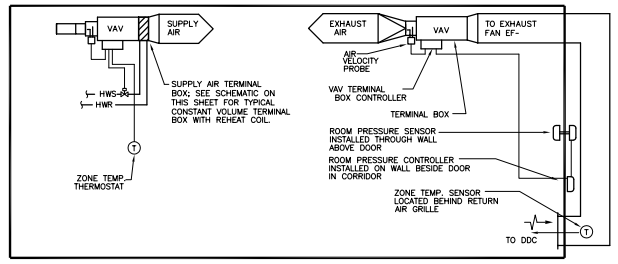
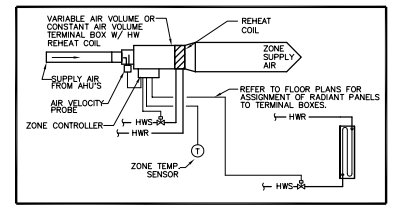
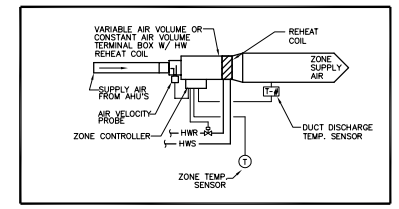


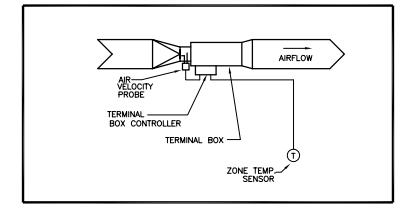
ISOLATION ROOM CONTROL SCHEMATIC



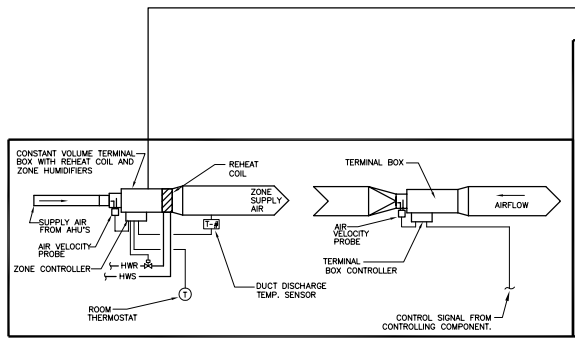
VAV & CV TERMINAL BOXES WITH HW REHEAT COILS AND RADIANT PANELS



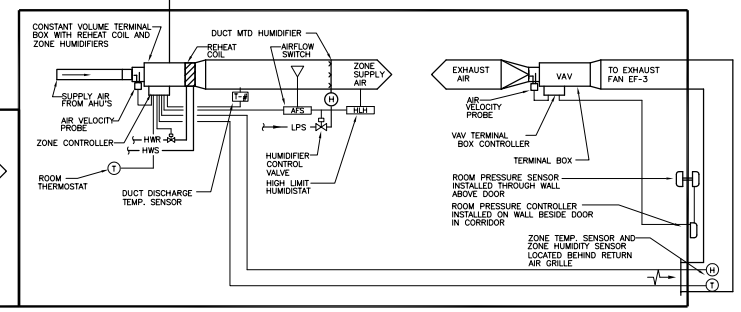
VAV & CV TERMINAL BOXES WITH HOT WATER REHEAT COILS



