ABBREVIATIONS

AAV	AUTOMATIC AIR VENT	ID	INSIDE DIAMETER
ABV	ABOVE	IN	INCH(ES)
AC	AIR CONDITIONING	IPLV	INTEGRATED PART LOAD VALUE
ACCEPT	ACCEPTANCE		
ACU	AIR CONDITIONING UNIT	JB	JUNCTION BOX
AD	ACCESS DOOR		
ADD	ADDITION		
AF	AFTER FILTER	KW	KILOWATT
AFF	ABOVE FINISHED FLOOR	KWH	KILOWATT HOUR
AFMS	AIR FLOW MEASURING STATION		
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	L	LENGTH
		LAT	LEAVING AIR TEMPERATURE
AG	AIR GAP	LBS	POUNDS
AHJ	AUTHORITY HAVING JURISDICTION	LDB	LEAVING DRY BULB
AHU	AIR HANDLING UNIT	LF	LINEAR FEET
AMB	AMBIENT	LP	LOW PRESSURE
A	AMPERE	LPC	LOW PRESSURE CONDENSATE
AP	ACCESS PANEL	LPS	LOW PRESSURE STEAM
APPROX	APPROXIMATELY	LWB	LEAVING WET BULB
ARCH	ARCHITECT	LWT	LEAVING WATER TEMPERATURE
ARI	AMERICAN REFRIGERATION INSTITUTE	M	MOTOR
AS	AIR SEPARATOR	MA	MIXED AIR
AUTO	AUTOMATIC	MAD	MIXED AIR DAMPER
AUX	AUXILIARY	MAX	MAXIMUM
		MBH	THOUSAND BTU PER HOUR
B	BOILER	MC	MECHANICAL CONTRACTOR
BAS	BUILDING MANAGEMENT SYSTEM	MCA	MINIMUM CIRCUIT AMPACITY
BDD	BACKDRAFT DAMPER	MCC	MOTOR CONTROL CENTER
BEL	BELOW	MD	MOTORIZED DAMPER
BHP	BRAKE HORSEPOWER	MECH	MECHANICAL
BOD	BOTTOM OF DUCT	MERV	MINIMUM EFFICIENCY REPORTING VALUE
BOP	BOTTOM OF PIPE	MFR	MANUFACTURER
BFP	BACKFLOW PREVENTER	MIN	MINIMUM
BSMT	BASEMENT	MOCP	MAXIMUM OVER CURRENT PROTECTION
BTU	BRITISH THERMAL UNIT		
BTUH	BTU PER HOUR	MPC	MEDIUM PRESSURE CONDENSATE
BV	BALL VALVE OR BALANCING VALVE	MPS	MEDIUM PRESSURE STEAM
BYV	BUTTERFLY VALVE	MV	MANUAL AIR VENT
C	COMMON, CONDENSATE OR CONDUIT	(N)	NEW
CA	CONTROL AIR	N/A	NOT APPLICABLE
CAP	CAPACITY	NC	NORMALLY CLOSED
CAV	CONSTANT AIR VOLUME	NIC	NOT IN CONTRACT
CB	CHILLED BEAM	NO	NORMALLY OPEN
CC	COOLING COIL OR CONTROLS CONTRACTOR	NOM	NOMINAL
CEG	CEILING EXHAUST GRILLE	NPSH	NET POSITIVE SUCTION HEAD
CER	CEILING EXHAUST REGISTER	NTS	NOT TO SCALE
CFF	CAP FOR FUTURE		
CFM	CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
CFS	CUBIC FEET PER SECOND	OAD	OUTSIDE AIR DAMPER
CHWP	CHILLED WATER PUMP	OAT	OUTSIDE AIR TEMPERATURE
CHWR	CHILLED WATER RETURN	OBD	OPPOSED BLADE DAMPER
CHWS	CHILLED WATER SUPPLY	OC	ON CENTER
CH	CHILLER	OD	OUTSIDE DIAMETER
CHV	CHECK VALVE	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
CL	CENTERLINE		
CLG	CEILING	OFOI	OWNER FURNISHED OWNER INSTALLED
CO	CLEANOUT	OPER	OPERATING
COL	COLUMN	OV	OUTLET VELOCITY
COMP	COMPRESSOR		
CONC	CONCRETE		
COND	CONDENSATE	P	PUMP OR PRESSURE OR POLE
CONN	CONNECTION	PC	PUMPED CONDENSATE
CONT	CONTINUATION	PD	PRESSURE DROP
CONTR	CONTRACTOR	PF	PREFILTER
COP	COEFFICIENT OF PERFORMANCE	PG	PIPE GUIDE OR PRESSURE GAUGE
CP	CONTROL PANEL OR CONDENSATE PUMP	PH	PHASE (ELECTRICAL)
CR	CONDENSATE RETURN	PHC	PREHEAT COIL
CRR	CEILING RETURN REGISTER	PLBG	PLUMBING
CRG	CEILING RETURN GRILLE	POC	POINT OF CONNECTION
		POD	POINT OF DISCONNECTION
CSD	CEILING SUPPLY DIFFUSER	PRESS	PRESSURE
CTE	CONNECT TO EXISTING	PRV	PRESSURE REDUCING VALVE
CU FT	CUBIC FEET	PS	PRESSURE SENSOR
CU IN	CUBIC INCH	PSI	POUNDS PER SQUARE INCH
CV	CONSTANT VOLUME OR CONTROL VALVE	PSIA	PSI ABSOLUTE
CW	COLD WATER	PSIG	PSI GAUGE
CWP	CONDENSER WATER PUMP	QTY	QUANTITY
CWR	CONDENSER WATER RETURN		
CWS	CONDENSER WATER SUPPLY	R	RISERS, RELOCATE OR RISE
		RA	RETURN AIR
D	DROP OR DRAIN	RAD	RETURN AIR DAMPER
DBT	DRY BULB TEMPERATURE	RD	REFRIGERANT DISCHARGE OR ROOF DRAIN
DDC	DIRECT DIGITAL CONTROL		
DEFL	DEFLECTION	REF	ROOFTOP EXHAUST FAN
DIA	DIAMETER	REFRIG	REFRIGERATION
DIFF	DIFFERENCE	REJ	REJECTION
DP	DIFFERENTIAL PRESSURE	REQ'D	REQUIRED
DPT	DEW POINT TEMPERATURE	REV	REVISE, REVISION OR REVOLUTIONS
DSD	DUCT SMOKE DETECTOR	RF	RETURN FAN
DV	DIAPHRAGM VALVE	RH	RELATIVE HUMIDITY
DWG(S)	DRAWING(S)	RHC	REHEAT COIL
DX	DIRECT EXPANSION	RHT	RADIANT HEATER
		RM	ROOM
(E)	EXISTING	RPM	REVOLUTIONS PER MINUTE
(ER)	EXISTING RELOCATED	RS	REFRIGERANT SUCTION
EA	EXHAUST AIR OR EACH	RTU	ROOFTOP UNIT
EAD	EXHAUST AIR DAMPER		
EAT	ENTERING AIR TEMPERATURE	S	SUPPLY OR SLOPE
EC	ELECTRICAL CONTRACTOR	SA	SUPPLY AIR
ECON	ECONOMIZER	SCFM	CFM, STANDARD CONDITIONS
EDB	ENTERING DRY BULB TEMPERATURE	SD	SMOKE DAMPER
EER	ENERGY EFFICIENCY RATING	SEER	SEASONAL ENERGY EFFICIENCY RATING
EF	EXHAUST FAN	SEN	SENSIBLE
EFF	EFFICIENCY	SF	SUPPLY FAN OR SQUARE FEET
EJ	EXPANSION JOINT	SHC	SQUARE HEAD COCK
EL	ELEVATION	SIU	SPLIT INDOOR UNIT
ELEC	ELECTRICAL		
EQUIP	EQUIPMENT	SOU	SPLIT OUTDOOR UNIT
ESP	EXTERNAL STATIC PRESSURE	SP	STATIC PRESSURE
ET	EXPANSION TANK	SPD	SPLITTER DAMPER
EWB	ENTERING WET BULB TEMPERATURE	SPEC	SPECIFICATIONS
EWT	ENTERING WATER TEMPERATURE	SQ IN	SQUARE INCH
EXH	EXHAUST	ST	STRAINER OR SOUND TRAP
EXT	EXTERNAL	STD	STANDARD
		STRUCT	STRUCTURAL
F	FAHRENHEIT OR FILTER	SV	STEAM VENT
FPB	FAN POWERED BOX		
FC	FLEXIBLE CONNECTION OR FAIL CLOSED	T	THERMOSTAT OR THERMOMETER
FCU	FAN COIL UNIT	TCP	TEMPERATURE CONTROL PANEL
FD	FIRE DAMPER	TDH	TOTAL DYNAMIC HEAD
FF	FINAL FILTER OR FINISHED FLOOR	TEMP	TEMPERATURE
FLR	FLOOR	TI	TENANT IMPROVEMENT
FO	FAIL OPEN	TRG	TRANSFER GRILLE
FPI	FINS PER INCH	TS	TEMPERATURE SENSOR
FPM	FEET PER MINUTE	TSP	TOTAL STATIC PRESSURE
FPS	FEET PER SECOND	TT	TEST TAP OR TEST TEE
FSD	FIRE/SMOKE DAMPER	TXV	THERMAL EXPANSION VALVE
FT	FOOT OR FEET	(TYP)	TYPICAL
G	GAS	U	HEAT TRANSFER COEFFICIENT
GA	GAUGE, GAGE	UC	UNDER CUT DOOR
GAL	GALLONS	UG	UNDERGROUND
GALV	GALVANIZED	UH	UNIT HEATER
GC	GAS COCK OR GENERAL CONTRACTOR	UON	UNLESS OTHERWISE NOTED
GLV	GLOBE VALVE		
GN	GENERAL NOTE		
GPM	GALLONS PER MINUTE	V	VENT OR VOLT OR VELOCITY
GND	GROUND	VAV	VARIABLE AIR VOLUME
GV	GATE VALVE	VB	VACUUM BREAKER
		VD	VOLUME DAMPER
H	HEIGHT	VEL	VELOCITY
HB	HOSE BIBB	VERT	VERTICAL
HC	HEATING COIL	VFD	VARIABLE FREQUENCY DRIVE
HD	HEAD	VFM	VENTURI FLOW METER
HOR	HORIZONTAL	VOL	VOLUME
HP	HIGH PRESSURE	VTR	VENT THROUGH ROOF
HP	HORSEPOWER		
HP	HEAT PUMP	W	WASTE OR WIDTH OR WATTS
HPC	HIGH PRESSURE CONDENSATE	W/	WITH
HPS	HIGH PRESSURE STEAM	W/O	WITHOUT
HR	HOUR(S)	WB	WET BULB TEMPERATURE
HRU	HEAT RECOVERY UNIT	WC	WATER COLUMN
HS	HUMIDITY SENSOR	WEG	WALL EXHAUST GRILLE
HTR	HEATER	WG	WATER GAUGE
HV	HOSE VALVE	WP	WORKING PRESSURE
HVAC	HEATING, VENTILATING & AIR CONDITIONING	WPD	WATER PRESSURE DROP
		WRR	WALL RETURN REGISTER
HW	HEATING WATER	WSHP	WATER-SOURCE HEAT PUMP
HWP	HEATING WATER PUMP	WSR	WALL SUPPLY REGISTER
HWR	HEATING WATER RETURN	WT	WEIGHT
HWS	HEATING WATER SUPPLY		
HX	HEAT EXCHANGER	XFMR	TRANSFORMER
HZ	FREQUENCY (HERTZ)		
		Z	ZONE
		ZD	ZONE DAMPER

HVAC LEGEND

GENERAL

SYMBOL	DESCRIPTION
(N)	NEW WORK
(E)	EXISTING WORK TO REMAIN
	EXISTING WORK TO BE REMOVED
(RL)	RELOCATE EXISTING
	CENTER LINE
	POINT OF CONNECTION OR POINT OF DISCONNECTION
1 / M-1	DETAIL 1, DRAWING M-1
A / M-1	SECTION A, DRAWING M-1
1 / M-1	ELEVATION 1, DRAWING M-1
1 / E-1	RISER IDENTIFICATION EXHAUST #1
HP / 1	EQUIPMENT IDENTIFICATION HEAT PUMP UNIT #1
1	KITCHEN EQUIPMENT TAG
#	NUMBER OR QUANTITY
#	KEYED NOTE
150 / 78°F	DIRECTION OF TRANSFER AIRFLOW (150 CFM) 78 DEGREES FAHRENHEIT

PIPING

SYMBOL	DESCRIPTION
	DIRECTION OF SLOPE
	DIRECTION OF FLOW
	PIPE UP
	PIPE DOWN
	PIPE DROP/PIPE RISE
	TOP CONNECTION – BRANCH LINE
	BOTTOM CONNECTION – BRANCH LINE
	TEE UP
	TEE DOWN
	PIPE GUIDE
	UNION
	BLIND FLANGE, CAP
	CONCENTRIC REDUCER
12"	PIPE SIZE (DIAMETER IN INCHES)

CONTROLS

SYMBOL	DESCRIPTION
TS	TEMPERATURE SENSOR
T	THERMOSTAT OR THERMOMETER
CO2	CARBON DIOXIDE SENSOR
OS	OCCUPANCY SENSOR
DSD	DUCT SMOKE DETECTOR
TS	TEMPERATURE SENSOR
SP	STATIC PRESSURE SENSOR
PS	PRESSURE SENSOR OR SWITCH
DPS	DIFFERENTIAL PRESSURE SENSOR
AFMS	AIR FLOW MONITORING STATION
M	MOTOR
A	ACTUATOR
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
BAS	BUILDING AUTOMATION SYSTEM
PI	PULSING INPUT

MISCELLANEOUS

SYMBOL	DESCRIPTION
RD	REFRIGERANT LIQUID/DISCHARGE
RS	REFRIGERANT SUCTION
	PNEUMATIC CONTROL VALVE
A	AIR LINE
ST	SOUND TRAP
CC	COOLING COIL
HC	HEATING COIL
RHT	RADIANT HEATER
BHT	BASEBOARD HEATER
CB	CHILLED BEAM
	THRUST BLOCK

DUCTWORK

SYMBOL (DOUBLE LINE)	DESCRIPTION	SYMBOL (SINGLE LINE)
AD/AP	ACCESS DOOR / ACCESS PANEL	
	FLEXIBLE CONNECTION	
	FLEXIBLE DUCT RUNOUT TO DIFFUSER	
24x12	RECTANGULAR DUCT SIZE (WIDTH x DEPTH IN INCHES)	24X12
18ø	ROUND DUCT SIZE (DIAMETER IN INCHES)	18ø
24x12ø	OVAL DUCT SIZE (WIDTH x DEPTH IN INCHES)	24X12ø
	DUCT THROUGH BEAM PENETRATION	
R D	DUCT OFFSET (RISE OR DROP)	R D
VD RVD	VOLUME DAMPER OR REMOTE VOLUME DAMPER	VD RVD
FD SD FSD	FIRE, SMOKE OR FIRE/SMOKE DAMPER	FD SD FSD
	SUPPLY DUCT UP	
	SUPPLY DUCT DOWN	
	EXHAUST DUCT UP	
	EXHAUST DUCT DOWN	
	RETURN DUCT UP	
	RETURN DUCT DOWN	
	CROSS SECTION OF SUPPLY DUCT	
	CROSS SECTION OF EXHAUST AIR DUCT	
	CROSS SECTION OF RETURN AIR DUCT	
	CROSS SECTION OF ROUND DUCT	
	DUCT ELBOW WITH TURNING VANES	
	SMOOTH RADIUS DUCT ELBOW WITHOUT TURNING VANES	
	CONICAL OR 45 DEGREE BOOT LO-LOSS BRANCH FITTING	
	WYE BRANCH FITTING	
12x6 / M	ACOUSTICAL LINING DUCT DIMENSION IS INSIDE DIMENSION	24x16 / M
	MOTORIZED DAMPER INSIDE DUCT	
TAG NECK SIZE-CFM	TRANSFER DUCT (WITH LINER)	TAG NECK SIZE-CFM
8"-11" BOD	INDICATES 8"11" TO BOTTOM OF DUCT	8"-11" BOD
TAG NECK SIZE-CFM	RECTANGULAR OR ROUND SUPPLY DIFFUSER OR REGISTER (SEE SCHEDULE). 4-WAY THROW UNLESS INDICATED OTHERWISE. EXAMPLES: SA12X12-400 REFERS TO TAG SA WITH 12"X12" NECK AND 400 CFM OR SB10-250 REFER TO TAG SB WITH 10" ROUND NECK AND 250 CFM.	TAG NECK SIZE-CFM
TAG NECK SIZE-CFM	RECTANGULAR OR ROUND EXHAUST GRILLE OR REGISTER (SEE SCHEDULE)	TAG NECK SIZE-CFM
TAG NECK SIZE-CFM	RECTANGULAR OR ROUND RETURN GRILLE OR REGISTER (SEE SCHEDULE)	TAG NECK SIZE-CFM
TAG NECK SIZE-CFM	WALL SUPPLY GRILLE OR REGISTER (SEE SCHEDULE)	TAG NECK SIZE-CFM
TAG NECK SIZE-CFM	WALL RETURN GRILLE OR REGISTER (SEE SCHEDULE)	TAG NECK SIZE=LENGTH-CFM
TAG NECK SIZE-LENGTH-CFM	LINEAR SLOT DIFFUSER (SEE SCHEDULE FOR NUMBER OF SLOTS). 2-WAY THROW UNLESS INDICATED OTHERWISE. EXAMPLES: SN10-48-250 REFERS TO TAG SN WITH 10" ROUND NECK, 48" SLOT LENGTH AND 250 CFM.	
	VARIABLE AIR VOLUME TERMINAL UNIT	
	VARIABLE AIR VOLUME TERMINAL UNIT W/REHEAT	
	FAN POWERED TERMINAL UNIT	
	FAN POWERED TERMINAL UNIT W/ REHEAT	

