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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)
- LC — LEVEL CONTROLLER
- LT — LEVEL TRANSMITTER
- SST — START/STOP

TERMINAL UNIT SYMBOLS

- CONVECTOR OR RADIATOR (RECESSED)
- HOT WATER REHEAT COIL

CONTROLS SYMBOLS

- 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

DUCTWORK SYMBOLS

- F/S — COMBINATION FIRE/SMOKE DAMPER
- 2 / 4 / 1/2 — 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
- MANUAL SPLITTER DAMPER
- 45° SUPPLY — STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)
- 45° RETURN
- DUCT MOUNTED COIL (HOT WATER OR STEAM COIL)

DUCTWORK SYMBOLS

- 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
- LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
- FLEXIBLE DUCTWORK (INSULATED)
- DUCT WITH SOUND LINING
- MANUAL VOLUME DAMPER
- FD — FIRE DAMPER
- BDD — BACK DRAFT DAMPER

DUCTWORK SYMBOLS

- UP / DN — SUPPLY DUCT (UP & DOWN)
- UP / DN — EXHAUST DUCT (UP & DOWN)
- UP / DN — RETURN DUCT (UP & DOWN)
- 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
- LIMIT OF DEMOLITION

CONTROLS SYMBOLS

- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- EPT — ELECTRONIC TO PNEUMATIC TRANSDUCER
- AT CO2 — CARBON DIOXIDE TRANSMITTER
- 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
- KC — TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
- DPM — DIFFERENTIAL PRESSURE MONITOR
- DIFFERENTIAL PRESSURE SENSING DEVICE

AIR TERMINAL SYMBOLS

- OR — TERMINAL UNIT WITH REHEAT COIL
- FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL.
- VENTURI AIR FLOW CONTROL VALVE (AFCV)

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–1–1 — BUILDING NO. WHERE EQUIPMENT IS LOCATED; ITEM (TERMINAL UNIT SHOWN); ITEM NUMBER (TERMINAL UNIT NO. 1); SERVED BY AIR HANDLER UNIT NO. 1

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
- GHS — GLYCOL–WATER HEATING SUPPLY
- GHR — GLYCOL–WATER HEATING RETURN
- CWS — CONDENSER WATER SUPPLY
- CWR — CONDENSER WATER RETURN
- CHS OR CHWS — CHILLED WATER SUPPLY
- CHR OR CHWR — CHILLED WATER RETURN
- GCS — CHILLED GLYCOL–WATER SUPPLY
- GCR — CHILLED GLYCOL–WATER RETURN
- MW — MAKE–UP WATER
- EXISTING PIPE TO BE REMOVED
- EXISTING PIPE

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

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) AND CAP W/ CHAIN
- WYE STRAINER WITH VALVED DRAIN AND QUICK–COUPLE HOSE CONNECTOR AND CAP W/ CHAIN
- FLEXIBLE CONNECTION
- ANGLE GLOBE VALVE
- OR — BUTTERFLY VALVE
- OR — BALL VALVE
- ISOLATION/SHUTOFF VALVE – SEE SPECS FOR VALVE TYPE
- 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
- OR — 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

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CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906–475–6616
FAX: 906–475–6954
NDW PROJECT NUMBER: 1211

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ABBREVIATIONS

A/E	ARCHITECT / ENGINEER
AAHX	AIR TO AIR HEAT EXCHANGER
AB	AIR BLENDER
AAV	AUTOMATIC AIR VENT
ACC	AIR COOLED CONDENSER
ACCH	AIR COOLED CHILLER
ACCU	AIR–COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
ACD	AUTOMATIC CONTROL DAMPER,MODULATING
ACDTP	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
AFW	AIR FOIL WHEEL (FAN)
AHU	AIR–HANDLING UNIT
AMP	AMPERGE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AW	AIR WASHER
AXF	AXIAL FLOW
B	BOILER
BD	BUTTERFLY DAMPER
BDD	BACKDRAFT DAMPER
BDR	BASE BOARD RADIATOR
BFP	BACKFLOW PREVENTER
BFT	BOILER PLANT FIRE TUBE
BG	BOTTOM GRILLE
BHP	BRAKE HORSEPOWER
BHW	HOT WATER HEATING BOILER
BHX	BOILER BLOWDOWN HEAT EXCHANGER
BIW	BACKWARD INCLINED WHEEL (FAN)
BMT	BONE MARROW TRANSPLANT
BR	BOTTOM REGISTER
BSC	BIOLOGICAL SAFETY CABINETS
BT	BLOWOFF TANK
BTC	BLOWOFF TANK CONTROL VALVE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BWT	BOILER PLANT WATER TUBE
C	CENTIGRADE (CELCIUS)
CC	COOLING COIL
CCD	COOLING COIL CONDENSATE DRAIN
CD	CEILING DIFFUSER
CD–1	CONSTRUCTION DOCUMENTS (SUBMISSION1)
CD–2	CONSTRUCTION DOCUMENTS (SUBMISSION2)
CENT	CENTRIFICAL
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CFT	CUBIC FEET
CFP	CHEMICAL FEED PUMP
CG	CEILING GRILLE
CH	CHILLER
CHP	CHILLED WATER PUMP
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 DIOXODE
COMP	COMPRESSOR UNIT
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CS	CONDENSATE STORAGE TANK
CSG	CLEAN STEAM GENERATOR
CT	COOLING TOWER
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	COLD WATER (POTABLE)
CWCC	CHILLED WATER COOLING COIL
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN (TO COOLING TOWER)
CWS	CONDENSER WATER SUPPLY (FROM COOLING TOWER)
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
DIW	DEIONIZED WATER
DP	DEW POINT TEMPERATURE
DP	DIFFUSER PLATE
DPA	DIFFERENTIAL PRESSURE ASSEMBLY
DPS	DIFFERENTIAL PRESSURE SENSOR
DX	DIRECT EXPANSION
DXCC	DIRECT EXPANSION COOLING COIL
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	EVAPORATIVE COOLER
ECC	ENGINEERING CONTROL CENTER
ECU	EVAPORATIVE CONDENSER UNIT
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EGS	EMERGENCY GAS SHUTOFF
EGT	ENTERING GLYCOL TEMPERATURE
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EMD	END OF MAIN DRIP (STEAM)
ENT	ENTERING
ER	EXHAUST REGISTER
ERC	ELECTRIC REHEAT COIL
ERP	ELECTRIC RADIANT PANEL
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ETO	ETHYLENE OXIDE
EUH	ELECTRIC UNIT HEATER
EWC	EVAPORATIVE WATER COOLER
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
FCU	FAN COIL UNIT (4 PIPE)
FCUC	FAN COIL UNIT COOLING ONLY
FCUH	FAN COIL UNIT HEATING ONLY
FCW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FHX	FLUE GAS/FEEDWATER HEAT EXCHANGER
FM	FLOW METER
FOP	FUEL OIL PUMP
FOT	FUEL OIL TANK
FOHX	FUEL OIL HEAT EXCHANGER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FPTU	FAN POWERED TERMINAL UNIT
FR	FLOOR REGISTER
FRP	FIBER REINFORCED POLYESTER
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
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GP	GALLONS PER MINUTE
GPR	GAS PRESSURE REGULATOR
GS	GALVANIZED STEEL
GWR	GLYCOL WATER RETURN
GWS	GLYCOL WATER SUPPLY
H	HUMIDIFER
H&CW	HOT & COLD WATER
HAC	HOUSEKEEPING AID CLOSET
HB	HOSE BIBB
HC	HEATING COIL
HD	HEAD
HD	HOOD
HOA	HAND/OFF/AUTOMATIC
HP	HEAT PUMP
HP	HORSEPOWER
HPC	HEAT PUMP CHILLER
HPDT	HIGH PRESSURE DRIP TRAP
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HRC	HEAT RECOVERY COIL
HRD	HEAT RECOVERY DEVICE
HRP	HYDRONIC RADIANT (CEILING) PANEL
HRW	HEAT RECOVERY WHEEL
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
HWP	HEATING HOT WATER PUMP
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWUH	HOT WATER UNIT HEATER
HVD	HOISTWAY VENT DAMPER
HX	HEAT EXCHANGER
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
IRH	INTRARED HEATER
IS	INSECT SCREEN
IU	INDUCTION UNIT
IV	INLET VANES
J	INTENTIALLY LEFT BLANK
kg	KILOGRAM
kg/HR	KILOGRAM PER HOUR
kPa	KILOPASCAL
kW	KILOWATT
kWh	KILOWATT HOUR
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)
LGT	LEAVING GLYCOL TEMPERATURE
LH	LATENT HEAT
LPG	LIQUID PROPANE GAS
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
LLHX	LIQUID TO LIQUID HEAT EXCHANGER
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
MH	MANHOLE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE STEAM
MRI	MAGNETIC RESONANCE IMAGING
MTD	MEAN TEMPERATURE DIFFERENCE
MVD	MANUAL VOLUME DAMPER
MZ	MULTI–ZONE
NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NGFM	NATURAL GAS FLOWMETER
NO	NORMALLY OPEN
NOAA	NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM	NOMINAL
NPLV	NON–STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAG	OUTSIDE AIR GRILLE
OAI	OUTSIDE AIR INTAKE
OD	OUTSIDE DIAMETER
OFM	OIL FLOWMETER
OR	OPERATING ROOM
P	PUMP
PA	PASCAL
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PEF	PROPELLER (TYPE) EXHAUST FAN
PF	PRE–FILTER
PG	PRESSURE GAGE
PGW	PROPYLENE GLYCOL–WATER (SOLUTION)
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
PTAC	PACKAGED TERMINAL AIR CONDITIONER
R/E	RETURN OR EXHAUST
RA	RETURN AIR
RAD	REFRIGERANT AIR DRYER
RAF	RADIO FREQUENCY
RAHX	ROTARY AIR HEAT EXCHANGER
RAT	RETURN AIR TEMPERATURE
RCCH	REMOTE CONDENSER CHILLER
RCU	RECIPROCATING CHILLER UNIT
RD	REFRIGERANT DISCHARGE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RF	RETURN FAN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RL	REFRIGERANT LIQUID LINE
RLA	RUN LOAD AMPERE
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RS	REFRIGERANT SUCTION
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
SCI	SPINAL CODE INJURY
SCR	SILICON CONTROLLED RECTIFIER
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
SF	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
SSHX	STEAM TO STEAM HEAT EXCHANGER
SSR	SOLID SEPARATOR
ST	STEAM TRAP
SUH	STEAM UNIT HEATER
SV	STEAM PRESSURE REDUCING VALVE
SVS	STEAM VENT SILENCER
SWHX	STEAM TO WATER HEAT EXCHANGER
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
TU	TERMINAL UNIT
TWU	THRU–WALL UNIT
UC	UNDER CUT
UC	UNIT COOLER
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
URV	UPBLAST UNIT VENTILATOR
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
VIV	VARIABLE INLET VANES
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
VSD	VARIABLE SPEED DRIVE
VUH	VERTICAL UNIT HEATER
W	WATTS
WAG	WASTE ANETHESIA GAS
Wb	WET–BULB (TEMPERATURE)
WC	WATER COOLED
WCCH	WATER COOLED CHILLER
WCCU	WATER COOLED CONDENSING UNIT
WCHP	WATER COOLED HEAT PUMPS
WCPU	WATER COOLED PACKAGED UNIT
WEF	WALL EXHAUST FAN
WF	WATER FILTER
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAGE
WPD	WATER SIDE PRESSURE DROP
YR	YEAR
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
TU	TERMINAL UNIT
TWU	THRU–WALL UNIT

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. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
9. SEE ARCHITECTURAL SHEET A002 LIFE SAFETY PLAN FOR FIRE/SMOKE WALL TYPES.

Revisions:	Date
75% Construction Documents	10/03/2013

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: MECHANICAL NOTES AND ABBREVIATIONS

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: M002

Dwg. 61 of 107

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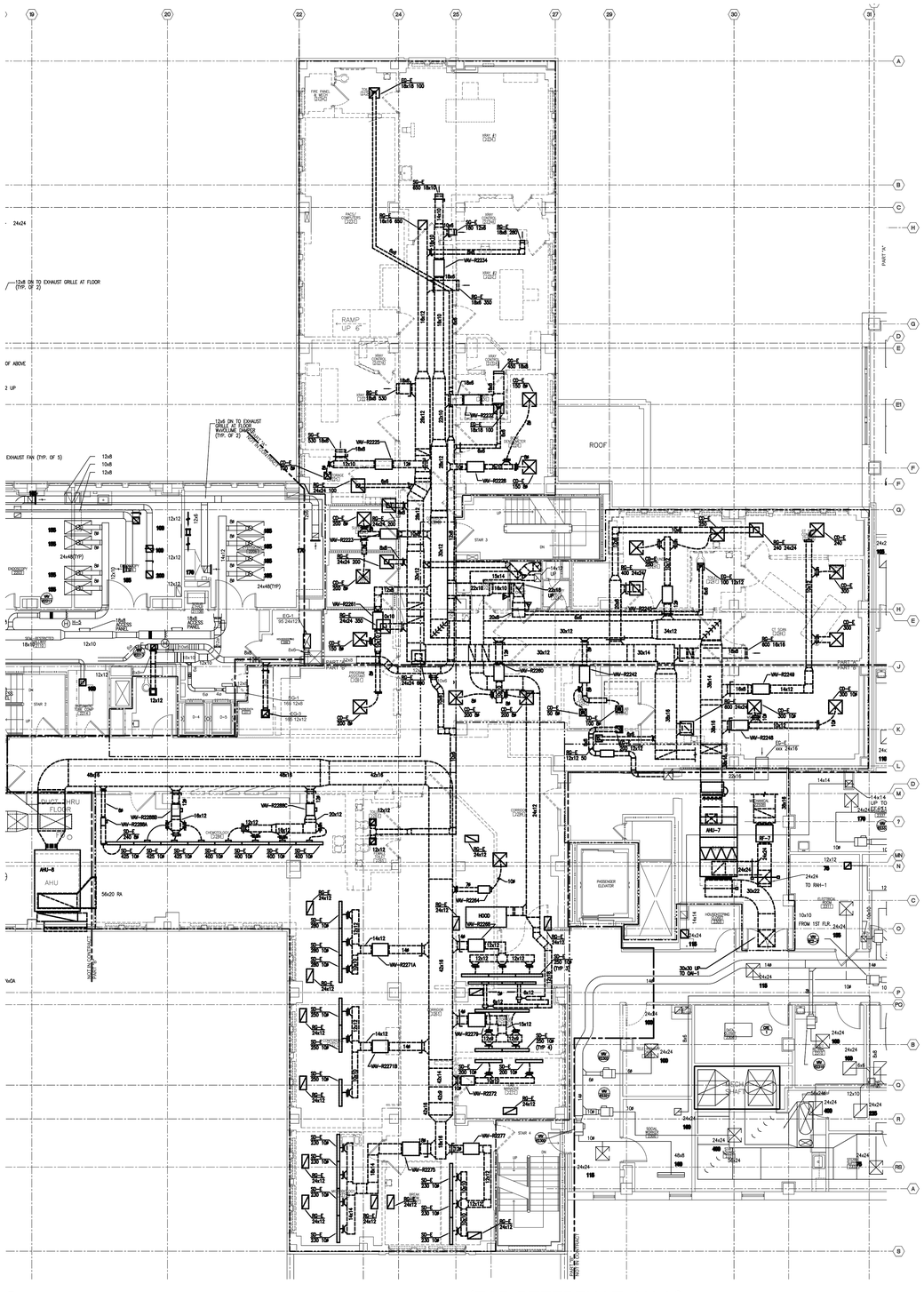
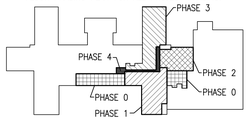


1 2ND FLOOR DUCTWORK DEMO PLAN - OVERALL (FOR REFERENCE ONLY)

1/8" = 1'-0"

NORTH

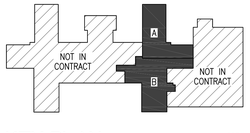
PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE

NORTH



KEY PLAN

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NORTH

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Revisions:	Date

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MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR DUCTWORK DEMO PLAN - OVERALL (FOR REFERENCE ONLY)

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MD101

Dwg. 62 of 107

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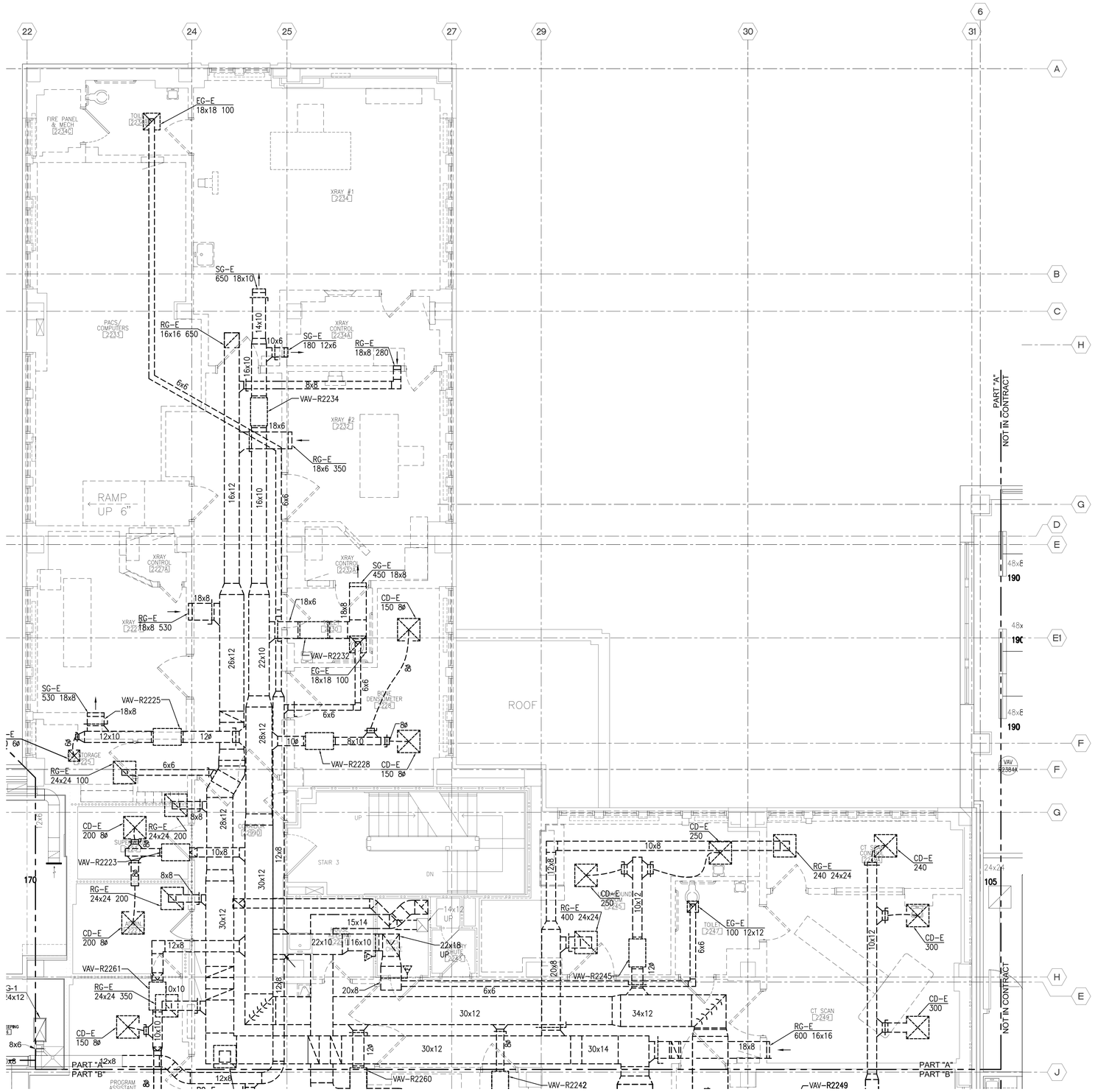

