMATIC DESIGN (SUBMISSION1)
SD-2	SCHEMATIC DESIGN (SUBMISSION2)
SDPR	SMOKE DAMPER
SDR	SMOKE DAMPER (RETURN)
SDS	SMOKE DAMPER (SUPPLY)
SEN	SENSIBLE HEAT
SAF	SUPPLY FAN
SG	SUPPLY AIR GRILLE
SH	STEAM HUMIDIFIER
SHC	STEAM HEATING COIL
SI	SQUARE INCHES
SP	STATIC PRESSURE
SP GR	SPECIFIC GRAVITY
SPD	SUPPLY PROCESS AND DISTRIBUTION
SPRV	STEAM PRESSURE REDUCING VALVE
SPS	STATIC PRESSURE SENSOR
SQ FT	SQUARE FOOT (FEET)
SR	SUPPLY AIR REGISTER
SS	STAINLESS STEEL
ST	STEAM TRAP
SUH	STEAM UNIT HEATER
SV	STEAM PRESSURE REDUCING VALVE
T & PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
TAB	TESTING, ADJUSTING, BALANCE
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISSOLVED SOLIDS
TG	TRANSFER GRILLE
TP	TRAP
TR	TOP REGISTER
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
UC	UNDER CUT
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
W	WATTS
WAG	WASTE ANETHESIA GAS
Wb	WET-BULB (TEMPERATURE)
WC	WATER COOLED
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAGE
WPD	WATER SIDE PRESSURE DROP
YR	YEAR
Z	INTENTIALLY LEFT BLANK

ABBREVIATIONS A-K

A/E	ARCHITECT / ENGINEER
AAHX	AIR TO AIR HEAT EXCHANGER
AB	AIR BLENDER
AAV	AUTOMATIC AIR VENT
ACD	AUTOMATIC CONTROL DAMPER,MODULATING
ACD-TP	AUTOMATIC CONTROL DAMPER,TWO POSITION
AD	ACCESS DOOR
AF	AFTER FILTER
AFCV	AIR FLOW CONTROL VALVE
AFF	ABOVE FINISHED FLOOR
AFMD	AIR FLOW MEASURING DEVICE
AHU	AIR-HANDLING UNIT
AMP	AMPERSE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
BDD	BACKDRAFT DAMPER
BDR	BASE BOARD RADIATOR
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BIW	BACKWARD INCLINED WHEEL (FAN)
BSC	BIOLOGICAL SAFETY CABINETS
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CENTIGRADE (CELCIUS)
CC	COOLING COIL
CCD	COOLING COIL CONDENSATE DRAIN
CD	CEILING DIFFUSER
CD-1	CONSTRUCTION DOCUMENTS (SUBMISSION1)
CD-2	CONSTRUCTION DOCUMENTS (SUBMISSION2)
CFM	CUBIC FEET PER MINUTE
CFT	CUBIC FEET
CG	CEILING GRILLE
CHW	CHILLER WATER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CI	CAST IRON
CM	CARBON MONOXIDE
CM	CUBIC METER
CM/S	CUBIC METER PER SECOND
CO	CLEAN OUT
CO2	CARBON DIOXIDE
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	COLD WATER (POTABLE)
CWCC	CHILLED WATER COOLING COIL
D	DAMPER - AUTOMATIC
D-1	OUTDOOR AIR DAMPER
D-2	RETURN AIR DAMPER
D-3	RELIEF AIR DAMPER
DB	DECIBELS
Db	DRY-BULB TEMPERATURE
DD-1	DESIGN DEVELOPMENT (SUBMISSION1)
DD-2	DESIGN DEVELOPMENT (SUBMISSION2)
DDC	DIRECT DIGITAL CONTROLS
DEG	DEGREE
DF	DIFFUSER
DIA	DIAMETER
DP	DEW POINT TEMPERATURE
DP	DIFFUSER PLATE
DPA	DIFFERENTIAL PRESSURE ASSEMBLY
DPS	DIFFERENTIAL PRESSURE SENSOR
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EMD	END OF MAIN DRIP (STEAM)
ENT	ENTERING
ER	EXHAUST REGISTER
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EX.	EXISTING
F	FAHRENHEIT
F&T	FLOAT AND THERMOSTATIC
F/SDPR	COMBINATION FIRE SMOKE DAMPER
FA	FREE AREA
FC	FLEXIBLE CONNECTION
FCW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FM	FLOW METER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
FSTAT	FREEZESTAT
FT	FEET
FT-LB	FOOT-POUND
FTR	FIN TUBE RADIATION
FV	FACE VELOCITY
GA	GAUGE
GAL	GALLONS
GH	GRAVITY HOOD
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H	HUMIDIFER
H&CW	HOT & COLD WATER
HC	HEATING COIL
HD	HEAD
HOA	HAND/OFF/AUTOMATIC
HP	HORSEPOWER
HPDT	HIGH PRESSURE DRIP TRAP
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HSTAT	HUMIDISTAT
HTM	HUMIDIFIER TERMINAL
HUM	HUMIDIFIER UNIT MOUNTED
HVU	HEATING AND VENTILATING UNIT
HW	HOT WATER
HWC	HOT WATER COIL
HWHC	HOT WATER HEATING COIL
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWUH	HOT WATER UNIT HEATER
HZ	HERTZ
I/O	INPUT/OUTPUT
IAQ	INDOOR AIR QUALITY
IBT	INVERTED BUCKET TRAP
ICF	IN-LINE CENTRIFUGAL FAN
ICU	INTENSIVE CARE UNIT
ID	INSIDE DIAMETER
IFB	INTEGRAL FACE AND BYPASS
IN	INCHES
IN HG	INCHES OF MERCURY
IN WC	INCH WATER COLUMN
IN WG	INCH WATER GAUGE
IN-LB	INCH-POUND
IPLV	INTERGRATED PART LOAD VALUE
IS	INSECT SCREEN
J	INTENTIALLY LEFT BLANK
kg	KILOGRAM
kg/HR	KILOGRAM PER HOUR
kPa	KILOPASCAL
kW	KILOWATT
kWh	KILOWATT HOUR

DRAWING SYMBOLS

- 2 / H4 — DETAIL NUMBER; DRAWING NUMBER WHERE DRAWN
- A / H7 — SECTION LETTER; DRAWING NUMBER WHERE SHOWN
- 26-SF 3 — BUILDING NO. WHERE EQUIPMENT IS LOCATED. EQUIPMENT ABBREVIATION (SUPPLY FAN) SUPPLY FAN NO. 3 IN BUILDING NO. 26
- TYPICAL UNIT NO.
- 26-TU-H — BUILDING NO. WHERE EQUIPMENT IS LOCATED; ITEM (TERMINAL UNIT SHOWN); ITEM NUMBER (TERMINAL UNIT NO. 1); SERVED BY AIR HANDLER UNIT NO. 1

GENERAL NOTES

1. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
2. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
3. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
4. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
5. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
6. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
7. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
8. WALL TYPE EXHAUST REGISTERS NOTED AS "BR" ON DRAWINGS ARE TO BE INSTALLED WITH BOTTOM ELEVATION OF REGISTER AT 7" [175mm] ABOVE FINISHED FLOOR.
9. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
10. STEAM HEADER SET PRESSURE: ___ PSIG [kPa] NORMAL; ___ PSIG [kPa] LOW DEMAND PERIODS
11. ALTITUDE-BOILER ROOM FLOOR: ___ FT. [M] ABOVE SEA LEVEL
12. SEISMIC PROVISIONS // REQUIRED - SEE SPECS // NOT REQUIRED // ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED

GENERAL NOTE:
REFER TO DRAWING GI-02 FOR PHASING PLAN.

MECHANICAL SHEET INDEX

No.	TITLE
MI-000	ABBREVIATIONS, SYMBOLS & GENERAL NOTES
MD-107D	LEVEL 7 - DEMOLITION
MH-107D	LEVEL 7 - HVAC
MD-108A	LEVEL 8 A - DEMOLITION
MD-108B	LEVEL 8 B - DEMOLITION
MD-108D	LEVEL 8 D - DEMOLITION
MH-108A	LEVEL 8 A - HVAC
MH-108B	LEVEL 8 B - HVAC
MH-108D	LEVEL 8 D - HVAC
MD-109A	LEVEL 9 A - DEMOLITION
MD-109B	LEVEL 9 B - DEMOLITION
MH-109A	LEVEL 9 A - HVAC
MH-109B	LEVEL 9 B - HVAC
MH-109D	LEVEL 9 D - HVAC
MM-401	ENLARGED PENTHOUSE - AREA A
MM-402	ENLARGED PENTHOUSE - AREA B
MM-403	PENTHOUSE SECTIONS - AREA A
MM-404	PENTHOUSE SECTIONS - AREA B
MM-501	DETAILS
MM-502	DETAILS
MM-503	DETAILS
MM-504	DETAILS
MM-601	SCHEDULES
MM-602	SCHEDULES
MM-603	SCHEDULES

Revisions:	Date

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Kahler Slater Project No. 211033.00

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Drawing Title: ABBREVIATIONS, SYMBOLS & GENERAL NOTES

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

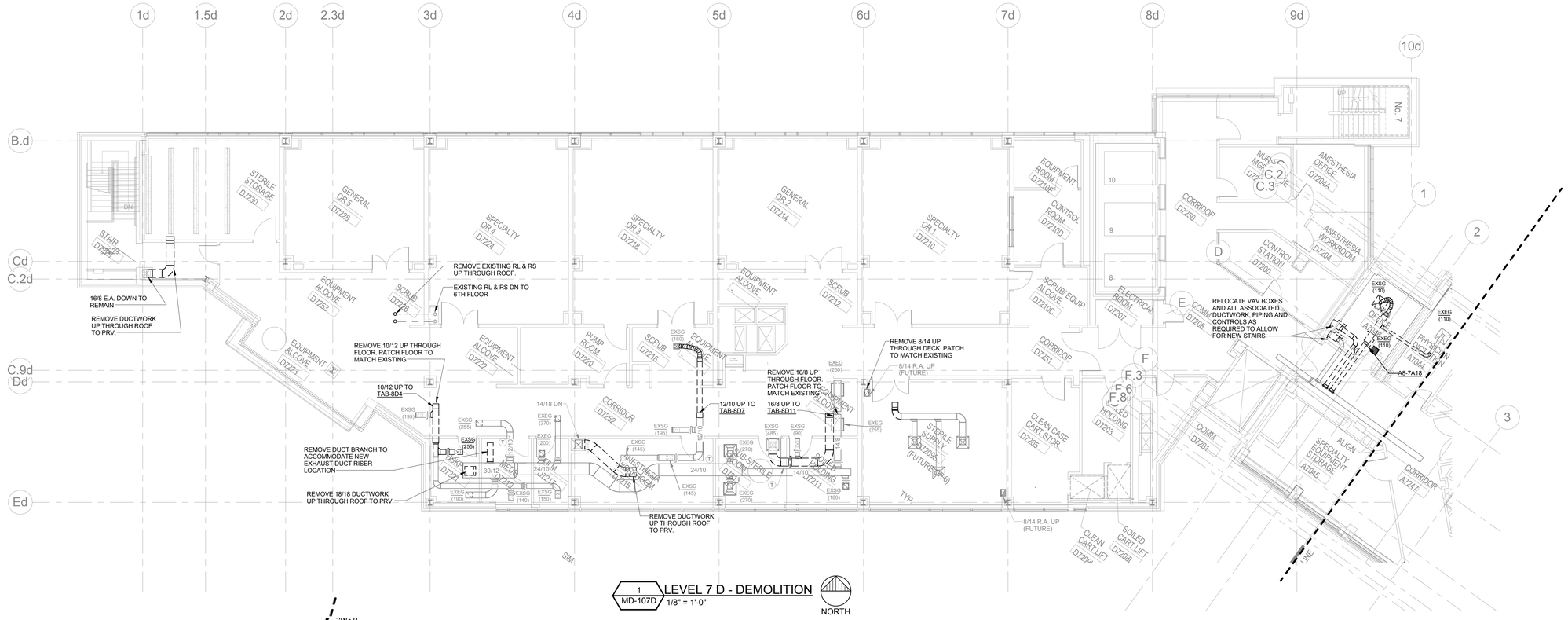
Project Number: 607-394

Building Number: 1

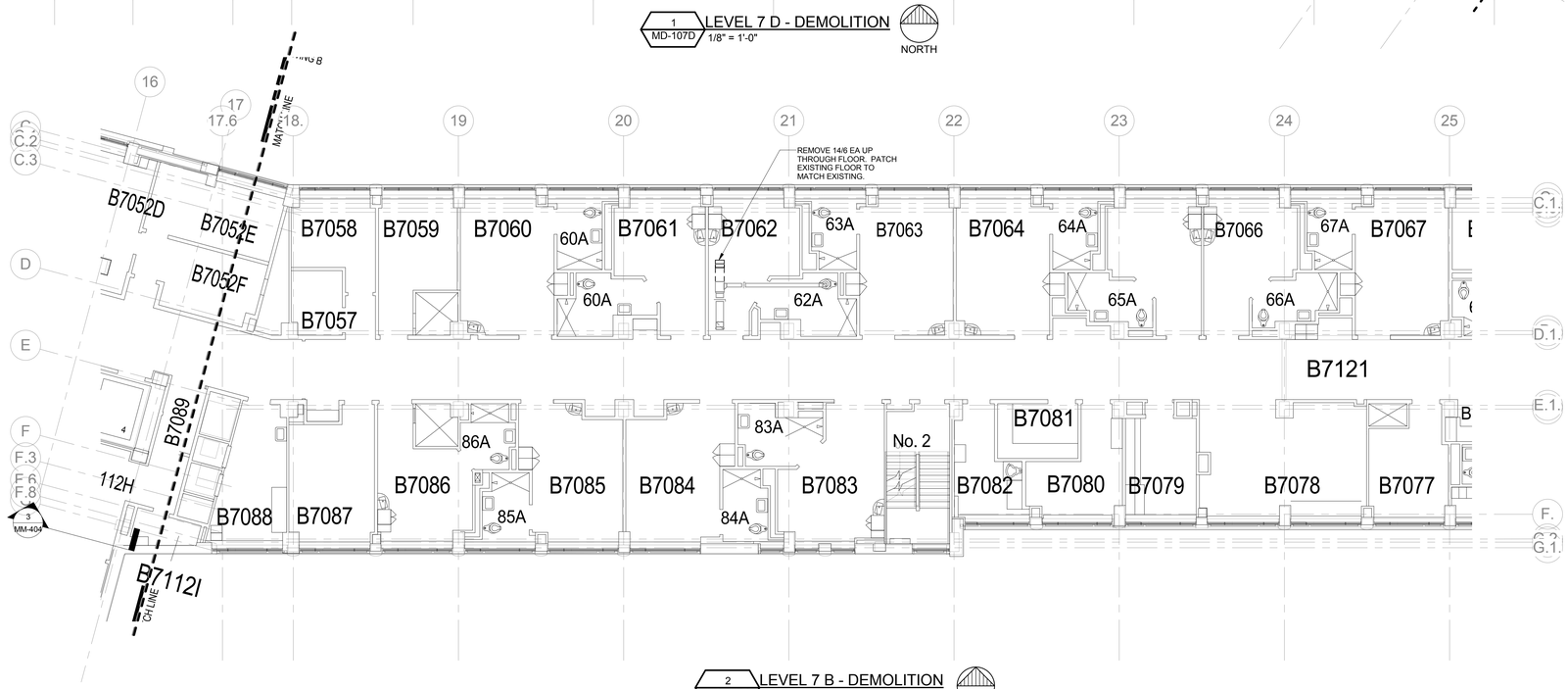
Drawing Number: MI-000

Office of Construction and Facilities Management

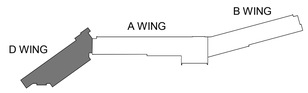
VA FORM 08-6231



1 MD-107D LEVEL 7 D - DEMOLITION
1/8" = 1'-0"
NORTH



2 MD-107D LEVEL 7 B - DEMOLITION
1/8" = 1'-0"
NORTH



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Kahler Slater Project No.
211033.00

Drawing Title
LEVEL 7 - DEMOLITION

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

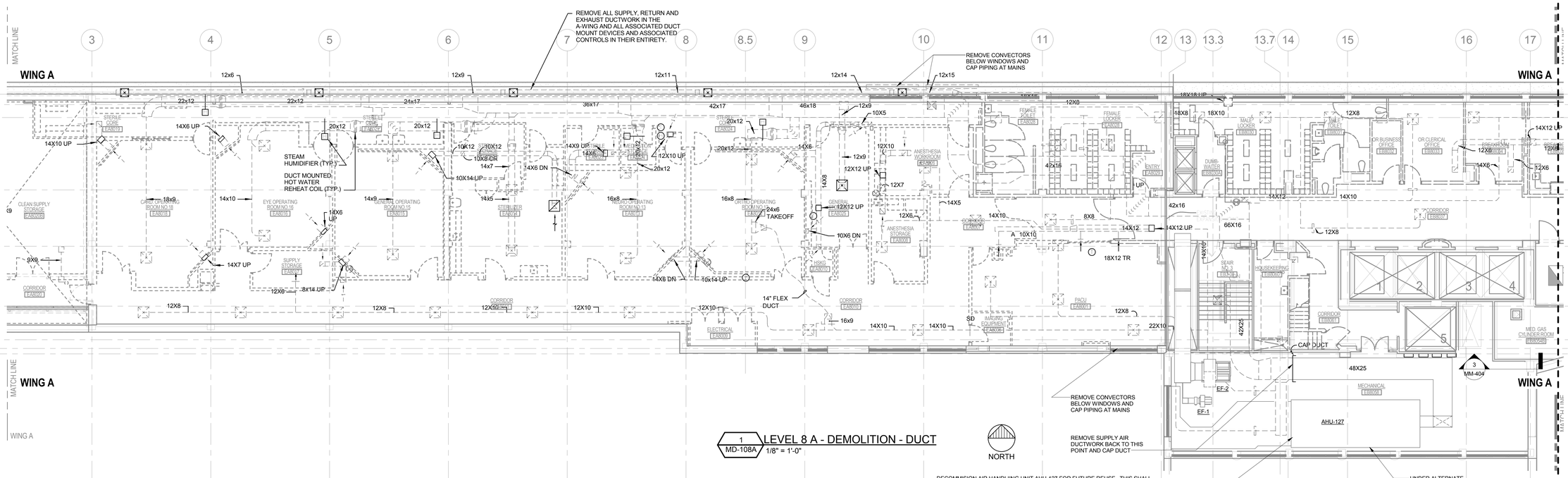
Project Number
607-394

Building Number
1

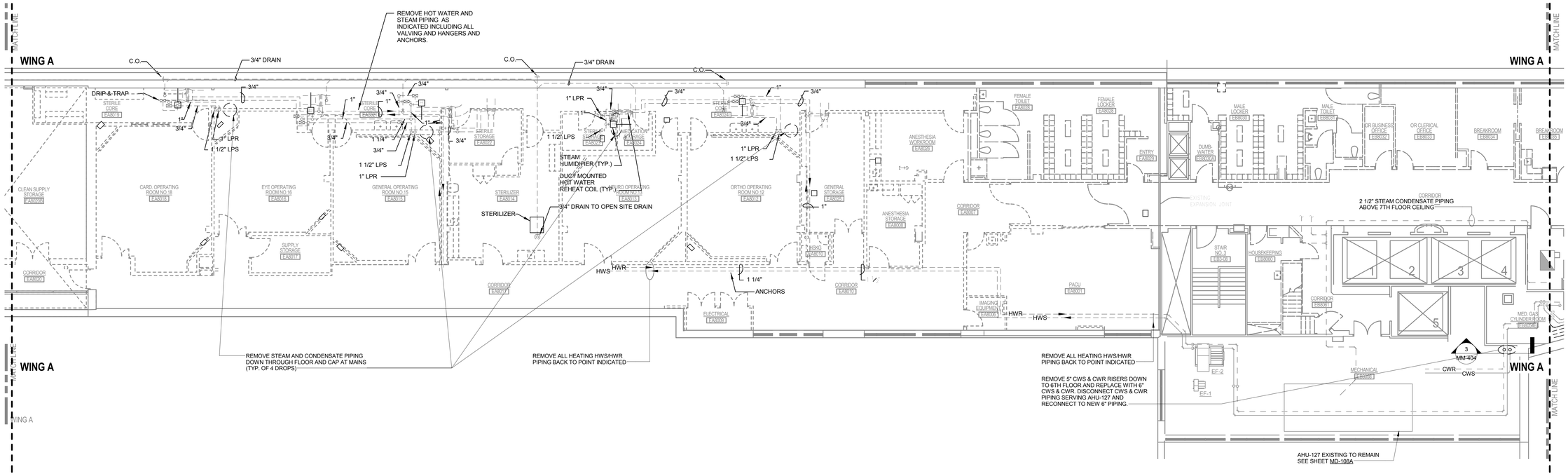
Drawing Number
MD-107D
Dwg. 40 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



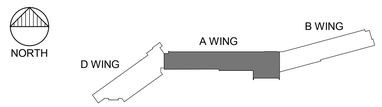
1 MD-108A LEVEL 8 A - DEMOLITION - DUCT
1/8" = 1'-0"



PHASING NOTE:

A PORTION OF THE 8TH FLOOR WILL BE OCCUPIED DURING CONSTRUCTION. EXISTING HVAC SYSTEMS SHALL REMAIN OPERATIONAL DURING OCCUPANCY. REFER TO SHEET AS-108T FOR ADDITIONAL INFORMATION

2 MD-108A LEVEL 8 A - DEMOLITION - PIPING
1/8" = 1'-0"



Revisions:	Date
1 Addendum 1	05/24/2013

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ARCHITECT:

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Kahler Slater Project No. 211033.00

Drawing Title: LEVEL 8 A - DEMOLITION

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

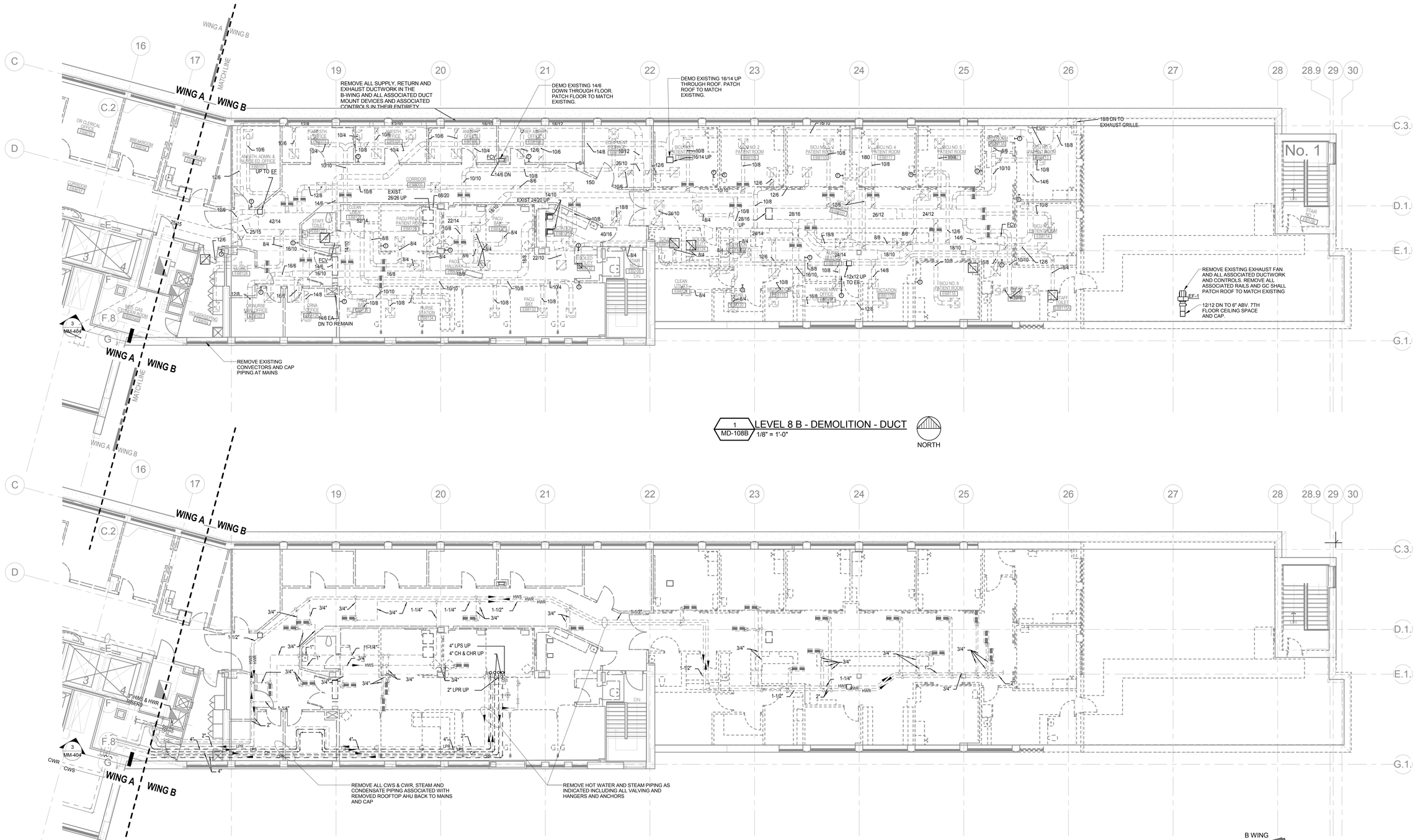
Building Number: 1

Drawing Number: MD-108A

Dwg. 42 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



1 MD-108B LEVEL 8 B - DEMOLITION - DUCT
1/8" = 1'-0"

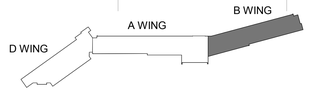
NORTH

PHASING NOTE:

A PORTION OF THE 8TH FLOOR WILL BE OCCUPIED DURING CONSTRUCTION. EXISTING HVAC SYSTEMS SHALL REMAIN OPERATIONAL DURING OCCUPANCY. REFER TO SHEET AS-108T FOR ADDITIONAL INFORMATION

2 MD-108B LEVEL 8 B - DEMOLITION - PIPING
1/8" = 1'-0"

NORTH



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ARCHITECT:

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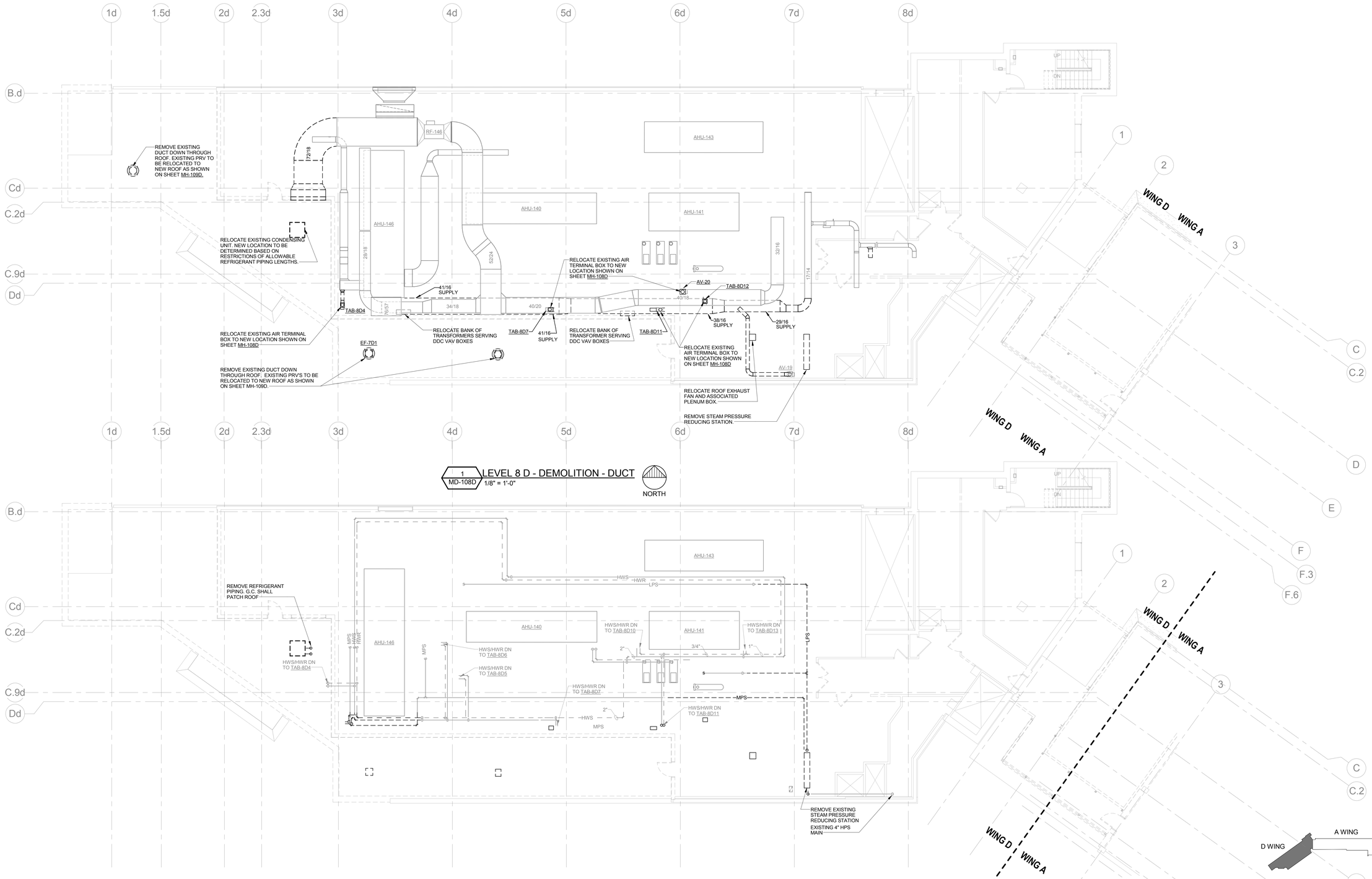
Drawing Title	Project Title	Project Number
LEVEL 8 B - DEMOLITION	WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B	607-394
Approved: Project Director	Location: MADISON, WI	Building Number: 1
	Date: DECEMBER 3, 2012 / Checked: WS / Drawn: RA	Drawing Number: MD-108B
		Dwg. 43 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



1 MD-108D LEVEL 8 D - DEMOLITION - DUCT
1/8" = 1'-0"
NORTH

2 MD-108D LEVEL 8 D - DEMOLITION - PIPING
1/8" = 1'-0"
NORTH

Revisions:	Date

ENGINEERS:

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Kahler Slater Project No. 211033.00

Drawing Title: LEVEL 8 D - DEMOLITION

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

Building Number: 1

Drawing Number: MD-108D

Dwg. 44 of 118

Office of Construction and Facilities Management

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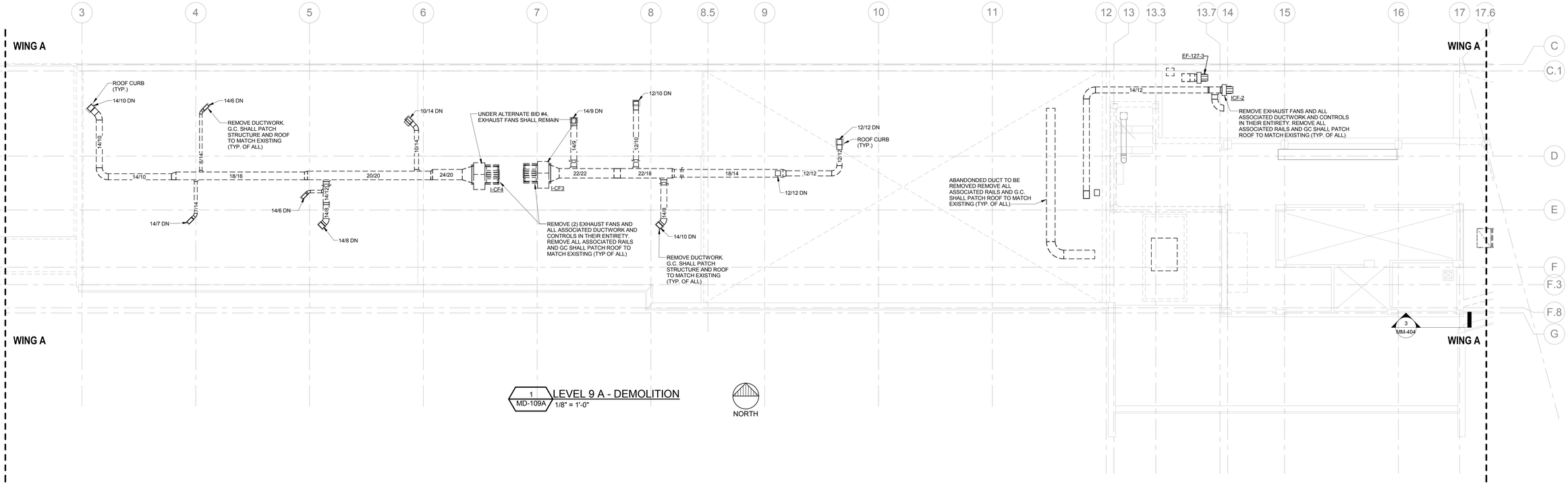
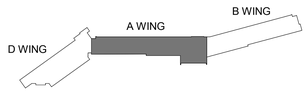


1 MD-109A LEVEL 9 A - DEMOLITION
1/8" = 1'-0"

NORTH



Revisions:	Date
1 Addendum 1	05/24/2013

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Drawing Title: LEVEL 9 A - DEMOLITION

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

Building Number: 1

Drawing Number: MD-109A

Dwg. 48 of 118

Office of Construction and Facilities Management

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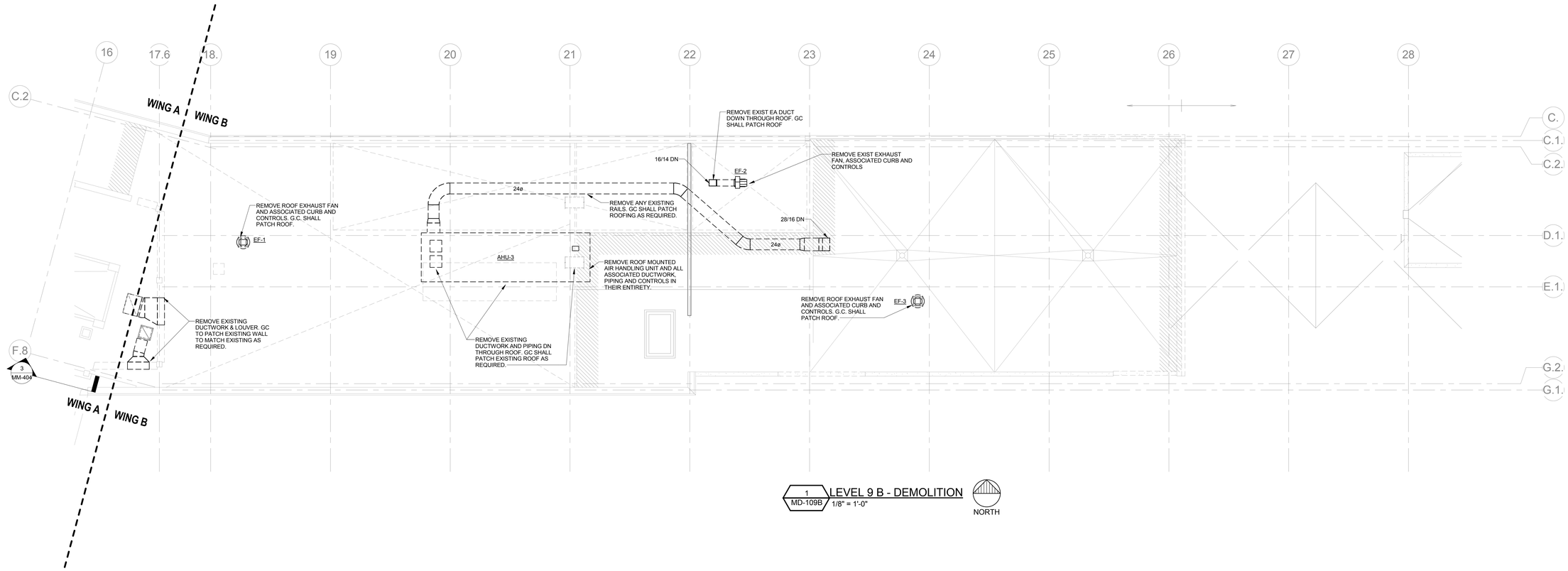
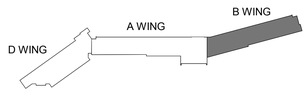


1 MD-109B LEVEL 9 B - DEMOLITION
1/8" = 1'-0"

NORTH



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Drawing Title
LEVEL 9 B - DEMOLITION

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date	Checked	Drawn
DECEMBER 3, 2012	WS	RA

Project Number
607-394

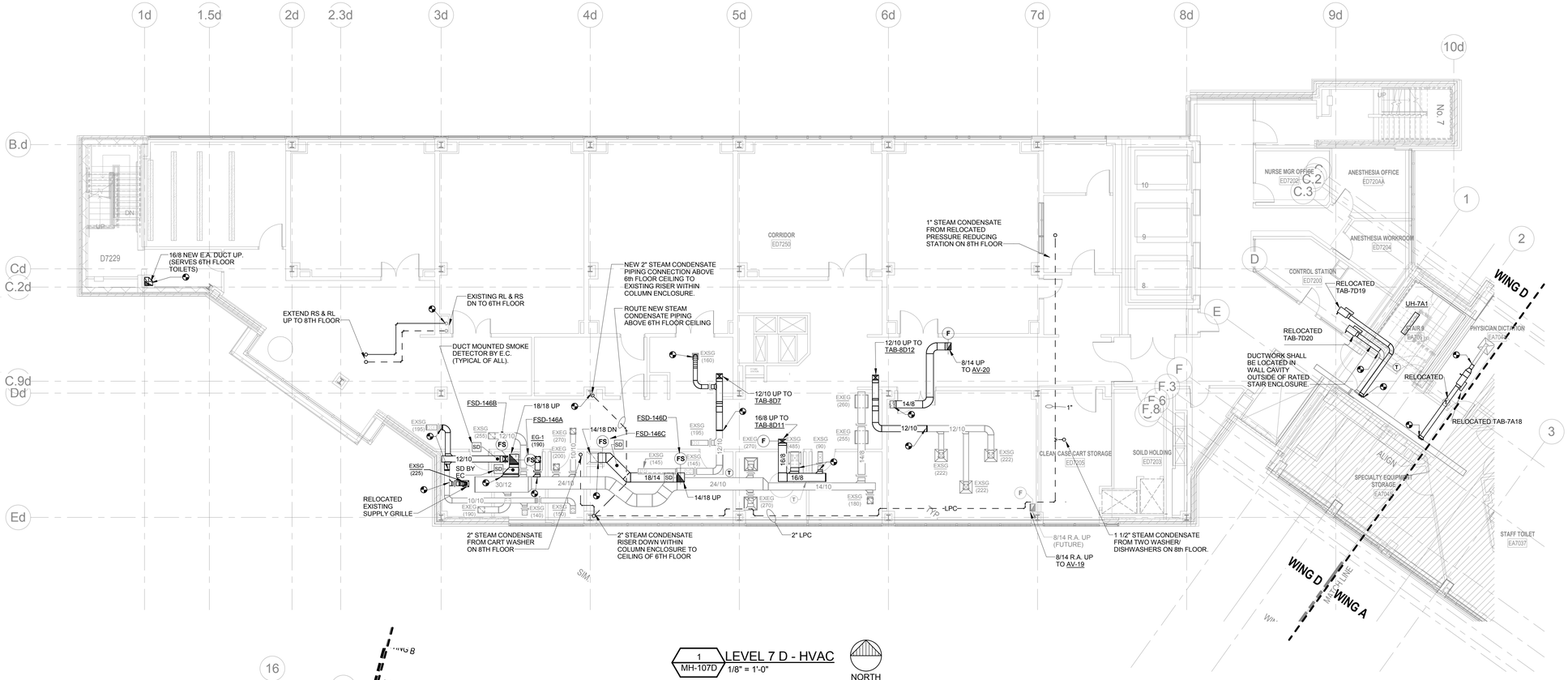
Building Number
1

Drawing Number
MD-109B

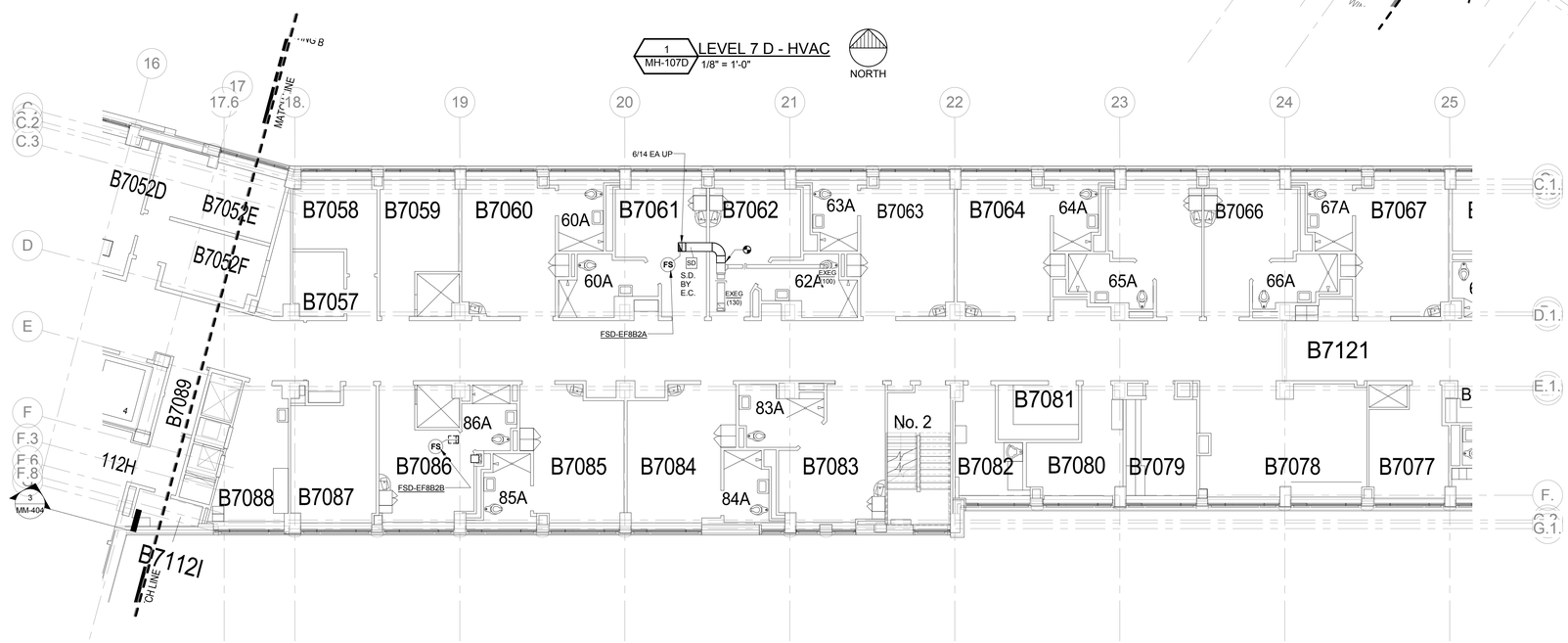
Dwg. 49 of 118

Office of Construction and Facilities Management

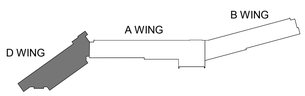
VA FORM 08-6231



1 MH-107D LEVEL 7 D - HVAC
1/8" = 1'-0"
NORTH



2 MH-107D LEVEL 7 D - HVAC
1/8" = 1'-0"
NORTH



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Kahler Slater Project No. 211033.00

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Drawing Title: LEVEL 7 - HVAC

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

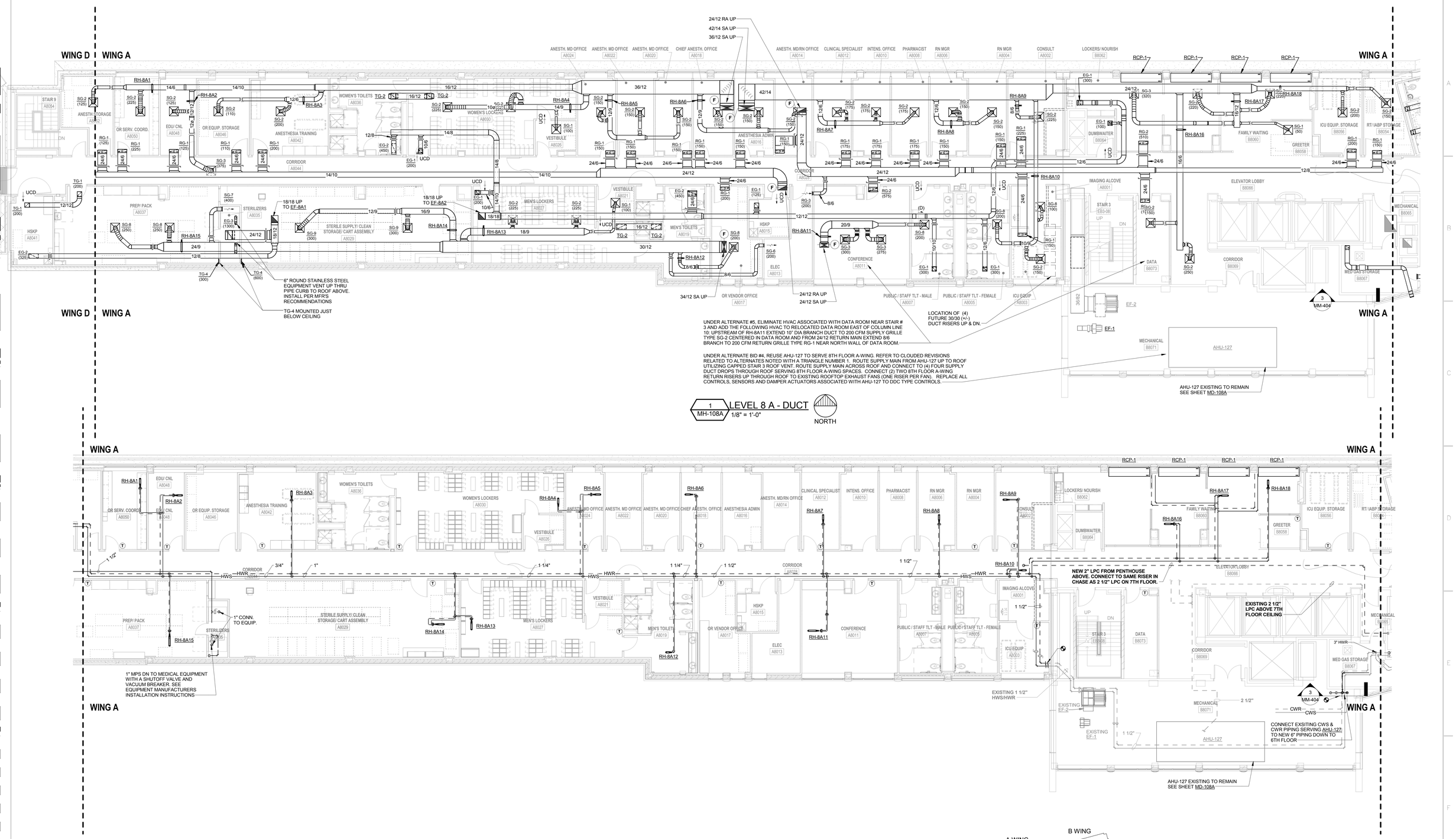
Building Number: 1

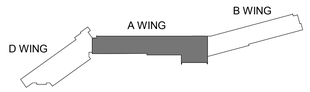
Drawing Number: MH-107D

Dwg. 41 of 118

Office of Construction and Facilities Management

VA FORM 08-6231





Revisions:	Date
1 Addendum 1	05/24/2013

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Drawing Title: LEVEL 8 A - HVAC