2012 WSEC COMPLIANCE

1. HVAC EQUIPMENT SHALL HAVE MINIMUM PERFORMANCE AT SPECIFIED RATING CONDITIONS NOT LESS THAN THE VALUES CALLED OUT IN SECTION C403.2.3, AND AS INDICATED IN TABLES C403.2.3(1) THROUGH C403.2.3(3) OF THE WSEC AND AS INDICATED ON THE CONTRACT DOCUMENTS.
2. PROVIDE DEADBAND BETWEEN HEATING/COOLING SPACE SENSOR SETPOINTS OF 5 DEGREES AS REQUIRED BY SECTION C403.2.4.2 OF THE WSEC OR AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
3. HVAC SYSTEMS SHALL BE EQUIPPED WITH AUTOMATIC CONTROLS CAPABLE OF ACCOMPLISHING SETBACK OR SHUTDOWN DURING UNOCCUPIED PERIODS AS REQUIRED BY SECTION C403.2.4.3 OF THE WSEC AND AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
4. PROVIDE BALANCING DEVICES IN ALL BRANCH DUCTS AND PIPE RUNS TO TERMINAL DEVICES AS INDICATED ON THE CONTRACT DOCUMENTS.
5. ALL DUCTWORK SHALL COMPLY WITH SMACNA STANDARDS FOR CONSTRUCTION OF GALVANIZED DUCTWORK. ALL DUCTWORK SHALL BE SEALED AS REQUIRED BY SECTION C403.2.7 OF THE WSEC. DUCTWORK STATIC PRESSURE AND SEAL CLASS:

WATER COLUMN	SEAL CLASS
0.5 TO 2 INCHES	SEAL TRANSVERSE JOINTS
2 TO 3 INCHES	SEAL TRANSVERSE JOINTS AND LONGITUDINAL SEAMS
ABOVE 3 INCHES	SEAL TRANSVERSE JOINTS, LONGITUDINAL SEAMS, AND DUCT WALL PENETRATIONS

6. ALL DUCTWORK SHALL BE INSULATED AS REQUIRED BY SECTION C403.2.7 OF THE WSEC AND AS DESCRIBED IN THE SPECIFICATIONS.

DUCT TYPE	LOCATION	R-VALUE
SUPPLY/RETURN	NOT WITHIN CONDITIONED SPACE	R-11 (INCLUDE APPROVED WEATHERPROOF BARRIER)
SUPPLY/RETURN/ OUTSIDE AIR	IN GROUND OR CONCRETE	R-6
OUTSIDE AIR	WITHIN CONDITIONED SPACE (NOT CONSIDERED PART OF THE BUILDING ENVELOPE)	R-7 (DAMPER AT ENVELOPE PENETRATION)
SUPPLY	WITHIN CONDITIONED SPACE	R-6

7. ALL PIPING SHALL BE INSULATED AS REQUIRED BY SECTION C403.3.2.8 OF THE WSEC AND AS DESCRIBED IN SPECIFICATIONS.

SYSTEM/TEMP (°F)		INSULATION CONDUCTIVITY	PIPE DIAMETER: ≤1"	>1"-2"	2"-4"	>4"-6"
			INSULATION THICKNESS:			
HEATING	201-250	.27-.30	2.5	2.5	3.0	3.0
	141-200	.25-.29	1.5	1.5	2.0	2.0
	105-140	.21-.28	1.0	1.0	1.5	1.5
COOLING	40-60	.21-.27	0.5	0.5	1.0	1.0
	BELOW 40	.20-.26	0.5	1.0	1.0	1.0

8. INDIVIDUAL ZONE TERMINAL UNITS AND HVAC SYSTEMS SERVING PORTIONS OF THE BUILDING HAVING LESS THAN 24-HOUR OPERATION SHALL BE SHUT OFF DURING UNOCCUPIED PERIODS AS REQUIRED BY SECTION C403.2.4.3 OF THE WSEC OR AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
9. SUPPLY AIR AND WATER TEMPERATURES SHALL BE AUTOMATICALLY RESET AS REQUIRED IN SECTION C403.2.4.3.1 OF THE WSEC OR AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
10. ALL AIR SYSTEMS SHALL BE PROVIDED WITH A 100% CAPABLE AIR ECONOMIZER CAPABILITY AS REQUIRED BY THE SECTION C403.3.3.1 AND C403.4.1 OF THE WSEC AND AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES.
11. NOT USED.
12. SIMULTANEOUS HEATING AND COOLING TO INDIVIDUAL ZONES SHALL BE PROHIBITED AS DESCRIBED IN THE TEMPERATURE CONTROL SEQUENCES AS DESCRIBED IN SECTION C403.2.4.2 OF THE WSEC.
13. NOT USED.
14. MOTOR EFFICIENCY SHALL NOT BE LESS THAN THE MINIMUM CALLOUTS PER SECTION C403.2.10 OF THE WSEC FOR FULL LOAD EFFICIENCIES.
15. RECORD DRAWINGS SHALL BE PROVIDED TO THE OWNER WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE AS REQUIRED BY SECTION C408.1.3 OF THE WSEC. THE DRAWINGS SHALL INDICATE THE LOCATION AND PERFORMANCE DATA OF EQUIPMENT, GENERAL CONFIGURATION OF DUCTWORK AND PIPING DISTRIBUTION SYSTEMS, INCLUDING FLOW RATES AS A MINIMUM.
16. OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER AS REQUIRED BY SECTION C408.1.3.2 OF THE WSEC. AS A MINIMUM, THE MANUALS SHALL INCLUDE:
    A. SUBMITTAL DATA
    B. OPERATION AND MAINTENANCE DATA FOR EQUIPMENT.
    C. NAMES AND ADDRESSES OF SERVICE AGENCIES.
    D. HVAC CONTOLS SYSTEM MAINTENANCE AND CALIBRATION INFORMATION.
    E. NARRATIVE OF HOW SYSTEM IS INTENDED TO OPERATE.
17. HVAC SYSTEMS SHALL BE BALANCED AS REQUIRED BY SECTION C408.2.2 OF THE WSEC.
18. COMMISSIONING SHALL BE PROVIDED AND REPORT OF COMMISSIONING BE SUBMITTED TO THE OWNER AS REQUIRED BY SECTION C408 OF THE WSEC, AND AS CALLED OUT IN SPECIFICATIONS.
19. PROVIDE AMCA RATED LEAKAGE AND CONTROL TYPE FOR RETURN, OUTSIDE AIR, AND EXHAUST DAMPERS PER SECTION C402.4.5.2.
20. PROVIDE OCCUPANCY SENSOR CONTROL PER SECTION C403.2.5.2.
21. FOR LARGE VOLUME FAN SYSTEMS, PROVIDE AIRFLOW REDUCTION BASED ON HEATING AND COOLING EXHAUST DEMAND PER SECTION C403.2.12.2.
22. PROVIDE APPROPRIATE LOW AND MEDIUM PRESSURE DUCTWORK CONSTRUCTION PER SECTION C403.2.7.3.1.
23. ADJUST DUCT STATIC PRESSURE SETPOINT BASED ON ZONE REQUIRING THE MOST PRESSURE PER SECTION C403.4.2.2.
24. PROVIDE CONTROLS THAT AUTOMATICALLY RESET HVAC SUPPLY AIR TEMP IN RESPONSE TO LOADS PER SECTION C403.4.5.4.

HVAC BASIS OF DESIGN

1. CODES AND STANDARDS
    A. AMERICANS WITH DISABILITIES ACT, (ADA)
    B. NFPA 90A: STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS, 2012 EDITION
    C. NFPA 90B: STANDARD FOR THE INSTALLATION OF WARM AIR HEATING AND AIR-CONDITIONING SYSTEMS, 2012 EDITION
    D. NFPA 101: LIFE SAFETY CODE, 2012 EDITION
    E. ASHRAE 2009 HANDBOOK, FUNDAMENTALS
    F. ASHRAE 2010 HANDBOOK, REFRIGERATION
    G. ASHRAE 2011 HANDBOOK, HVAC APPLICATIONS
    H. ASHRAE 2012 HANDBOOK, HVAC SYSTEMS AND APPLICATIONS
    I. ASHRAE 55-2010 THERMAL ENVIRONMENTAL CONDITIONS FOR HUMAN OCCUPANCY
    J. ASHRAE 62.1-2010 VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY
    K. ASHRAE 90.1-2010 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE
    L. ASHRAE 183-2007 PEAK COOLING AND HEATING LOAD CALCULATIONS IN BUILDINGS EXCEPT LOW-RISE RESIDENTAL BUILDINGS
    M. BUILDING CODES ENFORCED BY THE AUTHORITY HAVING JURISDICTION IN WASHINGTON:
        1. 2012 INTERNATIONAL BUILDING CODE (IBC) WITH STATE AMENDMENTS
        2. 2012 INTERNATIONAL MECHANICAL CODE (IMC) WITH STATE AMENDMENTS
        3. 2012 UNIFORM PLUMBING CODE (UPC) WITH STATE AMENDMENTS
        4. 2012 INTERNATIONAL FIRE CODE (IFC) WITH STATE AMENDMENTS
        5. 2012 NATIONAL FUEL GAS CODE (NFGC) NFPA 54, WAC 51-52
        6. 2008 NATIONAL ELECTRICAL CODE (NEC) WITH STATE AMENDMENTS
        7. 2012 WASHINGTON STATE ENERGY CODE (WAC 51-11, WSEC)
2. OUTDOOR DESIGN CONDITIONS
    A. SUMMER: 98.1°F DB, 66.5°F WB
    B. WINTER: 18.0°F
3. INDOOR DESIGN CONDITIONS
    A. ALL AREAS:
        1. COOLING 75°F +/-2°F
        2. HEATING 70°F +/-2°F
4. VENTILATION CRITERIA:
    A. OFFICE SPACES: 5 CFM/PERSON AND 0.06 CFM/SQ. FT. MINIMUM
    B. CONFERENCE ROOMS: 5 CFM/PERSON AND 0.06 CFM/SQ. FT. MINIMUM
    C. BREAK ROOMS: 5 CFM/PERSON AND 0.12 CFM/SQ. FT. MINIMUM
5. BUILDING ENVELOPE
    A. BUILDING ENVELOPE IS TO REMAIN AS AN EXISTING CONDITION.
6. INTERNAL HEAT GAIN
    A. LIGHTING:
        1. 1.0 W/SQ. FT.
    B. MISCELLANEOUS EQUIPMENT LOAD:
        1. 1.0 W/SQ. FT.
    C. OCCUPANTS:
        1. 275 BTUH SENSIBLE/275 BTUH LATENT
7. OCCUPANCY CRITERIA:
    A. OFFICE SPACES: 5 PEOPLE/ 1,000 SF
    B. CONFERENCE ROOMS: 50 PEOPLE/ 1,000 SF
    C. BREAK ROOMS: 50 PEOPLE/ 1,000 SF
8. DUCTWORK DESIGN CRITERIA
    A. SUPPLY DUCTWORK
        1. MEDIUM PRESSURE
            a. 0.2" WG/100 FT AND 2,000 FPM MAX VELOCITY
        2. LOW PRESSURE
            a. 0.08" WG/100 FT AND 1,500 FT/MIN MAX VELOCITY
    B. RETURN/EXHAUST DUCTWORK
        1. 0.08" WG/100 FT AND 1,500 FT/MIN MAX VELOCITY
    C. RETURN AIR PLENUM
        1. 300 FT/MIN MAX VELOCITY

HVAC DRAWING LIST

NOTE: NOT ALL SYMBOLS OR ABBREVIATIONS ARE APPLICABLE TO THIS PROJECT. REFER TO DETAILS AND NOTES FOR MOUNTING HEIGHTS.

sum
DESIGN STUDIO + architecture
2505 se 11th Ave | ste 268
portland, oregon 97202
sumdesignstudio.com
503 715 5847 ph | fax

JAMES F. THOMAS
STATE OF WASHINGTON
13343
REGISTERED
PROFESSIONAL ENGINEER

GLUMAC
900 SW Fifth Ave., Suite 1600
Portland, Or 97204
T. 503.227.5280 F. 503.274.7674
www.glumac.com
Job No: 02.15.00429
Contact: REM WILSON
engineers for a sustainable future℠

INSITU TRAINING BUILDING
118 E COLUMBIA RIVER WAY
BINGEN, WA 98605

PROJECT NUMBER: 14033
PLOT DATE: 150310
TEAM:

REVISION LOG:

	04/06/16	Permit Set

SHEET:
LEGENDS AND ABBREVIATIONS - MECHANICAL

M0.01

\\PDXDATA1\Jobs\~2015\02.15.00429 Insitu Training IHOP T\Drawings\AutoCAD

ELECTRIC HEATING SERIES FAN POWERED TERMINAL UNIT SCHEDULE

TAG	PREVIOUS TAG	MANUFACTURER	MODEL NUMBER	INLET SIZE (IN)	PRIMARY AIR MAX (CFM)	PRIMARY AIR MIN (CFM)	FAN FLOW (CFM)	FAN SP (IN.WG.)	FAN HP	FAN V/PH	ELECTRIC HEATING COIL LOAD (MBH)	EAT (°F)	LAT (°F)	CAPACITY (KW)	NO. OF STAGES	V/PH	EMERG POWER (Y/N)	SINGLE POC (Y/N)	OPER WT. (LBS)	NOTES
FPB-4	-	TITUS	DTQS-4	10	800	240	800	.25	0.33	277/1	11.9	65	79	3.5	2	277/1	N	Y	300	1-10
FPB-5	-	TITUS	DTQS-6	14	2000	600	2000	.25	0.75	277/1	29	65	78	8.5	3	277/1	N	Y	300	1-10

NOTES

1. COORDINATE WITH ELECTRICAL FOR POWER AND DISCONNECT AS REQUIRED.
2. MINIMUM EXTERNAL DISCHARGE AIR PRESSURE OF 0.20 IN.WG.
3. UNIT VENDOR TO VERIFY COIL SELECTIONS.
4. PROVIDE WITH 1" DISPOSABLE FILTERS.
5. MAXIMUM NC-30 DISCHARGE AND RADIATED SOUND LEVELS AT 0.5" STATIC PD.
   NOISE RATING FOR FAN PLUS 100% PRIMARY AIR AND IN ACCORDANCE WITH ARI STANDARD 880.
6. PROVIDE 5 FOOT DISCHARGE SOUND ATTENUATOR
7. LINING TYPE SHALL BE FIBER-FREE FOAM 1" LINER.
8. PROVIDE NEMA 1 CONTROLS ENCLOSURE.
9. PROVIDE UL CLASS II 24VAC TRANSFORMER.
10. PROVIDE WITH ECM MOTOR.

EXHAUST FAN SCHEDULE

TAG	MANUFACTURER	MODEL NUMBER	LOCATION	AREA SERVED	DISCH	TYPE	DRIVE	AIR FLOW (CFM)	SP (IN.WG.)	MIN. EFF. (%)	FAN RPM	MTR RPM	ELECTRICAL BHP	ELECTRICAL HP	ELECTRICAL V/PH	ELECTRICAL VFD (Y/N)	ELECTRICAL EMERG POWER (Y/N)	UNIT SIZE (L"xW"xH")	OPER. WT. (LBS)	NOTES
EF-4	GREENHECK	SQ-130	-	WORKROOM	HORIZONTAL	INLINE	DIRECT	1400	1.25	-	1630	1630	-	0.75	120/1	N	N	21x21x21	100	1-7

NOTES:

1. COORDINATE WITH ELECTRICAL FOR POWER AND DISCONNECT AS REQUIRED.
2. PROVIDE NEMA PREMIUM EFFICIENCY MOTOR.
3. PROVIDE NON-OVERLOADING MOTOR.
4. PROVIDE ECM (ELECTRONICALLY COMMUTATED MOTOR) WITH FACTORY MOUNTED POTENTIOMETER FOR SPEED ADJUSTMENT.
5. PROVIDE VIBRATION ISOLATION AND SEISMIC RESTRAINT PER SPECIFICATIONS.
6. PROVIDE MOTORIZED DAMPER (WITH END SWITCH).
7. PROVIDE ACCESS DOOR.

HEAT PUMP CONDENSING UNIT SCHEDULE

TAG	FAN COIL TAG	MANUFACTURER	MODEL NUMBER	LOCATION	COOLING (95°F ODB/80°F IDB/67°F EWB) NOM. CAP. (MBH)	COOLING EER	COOLING SEER	HEATING (47°F ODB/70°F IDB) NOM. CAP. (MBH)	HEATING COP	HEATING HSPF	REFRIG TYPE	REFRIG (LBS.)	ELECTRICAL V/PH	ELECTRICAL MCA (A)	ELECTRICAL MOCP (A)	ELECTRICAL EMERG POWER (Y/N)	UNIT SIZE (L"xW"xH")	OPER. WT. (LBS)	NOTES
HP-3	FCU-3	CARRIER	25HCE	-	42	11.5	14.0	41.8	3.66	8.2	-	-	208/1	24	40	N	31x31x39	250	1-3

NOTES:

1. COORDINATE WITH ELECTRICAL FOR POWER AND DISCONNECTS AS REQUIRED.
2. PROVIDE DISTRIBUTION CONTROLLER AND REFRIGERANT PIPING PER MANUFACTURER'S REQUIREMENTS.
3. PROVIDE MANUFACTURER'S CONTROL SYSTEM.

SPLIT SYSTEM HEAT PUMP FAN COIL SCHEDULE

TAG	COND UNIT TAG	MANUFACTURER	MODEL NUMBER	LOCATION	COOLING CAPACITY TOTAL (MBH)	COOLING CAPACITY SENSIBLE (MBH)	HEATING CAPACITY TOTAL (MBH)	SUPPLY AIR FLOW (CFM)	SUPPLY MIN OSA (CFM)	SUPPLY EAT (°F)	SUPPLY LAT (°F)	SUPPLY ESP (IN.WG.)	SUPPLY TSP (IN.WG.)	SUPPLY HP	ELECTRICAL V/PH	ELECTRICAL MCA (A)	ELECTRICAL EMERG POWER (Y/N)	UNIT SIZE (L"xW"xH")	OPER. WT. (LBS)	NOTES
FCU-3	HP-3	CARRIER	FX4D	-	36.9	33.2	41.8	1300	250	80/63	56/53	0.50	-	0.50	208/1	48.5	N	54x22x22	200	1-6

NOTES:

1. COOLING CAPACITY BASED ON 67°F ENTERING WET BULB AND 45°F COIL TEMPERATURES.
2. HEATING CAPACITY BASED ON 47°F OUTDOOR DRY BULB AND 70°F INDOOR DRY BULB TEMPERATURES.
3. COORDINATE WITH ELECTRICAL FOR POWER AND DISCONNECT AS REQUIRED.
4. PROVIDE 8.0 KW ELECTRIC HEATER.
5. PROVIDE PROGRAMMABLE THERMOSTAT WITH TEMPERATURE SETPOINTS FOR AT LEAST FOUR SCHEDULING PERIODS WITHIN 24 HOURS.
6. HORIZONTAL FAN COIL.