1 2ND FLOOR DUCTWORK DEMO PLAN - PART A

1/4" = 1'-0"

PHASING NOTE:
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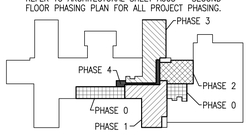

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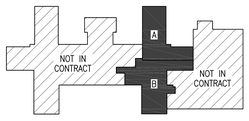

KEY PLAN

NOT TO SCALE

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CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR DUCTWORK DEMO PLAN - PART A	Project Title: EXPAND IMAGING		Project Number: 585-12-112
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN		Building Number: 1
	Date: 10/03/2013	Checked: JAU	Drawing Number: MD102
		Drawn: DLK	Dwg. 63 of 107

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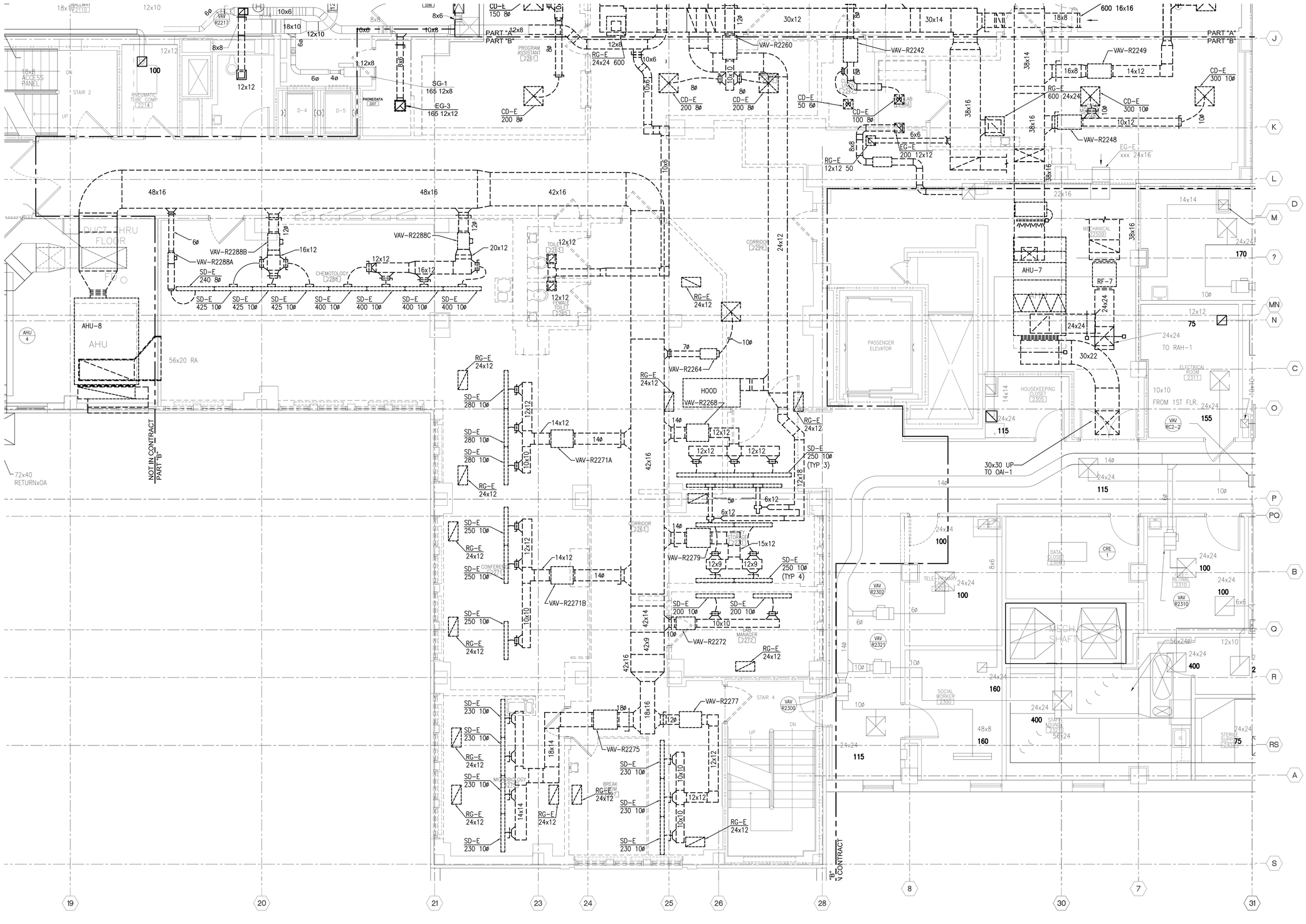
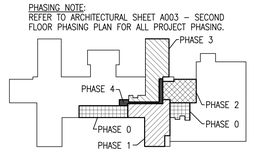


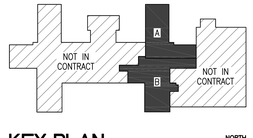
1 2ND FLOOR DUCTWORK DEMO PLAN - PART B

1/4" = 1'-0"



PHASING KEY PLAN

NOT TO SCALE



KEY PLAN

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CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR DUCTWORK DEMO PLAN - PART B

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MD103

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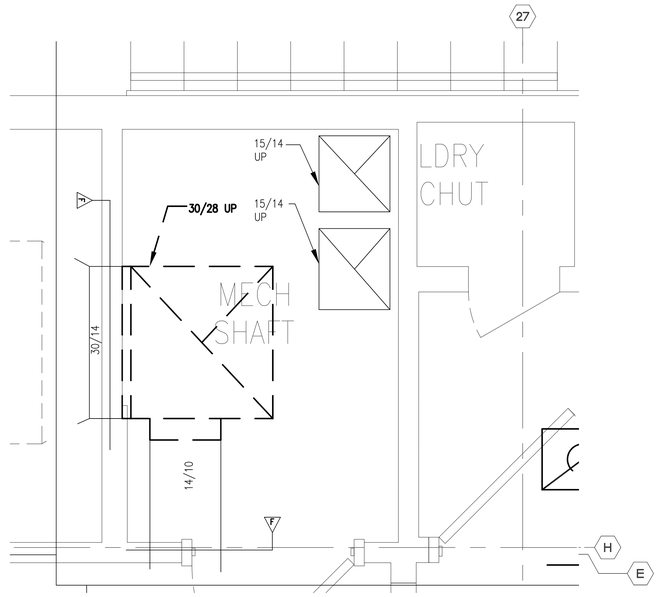
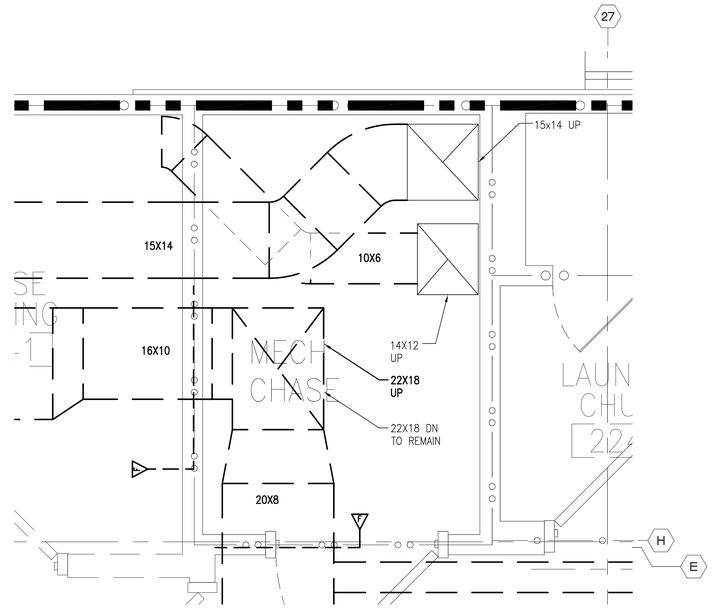
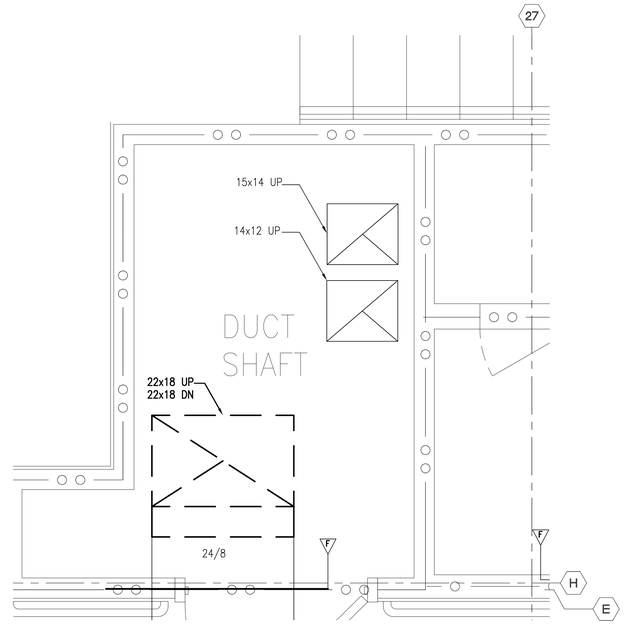


1 4TH FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"



1 2ND FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"



1 3RD FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"

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CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: ERV-2 EXHAUST RISER DUCTWORK DEMO

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MD104

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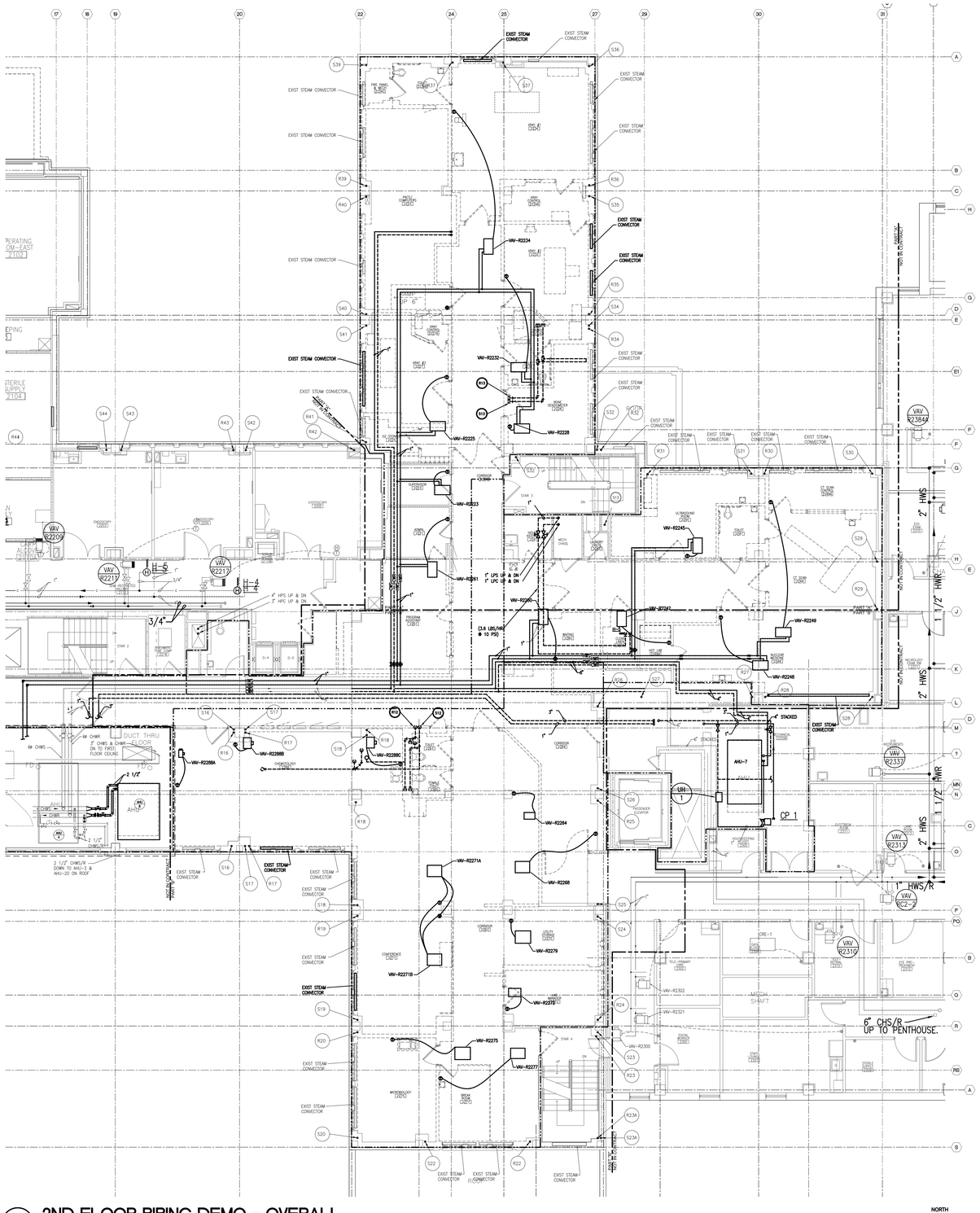
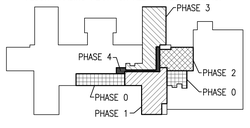


1 2ND FLOOR PIPING DEMO - OVERALL

1/8" = 1'-0"

NORTH

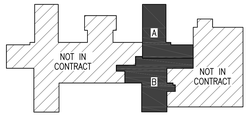
PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE

NORTH



KEY PLAN

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NORTH

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CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING DEMO - OVERALL (FOR REFERENCE ONLY)

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MD105

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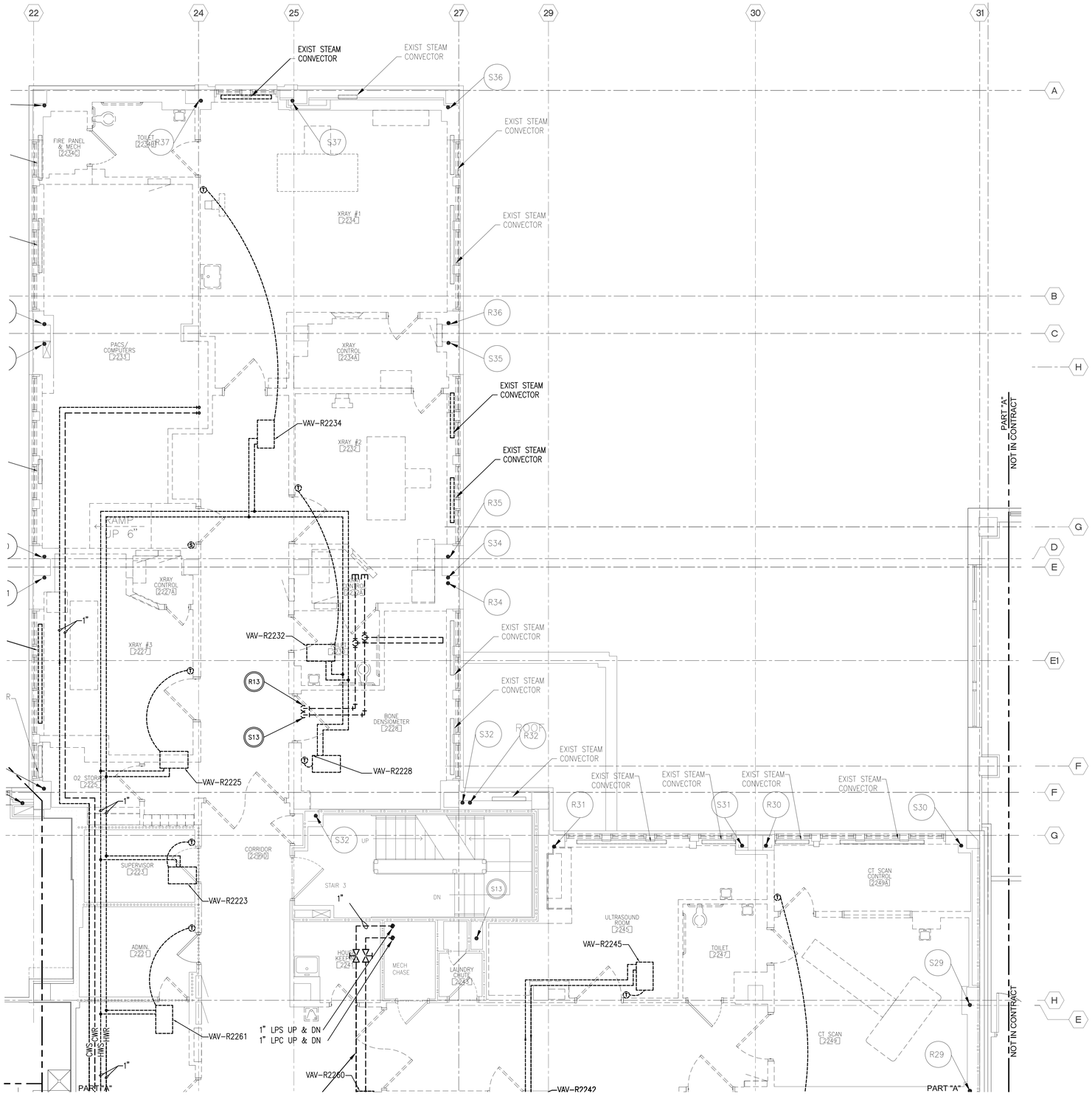
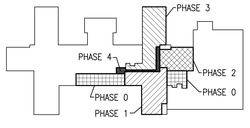