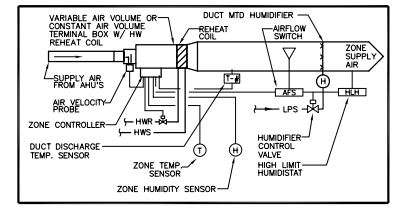
SUPPLY AIR VAV TERMINAL BOXES WITHOUT HOT WATER REHEAT COILS



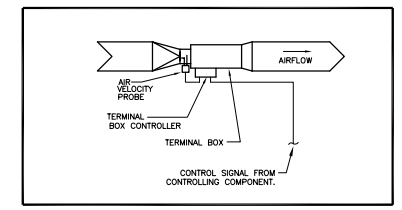
ISOLATION ANTE-ROOM CONTROL SCHEMATIC



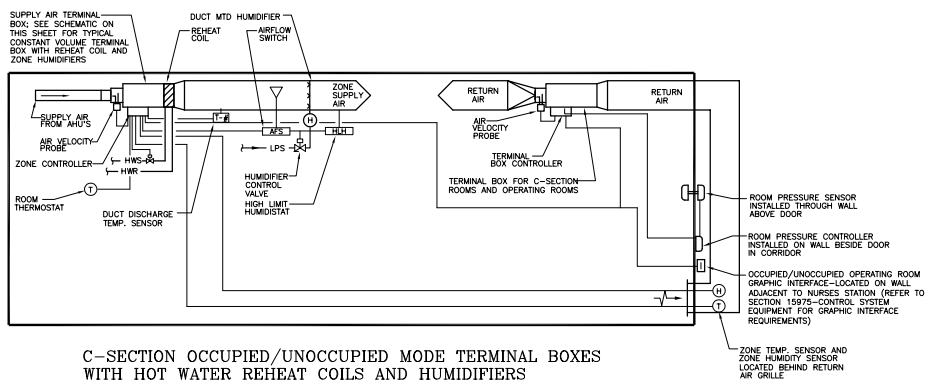
ISOLATION ROOM WITH HUMIDIFIER CONTROL SCHEMATIC



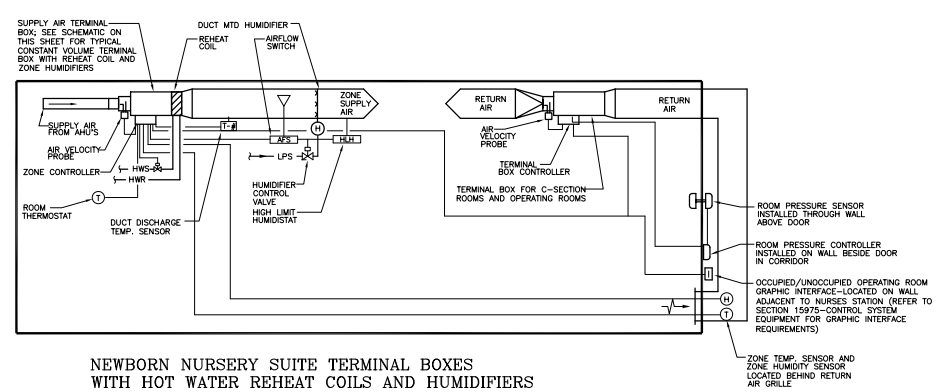
VAV & CV TERMINAL BOXES WITH HOT WATER REHEAT COILS AND ZONE HUMIDIFIERS



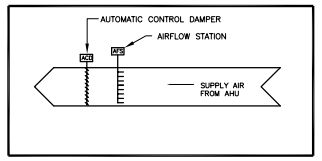
EXHAUST AND RETURN AIR VAV TERMINAL BOXES



C-SECTION OCCUPIED/UNOCCUPIED MODE TERMINAL BOXES WITH HOT WATER REHEAT COILS AND HUMIDIFIERS



NEWBORN NURSERY SUITE TERMINAL BOXES WITH HOT WATER REHEAT COILS AND HUMIDIFIERS



CV SUPPLY AIR WITH AUTOMATIC CONTROL DAMPER AND AIR FLOW STATION (BASEMENT FLOOR)