DIFFUSER AND GRILLE SCHEDULE

TAG	MANUFACTURER	MODEL NUMBER	DESCRIPTION	FACE TYPE	FACE SIZE (INCHES)	COLOR (NOTE #1)	MATERIAL	OBD	NOTES
SA	TITUS	OMNI	SQUARE CEILING SUPPLY	SQUARE PLAQUE	24 x 24	WHITE	STEEL	NO	1,2,3,4,5,6
SB	TITUS	TBDI-80	INSULATED PLENUM SLOT SUPPLY	SLOT	1 x 1-1/2" SLOT	WHITE	STEEL	NO	1,2,3,5,6,8,9
SC	TITUS	TBDI-80	INSULATED PLENUM SLOT SUPPLY	SLOT	2 x 1-1/2" SLOT	WHITE	STEEL	NO	1,2,3,5,6,8,9
SD	TITUS	272 RS	AEROBLADE SUPPLY GRILLE	3/4" SPACING, DOUBLE DEFL.	SEE PLANS	WHITE	STEEL	NO	1,2,3,4,5,6,7
RA	TITUS	50F	EGGCRATE RETURN	1/2" x 1/2" x 1/2" EGGCRATE	SEE PLANS	WHITE	ALUMINUM	NO	1,2,3,4,5,6
RB	TITUS	23RL	AEROBLADE RETURN GRILLE	3/4" SPACING, 45° DEFL.	SEE PLANS	WHITE	STEEL	NO	1,2,3,4,5,6,7
RC	TITUS	50FF	EGGCRATE RETURN W/ FILTER	1/2" x 1/2" x 1/2" EGGCRATE	SEE PLANS	WHITE	STEEL	NO	1,3,4,5,7,10

NOTES

1. MAXIMUM NC LEVEL SHALL BE 30.
2. ALL VISIBLE SURFACES AND DUCTWORK BEHIND FACE SHALL BE PAINTED FLAT BLACK.
3. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLANS FOR BORDER TYPES.
4. NECK SIZE AND CFM SHOWN ARE ON PLANS (EXAMPLE: SA12x12-400 REFERS TO TAG "SA" WITH 12x12 NECK AND 400 CFM).
5. PROVIDE RECTANGULAR/SQUARE TO ROUND TRANSITION AS REQUIRED AND SIZED FOR MAXIMUM 0.01" WG TOTAL PRESSURE DROP.
6. ADJUSTABLE HORIZONTAL / VERTICAL DISCHARGE.
7. ANY GRILLE/DIFFUSER MOUNTED DIRECTLY ON EXPOSED DUCT SHALL MATCH COLOR OF DUCT (IF PAINTED) OR SHALL HAVE CLEAR ANODIZED FINISH (IF DUCT IS UNPAINTED).
8. PLENUM CONNECTION SIZE, SLOT LENGTH, AND CFM SHOWN ON PLANS (EXAMPLE: SN8-120-2000 REFERS TO TAG "SN" WITH 8" ROUND CONNECTION, 120" CONTINUOUS SLOT LENGTH AND 2000 CFM).
9. PROVIDE MANUFACTURER'S INSULATED PLENUM.
10. PROVIDE WITH 1" FILTER.

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE-ELECTRIC REHEAT

TAG	PREVIOUS TAG	MANUFACTURER	MODEL NUMBER	INLET SIZE (IN)	AIRFLOW CFM COOL MAX (CFM)	AIRFLOW CFM COOL MIN (CFM)	AIRFLOW CFM HEAT MAX (CFM)	AIR P.D. (IN.WG.)	ELECTRIC REHEAT COIL V/PH	ELECTRIC REHEAT COIL NO. OF STAGES	ELECTRIC REHEAT COIL MAX (KW)	ELECTRIC REHEAT COIL EAT (°F)	ELECTRIC REHEAT COIL LAT (°F)	SINGLE POC (Y/N)	EMERG POWER (Y/N)	OPER. WT. (LBS)	NOTES
TU-5	-	TITUS	DESV	8	550	165	165	0.5	277/1	2	1.5	55	84	Y	N	100	1-9
TU-6	-	TITUS	DESV	8	550	165	165	0.5	277/1	2	1.5	55	84	Y	N	100	1-9

NOTES

1. COORDINATE WITH ELECTRICAL FOR POWER AND DISCONNECT AS REQUIRED.
2. PROVIDE PRESSURE INDEPENDENT TERMINAL UNIT.
3. UNIT VENDOR TO VERIFY COIL SELECTIONS.
4. PROVIDE DOOR INTERLOCKING FUSED DISCONNECT SWITCH.
5. PROVIDE NEMA 2 ELECTRIC HEAT & CONTROLS ENCLOSURE.
6. PROVIDE UL CLASS II 24VAC TRANSFORMER AS REQUIRED. COORDINATE WITH ELECTRICAL FOR LINE VOLTAGE POWER.
7. PROVIDE MINIMUM FIVE (5) FOOT LONG SOUND ATTENUATION DISCHARGE PLENUM. INSIDE CLEAR DIMENSION SHALL BE 2" HIGHER THAN TERMINAL HEIGHT AND 4" WIDER THAN TERMINAL WIDTH. REFER TO DETAILS.
8. INSULATION LINING TYPE SHALL BE MINIMUM 1" THICK OR R-4.2, WHICHEVER IS GREATER, WITH NON-FIBER, ANTI-MICROBIAL COATING. REFER TO SPECIFICATIONS.
9. MAXIMUM NC-30 DISCHARGE AND RADIATED SOUND LEVELS AT 0.5" STATIC PD. NOISE RATING IN ACCORDANCE WITH ARI STANDARD 880.

sum
DESIGN STUDIO
+ architecture
2505 se 11th Ave | ste 268
portland, oregon 97202
sumdesignstudio.com
503 715 5847 ph | fax

JAMES E. THOMAS
STATE OF WASHINGTON
13343
REGISTERED
PROFESSIONAL ENGINEER

GLUMAC
900 SW Fifth Ave., Suite 1600
Portland, Or 97204
T. 503.227.5280 F. 503.274.7674
www.glumac.com
Job No.: 02.15.00429
Contact: REM WILSON
engineers for a sustainable future

INSITU TRAINING BUILDING
118 E COLUMBIA RIVER WAY
BINGEN, WA 98605

PROJECT NUMBER: 14033
PLOT DATE: 150310
TEAM:

REVISION LOG:

	04/06/16	Permit Set

SHEET:
SCHEDULES - MECHANICAL

M0.02

OUTDOOR AIR CALCULATION (MULTIPLE-ZONE RECIRCULATING SYSTEM)

SYSTEM: (E) AH-1

BASED ON 2012 IMC WITH WASHINGTON STATE AMENDMENTS - TABLE 403.3 AND ASHRAE 62.1-2007 - TABLE 6-1

ROOM #	ZONE	DESCRIPTION	APPLICATION	AREA (SF)	TABLE 6-1 OUTDOOR AIR (CFM/SF)	TABLE 6-1 OCCUPANCY (P/1OOO SF)	CALCULATED OCCUPANTS	OVERRIDE # OCCUPANTS/ # FIXTURES	NUMBER OF OCCUPANTS / FIXTURES	OUTDOOR AIR REQ. (CFM/PERSON)	EXHAUST RATE REQ. (CFM/SF)	BREATHING ZONE OUTDOOR AIR FLOW (CFM) Vbz	TABLE 6-2 ZONE AIR DIST. EFFECTIVENESS Ez	ZONE OUTDOOR AIR FLOW (CFM) Voz	ZONE PRMARY AIR FLOW (MIN. CFM) Vpz	ZONE PRIMARY OUTDOOR AIR FRACTION Zp	EXHAUST REQUIRED (CFM)	OSA/EXH AIRFLOW PROVIDED (CFM)	AIR CLASS
104	FPB-1	(E) OFFICE	OFFICE SPACE	180	0.06	5	0.9		0.9	5.0	-	15	0.8	19	129	0.147	-		1
105	FPB-1	(E) OFFICE	OFFICE SPACE	110	0.06	5	0.6		0.6	5.0	-	9	0.8	12	69	0.174	-		1
106	FPB-1	(E) OFFICE	OFFICE SPACE	110	0.06	5	0.6		0.6	5.0	-	9	0.8	12	56	0.214	-		1
107	FPB-2	(E) RECEPTION	MAIN ENTRY LOBBIES	126	0.06	10	1.3		1.3	5.0	-	14	0.8	17	74	0.231	-		1
108	FPB-2	(E) RECEPTION	OFFICE SPACE	126	0.06	5	0.6		0.6	5.0	-	11	0.8	13	47	0.280	-		1
	FPB-2	(E) HALLWAY	CORRIDORS	200	0.06	0	0.0		0.0	0.0	-	12	0.8	15	65	0.231	-		1
111	FPB-2	(E) UNISEX	(EXH) TOILET - PRIVATE	48	-	-	-	1	1.0	-	25/50 (CFM/UNIT)	0	0.8	0	0	-	25/50	50	2
112	FPB-2	(E) UNISEX	(EXH) TOILET - PRIVATE	48	-	-	-	1	1.0	-	25/50 (CFM/UNIT)	0	0.8	0	0	-	25/50	50	2
109	FPB-3	(E) OFFICE	OFFICE SPACE	100	0.06	5	0.5		0.5	5.0	-	9	0.8	11	65	0.169	-		1
110	FPB-3	(E) OFFICE	OFFICE SPACE	492	0.06	5	2.5		2.5	5.0	-	42	0.8	52	260	0.200	-		1
117	FPB-4	TRAINING STATIONS	OFFICE SPACE	550	0.06	5	2.8		2.8	5.0	-	47	0.8	58	218	0.266	-		1
116	FPB-4	STORAGE	STORAGE	88	0.06	0	0.0		0.0	0.0	-	5	0.8	7	23	0.304	-		1
115	FPB-5	OFFICE	OFFICE SPACE	894	0.06	5	4.5		4.5	5.0	-	76	0.8	95	600	0.158	-		1
103	TU-1	(E) CONFERENCE	CONFERENCE/ MEETING	595	0.06	50	29.8		29.8	5.0	-	184	0.8	231	514	0.449	-		1
113	TU-1	(E) BREAK	OFFICE SPACE	153	0.06	5	0.8		0.8	5.0	-	13	0.8	16	42	0.381	-		1
110	TU-2	(E) OFFICE	OFFICE SPACE	210	0.06	5	1.1		1.1	5.0	-	18	0.8	22	123	0.179	-		1
110	TU-3	(E) OFFICE	OFFICE SPACE	210	0.06	5	1.1		1.1	5.0	-	18	0.8	22	123	0.179	-		1
110	TU-4	(E) OFFICE	OFFICE SPACE	210	0.06	5	1.1		1.1	5.0	-	18	0.8	22	123	0.179	-		1
119	TU-5	TRAINING STATIONS	OFFICE SPACE	552	0.06	5	2.8		2.8	5.0	-	47	0.8	59	165	0.358	-		1
118	TU-6	TRAINING STATIONS	OFFICE SPACE	552	0.06	5	2.8		2.8	5.0	-	47	0.8	59	165	0.358	-		1
122	TU-7 & 14	(E) BREAK	OFFICE SPACE	600	0.06	5	3.0		3.0	5.0	-	51	0.8	64	374	0.171	-		1
120	TU-10	(E) IT WORKROOM	OFFICE SPACE	160	0.06	5	0.8		0.8	5.0	-	14	0.8	17	47	0.362	-		1
121	TU-11	(E) IT SERVER	OFFICE SPACE	360	0.06	5	1.8		1.8	5.0	-	31	0.8	38	71	0.535	-		1
127	TU-12	(E) MENS	(EXH) LOCKER ROOMS	270	-	-	-		0.0	-	0.5	0	0.8	0	105	-	135	190	2
129	TU-12	(E) WOMENS	(EXH) LOCKER ROOMS	270	-	-	-		0.0	-	0.5	0	0.8	0	105	-	135	190	2
130	TU-12	(E) CONFERENCE	CONFERENCE/ MEETING	220	0.06	50	11.0		11.0	5.0	-	68	0.8	85	168	0.506	-		1
126	TU-13	(E) CONFERENCE	CONFERENCE/ MEETING	286	0.06	50	14.3		14.3	5.0	-	89	0.8	111	216	0.514	-		1
128	TU-13	(E) CORRIDOR	CORRIDORS	200	0.06	0	0.0		0.0	0.0	-	12	0.8	15	180	0.083	-		1
				7,920				Total all zones Pz:	84.2						Max(Zp):	0.535			

SYSTEM POPULATION (PEOPLE), Ps: 60

OCCUPANT DIVERSITY, D = (Ps) / Total all zones (Pz): 0.71

UNCORRECTED OUTDOOR AIR INTAKE (CFM), Vou: 737.0

SYSTEM VENTILATION EFFICIENCY, Ev: 0.61

OUTDOOR AIR INTAKE FLOW (CFM) , Vot: 1208

APPENDIX A OVERRIDE FOR Ev:

LEED EQc2 - 30% INCREASED VENTILATION: NO

OUTDOOR AIR CALCULATION (SINGLE ZONE OR 100% OSA SYSTEM)

SYSTEM: FCU-#3

BASED ON ASHRAE 62.1-2007 - TABLE 6-1

ROOM #	ZONE	DESCRIPTION	APPLICATION	AREA (SF)	TABLE 6-1 OUTDOOR AIR (CFM/SF)	TABLE 6-1 OCCUPANCY (P/1OOO SF)	CALCULATED OCCUPANTS	OVERRIDE # OCCUPANTS/ # FIXTURES	NUMBER OF OCCUPANTS / FIXTURES	OUTDOOR AIR REQ. (CFM/PERSON)	EXHAUST RATE REQ. (CFM/SF)	BREATHING ZONE OUTDOOR AIR FLOW (CFM) Vbz	TABLE 6-2 ZONE AIR DIST. EFFECTIVENESS Ez	ZONE OUTDOOR AIR FLOW (CFM) Voz	EXHAUST REQUIRED (CFM)	OSA/EXH AIRFLOW PROVIDED (CFM)
102	FCU-3	WORKROOM	GEN. MANUFACTURING (NOT HEAVY IND.)	778	0.18	7	5.4		5.4	10.0	0.0	195	0.8	243	0	250
				778				Total all zones Pz:	5.4							250

LEED EQc2 - 30% Increased Ventilation ?: NO

OUTDOOR AIR INTAKE FLOW (CFM) , Vot: 243

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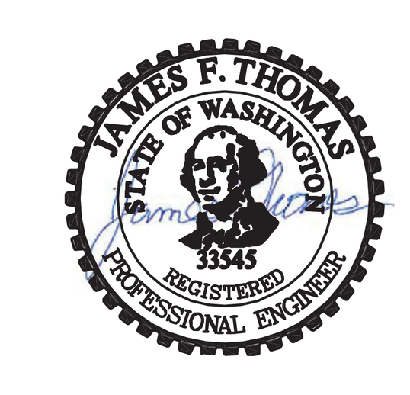
2505 se 11th Ave | ste 268
portland, oregon 97202
sumdesignstudio.com
503 715 5847 ph | fax



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900 SW Fifth Ave., Suite 1600
Portland, Or 97204
T. 503.227.5280 F. 503.274.7674
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Contact: REM WILSON
engineers for a sustainable future™

INSITU TRAINING BUILDING
118 E COLUMBIA RIVER WAY
BINGEN, WA 98605

PROJECT NUMBER: 14033

PLOT DATE: 150310

TEAM:

REVISION LOG:

	04/06/16	Permit Set

SHEET:
SCHEDULES - MECHANICAL

M0.03

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Summary — MECH-SUM

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Project Info

Project Address:	INSITU TRAINING BUILDING	Date	3/31/2106
	118 COLUMBIA RIVER WAY	For Building Dept. Use	
	BINGEN, WA 98605		
Applicant Name:	SUM DESIGN STUDIO		
Applicant Address:	2505 SE 11TH AVE., STE 268, PORTLAND, OR 97202		
Applicant Phone:	503-715-5847		

Project Description

Briefly describe mechanical systems in the text box provided

☐ New Building ☐ Building Addition ☑ System Upgrade ☐ No System Changes

☐ Total Bldg Performance

Total Bldg Performance compliance includes all mandatory provisions per C401.2 Option 2. Only MECH-SUM and MECH-CHK forms required.

Mechanical Systems Summary

Equip ID	Type of System (Note 1)	Space(s) Served	Compliance Path	Heating and Cooling	Fan Flow Controls	Air Economizer (Note 2)	Ventilation (Note 3)	Energy Recovery
HP-3	CONDENSING UNIT HEAT PUMP	OFFICE SPACES	Simple single zone system	Heating and cooling	Variable air volume (VAV)	Table C101.4.3.1	Minimum per IMC	Not Applicable
FC-3	SPLIT SYSTEM HEAT PUMP FAN COIL	OFFICE SPACES	Simple single zone system	Heating and cooling	Variable air volume (VAV)	Table C101.4.3.1	Minimum per IMC	Not Applicable

Note 1 - Provide basic description of system type, for example: unitary rooftop air handler, built-up central air handler; single-packaged, split system or packaged terminal air conditioner or heat pump; unit heater, warm-air furnace, electric resistance heater, 4-pipe fan coil, VRF system, energy recovery air handler, make-up air system, ground or water-source heat pump, etc.
Note 2 - If taking an exception to air economizer, select exception taken from drop down menu and complete MECH-ECONO form. Summary definitions of each exception are listed in MECH-ECONO.
Note 3 - If ventilation "Not applicable" is selected, provide explanation in Project Description box above.

HVAC Hydronic Systems

☐ Hydronic chilled water ☐ Water-loop heat pump ☑ No hydronic systems
☐ Hydronic heating ☐ Geothermal

Service Water Heating Systems

Equipment Type (s)
☐ Hot water heating tank(s) ☐ Instantaneous ☑ No service water systems
☐ Dedicated boiler ☐ Heat exchange from space heat boiler or central hot water/steam
Distribution Type (s)
☐ Circulation System ☐ On-demand

Mechanical Schedules

☑ Mechanical Plans ☐ MECH-EQ Form

Indicate location of equipment compliance information. If provided on plans then MECH-EQ forms are not required, however, include on plans all applicable compliance information listed in MECH-EQ tables.