1 2ND FLOOR PIPING DEMO - PART A

1/4" = 1'-0"

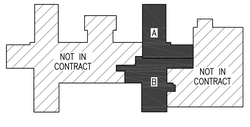
PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE

NORTH



KEY PLAN

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Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5640 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING DEMO - PART A

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MD106

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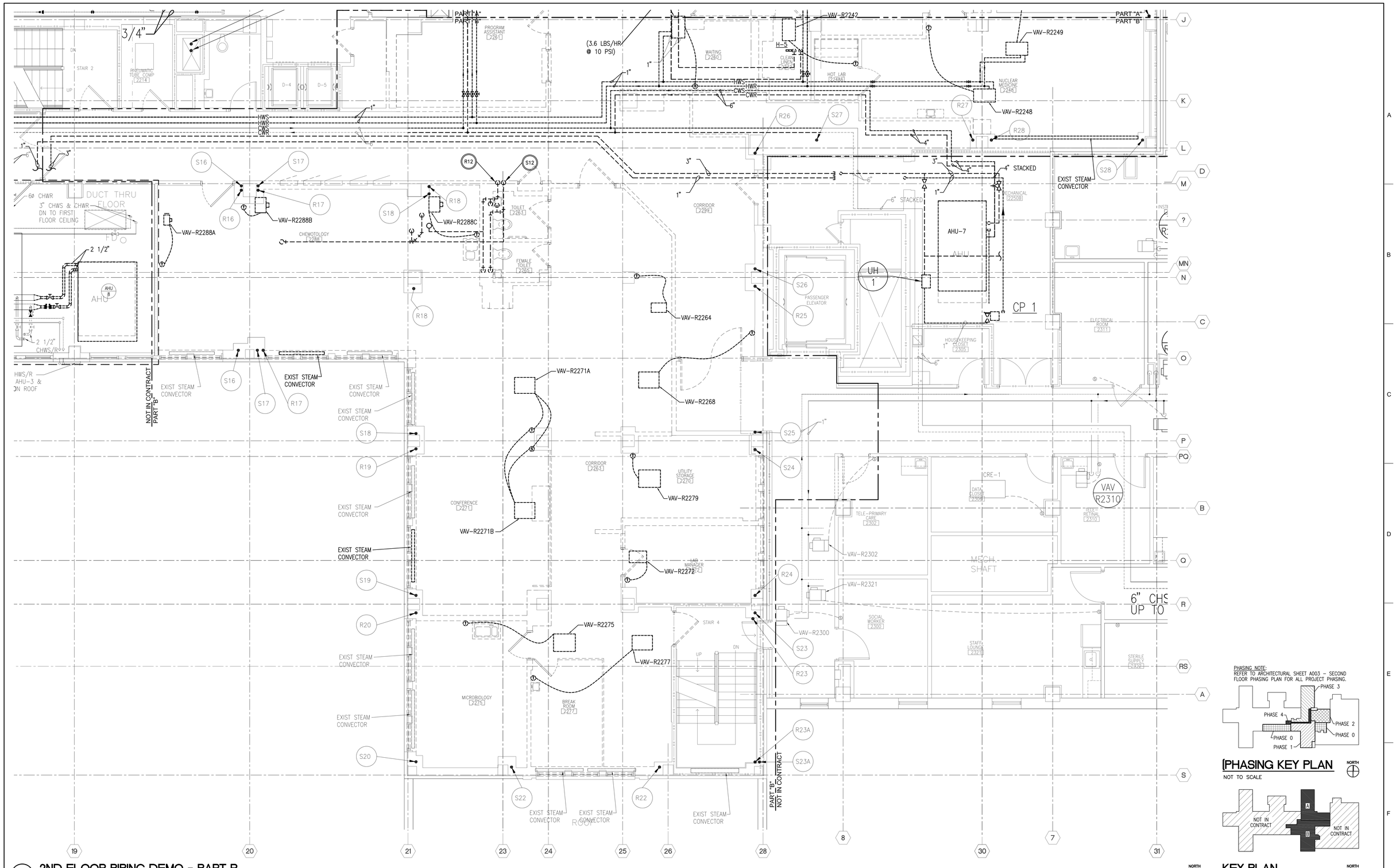

1 2ND FLOOR PIPING DEMO - PART B

1/4" = 1'-0"

PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.

PHASING KEY PLAN

NOT TO SCALE

KEY PLAN

NOT TO SCALE

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Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: 1108.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING DEMO - PART B	Project Title: EXPAND IMAGING		Project Number: 585-12-112
			Building Number: 1
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN		Drawing Number: MD107
	Date: 10/03/2013	Checked: JAU	Drawn: DLK
			Dwg. 68 of 107

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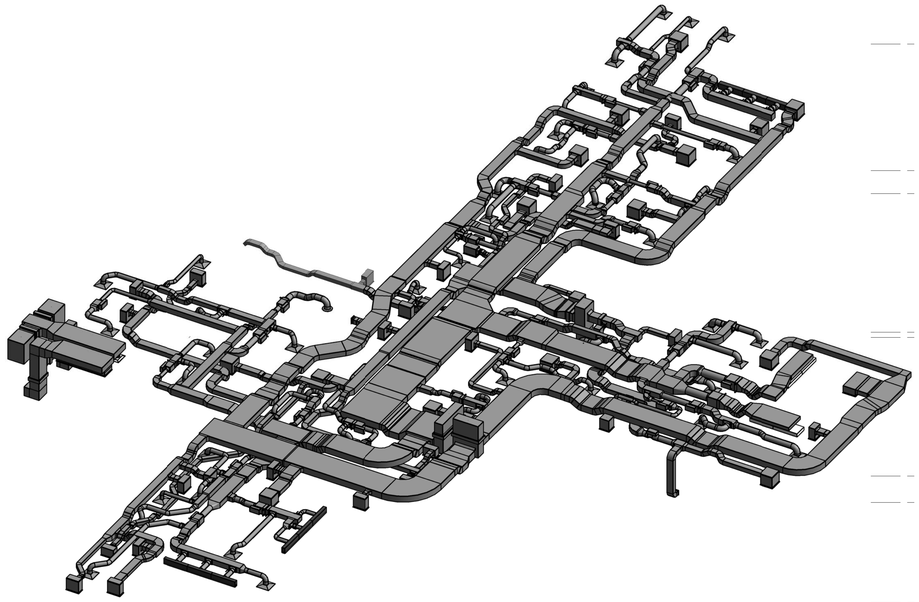
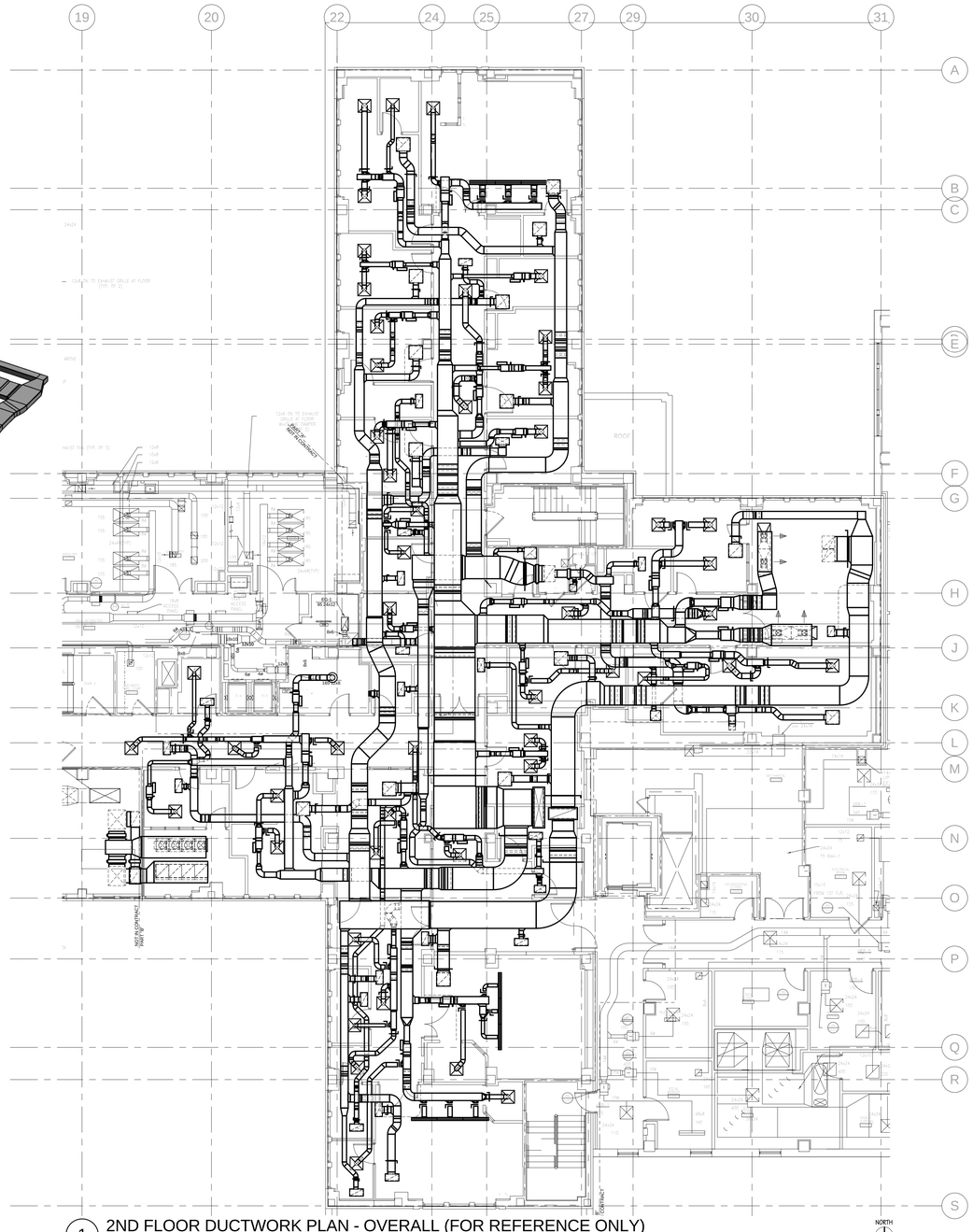
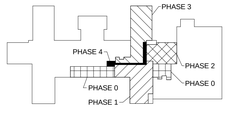


2 THREE DIMENSIONAL MECHANICAL DUCTWORK PLAN (FOR REFERENCE ONLY)

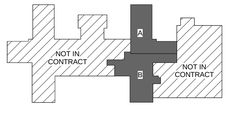


1 2ND FLOOR DUCTWORK PLAN - OVERALL (FOR REFERENCE ONLY)
1/8" = 1'-0"

PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN
NOT TO SCALE



KEY PLAN
NOT TO SCALE

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

Revisions:	Date
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ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR DUCWORK PLAN - OVERALL (FOR REFERENCE ONLY)

Project Title: EXPAND IMAGING

Project Number: 585-12-112

Building Number: 1

Approved: Project Director

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/13 | Checked: JAU | Drawn: DLK

Drawing Number: MH101
Dwg. 69 of 107

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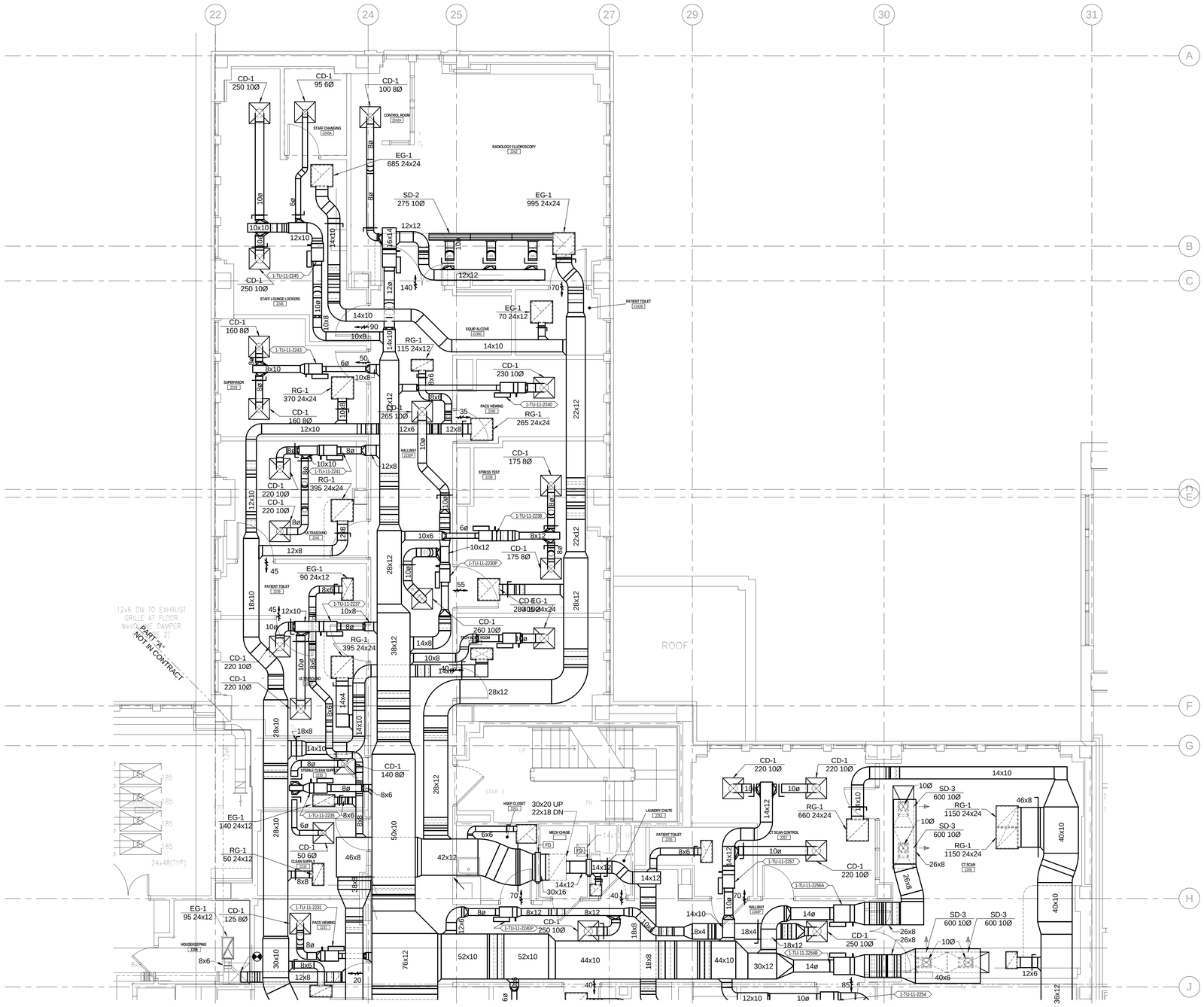
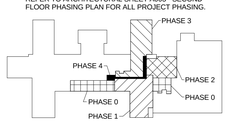


1 2ND FLOOR MECHANICAL DUCTWORK - PART A

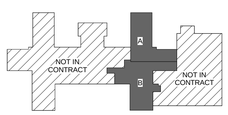
1/4" = 1'-0"

PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE



KEY PLAN

NOT TO SCALE

CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5666 | www.mepassociates.com
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NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

75% Construction Documents	10/03/2013
Revisions:	Date

Drawing Title: 2ND FLOOR DUCTOWRK PLAN - PART A

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/13 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MH102

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Office of Construction and Facilities Management

