

PRELIMINARY
NOT FOR
CONSTRUCTION

KING+PARKS MULTI-FAMILY RESIDENCES

PROJECT SITE: NE Martin Luther King Jr. Boulevard & N Rosa Parks Way
OWNER: Portland Community Reinvestment Initiatives Inc. (PCRI)
OWNER: 6329 NE Martin Luther King Jr. Blvd. Portland, Oregon 97211

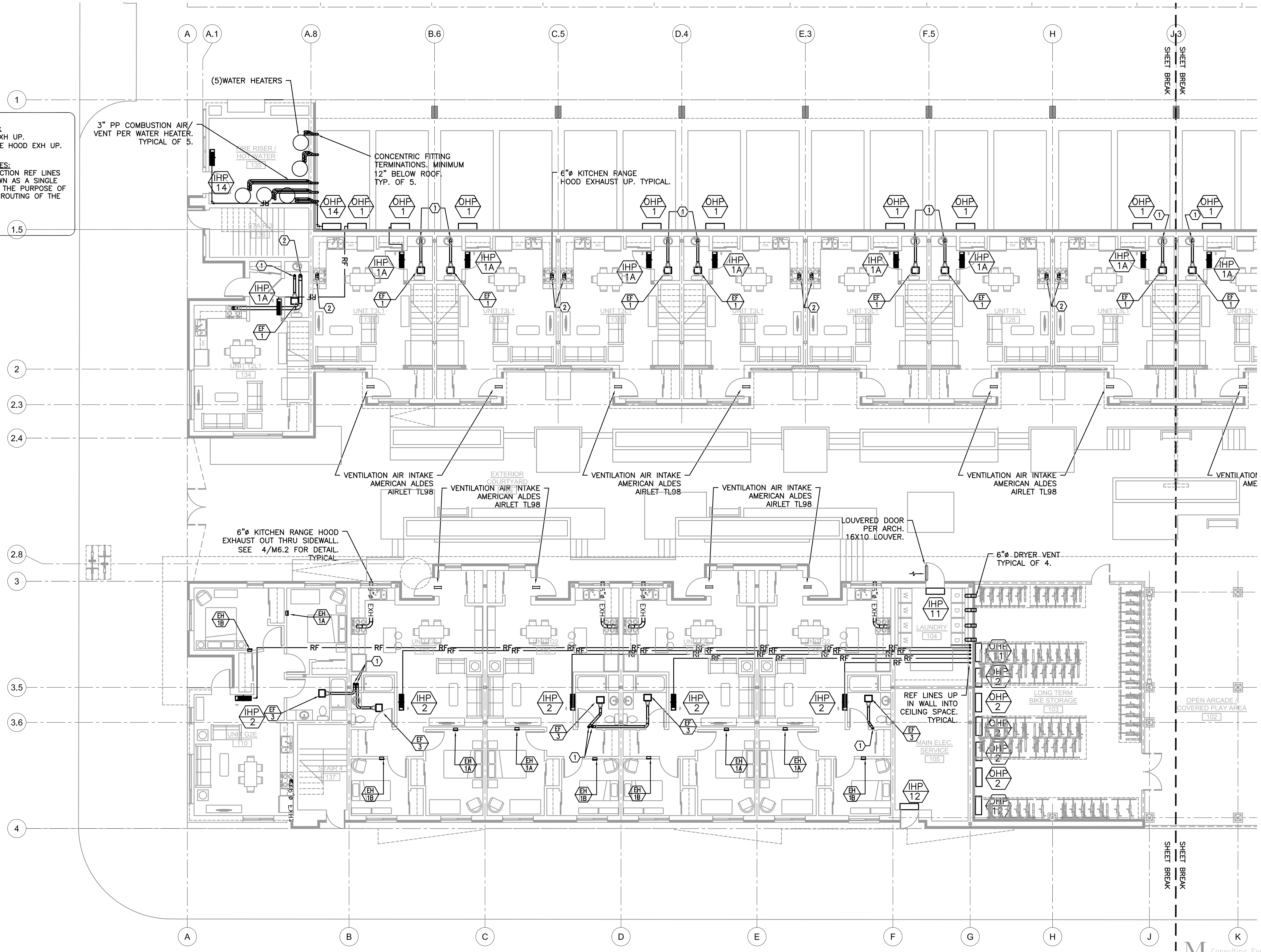


PROJECT NO. 16-0602
ISSUE DATE 01.05.2017
REVISIONS

SHEET
**MECHANICAL 1ST
FLOOR PLAN - SOUTH**
M2.0A
NOT FOR CONSTRUCTION
PRELIMINARY
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KEYED NOTES:
1. 4" Ø BA EXH UP.
2. 6" Ø RANGE HOOD EXH UP.

GENERAL NOTES:
1. LIQ & SUCTION REF LINES ARE SHOWN AS A SINGLE PIPE FOR THE PURPOSE OF SHOWING ROUTING OF THE PIPING.

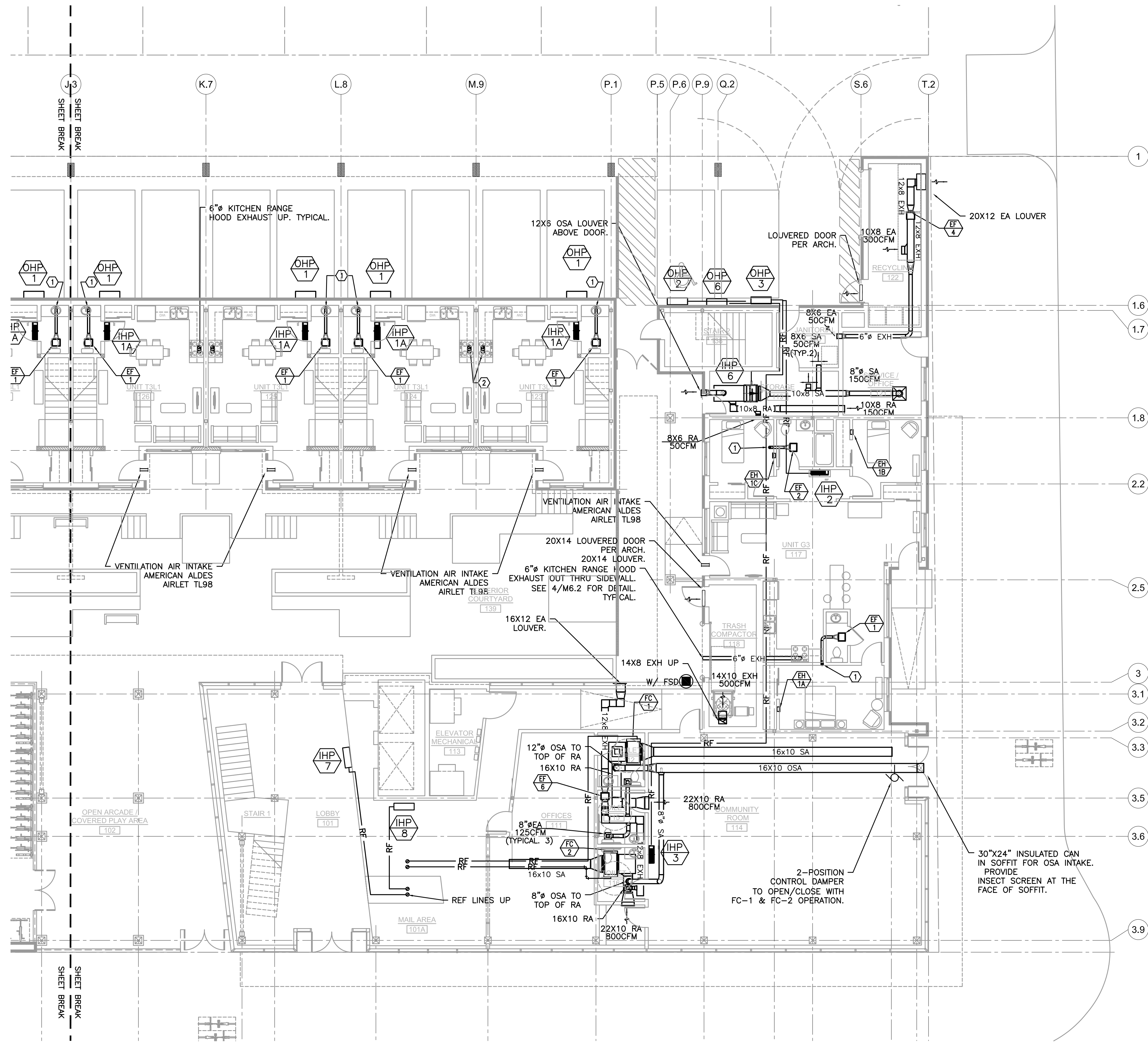


1 MECHANICAL FIRST FLOOR PLAN - SOUTH
SCALE: 1/8" = 1'-0"

MFI
INC. Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
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FAX: (503) 234-0677
WWW.MFI-ENG.COM
CONTACT: Takako Baker

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NO.	DESCRIPTION

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MECHANICAL 1ST FLOOR PLAN - NORTH
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1 MECHANICAL FIRST FLOOR PLAN - NORTH
 SCALE: 1/16" = 1'-0"

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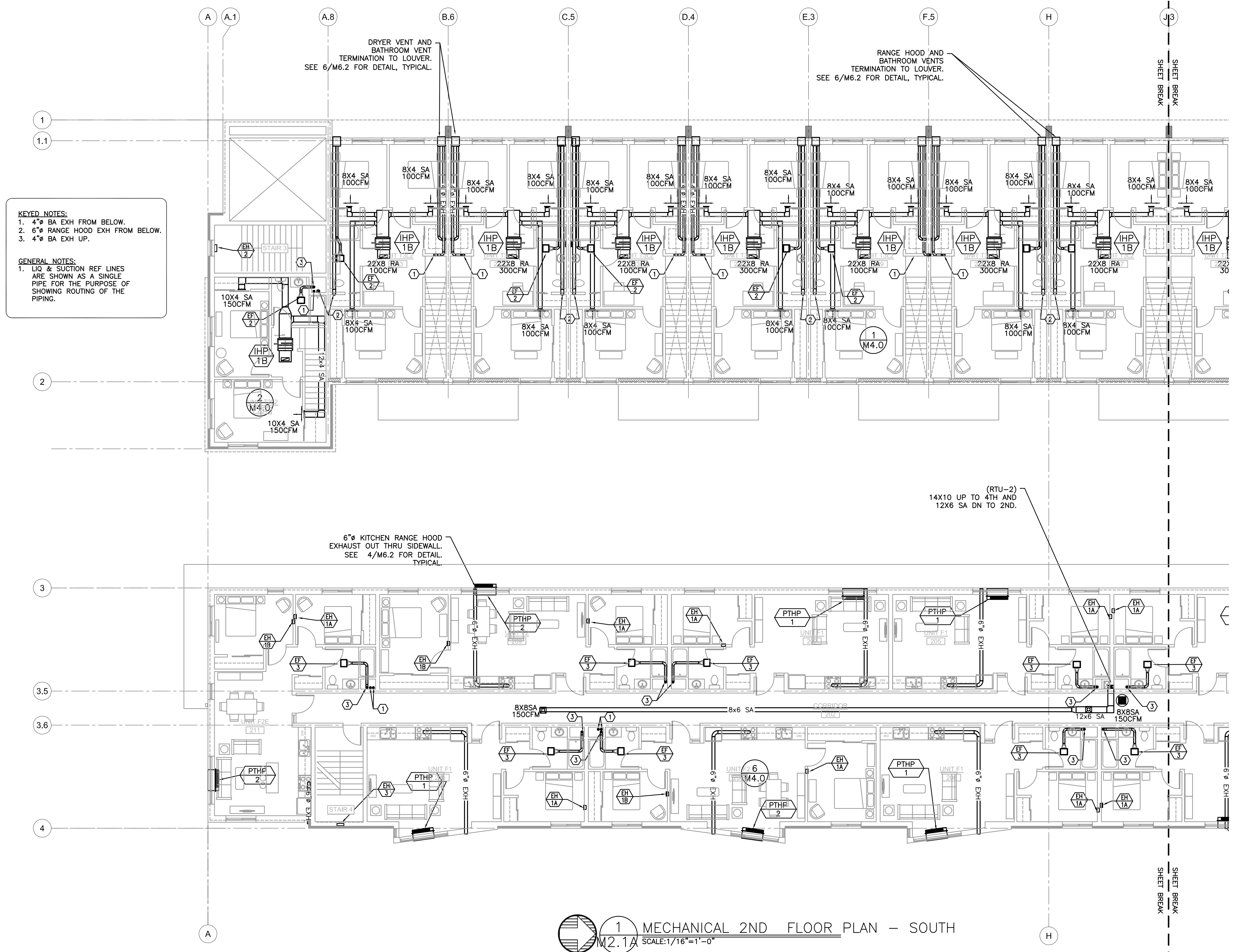
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SHEET
MECHANICAL 2ND
FLOOR PLAN - SOUTH

M2.1A

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CONTACT: TAKAKO BAKER



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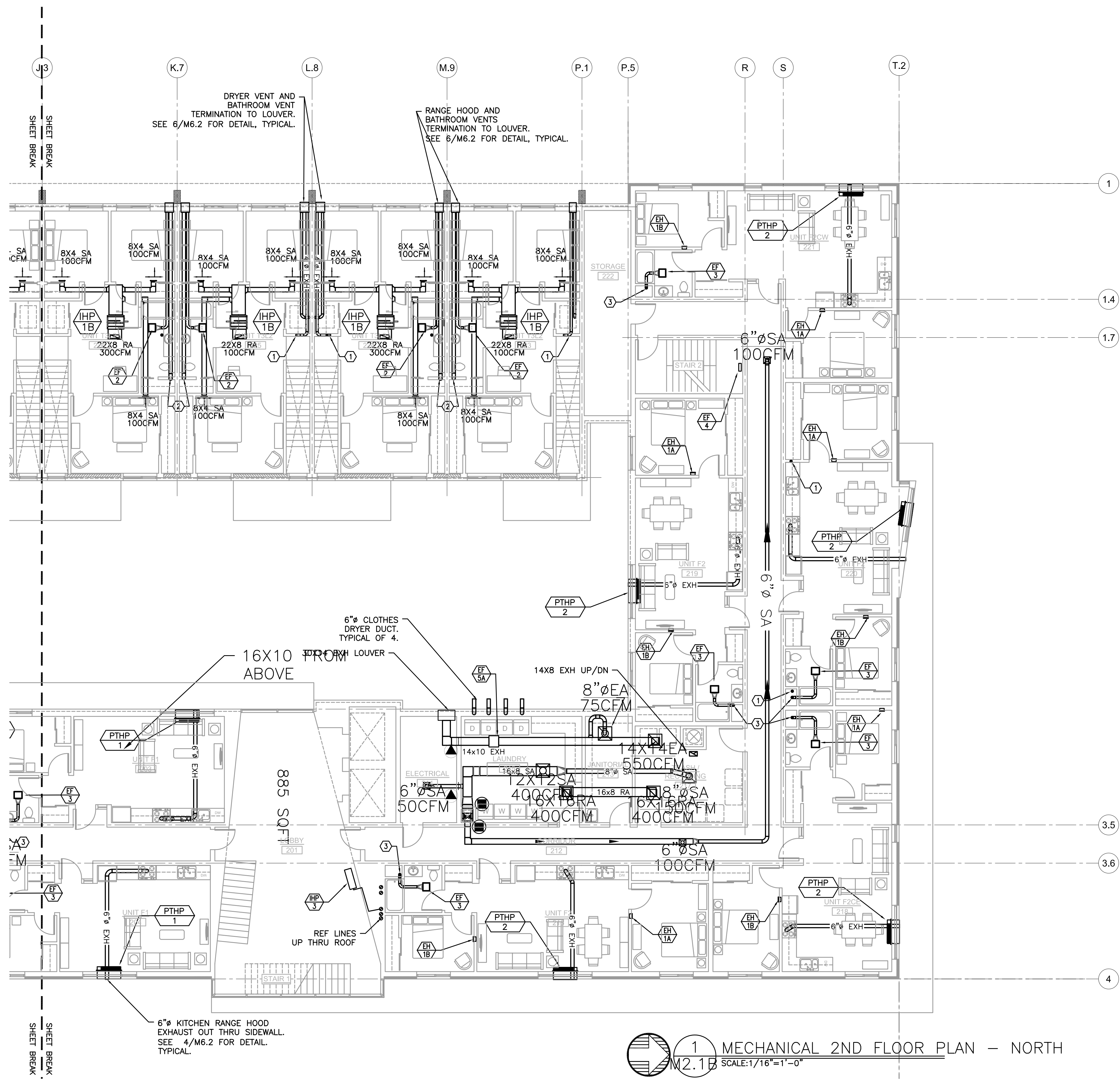
M2.1A MECHANICAL 2ND FLOOR PLAN - SOUTH
SCALE: 1/16" = 1'-0"

www.merrymanbarnesarchitects.com

PORTLAND, OREGON 97217 p. 503.222.9793

MERRYMAN BARNES ARCHITECTS 4713 NALBANE SUITE 304

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MECHANICAL 2ND FLOOR PLANS-NORTH

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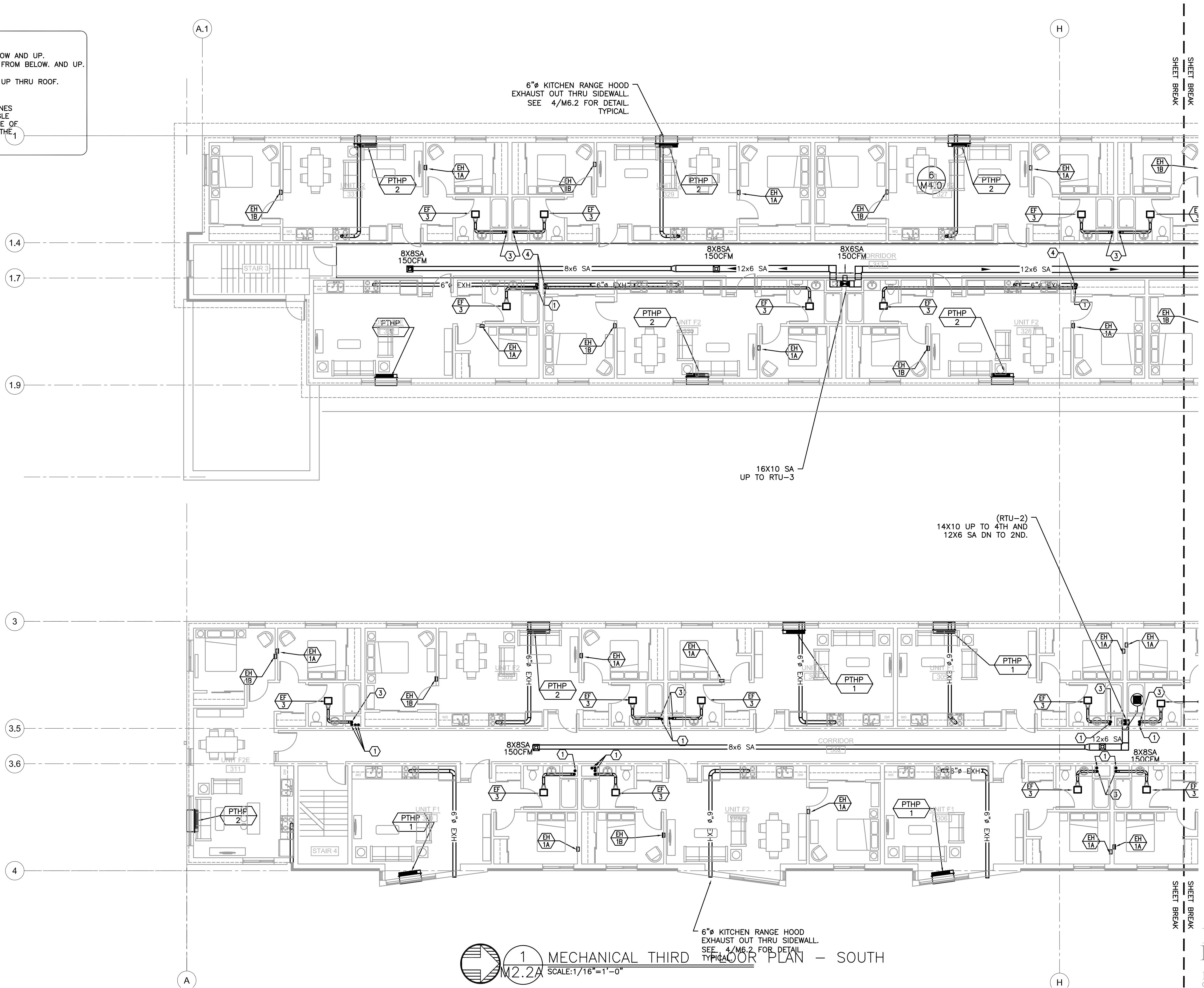
M2.1B MECHANICAL 2ND FLOOR PLAN - NORTH
SCALE: 1/16" = 1'-0"

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KEYED NOTES:
 1. 4" BA EXH FROM BELOW AND UP.
 2. 6" RANGE HOOD EXH FROM BELOW, AND UP.
 3. 4" BA EXH UP.
 4. 6" RANGE HOOD EXH UP THRU ROOF.