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Design Load Calculations

☑ Load calculation summary ☐ MECH-LOAD-CALC Form ☐ Equipment retrofit or repair

Provide design load calculations for all mechanical systems and equipment serving the building heating, cooling or ventilating needs. If a load calculation summary is provided with the permit documents that includes all applicable compliance information then the MECH-LOAD-CALC form is not required.

Equipment retrofit and repair projects where design loads in space(s) served have not changed from original design conditions are not required to perform load calculations.

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Summary, pg. 2 — MECH-SUM

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Fan Power

◉ Air system exceeding 5hp ○ No air system exceeds 5hp ○

Provide a MECH-FANSYS form for each HVAC system having a total fan system motor nameplate horsepower exceeding 5 horsepower. Refer to Section C403.2.10 and MECH-FANSYS-DOC for requirements and exceptions.

Commissioning Exception Summary

Describe means of eligibilty for commissioning exception (capacity, etc) for all systems noted as taking exception in Mechanical Systems Summary table. Refer to Section C408.2 and C408.4 for exceptions.

☑ Commissioning will be provided for all applicable systems

Commissioning Exceptions:
☐ Mechanical system(s)
☐ Service water heating system(s)

For systems requiring commissioning, Figure C408.1.2.1 Commissioning Compliance Checklist shall be submitted to the code official upon project completion.

Low Energy and Semi-Heated Spaces (Note 6 and 7)

Space Type	Location in Plan(s)	Space(s) Served	Area Served, square feet	Heating Capacity, Btu/h (Note 4)	Cooling Capacity, Btu/h (Note 5)	Peak Space Conditioning Capacity, Btu/h-sf	Compliance Check	Notes

Note 4 - Provide total installed heating output capacity of systems serving Low Energy or Semi-Heated space(s) in btuh.
Note 5 - Provide total installed cooling capacity of system serving Low Energy space(s) in Btu/h. Not allowed for semi-heated spaces. Enter 0 if no cooling.
Note 6 - Refer to Section C101.5.2 Low Energy Building. Intalled peak space conditioning capacity, heating or cooling, may not exceed 3.4 Btu/h-sf.
Note 7 - Refer to Section C402.1.4 and Semi-Heated Space definition in Chapter 2. Total heating output capacity may not exceed 8 btuh/sf. Only systems without electric resistance heating and no cooling are eligible for the wall insulation exception under semi-heated.

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Permit Plans Checklist - Page 1 of 4 — MECH-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Project Address: INSITU TRAINING BUILDING — Date: 3/31/2106

The following information is necessary to check a permit application for compliance with the mechanicial systems and equipment requirements of the Washington State Energy Code, Commercial Provisions.

Applicable (yes,no,na)	Code Section	Code Provision	Information Required - *Must be in permit documents*	Location in Documents	Building Department Notes
			GENERAL PROVISIONS		
Equipment Sizing & Performance					
yes	C403.2.1	Load calculations	Load calculations performed per ASHRAE Std 183 or equivalent per Chapter 3	Separate attached document	
yes	C403.2.2	Equipment and system sizing	Output capacity of heating and cooling equipment and systems do not exceed calculated loads, note exceptions taken	M0.02	
yes	C403.2.5	Minimum ventilation	Ventilation (natural or mechanical) provided per IMC; indicate mechanical ventilation is capable of being reduced to minimum requirement per IMC	M0.03	
yes	C403.2.3 & C403.2.3.2 & C403.2.12.1	Equipment minimum efficiency	Provide equipment schedules or complete MECH-SUM tables with type, capacity, efficiency, test standard (or other efficiency source) for all mechanical equipment	M0.02	
yes	C403.2.13	Electric motor efficiency	Provide equipment schedule with hp, rpm, and efficiency for all motors; note exceptions taken	M0.02	
na	C403.2.10.1	Fan power limitation	For all applicable systems > 5hp, provide system total nameplate hp in MECH-FANSYS-SUM form		
na	C403.2.10.1	Fan power limitation	For all applicable fan systems > 5hp, verify fan system motor hp or bhp complies with fan power limits per Table C403.2.10.1(1), provide MECH-FANSYS form for each system		
yes	C403.2.10.2	Motor nameplate hp	Indicate fan motors specified are the smallest available motor hp size greater than fan bhp, note exceptions taken	M0.02	
na	C403.2.10.3 & C403.2.13	Fractional hp fan motors	Indicate fan motors 1/12 to 1 hp are ECM type or meet minimum efficiency req.		
na	C403.2.3	Maximum air cooled chiller capacity	Indicate air-cooled chiller capacity does not exceed air-cooled chiller limit		
na	C403.2.3.1	Non-standard water-cooled chillers	Full-load and NPLV values for water-cooled centrifugal chiller adjusted for non-standard operational conditions		
na	C403.2.12.1.2	Centrifugal fan cooling towers	Large capacity cooling towers with centrifugal fan(s) meet efficiency requirements for axial fan open circuit cooling towers		
na	C403.2.3	Forced air furnace and unit heaters	Indicate intermittent ignition or IID, flue/draft damper & jacket loss		
na	C403.2.3.3	Packaged electric heating/cooling equipment	Verify all packaged electric equipment that provides > 20,000 Btu/h cooling capacity and heating is a heat pump, note in equipment schedule		
na	C403.2.3.4	Humidification	Indicate method of humidification (note requirements for systems with economizer)		
HVAC System Controls & Criteria					
yes	C403.2.4.1	Thermostatic controls	Indicate locations of thermostatic control zones on plans, including perimeter systems	M4.01	
na	C403.2.4.1.1	Heat pump supplementary heat	Indicate staged heating (compression/supplemental) and outdoor lock-out temperature is set to 40°F or less		
yes	C403.2.4.2	Setpoint overlap (deadband)	Indicate 5°F deadband minimum for systems controlling both heating & cooling	M0.01	
yes	C403.2.4.3	Automatic setback and shutdown	Indicate zone t-stat controls with required automatic setback & manual override	M0.01	
yes	C403.2.4.3.3	Automatic (optimum) start	Indicate system controls that adjust equip start time to match load conditions	M0.01	
na	C402.4.5.2 & C403.2.4.4	OSA, exhaust, and relief air dampers	Indicate location of outdoor air supply intake, and exhaust and relief outlet dampers; verify Class 1 leakage rating and control type (motorized or gravity); note exceptions taken	M0.01	
na	C402.4.5.2	Return air dampers	Indicate location of return air dampers; verify motorized control; verify Class 1 leakage rating for all return air dampers not integral to packaged equipment		
na	C402.4.5.1	Stairway and shaft vents	Indicate location of stairway and shaft vents, verify Class 1 leakage rated motorized dampers and method of activation		
na	C403.2.11	Heating outside a building	Indicate radiant heat system and occupancy controls		
na	C403.2.4.5	Snow melt systems	Indicate shut-off controls based on outdoor conditions		
na	C403.2.4.6	Combustion heating equipment	Indicate modulating or staged control		
na	C403.2.4.7	Group R1 hotel/motel systems	Indicate method for guest room temperature automatic setback (heating) & set-up (cooling), confirm adjustment of at least 5°F minimum.		
na	C403.2.4.8 / 9	Group R2/R3 dwelling and sleeping unit systems	Indicate 5-2 programmable thermostats in primary spaces with minimum of two setback periods; note exceptions taken		
yes	C403.2.5.1	Demand controlled ventilation	Indicate high-occupancy spaces and systems requiring DCV	M0.01	
yes	C403.2.5.2	Occupancy sensors	Indicate spaces requiring occupancy-based system control and method; or alternate means provided to automatically reduce OSA when partially occupied	M0.01	

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Permit Plans Checklist - Page 2 of 4 — MECH-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Project Address: INSITU TRAINING BUILDING — Date: 3/31/2106

The following information is necessary to check a permit application for compliance with the mechanicial systems and equipment requirements of the Washington State Energy Code, Commercial Provisions.

Applicable (yes,no,na)	Code Section	Code Provision	Information Required - *Must be in permit documents*	Location in Documents	Building Department Notes
			GENERAL PROVISIONS, CONTINUED		
HVAC System Controls & Criteria, Continued					
na	C403.2.5.3	Enclosed loading dock/parking garage ventilation	Indicate enclosed loading dock and enclosed parking garage ventilation system activation and control method		
na	C403.2.5.4.1	Kitchen exhaust hoods	Indicate kitchen hoods requiring make-up air; indicate make-up air source and conditioning method		
na	C403.2.5.4.2	Laboratory exhaust systems	Indicate lab exhaust systems requiring heat recovery, method & efficiency; or alternative method taken (VAV, semi-conditioned makeup, or CERM calculation)		
na	C403.2.6.1	Energy recovery (ER) - ventilation systems	Indicate ventilation systems requiring ER, method & efficiency; note exceptions		
na	C403.2.6.2	Energy recovery (ER) - condensate systems	Indicate on-site steam heating systems requiring energy recovery		
na	C403.2.6.3	Energy recovery (ER) - cooler/freezer condensers	Indicate remote refrig. condensers requiring ER and use of captured energy		
na	C403.4.6	Energy recovery (ER) - condenser systems	Indicate condenser systems requiring ER to pre-heat service water; indicate ER effectiveness; note exceptions taken		
na	C403.2.12	Variable flow control - fans/pumps	Indicate fan and pump motors requiring variable flow control and method (VSD or equivalent controls)		
na	C403.2.12.1	Variable flow control - heat rejection equipment	Indicate heat rejection equipment and cooling tower fans requiring variable flow control and method		
na	C403.2.12.2	Large volume fan systems	Indicate fan systems requiring airflow reduction based on heating and cooling demand; note exceptions taken		
na	C403.2.12.2	Single zone AC systems	Indicate method of cooling demand-based fan control for sys. > 110,000 Btu/h		
yes	C403.2.4.10	DDC system capabilities	Identify all DDC system input/output control points and indicate capability for trending and demand response setpoint adjustment	Spec 230900	
Ducting Systems					
yes	C403.2.7.1 & C403.2.7.3	Duct construction	Indicate all ductwork constructed and sealed per IMC, C402 leakage requirements and IBC vapor retarder requirements	M0.01	
yes	C403.2.7.3.1-3	Duct pressure classifications	Identify location of low, medium and high pressure ductwork on plans	M0.01	
na	C403.2.7.3.3	High pressure duct leakage test	Indicate high pressure duct leakage testing requirements on plans; provide test results to jurisdiction when completed		
yes	C403.2.7.1 / 2	Duct insulation	Indicate R-value of insulation on ductwork	M0.01	
Piping Systems					
yes	C403.2.8	Piping insulation	Indicate R-value of insulation on piping	M0.01	
na	C403.2.8.1	Piping insulation exposed to weather	Indicate method of protection from damage/degredation		
			SIMPLE SYSTEMS		
Qualifying Systems					
yes	C403.3	Qualifying single zone systems	Verify unitary or packaged equipment does not exceed capacity limits, does not have active humidifcation or simultaneous heating/cooling	M0.02	
na	C403.3	Qualifying 2-pipe heating systems	Verify 2-pipe heating-only system does not exceed capacity limits		
na	C403.3.2	Hydronic system controls	Refer to Complex Systems Section C403.4.3		
Simple System Economizers					
na	C403.3.1	Air economizer required	Indicate cooling systems requiring economizer controls; note in equipment schedule		
na	C403.3.1	Air economizer exceptions	Indicate eligible exception(s) taken and provisions to comply with exception(s)		
na	C403.3.1.1.1	Air economizer capacity	Indicate modulating OSA control capability up to 100% OSA; note exceptions taken		
na	C403.3.1.1.2	Integrated air economizer operation	Indicate capability for partial air economizer operation for systems with capacity > 65,000 Btu/h		
na	C403.3.1.1.3	Air economizer high limit controls	Indicate high limit shut-off control method per Table C403.3.1.1.3(2)		

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Permit Plans Checklist - Page 3 of 4 — MECH-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Project Address: INSITU TRAINING BUILDING — Date: 3/31/2106

The following information is necessary to check a permit application for compliance with the mechanicial systems and equipment requirements of the Washington State Energy Code, Commercial Provisions.

Applicable (yes,no,na)	Code Section	Code Provision	Information Required - *Must be in permit documents*	Location in Documents	Building Department Notes
			COMPLEX SYSTEMS		
Complex System Economizers					
na	C403.4.1	Air economizer required	Indicate cooling systems requiring economizer controls; note in equipment schedule		
na	C403.4.1	Air economizer exceptions	Indicate eligible exception(s) taken and provisions to comply with exception(s)		
na	C403.4.1.1	Water economizer capacity	For eligible systems where water economizer may be provided in lieu of air economizer, indicate system is capable of 100% cooling capacity at 50°F db/45°F wb OSA		
na	C403.4.1.2	Water economizer maximum pressure drop	Indicate precooling coils and heat exchangers in water economizer system do not exceed pressure drop limit		
na	C403.4.1.3	Integrated economizer operation	Indicate capability for partial economizer operation for air or water economizer systems		
na	C403.4.1.4	Economizer heating system impact	Verify control method of HVAC systems with economizers does not increase building heating energy usage during normal operation		
Specific System Requirements					
na	C403.4.2 & C403.2.12	VAV fan control	Indicate fans requiring variable flow control and method		
na	C403.4.2.1	VAV fan static pressure sensors	Indicate sensor locations on plans; include at least one sensor per major duct branch		
na	C403.4.2.2	VAV fan static pressure setpoint	Indicate fan system static pressure setpoint based on zone requiring most pressure		
na	C403.4.5	VAV systems serving multiple zones	Indicate supply air systems serving multiple zones, method of primary air control, and zones served; Indicate VAV or note exceptions taken		
na	C403.4.5	VAV systems serving multiple zones	For each air system terminal, indicate the maximum air flow rate of primary supply air during zone peak cooling and the maximum air flow rates during zone peak heating.		
na	C403.4.5.4	VAV system supply air reset	Indicate controls that automatically reset supply air temp in response to loads		
na	C403.4	Large capacity cooling systems	Indicate method of multi-stage or variable control for building cooling system capacity > 300 tons		
na	C403.4.7	Hot gas bypass limitation	Indicate cooling equipment unloading or capacity modulation method		
na	C403.4.3	Large capacity boiler systems	Indicate multi-stage or modulating burner for single boilers > 500,000 Btu/h		
na	C403.4.3	Boiler sequencing	Indicate automatic controls that sequence operation of multiple boilers		
na	C403.4.3.5	Chiller / boiler plant pump isolation	Indicate capability to automatically reduce overall plant flow and shut-off flow through chillers & boilers when not in use		
na	C403.4.3.6 & C403.2.12	Variable flow control - pumps	Indicate pumps requiring variable flow control & method		
na	C403.2.12.1 & C403.4.4	Variable flow control - cooling towers	Indicate cooling tower fans requiring variable flow control and method		
na	C403.4.3.4	Hydronic system part load controls	Indicate heating & chilled water systems have the capability to automatically reset supply water temp AND reduce flow by ≥ 50% for systems > 300,000 Btu/h		
na	C403.4.3.2	Two-pipe changeover systems	Indicate deadband, heating/cooling mode scheduling and changeover temperature range		
na	C403.4.3.3.1	Water loop heat pump - deadband	Indicate capability of central equipment to provide min. 20°F water supply temp deadband between heat rejection and heat addition modes		
na	C403.4.3.3.2.1	Water loop heat pump - heat rejection, Zone 4	Indicate method used to limit system heat loss when heat rejections is not needed		
na	C403.4.3.3.2.2	Water loop heat pump - heat rejection, Zone 5	Provide heat exchanger that separates cooling tower and heat pump loop		
na	C403.4.3.3.3	Water loop heat pump - isolation	Indicate 2-way isolation valve on each heat pump and variable flow control for systems with total pump power > 10 hp		
na	C403.5	Walk-in cooler / freezer - anti-sweat heaters	Indicate w/sf & control method for walk-in cooler/freezer door anti-sweat heaters		
na	C403.5 / 6	Cooler / freezer - evaporator and condenser fans	Indicate motor type for evaporator and condenser fans < 1 hp		

2012 Washington State Energy Code Compliance Forms for Commercial, Group R1, and > 3 story R2 and R3

Mechanical Permit Plans Checklist - Page 4 of 4 — MECH-CHK

2012 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1 — Revised May 2015

Project Address: INSITU TRAINING BUILDING — Date: 3/31/2106

The following information is necessary to check a permit application for compliance with the mechanicial systems and equipment requirements of the Washington State Energy Code, Commercial Provisions.