Department of Veterans Affairs

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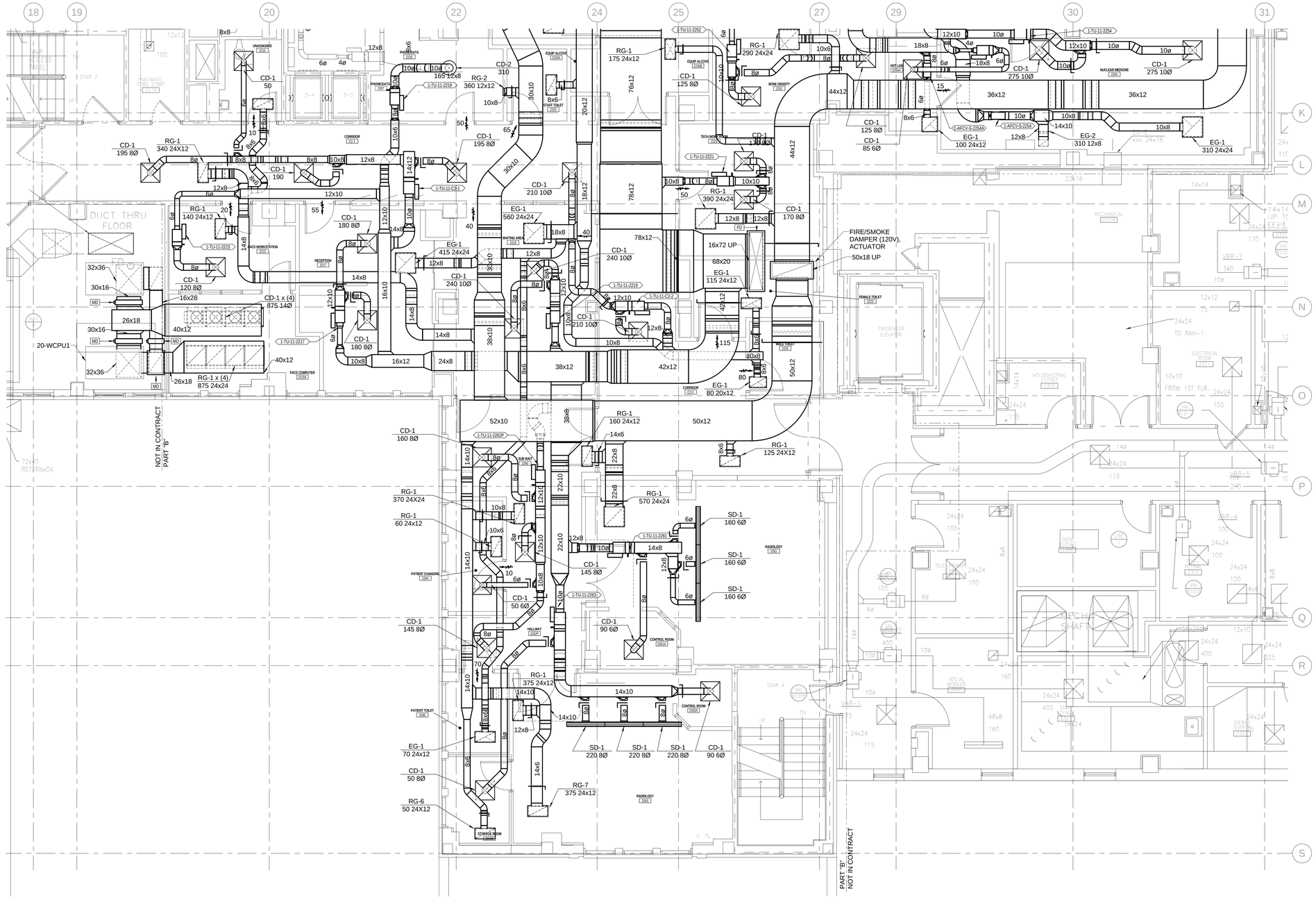
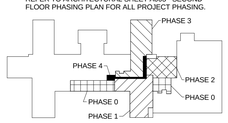


1 2ND FLOOR DUCTWORK PLAN - PART B

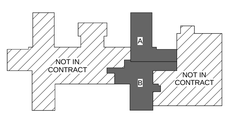
1/4" = 1'-0"

PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE



KEY PLAN

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Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC

engineers | consultants | commissioning

MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5480 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

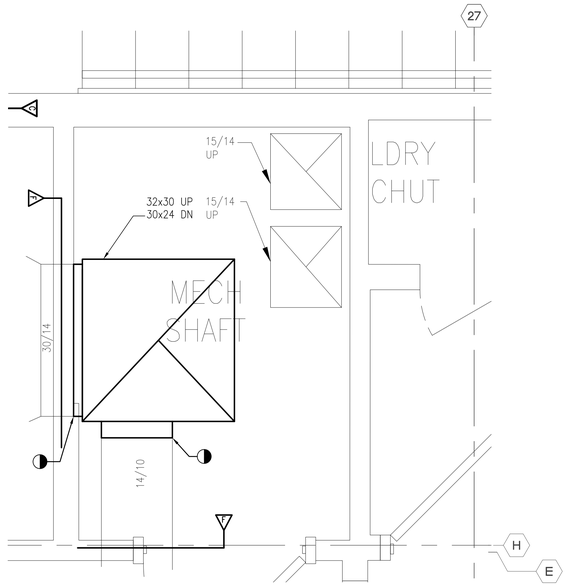
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR DUCTWORK PLAN - PART B	Project Title: EXPAND IMAGING			Project Number: 585-12-112
				Building Number: 1
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN			Drawing Number: MH103
	Date: 10/03/13	Checked: JAU	Drawn: DLK	Dwg. 71 of 107

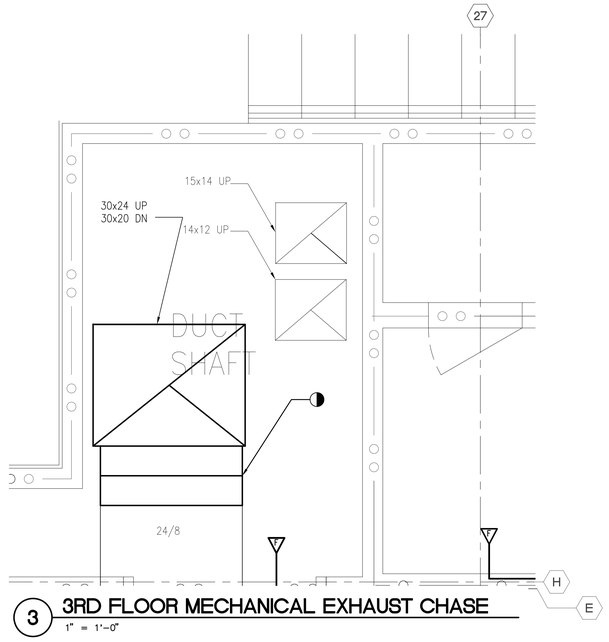
Office of Construction and Facilities Management

Department of Veterans Affairs

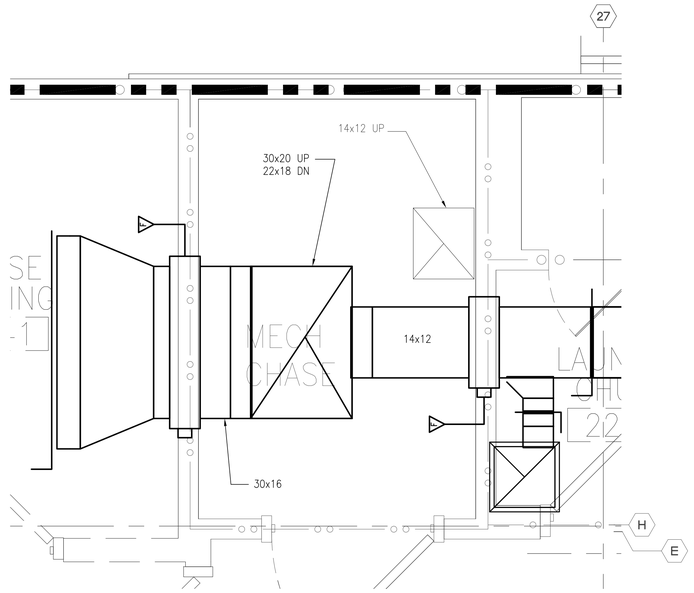
VA FORM 08-6231, OCT. 1978



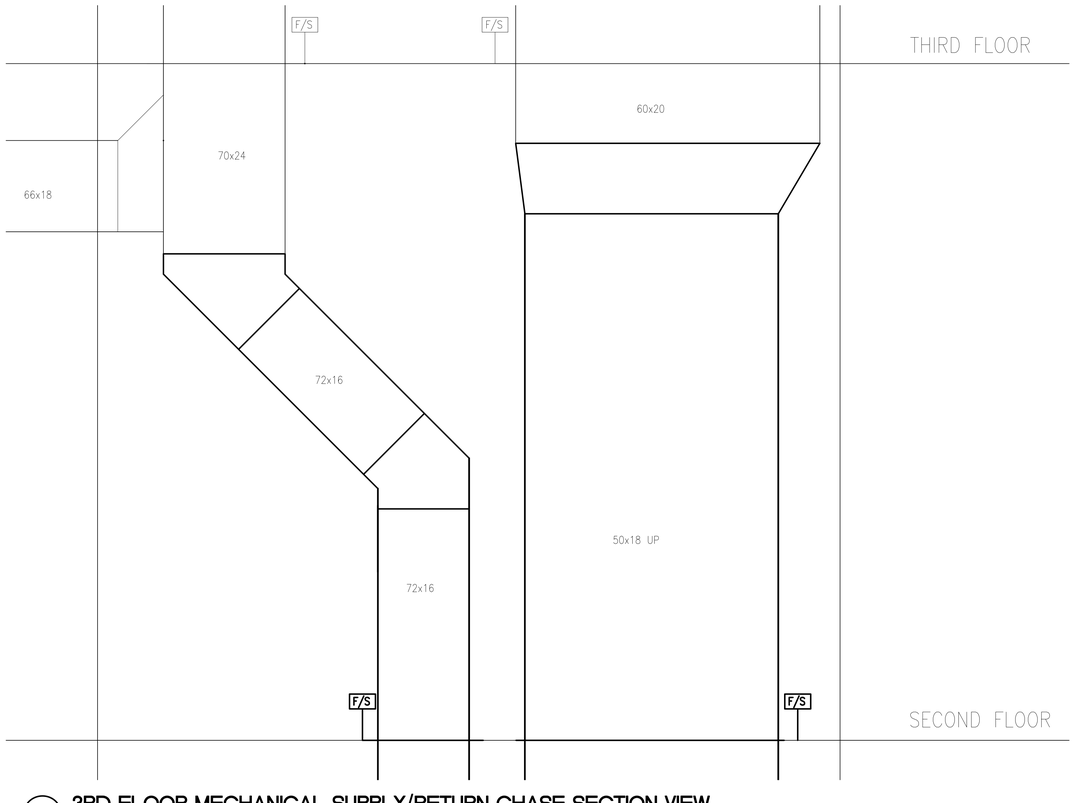
4 4TH FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"



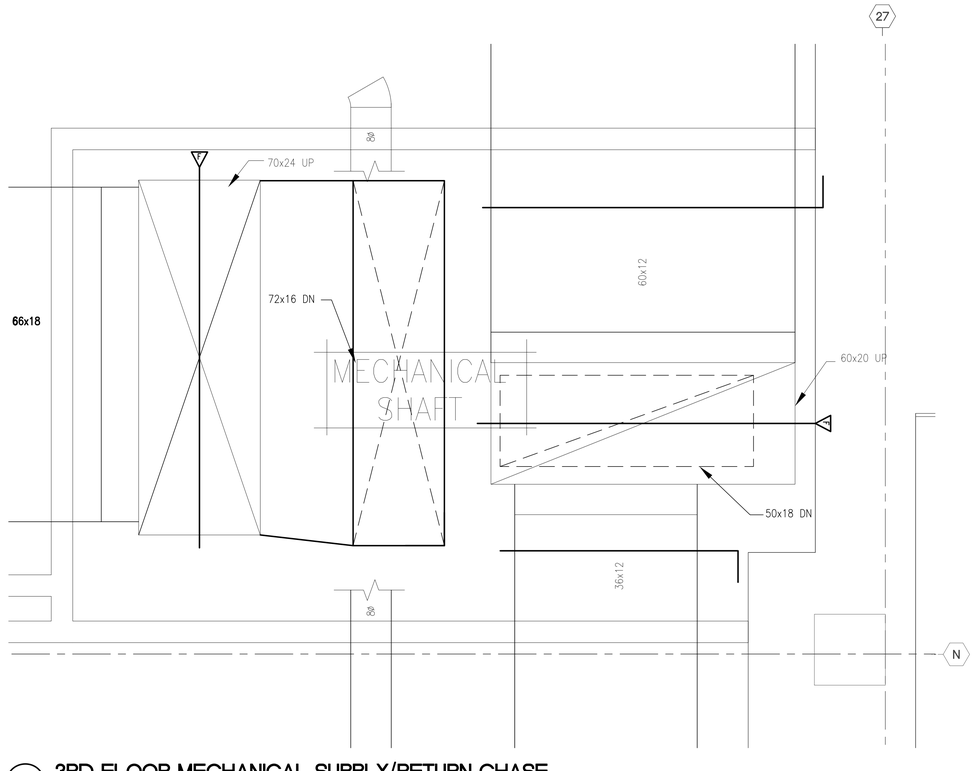
3 3RD FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"



1 2ND FLOOR MECHANICAL EXHAUST CHASE
1" = 1'-0"



5 3RD FLOOR MECHANICAL SUPPLY/RETURN CHASE SECTION VIEW
1" = 1'-0"



2 3RD FLOOR MECHANICAL SUPPLY/RETURN CHASE
1" = 1'-0"

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engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: ENLARGED MECHANICAL PLANS

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MH104

Dwg. 72 of 107

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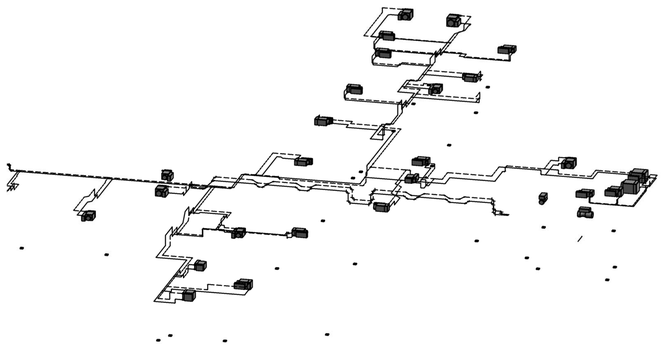
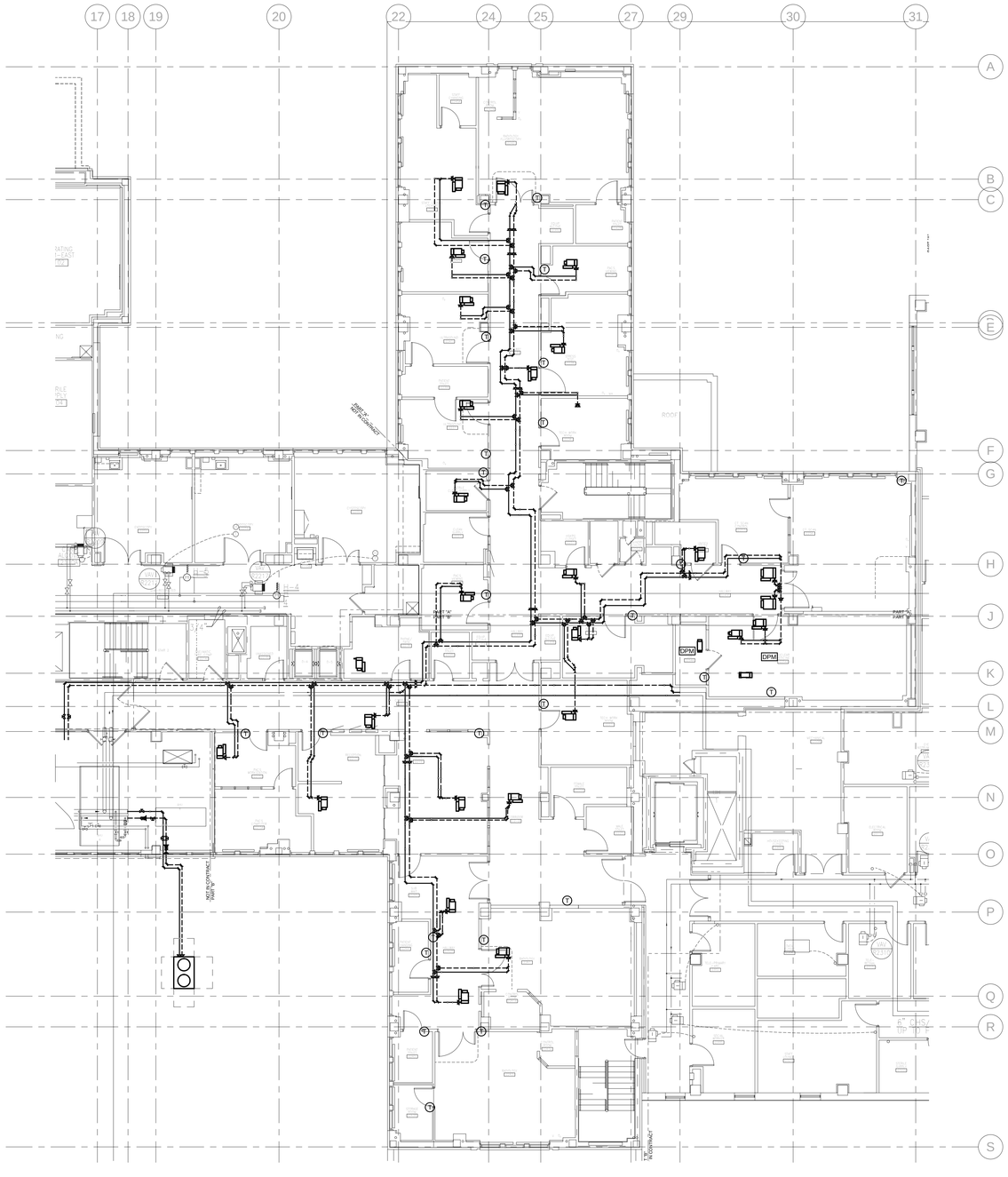


2 THREE DIMENSIONAL MECHANICAL PIPING PLAN (FOR REFERENCE ONLY)

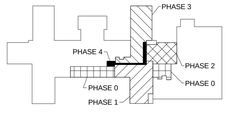


1 2ND FLOOR DUCTWORK PLAN - OVERALL (FOR REFERENCE ONLY)

1/8" = 1'-0"

NORTH

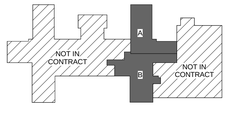
PHASING NOTE:
REFER TO ARCHITECTURAL SHEET A003 - SECOND FLOOR PHASING PLAN FOR ALL PROJECT PHASING.



