

CONTROLS SYMBOLS		
T	ROOM THERMISTAT	
M	ROOM HUMIDISTAT	
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	
M	ELECTRIC OPERATED CONTROL DAMPER/OR VALVE	
dPT	DIFFERENTIAL PRESSURE TRANSMITTER	
HS	HAND SWITCH (HAND-OFF-AUTO SWITCH)	
KC	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE	
ZC	VALVE OR DAMPER POSITION CONTROLLER	
KR	LOCAL RECORDING TIME CLOCK (RUNTIME)	
TSL	TEMPERATURE SWITCH, LOW (FREEZESTAT)	
LC	LEVEL CONTROLLER	
LT	LEVEL TRANSMITTER	

ABBREVIATIONS			
A/E	ARCHITECT / ENGINEER	I/O	INPUT/OUTPUT
ACC	AIR COOLED CONDENSER	IAQ	INDOOR AIR QUALITY
ACCU	AIR-COOLED CONDENSING UNIT	ID	INSIDE DIAMETER
ACU	AIR CONDITIONING UNIT	IFB	INTEGRAL FACE AND BYPASS
AD	ACCESS DOOR	IN	INCHES
AF	AFTER FILTER	IN HG	INCHES OF MERCURY
AFCV	AIR FLOW CONTROL VALVE	IN WG	INCH WATER GAUGE
AFF	ABOVE FINISHED FLOOR	IN-LB	INCH-POUND
AFMD	AIR FLOW MEASURING DEVICE	IN	INCH
AHU	AIR-HANDLING UNIT	kg/hr	KILOGRAM PER HOUR
AMP	AMPERE	kPa	KILOPASCAL
APD	AIR PRESSURE DROP	kW	KILOWATT
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE	kWh	KILOWATT HOUR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	L	LITER
BFP	BACKFLOW PREVENTER	L/s	LITERS PER SECOND (OR LITERS/SECOND)
BHP	BRAKE HORSEPOWER	LAT	LEAVING AIR TEMPERATURE
BSC	BIOLOGICAL SAFETY CABINETS	LBS/HR	POUNDS PER HOUR
BT	BLOWOFF TANK	LF	LINEAR FOOT (FEET)
BTU	BLOWOFF TANK CONTROL VALVE	LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
BTU	BRITISH THERMAL UNIT	LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
BTUH	BRITISH THERMAL UNIT PER HOUR	LPS	LOW PRESSURE STEAM
C	CENTIGRADE (CELCIUS)	LPSC	LOW PRESSURE STEAM (CLEAN)
CC	COOLING COIL	LSD	LINEAR SLOT DIFFUSER
CCD	COOLING COIL CONDENSATE DRAIN	LWT	LEAVING WATER TEMPERATURE
CFH	CUBIC FEET PER HOUR	M	METER, SI UNIT
CFM	CUBIC FEET PER MINUTE	M/s	METERS PER SECOND (OR METERS/SECOND)
CFT	CUBIC FEET	MAT	MIXED AIR TEMPERATURE
CFP	CHEMICAL FEED PUMP	MAX	MAXIMUM
CH	CHILLER	MB	MIXING BOX
CHP	CHILLED WATER PUMP	MBH	1000 BTUH
CHW	CHILLER WATER	MCA	MINIMUM BRANCH CIRCUIT AMPACITY
CHR	CHILLED WATER RETURN	MCM	MINIMUM EFFICIENCY REPORTING VALUE
CHS	CHILLED WATER SUPPLY	MIN	MINIMUM
CM	CUBIC METER	MM	MILLIMETER
CM/S	CUBIC METER PER SECOND	MPS	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
COP	COEFFICIENT OF PERFORMANCE	MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
CP	CONDENSATE PUMP	MP	MILLIMETER
CSG	CLEAN STEAM GENERATOR	MP	MILLIMETER
CU	CONDENSING UNIT	MP	MILLIMETER
CAV	CONSTANT AIR VOLUME	MP	MILLIMETER
CWCC	CHILLED WATER COOLING COIL	MP	MILLIMETER
DB	DECIBELS	MP	MILLIMETER
DB	DRY-BULB TEMPERATURE	MP	MILLIMETER
DDC	DIRECT DIGITAL CONTROLS	MP	MILLIMETER
DEG	DEGREE	MP	MILLIMETER
DIA	DIAMETER	MP	MILLIMETER
DP	DEW POINT TEMPERATURE	MP	MILLIMETER
DPA	DIFFERENTIAL PRESSURE ASSEMBLY	MP	MILLIMETER
DPS	DIFFERENTIAL PRESSURE SENSOR	MP	MILLIMETER
DX	DIRECT EXPANSION	MP	MILLIMETER
DXCC	DIRECT EXPANSION COOLING COIL	MP	MILLIMETER
EA	EXHAUST AIR	MP	MILLIMETER
EAT	ENTERING AIR TEMPERATURE	MP	MILLIMETER
ECC	ENGINEERING CONTROL CENTER	MP	MILLIMETER
EER	ENERGY EFFICIENCY RATIO	MP	MILLIMETER
EF	EXHAUST FAN	MP	MILLIMETER
EH	EXHAUST HOOD	MP	MILLIMETER
ESP	EXTERNAL STATIC PRESSURE	MP	MILLIMETER
ET	EXPANSION TANK	MP	MILLIMETER
EWT	ENTERING WATER TEMPERATURE	MP	MILLIMETER
EXIST.	EXISTING	MP	MILLIMETER
F	FAHRENHEIT	MP	MILLIMETER
F&T	FLOAT AND THERMOSTATIC DAMPER	MP	MILLIMETER
FD/SD	COMBINATION FIRE SMOKE DAMPER	MP	MILLIMETER
FD	FLOOR DRAIN	MP	MILLIMETER
FD	FIRE DAMPER	MP	MILLIMETER
FF	FINAL FILTER	MP	MILLIMETER
FM	FLOW METER	MP	MILLIMETER
FPM	FEET PER MINUTE	MP	MILLIMETER
FPT	FAN POWERED TERMINAL UNIT	MP	MILLIMETER
FS	FLOW SWITCH	MP	MILLIMETER
FSTAT	FREEZESTAT	MP	MILLIMETER
FT	FEET	MP	MILLIMETER
FT-LB	FOOT-POUND	MP	MILLIMETER
GA	GAUGE	MP	MILLIMETER
GAL	GALLONS	MP	MILLIMETER
GPM	GALLONS PER MINUTE	MP	MILLIMETER
H	HUMIDIFIER	MP	MILLIMETER
HC	HEATING COIL	MP	MILLIMETER
HD	HEAD	MP	MILLIMETER
HP	HORSEPOWER	MP	MILLIMETER
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)	MP	MILLIMETER
HPS	HIGH PRESSURE SUPPLY (STEAM)	MP	MILLIMETER
HSTAT	HUMIDISTAT	MP	MILLIMETER
HW	HOT WATER	MP	MILLIMETER
HWC	HOT WATER COIL	MP	MILLIMETER
HWHC	HOT WATER HEATING COIL	MP	MILLIMETER
HWP	HEATING HOT WATER PUMP	MP	MILLIMETER
HWR	HEATING HOT WATER RETURN	MP	MILLIMETER
HWHR	HEATING HOT WATER SUPPLY	MP	MILLIMETER
HZ	HERTZ	MP	MILLIMETER