Applicable (yes,no,na)	Code Section	Code Provision	Information Required - *Must be in permit documents*	Location in Documents	Building Department Notes
			SERVICE WATER HEATING		
Service Water Systems					
na	C404.2	Water-heating equip min. efficiency	Provide equipment schedule with type, capacity, efficiency, test standard or other efficiency source		
na	C404.3	Temperature controls	Indicate temperature controls have required setpoint capability		
na	C404.4	Heat traps	Indicate piping connected to equipment have heat traps on supply & discharge		
na	C404.5	Insulation under water heater	Indicate R-10 insulation under electric water heater tanks		
yes	C404.6	Service water piping insulation	Indicate R-value of insulation on piping; note exceptions taken	M0.01	
na	C404.7 / 8	Circulation systems and heat trace shut-off	Indicate shut-off capability based on occupancy and periods of limited demand		
na	C404.9	Group R-2 service hot water meters	Indicate method of usage metering for dwelling units served by a central service hot water system		
Pools & In-Ground Permanently Installed Spas					
na	C404.10.1	Pool heating equip min. efficiency	Provide equipment schedule with type, capacity, efficiency, test standard or other efficiency source		
na	C404.10.1 / 2	Pool heater on / off controls	Indicate automatic on/off control based on scheduling & accessible on/off switch on heater that operates independent of thermostat setting; note exceptions taken		
na	C404.10.3	Pool covers	Indicate vapor retardant cover and insulation rating as required		
na	C404.10.3	Pool assembly insulation	Indicate rating of insulation on sides and bottom of pools heated to > 90°F		
na	C404.10.4	Heat recovery	Indicate method, exhaust air temperature reduction and recovered energy use; note exceptions taken		
			COMMISSIONING		
Specific System Requirements					
yes	C408.2	Mechanical systems commissioning	Indicate all mechanical systems to be commissioned; for those that will not be commissioned, note exception taken	Spec 230500	
na	C408.4	Service water heating systems commissioning	Indicate all service water heating systems to be commissioned; for those that will not be commissioned, note exception taken		
yes	C408.1.1	Commissioning plan	Provide commissioning plan for all systems requiring commissioning; include in plan all required items per this section	M0.01	
yes	C408.2.2.1 & C408.2.2.2	Air system and hydronic system balancing	Include in commissioning plan that air and hydronic systems shall be balanced in a manner to first minimize throttling losses, then adjust to meet design flow conditions	M0.01	
yes	C408.2.2.1	Air system balancing devices	Indicate devices that provide the capability to balance all supply air outlets, zone terminals and equipment requiring system balancing	M2.01	
na	C408.2.2.2	Hydronic system balancing devices	Indicate devices that provide the capability to isolate, balance and measure flow for all hydronic equipment requiring system balancing		
yes	C408.2.3	Mechanical systems functional performance testing	Provide description of functional performance testing procedures for all applicable systems including: equipment, controls, economizers	M0.01	
na	C408.4.1	Service water heating functional performance testing	Provide description of functional performance testing procedures for all applicable systems including: equipment, controls, pools and spas		
yes	C408.1.4	Systems operation training	Indicate required systems operation training measures to be provided	M0.01	
yes	C408.1.2 & C403.1.3	Documentation	Indicate required documentation including: record documents, manuals, balancing reports, commissioning preliminary and final reports	M0.01	
	C408.1.2.1	Acceptance report	Indicate that Commissioning Compliance Checklist (Figure C408.1.2.1) is required upon completion of preliminary commissioning report	M0.01	

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portland, oregon 97202
sumdesignstudio.com
503 715 5847 ph | fax

GLUMAC
900 SW Fifth Ave., Suite 1600
Portland, Or 97204
T. 503.227.5280 F. 503.274.7674
www.glumac.com
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Contact: REM WILSON
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INSITU TRAINING BUILDING
118 E COLUMBIA RIVER WAY
BINGEN, WA 98605

PROJECT NUMBER: 14033
PLOT DATE: 150310
TEAM:
REVISION LOG:

	04/06/16	Permit Set

SHEET:
NREC FORMS - MECHANICAL

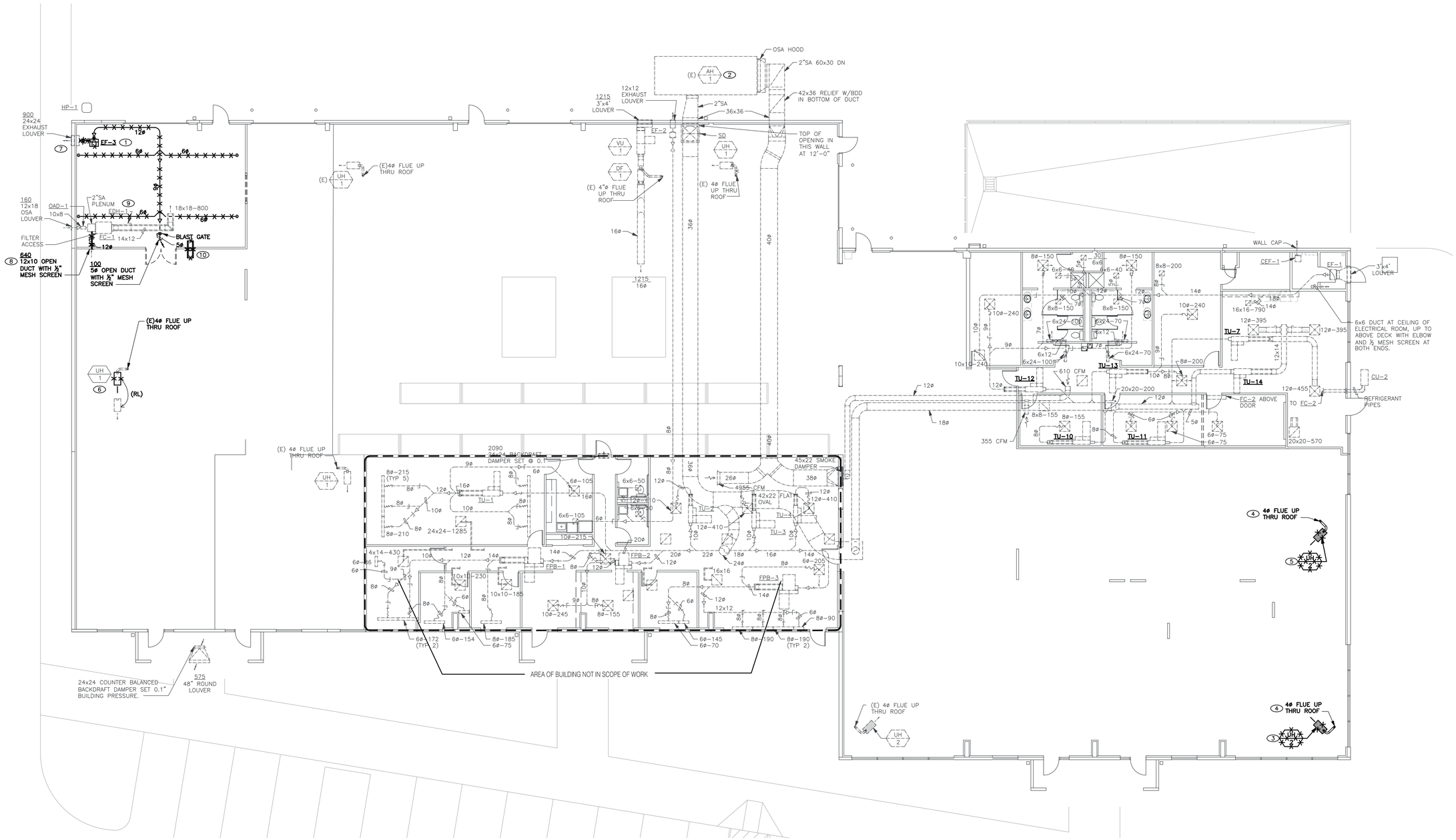
M0.04

KEYED NOTES (E)

1. REMOVE (E) EF-3 AND ASSOCIATED EXHAUST DUCKWORK. (E) 24"x24" EXHAUST LOUVER TO REMAIN. RETURN (E) EF-3 TO OWNER IN OPERATIONAL CONDITION.
2. CLEAN ALL INTERIOR SURFACES AND PROVIDE NEW FILTERS FOR AH-1. REBALANCE SUPPLY AND RETURN TO NEW AIR QUANTIES.
3. REMOVE AND RETAIN FOR RELOCATION.
4. CAP FLUE AND MAKE WEATHER-TIGHT BELOW ROOF LINE.
5. REMOVE UH AND RETURN TO OWNER IN OPERATIONAL CONDITION.
6. RELOCATE (E) UH-1 SOUTH TO AVOID CONFICT WITH (N) WALL. REUSE (E) FLUE ROOF PENITRATION. COORDINATE FLUE ROUTE WITH (N) WALL. EXTEND GAS PIPING AND ELECTRICAL.
7. REMOVE 2 (E) 4"ø DIA EXHAUST DUCTS. REPAIR LOUVER AS REQUIRED.
8. REMOVE (E) 12"x10" DUCT, GRILLE AND BALANCING DAMPER. PATCH WALL AS REQUIRED. REPLACE GRILLE TO INSIDE ROOM WITH (E) FC-1.

KEYED NOTES (E)

9. (E) FC-1 TO REMAIN OPERATIONAL.
10. REMOVE (E) TRANSFER DUCTWORK AND PATCH WALL AS REQUIRED.



1 DEMO FLOOR PLAN - MECHANICAL

SCALE: 1"=1'

0 4' 8' 16'

PROJECT NORTH

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sumdesignstudio.com
503 715 5847 ph | fax

JAMES E. THOMAS
STATE OF WASHINGTON
13343
REGISTERED
PROFESSIONAL ENGINEER

GLUMAC
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BINGEN, WA 98605

PROJECT NUMBER:	14033
PLOT DATE:	150310
TEAM:	

REVISION LOG:

	04/06/16	Permit Set

SHEET:
DEMO FLOOR PLAN - MECHANICAL

M1.01

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SHEET NOTES

A. X-RAY WALLS BEFORE CUTTING OR CORE DRILLING TO ENSURE NO EXISTING REBAR IS CUT WHEN INSTALLING NEW WALL PENETRATIONS.

B. DO NOT OVER-CUT OPENINGS. SEE ARCHITECTURAL DRAWINGS FOR CUTTING PROCEDURES TO BE FOLLOWED.

C. EXISTING AND NEW RETURN AIR PATH IS THROUGH A RETURN AIR PLENUM. ALL WALLS SEPARATING THE CLASSROOMS/OFFICE AREAS FROM THE OPEN WORK AREA 117A TO BE FULL-HEIGHT AND SEALED AIR-TIGHT.

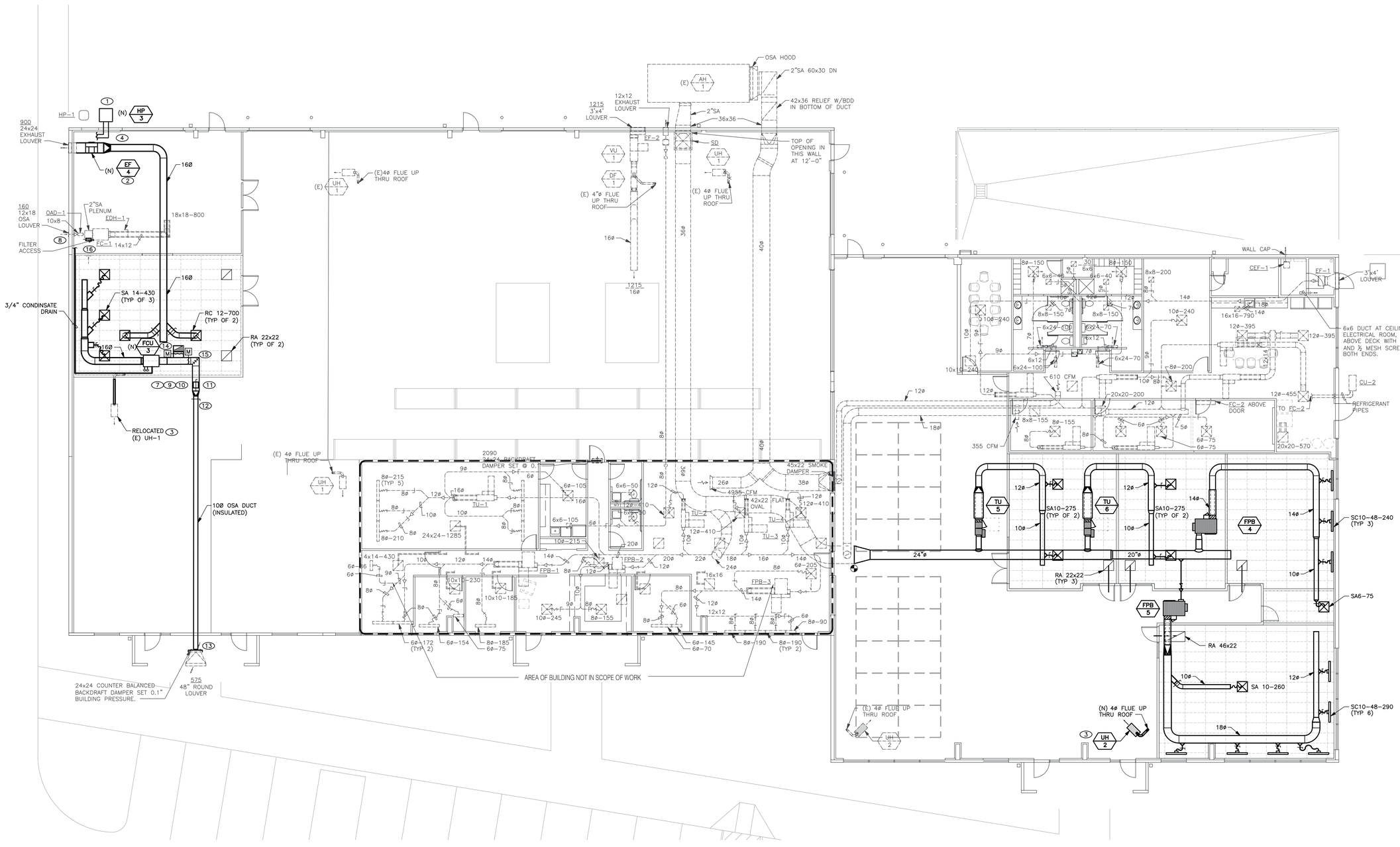
D. UNLESS OTHERWISE NOTED, BRANCH DUCTWORK TO THE DIFFUERS/GRILLE IS THE SAME SIZE AS THE DIFFUSER/GRILLE NECK SIZE.

KEYED NOTES ①

1. INSTALL CONDENSING UNIT ON EQUIPMENT PAD SUCH AS OLDCASTLE ECO PAD.
2. REUSE (E) UNISTRUT SUPPORT FOR (N) EF-4. CONNECT EXHAUST TO (E) EXHAUST LOUVER.
3. RELOCATED UNIT HEATER.
4. ROUTE REFRIGERANT PIPING DOWN WALL.
5. NOT USED.
6. NOT USED.
7. INSTALL (N) FC-3 ABOVE (N) LAY IN CEILING. SEE DETAIL 12/M7.01 INSTALL AT AN ELEVATION THAT WILL ALLOW THE 3/4" CONDENSATE TO DRAIN TO CONDENSATE DRAIN FOR (E) FC-1.
8. TIE (N) 3/4" CONDENSATE DRAIN INTO (E) CONDENSATE DRAIN FOR (E) FC-1.

KEYED NOTES ②

9. ROUTE (N) REFRIGERANT LINES ALONG WALL TO (N) HP-3. SIZE AND INSTALL PER MANUFACTURES RECOMMENDATIONS.
10. PROVIDE 22"x22"x48" INSULATED RA PLENUM WITH FILTER RACK.
11. (N) 16"x16" INSULATED RA DUCT WITH 14"x12" INLET WITH VOLUME DAMPER ON TOP OF DUCT. BALANCE TO 1050 CFM.
12. (N) 8"Ø INSULATED OSA DUCT WITH VOLUME DAMPER. BALANCE TO 250 CFM.
13. REMOVE (E) DAMPER AND CAP WITH SHEETMETAL. CONNECT (N) 8"Ø OSA DUCT.
14. (N) 24"x12" RA DUCT WITH INLET DIRECTED UP. PROVIDE WITH MOTORIZED DAMPER.
15. PROVIDE MOTORIZED DAMPER.
16. REUSE 12"x10" GRILLE AND MOUNT ON (E) RA DUCT. PROVIDE WITH VOLUME DAMPER.



1 FLOOR PLAN - MECHANICAL

SCALE: 1/8"=1'-0"

0 4' 8' 16'

PROJECT NORTH

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sumdesignstudio.com
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STATE OF WASHINGTON
19751
13343
REGISTERED
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PROJECT NUMBER:	14033
PLOT DATE:	150310
TEAM:	

REVISION LOG:

	04/06/16	Permit Set

SHEET:
FLOOR PLAN - MECHANICAL

M2.01

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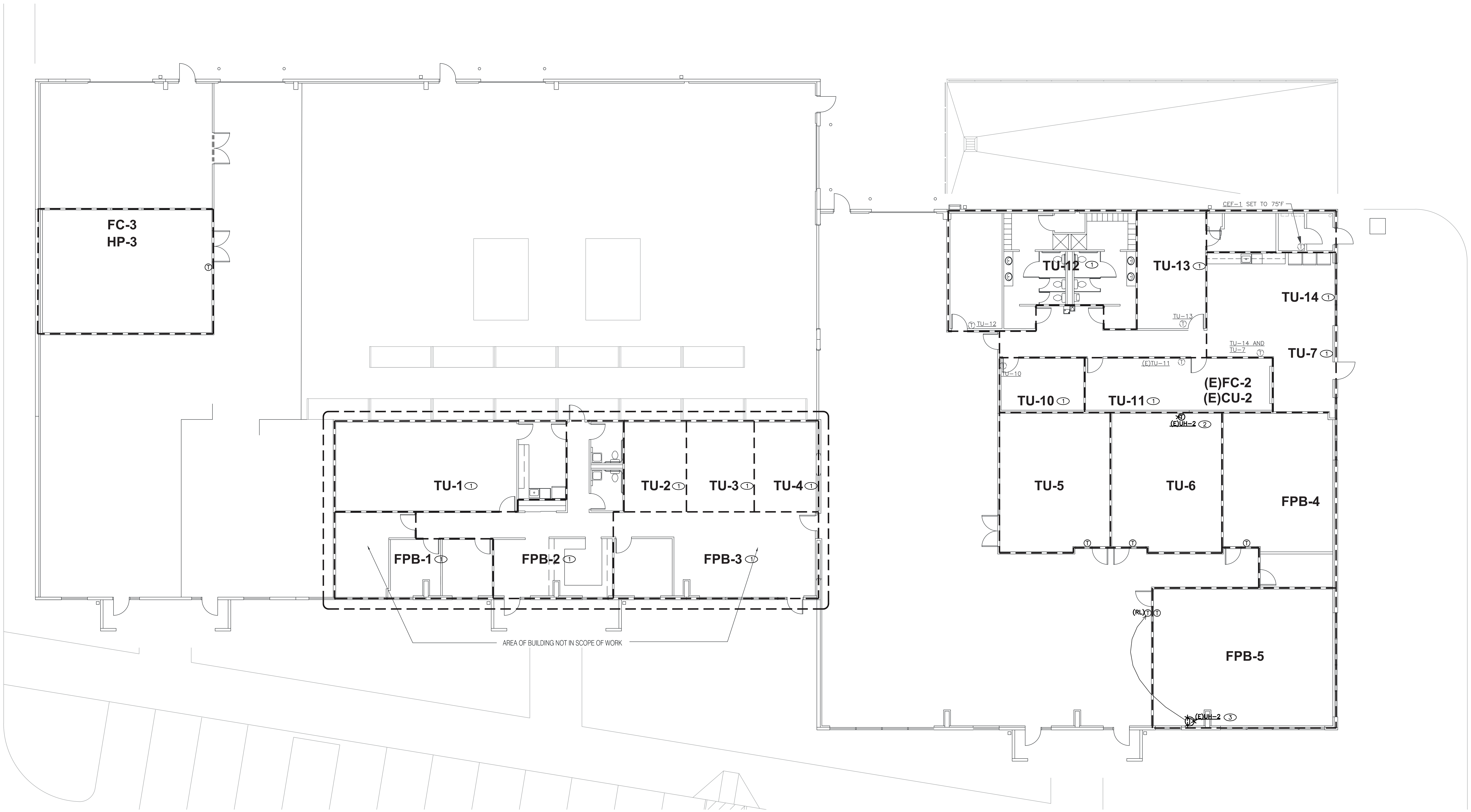
KEYED NOTES

1. EXISTING TERMINAL UNIT.
2. DEMOLISH THERMOSTAT AND ALL ASSOCIATED CONDUIT AND WIRING.
3. RELOCATE THERMOSTAT AS INDICATED.
4. RELOCATE THERMOSTAT FOR TU-2-12 TO LOCATION SHOWN. THERMOSTAT FOR TU-2-10 IS EXISTING TO REMAIN.
5. PROVIDE INSULATED BASE.



