ABBREVIATIONS

A/E	ARCHITECT/ENGINEER
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AP	ACCESS PANEL
CC	COOLING COIL
CD	CEILING DIFFUSER
CW	COLD WATER
Db	DRY BULB TEMPERATURE
DX	DIRECT EXPANSION
E/A	EXHAUST AIR
ES	ELECTRIC POWER SUPPLY
EXIST.	EXISTING
FC	FLEXIBLE CONNECTION
F.D.	FLOOR
FLR.	FIRE DAMPER
HC	HEATING COIL
HOA	HAND OFF AUTO
HP	HORSEPOWER
HV	HEATING AND VENTILATING UNIT
LPR	CONDENSATE RETURN
LPS	LOW PRESSURE STEAM
LBS/HR	POUNDS PER HOUR
MB	MIXING BOX
MAX.	MAXIMUM
MIN.	MINIMUM
O/A	OUTDOOR AIR
OAI	OUTDOOR AIR INTAKE
PD	PRESSURE DROP
RA	RETURN AIR
RF	RETURN FAN
RH	RELATIVE HUMIDITY
SA	SUPPLY AIR
SHU	STEAM HUMIDIFIER UNIT
SP	STATIC PRESSURE
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
VI	VIBRATION ISOLATOR
Wb	WET BULB TEMPERATURE
WF	WATER FILTER
WG	WATER GAGE
W/	WITH
WMS	WIRE MESH SCREEN

PIPING SYMBOLS

- EXISTING CONSTRUCTION
- NEW CONSTRUCTION
- 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
- STRAINER
- THERMOMETER
- PRESSURE GAGE
- (F&TT) FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES
- GATE VALVE
- CHECK VALVE
- BALL VALVE
- STRAIGHT-THRU MODULATING CONTROL VALVE
- SOLENOID VALVE (LIQUID)
- STRAINER WITH VALVED DRAIN AND QUICK-COUPLE HOSE CONNECTOR

LEGENDS

- EXISTING ITEMS TO BE REMOVED
- POINT OF CONNECTION BETWEEN NEW AND EXISTING WORK
- LIMIT OF DEMOLITION

CONTROL SYMBOLS

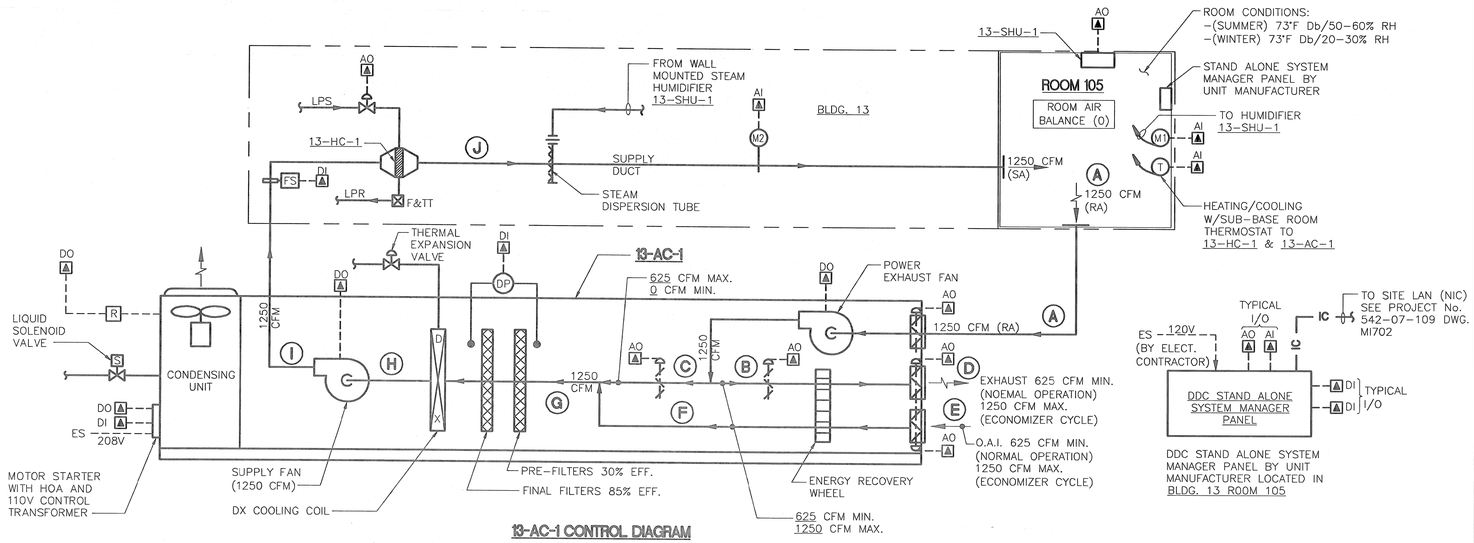
- AO — ANALOG OUTPUT FROM CONTROLLER
- AI — ANALOG INPUT TO CONTROLLER
- DO — DIGITAL OUTPUT FROM CONTROLLER
- DI — DIGITAL INPUT TO CONTROLLER
- FS — AIRFLOW SWITCH
- R — ELECTRIC RELAY
- M — ROOM HUMIDISTAT (MOISTURE)
- T — ROOM THERMOSTAT