GENERAL NOTES:
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MECHANICAL THIRD FLOOR PLAN - SOUTH
 M2.2A SCALE: 1/16" = 1'-0"

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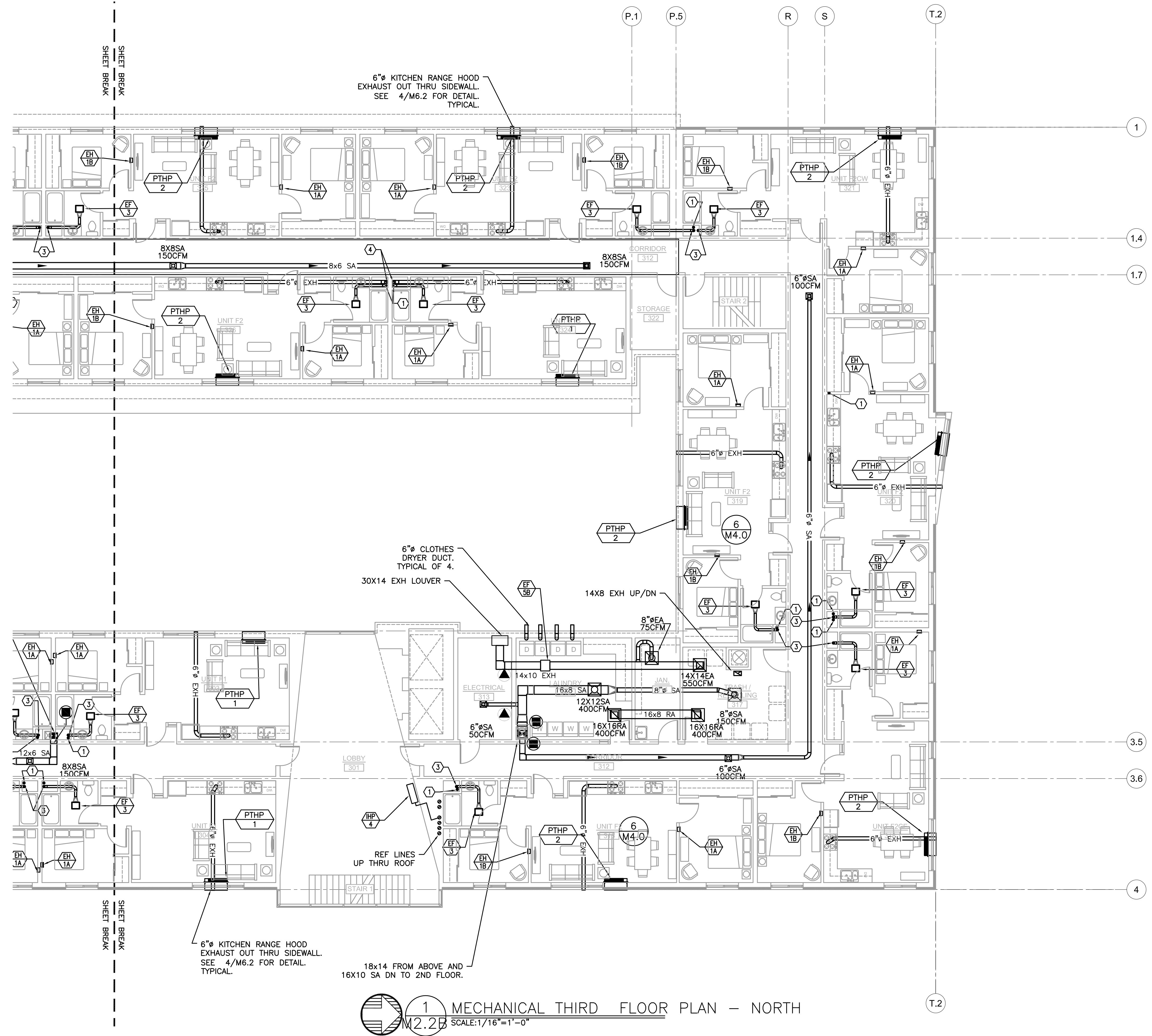
SHEET
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 FLOOR PLANS
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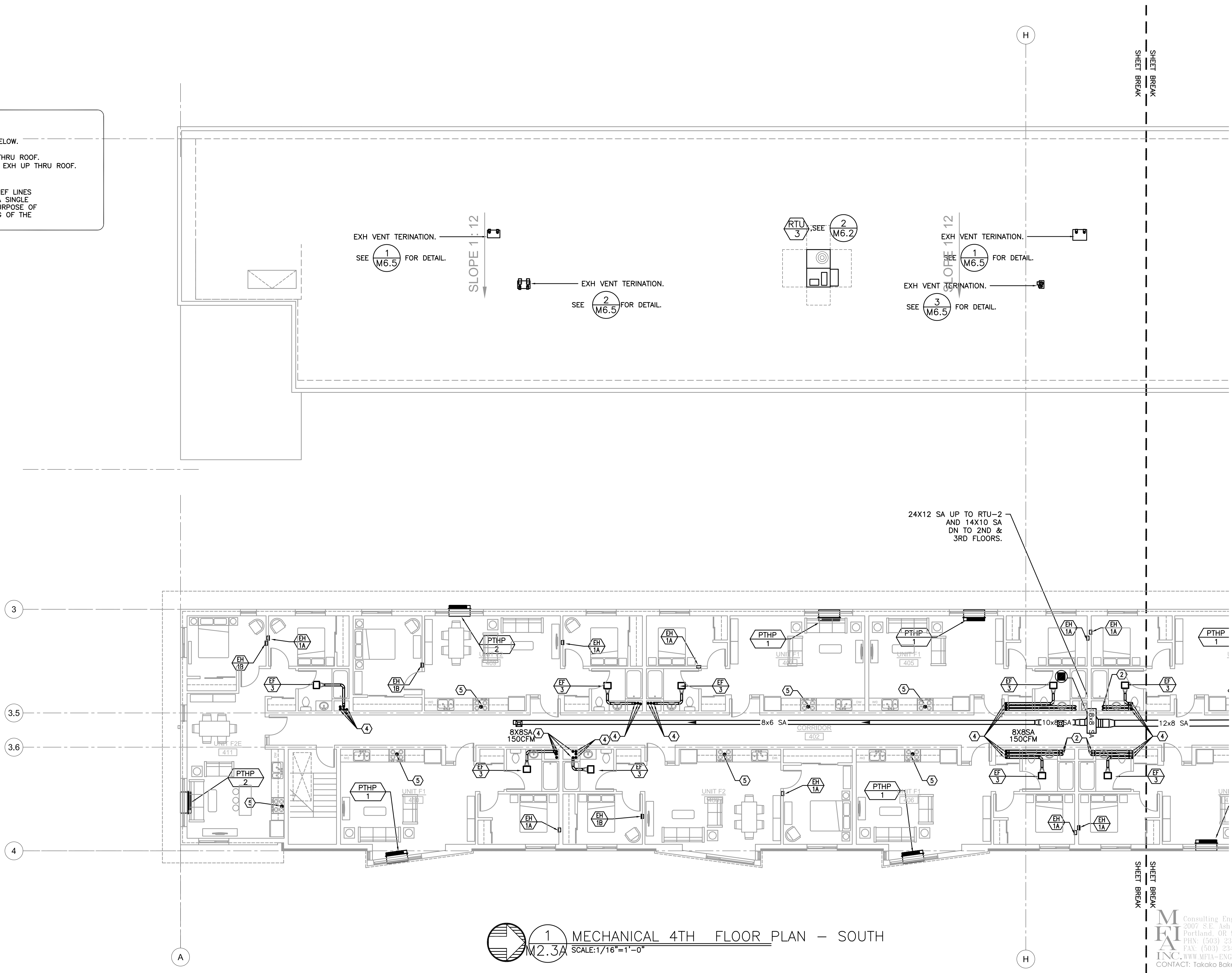
SHEET
MECHANICAL 4TH
FLOOR PLAN

M2.3A

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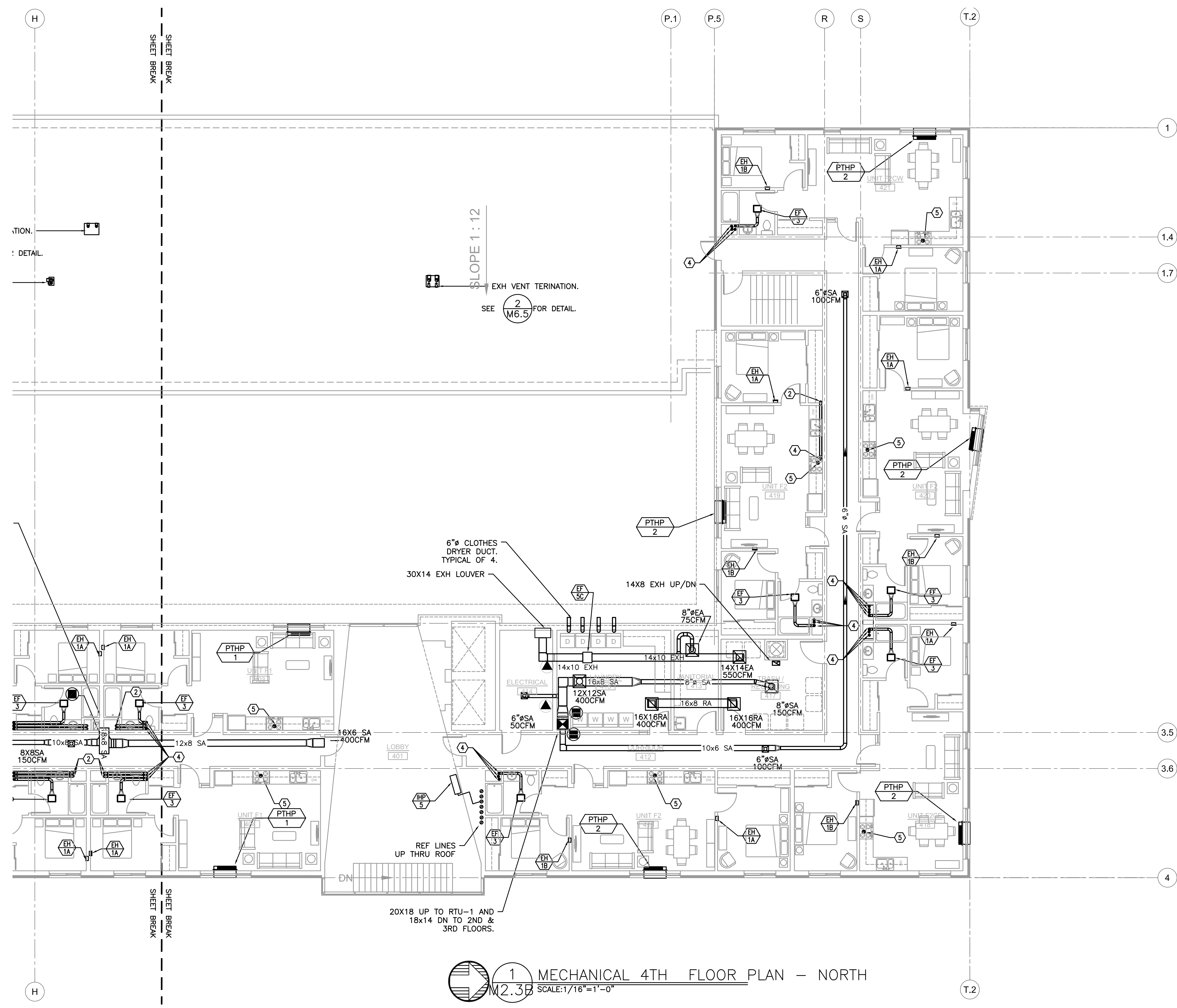
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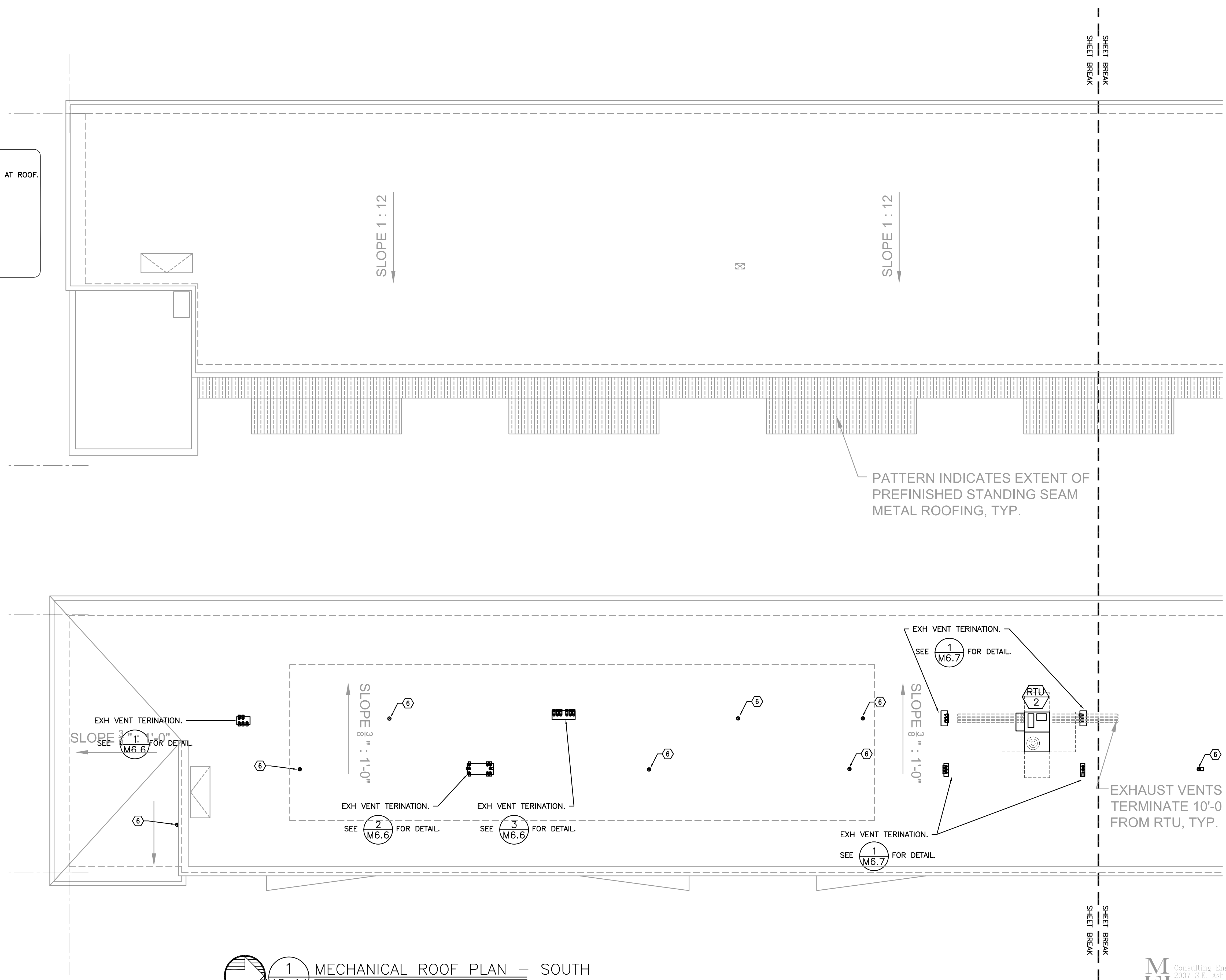
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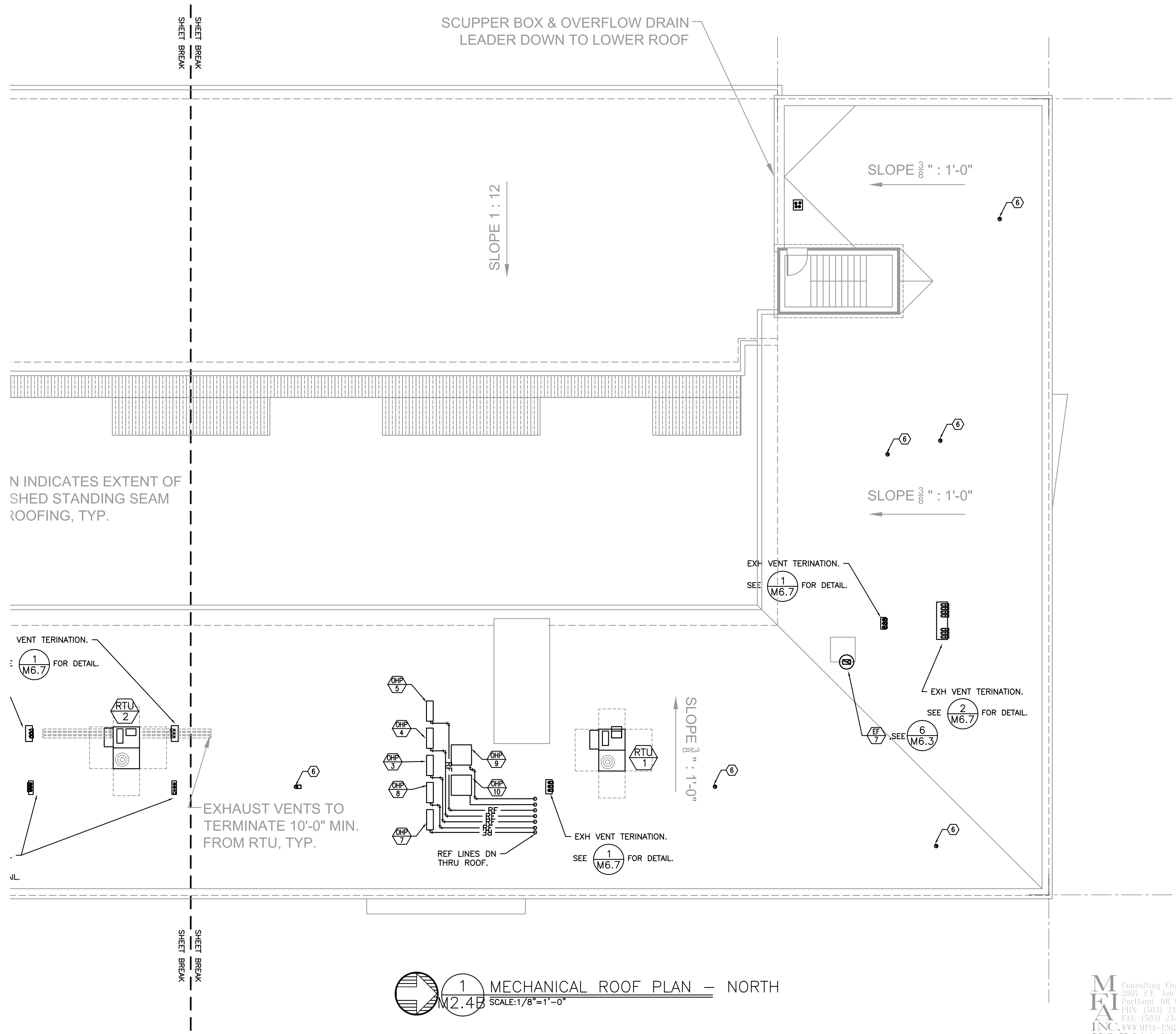
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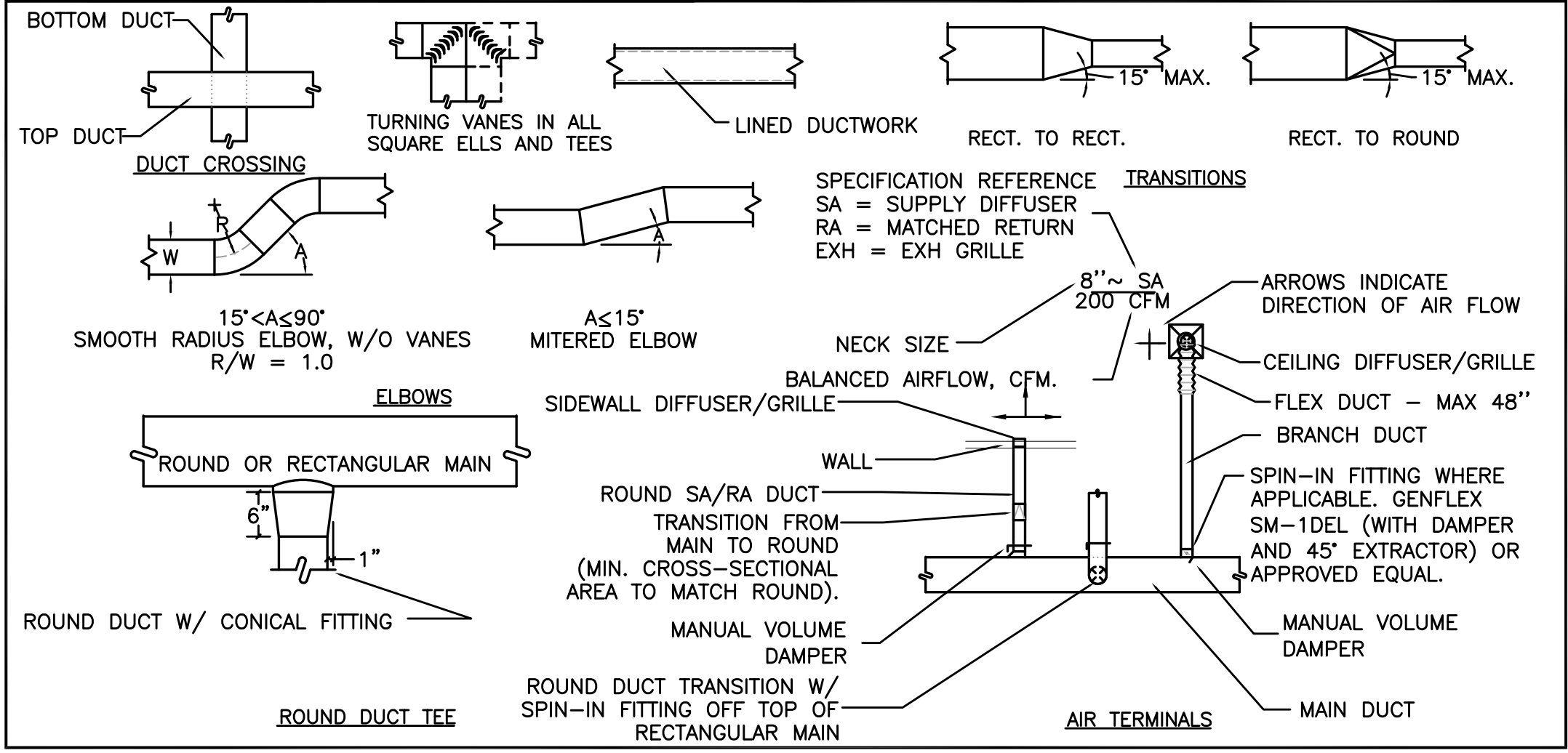
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MECHANICAL LEGEND