#### GENERAL NOTES

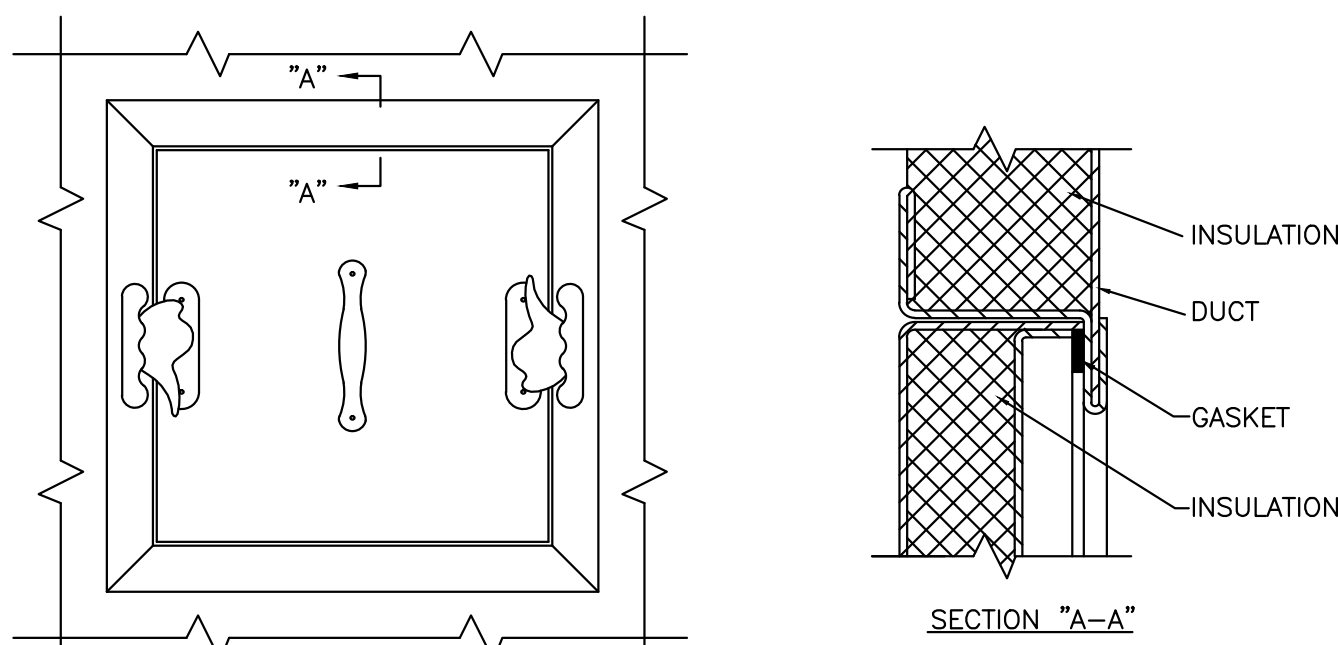
- ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
- THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
- ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
- TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
- FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
- DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
- WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.