INPUT/OUTPUT SUMMARY TABLE-TERMINAL BOXES

DESCRIPTION	INPUTS: ANALOG: SPACE TEMPERATURE	SPACE HUMIDITY	DAMPER POSITION	HEAT/COOL VALVE POSITION	DISCHARGE AIR TEMP. SENSOR	FLOW METER	CO2 SENSOR	INPUTS: BINARY: DIGITAL SELECTION	OUTPUTS: ANALOG: MODULATE DAMPER (DIRECT)	MODULATE DAMPER (REVERSE)	MODULATE DAMPER (RETURN)	OUTPUTS: BINARY: CONTROL RELAY	STATUS LED	2-POSITION DAMPER MOD.	ALARMS: HIGH LIMIT (TEMP)	LOW LIMIT (TEMP)	LOW LIMIT (HUMID.)	FLOW PRESSURE ALARM	FEATURES: TEMPERATURE RESET (PULLUP)	DEMAND START (QUIET)	DUCT FOLLOW DELAY	ECONOMIZER CYCLE (D.B.)	ZONE TEMPERATURE	MAX CONTROL	ZONE TEMP. SENSOR	TENANT OVERRIDE	TENANT LOCKOUT	FLOW LOG
CONSTANT VOLUME TERMINAL BOX WITH REHEAT	●		●			●			●	●					●	●								●	●		●		
VARIABLE VOLUME SUPPLY TERMINAL BOX WITHOUT REHEAT	●		●						●						●	●									●	●	●	●	
VARIABLE VOLUME TERMINAL BOX WITH REHEAT	●		●			●			●	●					●	●									●	●	●	●	
C-SECTION SUPPLY TERMINAL BOX W/ REHEAT & HUMIDIFIER	●	●	●			●			●	●					●	●	●	●							●	●	●	●	
C-SECTION OCCUPIED/UNOCCUPIED RETURN TERMINAL BOX			●									●													●	●	●	●	
ISOLATION ROOM SUPPLY TERMINAL BOX	●		●			●	●		●	●					●	●		●							●	●	●	●	
VAV TERMINAL BOX WITH REHEAT & HUMIDIFIER	●	●	●			●			●	●					●	●	●	●							●	●	●	●	
VAV TERMINAL BOX WITH REHEAT & RADIANT PANELS	●	●	●			●			●	●					●	●	●	●							●	●	●	●	
ISOLATION ROOM EXHAUST TERMINAL BOX			●									●													●	●	●	●	
NURSERY SUPPLY TERMINAL BOX W/ REHEAT & HUMIDIFIER	●	●	●			●			●	●					●	●	●	●							●	●	●	●	
SUPPLY AIR WITH ACD AND AFS			●						●																●		●	●	

SEQUENCE OF OPERATION - TERMINAL BOXES

A. GENERAL

1. VARIABLE AIR VOLUME CONSTANT AIR VOLUME TERMINALS WITH AND WITHOUT REHEAT COILS SHALL BE PRESSURE INDEPENDENT TYPE, USING AN INLET AIR VELOCITY PROBE TO MAINTAIN STEADY AIRFLOW AT STEADY STATE WITH SYSTEM UPSTREAM PRESSURE VARYING BETWEEN MINIMUM AND MAXIMUM RATED STATIC PRESSURE. ZONE CONTROLLER SHALL MODULATE VOLUME CONTROL DAMPER TO MAINTAIN AIR VELOCITY SETPOINT. THE ZONE CONTROLLER SHALL MAINTAIN SPACE TEMPERATURE SETPOINT (AS SENSED BY ZONE TEMPERATURE SENSOR) BY RESETTING THE AIR VELOCITY SETPOINT.

2. PROVIDE DISCHARGE TEMPERATURE SENSORS ON ALL SUPPLY TERMINAL BOXES WITH RE-HEAT COILS FOR MONITORING TERMINAL BOX DISCHARGE AIR TEMPERATURE

B. VARIABLE AIR VOLUME SUPPLY AIR TERMINAL BOXES WITHOUT HOT WATER REHEAT COILS

1. THE ZONE CONTROLLER SHALL INCREASE VAV TERMINAL BOX AIRFLOW ON A RISE IN SPACE TEMPERATURE. UPON A DROP IN SPACE TEMPERATURE BELOW THE SETPOINT, THE TERMINAL BOX SHALL MODULATE TOWARD ITS MINIMUM POSITION.

C. VARIABLE AIR VOLUME EXHAUST AND RETURN AIR TERMINAL BOXES

1. THE ZONE CONTROLLER SHALL INCREASE VAV TERMINAL BOX AIRFLOW BASED ON THE INPUT CONTROL SIGNAL AS OUTLINED IN THEIR APPLICATION SPECIFIC SEQUENCES.

D. VARIABLE AIR VOLUME TERMINAL BOXES WITH HOT WATER REHEAT COILS

1. THE ZONE CONTROLLER SHALL INCREASE VAV TERMINAL BOX AIRFLOW ON A RISE IN SPACE TEMPERATURE. UPON A DROP IN SPACE TEMPERATURE BELOW THE SETPOINT, THE TERMINAL BOX SHALL MODULATE TOWARDS ITS MINIMUM POSITION. UPON AN ADDITIONAL CALL FOR HEAT, THE ZONE CONTROLLER SHALL MODULATE THE ASSOCIATED HOT WATER REHEAT COIL VALVE OPEN.