	SUPPLY AIR DIFFUSER	AFF	ABOVE FINISH FLOOR
	RETURN AIR GRILLE	AHU	AIR HANDLING UNIT
	EXHAUST AIR GRILLE	B.D.	BOTTOM OF DUCT
	PERFORATED RETURN AIR PANEL	BHP	BRAKE HORSEPOWER
	DIRECTIONAL AIR FLOW	BTU	BRITISH THERMAL UNITS
	MANUAL VOLUME DAMPER	CFM	CUBIC FEET PER MINUTE
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	CONN.	CONNECTION
	RETURN AIR DUCT UP & DOWN	CONT.	CONTINUATION
	EXHAUST AIR DUCT UP & DOWN	CW	DOMESTIC COLD WATER
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	DB	DRY BULB
	RETURN AIR DUCT UP & DOWN	DIA.	DIAMETER
	EXHAUST AIR DUCT UP & DOWN	DIST.	DISTRIBUTION
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	EA	EXHAUST AIR
	RETURN AIR DUCT UP & DOWN	EDB	ENTERING DRY BULB TEMPERATURE
	EXHAUST AIR DUCT UP & DOWN	EWB	ENTERING WET BULB TEMPERATURE
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	EWT	ENTERING WATER TEMPERATURE
	RETURN AIR DUCT UP & DOWN	FF	FINISH FLOOR
	EXHAUST AIR DUCT UP & DOWN	FFIXT.	FIXTURE
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	FPM	FEET PER MINUTE
	RETURN AIR DUCT UP & DOWN	FPS	FEET PER SECOND
	EXHAUST AIR DUCT UP & DOWN	FT.	FEET / FOOT
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	GA.	GAUGE
	RETURN AIR DUCT UP & DOWN	GPM	GALLONS PER MINUTE
	EXHAUST AIR DUCT UP & DOWN	H	HEIGHT
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	HP	HORSEPOWER
	RETURN AIR DUCT UP & DOWN	I.D.	INSIDE DIAMETER
	EXHAUST AIR DUCT UP & DOWN	IN.	INCHES
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	L	LENGTH
	RETURN AIR DUCT UP & DOWN	LBS.	POUNDS
	EXHAUST AIR DUCT UP & DOWN	LDB	LEAVING DRY BULB
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	LWB	LEAVING WET BULB
	RETURN AIR DUCT UP & DOWN	LWT	LEAVING WATER TEMPERATURE
	EXHAUST AIR DUCT UP & DOWN	MAX.	MAXIMUM
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	MBH	THOUSANDS OF BTUs PER HOUR
	RETURN AIR DUCT UP & DOWN	MIN.	MINIMUM
	EXHAUST AIR DUCT UP & DOWN	NC	NOISE CRITERIA
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	N.C.	NORMALLY CLOSED
	RETURN AIR DUCT UP & DOWN	N.I.M.	NOT IN MECHANICAL
	EXHAUST AIR DUCT UP & DOWN	NO.	NUMBER
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	N.O.	NORMALLY OPEN
	RETURN AIR DUCT UP & DOWN	O.A.	OUTSIDE AIR
	EXHAUST AIR DUCT UP & DOWN	P	PERSON
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	PSI	POUNDS PER SQUARE INCH
	RETURN AIR DUCT UP & DOWN	P/T	PRESSURE / TEMPERATURE
	EXHAUST AIR DUCT UP & DOWN	R.A.	RETURN AIR
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	RECT.	RECTANGULAR
	RETURN AIR DUCT UP & DOWN	REQ'D	REQUIRED
	EXHAUST AIR DUCT UP & DOWN	S.A.	SUPPLY AIR
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	S.P.	STATIC PRESSURE
	RETURN AIR DUCT UP & DOWN	SQ.	SQUARE
	EXHAUST AIR DUCT UP & DOWN	TEMP.	TEMPERATURE
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	TYP.	TYPICAL
	RETURN AIR DUCT UP & DOWN	VAV	VARIABLE AIR VOLUME
	EXHAUST AIR DUCT UP & DOWN	W	WIDTH
	SUPPLY OR OUTSIDE AIR DUCT UP & DOWN	WB	WET BULB
	RETURN AIR DUCT UP & DOWN	WPD	WATER PRESSURE DROP
	EXHAUST AIR DUCT UP & DOWN	Ø	DIAMETER
	PRESSURE GAUGE	(E)	EXISTING
	PETE'S PLUG	(D)	DEMOLISH
	DOUBLE CHECK ASSEMBLY	---	NEW WORK
	PRESSURE REDUCING VALVE	HWS	(HWS) HEATING WATER SUPPLY
	UNION	HWR	(HWR) HEATING WATER RETURN
	2-WAY CONTROL VALVE		FIRE DAMPER
	3-WAY CONTROL VALVE		FIRE / SMOKE DAMPER
	CAP		SMOKE DAMPER
	SMOKE DETECTOR	SEISMIC BRACING	
	MOTORIZED DAMPER		LATERAL BRACING
			LONGITUDINAL BRACING
			LONGITUDINAL & LATERAL BRACING

AIR DISTRIBUTION DETAILS



ROOFTOP HVAC UNITS

MARK NUMBER	RTU 1	RTU 2	RTU 3
SYSTEM	WEST HALLWAYS	NORTH HALLWAYS	EAST HALLWAYS
TYPE	C.V.	C.V.	C.V.
DISCHARGE	VERTICAL	VERTICAL	VERTICAL
TOTAL CFM	2400	1300	900
ECONOMIZER	NONE-100% OSA	NONE-100% OSA	NONE-100% OSA
MIN. OSA	-	-	-
MAX OSA (FULL OCCUPANCY)	NA	NA	NA
CO2 CONTROL	NA	NA	NA
EXTERNAL SP. ("H2O)	1.20"	1.0"	0.75
TOTAL SP. ("H2O)	---	---	---
RPM	1007	1007	1007
WHEEL TYPE/ SIZE	F.C. 10X10(DIRECT)	F.C. 1X010 (DIRECT)	F.C. 10X10 (DIRECT)
MOTOR HP.	2.5, NOTE 1	1.0, NOTE 1	0.50" NOTE 1
POWER EXH FAN/ACCESSORY	NONE	NONE	NONE
FILTER TYPE	2"- 30%	2"- 30%	2"- 30%
GAS INPUT/OUTPUT (MBH)	150 / 120	150 / 117	115 / 89
EFF. (AFUE)	80.0%	78.8%	78.5%
STAGES/TYPE	2-S.S. HIGH HEAT	1-S.S. HIGH HEAT	2-S.S. HIGH HEAT
TOTAL CLG. (TONS)	6.0	4.0	3
SENSIBLE CLG. (MBH)	70	34.58	28
ENT. EVAP AIR TEMP (DB/WB.)	90/67	90/67	90/67
LVG. EVAP AIR TEMP (DB/WB.)	55/54	55/54	55/54
AMBIENT AIR (°F)	95	95	95
EER/SEER	11 SEER	13.0 SEER	13.0 SEER
REFRIGERANT	410A	410A	410A
DESIGN WEIGHT (LBS.)	750	650	600
SMOKE DETECTOR (RETURN DUCT)	NO	NO	NO
SPRING ISOLATION ROOF CURB	NO	NO	NO
CONVENIENCE OUTLET - ALWAYS POWERED	YES	YES	YES
VOLTAGE/PHASE	208/3	208/1	208/1
BASIS OF DESIGN - CARRIER MODEL	48TCA07	48TCA05	48TCA04

NOTES:
1. PROVIDE WITH HIGH STATIC FAN.

PACKAGED TERMINAL HEAT PUMP

MARK NUMBER	PTHP 1	PTHP 2
TYPE	THRU-THE-WALL HEAT PUMP	THRU-THE-WALL HEAT PUMP
SYSTEM	UNITS	UNITS
NOMINAL COOLING CAPACITY (BTUH)	12,000	14,400
HEATING CAPACITY (BTUH)	11,500	13,800
④ 47°F OUTDOOR AIR TEMP		
ELECTRIC HEATING CAPACITY (KW)	3.5	3.5
CFM (HI/LOW) (WET COIL)	340/245	390/340
MIN OSA (CFM)	0 - *	0 - *
LVG. AIR TEMP (°F)	55°F	55°F
REMOTE THERMOSTAT	YES	YES
EFFICIENCY (EER)	10.7	9.7
EFFICIENCY (COP)	3.1	3.0
ARCHITECTURAL GRILLE	YES	YES
DESIGN WT. (LBS)	135	145
ELECT (VOLTS/PHASE/HTZ)	230/1/60	230/1/60
TOTAL AMPS (HEAT)	15.5	15.5
MCA/MOP	19.5/20	19.5/20
CONDENSATE DRAIN KIT	YES	YES
BASIS OF DESIGN: AMMANA	PTHP123	PTHP153

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SPLIT SYSTEM HEAT PUMP												
SYSTEM	TOWNHOUSES		1ST FLOOR/2BA&3BA	2ND FLOOR LOBBY	3RD FLOOR LOBBY	4TH FLOOR LOBBY	OFFICE/HAN	1ST FLOOR LOBBY	LAUNDRY	ELECT.	COMMUNITY	WATER HEATER RM
INDOOR UNIT MARK NUMBER	IHP 1A	IHP 1B	IHP 2	IHP 3	IHP 4	IHP 5	IHP 6	IHP 7 IHP 8	IHP 11	IHP 12	IHP 13	IHP 14
TYPE (INDOOR UNIT)	WALL MTD	DUCTED FC	WALL MTD	WALL MTD	WALL MTD	WALL MTD	DUCTED	WALL MTD	WALL MTD	WALL MTD	WALL MTD	WALL MTD
HEATING CAPACITY	9000 BTUH	9000 BTUH	18,000 BTUH	21,500 BTUH	21,500 BTUH	21,500 BTUH	8,500 BTUH	21,500 BTUH	12,000 BTUH	15,000 BTUH	24,000 BTUH	9,000 BTUH
COOLING CAPACITY	9000 BTUH	9000 BTUH	20,000 BTUH	25,400 BTUH	25,400 BTUH	25,400 BTUH	9,000 BTUH	25,400 BTUH	14,400 BTUH	28,000 BTUH	24,000 BTUH	12,000 BTUH
CFM (HIGH)	380 CCFM	305 CFM	500 CCFM	640 CCFM	640 CCFM	640 CCFM	305 CFM	640 CCFM	400 CFM	583 CCFM	635 CCFM	380 CFM
WEIGHT	20 #	50 #	35 #	50 #	50 #	50 #	65#	50 #	35 #	45 #	35 #	35 #
BASIS OF DESIGN: DAIKIN	FTX09LVJU	FDXS09LVJU	FAQ18PVJU	FTXS24LVJU	FTXS24LVJU	FTXS24LVJU	FDXS09LVJU	FTXS24LVJU	FTXS12LVJU	FTKN18NMVJU	FAQ24PVJU	FTXS09LVJU
OUTDOOR UNIT MARK NUMBER	OHP 1	OHP 2	OHP 3	OHP 4	OHP 5	OHP 6	OHP 7 OHP 8	OHP 11	OHP 12	OHP 13	OHP 14	
TYPE (OUTDOOR UNIT)	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP
OUTDOOR COOLING CAPACITY	18,000 BTU/HR	18,000 BTU/HR	21,500 BTU/HR	21,500 BTU/HR	21,500 BTU/HR	21,500 BTU/HR	8,500 BTU/HR	21,500 BTU/HR	12,000 BTU/HR	15,000 BTU/HR	24,000 BTU/HR	9,000 BTU/HR
OUTDOOR HEATING CAPACITY	18,900 BTU/HR	20,000 BTU/HR	25,400 BTH	25,400 BTH	25,400 BTH	25,400 BTH	10,000 BTH	25,400 BTH	14,400 BTUH	28,000 BTUH	24,000 BTUH	12,000 BTUH
COOLING EFFICIENCY (SEER)	16.5	18.6	20	20	20	20	15.1	20	23	20.3	17.6	24.5
HTG EFFICIENCY (HSPF/COP)	9.5/4.1	12.7 HSPF	10.6/3.6	10.6/3.6	10.6/3.6	10.6/3.6	10.3/3.28	10.6/3.6	12.5/3.74	11/3.72	9.1 HPSF	12.5/4.47
MAX PIPING LENGTH	82 FT PER UNIT	165 FT	98 FT	98 FT	98 FT	98 FT	66 FT	98 FT	98 FT	98 FT	165 FT	98 FT
MAX PIPING ELEV. CHANGE	49 FT.	98 FT.	66 FT.	66 FT.	66 FT.	66 FT.	49 FT.	66 FT.	66 FT.	66 FT.	98 FT.	66 FT.
OUTDOOR UNIT DESIGN WT.	130 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.	150 LBS.
PUMPED CONDENSATE	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **	YES - **
BOD: DAIKIN	2MXS18NMVJU	RZQ18PVJU9	RXS24LVJU	RXS24LVJU	RXS24LVJU	RXS24LVJU	RXS09LVJU	RXS24LVJU	RXS12LVJU	RKN18NMVJU	RZA24PVJU9	RXS09LVJU
ELECTRICAL	208/1	208/1	208/1	208/1	208/1	208/1	208/1	208/1	208/1	208/1	208/1	208/1

** - ROUTE CONDENSATE TO FLOOR DRAIN
 ** - PROVIDE ALL UNITS THAT CANNOT BE DRAINED BY GRAVITY WITH A CONDENSATE PUMP. ROUTE CONDENSATE DRAINS FROM EACH UNIT TO FLOOR DRAINS SHOWN ON PLUMBING PLANS. KEEP ALL CONDENSATE DRAINS HIDDEN WITHIN STRUCTURE AS MUCH AS POSSIBLE. COORDINATE ALL CONDENSATE LINES WITH ARCHITECT PRIOR TO INSTALLATION.

EXHAUST FANS									
MARK NUMBER	EF 1	EF 2	EF 3	EF 4	EF 5A	EF 5B	EF 5C	EF 6	EF 7
TYPE	CEILING DIRECT DRIVE	CEILING CABINET--**	CEILING CABINET--**	CABINET DIRECT DRIVE	CEILING DIRECT DRIVE	CEILING DIRECT DRIVE	CEILING DIRECT DRIVE	CABINET DIRECT DRIVE	ROOF DIRECT DRIVE
SYSTEM	TOWNHOUSE	BATHROOM	BATHROOM	RECYCLING	1ST JAN/TRASH	2ND JAN/TRASH	3RD JAN/TRASH	1ST FL. R.R.	TRASH COMP.
CFM	60	30/90	30/90	350	625	625	625	375	500
TOTAL SP. (IN H2O)	0.375"	0.20	0.20	0.375"	0.50"	0.50"	0.50"	0.375"	0.50"
RPM	670	1062/1146	1062/1146	1315	1006	1006	1006	1320	1448
TIP SPEED (FPM)	--	NA	NA	--	--	--	--	--	--
MOTOR POWER (HP OR WATTS)	80 WATTS	5/11.7	5/11.7	135 W	254 W	254 W	254 W	135 WATTS	1/8 HP
CONTROLLED BY	CONTINUOUS	*	*	CONTINUOUS	CONTINUOUS	CONTINUOUS	CONTINUOUS	CONTINUOUS	CONTINUOUS
INTERLOCK WITH		MOTION SENSOR	MOTION SENSOR						
FAN SPEED CONTROLLER	YES	YES	YES	YES	YES	YES	YES	YES	NO
WHEEL TYPE	FC	BI	BI	FC	FC	FC	FC	FC	BI
BACK DRAFT DAMPER	GRAVITY	YES	YES	GRAVITY	2-POS CONTROL DAMPER			GRAVITY	2-POS CTRL DMP
ISOLATION	RUBBER	RUBBER	RUBBER	RUBBER	RUBBER	RUBBER	RUBBER	RUBBER	RUBBER
DESIGN WEIGHT (LBS)	15	25	25	25	35	35	35	25	20
MAX. SONES	1.1	0.3/0.6	0.3/0.6	3.0	1.2	1.2	1.2	0.7	8.1
BASIS OF DESIGN:	GREENHECK SP-B110	PANASONIC FV-05-11VKL1	PANASONIC FV-05-11VKL1	GREENHECK CSP-A390	GREENHECK CSP-A700	GREENHECK CSP-A700	GREENHECK CSP-A700	GREENHECK CSP-A390	GREENHECK G-095-D
VOLTS/PHASE	120/60/1	120/1/60	120/1/60	120/60/1	120/60/1	120/60/1	120/60/1	120/60/1	120/60/1

* - FAN TO RUN AT LOW SPEED CONTINUOUSLY, AND INCREASE TO HIGH SPEED UPON ACTIVATION OF THE MOTION SENSOR.
 ** - FANS TO INCLUDE LIGHTS, MOTION SENSOR AND MULTI SPEED CONTROL WITH TIME DELAY.

ELECTRIC WALL HEATER						
MARK NUMBER	EH 1A	EH 1B	EH 1C	EH 2	EH 3	EH 4
TYPE	RECESSED/WALL MTD			RECESSED/WALL MTD	RECESSED/WALL MTD	RECESSED/WALL MTD
SYSTEM	BEDROOM			STAIR 3	STAIR 4	STAIR 2
VOLTS/PHASE	120/1			208/1	208/1	208/1
ELECT HEAT KW	1.5 KW			2.0 KW	2.0 KW	2.0 KW
BASIS OF DESIGN--BERKO	SRA1512DSF			SRA2020DSF	SRA2020DSF	SRA2020DSF