1 **ZONING PLAN - MECHAICAL**

SCALE: 1/8"=1'-0"

0 4' 8' 16'

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sumdesignstudio.com
503 715 5847 ph | fax

JAMES F. THOMAS
STATE OF WASHINGTON
33545
REGISTERED PROFESSIONAL ENGINEER

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PROJECT NUMBER: 14033

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	04/06/16	Permit Set

SHEET:
ZONING PLAN - MECHANICAL

M4.01

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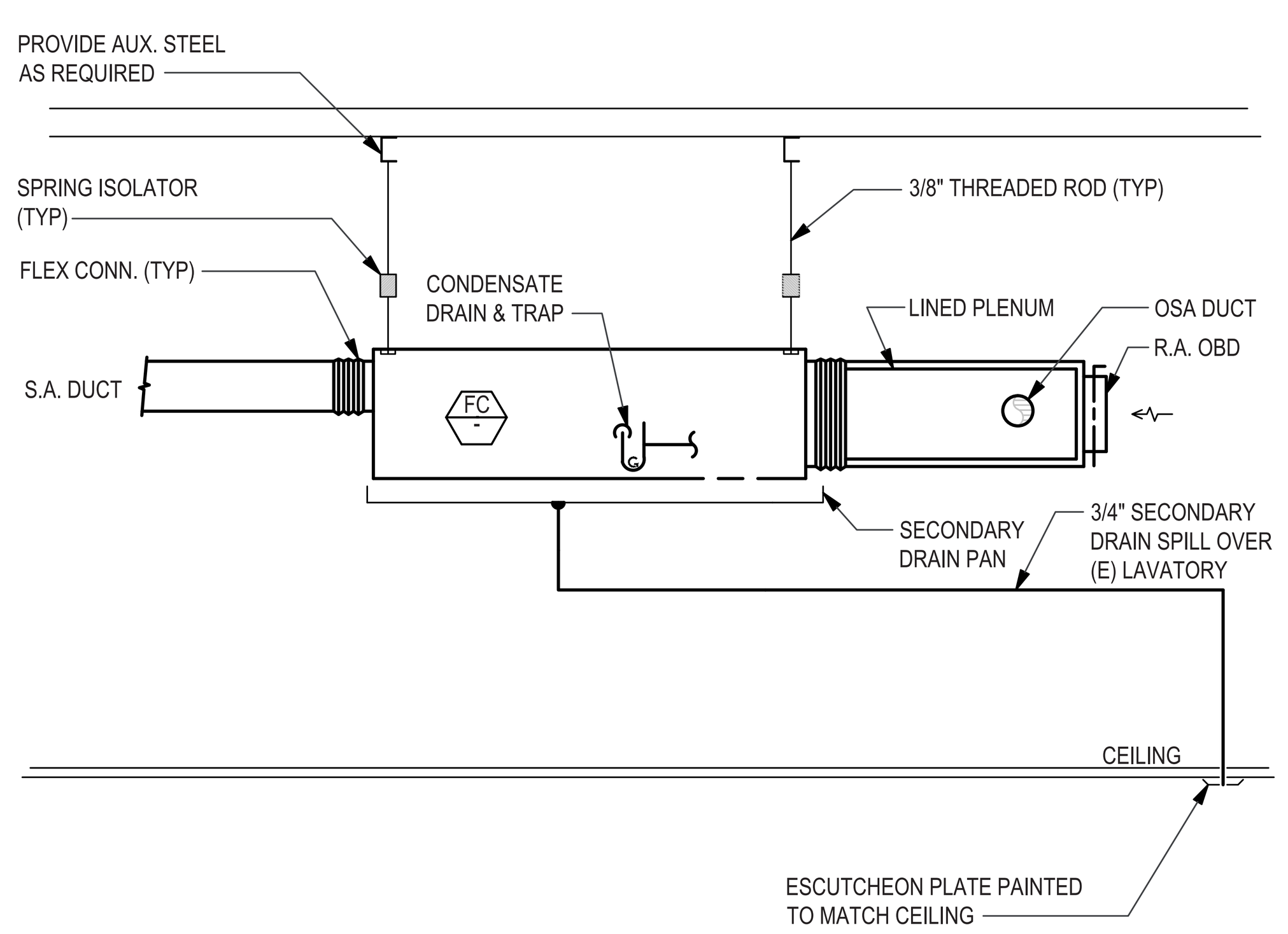
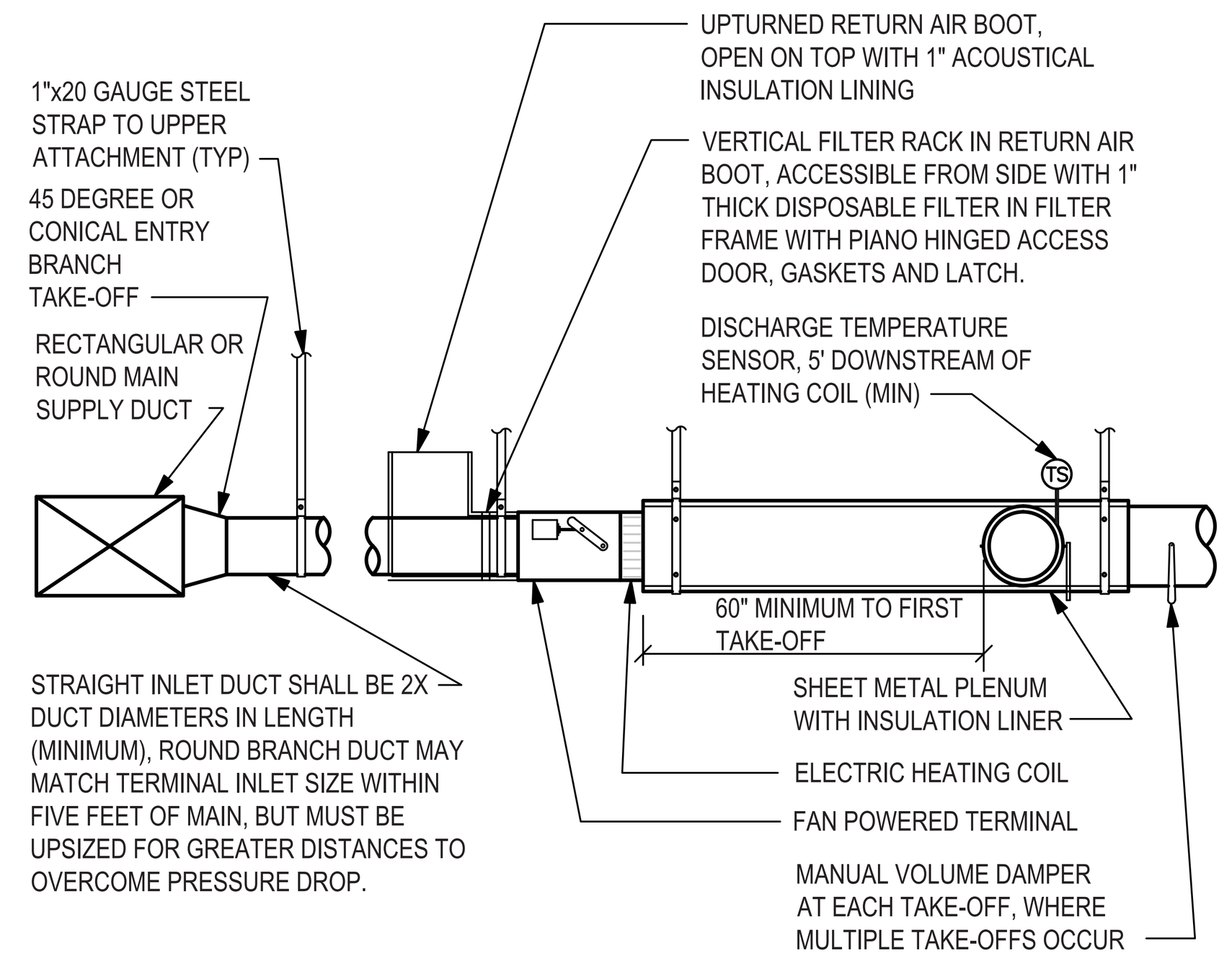


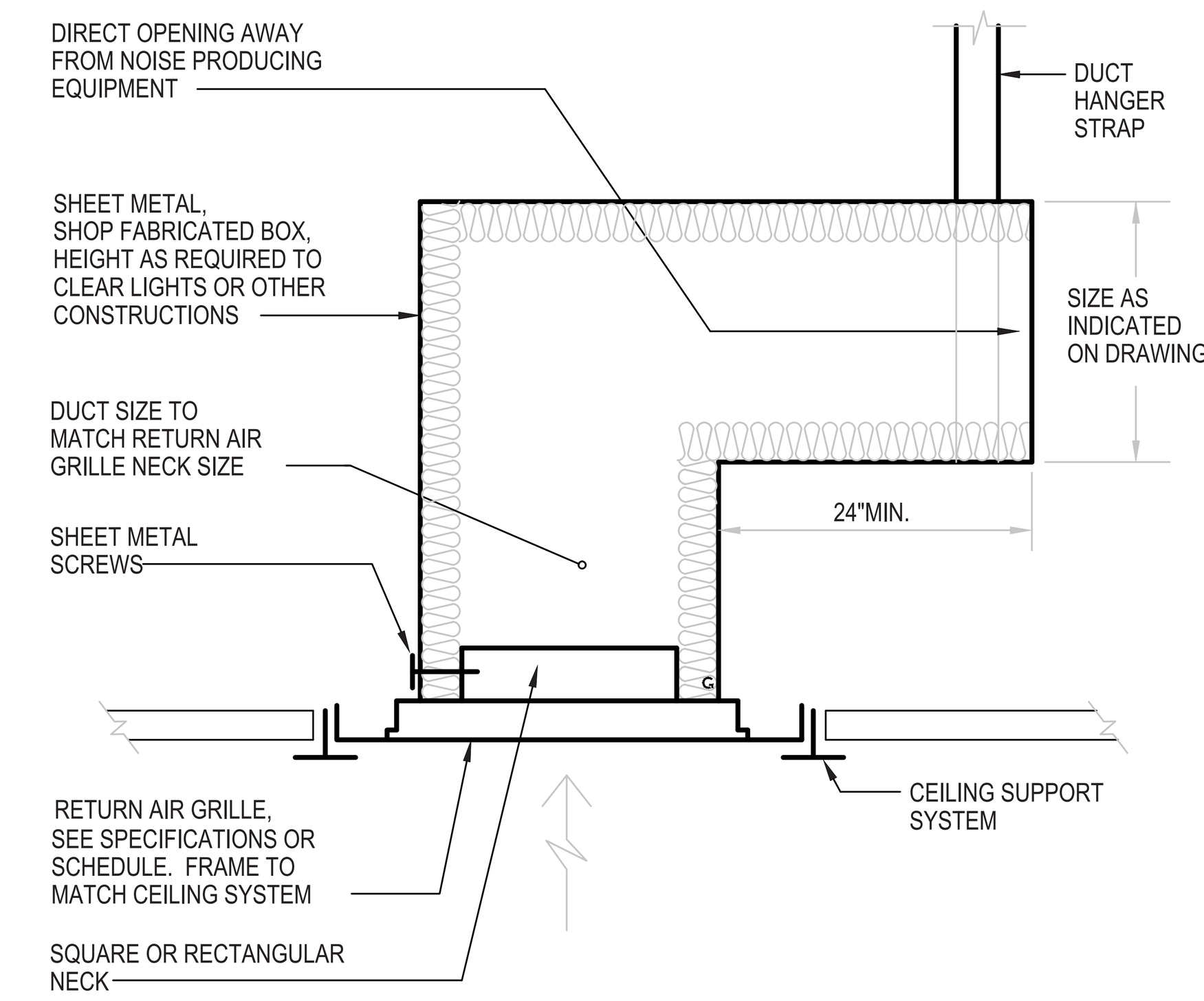
NOTES:
1. INSTALL UNIT AS HIGH AS POSSIBLE.
2. REFER TO PLANS FOR SIZES AND CONTINUATION.

12 FAN COIL DETAIL
SCALE: NONE

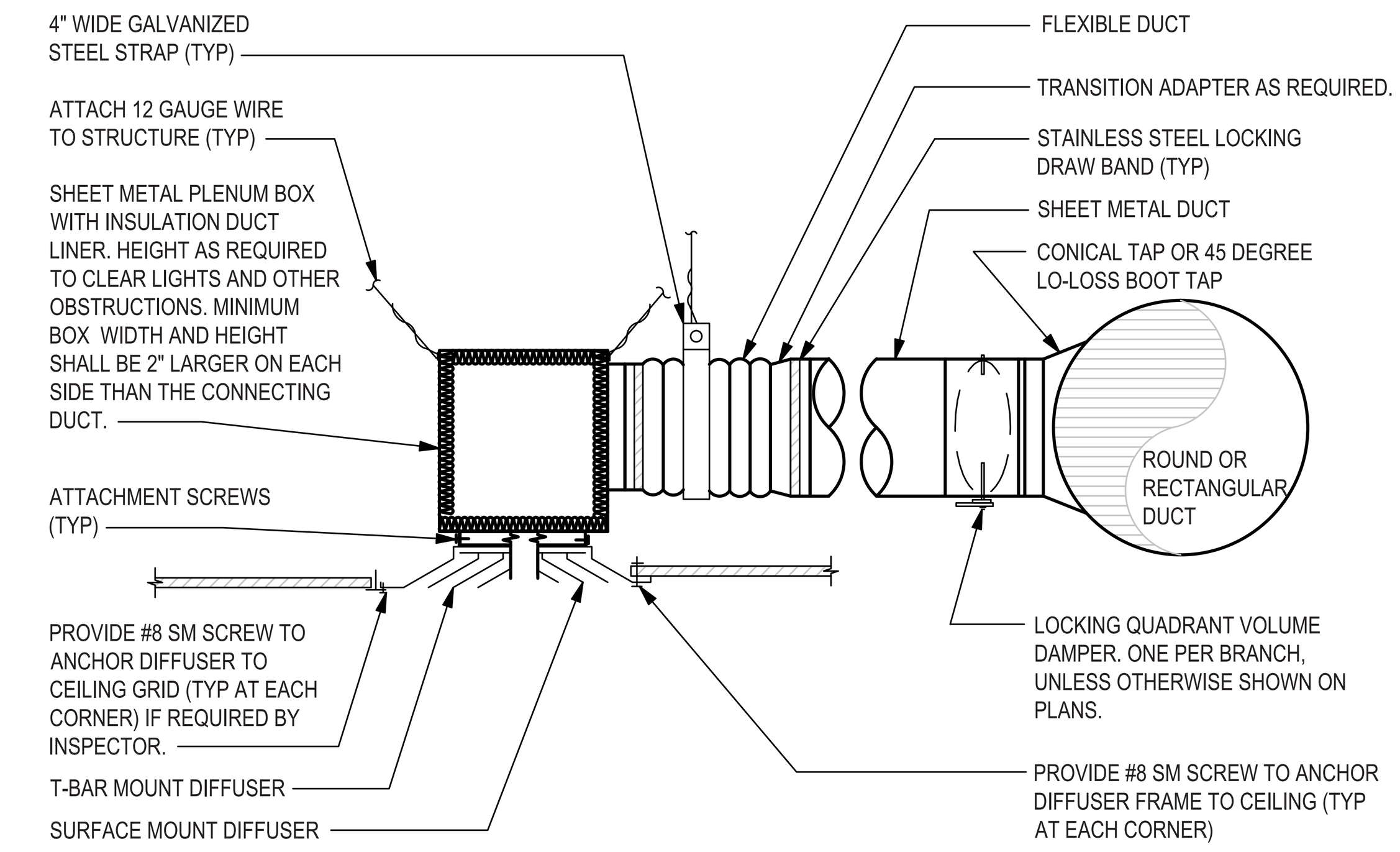


NOTES:
1. SHEET METAL OUTLET PLENUM SHALL BE LINED WITH 1" THICK FIBER-FREE INSULATION LINER.
2. MAINTAIN ADEQUATE CLEARANCE TO EASILY ACCESS AND MAINTAIN DAMPERS AND CONTROLS.
3. UNLESS OTHERWISE NOTED ON THE DRAWINGS, INSIDE CLEAR DIMENSIONS SHALL BE 2" HIGHER THAN TERMINAL UNIT OUTLET HEIGHT AND 4" WIDER THAN TERMINAL UNIT OUTLET WIDTH TO MINIMIZE NOISE TRANSMISSION TO DIFFUSERS.
4. INSIDE CLEAR DIMENSIONS MAY BE REDUCED TO MATCH UNIT OUTLET DIMENSIONS WHERE ALL DOWNSTREAM SUPPLY DUCTWORK IS GREATER THAN 20 FEET IN LENGTH WITH A MINIMUM OF TWO 90 DEGREE ELBOWS PRIOR TO CONNECTION AT EACH DIFFUSER.