DRAWING SYMBOLS

- 2 / MH1 — DETAIL NUMBER / DRAWING NUMBER WHERE DRAWN
- A / MH1 — SECTION LETTER / DRAWING NUMBER WHERE SHOWN
- BUILDING NO. WHERE EQUIPMENT IS LOCATED.
- AIR CONDITIONING UNIT
- 13-AC-1 — UNIT NO.1 IN BUILDING NO.13
- TYPICAL UNIT NO.

DUCTWORK SYMBOLS

- EXISTING DUCT TO REMAIN
- EXISTING DUCT TO BE REMOVED
- 10x8 — NEW DUCT (WIDTH x DEPTH)
- UP / DN — SUPPLY DUCT (UP & DOWN)
- UP / DN — RETURN DUCT (UP & DOWN)
- UP / DN — EXHAUST DUCT (UP & DOWN)
- ROUND AND SQUARE CEILING DIFFUSERS
- SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN REGISTER OR TOP GRILLE (WALL TYPE)
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
- VANED ELBOW (SHORT RADIUS)
- STANDARD RADIUS ELBOW
- 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.
- DUCT MOUNTED COIL (HOT WATER OR STEAM COIL)
- R — INCLINED RISE, IN DIRECTION OF AIR FLOW
- D — INCLINED DROP, IN DIRECTION OF AIR FLOW
- FC — FLEXIBLE CONNECTION
- FLEXIBLE DUCTWORK (INSULATED)
- VD — MANUAL VOLUME DAMPER
- FD — FIRE DAMPER



13-AC-1 CONTROL DIAGRAM

(13-AC-1) SEQUENCE OF OPERATION:

1. 13-AC-1 IS A PACKAGE OUTDOOR MOUNTED ON GRADE CONSTANT VOLUME RECIRCULATING AIR CONDITIONING UNIT WITH DX COOLING COIL, SUPPLY FAN, COMPLETE WITH ENERGY RECOVERY WHEEL, ECONOMIZER SYSTEM, POWERED RETURN/EXHAUST FAN, EXHAUST GOOSENECK, OUTDOOR AIR INTAKE HOOD, EXHAUST/RETURN, O.A. DAMPERS AND FACTORY BUILT IN CONTROLS SYSTEM SUPPLYING CONDITIONED AIR TO BUILDING 13 ROOM 105.
2. MOTOR STARTER SHALL BE PROVIDED WITH H-O-A SWITCH BY THE UNIT MANUFACTURER. IN THE OFF POSITION, THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL BE CLOSED. RETURN AIR DAMPER SHALL BE OPEN AND THE CONDENSING UNIT SHALL BE DISABLED.
3. IN THE HAND POSITION, THE OUTSIDE AIR DAMPER SHALL BE OPEN AND THE FANS WILL RUN, HAND OPERATION SHALL BE LIMITED FOR START-UP AND SERVICE.
4. NORMAL OPERATION IS IN AUTO POSITION, WHERE THE SYSTEM OPERATION IS CONTROLLED BY THE AUTOMATIC CONTROL SYSTEM THROUGH THE DIGITAL STAND ALONE SYSTEM MANAGER PANEL BY THE UNIT MANUFACTURER LOCATED IN ROOM 105. DIGITAL STAND ALONE SYSTEM MANAGER ALSO CONTROLS THE ENERGY RECOVERY WHEEL OPERATION, IT ALSO CONTROLS ECONOMIZER SYSTEM OPERATIONS BASED ON OUTDOOR AIR TEMPERATURE AND ENTHALPY CONDITIONS.
5. HEATING ROOM THERMOSTAT THROUGH THE DIGITAL STAND ALONE SYSTEM MANAGER PANEL VIA A PANEL MOUNTED OUTSIDE AIR CONTROLLER SHALL MODULATE THE STEAM HEATING COIL 13-HC-1 CONTROL VALVE TOWARDS OPEN POSITION WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 60°F (ADJ.). AT THIS CONDITION, ONLY THE SUPPLY AND POWER EXHAUST FANS SHALL RUN AND THE CONDENSING UNIT SHALL BE OFF. THE STEAM CONTROL VALVE SHALL BE FULLY OPEN WHEN OUTSIDE AIR TEMPERATURE IS 40°F AND BELOW TO MAINTAIN 73°F (ADJUSTABLE) ROOM TEMPERATURE DURING WINTER. COOLING ROOM THERMOSTAT SHALL ENABLE 13-AC-1 SYSTEM INCLUDING THE CONDENSING UNIT AND MODULATE THE DX COOLING COIL CONTROL VALVE TO MAINTAIN 73°F (ADJUSTABLE) ROOM TEMPERATURE DURING SUMMER.
6. AIRFLOW SWITCH FS SHALL DISABLE STEAM HUMIDIFIER 13-SHU-1 WHENEVER IT SENSES NO AIRFLOW IN THE SUPPLY DUCT.
7. PROVIDE HUMIDITY CONTROLLER WHICH SHALL MODULATE THE STEAM HUMIDIFIER 13-SHU-1 VIA HIGH LIMIT HUMIDISTAT (M2), TO MAINTAIN ROOM HUMIDISTAT, (M1) THROUGH THE DIGITAL STAND ALONE SYSTEM MANAGER PANEL TO MAINTAIN 30% RH (MAX) IN THE ROOM DURING WINTER. HUMIDIFIER 13-SHU-1 SHALL BE DISABLED WHENEVER 13-AC-1 IS OFF.
8. PROVIDE MAGNEHELIC GAUGES ACROSS FILTERS, TO INDICATE FILTERS MEDIA CHANGED.
9. PROVIDE PANEL RUNNING LIGHTS TO INDICATE UNIT OPERATION.
10. THE UNIT VENDOR SHALL PROVIDE UNIT SYSTEM CONTROLS AS NECESSARY TO ACHIEVE THE SEQUENCE OF OPERATION AND CONTROL STRATEGY HEREIN DESCRIBED, FOR COMPLETE FUNCTIONAL SYSTEM OPERATION.