* PROVIDE TAMPER-PROOF THERMOSTAT, WALL CAN, AND GRILL

KING+PARKS MULTI-FAMILY RESIDENCES

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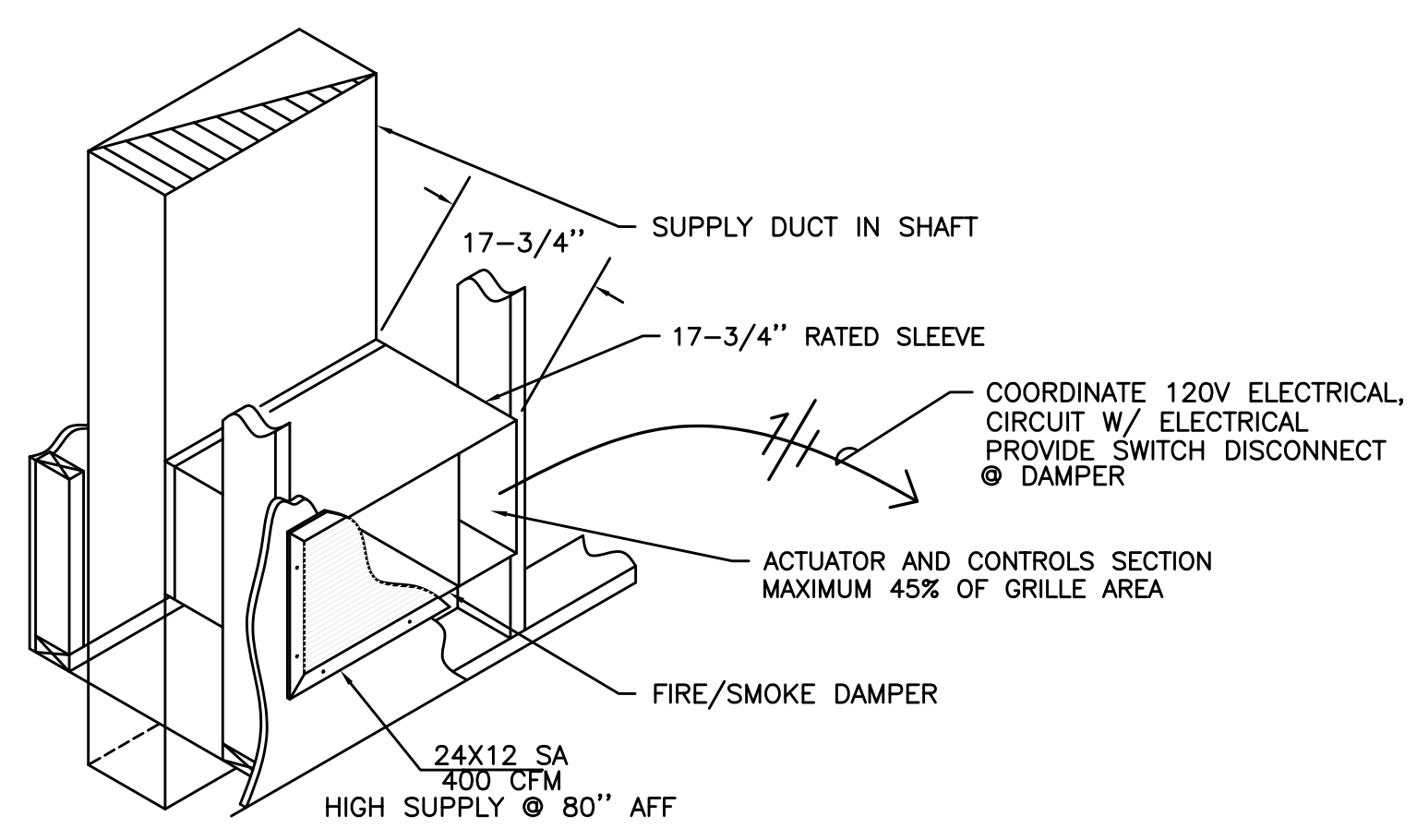
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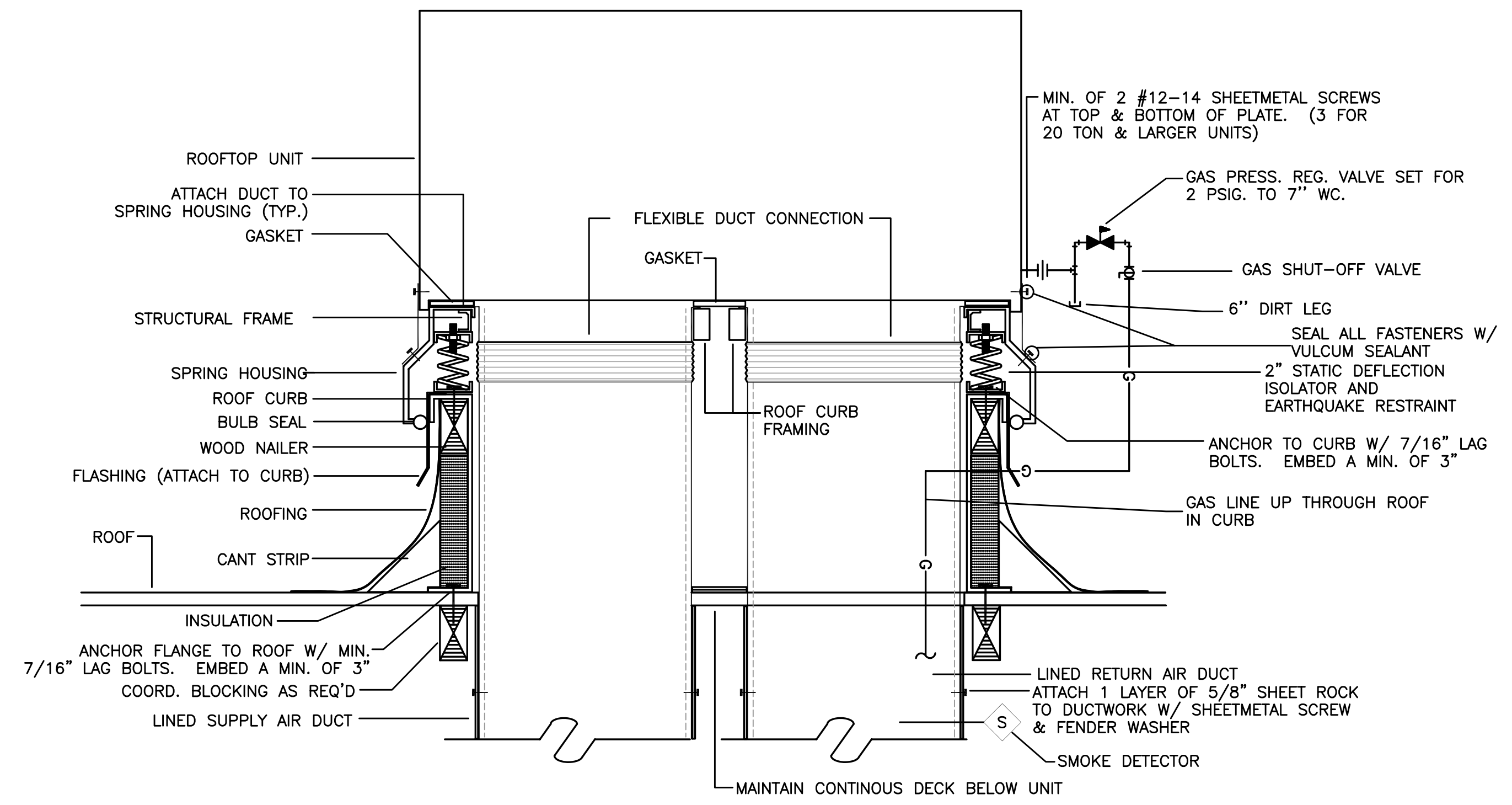
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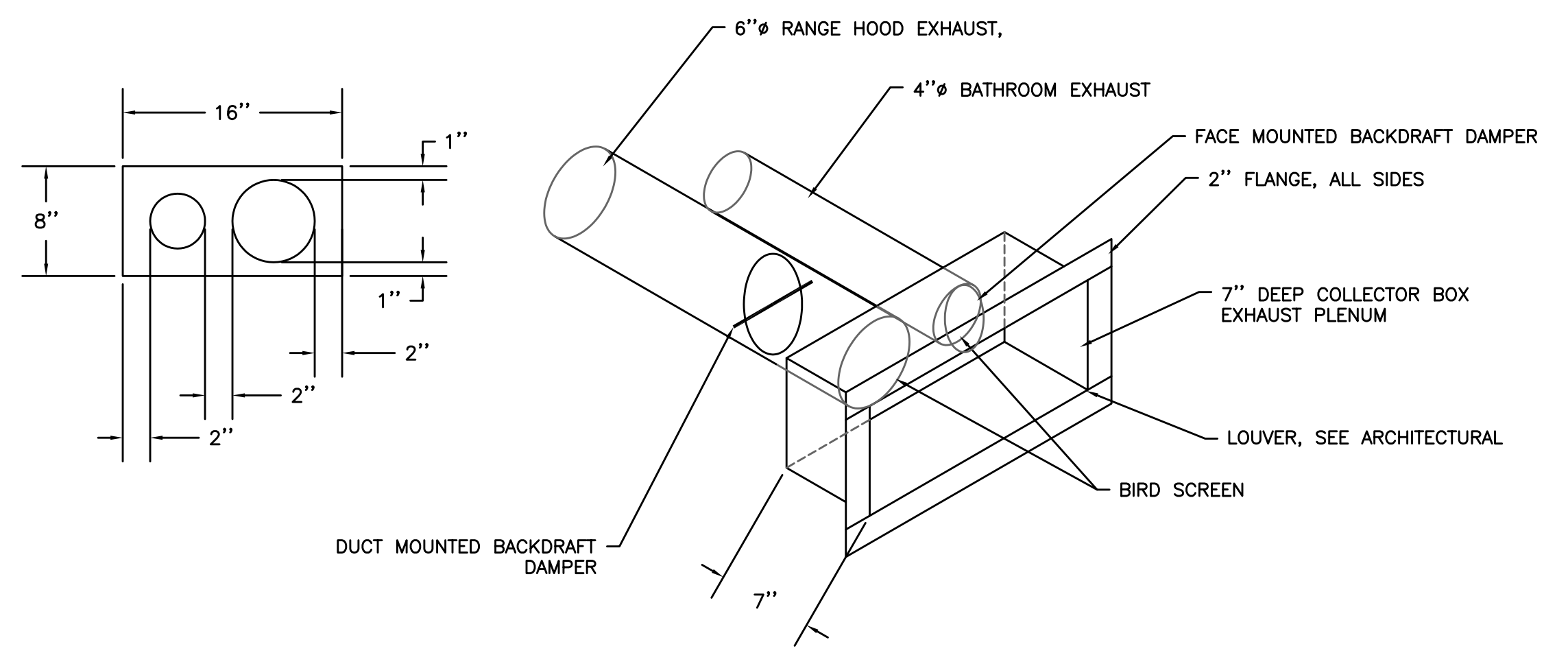
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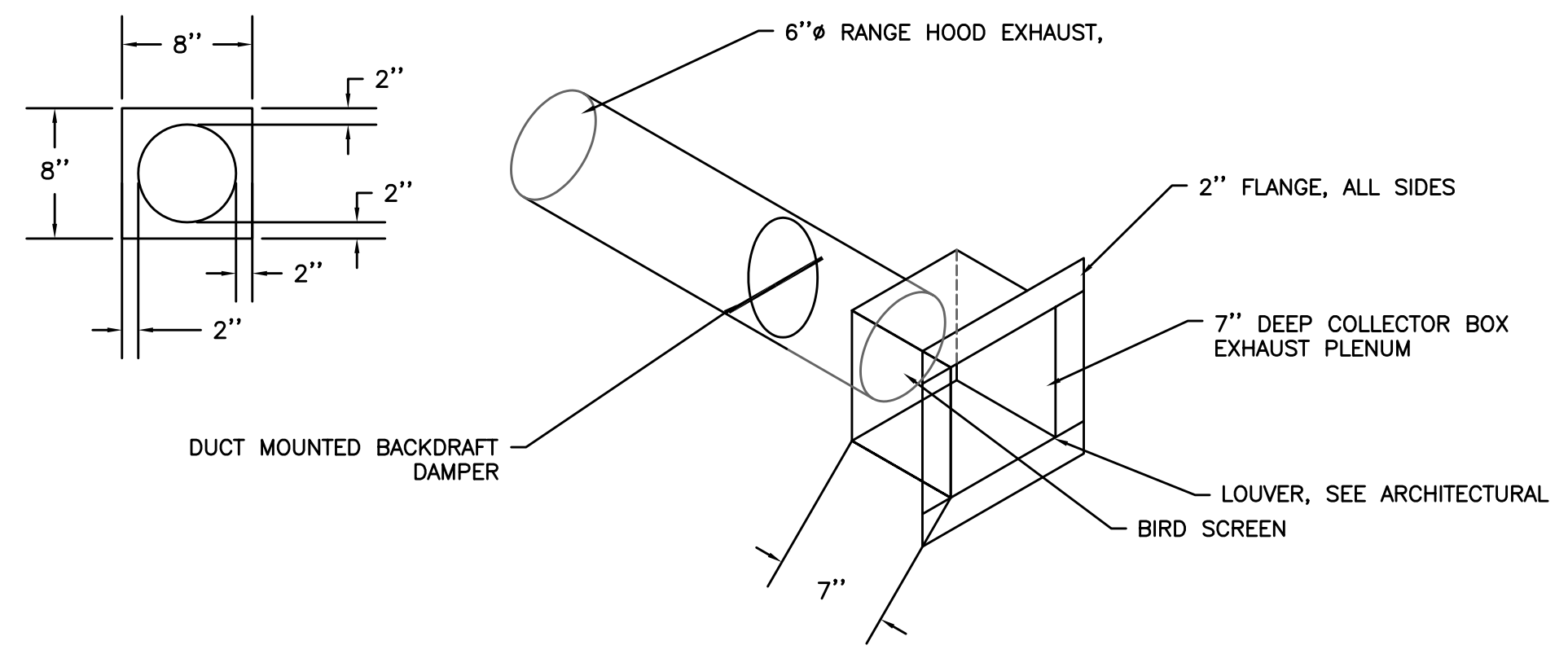
1 HIGH SUPPLY W/ FIRE/SMOKE DAMPER
SCALE: DETAIL



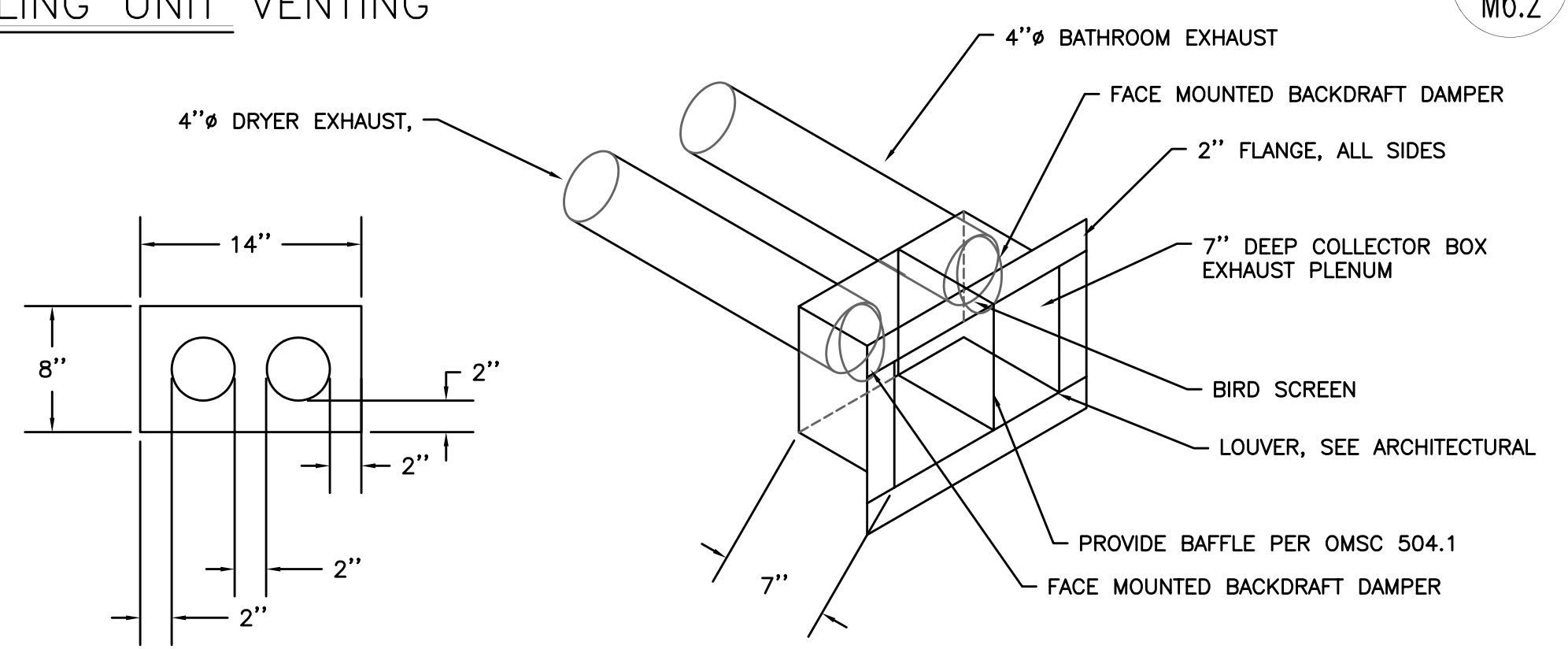
2 ROOF TOP UNIT W/ VIBRATION ISOLATION CURB
SCALE: DETAIL