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

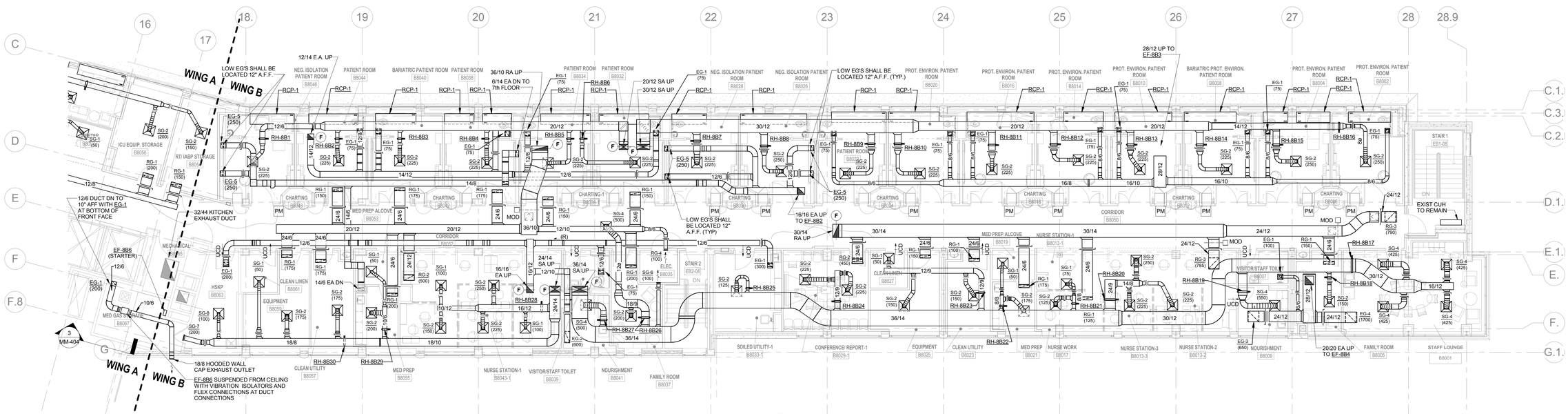
Building Number: 1

Drawing Number: MH-108A

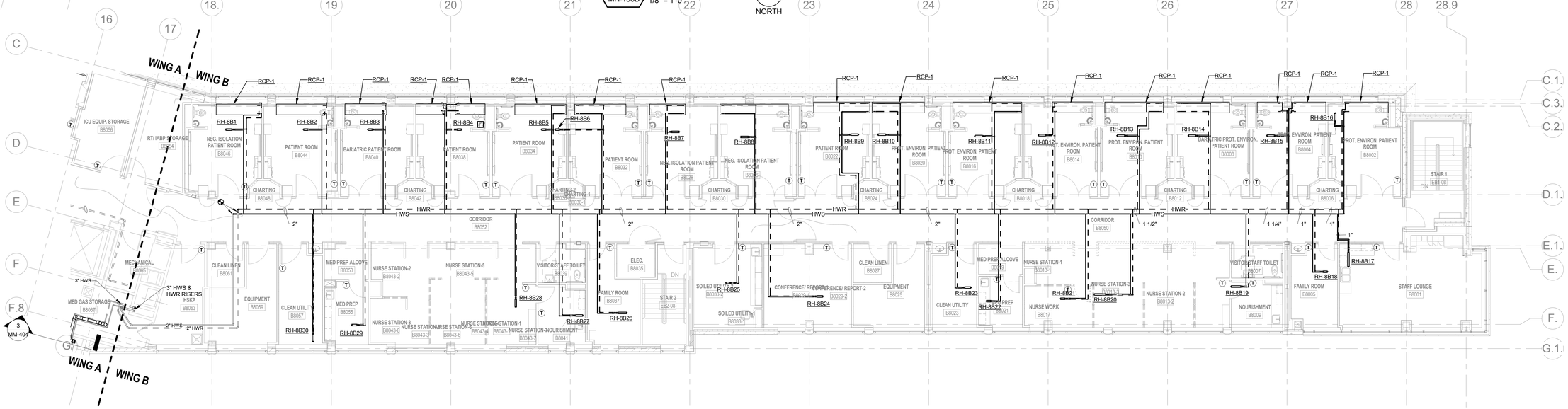
Dwg. 45 of 118

Office of Construction and Facilities Management

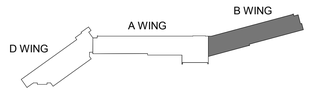
VA FORM 08-6231



1 MH-108B LEVEL 8 B - DUCT
1/8" = 1'-0"
NORTH



2 MH-108B LEVEL 8 B - PIPING
1/8" = 1'-0"
NORTH



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Kahler Slater Project No. 211033.00

Drawing Title: LEVEL 8 B - HVAC

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

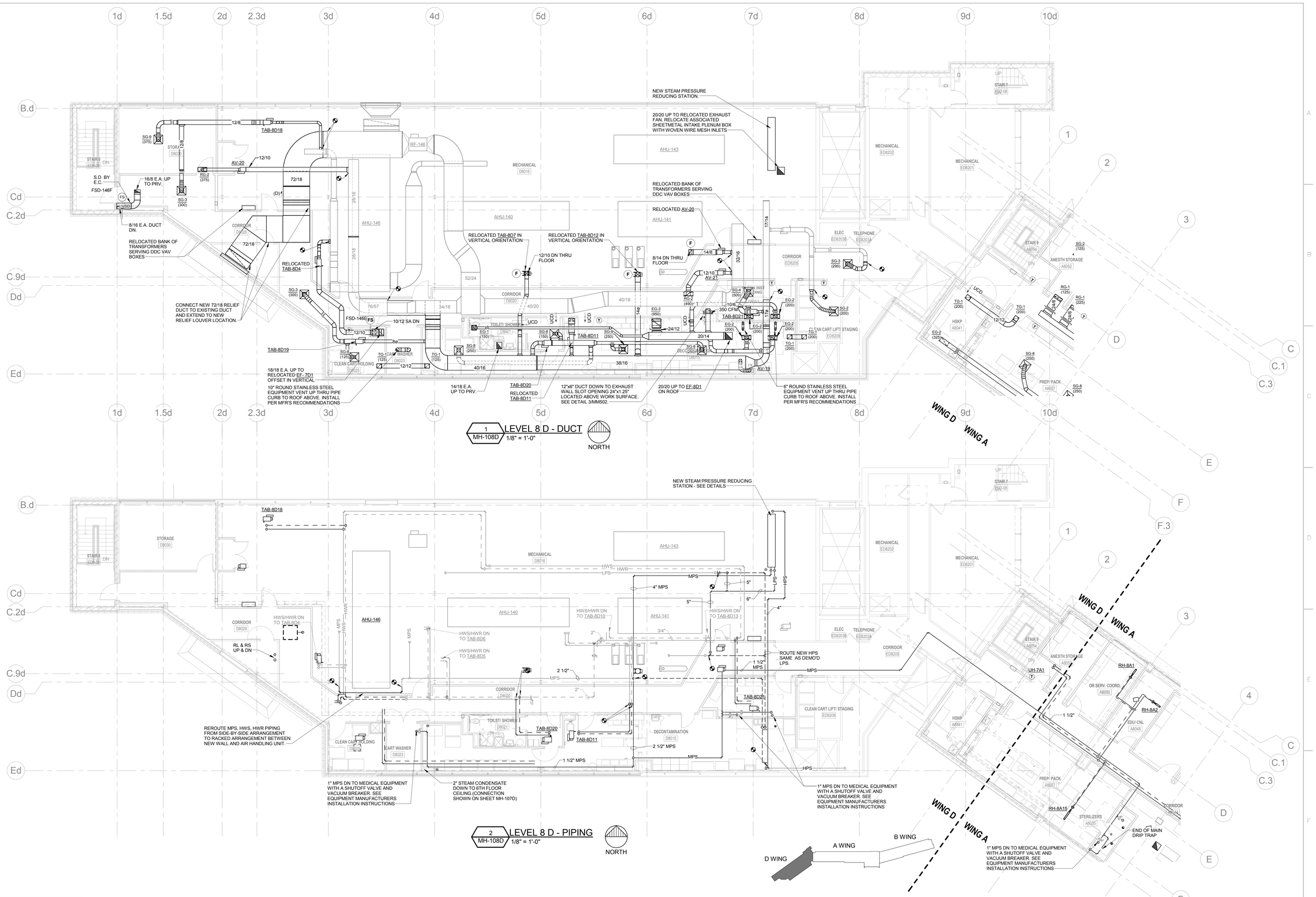
Building Number: 1

Drawing Number: MH-108B

Dwg. 46 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



Revisions:	Date
1 Addendum 1	05/24/2013

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Kahler Slater Project No. 211033.00

Drawing Title: LEVEL 8 D - HVAC

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

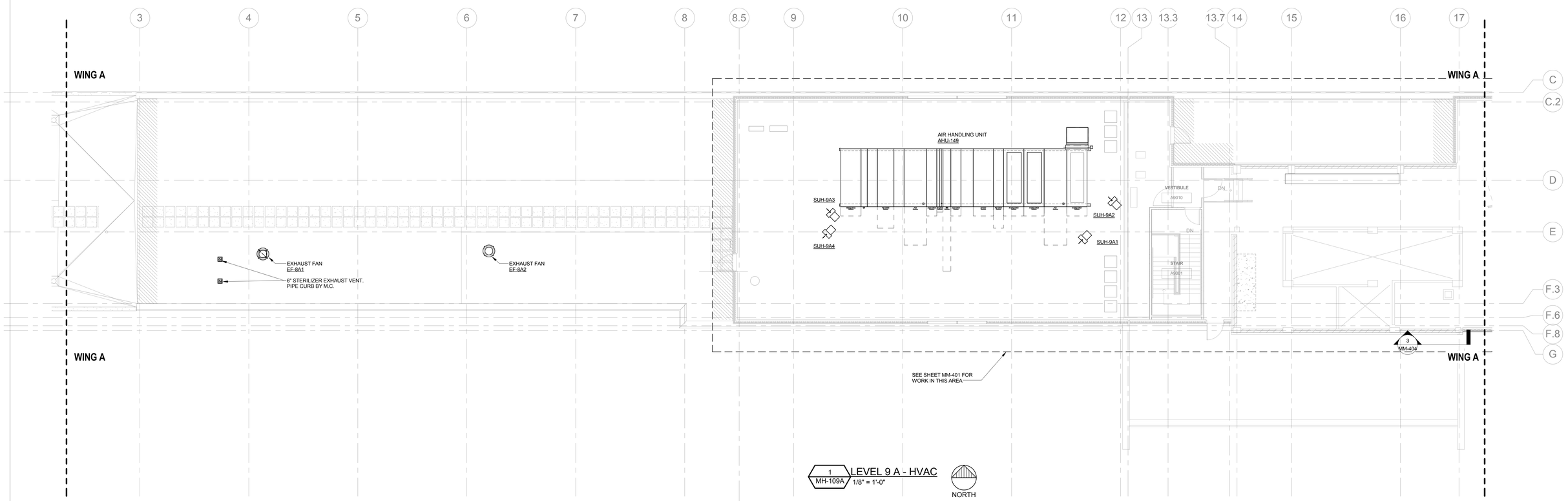
Building Number: 1

Drawing Number: MH-108D

Dwg. 47 of 118

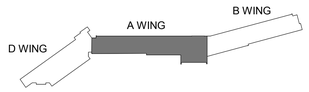
Office of Construction and Facilities Management

VA FORM 08-6231



1 MH-109A LEVEL 9 A - HVAC
1/8" = 1'-0"

NORTH



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Drawing Title
LEVEL 9 A - HVAC

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL
VETERAN'S HOSPITAL
CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

Project Number
607-394

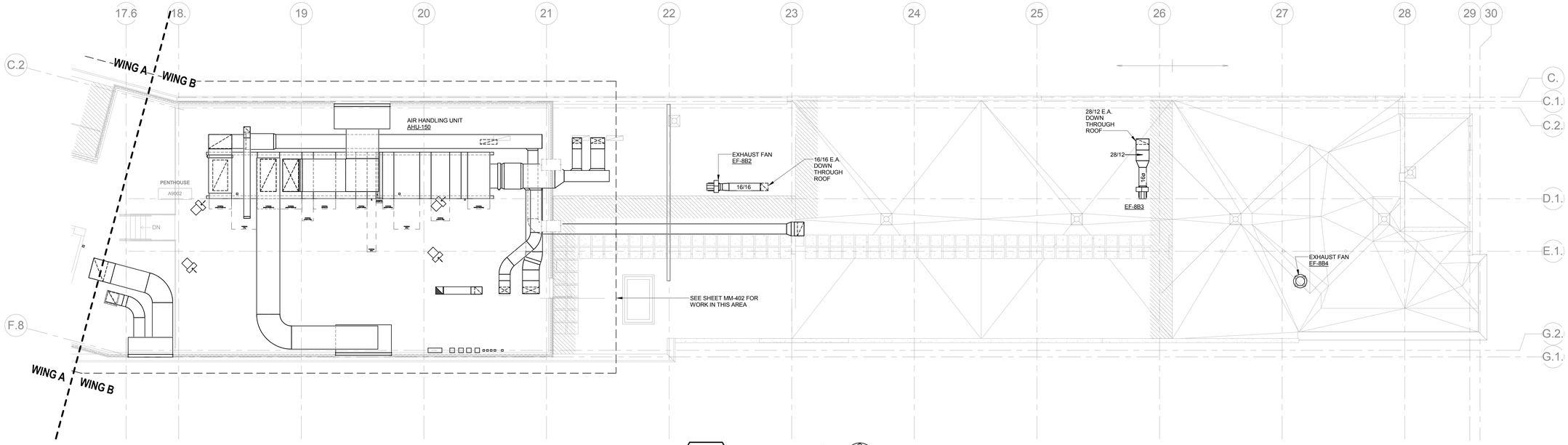
Building Number
1

Drawing Number
MH-109A

Dwg. 50 of 118

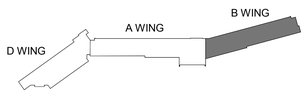
Office of Construction and Facilities Management

VA FORM 08-6231



1 MH-109B LEVEL 9 B - HVAC
1/8" = 1'-0"

NORTH



Revisions:	Date

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ARCHITECT:

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experience design

Kahler Slater Project No.
211033.00

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Drawing Title
LEVEL 9 B - HVAC

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date	Checked	Drawn
DECEMBER 3, 2012	WS	RA

Project Number
607-394

Building Number
1

Drawing Number
MH-109B
Dwg. 51 of 118

Office of Construction and Facilities Management

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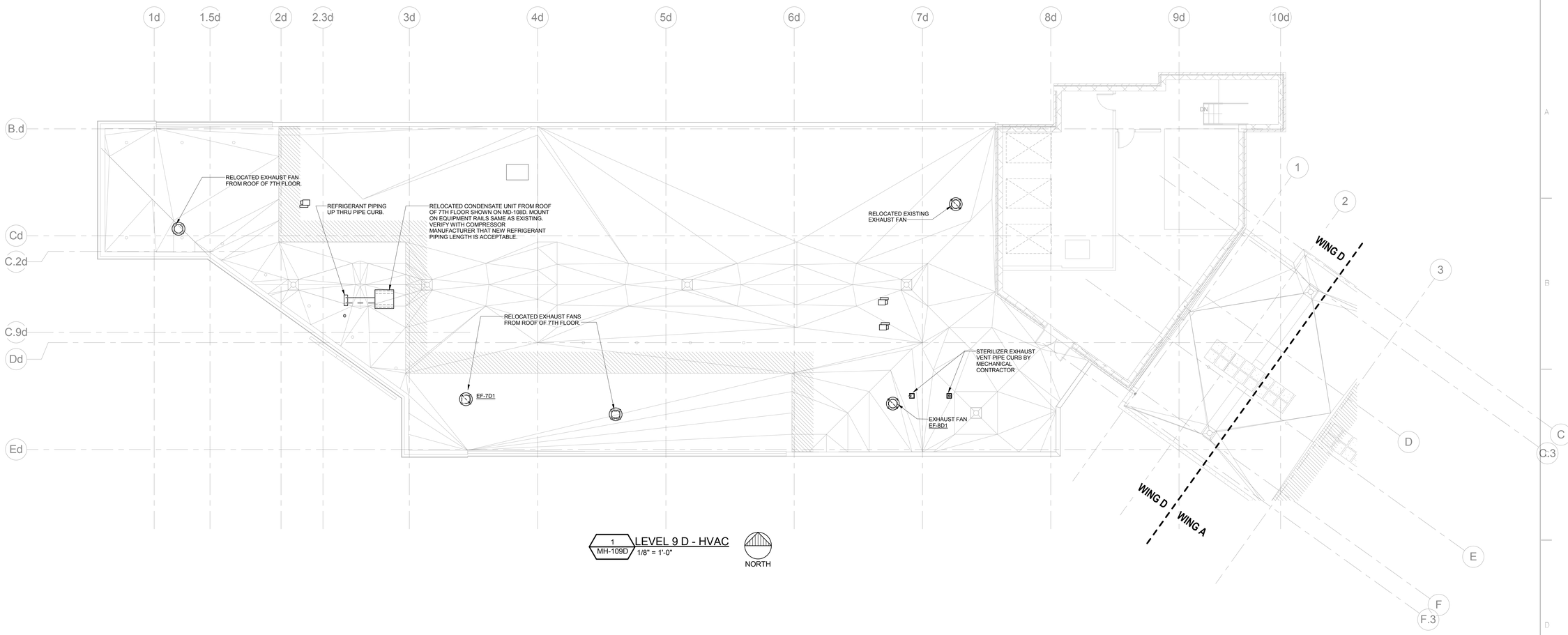

1 MH-109D LEVEL 9 D - HVAC
1/8" = 1'-0"

NORTH

Revisions:	Date
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Kahler Slater Project No.
211033.00

Drawing Title
LEVEL 9 D - HVAC

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

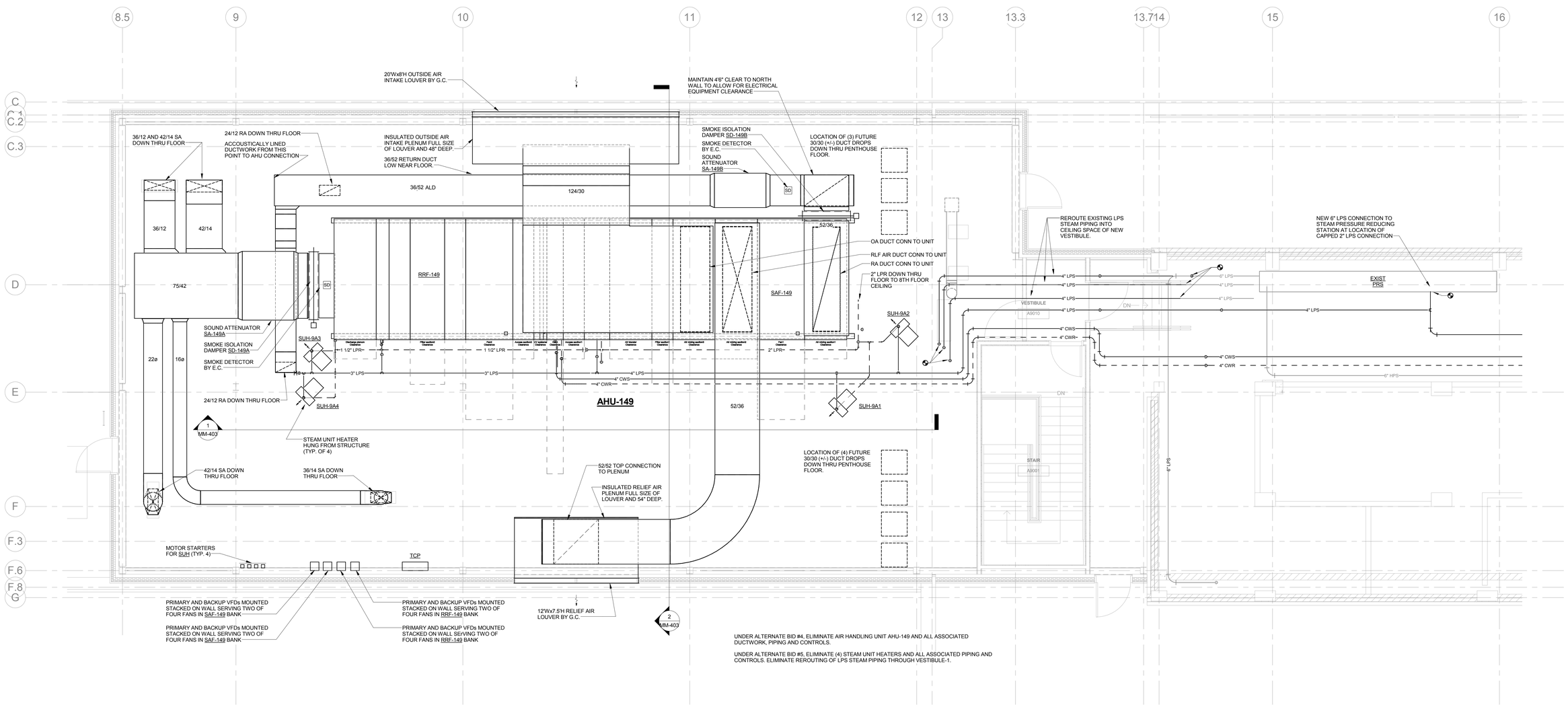
Project Number
607-394

Building Number
1

Drawing Number
MH-109D
Dwg. 52 of 118

Office of Construction and Facilities Management

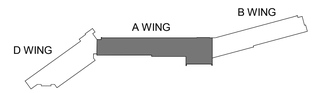
VA FORM 08-6231



1 MM-401 ENLARGED PENTHOUSE PLAN - AREA A

1/4" = 1'-0"

NORTH



Revisions:	Date
1 Addendum 1	05/24/2013

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Kahler Slater Project No. 211033.00

Drawing Title: ENLARGED PENTHOUSE - AREA A

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

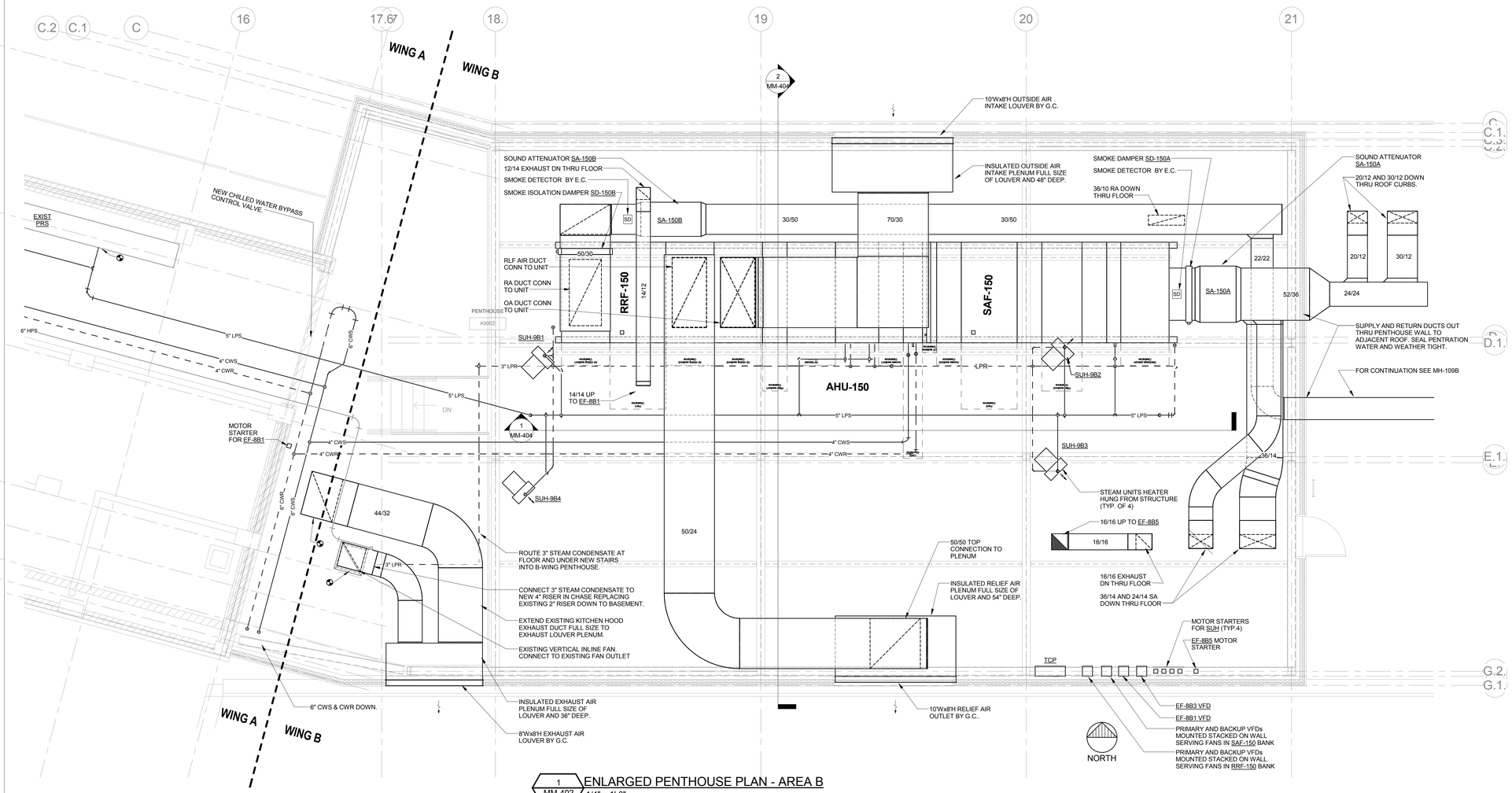
Building Number: 1

Drawing Number: MM-401

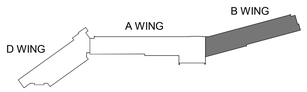
Dwg. 53 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



1 MM-402 ENLARGED PENTHOUSE PLAN - AREA B
1/4" = 1'-0"



Revisions:	Date

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ARCHITECT:

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Kahler Slater Project No.
211033.00