PHASING KEY PLAN

NOT TO SCALE

NORTH



KEY PLAN

NOT TO SCALE

NORTH

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Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC

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MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5660 | Fax: 715.832.5666 | www.mepassociates.com
MEP PROJECT NO : N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING PLAN - OVERAL (FOR REFERENCE ONLY)

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/13 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: MP101

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Department of Veterans Affairs

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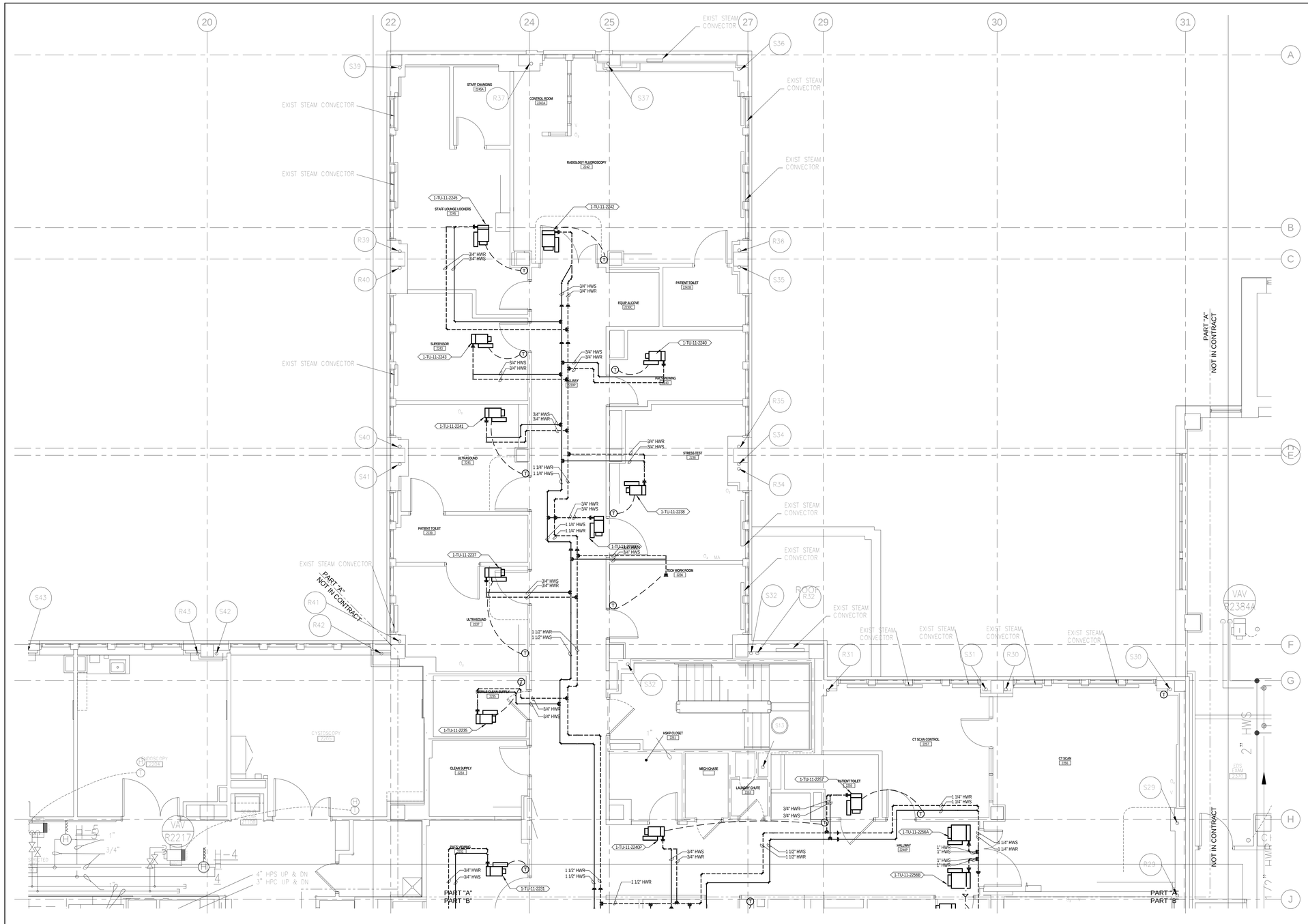
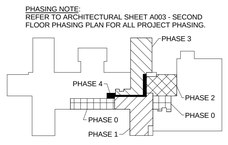


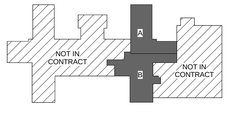
1 2ND FLOOR PIPING - PART A

1/4" = 1'-0"



PHASING KEY PLAN

NOT TO SCALE



KEY PLAN

NOT TO SCALE

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Phone: 715.832.5460 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS

420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING PLAN - PART A	Project Title: EXPAND IMAGING		Project Number: 585-12-112
			Building Number: 1
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN		Drawing Number: MP102
	Date: 10/03/13	Checked: JAU	Drawn: DLK
			Dwg. 74 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

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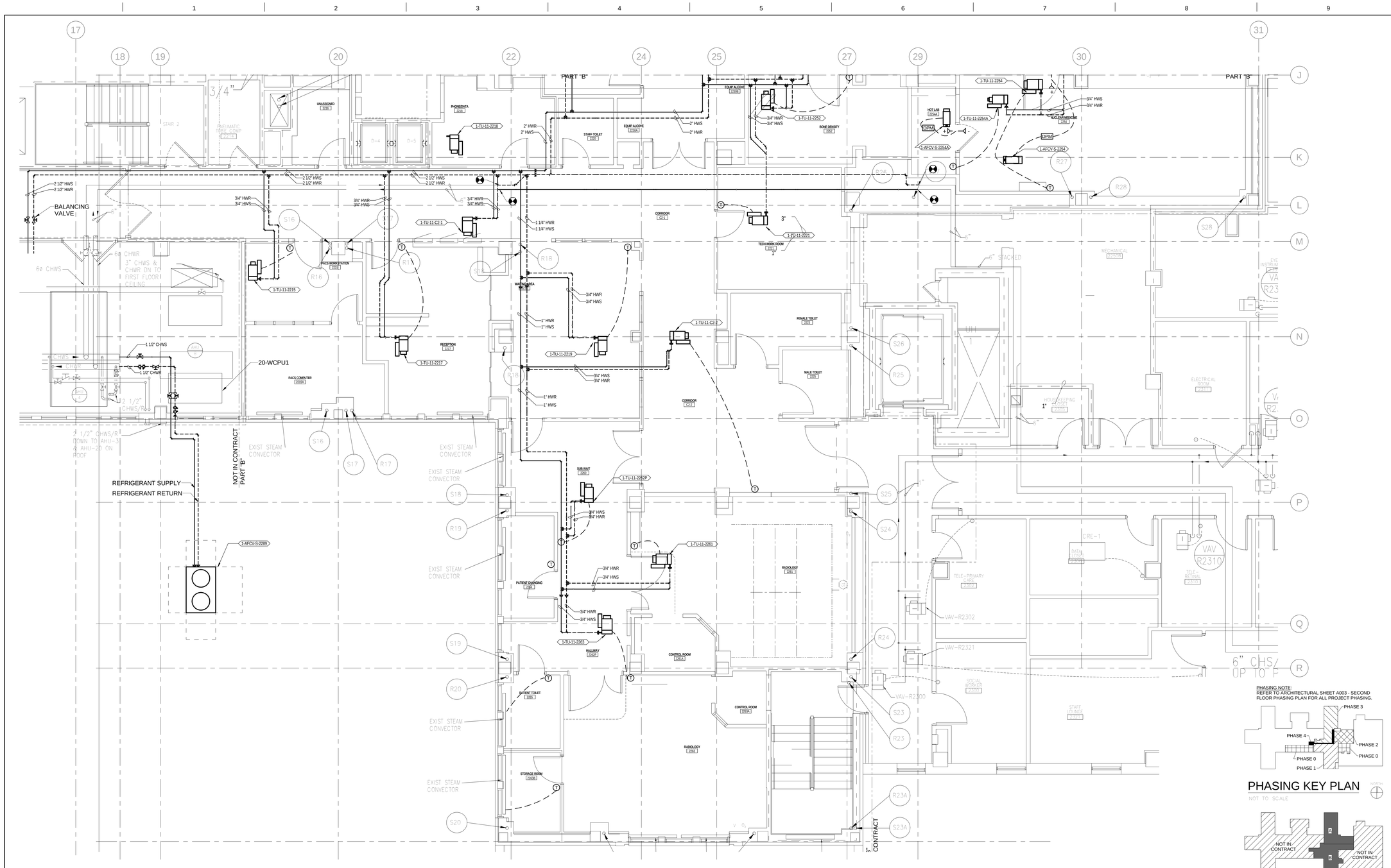

1 2ND FLOOR PIPING - PART B

1/4" = 1'-0"

Revisions:	Date
75% Construction Documents	10/03/2013

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420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: 2ND FLOOR PIPING PLAN - PART B	Project Title: EXPAND IMAGING		Project Number: 585-12-112
			Building Number: 1
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN		Drawing Number: MP103
	Date: 10/03/13	Checked: JAU	Drawn: DLK
			Dwg. 75 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

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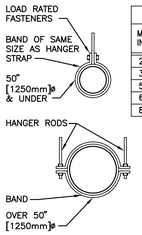
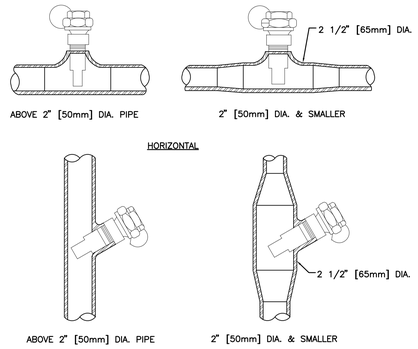


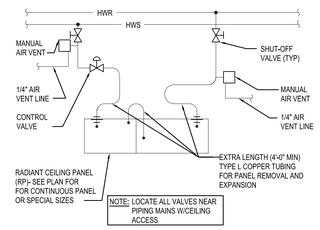
HANGER STRAPS OR RODS			
MAX. DUCT ø IN. [mm]	QUANTITY/SIZE IN. [mm]	MAX. LOAD LBS. [kg]	MAX. SPACING IN. [mm]
26 [650]	ONE 1 [25] x 22 GA STRAP	260 [119]	144 [3600]
36 [900]	ONE 1 [25] x 18 GA STRAP	420 [190]	144 [3600]
50 [1250]	ONE 1 [25] x 16 GA STRAP	700 [317]	144 [3600]
60 [1500]	TWO 3/8 [10]ø. RODS	1320 [598]	144 [3600]
84 [2100]	TWO 1/2 [13]ø RODS	2500 [1133]	144 [3600]

NOTE:
TABULATED DATA FROM SMACNA ALLOWS FOR DUCT REINFORCING AND INSULATION, BUT NO EXTERNAL LOAD.

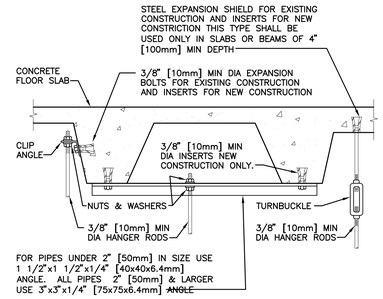
4 ROUND DUCT HANGERS
NTS



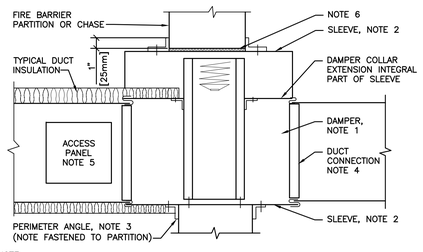
3 INSTALLATION OF THERMOMETER WELLS
NTS



2 RADIANT CEILING PANEL DETAIL
NTS



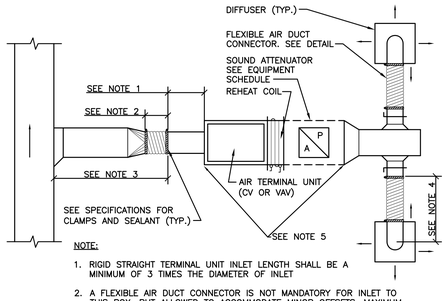
1 SECURING HANGER RODS IN CONCRETE
NTS



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.

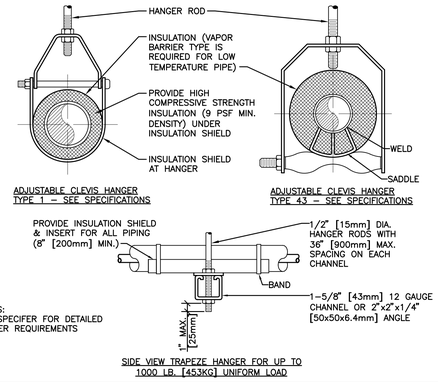
6 SECTION THRU FIRE DAMPER INSTALLATION
NTS



NOTE:

1. RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET
2. A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS. MAXIMUM LENGTH 3'-0" [900mm].
3. A BRANCH DUCT SERVING AN INDIVIDUAL BOX MAY BE THE SAME SIZE AS THE BOX INLET, PROVIDED THE EQUIVALENT LENGTH OF THE BRANCH DUCT, AS SHOWN, DOES NOT EXCEED 10 FEET (3 METERS). FOR LONGER LENGTHS, INCREASE THE DUCT SIZE AND PROVIDE A DUCT TRANSITION TO MAINTAIN THE DUCT STATIC PRESSURE DROP AT OR BELOW 0.2"/100' [1.64Pa/m].
4. FLEXIBLE AIR DUCT CONNECTORS, WHEN USED FROM TERMINAL UNIT SUPPLY AIR DUCT TO DIFFUSER, SHALL NOT EXCEED 5'-0" [1500mm]. USE RIGID ELBOWS FOR CHANGE OF DIRECTION GREATER THAN 45°.
5. COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.
6. USE OF THE FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.
7. TAPE VAPOR BARRIER AT FLEX DUCT CONNECTION

6 DUCT CONNECTIONS - AIR TERMINAL UNITS
NTS



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

NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

5 PIPE HANGERS
NTS

Revisions:	Date
75% Construction Documents	10/03/2013

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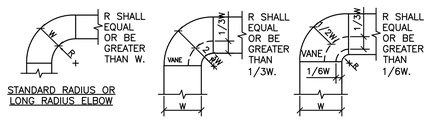
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: MECHANICAL DETAILS	Project Title: EXPAND IMAGING	Project Number: 585-12-112	Office of Construction and Facilities Management
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN	Building Number: 1	
	Date: 10/03/2013 / Checked: JAU / Drawn: DLK	Drawing Number: M501 Dwg. 76 of 107	Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

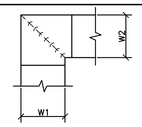


NOTE:

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.

13 DUCTWORK RADIUS ELBOWS

NTS

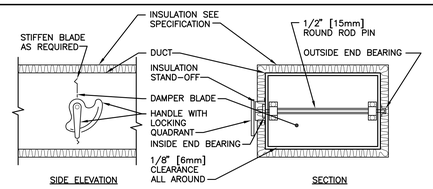


NOTE:

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.

9 DUCTWORK SQUARE VANE ELBOWS

NTS

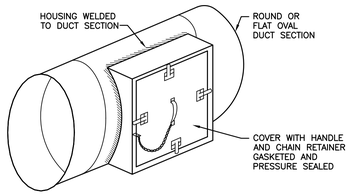


NOTE:

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.

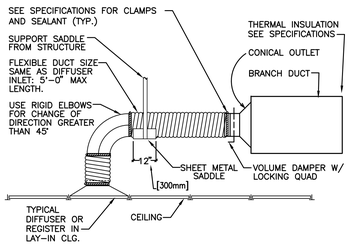
5 VOLUME DAMPER DETAIL

NTS



1 ACCESS SECTION FOR ROUND/OVAL DUCT

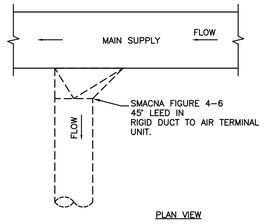
NTS



NOTE:
THE USE OF FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

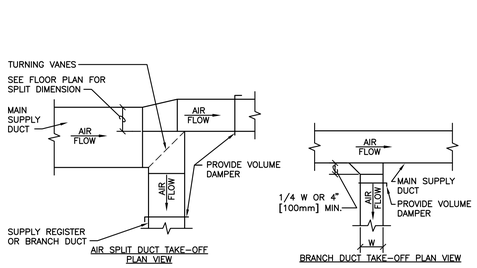
14 FLEXIBLE AIR DUCT CONNECTOR

NTS



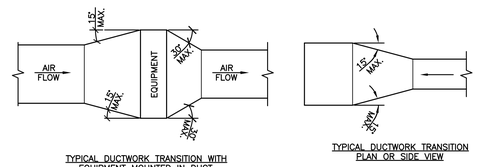
10 ALTERNATE SUPPLY DUCT TAKEOFF - AIR TERMINAL UNITS

NTS



6 SUPPLY DUCTWORK TAKE-OFFS

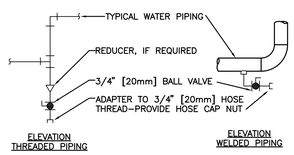
NTS



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

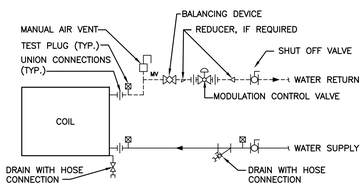
2 DUCTWORK TRANSITIONS (WITH EQUIPMENT MOUNTED IN DUCT)

NTS



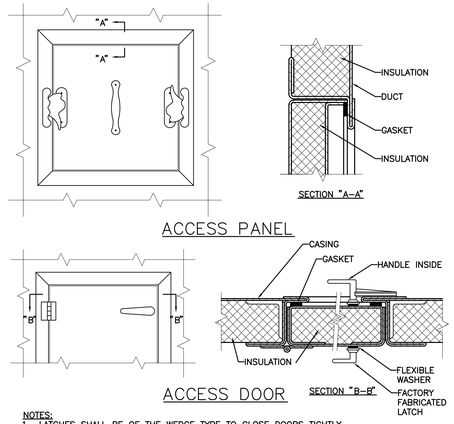
TYPICAL CHILLED AND HOT WATER PIPING DRAIN VALVE CONNECTIONS

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.



11 TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

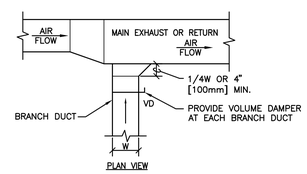
NTS



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
4. DOORS LARGER THAN 18x18 (NOMINAL) SHALL BE HINGED.