3 SIDE WALL DWELLING UNIT VENTING
NOT TO SCALE



4 SINGLE RANGE HOOD VENT
NOT TO SCALE



5 SIDE WALL VENTING, DRYER AND BATHROOM
NOT TO SCALE

KING+PARKS MULTI-FAMILY RESIDENCES

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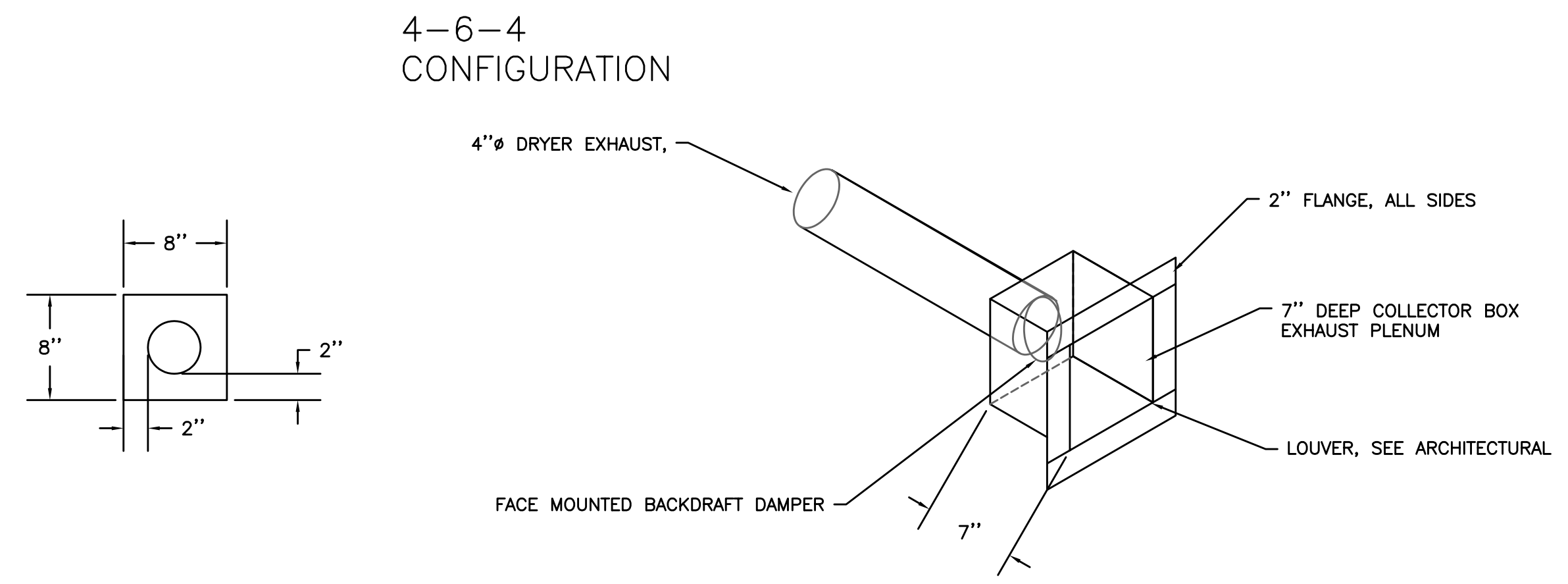
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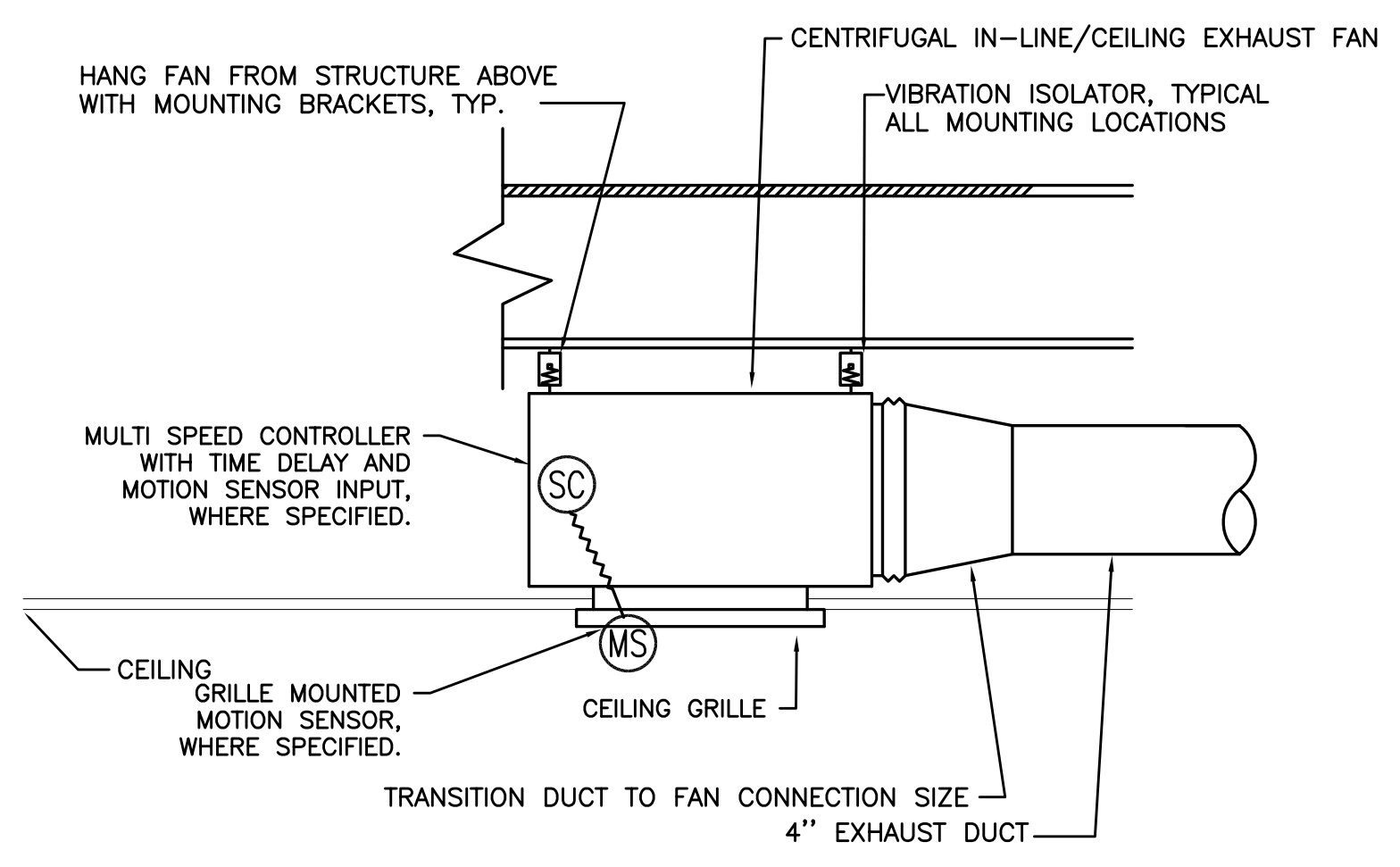
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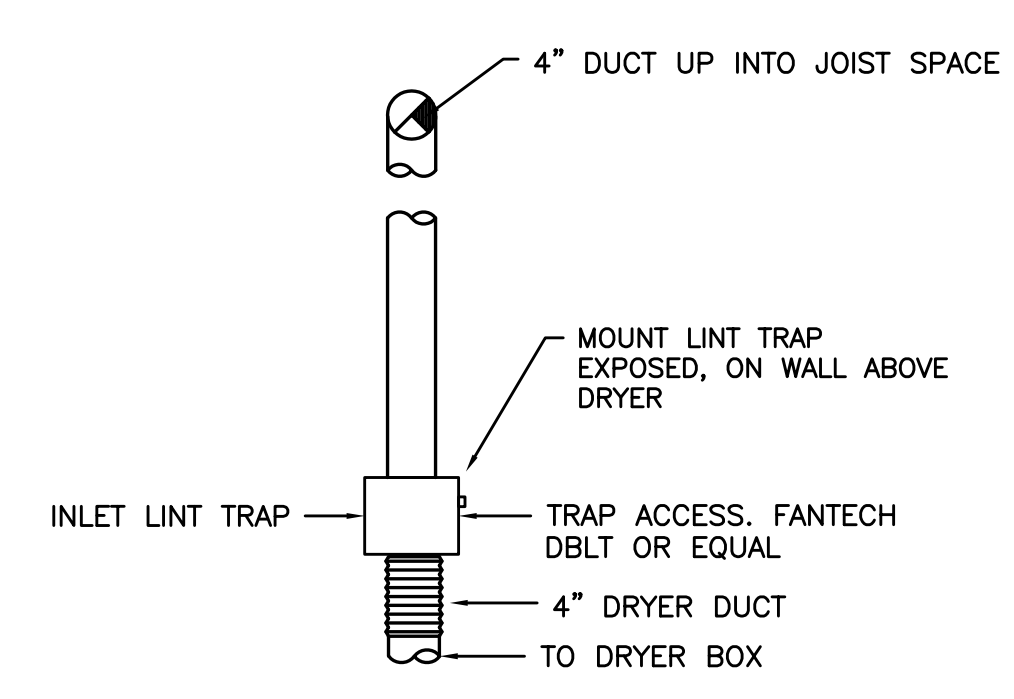
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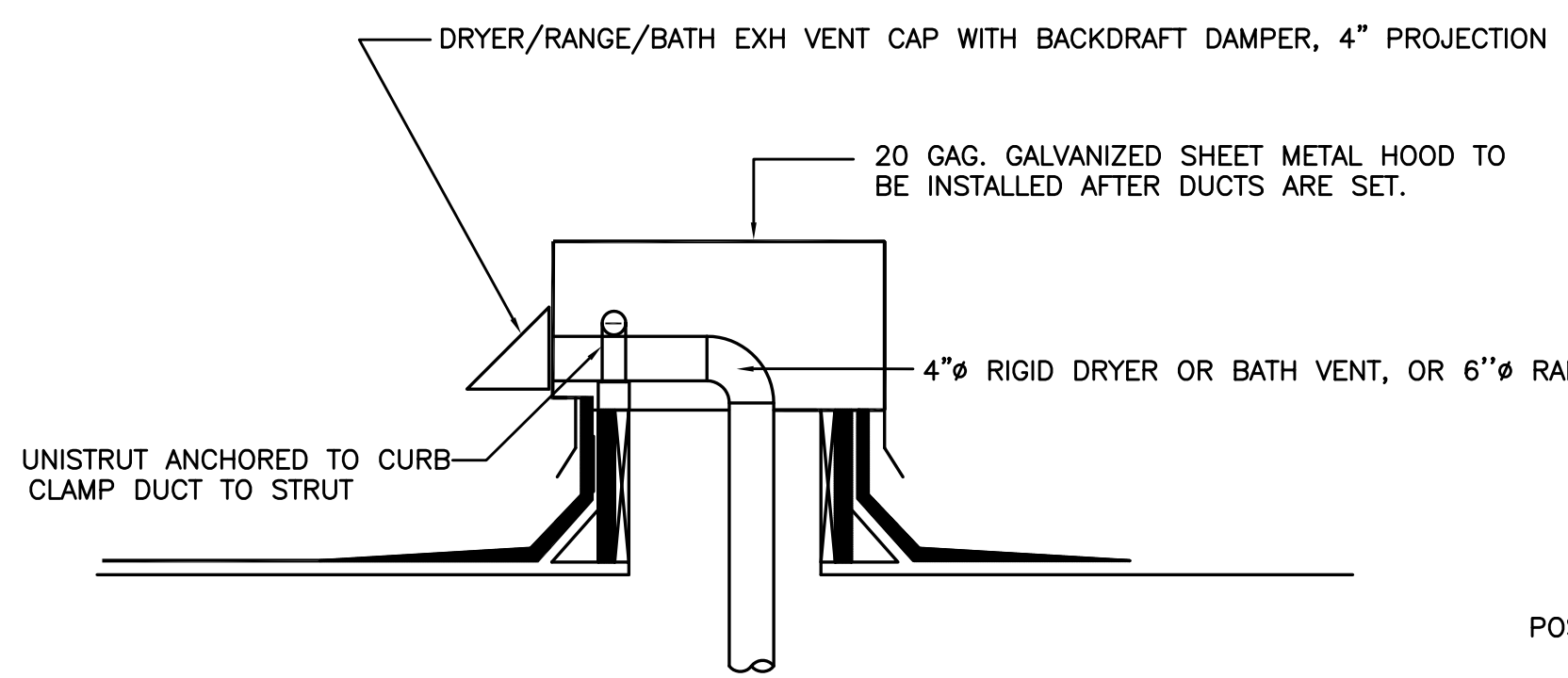
1 SINGLE DRYER VENT
M6.3 NOT TO SCALE



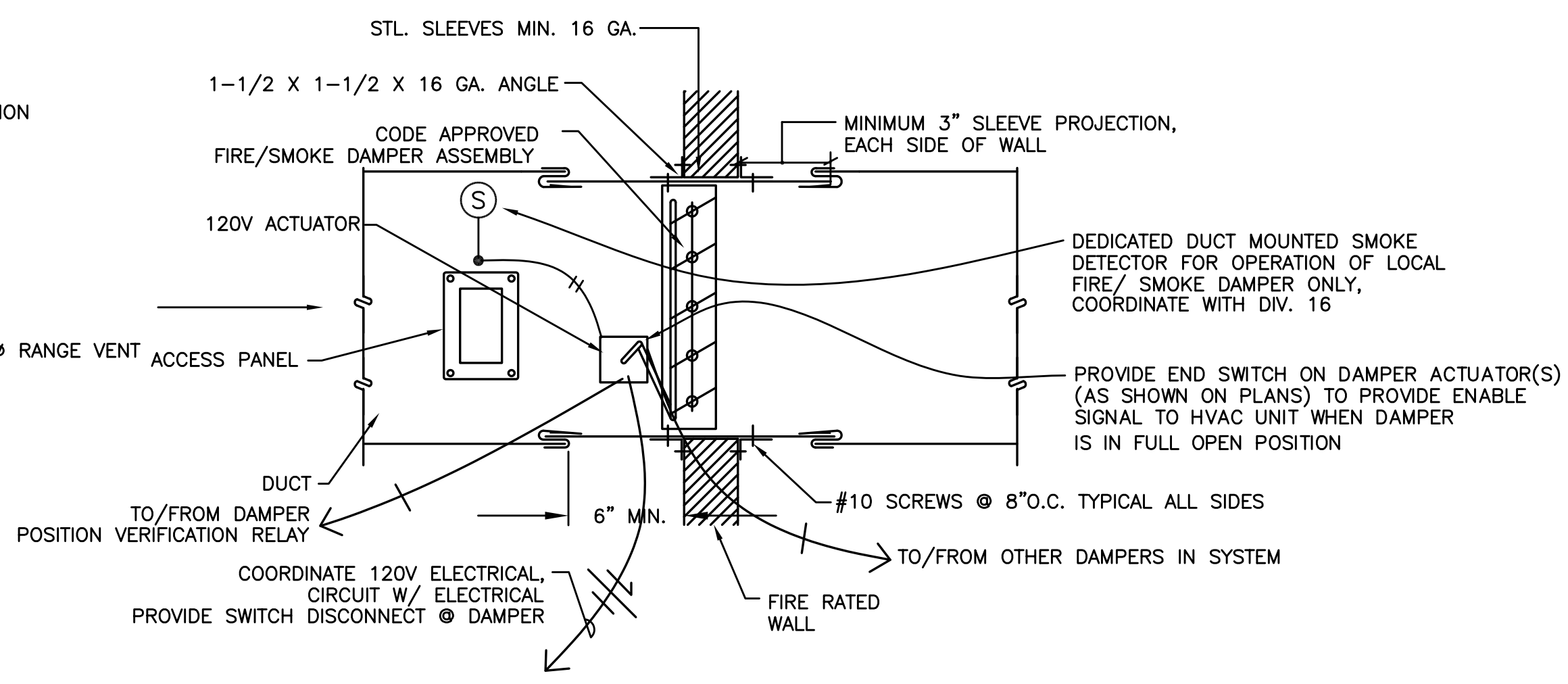
2 RESTROOM EXHAUST FAN
M6.3 SCALE:DETAIL



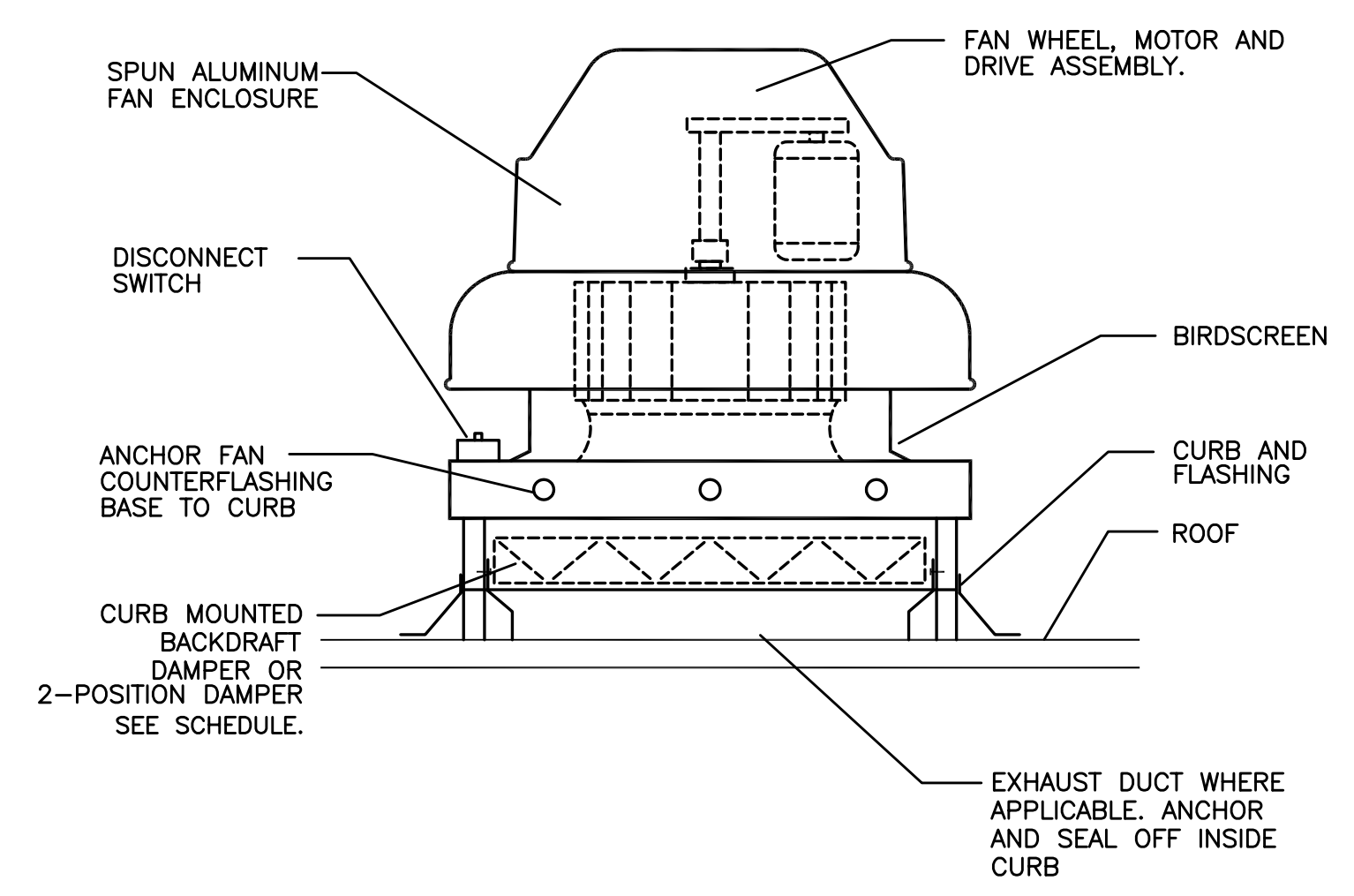
3 LINT TRAP
M6.3 DETAIL



4 TYPICAL ROOFTOP OUTLET HOOD
M6.3 NOT TO SCALE



5 FIRE/SMOKE DAMPER W/SMOKE DETECTOR
M6.3 NOT TO SCALE



6 EXHAUST FAN
M6.3 DETAIL

NOTE:
PROVIDE ALL REQUIRED CONTROL WIRING TO ACCOMPLISH:
FIRE/SMOKE DAMPER - FIRE/SMOKE DAMPER TO CLOSE UPON ACTIVATION OF LOCAL SMOKE DETECTOR
EXHAUST DUCTS/FANS - FIRE/SMOKE DAMPER TO CLOSE UPON SHUTDOWN OF ASSOCIATED EXHAUST FAN.
SUPPLY OR RETURN DUCTS/FANS - FIRE/SMOKE DAMPER TO CLOSE UPON SHUTDOWN OF ASSOCIATED AIR HANDLING UNIT.

GENERAL NOTES:
PROVIDE ACCESS IN CEILING OR WALL FOR DAMPER AND SMOKE DETECTOR
SEE ELECTRICAL DRAWINGS FOR WIRING INSTALLATION

KING+PARKS MULTI-FAMILY RESIDENCES

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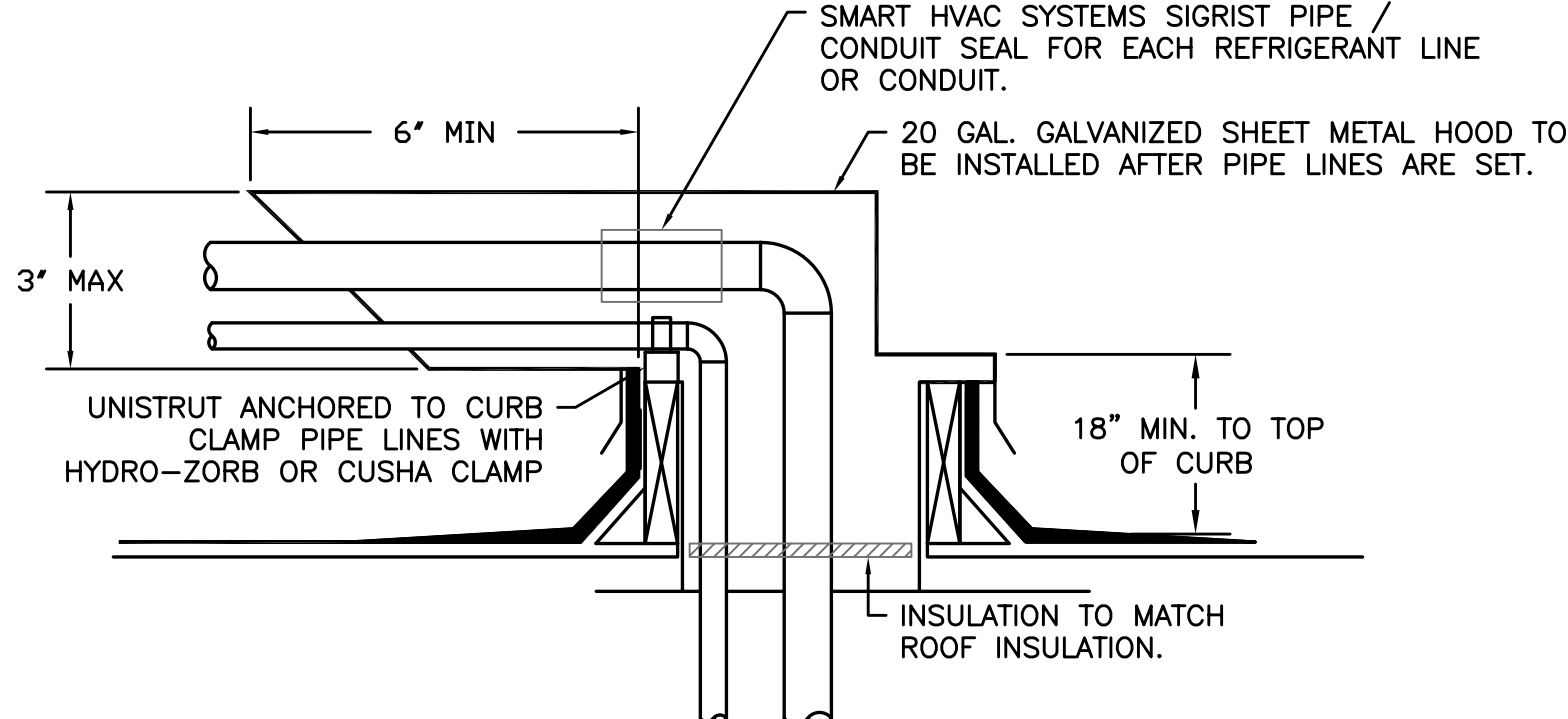
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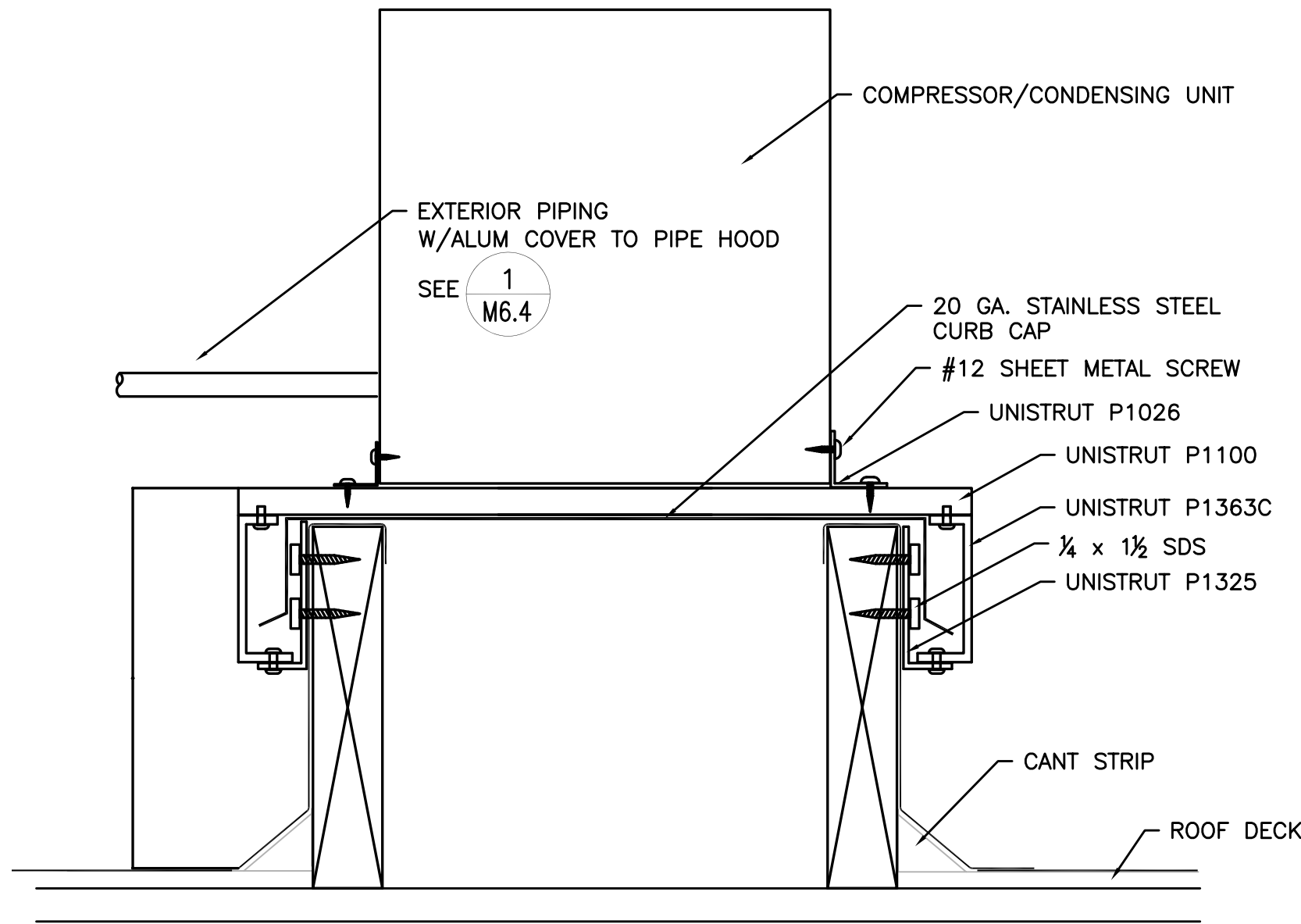
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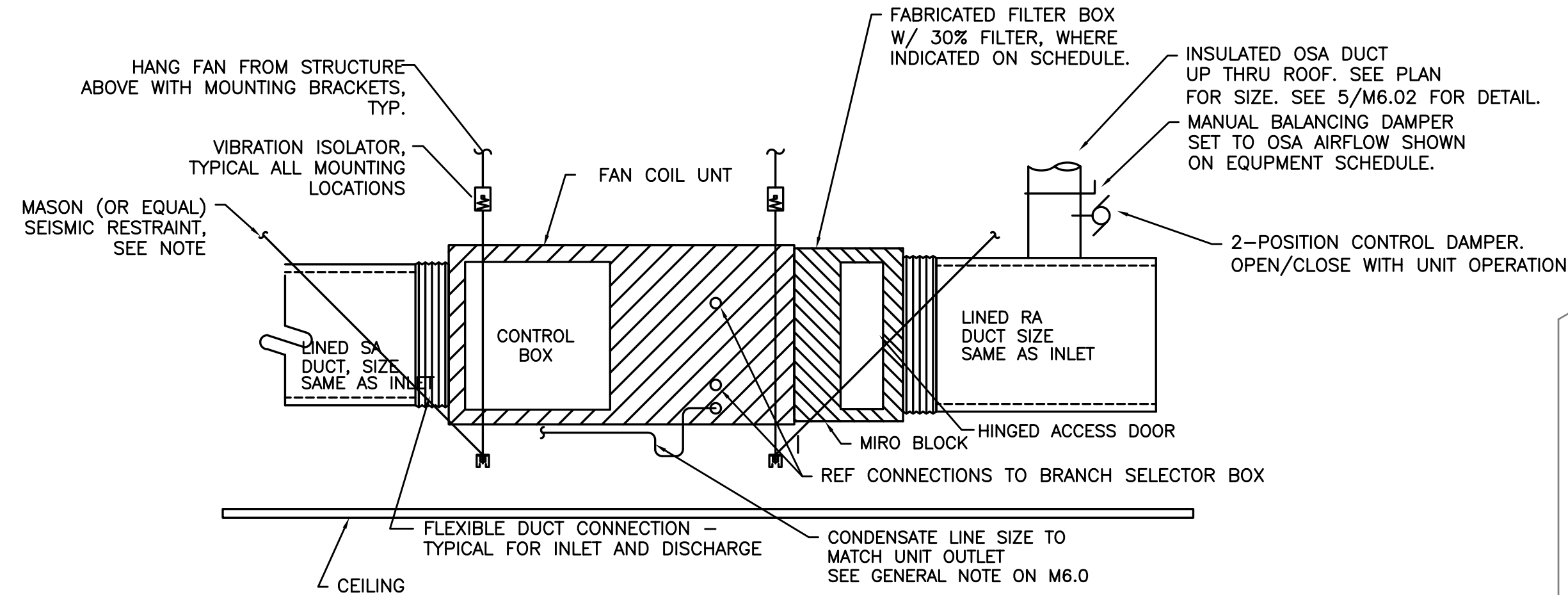
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1 PIPE HOOD DETAIL
 N6.4 SCALE: DETAIL