Drawing Title: ENLARGED PENTHOUSE - AREA B

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

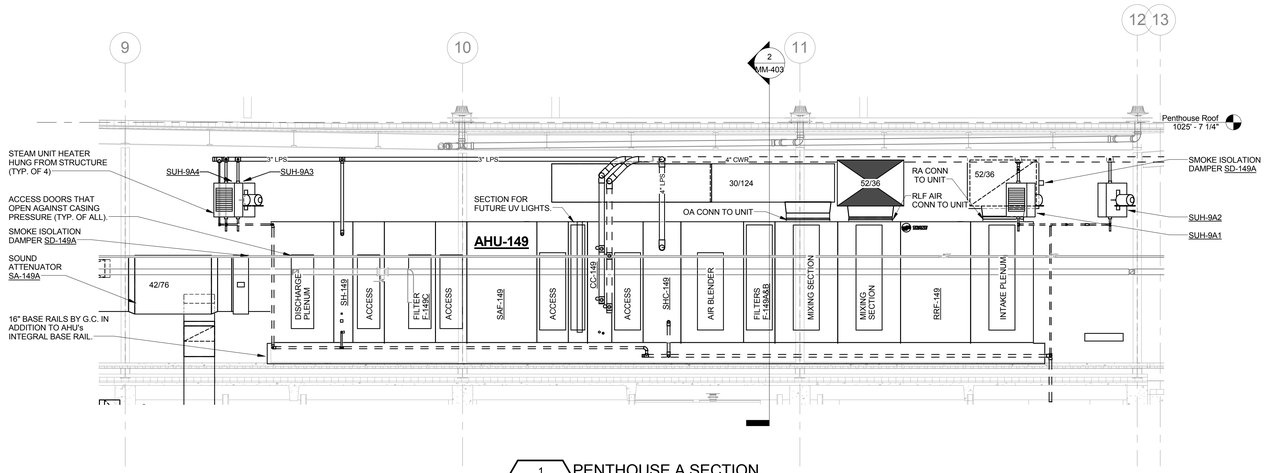
Building Number: 1

Drawing Number: MM-402

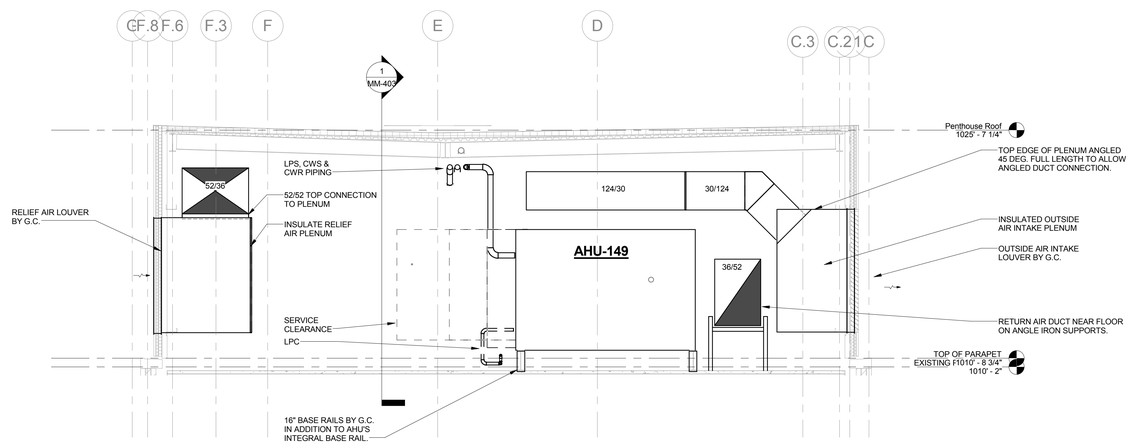
Dwg. 54 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



1 MM-403 PENTHOUSE A SECTION
1/4" = 1'-0"



2 MM-403 PENTHOUSE A SECTION
1/4" = 1'-0"

Revisions: | Date

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Kahler Slater Project No.
211033.00

Drawing Title
PENTHOUSE SECTIONS - AREA A

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

Project Number
607-394

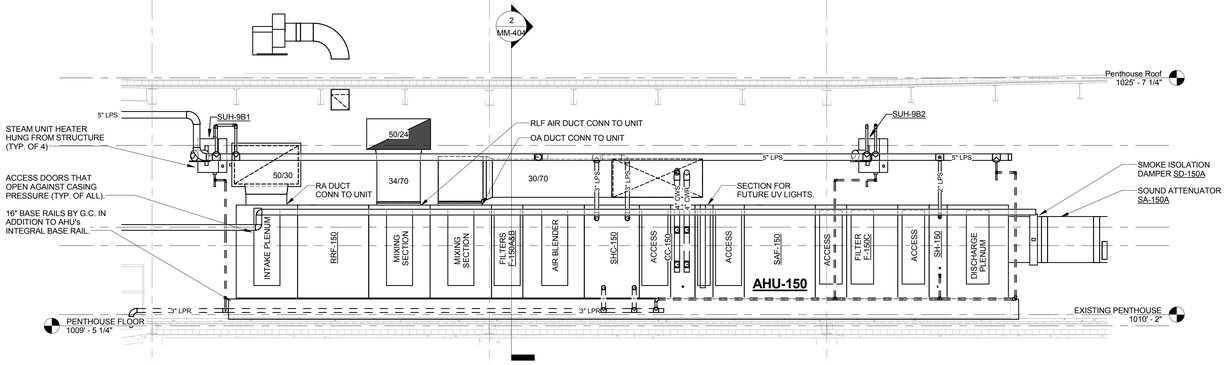
Building Number
1

Drawing Number
MM-403

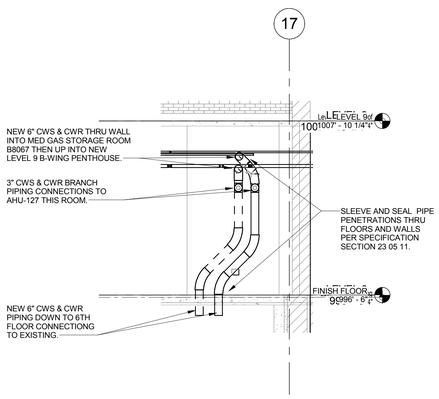
Dwg. 55 of 118

Office of Construction and Facilities Management

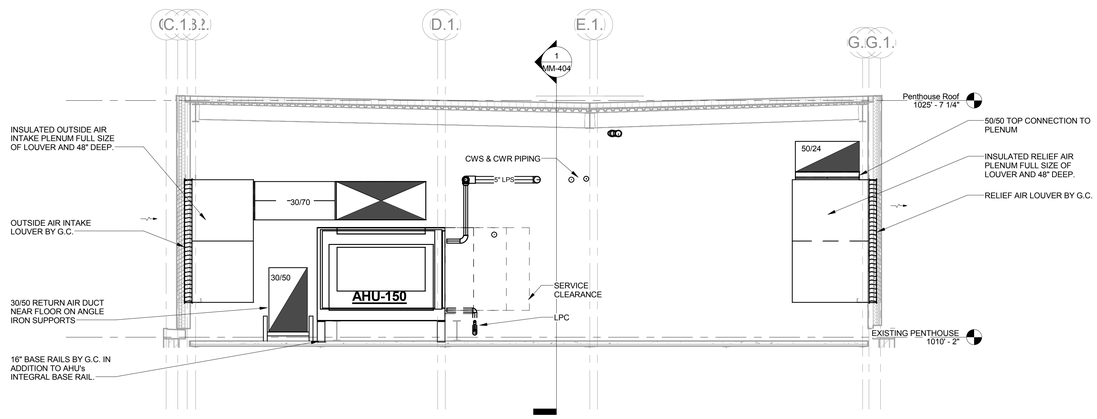
VA FORM 08-6231



1 MM-404 PENTHOUSE B SECTION
1/4" = 1'-0"



3 MM-404 SECTION AT NEW PIPING CONNECTIONS IN MECH ROOM B8071
1/4" = 1'-0"



2 MM-404 PENTHOUSE B SECTION
1/4" = 1'-0"

Revisions:	Date

ENGINEERS:

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Drawing Title
PENTHOUSE SECTIONS - AREA B

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

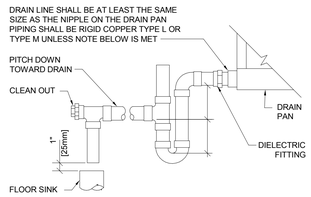
Project Number
607-394

Building Number
1

Drawing Number
MM-404
Dwg. 56 of 118

Office of Construction and Facilities Management

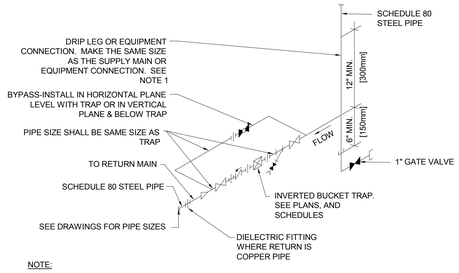
VA FORM 08-6231



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.
3. DRAIN TRAP HEIGHTS SHALL BE AS RECOMMENDED BY AIR HANDLING UNIT MANUFACTURER.

12 AIR HANDLING UNIT DRAIN TRAP DETAIL

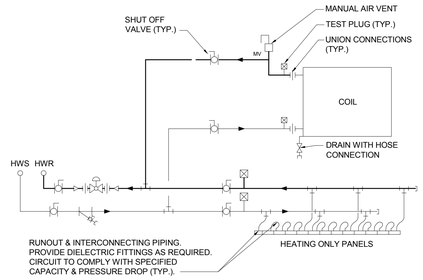
NTS



NOTE:
1. ALL DRIP POINTS ON STEAM MAINS SHALL BE PROVIDED WITH A 12" MINIMUM HIGH DRIP LEG FROM BOTTOM OF STEAM MAIN TO TRAP INLET. DRIP LEG SHALL HAVE 6" SCALE POCKET BELOW TRAP INLET.
2. PROVIDE BYPASS PIPING.

9 INVERTED BUCKET STEAM TRAP ASSEMBLY

NTS

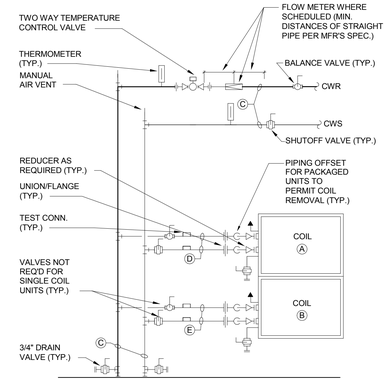


NOTE:
1. MINIMUM FLOW SHALL BE NO LESS THAN 0.5 GPM [1.9 LPM]

5 HYDRONIC TERMINAL UNIT COILS WITH RADIANT CEILING PANELS - PIPING CONNECTIONS

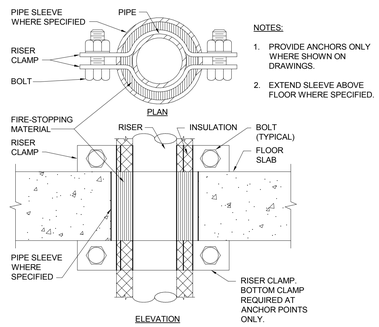
NTS

COOLING COIL PIPING DATA							
COIL NO.	COIL GPM (EA.)		PIPE SIZE			CONTROL VALVE	REMARKS
	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	2 WAY	3 WAY	
CC-149	136	136	4"	3"	3"	X	-	
CC-150	245	-	4"	4"	-	X	-	



1 AHU CHILLED WATER COOLING COIL PIPING DETAIL

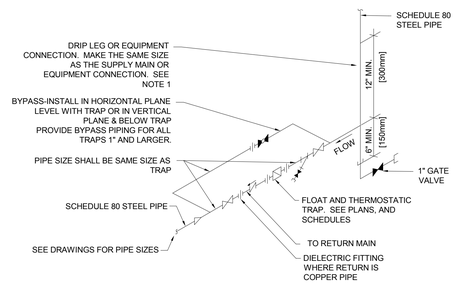
NTS



NOTES:
1. PROVIDE ANCHORS ONLY WHERE SHOWN ON DRAWINGS.
2. EXTEND SLEEVE ABOVE FLOOR WHERE SPECIFIED.

13 SUPPORT/ANCHOR FOR PIPE RISERS

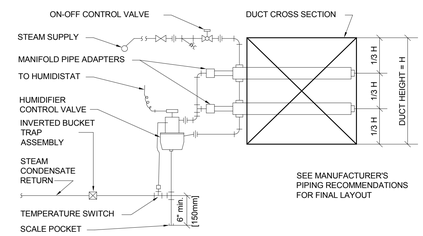
NTS



NOTE:
1. ALL DRIP POINTS ON STEAM MAINS SHALL BE PROVIDED WITH A 12" MINIMUM HIGH DRIP LEG FROM BOTTOM OF STEAM MAIN TO TRAP INLET. DRIP LEG SHALL HAVE 6" SCALE POCKET BELOW TRAP INLET.

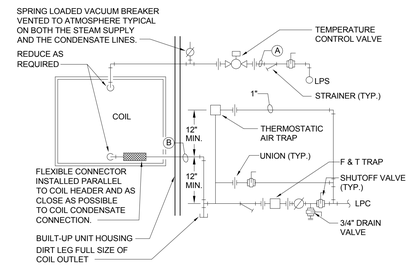
10 FLOAT AND THERMOSTATIC STEAM TRAP ASSEMBLY

NTS



6 STEAM HUMIDIFIER - PIPING CONNECTIONS (MULTIPLE DISPERSION TUBES)

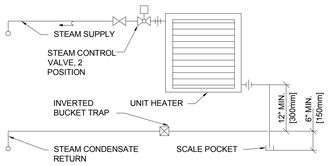
NTS



2 INTEGRAL FACE AND BYPASS STEAM COIL DETAIL

NTS

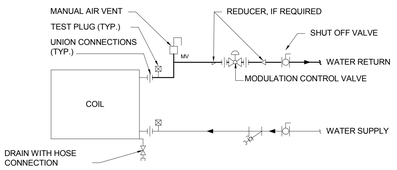
HEATING COIL PIPING DATA					
COIL NO.	PIPE SIZE		T.C.V. BYPASS		REMARKS
	Ⓐ	Ⓑ	YES	NO	
SHC-149	4"	2"	X	-	SEE COIL SCHEDULE FOR CAPACITY
SHC-150	5"	2.5"	X	-	SEE COIL SCHEDULE FOR CAPACITY



NOTES:
1. UNIT MOUNTED THERMOSTAT SHALL MAINTAIN SPACE TEMPERATURE BY CYCLING THE FAN. THE CONTROL VALVE SHALL BE INTERLOCK WITH THE FAN.

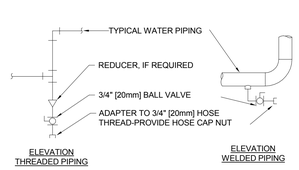
7 UNIT HEATERS (STEAM) PIPING CONNECTIONS

NTS



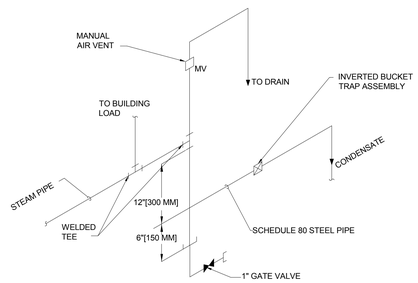
3 TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

NTS



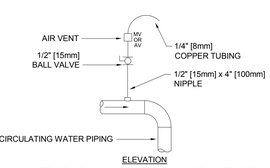
TYPICAL CHILLED AND HOT WATER PIPING DRAIN VALVE CONNECTIONS

NOTES:
1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.
2. WHERE SCALE POCKETS ARE SHOWN ON PIPE RISER DIAGRAMS AND/OR PLANS LOCATE DRAIN AT BOTTOM OF SCALE POCKET.



8 END OF STEAM LINE DRIP TRAP

NTS

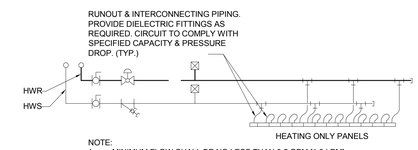


TYPICAL MANUAL AIR VENT

NOTES:
1. VENT ALL HIGH POINTS INDICATED ABOVE.
2. IF AUTOMATIC AIR VENTS ARE USED, PIPE DISCHARGE TO DRAIN.

11 DRAIN VALVE AND AIR VENT CONNECTIONS (HYDRONIC SYSTEMS)

NTS



NOTE:
1. MINIMUM FLOW SHALL BE NO LESS THAN 0.5 GPM [1.9 LPM]

4 HYDRONIC RADIANT CEILING PANELS - PIPING CONNECTIONS

NTS

Revisions:	Date

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ARCHITECT:

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Kahler Slater Project No. 211033.00

Drawing Title: DETAILS

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

Building Number: 1

Drawing Number: MM-501

Dwg. 57 of 118

Office of Construction and Facilities Management

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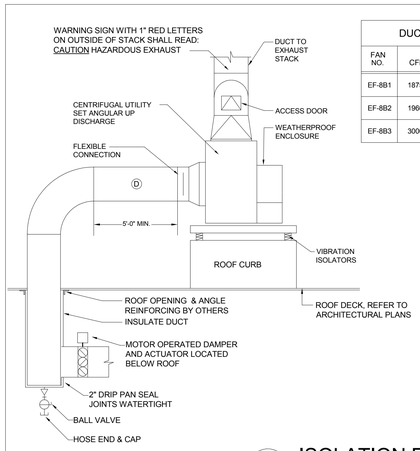
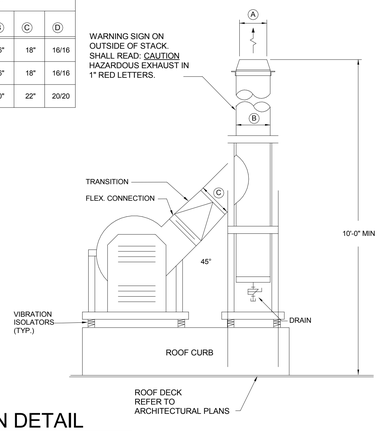
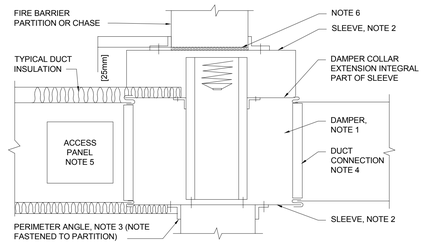


DUCT DIMENSION SCHEDULE							
FAN NO.	CFM	A	VELOCITY @ A (FPM)	B	C	D	
EF-8B1	1875	11"	2800	16"	18"	16/16	
EF-8B2	1960	11"	3000	16"	18"	16/16	
EF-8B3	3000	14"	2800	20"	22"	20/20	



12 ISOLATION EXHAUST FAN DETAIL

NTS

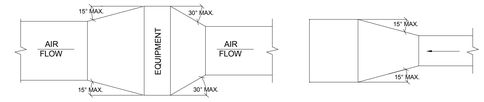


NOTE:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, 1S SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE- GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGELS: GALVANIZED STEEL, NOT LESS THAN 1 1/2"x1 1/2" [40x40mm], 14 GAGE, TO PROVIDE 1" [25mm] MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA; ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.
5. PROVIDE 1/4" TO 1/2" [6 TO 15mm] CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.
6. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" [75mm] HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

8 SECTION THRU FIRE DAMPER INSTALLATION

NTS



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

TYPICAL DUCTWORK TRANSITION PLAN OR SIDE VIEW

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

4 DUCTWORK TRANSITIONS (WITH EQUIPMENT MOUNTED IN DUCT)

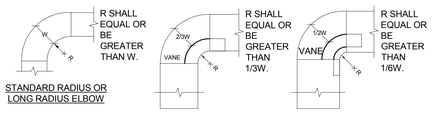
NTS

NOTE:

1. SECURE CURB CAP TO WOOD NAILING STRIP WITH 3/8" [10mm] CADMIUM PLATED LAG BOLTS NOT OVER 12" [300mm] ON CENTER.
2. SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (METAL DECK AND BAR JOIST ROOF).
3. RUN ELECTRICAL LINES THROUGH CLEARANCE HOLE PROVIDED IN GRAVITY DAMPER, THEN THROUGH VENTILATOR ELECTRICAL CONDUIT GUIDE.

1 POWER ROOF VENTILATOR

NTS



STANDARD RADIUS OR LONG RADIUS ELBOW

SHORT RADIUS ELBOW WITH ONE VANE

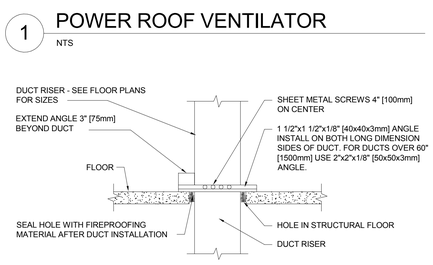
SHORT RADIUS ELBOW WITH TWO VANES

NOTE:

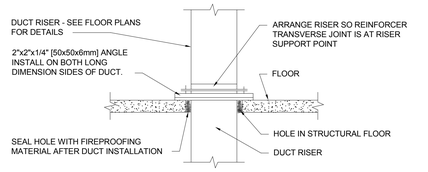
1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

5 DUCTWORK RADIUS ELBOWS

NTS



0.5 INCH WG [125Pa] TO 2 INCHES WG [500Pa] DUCT RISER SUPPORT

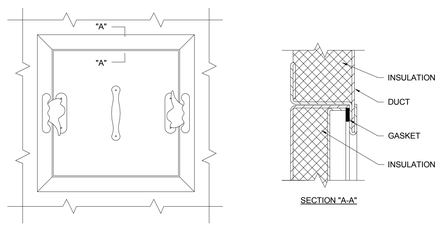


2 INCHES WG [500Pa] TO 4 INCHES WG [1000Pa] DUCT RISER SUPPORT

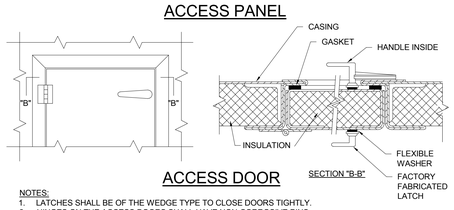
NOTE:
ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND FAN ROOM FLOORS SHALL BE PROVIDED WITH A 3" [75mm] HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

2 DUCT RISER SUPPORTS

NTS



ACCESS PANEL

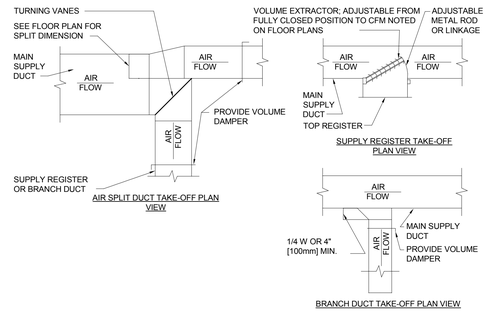


ACCESS DOOR

NOTES:
1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.
3. SEE SMACNA 2005, FIGURE 9-15

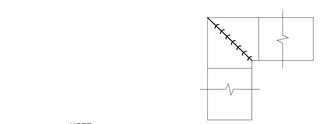
13 ACCESS PANEL AND DOOR DETAIL

NTS



9 SUPPLY DUCTWORK TAKE-OFFS

NTS

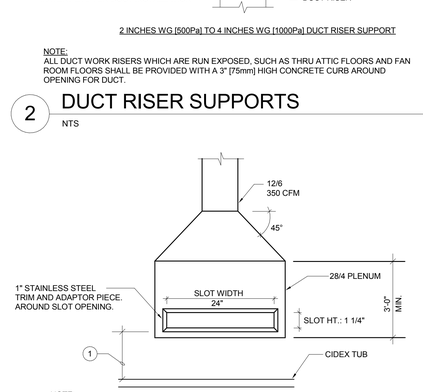


NOTE:

1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.
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.

6 DUCTWORK SQUARE VANE ELBOWS

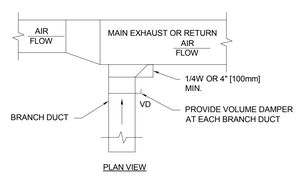
NTS



NOTE:
1. MOUNT HOOD IN FURRED-OUT WALL. COORDINATE MOUNTING HEIGHT TO BE DIRECTLY ABOVE TOP OF CIDEX TUB.

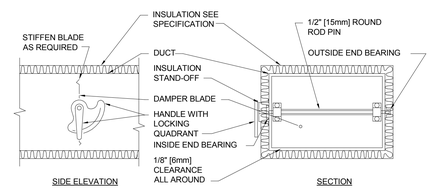
3 CIDEX EXHAUST HOOD RM. D8015

NTS



10 EXHAUST OR RETURN BRANCH DUCTWORK

NTS

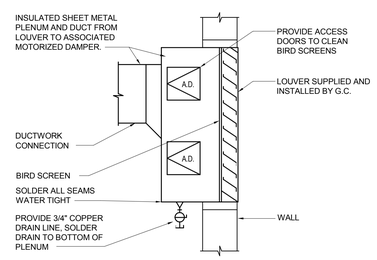


NOTE:

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.