(A) 1250 CFM
(SUMMER) – 73°F Db/60.9°F Wb/50% RH
(WINTER) – 73°F Db/55°F Wb/30% RH
(ECONOMIZER) – 73°F Db/20-50% RH

(B) 625 CFM
(SUMMER) – 73°F Db/60.9°F Wb/50% RH
(WINTER) – 73°F Db/55°F Wb/30% RH
(ECONOMIZER) – 1250 CFM

(C) 625 CFM
(SUMMER) – 73°F Db/60.9°F Wb/50% RH
(WINTER) – 73°F Db/55°F Wb/30% RH
(ECONOMIZER) – 0 CFM

(D) 625 CFM
(SUMMER) – 85.8°F Db/69.5°F Wb
(WINTER) – 25°F Db/21°F Wb
(ECONOMIZER) – 1250 CFM

(E) 625 CFM
(SUMMER) – 92°F Db/74°F Wb
(WINTER) – 2°F Db/1°F Wb
(ECONOMIZER) – 1250 CFM

(F) 625 CFM
(SUMMER) – 79°F Db/66°F Wb
(WINTER) – 50°F Db/37°F Wb
(ECONOMIZER) – 1250 CFM

(G) 1250 CFM
(SUMMER) – 76°F Db/63.6°F Wb
(WINTER) – 61.5°F Db/43.8° Wb
(ECONOMIZER) – 1250 CFM

(H) 1250 CFM
(SUMMER) – 44.6°F Db/44.4°F Wb
(WINTER) – 61.5°F Db
(ECONOMIZER) – 1250 CFM

(I) 1250 CFM
(SUMMER) – 47°F Db/45.6°F Wb
(WINTER) – 61.5°F Db
(ECONOMIZER) – 1250 CFM

(J) 1250 CFM
(SUMMER) – 47°F Db/45.6°F Wb
(WINTER) – 90°F Db
(ECONOMIZER) – 1250 CFM

Revisions	Date

A/E SEAL

A/E ADDRESS

CHU AND GASSMAN, INC
1528 WALNUT ST., SUITE 625, PHILADELPHIA, PA 19102
T. (215) 356-0912 F. (732) 563-4549
559 UNION AVENUE, MIDDLESEX, NJ 08846
T. (732) 563-4550 F. (732) 563-4549

FINAL CONSTRUCTION DOCUMENTS

Drawing Title: MECHANICAL SYMBOLS, ABBREVIATIONS, CONTROL DIAGRAM AND SEQUENCE OF OPERATION		Project Title: VAMC ENVIRONMENTAL CONTROLS	Date: 2/15/2012
			Project No.: 542-08-114
Approved: Chief Engineering Service: Michael Carcanague	Drawn: T. CHU	Building Number	DRAWING No.: MG001
Approved: Medical Center Director: Gary W. Devansky	Checked: D. GABRIEL	Location: COATESVILLE, PENNSYLVANIA	Dwg.2 Of 17

VA