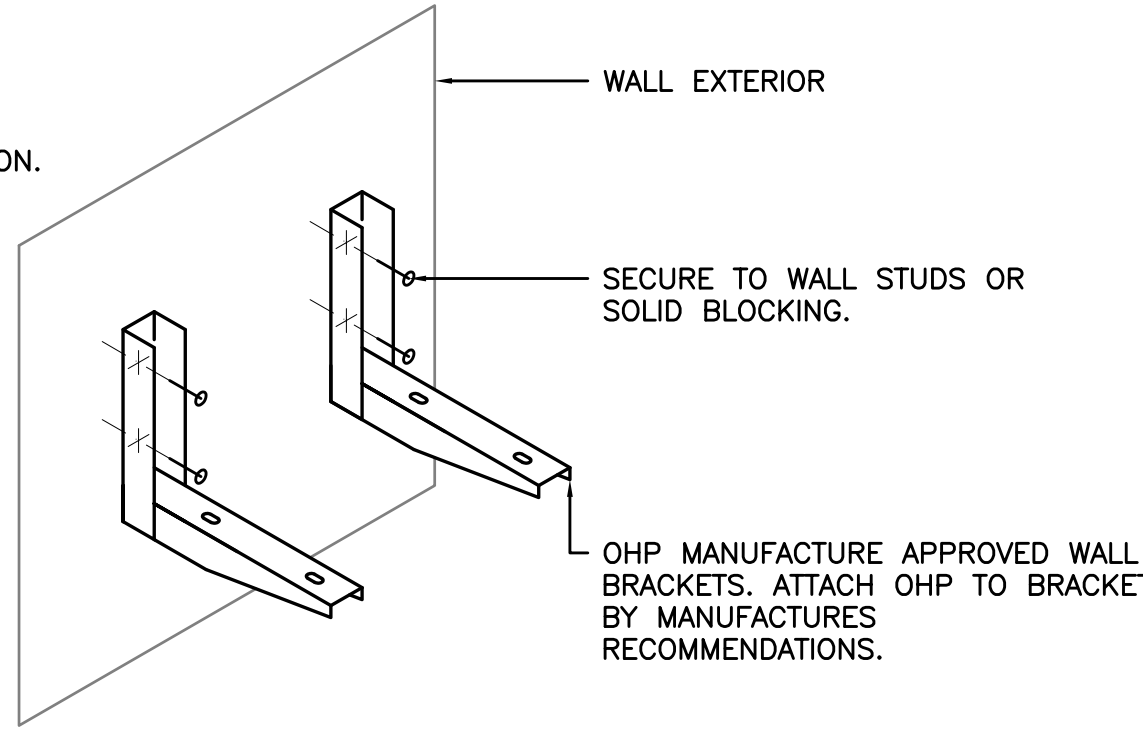


2 CONDENSER W/ CURB
 M6.4 SCALE: DETAIL



NOTE: LOCATE SUPPORT & SIESMIC TO MAINTAIN UNHINDERED ACCESS FOR MAINTENANCE OF UNIT.

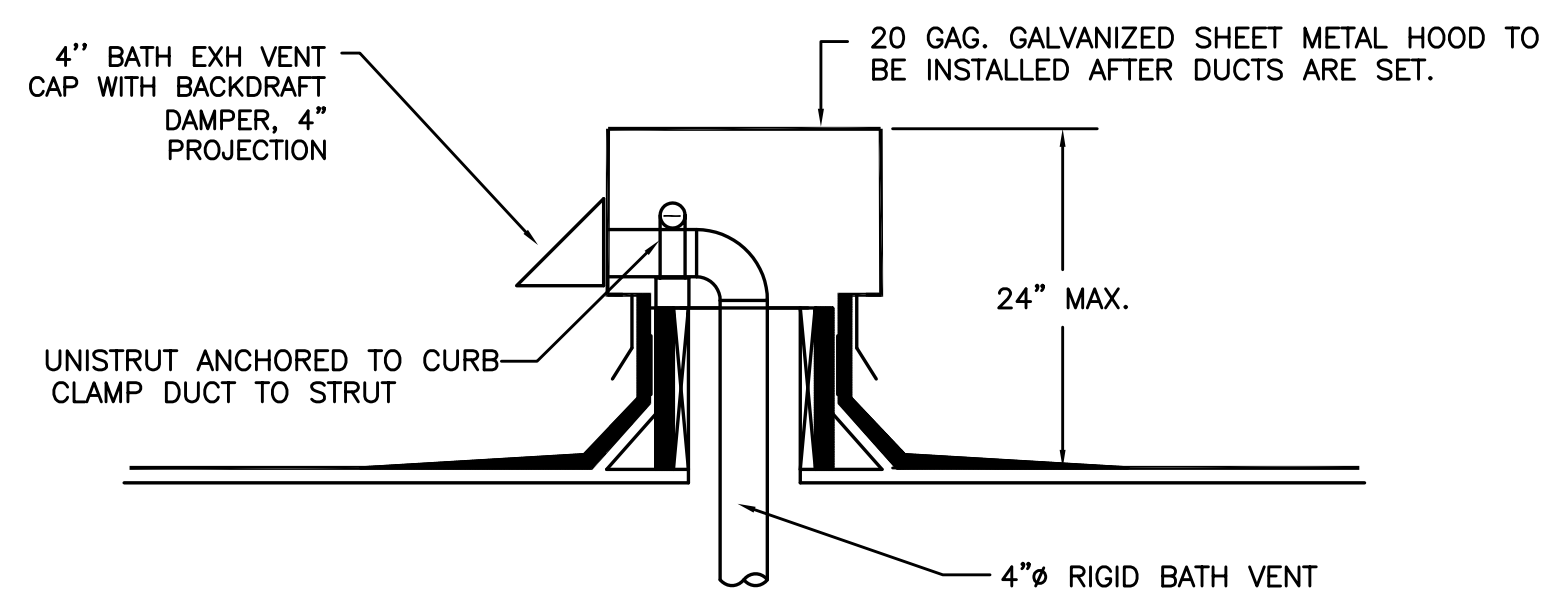
3 DUCTED FAN COIL (IHP)
 M6.4 SCALE: DETAIL



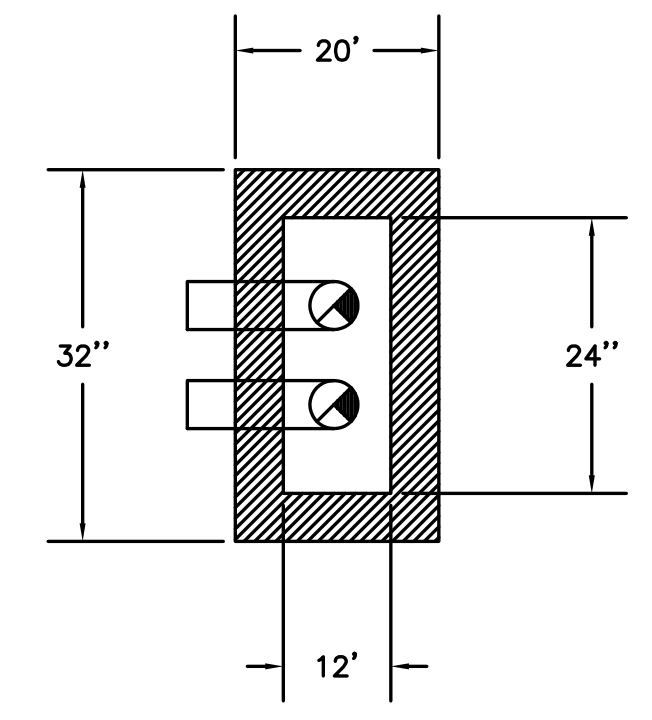
4 OHP MOUNTING DETAIL
 M6.4 SCALE: DETAIL

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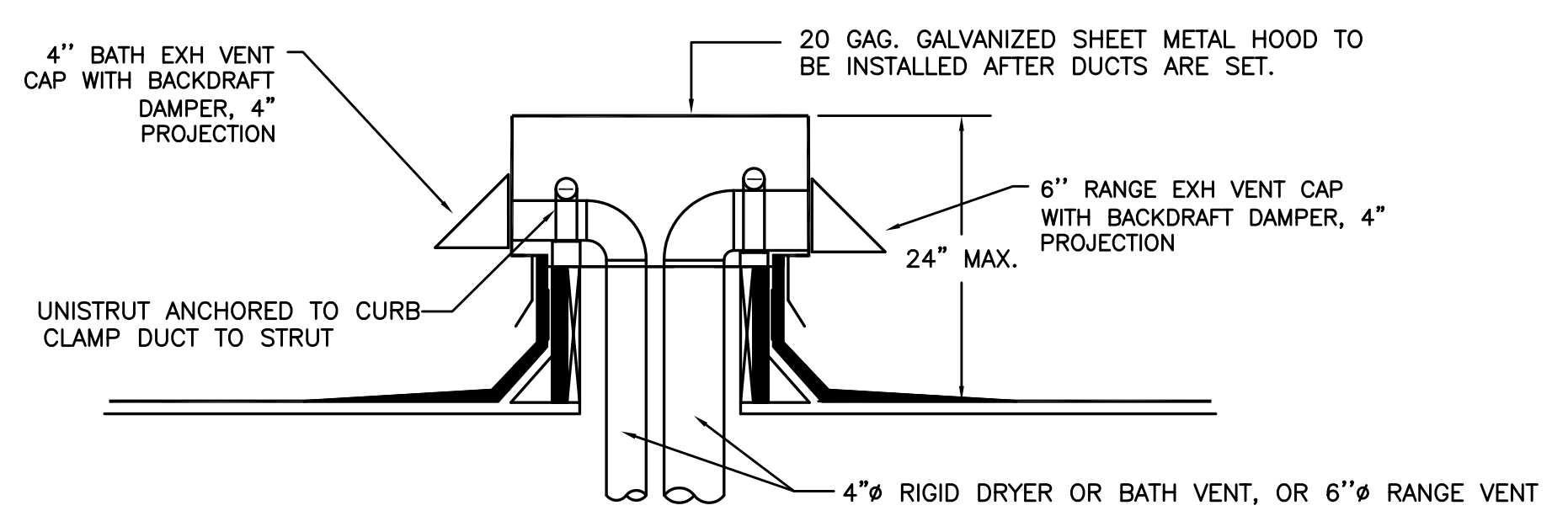


SECTION VIEW

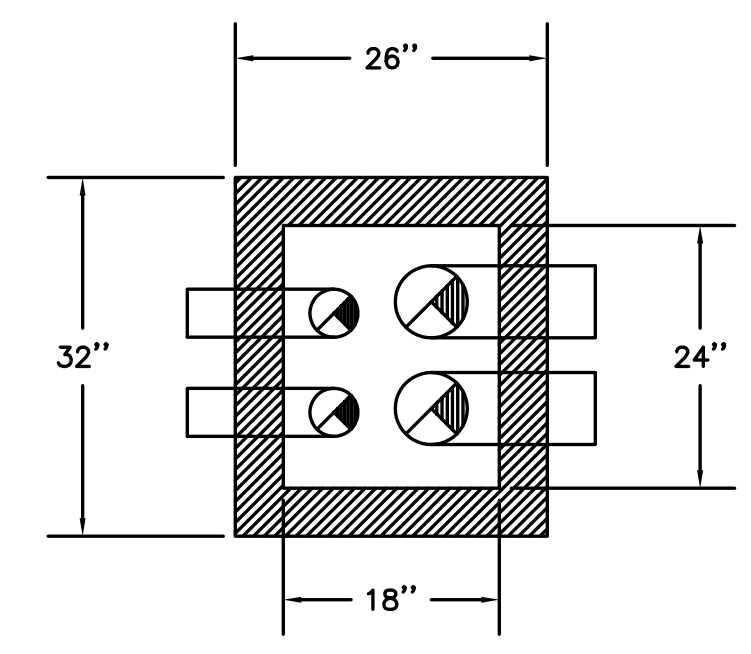


TYPICAL PLAN VIEW (2-4" Ø DUCTS)

1 TYPICAL ROOFTOP OUTLET HOOD
M6.5 NOT TO SCALE

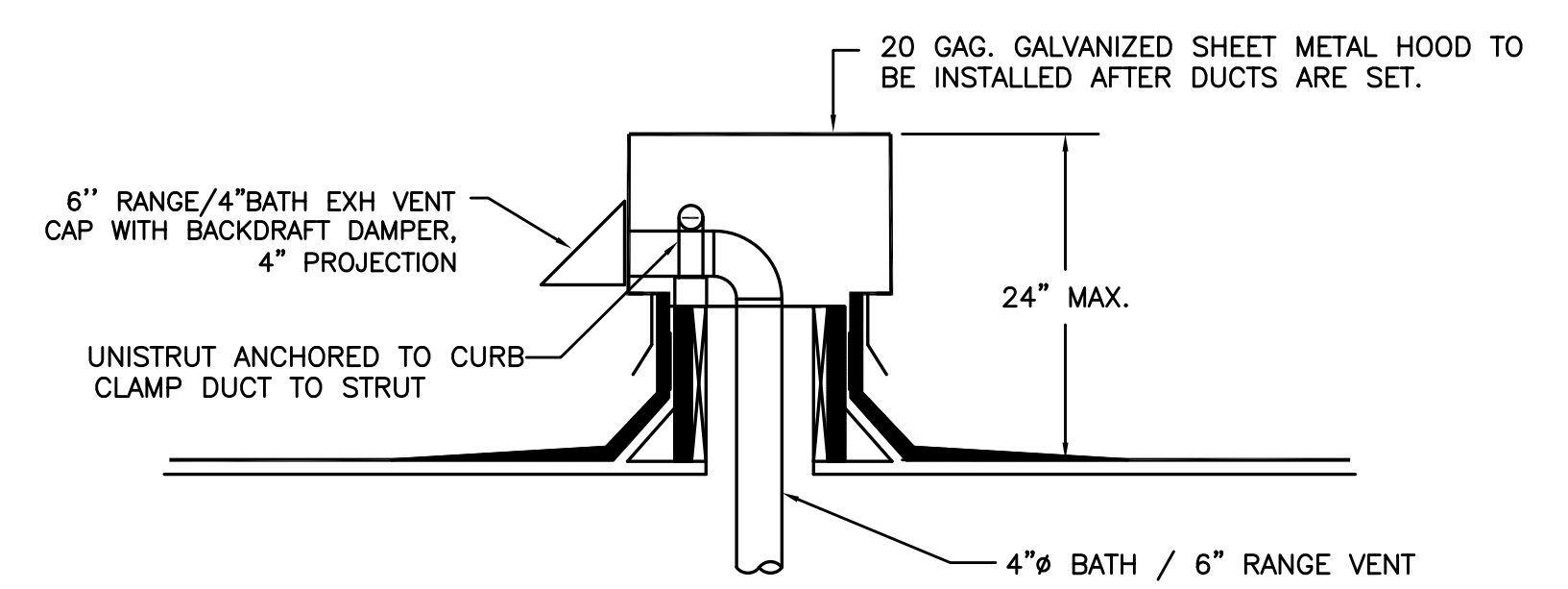


SECTION VIEW

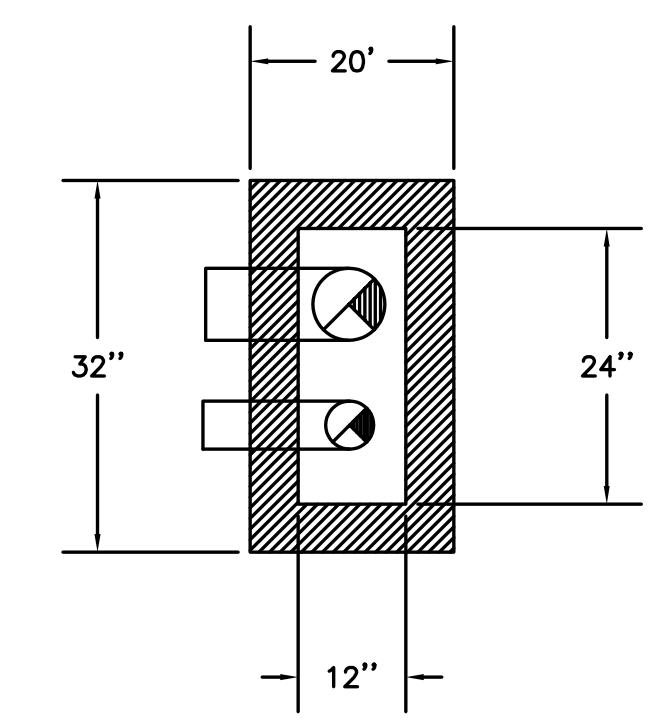


TYPICAL PLAN VIEW (2-4" Ø DUCTS & 2-6" Ø DUCTS)

2 TYPICAL ROOFTOP OUTLET HOOD
M6.5 NOT TO SCALE



SECTION VIEW



TYPICAL PLAN VIEW (1-6" Ø DUCT & 1- 4" Ø DUCT)