#### DUCTWORK SYMBOLS

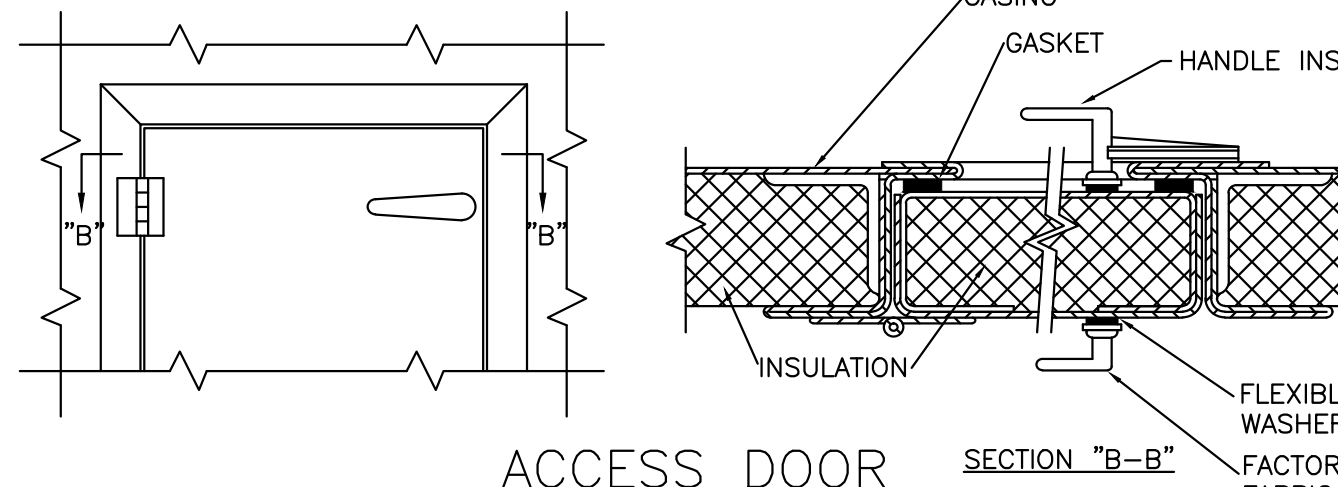
	FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
	VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
	STANDARD RADIUS ELBOW (LONG RADIUS)
	NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
	EXISTING DUCT TO REMAIN
	EXISTING DUCT TO BE REMOVED
	LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
	FLEXIBLE DUCTWORK (INSULATED)
	DUCT WITH SOUND LINING
	MANUAL VOLUME DAMPER
	FIRE DAMPER
	BACK DRAFT DAMPER
	AUTOMATIC CONTROL DAMPER MODULATING
	AUTOMATIC CONTROL DAMPER TWO POSITION
	MANUAL SPLITTER DAMPER
	STANDARD BRANCH SUPPLY OR RETURN, NO SPLITTER (45° TAP)
	SUPPLY DUCT (UP & DOWN)
	EXHAUST DUCT (UP & DOWN)
	RETURN DUCT (UP & DOWN)
	ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
	LINEAR SLOT DIFFUSER
	EXHAUST OR RETURN CEILING REGISTER OR GRILLE
	VANED ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
	CONNECT NEW DUCT TO EXISTING DUCT
	INCLINED RISE, IN DIRECTION OF AIR FLOW
	INCLINED DROP, IN DIRECTION OF AIR FLOW
	LIMIT OF DEMOLITION

#### GENERAL SYMBOLS

	DIRECTION OF FLOW
	REDUCER OR INCREASER
	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
	FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES
	THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES
	THERMOMETER
	PRESSURE GAGE
	FLOW ELEMENT
	TEST PLUG (PRESSURE/TEMPERATURE)
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	POINT OF CONNECTION BETWEEN NEW AND EXISTING WORK
	PRIMARY ELEMENT FOR FLOW METERING
	INVERTED BUCKET STEAM TRAP ASSEMBLY (T)
	CLOSED-FLOAT-THERMOSTATIC STEAM TRAP ASSEMBLY (T)
	THERMOSTATIC STEAM TRAP (T)
	PRESSURE GAGE (WITH SIPHON ON STEAM SERVICE)