9 FAN POWERED TERMINAL
SCALE: NONE

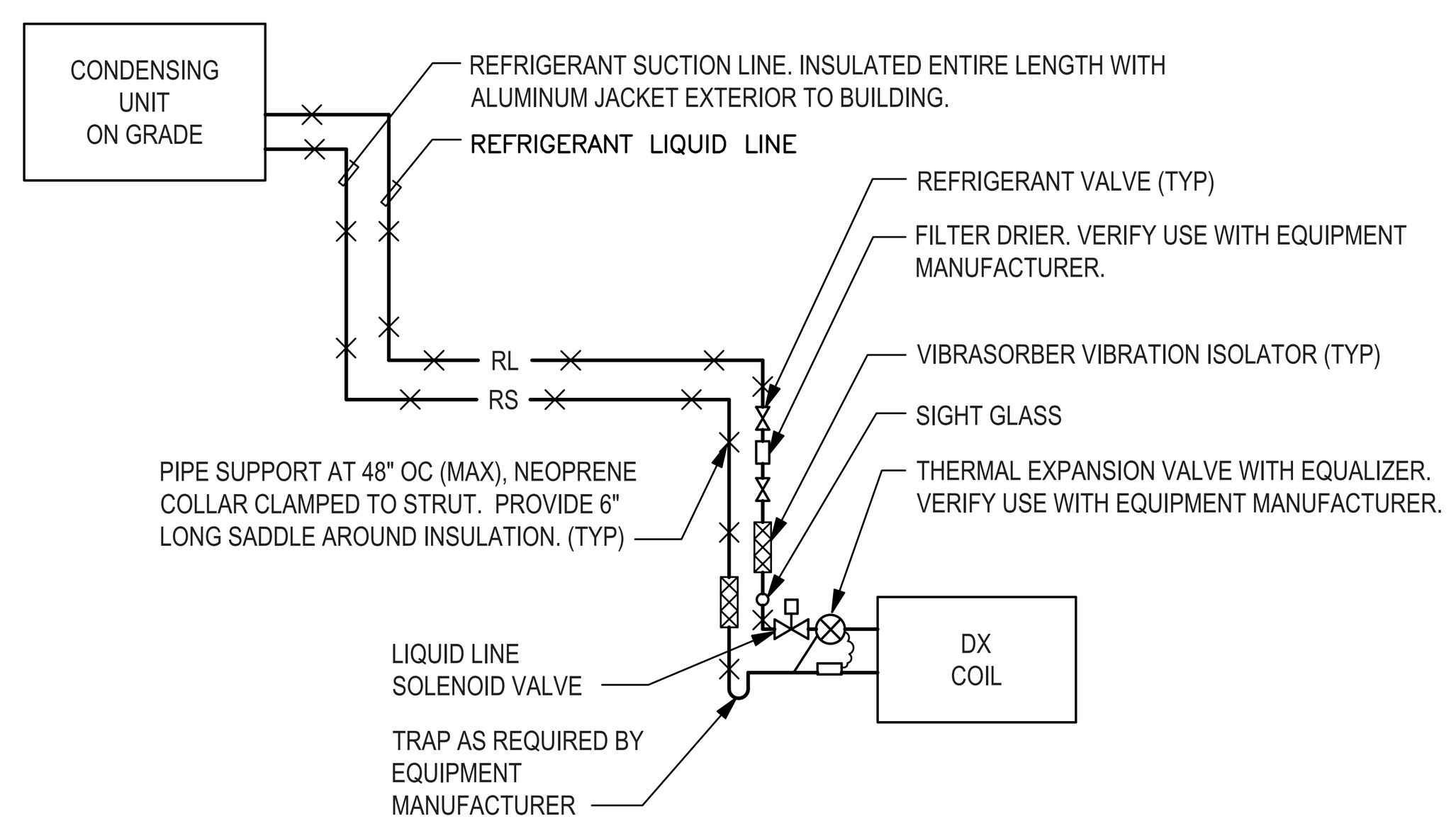


6 CEILING ACOUSTICAL RETURN AIR BOOT
SCALE: NONE



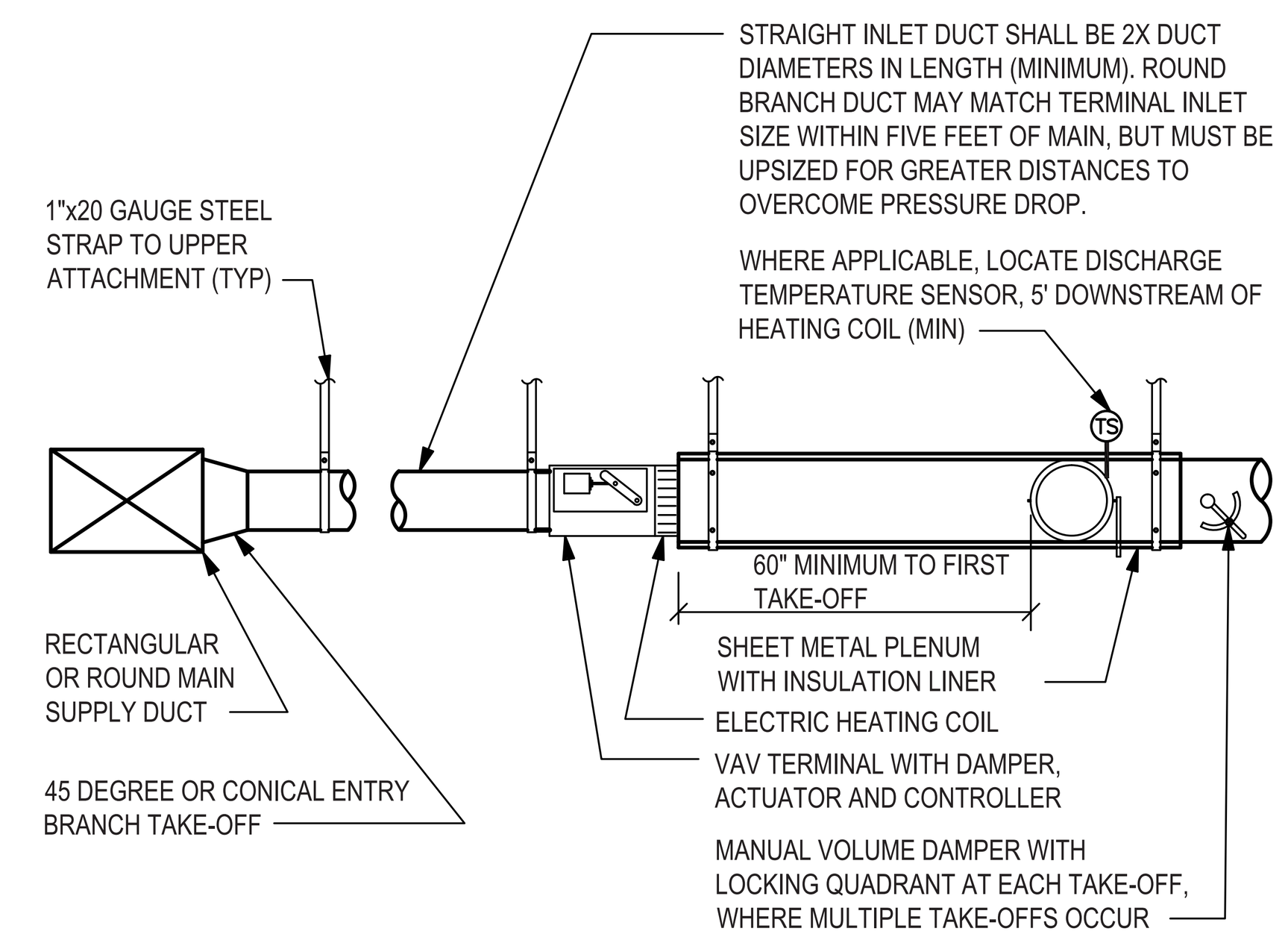
NOTES:
1. ACCESS TO BALANCING DAMPER MAY BE PROVIDED THRU REMOVABLE CEILING PANEL, RETURN AIR REGISTER OR HINGED LIGHT FIXTURE.
2. FOR INACCESSIBLE CEILING USE REMOTE FLEXIBLE STEEL SHAFT DAMPER OPERATOR OR PROVIDE 18"X18" (MIN) ACCESS DOOR.
3. DIFFUSER FRAME SHALL MATCH ARCHITECTURAL CEILING TYPE.
4. INSULATED FLEXIBLE DUCT (MAXIMUM 7' LENGTH) WITH ONE 90 DEGREE ELBOW. MINIMUM RADIUS 1.5X DIAMETER. DO NOT INSTALL KINKED OR DEFORMED.
5. REFER TO STRUCTURAL DESIGN FOR ATTACHMENT REQUIREMENTS AND ADDITIONAL SUPPORT OPTIONS.

3 CEILING DIFFUSER MOUNTING - PLENUM BOX
SCALE: NONE



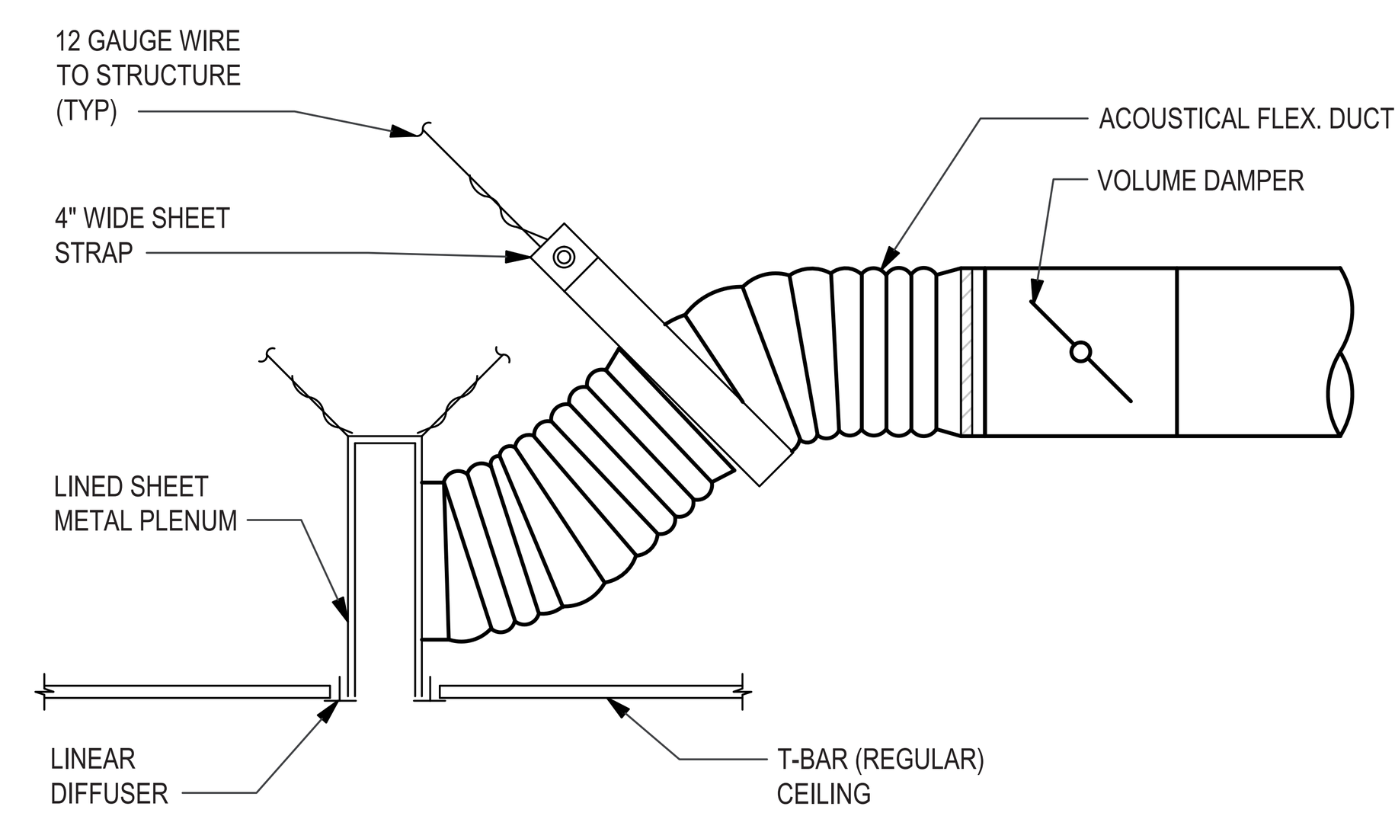
NOTES:
1. SIZE REFRIGERANT PIPING PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

11 REFRIGERANT PIPING SCHEMATIC
SCALE: NONE



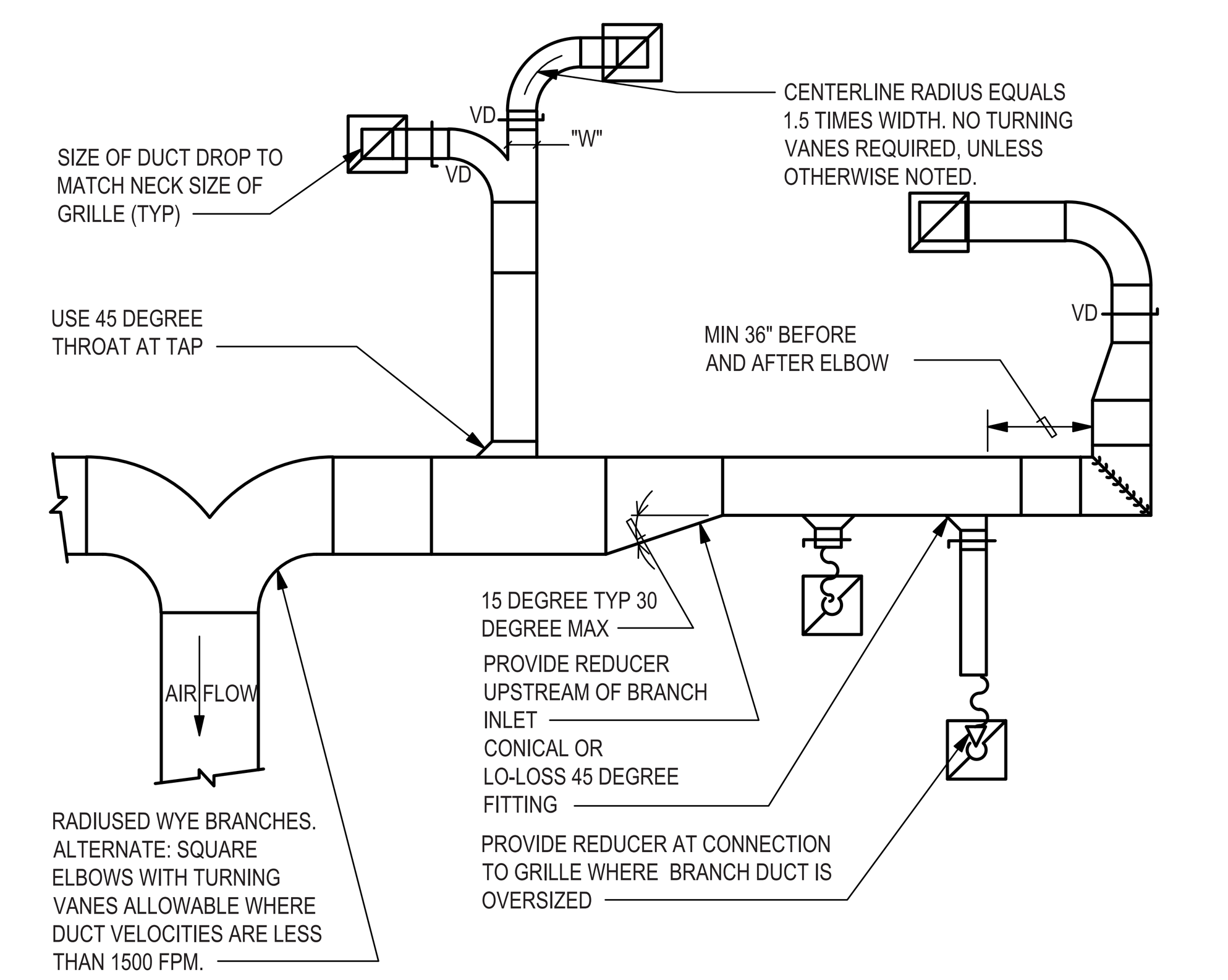
NOTES:
1. SHEET METAL OUTLET PLENUM SHALL BE LINED WITH 1" THICK FIBER-FREE INSULATION LINER.
2. MAINTAIN ADEQUATE CLEARANCE TO EASILY ACCESS AND MAINTAIN DAMPERS AND CONTROLS.
3. UNLESS OTHERWISE NOTED ON THE DRAWINGS, INSIDE CLEAR DIMENSIONS SHALL BE 2" HIGHER THAN TERMINAL UNIT OUTLET HEIGHT AND 4" WIDER THAN TERMINAL UNIT OUTLET WIDTH TO MINIMIZE NOISE TRANSMISSION TO DIFFUSERS.
4. INSIDE CLEAR DIMENSIONS MAY BE REDUCED TO MATCH UNIT OUTLET DIMENSIONS WHERE ALL DOWNSTREAM SUPPLY DUCTWORK IS GREATER THAN 20 FEET IN LENGTH WITH A MINIMUM OF TWO 90 DEGREE ELBOWS PRIOR TO CONNECTION AT EACH DIFFUSER.