3 TYPICAL ROOFTOP OUTLET HOOD
M6.5 NOT TO SCALE

KING+PARKS MULTI-FAMILY RESIDENCES

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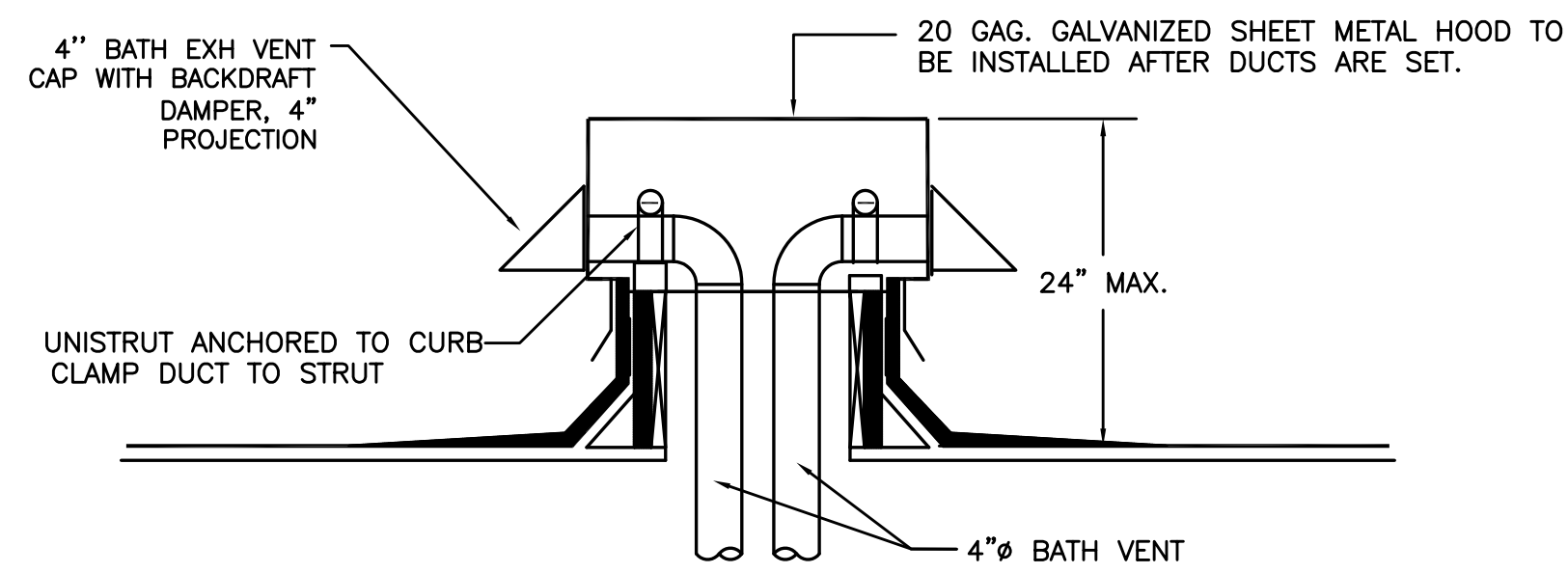
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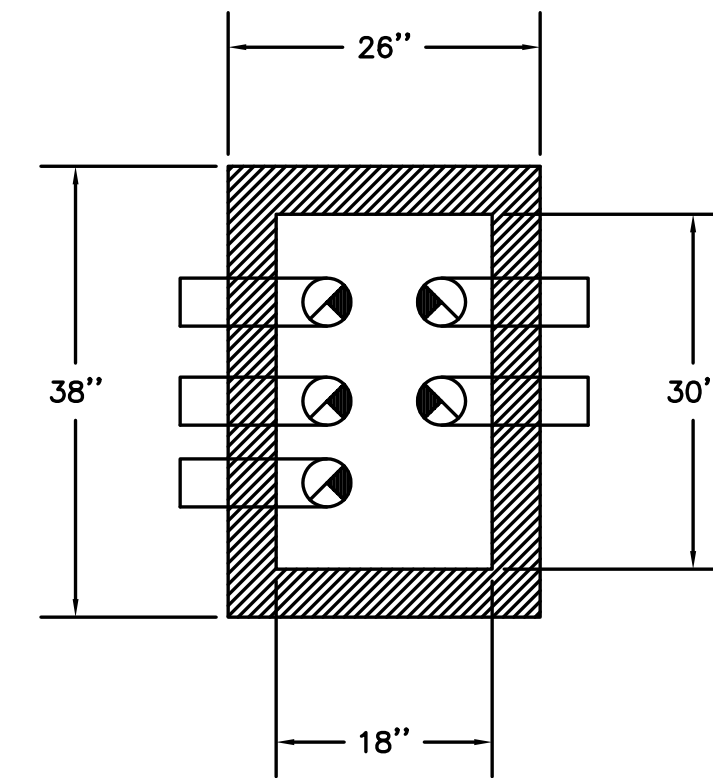
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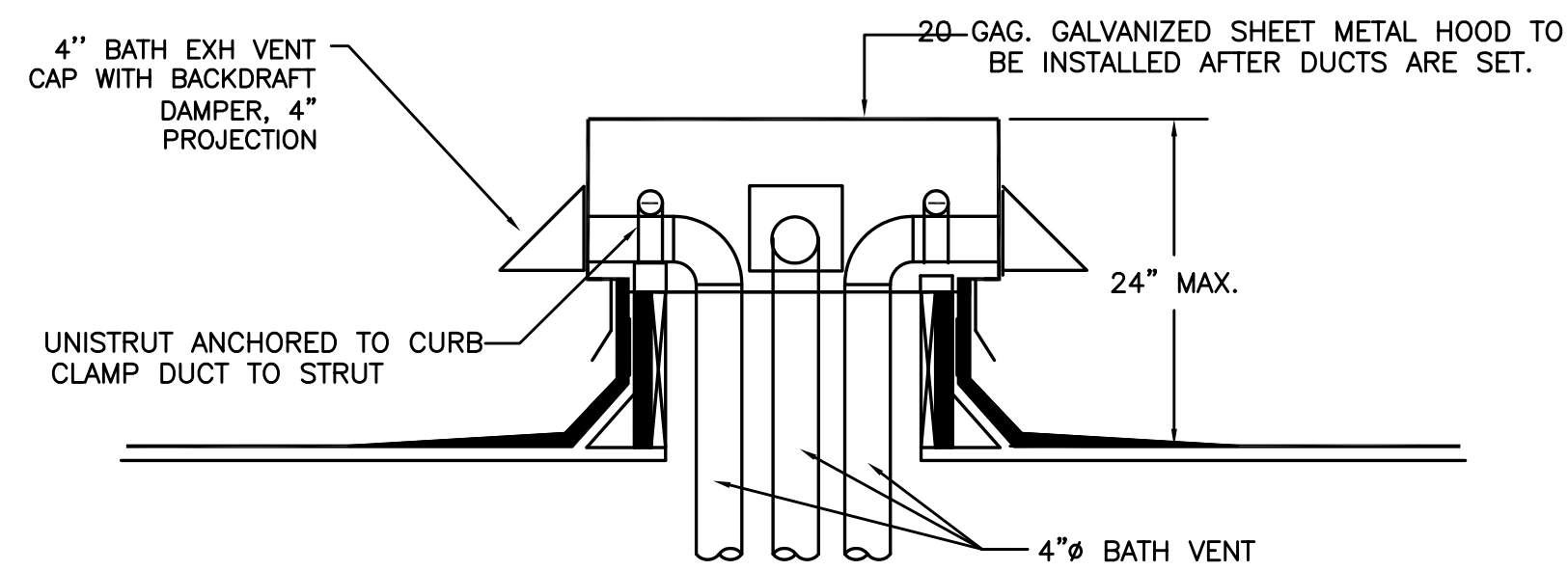


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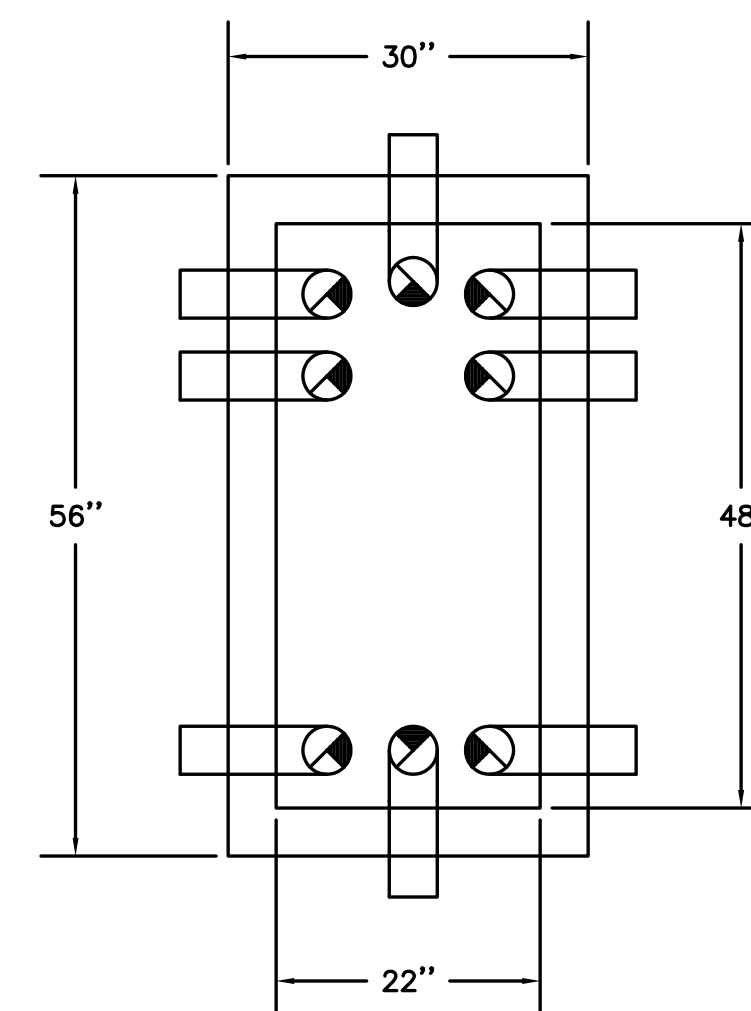


TYPICAL PLAN VIEW (5-4"Ø DUCTS)

1 TYPICAL ROOFTOP OUTLET HOOD
M6.6 NOT TO SCALE

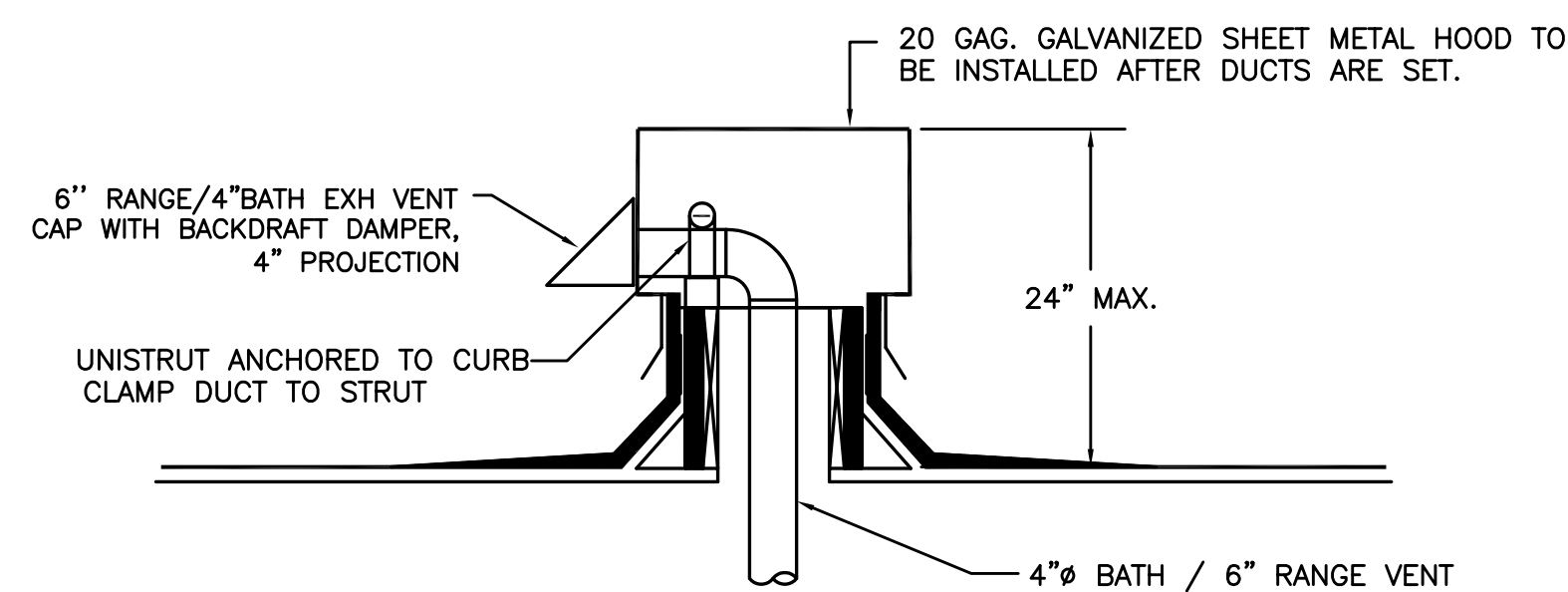


SECTION VIEW

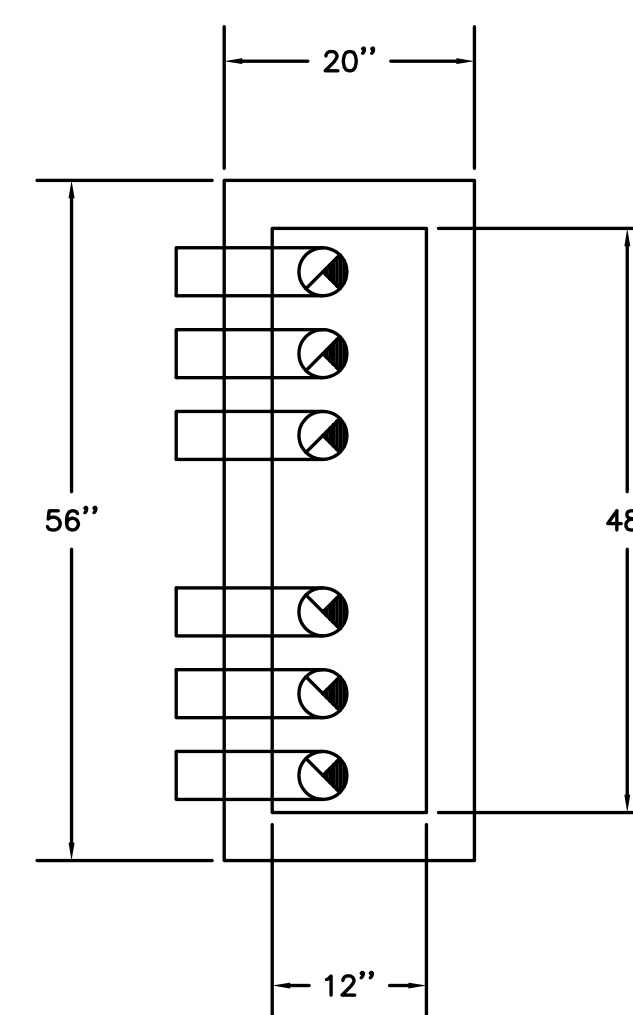


TYPICAL PLAN VIEW (8- 4"Ø DUCTS)

2 TYPICAL ROOFTOP OUTLET HOOD
M6.6 NOT TO SCALE



SECTION VIEW



TYPICAL PLAN VIEW (6-4"Ø DUCTS)

3 TYPICAL ROOFTOP OUTLET HOOD
M6.6 NOT TO SCALE

KING+PARKS MULTI-FAMILY RESIDENCES

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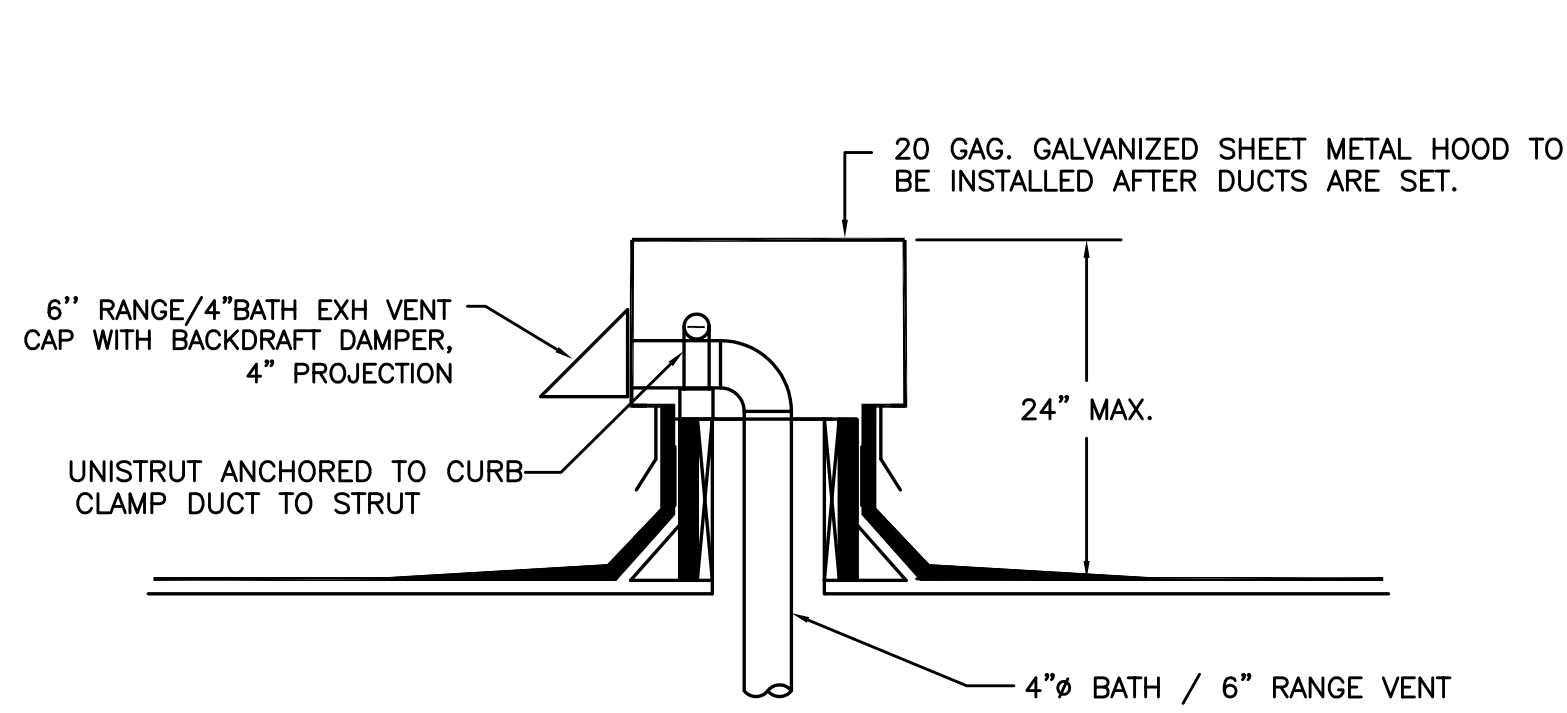
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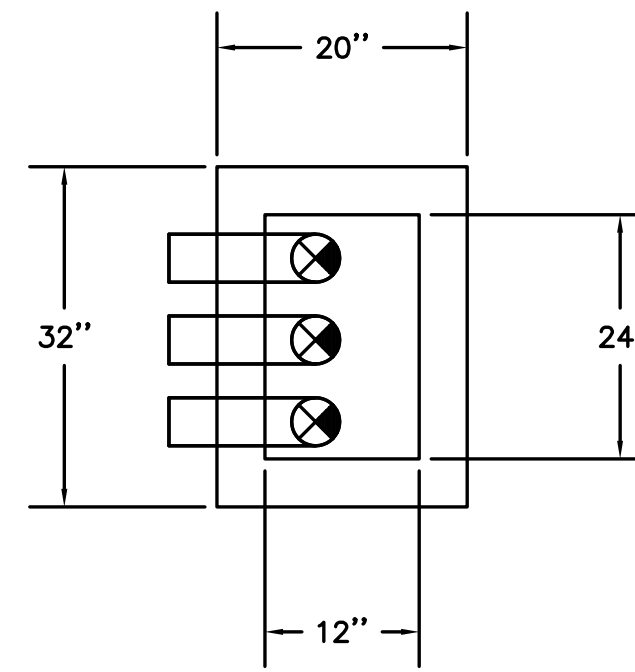
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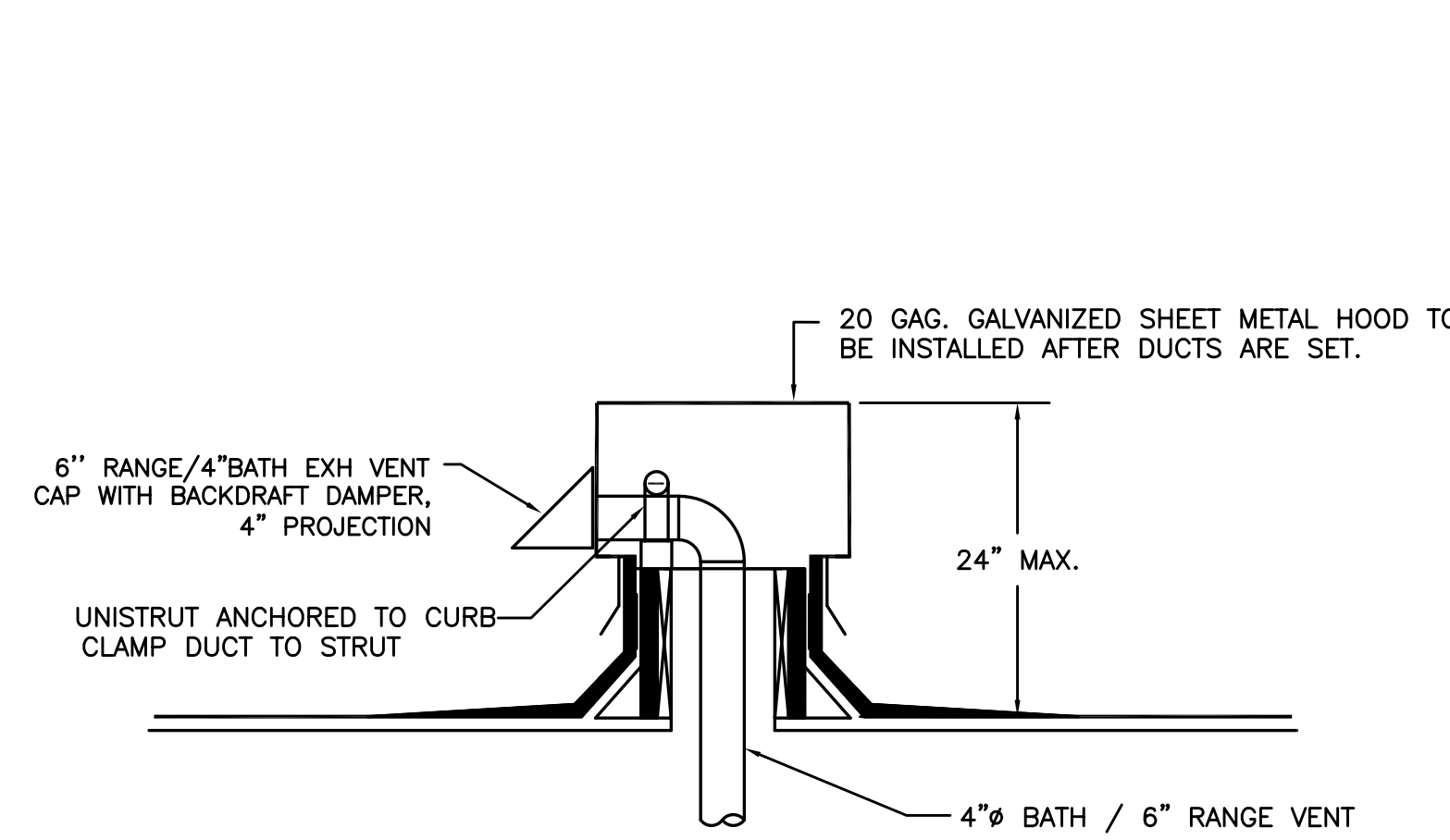