E. CONSTANT AIR VOLUME TERMINAL BOXES WITH HOT WATER REHEAT COILS

1. THE CONSTANT VOLUME TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW TO THE SPACE BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO AN AIRFLOW SENSOR SIGNAL. UPON A DROP IN SPACE TEMPERATURE, THE ZONE CONTROLLER SHALL MODULATE THE HOT WATER REHEAT COIL VALVE OPEN.

F. CONSTANT VOLUME OR VARIABLE VOLUME TERMINAL BOX WITH HUMIDIFIER AND REHEAT COIL

1. SUPPLY TERMINAL WITH REHEAT SHALL OPERATE AS DESCRIBED ABOVE. SPACE HUMIDITY SENSOR SHALL MAINTAIN SETPOINT BY MODULATING HUMIDIFIER ACTUATOR. AIRFLOW SWITCH (AFS) AND HIGH LIMIT DUCT HUMIDISTAT (HLH) SHALL LIMIT SIGNAL ON LACK OF AIRFLOW AND/OR HIGH DUCT HUMIDITY (>80%), RESPECTIVELY. THE HUMIDIFIER CONTROL SHALL BE INTERLOCKED WITH THE OPERATION OF THE AIR HANDLER TO PREVENT OPERATION OF THE HUMIDIFIER WHEN THE AHU IS DISABLED.

G. CONSTANT/VARIABLE AIR VOLUME TERMINAL BOXES WITH HOT WATER REHEAT COILS AND RADIANT PANEL VALVES

1. THE TERMINAL BOX SHALL FUNCTION AS A CONSTANT OR VARIABLE AIR VOLUME CONTROL AS DESCRIBED ABOVE. WHEN THE TERMINAL IS AT MINIMUM (OR CONSTANT) AIRFLOW AND SPACE TEMPERATURE IS BELOW SETPOINT,THE HOT WATER REHEAT VALVE WILL MODULATE OPEN. WHEN THE SIGNAL TO THE REHEAT VALVE IS 50% (ADJUSTABLE), THE RADIANT PANEL VALVE WILL BEGIN TO MODULATE OPEN.

H. ISOLATION ROOM SUPPLY TERMINAL BOXES AND EXHAUST TERMINAL BOXES (ISOLATION ROOMS)

1. THE SUPPLY TERMINAL SHALL OPERATE AS A CONSTANT VOLUME AIR VOLUME TERMINAL WITH REHEAT COIL (SEE "E" ABOVE).

2. THE EXHAUST TERMINAL BOX SHALL MODULATE EXHAUST VOLUME BETWEEN THE MIN AND 100% OPEN POSITIONS TO MAINTAIN A NEGATIVE PRESSURE OF 0.01" W.G. (ADJUSTABLE) AS SENSED BY ROOM PRESSURE SENSOR MOUNTED THROUGH THE CORRIDOR WALL. THE DAMPER SHALL OPEN AS THE PRESSURE IN THE ROOM INCREASES TOWARD 0.01" W.G. AND SHALL CLOSE AS THE PRESSURE DECREASES TO LESS THAN 0.01" W.G. A ROOM PRESSURE MONITOR/CONTROLLER MOUNTED IN THE CORRIDOR (ADJACENT TO THE ISOLATION ROOM DOOR) SHALL DISPLAY ROOM PRESSURE AND SHALL PERFORM CONTROL FUNCTIONS INCLUDING SETPOINT ADJUSTMENT. THE PANEL SHALL SEND AND ALARM TO THE DDC OPERATOR WORKSTATION WHENEVER THE PRESSURE SETPOINT CANNOT BE MAINTAINED FOR A PERIOD GREATER THAN 30 SECONDS (ADJ.).

3. DDC ZONE CONTROLLER ON THE EXHAUST AIRFLOW TERMINAL BOX SHALL ISSUE AN ALARM TO THE DDC SYSTEM IN THE EVENT THAT THE CONTROLLER IS CALLING FOR INCREASED EXHAUST AND THE AIRFLOW CONTROL VALVE IS AT MAXIMUM OPEN POSITION.

I. C-SECTION ROOM OCCUPIED MODE CONSTANT AIR VOLUME TERMINAL BOXES WITH ZONE-CONTROLLED HOT WATER REHEAT COILS AND ZONE HUMIDIFIERS.