7 VOLUME DAMPER DETAIL

NTS



11 LOUVER CONNECTION DETAIL

NTS

Revisions:	Date

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Kahler Slater Project No. 211033.00

Drawing Title: DETAILS

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

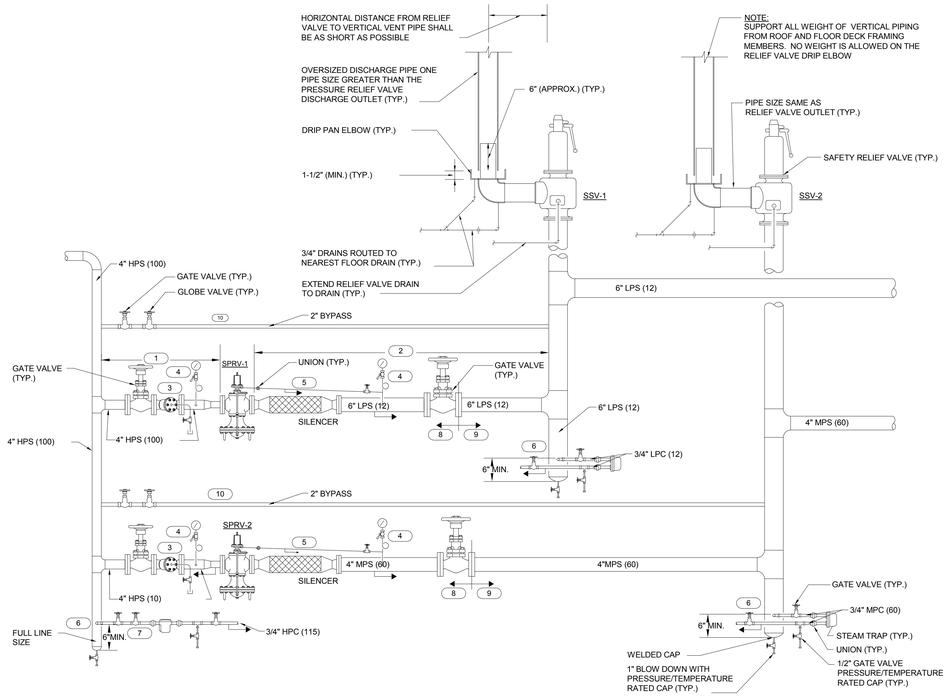
Building Number: 1

Drawing Number: MM-502

Dwg. 58 of 118

Office of Construction and Facilities Management

VA FORM 08-6231



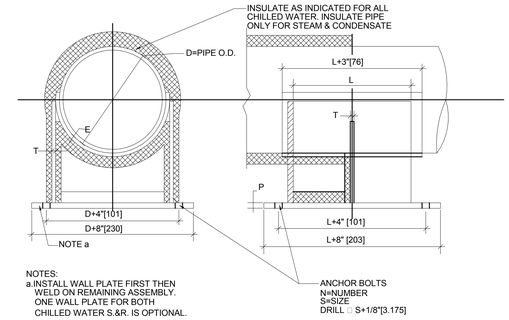
NOTES:

1. PROVIDE A MINIMUM OF 10 PIPE DIAMETERS (INLET EXPANDED LINE SIZE) TO THE INLET. TYPICAL FOR ALL PRESSURE REDUCING VALVES.
2. PROVIDE A MINIMUM OF 20 PIPE DIAMETERS (OUTLET EXPANDED LINE SIZE) FROM THE OUTLET. TYPICAL FOR ALL PRESSURE REDUCING VALVES.
3. STRAINER - ROTATE TO THE HORIZONTAL POSITION TO PREVENT CONDENSATE BUILD UP. INSTALL BLOW DOWN AS INDICATED, DIRECTED DOWN TOWARD THE FLOOR.
4. PRESSURE GAUGE WITH GAUGE VALVE AND COIL SIPHON. CONNECT TO THE SIDE OF THE STEAM MAIN.
5. PITCH PIPING AWAY FROM THE PILOT AND CONNECT UPSTREAM OF THE COIL SIPHON. CONNECT DOWNSTREAM OF SILENCER AT LEAST FOUR PIPE DIAMETERS FROM THE PRESSURE REDUCING VALVE. ALL CONTROL PIPING AND PILOTS TO BE INSTALLED ON THE FRONT OF THE PRESSURE REDUCING STATION TO FACILITATE SERVICING.
6. INSTALL SWING JOINTS AT ALL CONDENSATE CONNECTIONS TO THE MPS(60) AND LPS(12) HEADERS.
7. THE FIRST GATE VALVE SHALL BE WELDED AND THE SECOND SHALL BE THREADED.
8. HPS VALVES AND PIPING MUST BE USED UP TO THIS POINT IN THE SYSTEM.
9. LPS VALVES AND PIPING MAY BE USED PAST THIS POINT IN THE SYSTEM.
10. HPS VALVES AND PIPING MUST BE USED FOR BYPASS PIPING UP TO THE CONNECTION OF THE LPS HEADER AND FOR HPS TRAP DISCHARGE UP TO THE CONNECTION OF THE LPS HEADER.

6 STEAM PRESSURE REDUCING STATION PIPING

NTS

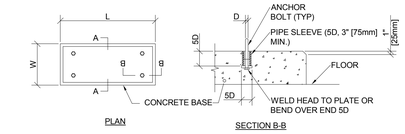
PIPE ANCHOR SCHEDULE														
D		L		P		T		E		N		S		BOLT PATTERN
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	
6"	152	8½"	216	¾"	19	⅝"	10	¾"	6	4"	102	⅞"	22	
8"	203	10"	254	¾"	19	½"	13	¾"	6	4"	102	⅞"	22	
10"	254	12"	305	¾"	19	½"	13	¾"	6	4"	102	⅞"	22	
12"	305	14"	356	¾"	19	½"	13	¾"	6	4"	102	⅞"	22	
14"	356	16"	406	¾"	19	½"	13	½"	13	4"	102	⅞"	22	
16"	406	18"	457	¾"	19	½"	13	½"	13	4"	102	⅞"	22	
18"	457	20"	508	1"	25	⅝"	16	½"	13	6"	152	1"	25	

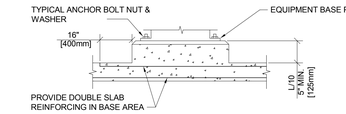


NOTES:
a. INSTALL WALL PLATE FIRST THEN WELD ON REMAINING ASSEMBLY. ONE WALL PLATE FOR BOTH CHILLED WATER S.&R. IS OPTIONAL.

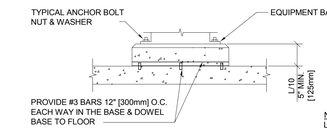
4 LARGE PIPE ANCHOR 6" -18"

NTS





SECTION A-A (BASE POURED WITH FLOOR SLAB)

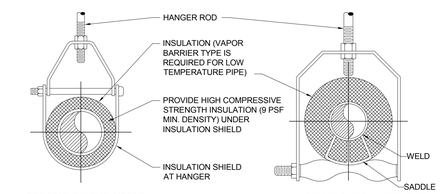


SECTION A-A (BASE NOT POURED WITH SLAB)

NOTE:
L & W DIMENSIONS SHALL BE 6" [150mm] GREATER THAN THE EQUIPMENT BASE PLATE.

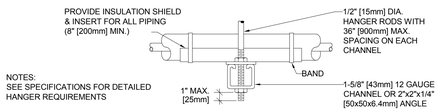
1 CONCRETE EQUIPMENT BASES

NTS



ADJUSTABLE CLEVIS HANGER TYPE 1 - SEE SPECIFICATIONS

ADJUSTABLE CLEVIS HANGER TYPE 43 - SEE SPECIFICATIONS



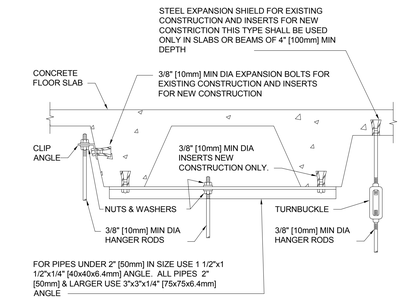
NOTES:
SEE SPECIFICATIONS FOR DETAILED HANGER REQUIREMENTS

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]	7 [2400]	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.																			

5 PIPE HANGERS

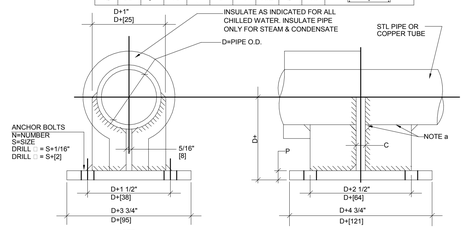
NTS



2 SECURING HANGER RODS IN CONCRETE

NTS

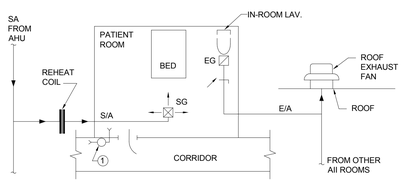
PIPE ANCHOR SCHEDULE											
D		P		C		N		S		BOLT PATTERN
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	
4"	102	⅝"	16	¾"	19	4"	102	¾"	19	
3"	76	½"	13	¼"	13	4"	102	⅝"	16	
2½"	64	⅜"	10	⅜"	10	4"	102	⅝"	16	
2"	51	⅜"	10	⅜"	10	4"	102	⅝"	16	
1½"	38	⅜"	10	¼"	6	4"	102	½"	13	



NOTE:
a. WHERE USED FOR COPPER TUBE OR PIPE, BRAZE TO FABRICATED STEEL ANCHOR.

3 SMALL PIPE ANCHOR $1\frac{1}{2}$"- 4"

NTS



GENERAL NOTES:

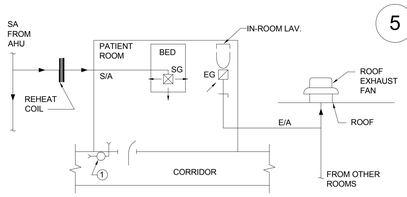
1. MAINTAIN NEGATIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE A-I-I ROOM AND THE ADJOINING CORRIDOR. A-I-I ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER NEGATIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED.
2. LOCATE THE CEILING EXHAUST AIR GRILLE ABOVE THE IN-ROOM LAV .
3. LOCATE THE CEILING SUPPLY AIR GRILLE NEAR THE DOOR OR FOOT OF THE PATIENT BED.
4. PROVIDE A DEDICATED EXHAUST SYSTEM FOR THE A-I-I ROOMS WITHOUT MIXING IT WITH ANY OTHER EXHAUST.

TYPICAL AIR BALANC:

1. THE INFECTIOUS ISOLATION ROOM SHALL BE KEPT UNDER NEGATIVE PRESSURE BY ENSURING AIR MOVEMENT INTO THE ISOLATION ROOM FROM THE ADJOINING CORRIDOR.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY TO THE ISOLATION ROOMS. INFECTIOUS ISOLATION ROOM MINIMUM SUPPLY AIR SHALL BE 12 ACPH (ASHRAE STANDARD 170 2008). INCREASE SUPPLY AIR VOLUME TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES AS REQUIRED.
3. THE PATIENT ROOM EXHAUST AIR SHALL BE BALANCED TO MAINTAIN A NEGATIVE 100 CFM (MINIMUM) DIFFERENTIAL BETWEEN THE INFECTIOUS ISLOATION ROOM SUPPLY AIR AND ROOM EXHAUST AIR.

7 AIR SYSTEM FOR AIRBORNE INFECTIOUS ISOLATION ROOM (A-I-I) (WITHOUT ANTEROOM)

NTS — NEGATIVE PRESSURE



GENERAL NOTES:

1. MAINTAIN POSITIVE AIR PRESSURE (0.01 INCH WATER COLUMN [2.5 PASCAL]) BETWEEN THE PROTECTIVE ENVIRONMENT PATIENT ROOM AND THE ADJOINING CORRIDOR. PROTECTIVE ENVIRONMENT PATIENT ROOMS SHALL HAVE A PERMANENTLY INSTALLED DEVICE AND/OR MECHANISM TO CONSTANTLY MONITOR THE DIFFERENTIAL AIR PRESSURE BETWEEN THE PATIENT ROOM AND THE CORRIDOR. A LOCAL VISUAL MEANS SHALL BE PROVIDED TO INDICATE WHENEVER POSITIVE DIFFERENTIAL PRESSURE IS NOT MAINTAINED.
2. LOCATE THE CEILING EXHAUST AIR GRILLE ABOVE THE IN-ROOM LAV .
3. LOCATE THE CEILING SUPPLY AIR GRILLE ABOVE OR NEAR THE HEAD OF THE PATIENT BED AREA.

TYPICAL AIR BALANCE:

1. THE PROTECTIVE ENVIRONMENT PATIENT ROOM SHALL BE KEPT UNDER POSITIVE PRESSURE BY ENSURING AIR MOVEMENT OUT OF THE PROTECTIVE ENVIRONMENT PATIENT ROOM INTO THE ADJOINING CORRIDOR.
2. THE SUPPLY AIR SYSTEM SHALL CONSIST OF THE CONSTANT VOLUME AIR DELIVERY TO THE PROTECTIVE ENVIRONMENT PATIENT ROOMS. ROOM MINIMUM SUPPLY AIR SHALL BE 12 ACPH (ASHRAE STANDARD 170 2008). INCREASE SUPPLY AIR VOLUME TO MEET THE INSIDE DESIGN CONDITIONS IN COOLING AND/OR HEATING MODES AS REQUIRED.
3. THE PATIENT ROOM EXHAUST AIR SHALL BE BALANCED TO MAINTAIN A POSITIVE 100 CFM (MINIMUM) DIFFERENTIAL BETWEEN THE PROTECTIVE ENVIRONMENT PATIENT ROOM SUPPLY AIR AND ROOM EXHAUST AIR.

8 AIR SYSTEM FOR PROTECTIVE ENVIROMENT PATIENT ROOM (WITHOUT ANTEROOM)

NTS — POSITIVE PRESSURE

Revisions:	Date

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Kahler Slater experience design

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Kahler Slater Project No. 211033.00

Drawing Title: DETAILS

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

Building Number: 1

Drawing Number: MM-503

Dwg. 59 of 118

Office of Construction and Facilities Management

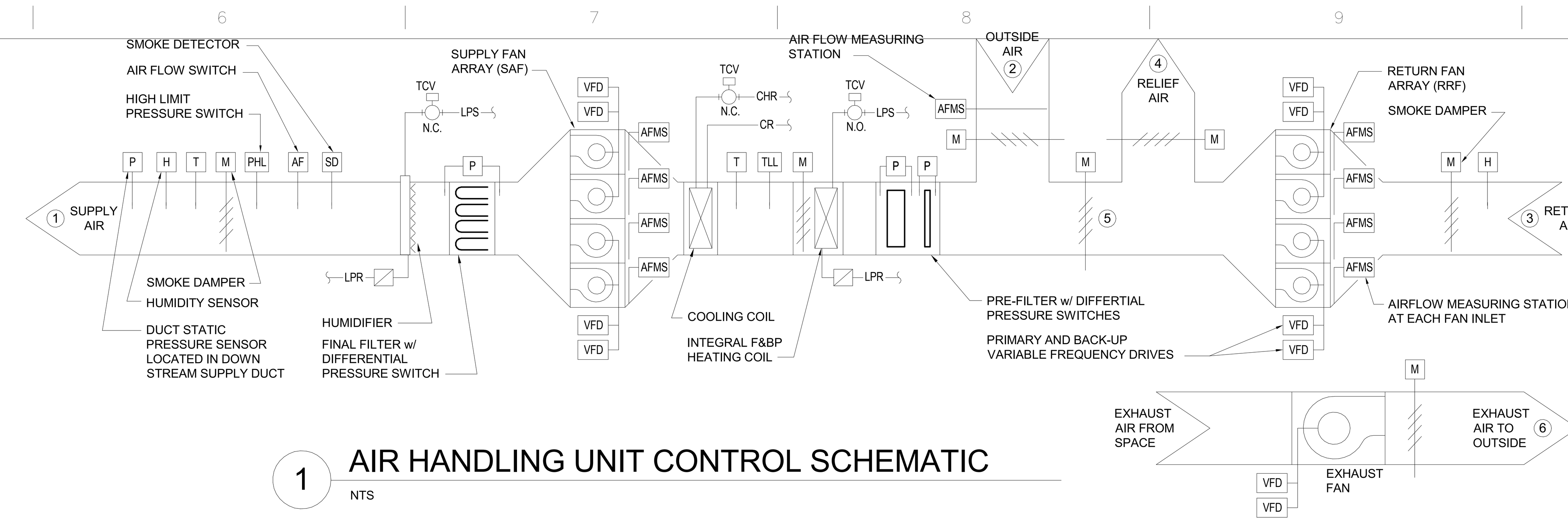
VA FORM 08-6231

AIR HANDLING UNITS (AHU-149 & AHU-150)

A. UNIT AHU-149 SERVES: 8th FLOOR A-WING, 7th FLOOR A-WING (FUTURE), 6th FLOOR A-WING WEST HALF (FUTURE)
B. UNIT AHU-150 SERVES: 8th FLOOR B-WING.
C. UNITS CONSISTS OF THE FOLLOWING:
   1. DRAW THROUGH AIR HANDLING UNIT.
   2. SUPPLY FAN ARRAY CONSISTING OF FOUR FANS. EACH GROUP OF TWO FANS SHALL BE CONTROLLED BY A PAIRED PRIMARY AND BACK-UP VARIABLE FREQUENCY DRIVE.
   3. RETURN RELIEF FAN ARRAY CONSISTING OF FOUR FANS. EACH GROUP OF TWO FANS SHALL BE CONTROLLED BY A PAIRED PRIMARY AND BACK-UP VARIABLE FREQUENCY DRIVE.
   4. STEAM HEATING COIL WITH INTEGRAL FACE AND BYPASS DAMPERS.
   5. CHILLED WATER COOLING COIL.
   6. MIXING BOX WITH FACTORY INSTALLED DAMPERS.
   7. STEAM HUMIDIFIER.
C. FURNISH SMOKE DAMPERS AND PROVIDE ACTUATORS AT THE INLET TO THE RETURN FAN AND OUTLET OF THE AIR HANDLING UNIT.
D. PROVIDE ACTUATORS FOR: MIXING BOX DAMPERS, INTEGRAL FACE AND BYPASS DAMPERS.
E. FURNISH CONTROL VALVES FOR THE FOLLOWING:
   1. CHILLED WATER COIL: 2-WAY MODULATING, NORMALLY CLOSED.
   2. STEAM COIL: MODULATING, NORMALLY OPEN.
   3. HUMIDIFIER: MODULATING NORMALLY CLOSED.
F. FURNISH AIRFLOW MEASURING STATIONS FOR: OUTDOOR AIR, SUPPLY AIR, RETURN AIR.
G. SYSTEM START/STOP:
   1. UNIT SHALL OPERATE 24 HOURS A DAY.
   2. INDEX UNIT FROM OCCUPIED TO SERVICE/OFF MODE THROUGH THE ECC.
   3. SERVICE/OFF CYCLE:
      a. SUPPLY AND RETURN FANS OFF.
      b. SUPPLY AND RETURN ISOLATION DAMPERS CLOSED.
      c. VFD OF THE SUPPLY AND RETURN FANS UNLOAD COMPLETELY.
      d. OUTSIDE AIR DAMPERS CLOSED.
      e. RETURN AIR DAMPER OPEN.
      f. COOLING COIL CONTROL VALVE CLOSED.
      g. HEATING COIL VALVE CLOSED.
      h. HUMIDIFIER VALVE CLOSED.
      i. HUMIDIFIER LOCKED OUT.
      j. A CURRENT SENSOR WIRED INTO THE SUPPLY FAN MOTOR STARTER HOLDING COIL CIRCUIT SHALL PROVIDE A POSITIVE INTERLOCK FOR THE SHUTDOWN OF THE MOTOR OPERATED DAMPERS AND THE HUMIDIFIER.
   4. OCCUPIED CYCLE:
      a. SUPPLY AND RETURN FAN SMOKE ISOLATION DAMPERS OPEN.
      b. SUPPLY AND RETURN FANS START AND OPERATE CONTINUOUSLY
      c. VFD OF THE SUPPLY AND RETURN FAN UNDER CONTROL.
      d. ENABLE THE FOLLOWING DEVICES: HEATING COIL CONTROL VALVE, COOLING COIL CONTROL VALVE, HUMIDIFIER VALVE.
      e. OPEN THE FOLLOWING DAMPERS TO THEIR RESPECTIVE MINIMUM AND MAXIMUM POSITIONS: OUTSIDE AIR, RETURN AIR, RELIEF AIR.
   5. PROVIDE AN END SWITCH AT THE UNIT SMOKE DAMPERS TO PREVENT THE FANS FROM STARTING UNTIL THE DAMPERS ARE 100% OPEN.
H. DISCHARGE AIR TEMPERATURE CONTROL:
   1. MAINTAIN DISCHARGE AIR TEMPERATURE BY MODULATING THE FOLLOWING IN SEQUENCE FROM A SINGLE SETPOINT THERMOSTAT:
      a. HEATING COIL CONTROL VALVE.
      b. OUTSIDE, RETURN AND EXHAUST AIR MOTOR OPERATED DAMPERS.
      c. COOLING COIL CONTROL VALVE.
   2. MAINTAIN DISCHARGE AIR AT 55°F (ADJUSTABLE).
I. COOLING LOCKOUT: LOCKOUT COOLING AT OUTSIDE AIR TEMPERATURES LOWER THAN 55°F.
J. FREEZE PROTECTION:
   1. FACE AND BYPASS DAMPERS:
      a. AT OUTSIDE AIR TEMPERATURES LOWER THAN 40°F, THE STEAM CONTROL VALVE SHALL BE 100% OPEN AND THE INTEGRAL FACE AND BYPASS DAMPERS MODULATED.
      b. AT OUTSIDE AIR TEMPERATURES ABOVE 40°F, THE STEAM CONTROL VALVE SHALL BE MODULATED AND THE INTEGRAL FACE AND BYPASS DAMPERS 100% OPEN TO THE COIL.
   2. A MANUAL RESET, LOW TEMPERATURE THERMOSTAT(S) LOCATED AT THE INLET OF THE COOLING COIL SHALL SHUT DOWN THE SYSTEM UPON SENSING A TEMPERATURE OF LESS THAN 40°F.
K. ECONOMIZER:
   1. AN ENTHALPY ECONOMIZER SHALL POSITION THE OUTSIDE, RETURN AND EXHAUST AIR DAMPERS TO THEIR MINIMUM AND MAXIMUM POSITIONS WHENEVER THE OUTSIDE AIR EXCEEDS THE RETURN AIR ECONOMIZER SWITCHOVER SETPOINT.
   2. PROVIDE AN INTERLOCK TO PREVENT THE OUTSIDE AIR DAMPERS FROM CLOSING TO MINIMUM POSITION IF THE BUILDING CHILLED WATER PUMPS ARE NOT RUNNING.
L. HUMIDITY CONTROL:
   1. MODULATE THE HUMIDIFIER TO MAINTAIN RETURN AIR HUMIDITY SETPOINT. PROVIDE A HUMIDITY HIGH LIMIT CONTROL IN THE DISCHARGE AIR EIGHT (8) FEET DOWNSTREAM OF THE HUMIDIFIER TO OVERRIDE THE HUMIDIFIER CONTROL SIGNAL AND MODULATE THE HUMIDIFIER VALVE CLOSED UPON A RISE IN RH%.
   2. HUMIDITY SETPOINT SHALL BE CONSTANT.
   3. MOUNT AND WIRE ALL HUMIDIFIER CONTROLS FURNISHED BY THE HUMIDIFIER MANUFACTURER.
M. STATIC PRESSURE CONTROL:
   1. A DDC SYSTEM STATIC PRESSURE CONTROL PROGRAM, WITH SENSORS WHERE SHOWN ON PLANS, SHALL MAINTAIN A SETPOINT OF 1" (ADJUSTABLE) WATER COLUMN STATIC PRESSURE BY MODULATING THE VFD OF THE SUPPLY FAN.
   2. A DDC VOLUMETRIC FAN-MATCHING PROGRAM SHALL:
      a. MEASURE, LINEARIZE AND RECORD THE VELOCITY PRESSURES OF THE AIR FLOWS AT THE SUPPLY AND RETURN AIR FLOW MEASURING STATIONS.
      b. USE THE RECORDED VELOCITY PRESSURES TO CALCULATE THE AIR FLOW VOLUMES AT EACH AIR FLOW MEASURING STATION AND THE VOLUME DIFFERENTIAL BETWEEN THEM.
      c. MODULATE THE RETURN-EXHAUST FAN VFD TO MAINTAIN A CONSTANT VOLUME DIFFERENTIAL BETWEEN THE SUPPLY AND RETURN AIR STREAMS PER AIR HANDLING UNIT BALANCING SCHEMATIC.
      d. AN AIR FLOW MEASURING STATION LOCATED IN THE OUTSIDE AIR DUCT SHALL MEASURE, LINEARIZE, AND RECORD THE AMOUNT OF OUTSIDE AIR AND MODULATE THE RETURN AND OUTSIDE AIR DAMPERS TO MAINTAIN A CONSTANT AIR FLOW. THIS CONTROL SHALL BE OVERRIDDEN DURING ECONOMIZER CYCLE OPERATION.
   3. THE VFD OF THE SUPPLY AND RETURN FANS SHALL START FULLY UNLOADED, SHALL LOAD SLOWLY OVER AN ADJUSTABLE TIME PERIOD AND SHALL BE QUICK TO UNLOAD UPON SHUTDOWN.
   4. A DEDICATED STATIC PRESSURE HIGH LIMIT CONTROLLER WITH MANUAL RESET (NOT USED FOR ANY OTHER STATIC PRESSURE CONTROL FUNCTION) SHALL SHUT DOWN THE SUPPLY AND RETURN FANS WHEN THE STATIC PRESSURE IN THE DUCTWORK AT THE SUPPLY FAN EXCEEDS 3" WATER COLUMN (ADJUSTABLE).
N. SURGE MODES: AHU-150 ONLY
   1. UNIT SHALL BE CAPABLE OF CREATING TWO NEGATIVE PRESSURE ZONES (EAST AND WEST) ON THE 8TH FLOOR B-WING WITH RESPECT TO THE ADJACENT WINGS. THESE ZONES SHALL BE CAPABLE OF BEING ACTIVATED INDIVIDUALLY OR IN UNISON.
   2. INDEX UNIT FROM OCCUPIED TO SURGE MODE(S) THROUGH THE ECC UPON REQUEST BY THE 8th FLOOR B-WING NURSING STAFF.
   3. SURGE MODE (EAST ZONE):
      a. AIR HANDLING UNIT AHU-150 INDEXED TO 100% OUTSIDE AIR MODE.
      b. SUPPLY AND RETURN FAN SMOKE ISOLATION DAMPERS OPEN.
      c. SUPPLY FANS REMAIN OPERATING WITH AIRFLOW UNCHANGED.
      d. RETURN FANS REMAIN OPERATING AND REDUCE TO SCHEDULED AIRFLOW.
      e. EXHAUST FAN EF-8B4 OPERATING WITH AIRFLOW UNCHANGED.
      f. EXHAUST FAN EF-8B3 INCREASES FROM 'NORMAL' TO 'SURGE' AIRFLOW.
      g. VFD OF THE SUPPLY AND RETURN FAN UNDER CONTROL.
      h. VFD OF EF-8B3 INDEX FROM ‘NORMAL’ TO ‘SURGE’ OPERATION.
      i. DEVICES REMAIN UNDER CONTROL: HEATING COIL CONTROL VALVE, COOLING COIL CONTROL VALVE, HUMIDIFIER VALVE.
      j. INDEX DAMPERS TO THE FOLLOWING POSITIONS: OUTSIDE AIR MODULATES TO FULL OPEN, RETURN AIR MODULATES TO FULL CLOSED, RELIEF AIR MODULATED TO FULL OPEN, BRANCH DUCT RETURN AIR DAMPERS IN CORRIDOR B8050 AND NURSE STATION B8013 MODULATES TO FULL CLOSED.
   4. SURGE MODE (WEST ZONE):
      a. AIR HANDLING UNIT AHU-150 INDEXED TO 100% OUTSIDE AIR MODE.
      b. SUPPLY AND RETURN FAN SMOKE ISOLATION DAMPERS OPEN.
      c. SUPPLY FANS REMAIN OPERATING WITH AIRFLOW UNCHANGED.
      d. RETURN FANS REMAIN OPERATING AND REDUCE TO SCHEDULED AIRFLOW.
      e. EXHAUST FAN EF-8B2 AND EF-B5 OPERATING WITH AIRFLOW UNCHANGED.
      f. EXHAUST FAN EF-8B1 INCREASES FROM 'NORMAL' TO 'SURGE' AIRFLOW.
      g. VFD OF THE SUPPLY AND RETURN FAN UNDER CONTROL.
      h. VFD OF EF-8B1 INDEX FROM ‘NORMAL’ TO ‘SURGE’ OPERATION.
      i. DEVICES REMAIN UNDER CONTROL: HEATING COIL CONTROL VALVE, COOLING COIL CONTROL VALVE, HUMIDIFIER VALVE.
      j. INDEX DAMPERS TO THE FOLLOWING POSITIONS: OUTSIDE AIR MODULATES TO FULL OPEN, RETURN AIR MODULATES TO FULL CLOSED, RELIEF AIR MODULATED TO FULL OPEN, BRANCH DUCT RETURN AIR DAMPER IN CORRIDOR B8052 MODULATES TO FULL CLOSED.
O. CONTROL PANEL: ALL COMPONENTS REQUIRED FOR CONTROL OF THIS SYSTEM SHALL BE INSTALLED IN A TEMPERATURE CONTROL PANEL LOCATED AS SHOWN ON THE PLANS.