8 VAV TERMINAL WITH ELECTRIC REHEAT
SCALE: NONE



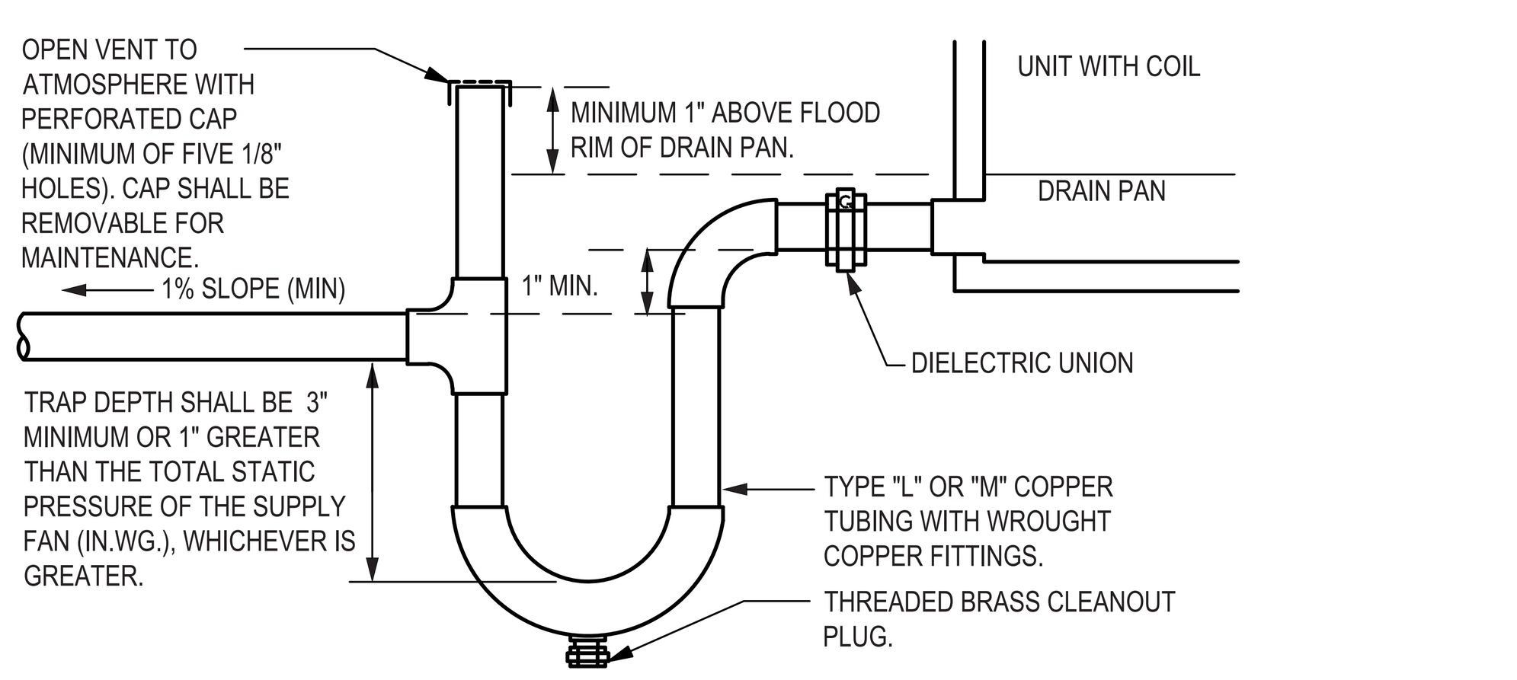
NOTES:
1. REFER TO PLANS FOR SIZES AND CONTINUATION.

5 CEILING DIFFUSER
SCALE: NONE



NOTES:
1. PROVIDE DUCT LINER AND/OR EXTERNAL DUCT INSULATION AS NOTED ON PLANS OR IN SPECIFICATIONS.
2. PROVIDE HANGERS AND SEISMIC BRACING PER SMACNA AND BUILDING CODE.
3. LOCATE MANUAL BALANCING DAMPERS IMMEDIATELY DOWNSTREAM OF EACH DUCT TAP.
4. MAINTAIN MINIMUM 36" CLEARANCE BETWEEN LEADING OR TRAILING ELBOW JOINT AND DUCT TAP FITTINGS.
5. TURNING VANES REQUIRED ON RECTANGULAR DUCT SYSTEM ELBOWS. SINGLE THICKNESS VANES UP TO 25" HEIGHT AND DOUBLE THICKNESS VANES IN DUCTS GREATER THAN 25" HEIGHT. RADIUSED ELBOWS MAY BE USED AS AN ALTERNATE.
6. NO TURNING VANES REQUIRED ON DUCT SIZES LESS THAN 180 SQ. IN. IF DUCT VELOCITY IS LESS THAN 1500 FPM.

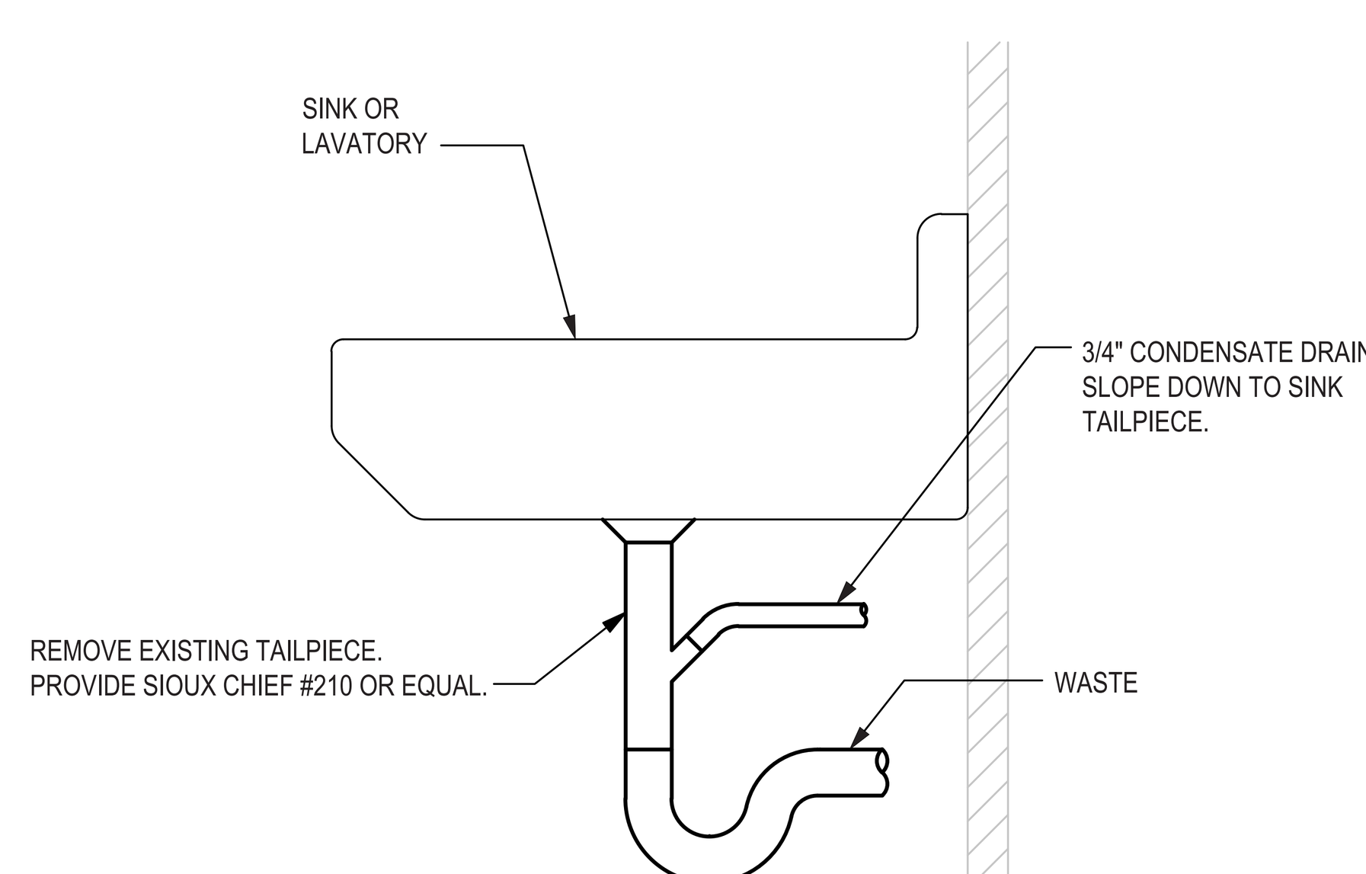
2 RETURN AND EXHAUST DUCT FITTINGS
SCALE: NONE



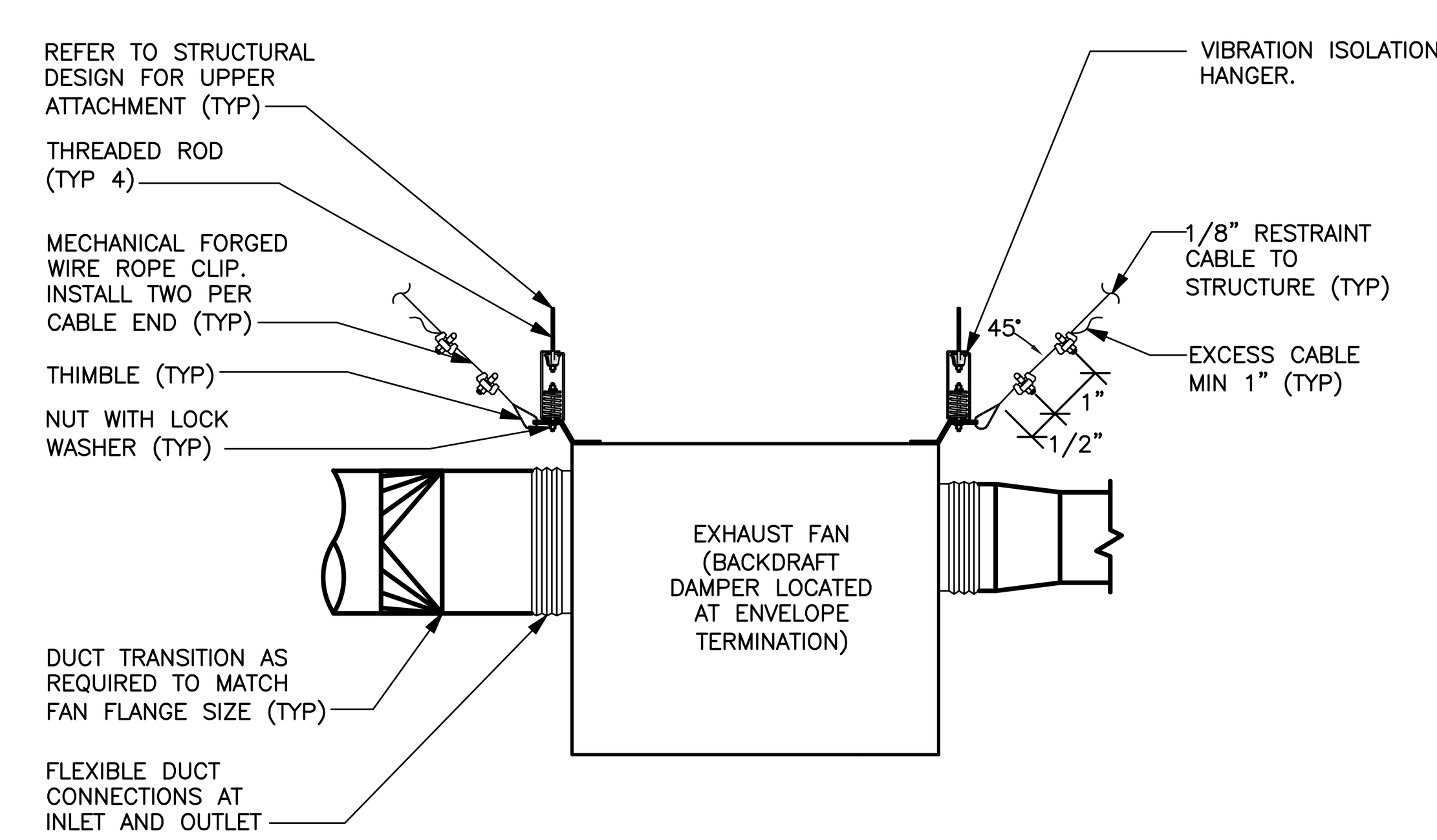
NOTES:
1. CONDENSATE PIPE TERMINATION SHALL BE LOCATED A MINIMUM OF 1" ABOVE THE FLOOD RIM OF AN APPROVED TRAPPED RECEPTOR, LANDSCAPING AREA OR OTHER LOCATION AS APPROVED BY THE AUTHORITY HAVING JURISDICTION.
2. ALL INTERIOR CONDENSATE DRAIN PIPING ABOVE CEILINGS SHALL BE INSULATED.
3. PROVIDE PIPE SUPPORTS AS REQUIRED TO MAINTAIN MINIMUM 1% SLOPE.
4. INSTALL TRAP PARALLEL TO UNIT, IF POSSIBLE.
5. MINIMUM CONDENSATE PIPE SIZES SHALL BE PER THE FOLLOWING TABLE UNLESS LARGER SIZE IS SHOWN ON PLANS OR AS REQUIRED BY AUTHORITY HAVING JURISDICTION AND/OR LOCAL BUILDING CODE REQUIREMENTS.

CAPACITY	SIZE
UP TO 20 TONS	3/4"
21 TO 40 TONS	1"

10 COOLING COIL CONDENSATE TRAP
SCALE: NONE

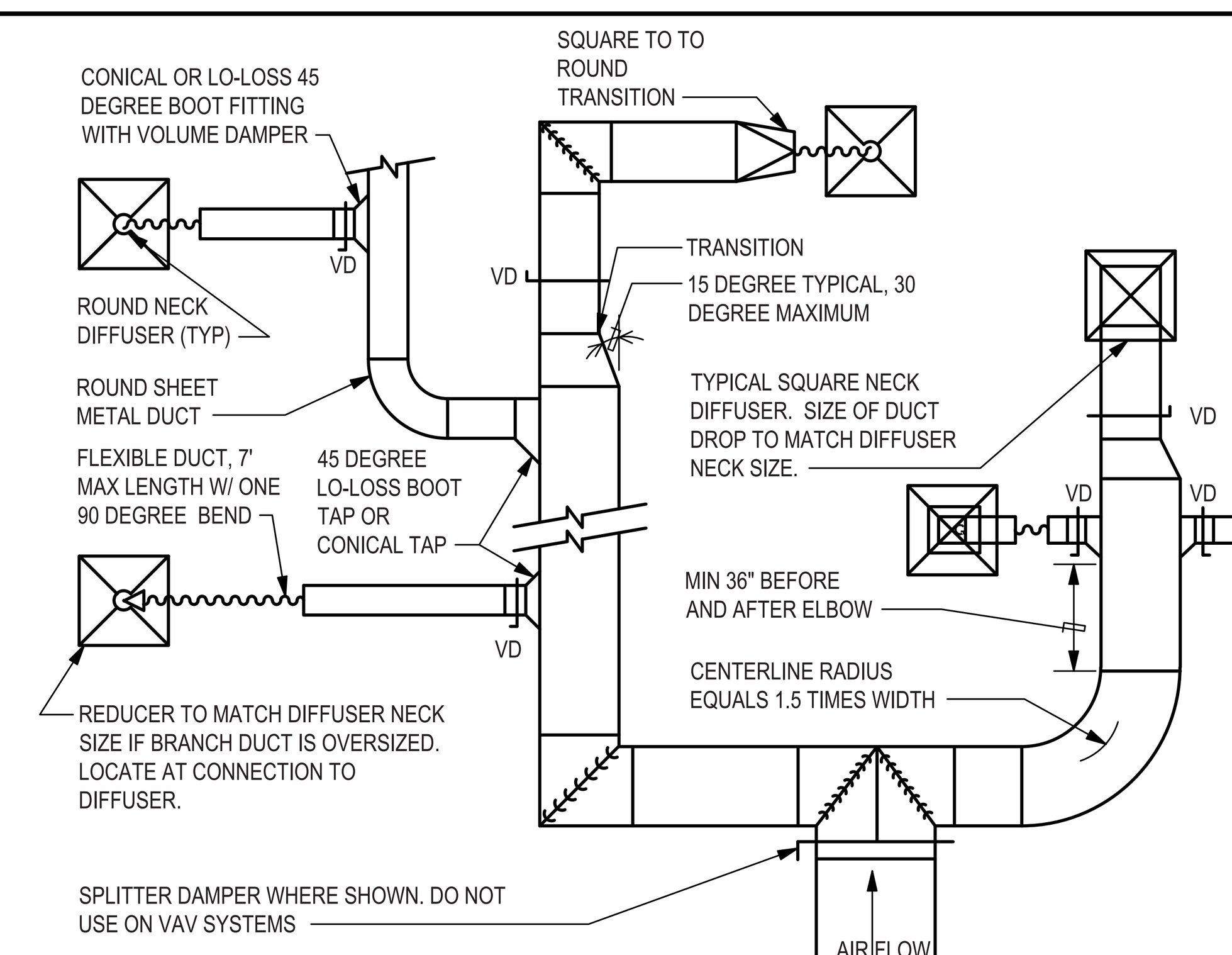


7 CONDENSATE CONNECTION TO SINK TAILPIECE
SCALE: NONE



NOTES:
1. PROVIDE MOTORIZED DAMPER IN DUCTWORK AT ENVELOPE TERMINATION.
2. TRANSITION DUCT CONNECTION AS REQUIRED TO MATCH FAN COLLARS.
3. REFER TO STRUCTURAL DESIGN FOR ATTACHMENT REQUIREMENTS AND ADDITIONAL SUPPORT OPTIONS.

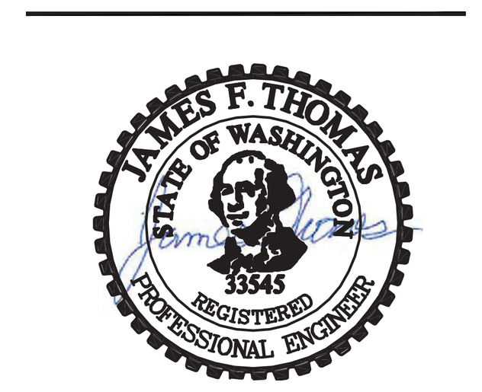
4 EXHAUST FAN-INLINE SUSPENDED
SCALE: NONE



NOTES:
1. PROVIDE DUCT LINER AND/OR EXTERNAL DUCT INSULATION AS NOTED ON PLANS OR IN SPECIFICATIONS.
2. PROVIDE HANGERS AND SEISMIC BRACING PER SMACNA AND BUILDING CODE REQUIREMENTS.
3. LOCATE MANUAL BALANCING DAMPERS IMMEDIATELY DOWNSTREAM OF EACH DUCT TAP.
4. CUSHION HEADS OR BULLHEAD TEES ARE NOT ALLOWED.
5. MAINTAIN MINIMUM 36" CLEARANCE BETWEEN LEADING OR TRAILING ELBOW JOINT AND DUCT TAP FITTINGS.
6. RADIUSED ELBOWS OR TURNING VANES REQUIRED ON RECTANGULAR DUCT SYSTEM ELBOWS. SINGLE THICKNESS VANES UP TO 25" HEIGHT AND DOUBLE THICKNESS VANES IN DUCTS GREATER THAN 25" HEIGHT.

1 SUPPLY DUCT FITTINGS
SCALE: NONE

sum
DESIGN STUDIO + architecture
2505 se 11th Ave | ste 268
portland, oregon 97202
sumdesignstudio.com
503 715 5847 ph | fax



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Portland, Or 97204
T. 503.227.5280 F. 503.274.7674
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