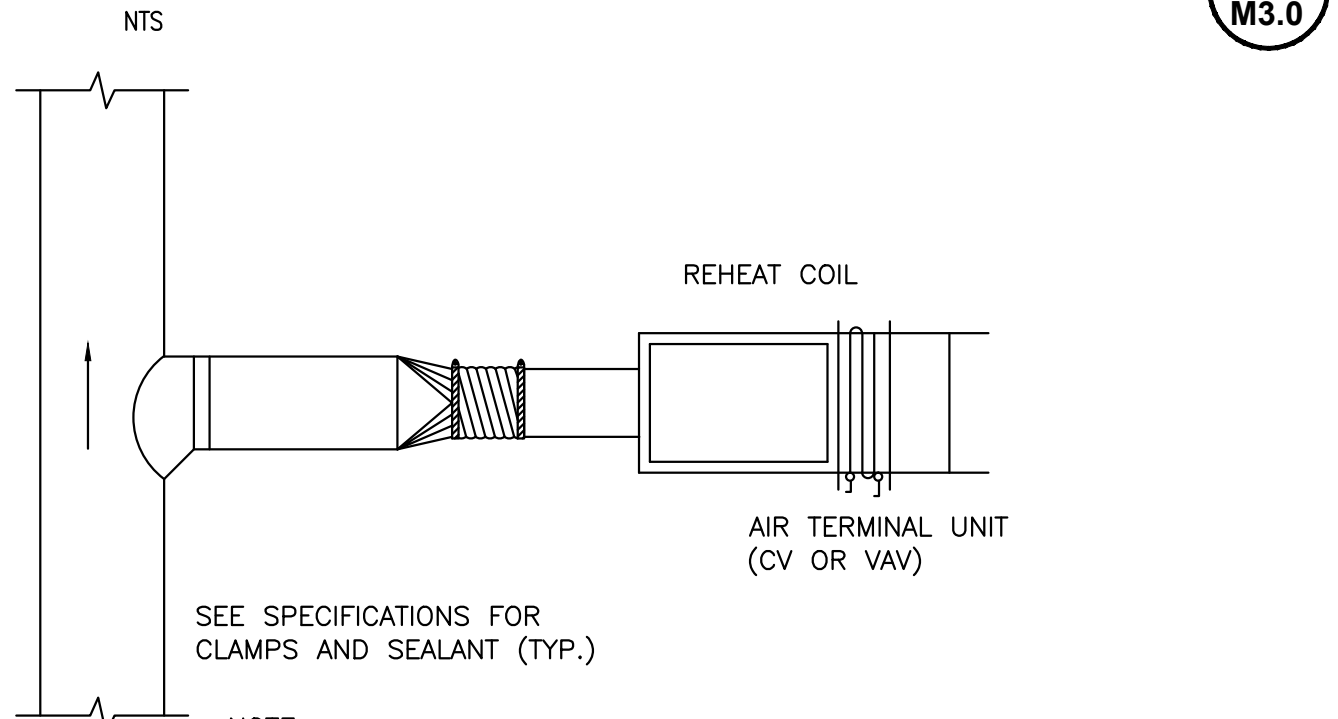
#### ACCESS PANEL



#### ACCESS DOOR

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

#### ACCESS PANEL AND DOOR DETAIL



#### NOTE:

- RIGID STRAIGHT TERMINAL UNIT INLET LENGTH SHALL BE A MINIMUM OF 3 TIMES THE DIAMETER OF INLET
- A FLEXIBLE AIR DUCT CONNECTOR IS NOT MANDATORY FOR INLET TO THIS BOX, BUT ALLOWED TO ACCOMMODATE MINOR OFFSETS, MAXIMUM LENGTH 1'-0" [900mm].
- 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 0.08"/100' [1.64Pa/m].
- COMPONENT ARRANGEMENT MAY VARY BY MANUFACTURER. PROVIDE INSULATION W/VAPOR BARRIER FOR CONNECTING DUCT SECTIONS.

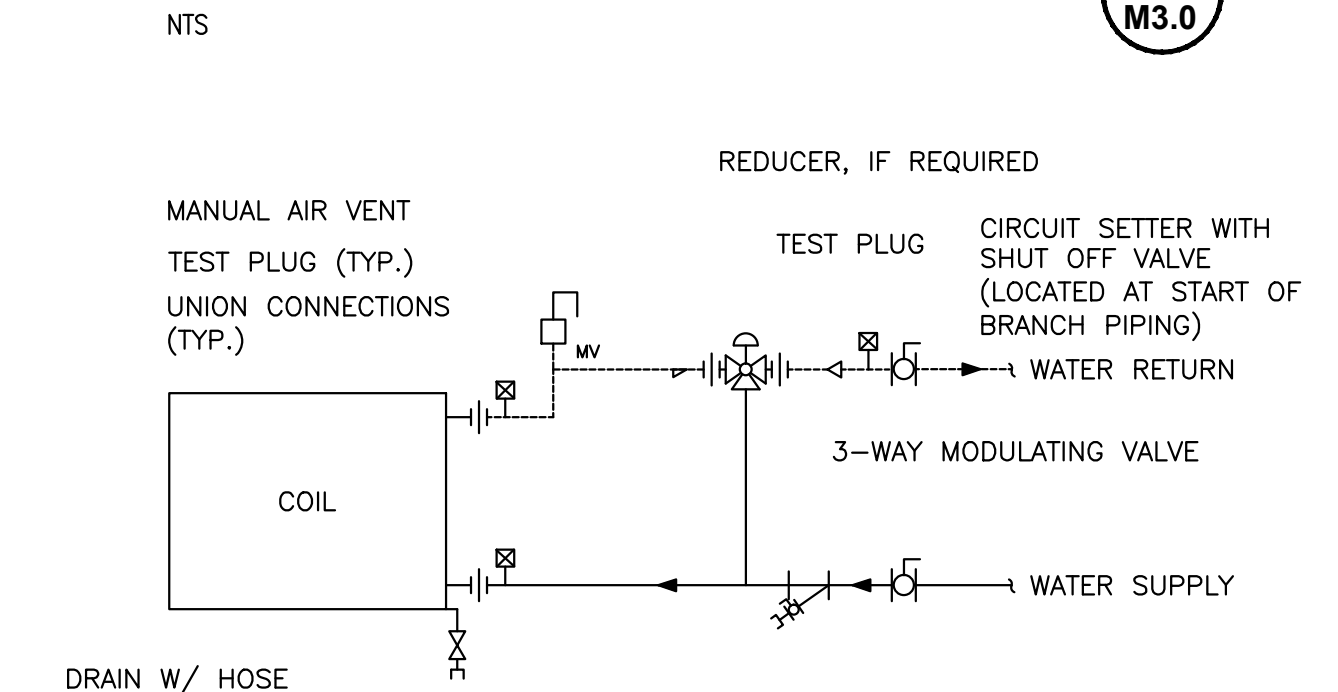
#### DUCT CONNECTIONS - AIR TERMINAL UNITS