CONTROL SEQUENCES

A. SETPOINTS:
   1. ALL SETPOINTS INDICATED IN THE CONTROL SPECIFICATION ARE TO BE ADJUSTABLE.
   2. THE SETPOINTS SHALL BE READILY AVAILABLE TO BE MODIFIED IN THE MECHANICAL SYSTEM SOFTWARE SYSTEM SUMMARY (EITHER TEXTUAL OR GRAPHIC BASED) AND UNDER THE SAME SOFTWARE LEVEL AS HARDWARE POINTS. SOME LESS USED SETPOINTS MAY BE PROVIDED ON A LOWER SOFTWARE LEVEL, IF REQUESTED BY THE USER AGENCY FOR CLARITY.
   3. THE SETPOINTS INDICATED HEREIN ARE ONLY SPECIFIED AS A CALCULATED STARTING POINT (OR INITIAL SYSTEM OPERATION).
   4. IT IS EXPECTED THAT SETPOINT ADJUSTMENTS AND CONTROL LOOP TUNING SHALL BE REQUIRED TO PROVIDE OPTIMUM SYSTEM OPERATION BASED ON REQUIREMENTS OF THE BUILDING.
   5. THE FOLLOWING SETPOINTS SHOULD BE USED AS INITIAL SETPOINTS UNLESS OTHERWISE SPECIFIED IN THE INDIVIDUAL CONTROL SEQUENCES:
      a. OCCUPIED SPACE TERMINAL UNIT HEATING: 72°F
      b. OCCUPIED SPACE TERMINAL UNIT COOLING: 75°F
      c. UNOCCUPIED SPACE TERMINAL UNIT HEATING (WHEN BUILDING IS NORMALLY OCCUPIED): SAME AS OCCUPIED SPACE TERMINAL UNIT HEATING TEMPERATURE.
      d. UNOCCUPIED SPACE TERMINAL UNIT COOLING (WHEN BUILDING IS NORMALLY OCCUPIED): SAME AS OCCUPIED SPACE TERMINAL UNIT COOLING TEMPERATURE.
      e. UNOCCUPIED SPACE TERMINAL UNIT HEATING (WHEN BUILDING IS NORMALLY UNOCCUPIED): 62°F
      f. UNOCCUPIED SPACE TERMINAL UNIT COOLING (WHEN BUILDING IS NORMALLY UNOCCUPIED): 82°F
      g. MECHANICAL OR UNOCCUPIED SPACE VENTILATION: 75°F
      h. MECHANICAL OR UNOCCUPIED SPACE HEATING: 62°F
   6. THE CONTROL CONTRACTOR SHALL WORK WITH THE BALANCING CONTRACTOR AND THE ENGINEER TO PROVIDE THE FINAL SYSTEM SETPOINT ADJUSTMENTS AND CONTROL LOOP TUNING AFTER THE SYSTEM IS IN OPERATION AND BUILDING IS IN USE.
B. ANTI-CYCLING:
   1. WHEN HVAC EQUIPMENT OR A SEQUENCE IS SPECIFIED TO BE STARTED AND STOPPED BY A TEMPERATURE, HUMIDITY, PRESSURE SETPOINT OR ANY OTHER CONTROLLED VARIABLE, THERE SHALL BE AN ADJUSTABLE DIFFERENTIAL SETPOINT THAT SHALL BE SET TO PREVENT SHORT CYCLING OF THE SYSTEMS AND EQUIPMENT DUE TO MINOR CHANGES IN THE CONTROLLED VARIABLE.
   2. TEMPERATURE DIFFERENTIAL SETPOINTS SHALL BE SET AT 2°F AND NON-TEMPERATURE SETPOINTS SHALL BE SET AT 10% OF THE CONTROLLED RANGE UNLESS OTHERWISE SPECIFIED.
   3. SETPOINTS SHALL INDICATE AT WHEN THE PROCESS SHOULD BE TURNED ON.
   4. COOLING DIFFERENTIALS SHALL BE SET FOR BELOW SETPOINT AND HEATING DIFFERENTIALS SHALL BE SET ABOVE SETPOINT AND WILL BE USED TO TURN THE PROCESS OFF.
   5. NON-TEMPERATURE DIFFERENTIALS SHALL BE SET ABOVE SETPOINT IF THE SETPOINT IS INDICATING A MINIMUM VALUE OR BELOW SETPOINT IF THE SETPOINT IS INDICATING A MAXIMUM VALUE.
   6. PROVIDE MINIMUM RUNTIME TIMERS FOR LOADS THAT ARE CYCLED TO PREVENT OVER-CYCLING.
   7. TIMERS SHALL BE SET AS SPECIFIED OR AS NEEDED TO PREVENT DAMAGE OR EXCESSIVE WEAR TO THE EQUIPMENT.
   8. UNLESS OTHERWISE SPECIFIED IN THE INDIVIDUAL CONTROL SEQUENCES, FANS AND PUMPS SHALL HAVE A MINIMUM RUNTIME ON TIMERS OF 15 MINUTES (ADJUSTABLE) AND OFF TIMERS OF 5 MINUTES (ADJUSTABLE).
   9. SAFETIES SHALL OVERRIDE RUNTIME TIMERS.
D. DEADBANDS:
   1. PROVIDE DEADBANDS FOR ALL DDC CONTROL LOOPS TO PREVENT CONSTANT HUNTING OF OUTPUT SIGNALS TO CONTROLLED DEVICES.
   2. DEADBANDS SHALL BE SET TO PROVIDE ADEQUATE CONTROL AROUND SETPOINT AS FOLLOWS UNLESS OTHERWISE SPECIFIED IN THE INDIVIDUAL CONTROL SEQUENCES:
      a. TEMPERATURE CONTROL: ±0.5°F.
      b. HUMIDITY CONTROL: ±1% RH.
      c. AIRFLOW CONTROL: ±2% OF TOTAL FLOW.
      d. AHU STATIC PRESSURE CONTROL: ±0.01 IN. W.C.
E. CONTROLS: HARDWIRE ALL SENSORS DIRECTLY TO THE BAS CONTROLLER PROVIDING THE CONTROL SIGNAL TO THE END DEVICE. SHARING THE INPUT/OUTPUT SIGNALS VIA A NETWORK IS NOT ALLOWED FOR CONTROL.
F. ALARMS: PROVIDE ALL ALARMED POINTS WITH ADJUSTABLE TIME DELAYS TO PREVENT NUISANCE TRIPPING UNDER NORMAL OPERATION AND ON EQUIPMENT START-UP. PROVIDE ALARMS ON ALL POINTS AS INDICATED ON POINT CHARTS.
G. EQUIPMENT START/STOP FAILURE STATES: ALL START/STOP POINTS FOR EQUIPMENT SHALL UTILIZE NORMALLY OPEN CONTACTS UNLESS CALLED OUT SPECIFICALLY IN THE INDIVIDUAL CONTROL SEQUENCES.
H. VFD BYPASS & SAFETY INTERLOCKS:
   1. VFD’S EQUIPPED WITH BYPASS STARTERS SHALL BE INTERLOCKED SO THAT THE START/STOP AND SAFETY CIRCUITS THAT ARE CALLED OUT FOR VFD OPERATION SHALL BE FUNCTIONAL WHEN THE VFD IS INDEXED TO THE BYPASS STARTER MODE.
   2. UNLESS OTHERWISE SPECIFIED IN THE SEQUENCE, THE SWITCH FROM INVERTER TO BYPASS STARTER MODES SHALL BE THROUGH A MANUAL SWITCH PROVIDED ON THE VFD/BYPASS STARTER PACKAGE.
J. VFD MINIMUM SPEED: THE VFD START-UP TECHNICIAN SHALL WORK WITH THE TEMPERATURE CONTROLS CONTRACTOR DETERMINE THE MINIMUM SPEED REQUIRED FOR THE MOTOR CONTROLLED BY THE VFD TO PROVIDE COOLING OF THE MOTOR AS INSTALLED TO PREVENT HEAT RELATED PROBLEMS. THIS MINIMUM SPEED SHALL BE SET IN THE VFD CONTROLLER.
K. CURRENT SWITCH SETUP: WHEN CURRENT SWITCHES ARE USED FOR PROVING FAN, THEY SHALL BE SET UP SO THAT THEY WILL DETECT BELT OR COUPLING LOSS BY THE REDUCTION IN CURRENT DRAW ON LOSS OF COUPLED LOAD. THE CURRENT SWITCH SET UP SHALL BE REDONE BY THE TEMPERATURE CONTROLS CONTRACTOR AFTER THE BALANCER IS COMPLETE.
L. DAMPER INTERLOCKS FOR FANS WITH STARTERS:
   1. FOR FAN SYSTEMS WITH MAGNETIC STARTERS AND SHUTOFF DAMPERS SPECIFIED WITH END SWITCHES, THE DAMPER INTERLOCK SHALL BE HARDWIRED IN SUCH A WAY THAT THE DAMPER SHALL OPEN IF THE FAN STARTER HAND/OFF/AUTO SWITCH IS IN THE HAND OR IN THE AUTO POSITION AND BEING CALLED TO START.
   2. AFTER THE DAMPER END SWITCH HAS PROVEN THE DAMPER OPEN, A HARDWIRE INTERLOCK FROM THE END SWITCH TO THE STARTER HOLDING COIL FOR THE FAN SHALL CAUSE THE FAN TO START.
   3. FOR FAN SYSTEMS THAT ARE DUCTED IN PARALLEL, SEE SPECIFIC SEQUENCE FOR FAN SYSTEM ON INTERLOCK REQUIREMENTS.
M. DAMPER INTERLOCKS FOR FANS WITH VFD’S:
   1. FOR FAN SYSTEMS WITH VFD’S AND SHUTOFF DAMPERS SPECIFIED WITH END SWITCHES, THE DAMPER END SWITCHES SHALL BE HARDWIRE INTERLOCKED TO THE SAFETY CIRCUIT(S) OF THE VFD TO PREVENT THE FAN FROM STARTING UNTIL THE DAMPER IS PROVEN OPEN.
   2. THIS INTERLOCK SHALL PREVENT THE FAN FROM RUNNING IN EITHER THE VFD OR BYPASS (IF PROVIDED) MODE.
   3. FOR FAN SYSTEMS THAT ARE DUCTED IN PARALLEL, SEE SPECIFIC SEQUENCE FOR FAN SYSTEM ON INTERLOCK REQUIREMENTS.
N. SMOKE DAMPER CONTROL:
   1. IF A FAN FAILS TO START, AFTER AN APPROPRIATE TIME DELAY (NOT LONGER THAN FIVE MINUTES), THE ASSOCIATED SMOKE DAMPERS SHALL CLOSE.
   2. IF DDC CONTROLLED AND FAN FAILS TO START, SMOKE DAMPERS SHALL CLOSE, THE FAN SHALL BE LATCHED OFF, AND AN ALARM SENT THROUGH THE DDC SYSTEM.
   3. A SOFTWARE RESET POINT SHALL BE PROVIDED TO RESET THE FAN SYSTEM.
   4. ON FAN SYSTEM START-UP, A TIME DELAY SHALL ALLOW THE DAMPERS TO OPEN BEFORE THE FAN IS STARTED.
   5. ALL NECESSARY SOFTWARE AND HARDWARE INTERLOCKS SHALL BE PROVIDED TO PERFORM THESE FUNCTIONS. INDIVIDUAL CONTROL SEQUENCES MAY PROVIDE MORE DETAILS ON HOW THIS SHOULD BE ACCOMPLISHED.
   6. EACH SMOKE DAMPER SHALL BE INDIVIDUALLY IDENTIFIED AND MONITORED.
O. FAN INTERLOCKING:
   1. PROVIDE INTERLOCKS BETWEEN SUPPLY AND RETURN OR EXHAUST FAN SYSTEMS AS SCHEDULED ON THE PLANS OR CALLED OUT IN INDIVIDUAL CONTROL SEQUENCES.
   2. IF DDC CONTROLLED, INTERLOCKS SHALL BE DONE THROUGH DDC START/STOP POINTS UNLESS OTHERWISE SPECIFIED IN INDIVIDUAL CONTROL SEQUENCES.
   3. IF NOT DDC CONTROLLED, INTERLOCKS SHALL BE ACCOMPLISHED VIA HARDWIRE INTERLOCKS BETWEEN FAN STARTERS OR VFD’S.
P. THERMOSTATS AND SENSORS:
   1. ALL DEVICES AND EQUIPMENT INCLUDING TERMINAL UNITS, SPECIFIED TO BE CONTROLLED IN A CONTROL SEQUENCE BY A THERMOSTAT OR SENSOR, SHALL BE PROVIDED WITH A THERMOSTAT OR SENSOR, WHETHER OR NOT THE DEVICE IS INDICATED ON THE PLANS.
   2. CONSULT THE HVAC DESIGN ENGINEER FOR THE THERMOSTAT OR SENSOR LOCATION.
   3. DISPLAY RESOLUTION:
      a. DISPLAY THE FOLLOWING RESOLUTIONS WHEN INDICATING MEASURED VALUES:
         1). AIRFLOW: ROUND UP TO THE NEAREST FULL CFM, IE. 102 CFM.
         2). TEMPERATURE, HUMIDITY, CURRENT, CO OR SIMILAR: ROUND UP TO THE NEAREST ONE-TENTH OF THE UNIT, IE. 54.2°F.
         3). PRESSURE:
            a). FOR PRESSURES LARGER THAN 5 PSI: ROUND UP TO THE NEAREST 0.1 PSI.
            b). FOR PRESSURES BETWEEN 0.5 AND 5 PSI: ROUND UP TO THE NEAREST 0.01 PSI.
            c). FOR PRESSURES BETWEEN 14” W.C AND 1” W.C.: ROUND UP TO THE NEAREST 0.01” W.C.
            d). FOR PRESSURES SMALLER THAN 1” W.C.: ROUND UP TO THE NEAREST 0.0001” W.C.
      b. USE THE SIGNIFICANT DIGITS INDICATED ABOVE AND FURTHER DISCUSSED WITH THE ENGINEER FOR BUILDING TREND DATA. DO NOT SAVE TREND DATA WITH MORE THAN THE AGREED UPON RESOLUTION.
Q. PRESSURE SENSORS:
   1. PRESSURE SENSORS USED TO VARY VFD SPEEDS SHALL BE HARDWIRED TO THE BAS CONTROLLER PROVIDING THE CONTROL SIGNAL TO THE VFD.
   2. SHARING PRESSURE CONTROL SIGNALS VIA A NETWORK IS NOT ALLOWED.
   3. PRESSURE DIFFERENTIAL CONTROL SETPOINTS SHALL BE MINIMUM PRESSURE REQUIRED TO ACHIEVE SYSTEM DESIGN AIRFLOW. FINAL SETPOINT SHALL BE OPTIMIZED THROUGH COORDINATION WITH THE BALANCING CONTRACTOR.
R. SCHEDULING:
   1. PROVIDE SCHEDULING OF DDC TERMINAL UNITS IN GROUPS BASED ON OCCUPANCY.
   2. WORK WITH THE OWNER TO DETERMINE HOW MANY GROUPS ARE REQUIRED AND WHICH ZONES SHOULD BE INCLUDED.
   3. INDIVIDUAL TERMINAL UNITS SHALL BE ABLE TO RECEIVE TEMPORARY SCHEDULES THAT WILL OVERRIDE THE GROUP SCHEDULES.
   4. TEMPORARY OVERRIDE BUTTONS AT THE ZONE SENSOR (WHERE SPECIFIED ON POINT CHARTS) SHALL OVERRIDE THE SCHEDULING TO OCCUPIED.



1 AIR HANDLING UNIT CONTROL SCHEMATIC

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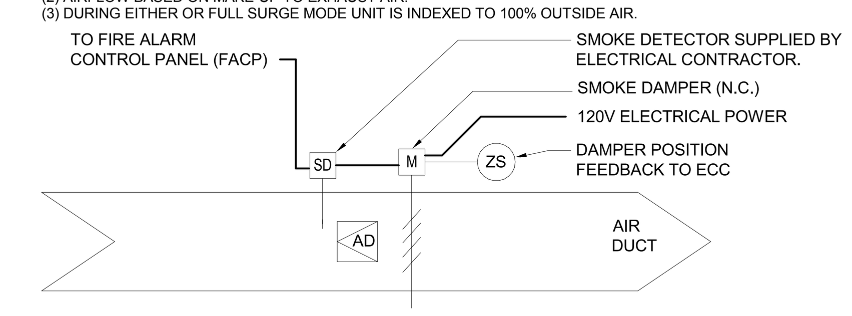
AIR HANDLING SYSTEM BALANCING DATA (AHU-)

NO.	SYSTEM SERVES	SAF CFM (1) MAX.	SAF CFM (1) MIN.	O.A. CFM (2) MAX.	O.A. CFM (2) MIN.	RRF CFM (3) MAX.	RRF CFM (3) MIN.	RLF CFM (4) MAX.	RLF CFM (4) MIN.	R.A. CFM (5) MAX.	R.A. CFM (5) MIN.	RELATED EXHAUST FAN (6) EF TAG / CFM					TOTAL CFM	REMARKS
149	8th FLOOR A-WING	8800	8800	8800 (1)	4050 (2)	4750	4750	4750 (1)	0	4750	0 (1)	EF-8A1 1625	EF-8A2 2425				4050	PRESENT DESIGN CONDITIONS
149	A-WING 6th, 7th & 8th	30,000	30,000	30,000 (1)	8000	22,000	22,000	22,000 (1)	0	22,000	0 (1)						APPROX. 8000	FUTURE CONDITIONS
150	8th FLOOR B-WING	11,200	11,200	11,200 (1)	6610 (2)	4590	4590	4590 (1)	0	4590	0 (1)	EF-8B1 375	EF-8B2 1960	EF-8B3 750	EF-8B4 2350	EF-8B5 1175	6610	NORMAL MODE
150	8th FLOOR B-WING	11,200	11,200	11,200 (3)	11,200 (3)	3000	3000	3000	3000	0	0	EF-8B1 1875	EF-8B2 1960	EF-8B3 750	EF-8B4 2350	EF-8B5 1175	8110	EAST SURGE MODE
150	8th FLOOR B-WING	11,200	11,200	11,200 (3)	11,200 (3)	2540	2540	2540	2540	0	0	EF-8B1 375	EF-8B2 1960	EF-8B3 3000	EF-8B4 2350	EF-8B5 1175	8860	WEST SURGE MODE
150	8th FLOOR B-WING	11,200	11,200	11,200 (3)	11,200 (3)	1500	1500	1500	1500	0	0	EF-8B1 1875	EF-8B2 1960	EF-8B3 3000	EF-8B4 2350	EF-8B5 1175	10,360	FULL SURGE MODE (EAST + WEST)

(1) AIRFLOW IS AT FULL ECONOMIZER.
(2) AIRFLOW BASED ON MAKE-UP TO EXHAUST AIR.
(3) DURING EITHER OR FULL SURGE MODE UNIT IS INDEXED TO 100% OUTSIDE AIR.



SMOKE DAMPER:
1. OPERATION OF DUCT SMOKE DETECTORS SHALL CAUSE A SYSTEM SUPERVISORY CONDITION AND SHUT DOWN THE VENTILATION SYSTEM AND CLOSE THE ASSOCIATED SMOKE DAMPERS AS APPROPRIATE.
2. TYPICAL FOR SMOKE ISOLATION DAMPERS LOCATED AT AIR HANDLING UNITS.