1. THE SUPPLY AIR TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW TO THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO AN AIRFLOW SENSOR SIGNAL. UPON A DROP IN SPACE TEMPERATURE, THE ZONE CONTROLLER SHALL MODULATE THE HOT WATER REHEAT COIL VALVE OPEN.

2. SPACE HUMIDITY SENSOR SHALL MAINTAIN SETPOINT BY MODULATING HUMIDIFIER ACTUATOR. AIRFLOW SWITCH (AFS) AND HIGH LIMIT DUCT HUMIDISTAT (HLH) SHALL LIMIT SIGNAL ON LACK OF AIRFLOW AND/OR HIGH DUCT HUMIDITY (>80%), RESPECTIVELY.

3. THE RETURN AIR TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW FROM THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO THE AIRFLOW SENSOR SIGNAL. THE DDC SYSTEM SHALL MONITOR INDIVIDUAL C-SECTION ROOM SUPPLY AIRFLOW AS SENSED BY THE ASSOCIATED C-SECTION ROOM SUPPLY TERMINAL BOX AND CALCULATE A RETURN AIRFLOW SETPOINT BY SCALING THE MONITORED C-SECTION ROOM SUPPLY AIR CFM TO ALLOW POSITIVE PRESSURIZATION IN THE ROOM AT ALL TIMES. (THE POSITIVE PRESSURIZATION SHALL BE BASED ON THE DIFFERENCE BETWEEN THE SUPPLY AND RETURN AIR VOLUME FOR THE ASSOCIATED TERMINAL BOX AS INDICATED IN THE "MAX CFM" COLUMN OF THE TERMINAL BOX SCHEDULE ON DRAWING H704)

J. C-SECTION ROOM UNOCCUPIED MODE CONSTANT AIR VOLUME TERMINAL BOXES WITH ZONE-CONTROLLED HOT WATER REHEAT COILS AND ZONE HUMIDIFIERS.

1. PROVIDE A GRAPHICAL INTERFACE LOCATED AT THE C-SECTION SUITE NURSES STATION TO ALLOW ANY C-SECTION ROOM TO BE PLACED IN THE OCCUPIED OR UNOCCUPIED MODE AT ANY TIME. THE SYSTEM SHALL INITIALLY BE SET TO OCCUPIED MODE.

2. EACH C-SECTION ROOM SHALL BE PROVIDED WITH AN OVERRIDE SWITCH ON THE TEMPERATURE SENSOR TO SWITCH THE ROOM INTO OCCUPIED MODE AT ANY TIME. IN ADDITION THE GRAPHIC INTERFACE SHALL BE CAPABLE OF SWITCHING ANY ROOM INTO THE UNOCCUPIED OR OCCUPIED MODE AT ANY TIME. ONCE A ROOM HAS BEEN SWITCHED FROM UNOCCUPIED TO OCCUPIED MODE, A 12 HOUR LOCKOUT SHALL BE ENGAGED TO PROHIBIT THE INADVERTENT SWITCHING OF THE ROOM INTO THE UNOCCUPIED MODE DURING AN OPERATION. AFTER THE LOCKOUT TIME HAS EXPIRED THE ROOM SHALL REVERT BACK TO THE NORMALLY SCHEDULED OCCUPIED OR UNOCCUPIED MODE.

3. THE PRIMARY AIR SUPPLY TERMINAL FOR THE C-SECTION ROOMS SHALL MODULATE TO THE MINIMUM SUPPLY CFM AS INDICATED IN THE "MIN CFM" COLUMN OF THE TERMINAL BOX SCHEDULE ON DRAWING H704. THE PRIMARY AIR SUPPLY TERMINAL BOX SHALL MAINTAIN THE MINIMUM AIR FLOW TO THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO AN AIR FLOW SENSOR SIGNAL. UPON A DROP IN SPACE TEMPERATURE, THE ZONE CONTROLLER SHALL MODULATE THE HOT WATER REHEAT COIL VALVE OPEN.