HANGER STRAPS OR RODS				
MAX. DUCT 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] RODS	1320 [598]	144 [3600]	
84 [2100]	TWO 1/2 [13] RODS	2500 [1133]	144 [3600]	

#### NOTE:

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

#### ROUND DUCT HANGERS

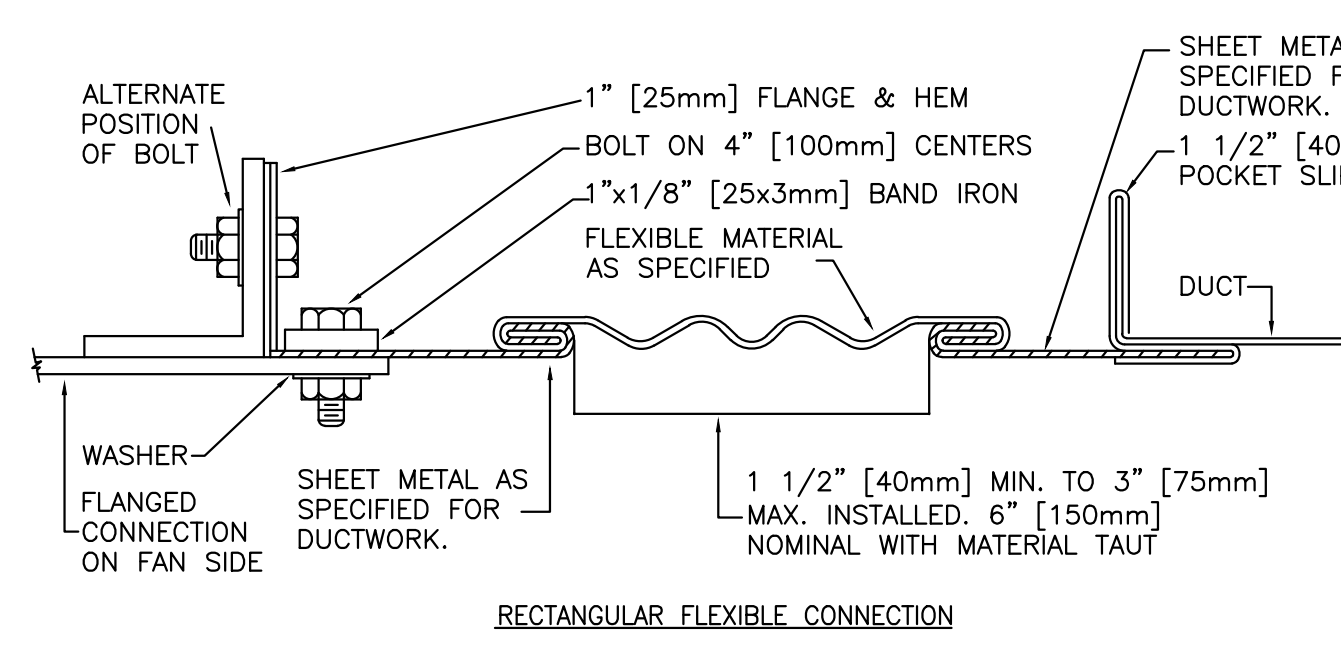


- \*\*\* BOTH SIDES OF CONTROL VALVES SHALL BE PROVIDED WITH THREADED FITTINGS

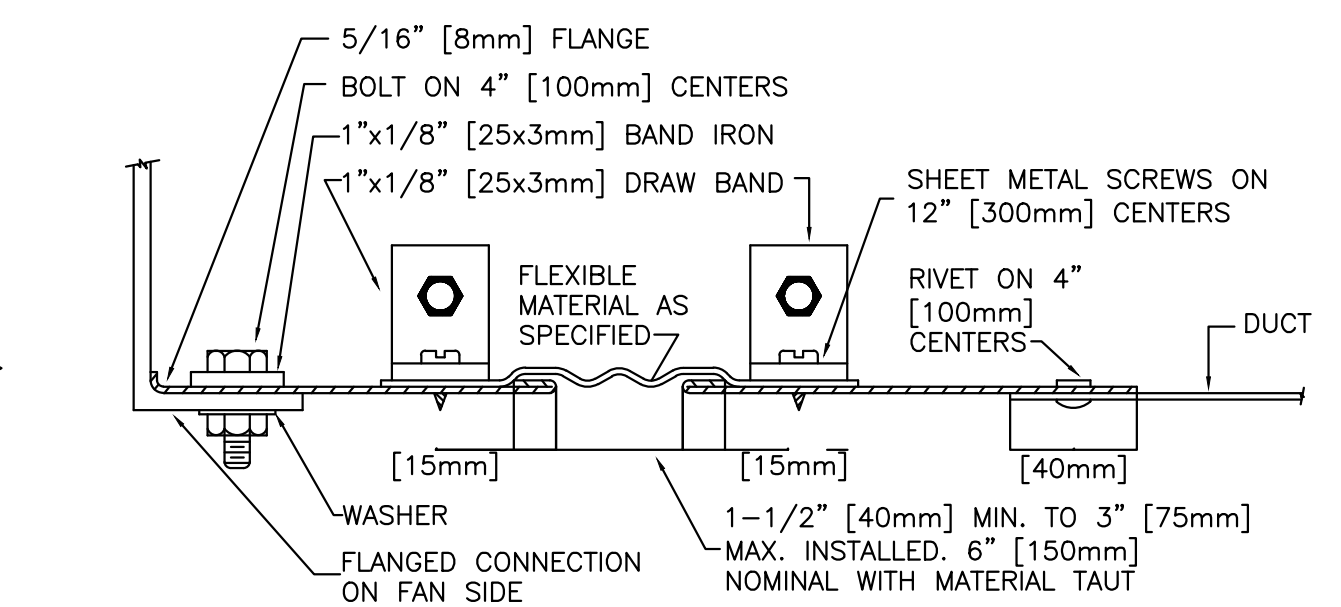
- \*\*\* UNION FITTINGS SHALL BE PROVIDED ON EITHER SIDE OF THE 3-WAY VALVE. 3-WIRE FLOATING POINT CONTROL IS NOT ACCEPTABLE