6 SMOKE DAMPER CONTROL

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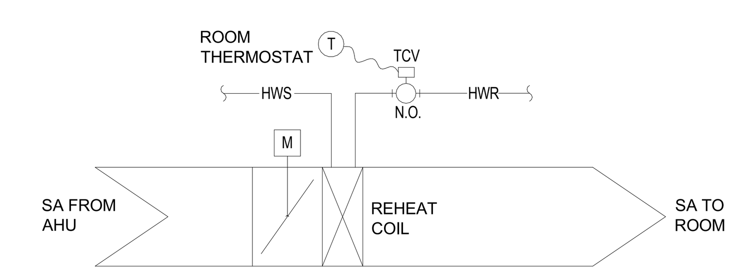

VARIABLE AIR VOLUME (VAV) REHEAT BOX (WATER)
A. BOX MANUFACTURER SHALL SHIP BOX TO TEMPERATURE CONTROL CONTRACTOR. FURNISH AND INSTALL DIRECT DIGITAL CONTROLLER ON BOX AND TURN BOX OVER TO HEATING CONTRACTOR FOR INSTALLATION.
B. THERMOSTAT: SINGLE POINT MONITORING AND CONTROL.
C. CONTROL VALVE: TWO-WAY (THREE-WAY WHERE INDICATED), MODULATING, NORMALLY OPEN.
D. RISE IN SPACE TEMPERATURE ABOVE SETPOINT:BOX ACTUATOR: MODULATE TO MAXIMUM OPEN POSITION. REHEAT COIL VALVE: FULLY CLOSED.
E. DROP IN SPACE TEMPERATURE BELOW SETPOINT:
   1. FIRST STEP: BOX ACTUATOR: MODULATE TO MINIMUM OPEN POSITION. REHEAT COIL VALVE: FULLY CLOSED.
   2. SECOND STEP: MODULATE REHEAT COIL VALVE TO FULLY OPEN.
   3. THIRD STEP (WHERE INDICATED BY A REHEAT CFM ON THE VAV REHEAT BOX SCHEDULE): BOX ACTUATOR: MODULATE TO MAXIMUM OPEN. REHEAT COIL VALVE: FULLY OPEN.
F. RETURN AIR BOX CONTROL (8th FLOOR D-WING) SHALL TRACK WITH ACTUAL AIRFLOW OF ASSOCIATED SUPPLY BOX (NOT SETPOINT) LESS ANY SCHEDULED OFFSET AIRFLOW.

7 VARIABLE AIR VOLUME BOX WITH HOT WATER REHEAT COIL CONTROL

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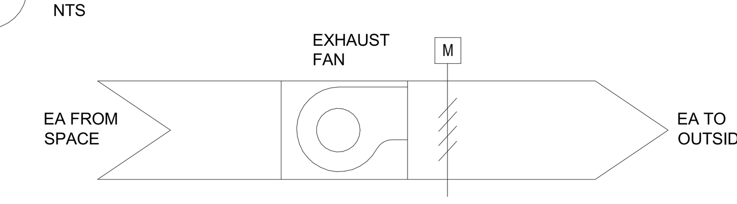

EXHAUST FAN
A. DAMPER: FURNISH A MOTOR OPERATED DAMPER AND PROVIDE AN ACTUATOR FOR THE EXHAUST FANS AS INDICATED IN THE SCHEDULE BELOW.
B. OPEN DAMPER WHENEVER EXHAUST FAN IS STARTED.
C. INTERLOCK THE EXHAUST FANS TO OPERATE WHENEVER THE LISTED INTERLOCK DEVICE IN THE SCHEDULE BELOW IS ON.

EXHAUST FAN DAMPER & INTERLOCK SCHEDULE

EXHAUST FAN No.	MOTOR OPERATED DAMPER	INTERLOCK DEVICE
EF-8A1	YES	AHU-149
EF-8A2	YES	AHU-149
EF-8B1	YES	AHU-150
EF-8B2	YES	AHU-150
EF-8B3	YES	AHU-150
EF-8B4	YES	AHU-150
EF-8D1	YES	AHU-146

8 EXHAUST FAN CONTROL

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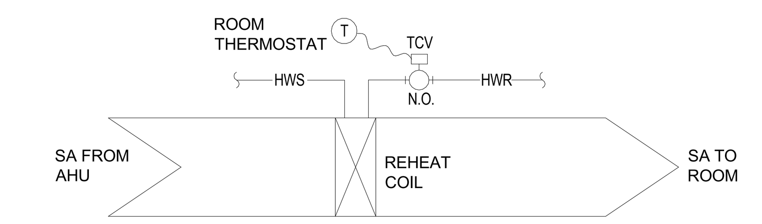

REHEAT COILS (WATER)
A. THERMOSTAT: SINGLE SETPOINT.
B. CONTROL VALVE: TWO-WAY (OR THREE-WAY WHERE INDICATED), MODULATING, NORMALLY OPEN.
C. RISE IN SPACE TEMPERATURE ABOVE SETPOINT: CONTROL VALVE: MODULATE TO FULLY CLOSED.
D. DROP IN SPACE TEMPERATURE BELOW SETPOINT: CONTROL VALVE: MODULATE TO FULLY OPEN.

2 HOT WATER REHEAT COIL CONTROL

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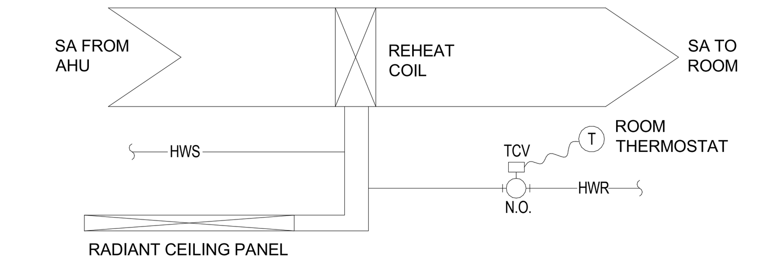

REHEAT COILS WITH RADIANT CEILING PANELS (WATER)
A. THERMOSTAT: SINGLE SETPOINT.
B. CONTROL VALVE: TWO-WAY (THREE-WAY WHERE INDICATED FOR REHEAT COIL), MODULATING, NORMALLY OPEN. A SINGLE VALVE SHALL SERVE BOTH REHEAT COIL AND RADIANT CEILING PANEL.
C. RISE IN SPACE TEMPERATURE ABOVE SETPOINT: REHEAT COIL AND RADIATION VALVE: FULLY CLOSED.
D. DROP IN SPACE TEMPERATURE BELOW SETPOINT:
   1. FIRST STEP: REHEAT COIL AND RADIATION VALVE: MODULATE TO 50% OPEN.
   2. SECOND STEP: REHEAT COIL AND RADIATION VALVE: CONTINUE MODULATING OPEN.

3 HOT WATER REHEAT COIL WITH RADIANT CEILING PANEL CONTROL

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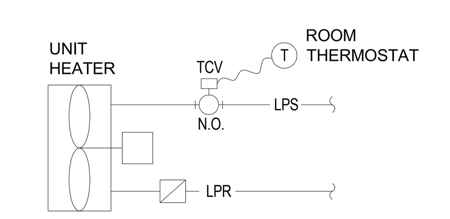

UNIT HEATER (STEAM)
A. THERMOSTAT: SINGLE SETPOINT.
B. CONTROL VALVE: TWO-WAY (OR THREE-WAY WHERE INDICATED), MODULATING, NORMALLY OPEN.
C. RISE IN SPACE TEMPERATURE ABOVE SETPOINT: FAN: CYCLE OFF, CONTROL VALVE: MODULATE TO FULLY CLOSED.
D. DROP IN SPACE TEMPERATURE BELOW SETPOINT: FAN: CYCLE ON, CONTROL VALVE: MODULATE TO FULLY OPEN.

4 STEAM UNIT HEATER CONTROL

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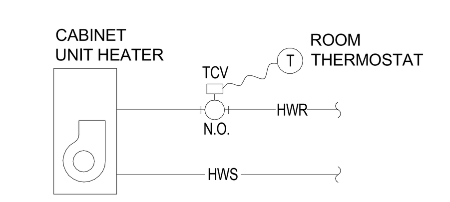

CABINET UNIT HEATER (WATER)
A. THERMOSTAT: SINGLE SETPOINT.
B. CONTROL VALVE: TWO-WAY (OR THREE-WAY WHERE INDICATED), MODULATING, NORMALLY OPEN.
C. RISE IN SPACE TEMPERATURE ABOVE SETPOINT: FAN: CYCLE OFF, CONTROL VALVE: MODULATE TO FULLY CLOSED.
D. DROP IN SPACE TEMPERATURE BELOW SETPOINT: FAN: CYCLE ON, CONTROL VALVE: MODULATE TO FULLY OPEN.
E. HOT WATER SUPPLY STRAP ON BULB SHALL PREVENT FAN FROM RUNNING UNIT HOT WATER IS SENSED.

5 HOT WATER CABINET UNIT HEATER CONTROL

NTS

Revisions: | Date

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Kahler Slater Project No.
211033.00

Drawing Title: DETAILS

Approved: Project Director

Project Title: WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location: MADISON, WI

Date	Checked	Drawn
DECEMBER 3, 2012	WS	RA

Project Number: 607-394

Building Number: 1

Drawing Number: MM-504

Dwg. 60 of 118

Office of Construction and Facilities Management

VA FORM 08-6231

AIR FLOW MEASURING DEVICE SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	AIR FLOW MIN CFM	AIR FLOW MIN [L/s]	AIR FLOW MAX CFM	AIR FLOW MAX [L/s]	DUCT SIZE WIDTH IN	DUCT SIZE WIDTH [mm]	DUCT SIZE HEIGHT IN	DUCT SIZE HEIGHT [mm]	APD IN	APD [mm]	REMARKS
149A	SUPPLY AIR	AHU-149	0	[ ]	30000	[14000]	22	[550]	0	[ ]	0.05	[1]	ONE DEVICE AT INLET OF EACH FAN IN FAN ARRAY
149B	RETURN AIR	AHU-149	0	[ ]	21000	[9900]	22	[550]	0	[ ]	0.05	[1]	ONE DEVICE AT INLET OF EACH FAN IN FAN ARRAY
149C	OUTSIDE AIR	AHU-149	0	[ ]	30000	[14000]	52	[1300]	36	[900]	0.05	[1]	
150A	SUPPLY AIR	AHU-150	0	[ ]	16000	[7600]	25	[630]	0	[ ]	0.05	[1]	ONE DEVICE AT INLET OF EACH FAN IN FAN ARRAY
150B	RETURN AIR	AHU-150	0	[ ]	12000	[5700]	25	[630]	0	[ ]	0.05	[1]	ONE DEVICE AT INLET OF EACH FAN IN FAN ARRAY
150C	OUTSIDE AIR	AHU-150	0	[ ]	16000	[7600]	50	[1300]	24	[600]	0.05	[1]	

SMOKE AND COMBINATION FIRE/SMOKE DAMPER SCHEDULE

MARK	LOCATION	FAN SYSTEM	SYSTEM AND/OR SERVICE	DUCT SIZE IN	DUCT SIZE [mm]	DUCT PRESSURE CLASS IN WG	DUCT PRESSURE CLASS [Pa]	REMARKS
SD-149A	A-WING PENTHOUSE	RRF-149	AHU-149	75x42	[1875x1050]	7.5	[1900]	
SD-149B	A-WING PENTHOUSE	SAF-149	AHU-149	124x30	[3100 x750]	8	[2000]	
SD-150A	B-WING PENTHOUSE	SAF-150	AHU-150	52x36	[1300x900]	8	[2000]	
SD-150B	B-WING PENTHOUSE	RRF-150	AHU-150	30x50	[750x1250]	3	[750]	
FSD-146A	D-WING 7TH FLOOR	AHU-146	EF-7D1	18x18	[450x450]	(1)	-	
FSD-146B	D-WING 7TH FLOOR	AHU-146	AHU-146	12x10	[300x250]	(1)	-	
FSD-146C	D-WING 7TH FLOOR	(2)	EXISTING PRV (ON ROOF)	18x14	[450x350]	(1)	-	
FSD-146D	D-WING 7TH FLOOR	(2)	EXISTING PRV (ON ROOF)	18x14	[450x350]	(1)	[-300]	
FSD-EF8B2A	B-WING 7TH FLOOR	(2)	EF8B2	16x4	[400x100]	1.5	[380]	
FSD-EF8B2B	B-WING 7TH FLOOR	(2)	EF8B2	12x12	[300x300]	1.5	[380]	
FSD-146E	D-WING 8TH FLOOR	AHU-146	AHU-146	12x10	[300x250]	(1)	-	
FSD-146F	D-WING 8TH FLOOR	AHU-146	EXISTING PRV (ON ROOF)	8x16	[200x400]	(1)	-	

(1) MATCH EXISTING DUCT PRESSURE CLASS FOR AHU-146 SYSTEM.

(2) VERIFY AHU SYSTEM WITH PLANT OPERATIONS.

AIR FILTER SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	MERV RATING	AIR FLOW CFM	AIR FLOW [L/s]	APD INITIAL IN	APD INITIAL [mm]	APD CHANGEOVER IN	APD CHANGEOVER [mm]	HOUSING TYPE	CARTRIDGES #	CARTRIDGES SIZE IN	CARTRIDGES SIZE [mm]	ARRANGEMENT	REMARKS
F-149A	A-WING PENTHOUSE	8TH FOOR A-WING	AHU-149	8	30000	[14000]	0.3	[8]	0.7	[18]	SIDE SERVICE	20	2x20x24	50x500x600	PER MFR	
F-149B	A-WING PENTHOUSE	8TH FLOOR A-WING	AHU-149	11	30000	[14000]	0.3	[8]	0.5	[13]	SIDE SERVICE	20	12x20x24	300x500x600	PER MFR	
F-149C	A-WING PENTHOUSE	8TH FLOOR A-WING	AHU-149	17 (HEPA)	30000	[14000]	1	[25]	2	[50]	SIDE SERVICE	3 12	12x24x12 12x24x30	300x600x300 300x600x750	PER MFR	
F-150A	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	8	16000	[7600]	0.3	[8]	0.7	[18]	SIDE SERVICE	4 8	2x12x24 2x20x24	50x300x600 50x500x600	PER MFR	
F-150B	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	11	16000	[7600]	0.3	[8]	0.5	[13]	SIDE SERVICE	4 8	12x12x24 12x20x24	300x300x600 300x500x600	PER MFR	
F-150C	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	17 (HEPA)	16000	[7600]	1	[25]	2	[50]	SIDE SERVICE	3 3	12x24x30 12x20x24	300x600x750 300x750x600	PER MFR	
								[ ]		[ ]						

RADIANT CEILING PANEL SCHEDULE (HYDRONIC)

MARK	ROOM LOCATION	AREA SERVED	PANEL SIZE IN	PANEL SIZE [mm]	HEATING CAPACITY BTUH/LF	HEATING CAPACITY [W]	EWT °F	EWT [°C]	LWT °F	LWT [°C]	HOT WATER FLOWRATE GPM	HOT WATER FLOWRATE [L/m]	WPD FT	WPD [kPa]	REMARKS
RCP-1	SEE PLAN	SEE PLAN	24" WIDE SEE DWG FOR LENGTH	[600 x __]	290	[85]	190	[88]	170	[77]	0.1/LF	[ ]	4	[12]	

SINGLE DUCT AIR TERMINAL UNIT SCHEDULE

MARK	LOCATION	AREA AND/OR ROOM SERVED	SYSTEM AIR HANDLING	SIZE	AIR FLOW MAX CFM	AIR FLOW MAX [L/s]	AIR FLOW MIN CFM	AIR FLOW MIN [L/s]	ADDITIONAL SOUND ATTUNATION REQUIRED	CONTROL TYPE	CONTROL SEQUENCE	REHEAT HW	REHEAT ELEC	REHEAT NONE	PERIMETER SUPPLEMENTAL HEAT LINK	REMARKS
TAB-8D18	8TH FLOOR D-WING	D8030	AHU-146	10"	675	[320]	675	[320]	NO	DDC	DETAIL 7/MM504	(1)	-	-	NONE	
TAB-8D19	8TH FLOOR D-WING	D8025, D8028	AHU-146	8"	425	[200]	425	[200]	NO	DDC	DETAIL 7/MM504	(1)	-	-	NONE	
TAB-8D20	8TH FLOOR D-WING	D8015	AHU-146	10"	900	[420]	900	[420]	NO	DDC	DETAIL 7/MM504	(1)	-	-	NONE	
TAB-8D21	8TH FLOOR D-WING	D8013	AHU-146	8"	500	[240]	500	[240]	NO	DDC	DETAIL 7/MM504	(1)	-	-	NONE	
AV-20	8TH FLOOR D-WING	D8030	AHU-146	10"	375	[180]	375	[180]	NO	DDC	DETAIL 7/MM504	-	-	X	NONE	RETURN BOX FOR TAB-8D18
AV-21	8TH FLOOR D-WING	D8020, D8028	AHU-146	8"	490	[230]	490	[230]	NO	DDC	DETAIL 7/MM504	-	-	X	NONE	RETURN BOX FOR TAB-8D19

(1) SEE HW COIL SCHEDULE, SHEET MM-603 FOR COIL DATA/CAPACITY

AIR HANDLING UNIT SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	TYPE	AIR FLOW	AIR FLOW SUPPLY CFM	AIR FLOW SUPPLY [L/s]	AIR FLOW MIN OA CFM	AIR FLOW MIN OA [L/s]	AIR FLOW RETURN CFM	AIR FLOW RETURN [L/s]	SUPPLY FAN MARK	RETURN RELIEF FAN MARK	EXHAUST FAN MARK	PRE-FILTER MARK	AFTER FILTER MARK	FINAL FILTER MARK	HEAT RECOVERY MARK	PREHEAT COIL MARK	COOLING COIL MARK	REHEAT COIL	HUMIDIFIER MARK	REMARKS
AHU-149	A-WING PENTHOUSE	8TH FLOOR A-WING	PRE-ENGINEERED	CONSTANT	30000	[14000]	9000	[4200]	21000	[9900]	SAF-149	RRF-149	SEE FAN SCHED	F-149A	F-149B	F-149C	N/A	SHC-149	CC-149	N/A	SH-149	(1)
AHU-150	B-WING PENTHOUSE	8TH FLOOR B-WING	PRE-ENGINEERED	CONSTANT	16000	[7600]	8000	[3800]	12000	[5700]	SAF-150	RRF-150	SEE FAN SCHED	F-150A	F-150B	F-150C	N/A	SHC-150	CC-150	N/A	SH-150	(1)

(1) PROVIDE WITH MINIMUM 8" HIGH MANUFACTURERS BASE RAIL, SECTION FOR FUTURE UV LIGHTING AND 6 INTERNAL MARINE SERVICE LIGHTS.

CHILLED WATER COOLING COIL SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	AIR FLOW CFM	AIR FLOW [L/s]	MAX FACE VELOCITY FPM	MAX FACE VELOCITY [M/s]	APD IN WG	APD [Pa]	EAT Db °F	EAT Db [°C]	EAT Wb °F	EAT Wb [°C]	LAT Db °F	LAT Db [°C]	LAT Wb °F	LAT Wb [°C]	TOTAL CAPACITY MBH	TOTAL CAPACITY [kW]	SENSIBLE CAPACITY MBH	SENSIBLE CAPACITY [kW]	CHILLED WATER FLOW GPM	CHILLED WATER FLOW [L/s]	CHILLED WATER EWT °F	CHILLED WATER EWT [°C]	CHILLED WATER LWT °F	CHILLED WATER LWT [°C]	CHILLED WATER WPD FT	CHILLED WATER WPD [M]	REMARKS
CC-149	A-WING PENTHOUSE	8TH FOOR A-WING	AHU-149	30000	[14000]	500	[3]	0.8	[200]	81	[27]	67	[19]	52	[11]	51.5	[11]	1375	[400]	960	[280]	275	[17]	45	[7]	55	[13]	14	[4]	(1) (2)
CC-150	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	16000	[7600]	500	[3]	1.0	[250]	95	[35]	75	[24]	52	[11]	51.5	[11]	1225	[360]	765	[220]	275	[17]	45	[7]	55	[13]	7.5	[2]	(1)

NOTE

(1) COOLING COIL FIN SPACING SHALL NOT EXCEED 132 FINS PER FOOT [400 FINS PER METER].

(2) SCHEDULED DATA IS FOR FULL/FUTURE COOLING COIL CAPCITY. PROVIDE BLANK-OFF PANEL AT ENTERING AIR SIDE OF TOP COIL AND CLOSE ISOLATION VALVES FOR PRESENT DEISGN CAPACITY.

STEAM HEATING COIL SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	APPLICATION	AIR FLOW CFM	AIR FLOW [L/s]	MAX FACE VELOCITY FPM	MAX FACE VELOCITY [M/s]	APD IN WG	APD [Pa]	TEMPERATURES EAT °F	TEMPERATURES EAT [°C]	TEMPERATURES LAT °F	TEMPERATURES LAT [°C]	TOTAL MIN CAPACITY MBH	TOTAL MIN CAPACITY [kW]	STEAM ENT CONT VALVE PSIG	STEAM ENT CONT VALVE [kPa]	STEAM ENT COIL PSIG	STEAM ENT COIL [kPa]	STEAM FLOW LBS/HR	STEAM FLOW [kg/HR]	STEAM STEAM TRAP MARK	STEAM STEAM TRAP LBS/HR	STEAM STEAM TRAP [kg/HR]	REMARKS
SHC-149	A-WING PENTHOUSE	8TH FLOOR A-WING	AHU-149	PREHEAT	30000	[14000]	775	[370]	0.2	[50]	40	[4]	60	[16]	700	[2400]	7	[48]	5	[35]	725	[330]	-	2175	[990]	INTEGRAL FACE & BYPASS
SHC-150	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	PREHEAT	16,000	[7600]	775	[370]	1	[250]	-15	[-26]	60	[16]	1,350	[4600]	7	[48]	5	[35]	1400	[640]	-	4200	[1900]	INTEGRAL FAE & BYPASS

FAN SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	AIR FLOW CFM	AIR FLOW [L/s]	TSP IN	TSP [Pa]	FAN TYPE	FAN WHEEL	FAN CLASS	FAN ARRANGEMENT, ROTATION, AND DISCHARGE	FAN DIAMETER IN	FAN DIAMETER [mm]	MIN % EFF	DRIVE	FAN MAX RPM	MOTOR ELECTRICAL NOMINAL POWER BHP	NOMINAL POWER HP	NOMINAL POWER [kW]	PHASE	VOLT	RPM	SPEED CONTROL	CONTROL SEQUENCE	REMARKS
SAF-149	A-WING PENTHOUSE	8TH FLOOR A-WING	AHU-149	30000	[14000]	8	[2000]	PLENUM	AF	2	ARRAY OF 4 FANS	22	[550]	60%	DIRECT	2675	60	4@ 20	[6@15]	3	208	2414	CONSTANT w/ VFDs	DETAIL 1/MM504	(1)
SAF-150	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	16000	[7600]	8	[2000]	PLENUM	AF	2	ARRAY OF 2 FANS	25	[630]	60%	DIRECT	2270	32	2@ 20	[2@15]	3	208	2116	CONSTANT w/ VFDs	DETAIL 1/MM504	
RRF-149	A-WING PENTHOUSE	8TH FLOOR A-WING	AHU-149	21000	[9900]	7.5	[1900]	PLENUM	AF	2	ARRAY OF 4 FANS	22	[550]	55%	DIRECT	2675	16.6	4@5	[4@4]	3	208	1531	CONSTANT w/ VFDs	DETAIL 1/MM504	(1)
RRF-150	B-WING PENTHOUSE	8TH FLOOR B-WING	AHU-150	12000	[5700]	3	[750]	PLENUM	AF	2	ARRAY OF 2 FANS	25	[630]	65%	DIRECT	2270	8.6	2@5	[4@4]	3	208	1330	CONSTANT w/ VFDs	DETAIL 1/MM504	
EF-8A1	A-WING ROOF	8TH FLOOR A-WING	AHU-149	1625	[770]	1	[250]	CENTRIFUGAL	BI	-	DOWN	14	[350]	50%	BELT	1726	0.6	1	[1]	3	208	1725	CONSTANT	DETAIL 8/MM504	
EF-8A2	A-WING ROOF	8TH FLOOR A-WING	AHU-149	2425	[1100]	1.5	[380]	CENTRIFUGAL	BI	-	DOWN	16	[400]	50%	BELT	1576	0.9	1.5	[1]	3	208	1725	CONSTANT	DETAIL 8/MM504	
EF-8B1	B-WING P.H. ROOF	8TH FLOOR B-WING PATIENT ROOM TOILETS	AHU-150	1875	[890]	2	[500]	CENTRIFUGAL	BI	-	HORIZONTAL DISCHARGE	15	[380]	50%	BELT	2113	1.11	1.5	[1]	3	208	1725	CONSTANT w/ VFDs	DETAIL 8/MM504	
EF-8B2	B-WING ROOF	8TH FLOOR B-WING NEG. PRES. RMS	AHU-150	1960	[930]	2	[500]	CENTRIFUGAL	BI	-	UPBLAST	16	[400]	60%	BELT	1745	1.06	1.5	[1]	3	208	1725	CONSTANT	DETAIL 8/MM504	
EF-8B3	B-WING ROOF	8TH FLOOR B-WING PATIENT ROOM TOILETS	AHU-150	3000	[1400]	2	[500]	CENTRIFUGAL	BI	-	UPBLAST	18	[450]	60%	BELT	2156	1.3	3	[2]	3	208	1725	CONSTANT w/ VFDs	DETAIL 8/MM504	
EF-8B4	B-WING ROOF	8TH FLOOR B-WING STAFF/FAMILY LOUNGE	AHU-150	2350	[1100]	1	[250]	CENTRIFUGAL	BI	-	DOWN	18	[450]	60%	BELT	1460	0.7	1	[1]	3	208	1725	CONSTANT	DETAIL 8/MM504	
EF-8B5	B-WING PENTHOUSE	8TH FLOOR B-WING SUPPORT SPACES	AHU-150	1175	[550]	1.5	[380]	CENTRIFUGAL	BI	-	DOWN	14	[350]	45%	BELT	1960	0.7	1	[1]	3	208	1725	CONSTANT	DETAIL 8/MM504	
EF-8B6	MED GAS B8067	MED GAS B8067	AHU-150	200	[94]	0.75	[190]	CENTRIFUGAL	FC	-	HORIZONTAL DISCHARGE	11	[280]	-	DIRECT	981	0.11	0.11	[ ]	1	120	981	CONSTANT		
EF-8D1	D-WING ROOF	8TH FLOOR D-WING DECONTAMINATION	AHU-146	2100	[990]	2	[500]	CENTRIFUGAL	BI	-	DOWN	20	[500]	45%	BELT	1272	1.4	2	[2]	3	208	1725	CONSTANT	DETAIL 8/MM504	

NOTE

(1) SCHEDULED DATA IS FOR FULL/FUTURE CAPCITY. TO AID IN BALANCING FANS FOR PRESENT DESIGN CAPACITY, PROVIDE BLANK-OFF PANEL ON INLET SIDE OF TOP TWO FANS AND LOCK-OUT ASSOCIATED VFD'S. SEE SHEET MM504 FOR BALANCING DATA.