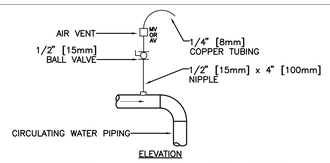
7 ACCESS PANEL AND DOOR DETAIL

NTS



3 EXHAUST OR RETURN BRANCH DUCTWORK

NTS

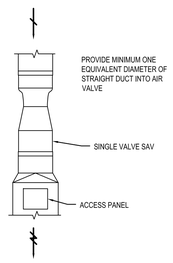


TYPICAL MANUAL AIR VENT

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

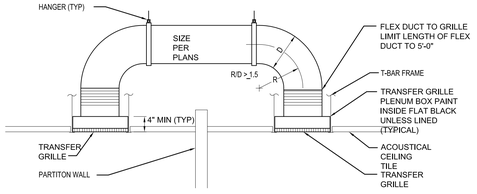
15 DRAIN VALVE AND AIR VENT CONNECTIONS (HYDRONIC SYSTEMS)

NTS



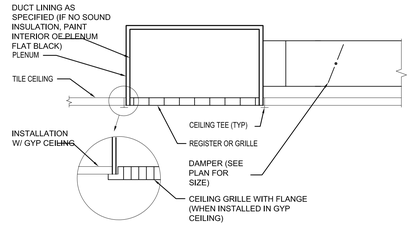
12 AIR VALVE DETAIL

NTS



8 TRANSFER GRILLE DETAIL

NTS



4 RETURN/EXHAUST CONNECTION DETAIL

NTS

75% Construction Documents	10/03/2013
Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: 9008.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: MECHANICAL DETAILS	Project Title: EXPAND IMAGING		Project Number: 585-12-112
			Building Number: 1
Approved: Project Director	Location: IRON MOUNTAIN, MICHIGAN		Drawing Number: M502
	Date: 10/03/2013	Checked: JAU	Drawn: DLK

Dwg. 77 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

AIR TERMINAL UNIT SIZING SCHEDULE

SIZE	MIN ALLOWABLE AIR FLOW		MAX ALLOWABLE AIR FLOW		DUCT INLET SIZE		MAX APD		MAXIMUM SOUND POWER LEVEL (Re: 10^-12 WATTS) FOR BOX DISCHARGE AT MAXIMUM INLET DUCT STATIC						HOT WATER HEATING COIL										REMARKS
									OCTAVE BANDS						EAT		EWT		FLOW		MAX WPD		PIPE RUNOUT SIZE TO COIL		
	CFM	[L/s]	CFM	[L/s]	IN	[mm]	IN WG	[Pa]	2	3	4	5	6	7	°F	[°C]	°F	[°C]	GPM	[L/m]	FT	[kPa]	IN	[mm]	
A	60	[28]	170	[80]	4	[100]	0.4	[100]	69	65	58	52	51	47	55	[13]	140	[60]	0.5	[2]	3	[9]	0.75	[19]	----
B	90	[42]	260	[120]	5	[130]	0.4	[100]	69	63	59	52	51	47	55	[13]	140	[60]	0.5	[2]	3	[9]	0.75	[19]	----
C	130	[61]	380	[180]	6	[150]	0.4	[100]	69	67	61	55	52	49	55	[13]	140	[60]	0.7	[3]	4	[12]	0.75	[19]	----
D	160	[76]	490	[230]	7	[180]	0.4	[100]	70	68	63	57	53	49	55	[13]	140	[60]	0.7	[3]	4	[12]	0.75	[19]	----
E	230	[110]	680	[320]	8	[200]	0.4	[100]	71	68	59	53	51	47	55	[13]	140	[60]	1	[4]	3	[9]	0.75	[19]	----
F	270	[130]	790	[370]	9	[230]	0.4	[100]	71	69	60	54	51	47	55	[13]	140	[60]	1.5	[6]	4	[12]	0.75	[19]	----
G	350	[170]	1050	[500]	10	[250]	0.4	[100]	74	68	61	57	54	52	55	[13]	140	[60]	1.5	[6]	4	[12]	0.75	[19]	----
H	500	[240]	1500	[710]	12	[300]	0.4	[100]	73	69	64	59	57	53	55	[13]	140	[60]	2.5	[10]	3	[9]	0.75	[19]	----
I	750	[350]	2250	[1100]	14	[350]	0.4	[100]	73	68	65	61	61	59	55	[13]	140	[60]	3.5	[13]	4	[12]	0.75	[19]	----
J	1000	[470]	3000	[1400]	16	[400]	0.4	[100]	73	68	66	60	58	55	55	[13]	140	[60]	4.5	[17]	4	[12]	1	[25]	----

NOTES

1. INLET STATIC BASED ON ARI 885-98.
2. THIS SCHEDULE IS USED WITH THE TERMINAL UNIT SCHEDULE.
3. CONTROL SEQUENCE SHALL BE AS INDICATED ON THE AIR TERMINAL UNIT SCHEDULE.
4. PROVIDE SOUND ATTENUATION AFTER-SECTION AS REQUIRED TO MEET ROOM NC LEVEL.

AIR DEVICE SCHEDULE (SUPPLY)

MARK	TYPE	MOUNTING	PANEL/FRAME SIZE		DAMPER	FINISH	REMARKS
			IN x IN	[mm x mm]			
CD-1	LOUVERED FACE	CEILING	24 x 24	[600 x 600]	NONE	WHITE	1
CD-2	LOUVERED FACE	CEILING	24 x 24	[600 x 600]	NONE	WHITE	1
SD-1	SLOT DIFFUSER	CEILING	6 x 48	[600 x 600]	NONE	WHITE	2
SD-2	SLOT DIFFUSER	CEILING	9 x 48	[600 x 600]	NONE	WHITE	2
SD-3	PERFORATED	CEILING	24 X 48	[600 x 600]	NONE	WHITE	3
SD-4	ROUND	CEILING	18"	[600 x 600]	NONE	WHITE	1

NOTES

1. SEE FLOOR PLAN FOR THROW PATTERN.
2. ADJUSTABLE BLADES FOR THROW ADJUSTMENTS.
3. LAMINAR FLOW DIFFUSER. BALANCE DAMPER LOCATED IN DUCTWORK, SEE PLANS.

AIR DEVICE SCHEDULE (RETURN/EXHAUST)

MARK	TYPE	MOUNTING	DAMPER	FINISH	REMARKS
RG-1	EGG CRATE	CEILING	NONE	WHITE	LAY-IN
RG-2	EGG CRATE	CEILING	NONE	WHITE	SIDEWALL
EG-1	EGG CRATE	CEILING	NONE	WHITE	LAY-IN
EG-2	EGG CRATE	CEILING	NONE	WHITE	SIDEWALL

SINGLE DUCT AIR TERMINAL UNIT SCHEDULE

MARK	LOCATION	AREA AND/OR ROOMS SERVED	SYSTEM AIR HANDLING	SIZE	AIR FLOW				ADDITIONAL SOUND ATTUNATION REQUIRED	CONTROL TYPE	CONTROL SEQUENCE	REHEAT			PERIMETER SUPPLEMENTAL HEAT LINK	REMARKS
					MAX		MIN									
					CFM	[L/s]	CFM	[L/s]				HW	ELEC	NONE		
1-TU-11-2215	West Wing	2215	AHU 10	A	120	[57]	120	[57]	NONE	VAV		X			NONE	
1-TU-11-2217	West Wing	2217	AHU 10	C	360	[170]	360	[170]	NONE	CV		X			NONE	
1-TU-11-2218	West Wing	2218	AHU 10	C	310	[150]	310	[150]	NONE	CV				X	NONE	
1-TU-11-2219	West Wing	2219	AHU 10	D	480	[230]	480	[230]	NONE	CV		X			NONE	
1-TU-11-2221	West Wing	2221	AHU 10	C	340	[160]	215	[100]	NONE	VAV		X			NONE	
1-TU-11-2230P	North Wing	2230P	AHU 10	E	525	[250]	525	[250]	NONE	CV		X			NONE	
1-TU-11-2231	North Wing	2231	AHU 10	A	125	[59]	125	[59]	NONE	CV		X			NONE	
1-TU-11-2235	North Wing	2235/2233	AHU 10	A	190	[90]	190	[90]	NONE	CV		X			NONE	
1-TU-11-2236	North Wing	2236	AHU 10	C	280	[130]	140	[66]	NONE	VAV		X			NONE	
1-TU-11-2237	North Wing	2237	AHU 10	D	440	[210]	440	[210]	NONE	CV		X			NONE	
1-TU-11-2238	North Wing	2238	AHU 10	C	350	[240]	280	[130]	NONE	VAV		X			NONE	
1-TU-11-2240	North Wing	2240	AHU 10	B	230	[110]	110	[52]	NONE	VAV		X			NONE	
1-TU-11-2240P	East Wing	2240P	AHU 10	E	500	[240]	500	[240]	NONE	CV		X			NONE	
1-TU-11-2242	North Wing	2242/2242A	AHU 10	G	925	[440]	925	[440]	NONE	CV		X			NONE	
1-TU-11-2241	North Wing	2241	AHU 10	D	440	[210]	440	[210]	NONE	CV		X			NONE	
1-TU-11-2243	North Wing	2243	AHU 10	C	320	[150]	150	[71]	NONE	VAV		X			NONE	
1-TU-11-2245	North Wing	2245/2245B	AHU 10	E	595	[280]	595	[280]	NONE	CV		X			NONE	
1-TU-11-2252	East Wing	2252	AHU 10	B	250	[120]	250	[120]	NONE	CV		X			NONE	
1-TU-11-2254	East Wing	2254	AHU 10	E	550	[260]	550	[260]	NONE	CV		X			NONE	
1-TU-11-2254A	East Wing	2254A	AHU 10	A	85	[40]	85	[40]	NONE	CV		X			NONE	
1-TU-11-2256A	East Wing	2256	AHU 10	H	1200	[570]	1200	[570]	NONE	CV		X			NONE	
1-TU-11-2256B	East Wing	2256	AHU 10	H	1200	[570]	1200	[570]	NONE	CV		X			NONE	
1-TU-11-2257	East Wing	2257	AHU 10	E	660	[310]	660	[310]	NONE	CV		X			NONE	
1-TU-11-2261	South Wing	2261	AHU 10	E	570	[270]	570	[270]	NONE	CV		X			NONE	
1-TU-11-2262P	South Wing	2262P/2260	AHU 10	E	500	[240]	500	[240]	NONE	CV		X			NONE	
1-TU-11-2263	South Wing	2263	AHU 10	F	800	[380]	800	[380]	NONE	CV		X			NONE	
1-TU-11-C2-1	West Wing	C2-1	AHU 10	E	630	[300]	630	[300]	NONE	CV		X			NONE	
1-TU-11-C2-2	South Wing	C2-1	AHU 10	D	410	[190]	410	[190]	NONE	CV		X			NONE	

AIR FLOW CONTROL VALVE SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	SIZE		AIR FLOW				APD AT MAX AIR FLOW		CONTROL TYPE	CONNECT TO ECC	APPLICATION	REMARKS
						MAX		MIN							
				IN	[mm]	CFM	[L/s]	CFM	[L/s]	IN WG	[Pa]				
1-AFCV-S-2254	NUCLEAR MEDICINE	2254	VAV	8	[200]	620	[290]	620	[290]		[ ]				----
1-AFCV-S-2254	HOT LAB	2254A	VAV	6	[150]	100	[47]	100	[47]		[ ]				----

Revisions:	Date
75% Construction Documents	10/03/2013

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: MECHANICAL EQUIPMENT SCHEDULES

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: M601

Dwg. 78 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

DUCT PRESSURE CLASS, MATERIAL, & LEAKAGE

SYSTEM	SERVICE	DUCT CONSTRUCTION: PRESSURE CLASS (IN W.G.)	MATERIALS OF CONSTRUCTION	SMACNA SEAL CLASS	LEAKAGE TESTING: PERCENT OF DUCT TO BE TESTED	TEST PRESSURE (IN W.G.)	ALLOWABLE LEAKAGE (% OF TAKE-OFF)	REMARKS
AHU-11	SUPPLY AIR FROM AIR HANDLING UNIT TO SUPPLY AIR TERMINAL	3	GALVANIZED	A	100	3	2	-
	SUPPLY AIR FROM SUPPLY AIR TERMINALS TO AIR OUTLETS	2	GALVANIZED	A	100	2	2	-
	RETURN AIR FROM AIR INLET TO AIR HANDLING UNIT	-2	GALVANIZED	A	100	2	2	-
	OUTDOOR AIR FROM LOUVER TO AIR HANDLING UNIT	-2	GALVANIZED	A	100	2	2	-
ERV-3	GENERAL EXHAUST AIR ALL INCLUSIVE	-2	GALVANIZED/ ALUM	A	100	2	2	-

HVAC DESIGN DATA

DESIGN CONDITIONS	SUMMER TEMP °F	SUMMER TEMP [°C]	SUMMER WET BULB TEMP °F	SUMMER WET BULB TEMP [°C]	SUMMER % HUMIDITY	WINTER TEMP °F	WINTER TEMP [°C]	WINTER DEWPOINT TEMP °F	WINTER DEWPOINT TEMP [°C]	WINTER % HUMIDITY	LOWEST AVERAGE ANNUAL DEWPOINT °F	LOWEST AVERAGE ANNUAL DEWPOINT [°C]
OUTDOOR DESIGN CONDITIONS	88	[31]	72	[22]	46	-20	[-29]	0	[-18]	NA	-16	[-28]
INDOOR AREA DESIGN CONDITIONS												
RAGIOGRAPHIC/ FLUOROSCOPIC	75	[24]			20-60	70	[21]			20-60		
NUCLEAR MEDICINE SCANNING	75	[24]			20-60	70	[21]			20-60		
NUCLEAR MEDICINE LABORATORY	75	[24]			20-60	70	[21]			20-60		
CT - CONTROL	75	[24]			20-60	70	[21]			20-60		
CT - SCANNING	75	[24]			20-60	70	[21]			20-60		
RADIOLOGY	75	[24]			20-60	70	[21]			20-60		
ULTRASOUND	75	[24]			20-60	70	[21]			20-60		
BONE DENSITY	70	[21]			20-50	70	[21]			20-50		
TOILET	N/A				N/A	68	[20]			N/A		
STAFF BREAKROOM	75	[24]			20-60	70	[21]			20-60		
HOUSEKEEPING	N/A				N/A	N/A				N/A		
PULMONARY EXERCISE	75	[24]			20-60	70	[21]			20-60		
CORRIDORS	75	[24]			20-60	70	[21]			20-60		
DRESSING ROOM	N/A				N/A	N/A				N/A		
OFFICES	75	[24]			20-60	70	[21]			20-60		
ELECTRICAL	86	[30]			N/A	40	[4]			N/A		
CLEAN UTILITY/ STORAGE	N/A				N/A	N/A				N/A		
ADMISSION	75	[24]			20-60	70	[21]			20-60		

AIR COOLED CONDENSING UNIT SCHEDULE (AIR CONDITIONING SERVICE)

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	TYPE	MIN REFRIGERATION MBH	MIN REFRIGERATION [kW]	REFRIGERANT	MAX SUCTION TEMP @ COMP °F	MAX SUCTION TEMP @ COMP [°C]	OA TEMP °F	OA TEMP [°C]	MIN EER	IPLV	COMPRESSOR MOTOR # COMP	COMPRESSOR MOTOR NOMINAL POWER HP	COMPRESSOR MOTOR NOMINAL POWER [kW]	COMPRESSOR MOTOR PHASE	COMPRESSOR MOTOR VOLT	CONDENSER FAN MOTOR # FANS	CONDENSER FAN MOTOR NOMINAL POWER HP	CONDENSER FAN MOTOR NOMINAL POWER [W]	CONDENSER FAN MOTOR PHASE	CONDENSER FAN MOTOR VOLT	AUX CHILLED WATER COIL
20-ACCU1	ROOFTOP	PACS	2215A	SCROLL	98	[330]	410A			88	[31]			2		[ ]	3	208	2	1.4	[1000]	3	208	

SPLIT SYSTEM AIR CONDITIONER SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	TYPE	TOTAL SUPPLY AIR FLOW CFM	TOTAL SUPPLY AIR FLOW [L/s]	MIN. OUTSIDE AIR FLOW CFM	MIN. OUTSIDE AIR FLOW [L/s]	EXT STATIC PRESSURE IN	EXT STATIC PRESSURE [Pa]	COOLING CAPACITY: MIN TOTAL CAPACITY MBH	MIN TOTAL CAPACITY [kW]	MIN SENS CAPACITY MBH	MIN SENS CAPACITY [kW]	MIN SEER	EAT Db °F	EAT Db [°C]	EAT Wb °F	EAT Wb [°C]	OSA DESIGN TEMP °F	OSA DESIGN TEMP [°C]	COMP Kw	ELECTRICAL DATA: INDOOR FAN HP	INDOOR FAN [W]	INDOOR FAN CONTROL	REMOTE CONTROLLED CONDENSER	REMARKS
20-WCPU1	ROOF	PACS	COOLING ONLY	3500	[1700]	0	[ ]		[ ]	102	[350]	90	[26]		72	[22]			[88]	[31]		4	[3000]			

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
7-CWCC1	2180 MECH	PACS	20-WCPU1	4500	[2100]		[ ]	0.5	[130]	72	[22]	60	[16]	55	[13]	52	[11]	102	[30]	90	[26]	32	[2]	45	[7]	52	[11]	30.5	[9]	

Revisions:	Date
75% Construction Documents	10/03/2013

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5685 | Fax: 715.832.5668 | www.mepassociates.com
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420 RAIL STREET
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NDW PROJECT NUMBER: 1211