#### TERMINAL UNIT WATER COILS - PIPING CONNECTIONS

NTS



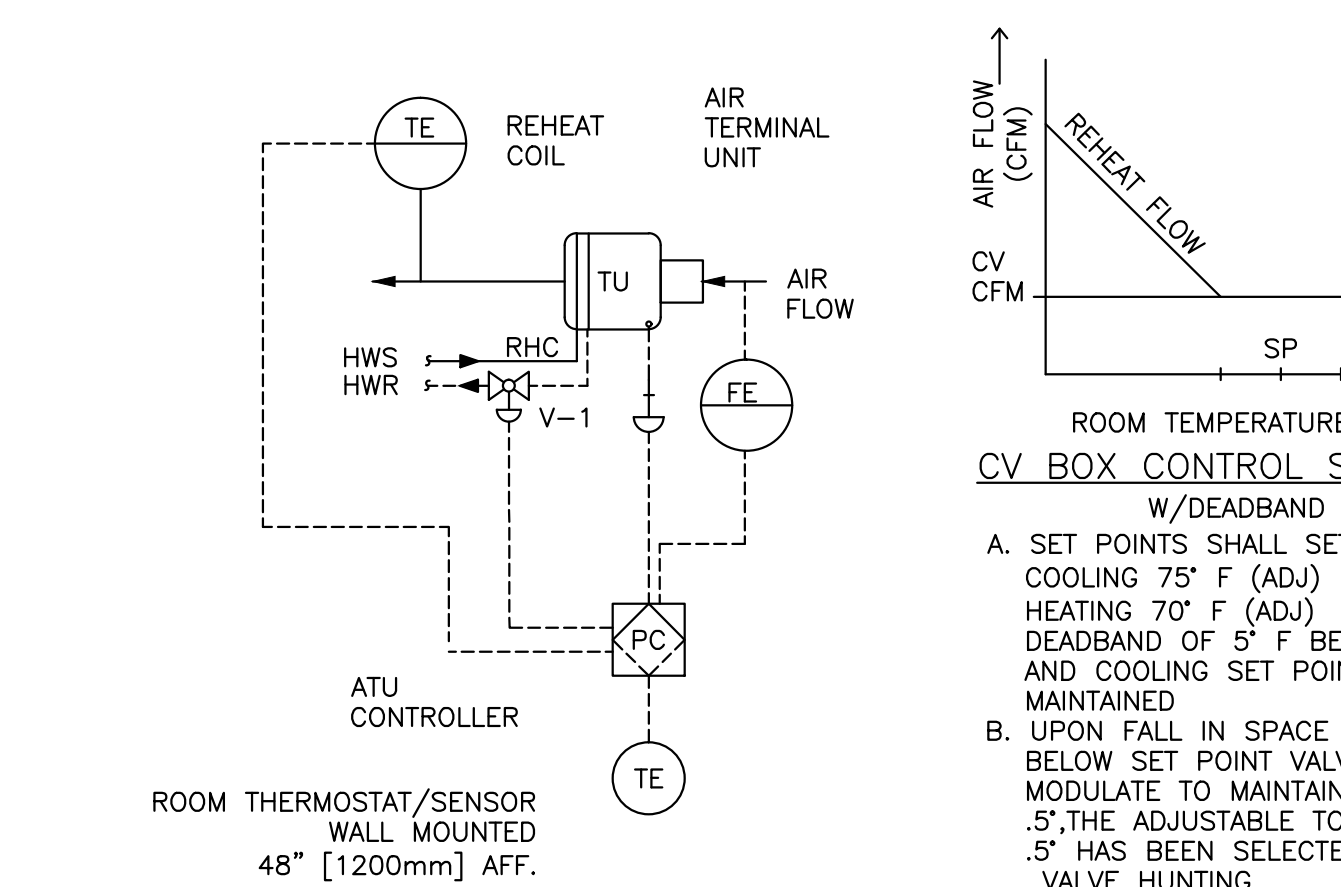
#### RECTANGULAR FLEXIBLE CONNECTION



#### ROUND FLEXIBLE CONNECTION

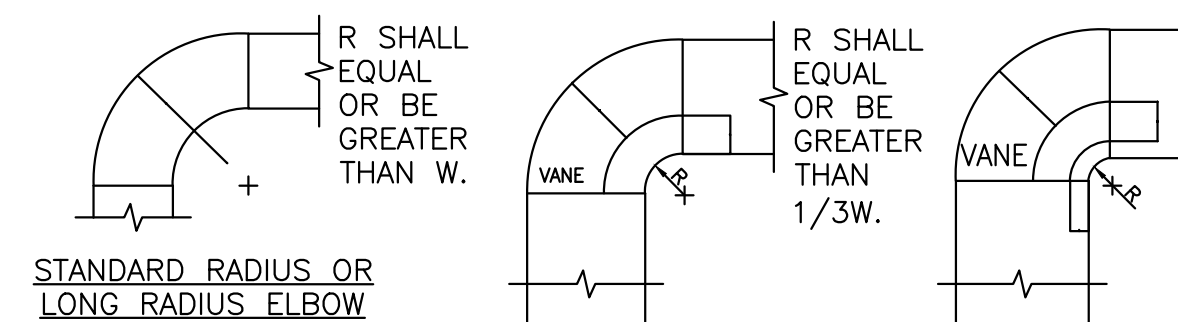
#### FLEXIBLE DUCT CONNECTIONS

NTS



#### CONSTANT VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM

NTS



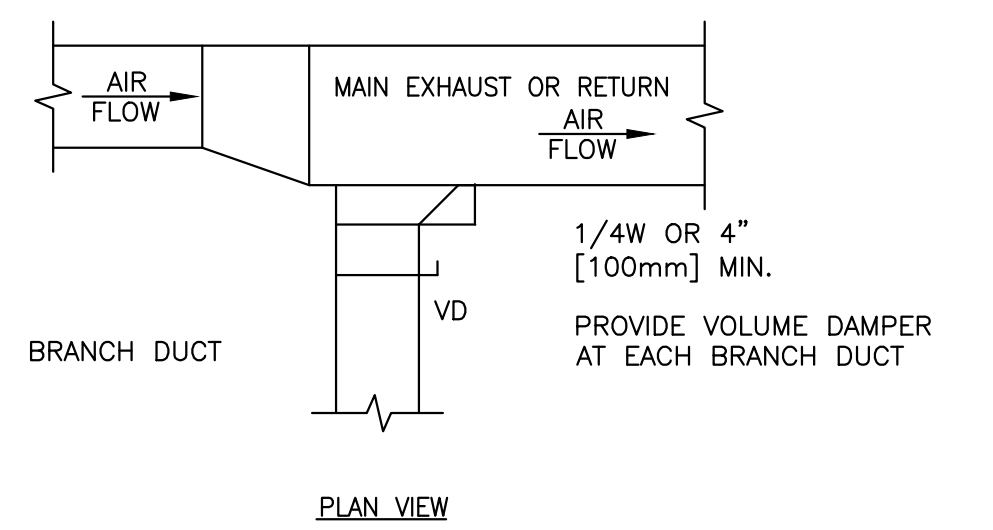
#### STANDARD RADIUS OR LONG RADIUS ELBOW

#### NOTE:

- THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
- 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.