4. THE RETURN AIR TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW FROM THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO THE AIRFLOW SENSOR SIGNAL. THE DDC SYSTEM SHALL MONITOR INDIVIDUAL C-SECTION ROOM SUPPLY AIRFLOW AS SENSED BY THE C-SECTION ROOM SUPPLY TERMINAL BOX AND CALCULATE A RETURN AIRFLOW SETPOINT BY SCALING THE MONITORED C-SECTION ROOM SUPPLY AIR CFM TO ALLOW POSITIVE PRESSURIZATION IN THE ROOM AT ALL TIMES. (THE POSITIVE PRESSURIZATION SHALL BE BASED ON THE DIFFERENCE BETWEEN THE SUPPLY AND RETURN AIR VOLUME FOR THE ASSOCIATED TERMINAL BOX AS INDICATED IN THE "MIN CFM" COLUMN OF THE TERMINAL BOX SCHEDULE ON DRAWING H704)

K. NEWBORN NURSERY CONSTANT AIR VOLUME TERMINAL BOXES WITH ZONE-CONTROLLED HOT WATER REHEAT COILS AND ZONE HUMIDIFIERS.

1. THE SUPPLY AIR TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW TO THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO AN AIRFLOW SENSOR SIGNAL. UPON A DROP IN SPACE TEMPERATURE, THE ZONE CONTROLLER SHALL MODULATE THE HOT WATER REHEAT COIL VALVE OPEN.

2. SPACE HUMIDITY SENSOR SHALL MAINTAIN SETPOINT BY MODULATING HUMIDIFIER ACTUATOR. AIRFLOW SWITCH (AFS) AND HIGH LIMIT DUCT HUMIDISTAT (HLH) SHALL LIMIT SIGNAL ON LACK OF AIRFLOW AND/OR HIGH DUCT HUMIDITY (>80%), RESPECTIVELY.

3. THE RETURN AIR TERMINAL BOX SHALL MAINTAIN A CONSTANT VOLUME OF AIR FLOW FROM THE ROOM BY MODULATING THE TERMINAL CONTROL DAMPER IN RESPONSE TO THE AIRFLOW SENSOR SIGNAL. THE DDC SYSTEM SHALL MONITOR NURSERY SUITE SUPPLY AIRFLOW AS SENSED BY THE ASSOCIATED SUPPLY TERMINAL BOX AND CALCULATE A RETURN AIRFLOW SETPOINT BY SCALING THE MONITORED NURSERY ROOM SUPPLY AIR CFM TO ALLOW POSITIVE PRESSURIZATION IN THE ROOM AT ALL TIMES. (THE POSITIVE PRESSURIZATION SHALL BE BASED ON THE DIFFERENCE BETWEEN THE SUPPLY AND RETURN AIR VOLUME FOR THE ASSOCIATED TERMINAL BOX AS INDICATED IN THE "MAX CFM" COLUMN OF THE TERMINAL BOX SCHEDULE ON DRAWING H704)

L. CONSTANT VOLUME SUPPLY AIR WITH AUTOMATIC CONTROL DAMPER AND AIR FLOW STATION.

1. THE SUPPLY AIR CONTROL DAMPER SHALL MODULATE IN RESPONSE TO THE AIRFLOW SENSOR SIGNAL TO MAINTAIN A CONSTANT AIRFLOW SETPOINT (ADJ.) INDICATED ON DRAWING H208.

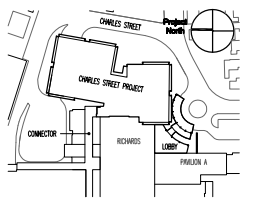
2. A 100% OPEN POSITION FOR THE CONTROL DAMPER SHALL BE DETERMINED BY THE BALANCING CONTRACTOR PRIOR TO COMPLETION OF SEQUENCE BY ATC CONTRACTOR. 100% OPEN SHALL BE THE POSITION OF THE CONTROL DAMPER WHEN THE AIRFLOW STATION SENSES AIR FLOW INDICATED ON DRAWING H208.

General Notes:

MARK	ISSUE DATE	DESCRIPTION
PERMIT	09/24/04	PERMIT SET - NOT FOR CONSTRUCTION

FOR PERMIT ONLY
NOT FOR CONSTRUCTION

Issue Log



Key Plan

TRO
Architecture
Planning
Engineering
Interior Design
The Ritchie Organization
90 Bridge Street
Newton, MA 02465-2124
617-558-8400

Maine Medical Center
Charles Street Project
Portland, Maine
MMC Project No. 21841

Drawing Title
HVAC SYSTEMS SEQUENCE OF OPERATION

0" 0 0 0 0

Commission No.	4673	Date Issued	
Scale	NTS	Sheet Number	
Drawn By	FMC		
Approved By	GW		H507
Filename	4673H507		

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