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Project Number: 585-12-112

Building Number: 1

Drawing Number: M602

Dwg. 79 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

AIRFLOW BALANCE

Room Number	Room Name	VA Design Manual Page	Room Air Balance	Return/ Exhaust	Constant/ Variable Volume	Room Area (ft²)	Ceiling Height (ft)	Number of Occupants	Source (Unit No.)	Code Requirements				Design																Notes
										Outdoor		Supply	Exhaust	Supply				Outdoor				Return				Exhaust		Transfer		
														Maximum		Minimum		Maximum		Minimum		Maximum		Minimum						
										(CFM per Person)	(Air Changes per Hour)	(Air Changes per Hour)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	(CFM)	(CFM per Person)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	(CFM)	(Air Changes per Hour)	In (CFM)	Out (CFM)	
2215	PACS WORKSTATION	6.100	o	R	VAV	110	8	1	-	-	2	4	-	120	8.2	120	8.2	30	2.0	30	30	2.0	140	9.5	140	9.5	0	0.0	20	0	-
2216	UNASSIGNED	6.98	o	R	VAV	53	8	1	-	-	-	4	-	50	7.1	50	7.1	13	1.8	13	13	1.8	60	8.5	60	8.5	0	0.0	10	0	-
2217	RECEPTION	6.95	–	E	CV	202	8	3	-	-	2	6	-	360	13.4	360	13.4	90	3.3	90	30	3.3	0	0.0	0	0.0	415	15.4	55	0	-
2218	PHONE/DATA	6.101	NA	R	CV	126	8	-	-	-	-	-	-	310	18.5	310	18.5	78	4.6	78	-	4.6	360	21.5	360	21.5	0	0.0	50	0	-
2219	WAITING AREA	6.95	–	E	CV	297	8	16	-	-	2	6	-	480	12.1	480	12.1	120	3.0	120	8	3.0	0	0.0	0	0.0	560	14.1	80	0	-
2220	STAFF TOILET	6.98	-	E	CV	47	8	-	-	-	-	4	-	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	65	10.4	65	0	-
2221	TECH WORK ROOM	6.98	o	R	VAV	200	8	6	-	-	2	4	-	340	12.8	215	8.1	85	3.2	54	9	2.0	390	14.6	390	14.6	0	0.0	50	0	-
2223	FEMALE TOILET	6.98	--	E	CV	86	8	-	-	-	-	10	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	115	10.0	115	0	-
2225	MALE TOILET	6.98	--	E	CV	57	8	-	-	-	-	10	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	80	10.5	80	0	-
2230P	HALLWAY	6.95	+	R	CV	112	8	2	-	-	2	4	-	525	35.2	525	35.2	131	8.8	131	66	8.8	115	7.7	115	7.7	0	0.0	0	410	-
2231	PACS VIEWING	6.100	o	R	VAV	112	8	2	-	-	2	4	-	125	8.4	125	8.4	31	2.1	31	16	2.1	145	9.7	145	9.7	0	0.0	20	0	-
2233	CLEAN SUPPLY	6.100	+	R	CV	82	8	-	-	-	-	4	-	50	4.6	50	4.6	13	1.1	13	-	1.1	50	4.6	50	4.6	0	0.0	0	0	-
2235	STERILE CLEAN SUPPLY	6.75	+	E	CV	64	8	-	-	-	4	4	-	140	16.5	140	16.5	35	4.1	35	-	4.1	0	0.0	0	0.0	140	16.5	0	0	-
2236	TECH WORK	6.98	o	R	VAV	131	8	3	-	-	2	4	-	280	16.0	140	8.0	70	4.0	35	12	2.0	320	18.3	320	18.3	0	0.0	40	0	-
2237	ULTRASOUND	6.44	+	R	CV	146	8	3	-	-	2	6	-	440	22.6	440	22.6	110	5.7	110	37	5.7	395	20.3	395	20.3	0	0.0	0	45	-
2238	STRESS TEST	6.93	-	E	VAV	207	8	2	-	-	2	10	-	350	12.7	280	10.1	88	3.2	70	35	2.5	0	0.0	0	0.0	405	14.7	55	0	-
2239	PATIENT TOILET	6.54	--	R	CV	67	8	-	-	-	-	-	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	90	10.1	90	0	-
2240	PACS VIEWING	6.100	o	R	VAV	102	8	2	-	-	2	4	-	230	16.9	110	8.1	58	4.2	28	14	2.0	265	19.5	265	19.5	0	0.0	35	0	-
2240P	HALLWAY	6.95	+	R	CV	460	8	-	-	-	2	4	-	500	8.2	500	8.2	125	2.0	125	-	2.0	175	2.9	175	2.9	0	0.0	0	325	-
2241	ULTRASOUND	6.44	+	R	CV	150	8	3	-	-	2	6	-	440	22.0	440	22.0	110	5.5	110	37	5.5	395	19.8	395	19.8	0	0.0	0	45	-
2242	RADIOLOGY/ FLUOROSCOPY & CONTROL ROOM	6.44	-	E	CV	437	8	4	-	-	2	6	-	925	15.9	925	15.9	231	4.0	231	58	4.0	0	0.0	0	0.0	995	17.1	140	70	-
2242B	PATIENT TOILET	6.54	--	E	CV	50	8	-	-	-	-	-	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	70	10.5	70	0	-
2243	SUPERVISOR	6.98	o	R	VAV	137	8	3	-	-	2	4	-	320	17.5	150	8.2	80	4.4	38	13	2.1	370	20.3	370	20.3	0	0.0	50	0	-
2245	STAFF LOUNGE LOCKERS	6.75	o	E	CV	290	8	6	-	-	2	4	-	595	15.4	595	15.4	149	3.8	149	25	3.8	0	0.0	0	0.0	685	17.7	90	0	-
2251	HOUSEKEEPING	6.103	--	E	CV	50	8	-	-	-	-	10	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	70	10.4	70	0	-
2252	BONE DENSITY	6.40	o	R	CV	172	8	3	-	-	2	6	-	250	10.9	250	10.9	63	2.7	63	21	2.7	290	12.6	290	12.6	0	0.0	40	0	-
2253	LAUNDRY CHUTE	6.103	--	E	CV	15	8	-	-	-	-	-	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	40	19.5	40	0	-
2254	NUCLEAR MEDICINE	6.40	-	E	CV	409	8	4	-	-	2	10	-	550	10.1	550	10.1	138	2.5	138	34	2.5	0	0.0	0	0.0	620	11.4	85	15	-
2254A	HOT LAB	6.40	-	E	CV	36	8	1	-	-	2	6	-	50	10.4	50	10.4	13	2.6	13	13	2.6	0	0.0	0	0.0	60	12.5	10	0	-
2255	PATIENT TOILET	6.54	--	R	CV	53	8	-	-	-	-	-	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	70	9.9	70	0	-
2256	CT SCAN	6.43	+	R	CV	396	8	4	-	-	2	12	-	2,400	45.5	2,400	45.5	600	11.4	600	150	11.4	2,400	45.5	2,400	45.5	0	0.0	0	0	-
2257	CT SCAN CONTROL	6.43	+	R	CV	192	8	2	-	-	2	12	-	660	25.8	660	25.8	165	6.4	165	83	6.4	660	25.8	660	25.8	0	0.0	0	0	-
2260	SUB WAIT	6.95	+	R	CV	62	8	-	-	-	2	4	-	160	19.4	160	19.4	40	4.9	40	-	4.9	160	19.4	0	0.0	0	0.0	0	0	-
2261	RADIOLOGY	6.43	+	R	CV	411	8	4	-	-	2	6	-	570	10.4	570	10.4	143	2.6	143	36	2.6	570	10.4	570	10.4	0	0.0	0	0	-
2262P	HALLWAY	6.95	+	R	CV	269	8	-	-	-	2	4	-	290	8.1	290	8.1	73	2.0	73	-	2.0	185	5.2	185	5.2	0	0.0	0	105	-
2263	RADIOLOGY	6.43	+	R	CV	371	8	4	-	-	2	6	-	750	15.2	750	15.2	188	3.8	188	47	3.8	750	15.2	750	15.2	0	0.0	0	0	-
2263B	STORAGE	6.100	+	R	CV	56	8	-	-	-	-	4	-	50	6.6	50	6.6	13	1.7	13	-	1.7	50	6.6	50	6.6	0	0.0	0	0	-
2264	PATIENT CHANGING	6.96	--	R	CV	59	8	1	-	-	-	4	-	50	6.4	50	6.4	13	1.6	13	13	1.6	60	7.6	0	0.0	0	0.0	10	0	-
2265	PATIENT TOILET	6.54	--	E	CV	52	8	-	-	-	-	-	10	0	0.0	0	0.0	0	0.0	0	-	0.0	0	0.0	0	0.0	70	10.1	70	0	-
C2-1	CORRIDOR	6.95	+	R	CV	544	8	-	-	-	2	4	-	580	8.0	580	8.0	145	2.0	145	-	2.0	340	4.7	0	0.0	0	0.0	0	240	-
C2-2	CORRIDOR	6.95	+	R	CV	378	8	-	-	-	2	4	-	410	8.1	410	8.1	103	2.0	103	-	2.0	125	2.5	125	2.5	0	0.0	0	285	-
AHU Totals:						7,250		80						13,350		12,725		3,338		3,181			8,770		8,210		4,550				-
2215A	PACS COMPUTER	6.100	o	R	VAV	135	8	2	-	-	2	4	-	0	0.0	0	0.0	0	0.0	0	0	0.0	3,500	194.4	0	0.0	0	0.0	0	0	-
COOLING UNT:						135		-						3,500		0		0		0			3,500		0		0				-

VA FORM 08-6231, OCT 1978

75% Construction Documents	10/03/2013
Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: ROOM AIR BALANCE SCHEDULE

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: M603

Dwg. 80 of 107

Office of Construction and Facilities Management

Department of Veterans Affairs

CONTROLS SYMBOLS

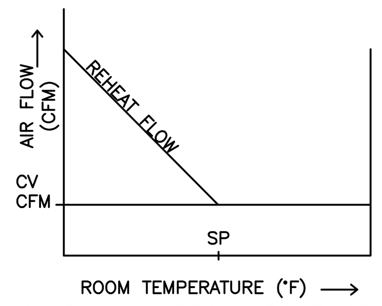
- (T) ROOM THERMOSTAT/TRANSMITTER – WALL MOUNT
- (M) ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER – WALL MOUNT
- (TT) TEMPERATURE TRANSMITTER
- (TT) TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
- (MT) MOISTURE (HUMIDITY) TRANSMITTER
- (PT) PRESSURE TRANSMITTER
- (SPS) STATIC PRESSURE SENSOR
- (FT) FLOW TRANSMITTER
- (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)
- (LC) LEVEL CONTROLLER
- (LT) LEVEL TRANSMITTER

CONTROLS SYMBOLS

- (PSH) PRESSURE SWITCH HIGH
- (PSL) PRESSURE SWITCH LOW
- (EPT) ELECTRONIC TO PNEUMATIC TRANSDUCER
- (AT) CO2 CARBON DIOXIDE TRANSMITTER
- (AT) CO CARBON MONOXIDE TRANSMITTER
- (AT) OC OCCUPANCY SENSOR
- [LTCP] LOCAL TEMPERATURE CONTROL PANEL
- [HVAC] HVAC CONTROL PANEL
- [VSMC] VARIABLE SPEED MOTOR CONTROLLER
- [FACP] FIRE ALARM CONTROL PANEL
- (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
- (KC) TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE

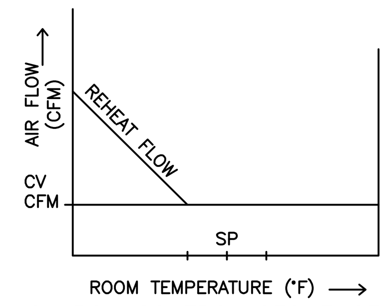
CONTROLS SYMBOLS

- 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



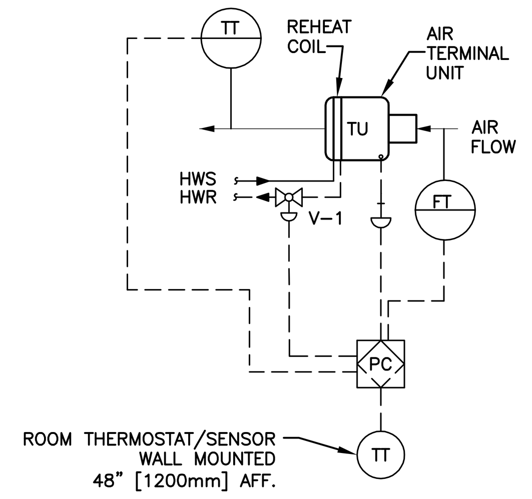
CV BOX CONTROL SEQUENCE
NO DEADBAND

A. UPON FALL IN SPACE TEMPERATURE BELOW SET POINT VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5°, THE ADJUSTABLE TOLERANCE OF ± .5° HAS BEEN SELECTED TO PREVENT VALVE HUNTING
B. THE REVERSE SHALL OCCUR ON RISE IN SPACE TEMPERATURE.



CV BOX CONTROL SEQUENCE
W/DEADBAND

A. SET POINTS SHALL SET AS FOLLOWS:
COOLING 75° F (ADJ)
HEATING 70° F (ADJ)
DEADBAND OF 5° F BETWEEN HEATING AND COOLING SET POINT WILL BE MAINTAINED
B. UPON FALL IN SPACE TEMPERATURE BELOW SET POINT VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5°,THE ADJUSTABLE TOLERANCE OF ± .5° HAS BEEN SELECTED TO PREVENT VALVE HUNTING
C. THE REVERSE SHALL OCCUR ON RISE IN SPACE TEMPERATURE.

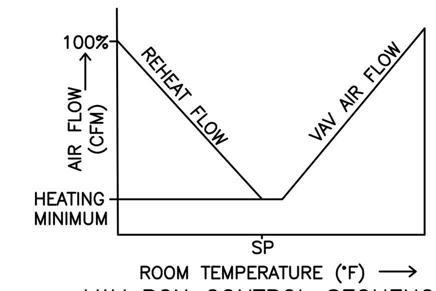


NO SUPPLEMENTAL HEATING

4 CONSTANT VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM
NTS

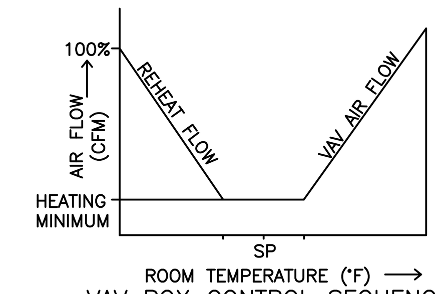
SYSTEM: CAV TERMINAL UNITS			POINT LEGEND		SYSTEM OUTPUTS: BINARY			SYSTEM OUTPUTS: ANALOG				SYSTEM INPUTS: BINARY							SYSTEM INPUTS: ANALOG									SYSTEM SOFTWARE/CONTROL: ALARM PROCESSING							SYSTEM SOFTWARE/CONTROL: APPLICATION/FUNCTION																
SYSTEM COMPONENT:	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE NO.	--	ELECTRIC DEVICE	START/STOP	OPEN/CLOSE	--	SPEED COMMAND	VALVE POSITION	DAMPER POSITION	STATUS	ALARM	PRESSURE	HIGH HUMIDITY	HIGH STATIC PRESSURE	LOW TEMPERATURE	--	TEMPERATURE (TI)	PRESSURE	POSITION	FLOW	PERCENT	STATIC PRESSURE	CARBON MONOXIDE	HUMIDITY	VACUUM	Local Alarm Panel	Area Alarm Panel	Master Alarm Panel	HIGH LIMIT	LOW LIMIT	--	--	SCHEDULE START/STOP	FUNCTION	DUTY CYCLE	TEMPERATURE ECONOMIZER	ENTHALPY ECONOMIZER	TEMPERATURE RESET	DEMAND LIMITING	TEMPERATURE OVERRIDE	STATIC PRESSURE RESET	--	--	PRESSURE/VOLUME CONTROL	FAILURE MODE	SPACE TEMP. CONTROL	FULL COMMUNICATION	TRENDING	REMARKS
ROOM TEMPERATURE	AI-1	TT-RM																	●												●	●																●		●	
SUPPLY AIR TEMPERATURE	AI-2	TT-SA																	●												●	●																●		●	
SUPPLY AIR FLOW (CFM)	AI-3	FT																				●									●	●																●		●	
VAV DAMPER	AO-1	D-1									●										●																											●		●	
REHEAT COIL VALVE	AO-2	V-1								●											●																											●		●	

5 POINTS LIST FOR CAV AIR TERMINAL UNITS AND SUPPLEMENTAL HEAT
NTS



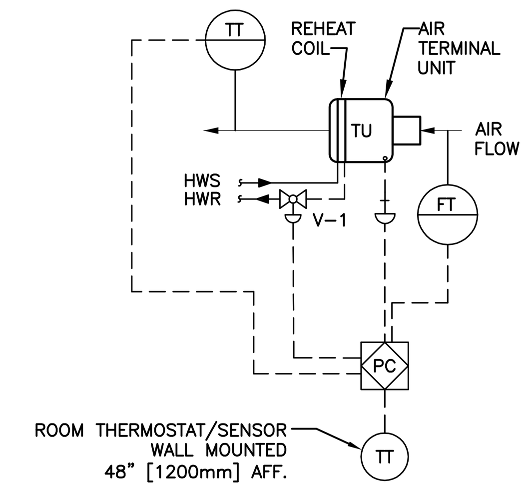
VAV BOX CONTROL SEQUENCE
NO DEADBAND

A. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
B. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
C. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



VAV BOX CONTROL SEQUENCE
W/DEADBAND

A. SET POINTS SHALL BE SET AS FOLLOWS:
COOLING 75°F (ADJ)
HEATING 70°F(ADJ)
DEADBAND OF 5° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



NO SUPPLEMENTAL HEATING

1 VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM
NTS

SYSTEM: VAV TERMINAL UNITS			POINT LEGEND		SYSTEM OUTPUTS: BINARY			SYSTEM OUTPUTS: ANALOG				SYSTEM INPUTS: BINARY							SYSTEM INPUTS: ANALOG									SYSTEM SOFTWARE/CONTROL: ALARM PROCESSING							SYSTEM SOFTWARE/CONTROL: APPLICATION/FUNCTION																
SYSTEM COMPONENT:	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE NO.	--	ELECTRIC DEVICE	START/STOP	OPEN/CLOSE	--	SPEED COMMAND	VALVE POSITION	DAMPER POSITION	STATUS	ALARM	PRESSURE	HIGH HUMIDITY	HIGH STATIC PRESSURE	LOW TEMPERATURE	--	TEMPERATURE (TI)	PRESSURE	POSITION	FLOW	PERCENT	STATIC PRESSURE	CARBON MONOXIDE	HUMIDITY	VACUUM	Local Alarm Panel	Area Alarm Panel	Master Alarm Panel	HIGH LIMIT	LOW LIMIT	--	--	SCHEDULE START/STOP	FUNCTION	DUTY CYCLE	TEMPERATURE ECONOMIZER	ENTHALPY ECONOMIZER	TEMPERATURE RESET	DEMAND LIMITING	TEMPERATURE OVERRIDE	STATIC PRESSURE RESET	--	--	PRESSURE/VOLUME CONTROL	FAILURE MODE	SPACE TEMP. CONTROL	FULL COMMUNICATION	TRENDING	REMARKS
ROOM TEMPERATURE	AI-1	TT-RM																	●												●	●																●		●	
SUPPLY AIR TEMPERATURE	AI-2	TT-SA																	●												●	●																●		●	
SUPPLY AIR FLOW (CFM)	AI-3	FT																				●									●	●																●		●	
VAV DAMPER	AO-1	D-1									●										●																											●		●	
REHEAT COIL VALVE	AO-2	V-1								●											●																											●		●	