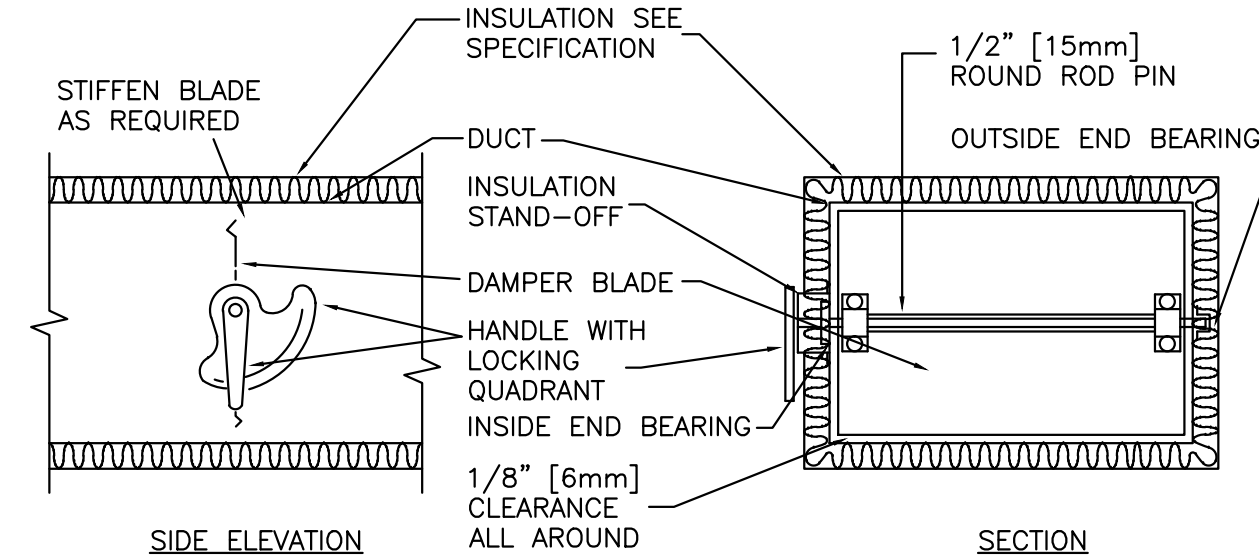
#### DUCTWORK RADIUS ELBOWS

NTS



#### EXHAUST OR RETURN BRANCH DUCTWORK

NTS

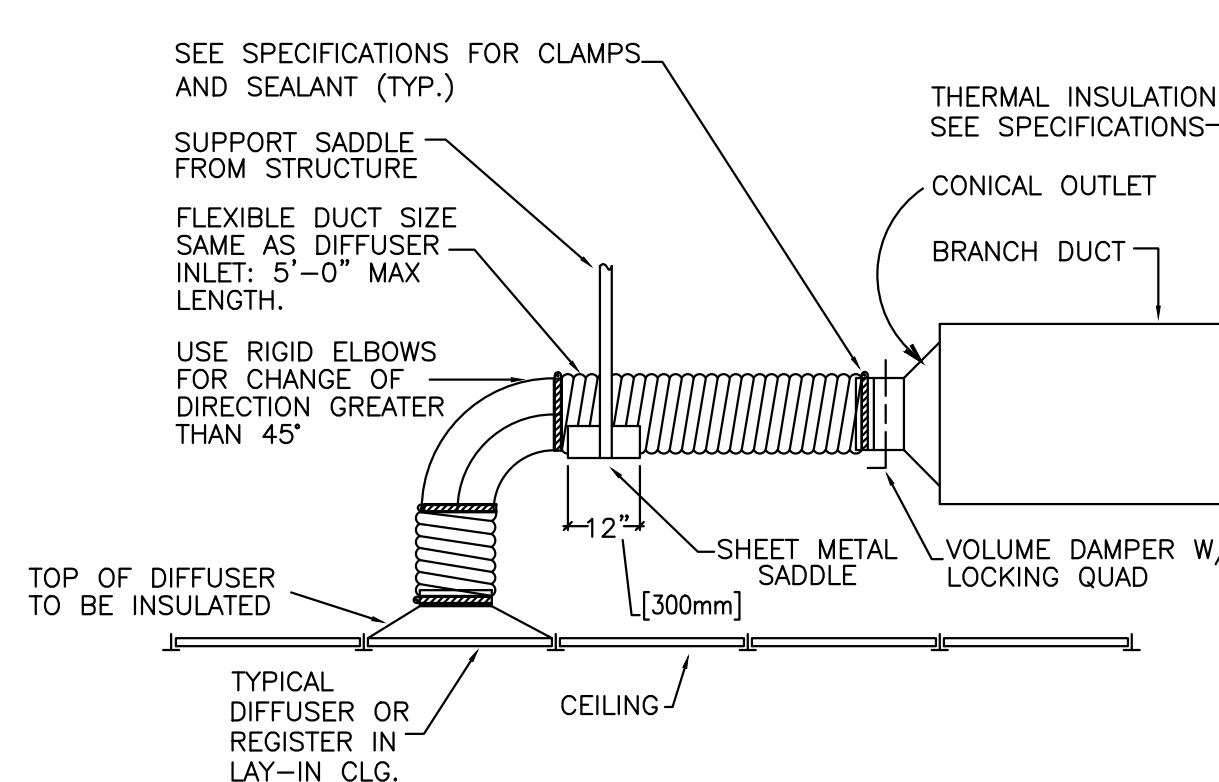


#### NOTE:

- DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
- DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

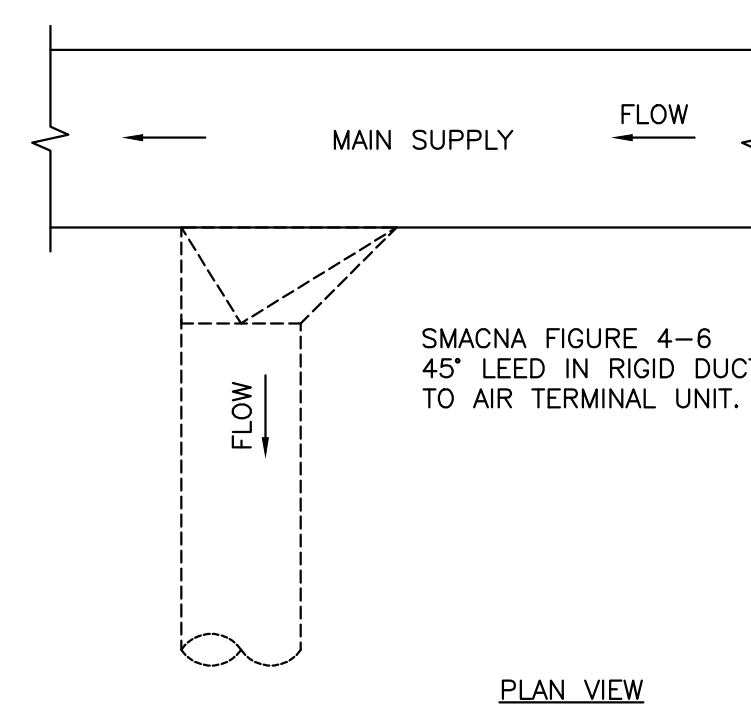
#### VOLUME DAMPER DETAIL

NTS



#### FLEXIBLE AIR DUCT CONNECTOR

NTS



#### SUPPLY DUCT TAKEOFF - AIR TERMINAL UNITS

NTS

**PARADIGM**  
ENGINEERS AND CONSTRUCTORS

PO BOX 498223  
Louisville, Kentucky 40253  
502-339-8611 www.paradigmusa.com

CARDIAC CATH LAB  
SITE PREPARATION  
PROJECT: 603-09-704  
VA MEDICAL CENTER  
800 Zorn Ave.  
Louisville, Kentucky 40206

Department of  
Veterans Affairs



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REVISIONS	
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CONC. NO.

MADE BY JEM CHECKED HB  
DATE 05-21-12

MECHANICAL LEGEND,  
ABBREVIATIONS,  
DETAILS, ETC.

DRAWING NO. M3.0

RECORD DRAWINGS T-659