STEAM HUMIDIFER SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SEVICE	HUMIDIFIER TYPE	AIR FLOW CFM	AIR FLOW [L/s]	# OF MANIFOLDS	EAT Db °F	EAT Db [°C]	EAT Wb °F	EAT Wb [°C]	EAT DEWPOINT °F	EAT DEWPOINT [°C]	LAT DEWPOINT °F	LAT DEWPOINT [°C]	SOURCE	STEAM PRESS ENT VALVE PSIG	STEAM PRESS ENT VALVE [kPa]	STEAM PRESS ENT HEATER PSIG	STEAM PRESS ENT HEATER [kPa]	STEAM FLOW LBS/HR	STEAM FLOW [kg/HR]	CONTROL TYPE	TRAP MARK	TRAP CAPACITY LBS/HR	TRAP CAPACITY [kg/HR]	REMARKS
SH-149	A-WING PENTHOUSE	AHU-149	UNIT-MOUNTED DISPERSION TUBE	30000	[14000]	AS REQ'D	78	[26]	63	[17]	54	[12]	58	[14]	CLEAN STEAM	5	[35]	1	[7]	255	[120]	ELECTRONIC	-	15	[7]	
SH-150	B-WING PENTHOUSE	AHU-150	UNIT-MOUNTED DISPERSION TUBE	16000	[7600]	AS REQ'D	78	[26]	60	[16]	48	[9]	58	[14]	CLEAN STEAM	5	[35]	1	[7]	255	[120]	ELECTRONIC	-	15	[7]	

SOUND ATTENUATING DEVICE SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	AIRFLOW CFM	AIRFLOW [L/s]	APD IN WG	APD [Pa]	INLET WIDTH IN	INLET WIDTH [mm]	INLET HEIGHT IN	INLET HEIGHT [mm]	UNIT LENGTH IN	UNIT LENGTH [mm]	DYNAMIC INSERTION LOSS DB OCTAVE BAND AND MID-FREQUENCY [CPS] 63	125	250	500	1000	2000	4000	8000	REMARKS
														1	2	3	4	5	6	7	8	
SA-149A	A-WING PENTHOUSE	AHU-149 OUTLET	RECTANGULAR	30000	[14000]	0.3	[75]	72	[1800]	42	[1100]	60	[1500]	4	4	9	13	18	18	12	6	MYLAR FILM LINER
SA-149B	A-WING PENTHOUSE	AHU-149 INLET	RECTANGULAR	21000	[9900]	0.3	[75]	52	[1300]	32	[800]	60	[1500]	4	4	7	15	23	28	16	8	MYLAR FILM LINER
SA-150A	B-WING PENTHOUSE	AHU-150 OUTLET	RECTANGULAR	16000	[7600]	0.3	[75]	52	[1300]	36	[900]	36	[900]	5	5	11	17	16	16	12	6	MYLAR FILM LINER
SA-150B	B-WING PENTHOUSE	AHU-150 INLET	RECTANGULAR	12000	[5700]	0.3	[75]	30	[750]	50	[1300]	60	[1500]	6	8	17	20	24	26	16	8	MYLAR FILM LINER

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Kahler Slater Project No.
211033.00

Drawing Title
SCHEDULES

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date
DECEMBER 3, 2012

Checked
WS

Drawn
RA

Project Number
607-394

Building Number
1

Drawing Number
MM-601

Dwg. 61 of 118

Office of Construction and Facilities Management

VA FORM 08-6231

STEAM UNIT HEATER SCHEDULE

MARK	LOCATION	AREA SERVED	TYPE UNIT	AIR FLOW		EAT		MIN CAPACITY		STEAM						TRAP		CONTROL SEQUENCE	MOTOR					REMARKS
										PRESS ENT VALVE		PRESS ENT HEATER		FLOW					NOMINAL POWER		PHASE	VOLT	RPM	
				CFM	[L/s]	°F	[°C]	BTUH	[W]	PSIG	[kPa]	PSIG	[kPa]	LBS/HR	[kg/HR]	LBS/HR	[kg/HR]		HP	[W]				
SUH-9A1	A-WING PENTHOUSE	A-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9A2	A-WING PENTHOUSE	A-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9A3	A-WING PENTHOUSE	A-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9A4	A-WING PENTHOUSE	A-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9B1	B-WING PENTHOUSE	B-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9B2	B-WING PENTHOUSE	B-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9B3	B-WING PENTHOUSE	B-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	
SUH-9B4	B-WING PENTHOUSE	B-WING PENTHOUSE	HORIZONTAL	1900	[900]	60	[16]	120	[35]	7	[48]	5	[35]	122	[55]		[ ]	DETAIL 4/MM504	0.33	[250]	1	120	1140	

AIR DEVICE SCHEDULE (SUPPLY)

MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANEL/FRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX												
		CFM	[L/s]	CFM	[L/s]	IN WG	[Pa]		IN x IN	[mm x mm]	IN	[mm]				
SG-1	ASPD	0	[ ]	100	[47]	0.200	[50]	LAY-IN	24x24		6		20	NO	ALUM	"PRICE"
SG-2	ASPD	101	[48]	250	[120]	0.200	[50]	LAY-IN	24x24		8		20	NO	ALUM	"PRICE"
SG-3	ASPD	251	[120]	400	[190]	0.200	[50]	LAY-IN	24x24		10		20	NO	ALUM	"PRICE"
SG-4	ASPD	401	[190]	550	[260]	0.200	[50]	LAY-IN	24x24		12		20	NO	ALUM	"PRICE"
SG-5	ASPD	551	[260]	750	[350]	0.200	[50]	LAY-IN	24x24		14		20	NO	ALUM	"PRICE"
SG-6	620	0	[ ]	200	[94]	0.200	[50]	FLANGE	8x6		8x6		20	NO	ALUM	"PRICE"
SG-7	620	201	[95]	400	[190]	0.200	[50]	FLANGE	10x8		10x8		20	NO	ALUM	"PRICE"
SG-8	ASPD	101	[48]	250	[120]	0.200	[50]	FLANGE	24x24		8		20	NO	ALUM	"PRICE"

NOTES

2. INSTALL MAUAL VOLUME DAMPERS IN BRANCH DUCTS TO ALL GRILLES - SEE DETAIL FOR DAMPER IN BRANCH DUCT SERVING EACH DIFFUSER.
3. PROVIDE SQUARE TO ROUND ADAPTER.

AIR DEVICE SCHEDULE (RETURN)

MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANEL/FRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX												
		CFM	[L/s]	CFM	[L/s]	IN WG	[Pa]		IN x IN	[mm x mm]	IN x IN	[mm x mm]				
RG-1	635	0	[ ]	300	[140]	0.200	50.000	LAY-IN	24x6		24x6		20	NO	ALUM	"PRICE"
RG-2	635	301	[140]	600	[280]	0.200	50.000	LAY-IN	24x12		24x12		20	NO	ALUM	"PRICE"
RG-3	635	601	[280]	1500	[710]	0.200	50.000	LAY-IN	24X24		22X22		20	NO	ALUM	"PRICE"
RG-4	630	0	[ ]	200	[94]	0.200	50.000	FLANGE	8x6		8x6		20	NO	ALUM	"PRICE"

NOTE

1. INSTALL MAUAL VOLUME DAMPERS IN BRANCH DUCTS TO ALL GRILLES - SEE DETAIL FOR DAMPER IN BRANCH DUCT SERVING EACH DIFFUSER.

AIR DEVICE SCHEDULE (EXHAUST)

MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANEL/FRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX												
		CFM	[L/s]	CFM	[L/s]	IN WG	[Pa]		IN x IN	[mm x mm]	IN x IN	[mm x mm]				
EG-1	635	0	[ ]	300	[140]	0.200	50.000	SURFACE	12x12		12x12		20	NO	ALUM	"PRICE"
EG-2	635	301	[140]	600	[280]	0.200	50.000	LAY-IN	24x12		24x12		20	NO	ALUM	"PRICE"
EG-3	635	601	[280]	1500	[710]	0.200	50.000	LAY-IN	24x24		24x24		20	NO	ALUM	"PRICE"
EG-4	630	1501	[710]	2000	[940]	0.200	50.000	LAY-IN	24x24		24x24		30	NO	ALUM	"PRICE"
EG-5	635	200	[94]	200	[94]	0.200	50.000	SURFACE	12X6		12X6		20	NO	ALUM	"PRICE"

NOTE

1. INSTALL MANUAL VOLUME DAMPERS IN BRANCH DUCTS TO ALL GRILLES - SEE DETAIL FOR DAMPER IN BRANCH DUCT SERVING EACH DIFFUSER.
2. PROVIDE SQUARE TO ROUND ADAPTER.

AIR DEVICE SCHEDULE (TRANSFER)

MARK	TYPE	AIR FLOW				MAX APD		MOUNTING	PANEL/FRAME SIZE		NECK SIZE		NC	DAMPER	FINISH	REMARKS
		MIN		MAX												
		CFM	[L/s]	CFM	[L/s]	IN WG	[Pa]		IN x IN	[mm x mm]	IN x IN	[mm x mm]				
TG-1	635	0	[ ]	200	[94]	0.100	25.000	SURFACE	12x12		12X12		20	NO	ALUM	"PRICE"
TG-2	635	201	[95]	500	[240]	0.100	25.000	LAY-IN	24x12		24x12		20	NO	ALUM	"PRICE"
TG-3	635	501	[240]	1000	[470]	0.100	25.000	LAY-IN	24x24		24x24		20	NO	ALUM	"PRICE"
TG-4	635	300	[140]	600	[280]	0.100	25.000	FLANGE	18X18		18X18		20	NO	ALUM	"PRICE"

DDC POINT CHARTS

Wm. S. Middleton VA Hospital

Consolidate ICU, 8th Floor

	INPUTS								OUTPUTS								SW.		SYSTEM FEATURES														
	ANALOG					DIGITAL			ANALOG			DIGITAL					PTS.		ALARMS			MISCELLANEOUS										
	TEMPERATURE	RELATIVE HUMIDITY	PRESSURE	CARBON DIOXIDE/VOCs	FLOW	SETPOINT ADJUST	OTHER	STATUS	ALARM	OVERRIDE	OTHER	OTHER	ELECTRIC MODULATING	OTHER	OTHER	ENABLE/DISABLE	START/STOP	OPEN/CLOSE	ON/OFF	OTHER	ANALOG	DIGITAL	HIGH ANALOG	LOW ANALOG	OFF NORMAL	RUNTIME	POINT HISTORY	SYSTEM GRAPHIC	KW / KWH	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER	NOTES
AIR HANDLING UNITS AHU-149 & AHU-150																												X											
(See Sequences for applicable points)																																							
Space Conditions	X	X	X			X																	X	X			X		X										
Outdoor Air	X	X			X																						X		X										
Return Air	X	X			X																		X	X			X		X										
Mixed Air	X																										X		X										
Discharge Air	X		X		X																		X	X			X		X										
Filter Differential									X																		X		X										Each Filter Bank
Isolation Smoke Dampers								X										X									X		X										
Economizer Dampers								X					X														X		X										
Relief Dampers								X					X														X		X										
Heating Coil Valve	X												X														X		X										
Heating Coil Bypass Dampers								X					X														X		X										
Cooling Coil Valve	X												X														X		X										CWS-T & CWR-T
Supply Fan Array with VFDs					X			X	X				X				X								X	X	X		X										Each VFD
Return Relief Fan Array with VFDs					X			X	X				X				X								X	X	X		X										Each VFD
Low Limit Thermostat									X																		X		X										
Fan Static Pressure Safeties									X													X					X		X										
Fire Alarm Shutdown																						X					X		X										
Minimum Outside Air Flow Setpoint						X															X						X		X										
Run Mode																						X					X		X										
Service-Off Mode											X											X					X		X										
Economizer Mode																						X					X		X										
Discharge Air Temperature Setpoint						X															X						X		X										
Duct Static Pressure Setpoint			X			X															X						X		X										
Return Volume Matching Setpoint						X															X						X		X										
STEAM HUMIDIFIERS																																							
Humidifier Control Signal																X		X									X		X										
Return Air Humidity Sensor		X																									X		X										
Duct Mounted High Limit Humidity Sensor		X																					X				X		X										
Modulating Steam Valve													X														X		X										
Airflow Interlocks								X																			X		X										
Retun Air Humidity Setpoints						X															X						X		X										
EXHAUST FANS																																							
Typical of all Except EF-8B1 & EF-8B3								X	X								X								X	X	X		X										
EF-8B1 & EF-8B3 with VFDs								X	X				X				X								X	X	X		X										Each VFD
ISOLATION ROOMS																																							
Room Pressure			X					X									X								X	X	X		X										
DUCT MOUNT ZONE REHEAT COILS																																							
(See Sequences/Drwgs. for applicable points)																																							
Room Air	X																						X	X			X		X										
Reheat Coil Valve													X														X		X										
Room Air Temperature Setpoint						X															X						X		X										
SA-VAV/RA-VAV BOXES																																							
(See Sequences/Drwgs. for applicable points)																																							
Room Air	X																						X	X			X		X										
Discharge Air	X			X																			X	X			X		X										
Damper													X														X		X										
Reheat Coil Valve													X														X		X										
Room Air Temperature Setpoint						X															X						X		X										
CABINET UNIT HEATERS AND UNIT HEATERS																																							
Room Air	X																										X		X										
Control Valve													X														X		X										
Unit Fan								X		X							X								X	X	X		X										Aquastat Input
FIRE ALARM INTERFACE																																							
Fire Alarm Control Relays (Each)									X																		X		X										
SYSTEM MONITORING																																							
Supply and Return Water Temperatures	X																										X		X										
Water Flow Rates				X																							X		X										
Steam Flow Rates				X																							X		X										
FIRE/SMOKE DAMPERS																													X										
Fire/Smoke Damper								X										X									X		X										
MISCELLANEOUS MONITORING																																							
All VFD's								X	X				X												X	X			X										Integrate at ECC
Lighting Control System								X																	X	X			X										Integrate at ECC
Water Flow Measuring Stations				X																							X		X										
Air Flow Measuring Stations				X																							X		X										
Medical Equipment Refrigerators	X																						X	X			X		X										

Revisions:	Date

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Kahler Slater Project No.
211033.00

Drawing Title
SCHEDULES

Approved: Project Director

Project Title
WM. S. MIDDLETON MEMORIAL VETERAN'S HOSPITAL CONSOLIDATE ICUs, 8A/8B

Location
MADISON, WI

Date: DECEMBER 3, 2012
Checked: WS
Drawn: RA

Project Number
607-394

Building Number
1

Drawing Number
MM-602

Dwg. 62 of 118

Office of Construction and Facilities Management

VA FORM 08-6231

HOT WATER HEATING COIL SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	APPLICATION	AIR FLOW		MAX FACE VELOCITY		APD		TEMPERATURES				TOTAL MIN CAPACITY		HOT WATER								% GLYCOL	REMARKS
											EAT		LAT				FLOW		EWT		LWT		MAX. WPD			
					CFM	[L/s]	FPM	[M/s]	IN WG	[Pa]	°F	[°C]	°F	[°C]	MBH	[kW]	GPM	[L/s]	°F	[°C]	°F	[°C]	FT	[kPa]		
RH-8A 1	A8050	A8050, A8052	AHU-149	DUCT REHEAT	350	[170]	600	[3]	0.3	[75]	55	[13]	100	[38]	17.5	[60]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8A 2	A8048	A8048,A8044	AHU-149	DUCT REHEAT	500	[240]	600	[3]	0.3	[75]	55	[13]	100	[38]	25.0	[85]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 3	A8042	A8042,A8046	AHU-149	DUCT REHEAT	310	[150]	600	[3]	0.3	[75]	55	[13]	100	[38]	15.5	[53]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 4	A8030	A8026,A8030	AHU-149	DUCT REHEAT	550	[260]	600	[3]	0.3	[75]	55	[13]	100	[38]	27.0	[92]	2.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 5	A8024	A8020,A8022,A8024	AHU-149	DUCT REHEAT	450	[210]	600	[3]	0.3	[75]	55	[13]	100	[38]	22.5	[77]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 6	A8018	A8014,A8016,A8018	AHU-149	DUCT REHEAT	450	[210]	600	[3]	0.3	[75]	55	[13]	100	[38]	22.5	[77]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 7	A8012	A8008,A8010,A8012	AHU-149	DUCT REHEAT	525	[250]	600	[3]	0.3	[75]	55	[13]	100	[38]	26.0	[89]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 8	A8006	A8004,A8006	AHU-149	DUCT REHEAT	300	[140]	600	[3]	0.3	[75]	55	[13]	100	[38]	15.0	[51]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 9	A8002	A8002	AHU-149	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 10	A8028	A8001,A8003,A8005	AHU-149	DUCT REHEAT	450	[210]	600	[3]	0.3	[75]	55	[13]	100	[38]	22.5	[77]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 11	A8011	A8007,A80111	AHU-149	DUCT REHEAT	775	[370]	600	[3]	0.3	[75]	55	[13]	100	[38]	38.5	[130]	2.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 12	A8019	A8017	AHU-149	DUCT REHEAT	200	[94]	600	[3]	0.3	[75]	55	[13]	100	[38]	10.0	[34]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 13	A8027	A8021,A8027	AHU-149	DUCT REHEAT	550	[260]	600	[3]	0.3	[75]	55	[13]	100	[38]	27.0	[92]	2.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 14	A8029	A8029	AHU-149	DUCT REHEAT	600	[280]	600	[3]	0.3	[75]	55	[13]	100	[38]	29.5	[100]	2.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8A 15	A8037	A8037	AHU-149	DUCT REHEAT	500	[240]	600	[3]	0.3	[75]	55	[13]	100	[38]	25.0	[85]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8A 16	B8060	B8073, B8069	AHU-149	DUCT REHEAT	400	[190]	600	[3]	0.3	[75]	55	[13]	100	[38]	20.0	[68]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8A 17	B8060	B8060, B8062, B8058	AHU-149	DUCT REHEAT	810	[380]	600	[3]	0.3	[75]	55	[13]	100	[38]	40.0	[140]	2.0	[ ]	190	[88]	170	[77]	3	[9]	N/A	(1)
RH-8A 18	B8060	b8056, B8054	AHU-149	DUCT REHEAT	350	[170]	600	[3]	0.3	[75]	55	[13]	100	[38]	17.5	[60]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 1	B8046	B8046	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 2	B8044	B8044	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 3	B8040	B8040	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 4	B8038	B8038	AHU-150	DUCT REHEAT	250	[120]	600	[3]	0.3	[75]	55	[13]	100	[38]	12.5	[43]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 5	B8034	B8034	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 6	B8034	B8032	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 7	B8028	B8028	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 8	B8026	B8026	AHU-150	DUCT REHEAT	250	[120]	600	[3]	0.3	[75]	55	[13]	100	[38]	12.5	[43]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 9	B8022	B8022	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 10	B8020	B8020	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 11	B8016	B8016	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 12	B8014	B8014	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 13	B8010	B8010	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 14	B8008	BB8008	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 15	B8004	B8004	AHU-150	DUCT REHEAT	250	[120]	600	[3]	0.3	[75]	55	[13]	100	[38]	12.5	[43]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 16	B8002	B8002	AHU-150	DUCT REHEAT	250	[120]	600	[3]	0.3	[75]	55	[13]	100	[38]	12.5	[43]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8B 17	B8001	B8001	AHU-150	DUCT REHEAT	1700	[800]	600	[3]	0.3	[75]	55	[13]	100	[38]	84.0	[290]	5.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8B 18	B8005	B8005	AHU-150	DUCT REHEAT	150	[71]	600	[3]	0.3	[75]	55	[13]	100	[38]	7.5	[26]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 19	B8009	B8009	AHU-150	DUCT REHEAT	550	[260]	600	[3]	0.3	[75]	55	[13]	100	[38]	27.0	[92]	2.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
RH-8B 20	B8013	B8013	AHU-150	DUCT REHEAT	700	[330]	600	[3]	0.3	[75]	55	[13]	100	[38]	34.5	[120]	2.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 21	B8017	B8015,B8017	AHU-150	DUCT REHEAT	200	[94]	600	[3]	0.3	[75]	55	[13]	100	[38]	10.0	[34]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 22	B8021	B8019,B8027	AHU-150	DUCT REHEAT	225	[110]	600	[3]	0.3	[75]	55	[13]	100	[38]	11.0	[38]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 23	B8023	B8023,B8025, B8027,B8029	AHU-150	DUCT REHEAT	500	[240]	600	[3]	0.3	[75]	55	[13]	100	[38]	25.0	[85]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 24	B8031	B8031	AHU-150	DUCT REHEAT	450	[210]	600	[3]	0.3	[75]	55	[13]	100	[38]	22.5	[77]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 25	B8033	B8033	AHU-150	DUCT REHEAT	125	[59]	600	[3]	0.3	[75]	55	[13]	100	[38]	6.0	[20]	0.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 26	B8037	B8037,B8052	AHU-150	DUCT REHEAT	700	[330]	600	[3]	0.3	[75]	55	[13]	100	[38]	34.5	[120]	2.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 27	B8041	B8041	AHU-150	DUCT REHEAT	500	[240]	600	[3]	0.3	[75]	55	[13]	100	[38]	25.0	[85]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 28	B8043	B8043,B8045, B8047,B8049,B8051	AHU-150	DUCT REHEAT	825	[390]	600	[3]	0.3	[75]	55	[13]	100	[38]	41.0	[140]	2.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 29	B8055	B8053,8055	AHU-150	DUCT REHEAT	250	[120]	600	[3]	0.3	[75]	55	[13]	100	[38]	12.5	[43]	1.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	
RH-8B 30	B8057	B8057,B8059B,B8061, B8063	AHU-150	DUCT REHEAT	500	[240]	600	[3]	0.3	[75]	55	[13]	100	[38]	25.0	[85]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
TAB-8D 18	D8030	D8030	AHU-146	VAV REHEAT	675	[320]	600	[3]	0.3	[75]	55	[13]	100	[38]	33.5	[110]	2.0	[ ]	190	[88]	160	[71]	3	[9]	N/A	(1)
TAB-8D 19	D8029	D8029, D8028	AHU-146	VAV REHEAT	425	[200]	425	[2]	0.3	[75]	55	[13]	100	[38]	21.0	[72]	1.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	
TAB-8D 20	D8015 ANTE	D8015, ANTE	AHU-146	VAV REHEAT	900	[420]	900	[5]	0.3	[75]	55	[13]	100	[38]	44.5	[150]	2.5	[ ]	190	[88]	160	[71]	3	[9]	N/A	

(1) THREE-WAY VALVE

Revisions: Date

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Kahler Slater Project No. 211033.00

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Approved: Project Director

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Location: MADISON, WI

Date: DECEMBER 3, 2012 | Checked: WS | Drawn: RA

Project Number: 607-394

Building Number: 1

Drawing Number: MM-603

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Office of Construction and Facilities Management

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