2 POINTS LIST FOR VAV AIR TERMINAL UNITS AND SUPPLEMENTAL HEAT
NTS

JOB: BUILDING: VA IRON MOUNTAIN, MI			POINT LEGEND		SYSTEM OUTPUTS: BINARY			SYSTEM OUTPUTS: ANALOG				SYSTEM INPUTS: BINARY							SYSTEM INPUTS: ANALOG									SYSTEM SOFTWARE/CONTROL: ALARM PROCESSING							SYSTEM SOFTWARE/CONTROL: APPLICATION/FUNCTION																PAGE:
SYSTEM: GENERAL CONTROL POINTS 2ND FLOOR SURGERY & SURGERY CENTER FLOW AND PRESSURIZATION SYSTEM COMPONENT:	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE NO.	--	ELECTRIC DEVICE	START/STOP	OPEN/CLOSE	--	SPEED COMMAND	VALVE POSITION	DAMPER POSITION	STATUS	ALARM	PRESSURE / DIFF PRESS	HIGH HUMIDITY	HI/LOW STATIC/DIFF PRESS	LOW TEMPERATURE	--	TEMPERATURE (TI)	PRESSURE	POSITION	FLOW	PERCENT	STATIC PRESSURE	CARBON MONOXIDE	HUMIDITY	VACUUM	Local Alarm Panel	Area Alarm Panel	Master Alarm Panel	HIGH LIMIT	LOW LIMIT	--	--	SCHEDULE START/STOP	FUNCTION	DUTY CYCLE	TEMPERATURE ECONOMIZER	ENTHALPY ECONOMIZER	TEMPERATURE RESET	DEMAND LIMITING	TEMPERATURE OVERRIDE	STATIC PRESSURE RESET	--	--	PRESSURE/VOLUME CONTROL	FAILURE MODE	SPACE TEMP. CONTROL	FULL COMMUNICATION	TRENDING	REMARKS
ROOM SUPPLY AIRFLOW (CFM)	AI-1	SAF																				●									●	●																		●	1-5; THERMAL UNIT
CONSTRUCTION AREA PRESSURE	AI-3	PS																		●								●			●	●																		●	6

REMARKS:
1. SEE AIR BALANCE SCHEDULES FOR PROGRAMMING SETPOINTS.

3 POINTS LIST FOR ROOM AIR BALANCE MONITORING

75% Construction Documents	10/03/2013
Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: MECHANICAL CONTROLS DIAGRAMS
Approved: Project Director

Project Title: EXPAND IMAGING
Location: IRON MOUNTAIN, MICHIGAN
Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112
Building Number: 1
Drawing Number: M701
Dwg. 81 of 107

Office of Construction and Facilities Management
Department of Veterans Affairs

VA FORM 08-6231, OCT 1978

CONTROLS SYMBOLS

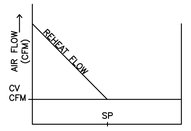
T	ROOM THERMOSTAT/TRANSMITTER – WALL MOUNT
M	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER – WALL MOUNT
TT	TEMPERATURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
MT	MOISTURE (HUMIDITY) TRANSMITTER
PT	PRESSURE TRANSMITTER
SPS	STATIC PRESSURE SENSOR
FT	FLOW TRANSMITTER
IT	CURRENT TRANSMITTER
CT	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)
LC	LEVEL CONTROLLER
LT	LEVEL TRANSMITTER

CONTROLS SYMBOLS

PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
AT CO2	CARBON DIOXIDE TRANSMITTER
AT CO	CARBON MONOXIDE TRANSMITTER
AT OC	OCCUPANCY SENSOR
LTCP	LOCAL TEMPERATURE CONTROL PANEL
HVAC	HVAC CONTROL PANEL
VSMC	VARIABLE SPEED MOTOR CONTROLLER
FACP	FIRE ALARM CONTROL PANEL
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
KC	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE

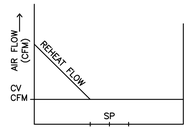
CONTROLS SYMBOLS

	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



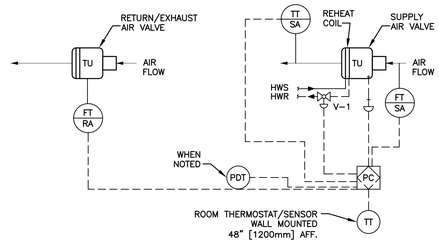
CV VALVE CONTROL SEQUENCE
NO DEADBAND

A. UPON FALL IN SPACE TEMPERATURE BELOW SET POINT VALVE V–1 WILL MODULATE TO MAINTAIN SET POINT ± .5°, THE ADJUSTABLE TOLERANCE OF ± .5° HAS BEEN SELECTED TO PREVENT VALVE HUNTING
B. THE REVERSE SHALL OCCUR ON RISE IN SPACE TEMPERATURE.



CV VALVE CONTROL SEQUENCE
W/DEADBAND

A. SET POINTS SHALL SET AS FOLLOWS:
COOLING 75° F (ADJ)
HEATING 70° F (ADJ)
DEADBAND OF 5° F BETWEEN HEATING AND COOLING SET POINT WILL BE MAINTAINED
B. UPON FALL IN SPACE TEMPERATURE BELOW SET POINT VALVE V–1 WILL MODULATE TO MAINTAIN SET POINT ± .5°,THE ADJUSTABLE TOLERANCE OF ± .5° HAS BEEN SELECTED TO PREVENT VALVE HUNTING
C. THE REVERSE SHALL OCCUR ON RISE IN SPACE TEMPERATURE.



2 CONSTANT VOLUME AIR FLOW CONTROL VALVE DIAGRAM

NTS

| SYSTEM: CAV TERMINAL UNITS | | | POINT LEGEND | SYSTEM OUTPUTS | | SYSTEM INPUTS | | |

CONTROLS SYMBOLS

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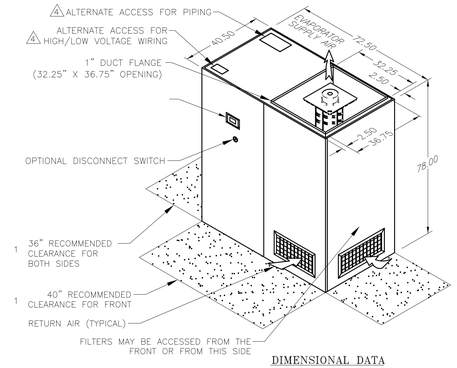
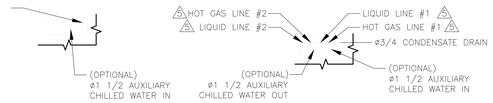
	MOTOR STARTER
M	ELECTRIC OPERATED CONTROL DAMPER/OR VALVE

NOTES:

1. DIMENSIONS NOTED ARE THE MINIMUM CLEARANCES REQUIRED BY THE FACTORY. CONSULT LOCAL BUILDING CODES AND NEC FOR ADDITIONAL CLEARANCE REQUIREMENTS.
2. ALL PIPING TERMINATES INSIDE OF CABINET.
3. NOT ALL COMPONENTS AND OPTIONS ARE SHOWN. LOCATIONS MAY VARY DEPENDING ON OPTIONS.
4. OPENINGS ARE NOT PROVIDED FOR ALTERNATE ACCESS LOCATIONS.
5. SEE TABLE FOR CONNECTION PIPE SIZES.



DIMENSIONAL DATA



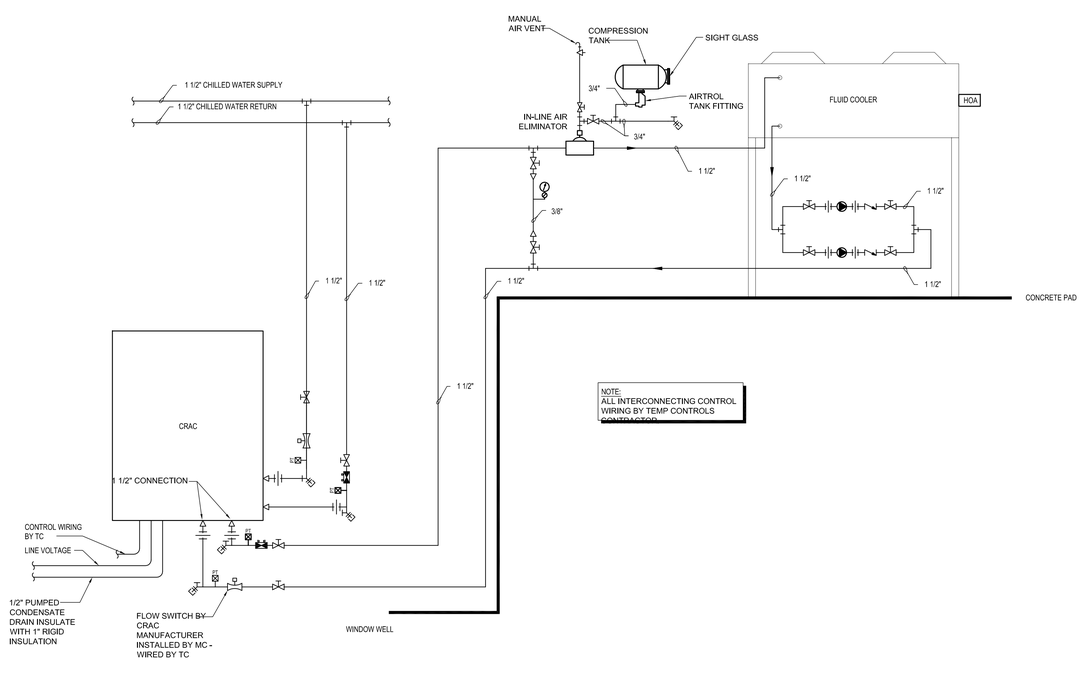
WATER/GLYCOL COOLED AIR COOLED

1 COMPUTER ROOM COOLING UNIT

NTS

CRAC-1, CRAC-2 INPUT/OUTPUT SUMMARY

SYSTEM, APPARATUS OR AREA POINT DESCRIPTION	INPUTS – ANALOG – MEASURED: TEMPERATURE	RELATIVE HUMIDITY	STATIC PRESSURE	DIFFERENTIAL PRESSURE	AIR FLOW (CFM)	CURRENT	DAMPER POSITION FEEDBACK	INPUTS – ANALOG – CALC.: ENTHALPY	RUN TIME	EFFICIENCY	INPUTS – DIGITAL: TEMPERATURE SWITCH	PRESSURE SWITCH	FLOW SWITCH	END SWITCH	CURRENT SWITCH	SMOKE EETECTOR	FREEZE STAT	STATUS	OUTPUTS – ANALOG: VALVE MODULATION	DAMPER MODULATION	VFD MODULATION	SET POINT ADJUST.	OUTPUTS – DIGITAL: START/STOP	OPEN/CLOSE	HOA/LOW	SYSTEM FEATURES – ALARMS: HIGH ANALOG	LOW ANALOG	HIGH DIGITAL	LOW DIGITAL	PROOF	PROGRAMS: TIM SCHEDULING	DEMAND LIMITING	DUTY CYCLE	START/STOP OPT.	ENTHALPY OPT.	SMOKE CNT.	TREND	ALARM INSTRUCT	MAINT. WRK. ORD.	REMARKS
UNIT STATUS																															X										X		ALL POINTS MONITORED BY SIEMENS BAS SHALL BE VIA BACNET INTEGRATION.
SPACE TEMPERATURE																									X	X															X		
SPACE RELATIVE HUMIDITY																									X	X															X		
COMPRESSOR STATUS																															X										X		
ELECTRIC REHEAT STAUTUS																															X										X		
MOISTURE ALARM (DRAIN PAN)																													X												X		
UNIT ALARM																												X	X												X		
MOISTURE ALARM (REMOTE SENSOR)																													X												X		
SHARED SUPPLY AIR MOTORIZED DAMPER															X									X																		



2 COMPUTER ROOM UNIT FLOW DIAGRAM

NTS

Revisions:	Date
75% Construction Documents	10/03/2013

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5668 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title	MECHANICAL CONTROLS DIAGRAMS
Project Title	EXPAND IMAGING
Project Number	585-12-112
Building Number	1
Approved: Project Director	
Location	IRON MOUNTAIN, MICHIGAN
Date	10/03/2013
Checked	JAU
Drawn	DLK
Drawing Number	M703
Dwg. 83 of 107	

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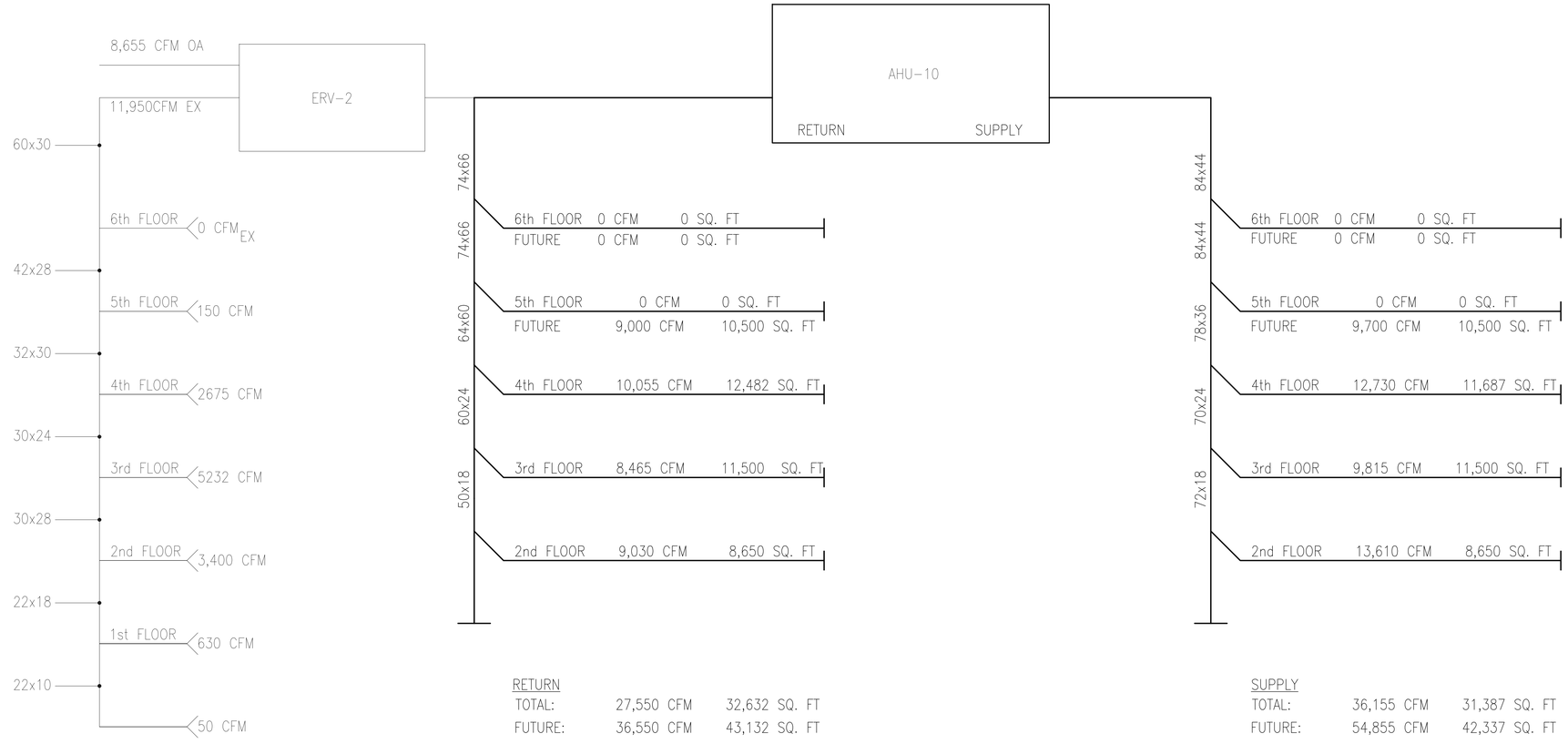

RETURN

TOTAL:	27,550 CFM	32,632 SQ. FT
FUTURE:	36,550 CFM	43,132 SQ. FT

SUPPLY

TOTAL:	36,155 CFM	31,387 SQ. FT
FUTURE:	54,855 CFM	42,337 SQ. FT

75% Construction Documents	10/03/2013
Revisions:	Date

CONSULTANTS:

MEP ASSOCIATES, LLC
engineers | consultants | commissioning
MEP Associates, LLC | 2720 Arbor Court | Eau Claire, WI 54701
Phone: 715.832.5680 | Fax: 715.832.5648 | www.mepassociates.com
MEP PROJECT NO.: N08.12.05

ARCHITECT/ENGINEERS:

NORTHERN DESIGN WORKS
420 RAIL STREET
NEGAUNEE, MI 49866
PHONE: 906-475-6616
FAX: 906-475-6954
NDW PROJECT NUMBER: 1211

Drawing Title: AIRFLOW RISER DIAGRAM

Approved: Project Director

Project Title: EXPAND IMAGING

Location: IRON MOUNTAIN, MICHIGAN

Date: 10/03/2013 | Checked: JAU | Drawn: DLK

Project Number: 585-12-112

Building Number: 1

Drawing Number: M704

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Department of Veterans Affairs

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