SECTION VIEW

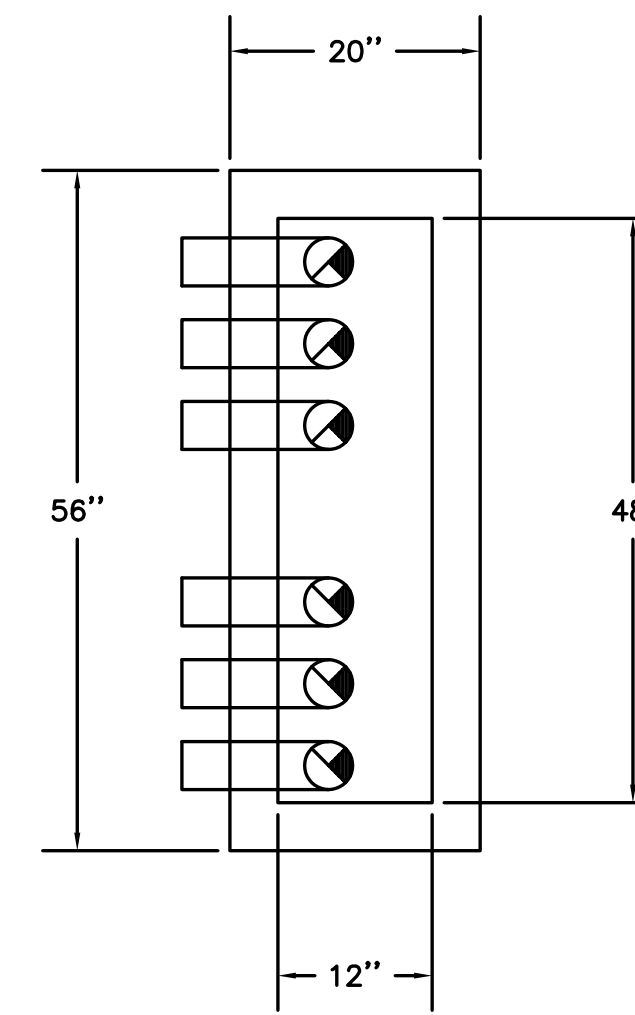


TYPICAL PLAN VIEW (6-4"Ø DUCTS)

1 TYPICAL ROOFTOP OUTLET HOOD
M6.7 NOT TO SCALE

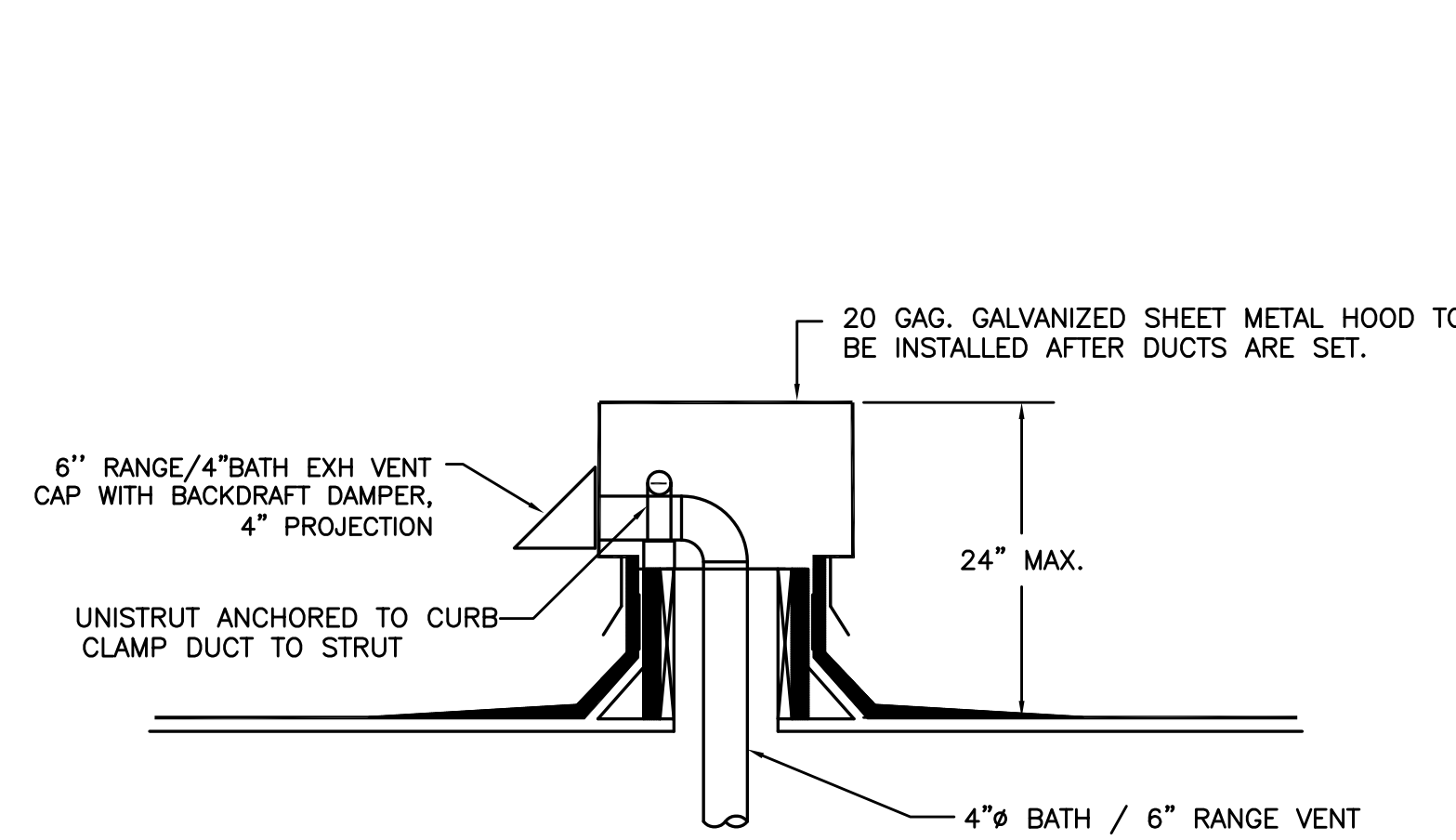


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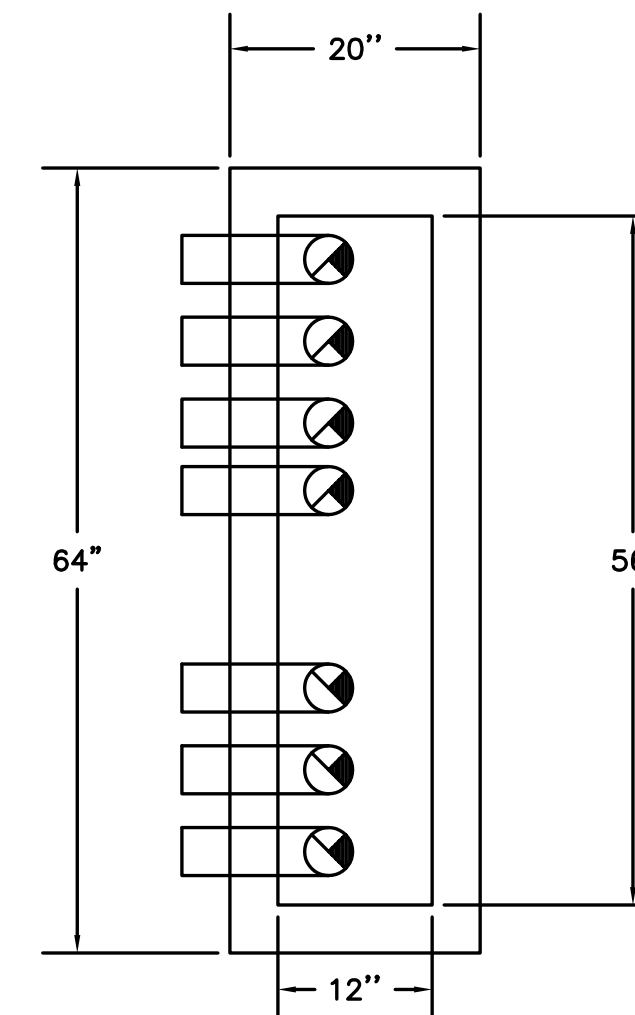


TYPICAL PLAN VIEW (7-4"Ø DUCTS)

2 TYPICAL ROOFTOP OUTLET HOOD
M6.7 NOT TO SCALE



SECTION VIEW



TYPICAL PLAN VIEW (7-4"Ø DUCTS)

2 TYPICAL ROOFTOP OUTLET HOOD
M6.7 NOT TO SCALE

KING+PARKS MULTI-FAMILY RESIDENCES

PROJECT SITE: NE Martin Luther King Jr. Boulevard & N Rosa Parks Way
OWNER: Portland Community Reinvestment Initiatives Inc. (PCRI)
6329 NE Martin Luther King Jr. Blvd. Portland, Oregon 97211

MBA MERRYMAN BARNES ARCHITECTS 4713 MALBINAWE SUITE 304 PORTLAND, OREGON 97217 P. 503.222.3753 WWW.MERRYMANBARNESARCHITECTS.COM

PROJECT NO. 16-0602	ISSUE DATE 01.05.2017
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REVISIONS

SHEET

MECHANICAL
DETAILS

M6.7

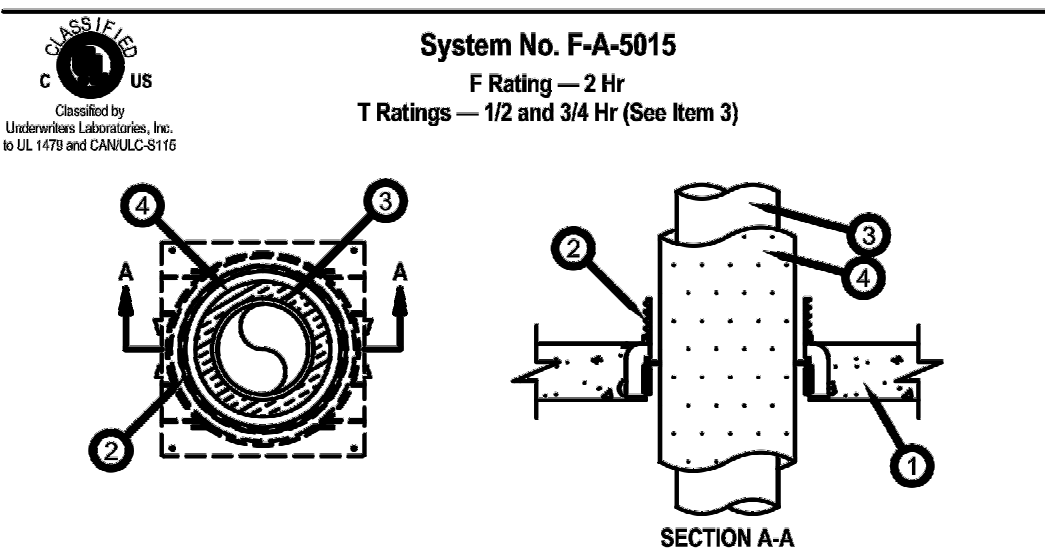
NOT FOR CONSTRUCTION

PRELIMINARY

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PRELIMINARY
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CONSTRUCTION

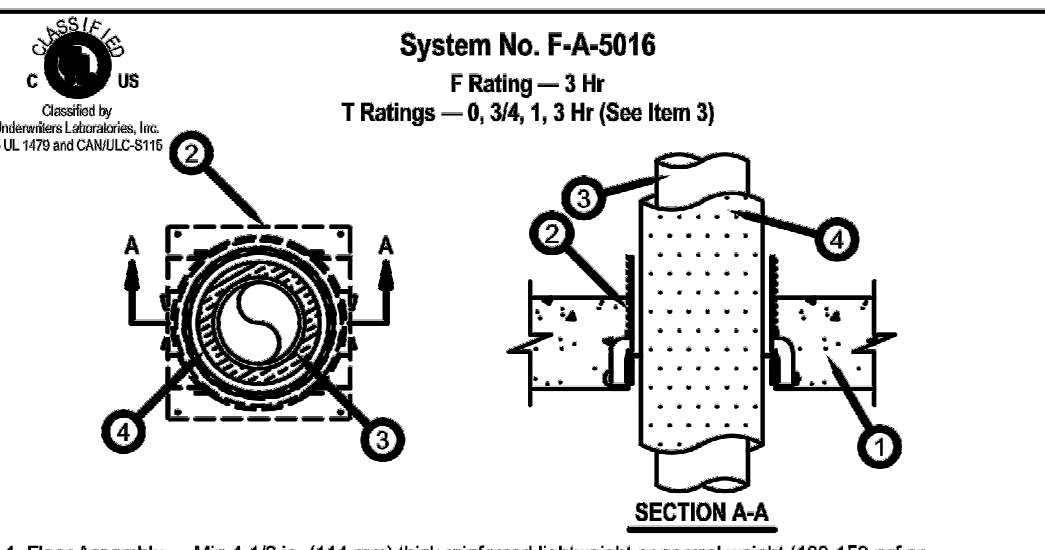
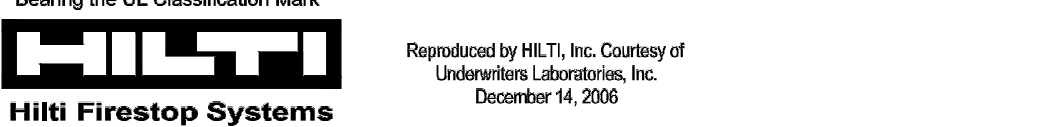


System No. F-A-5015
F Rating — 2 Hr
T Ratings — 1/2 and 3/4 Hr (See Item 3)

1. Floor Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
1A. Floor Assembly — (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series Designs in the Fire Resistance Directory and as summarized below:
A. Steel Floor and Form Units — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the Individual Floor-Ceiling Design.
B. Concrete — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-75/2.5"N, CP 680-110/4"N, CP 680-160/6"N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"

Nom Pipe Diam, in. (mm)	Nom Thick. Of Pipe Insul., in. (mm)	Firestop Device	T-Rating, Hr
1/2 (13)	1 (25)	CP 680-75/2.5"N, CP 682-75/2.5"CP 680-M 2", CP 680-P 2"	3/4
1 (25)	3/4 (19)	CP 680-75/2.5"N CP 680-P 3"	1/2
1 (25)	1 (25)	CP 680-M 3", CP 680-P 3"	1/2
1 (25) (see Item 5)	1 (25)	CP 682-110/4"CP 680-M 4"	1/2
2 (51)	1 (25)	CP 680 110/4"N, CP682 110/4"CP 680-M 4", CP 680-P 4"	1/2
2 (51)	3/4 (19)	CP 680-100/4"NCP 680-P 4"	1/2
4 (102)	3/4 (19)	CP 680-160/6"NCP 680-P 6	1/2

4. Tube Insulation - Plastics* — Nom 3/4 or 1 in. (19 or 25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
See Plastics* (MIFZ2) Category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-5VA may be used.
5. Packing Material* — (Not Shown) — When using a 1 in. (25 mm) diam pipe with 1 in. (25 mm) thick AB/PVC pipe insulation in a 4 in. (102 mm) device, and a max 2 in. (51 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation shall be firmly packed into top of device, flush with the top of the device.
*Bearing the UL Classification Mark

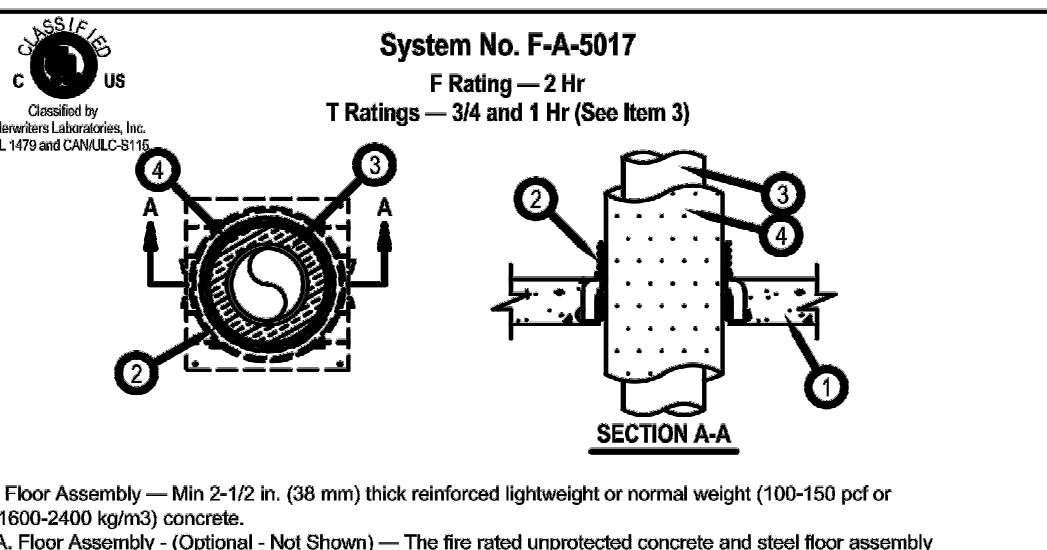
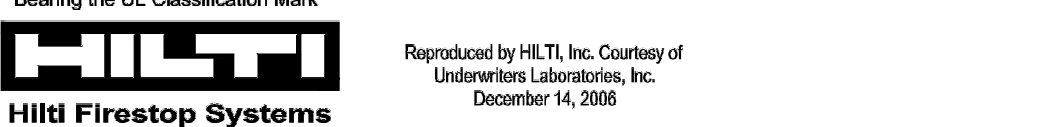


System No. F-A-5016
F Rating — 3 Hr
T Ratings — 0, 3/4, 1, 3 Hr (See Item 3)

1. Floor Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
1A. Floor Assembly — (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series Designs in the Fire Resistance Directory and as summarized below:
A. Concrete — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the Individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-110/4"N, CP 680-160/6"N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"

Nom Pipe Diameter*	Nom Pipe Cover-in. (mm)	Firestop	T Rating-Hr
1/2 in. (13 mm)	1 (25)	CP 680-75/2.5"N, CP 682-75/2.5" CP 680-M 2", CP 680-P 2"	3
1 in. (25 mm)	1 (25)	CP 680-110/4"N, CP 682-110/4" CP 680-M 3", CP 680-P 3", CP 680-M 4", CP 680-P 4"	3/4
2 in. (51 mm)	3/4 (19)	CP 680-110/4"N CP 680-P 4"	1
4 in. (102 mm)	3/4 (19)	CP 680-160/6"N CP 680-P 6"	3/4

* - When pipe diameter smaller than shown in above table is used, the insulated pipe shall be installed in conjunction with Item 5 and the T Ratings are 0 hr.
4. Tube Insulation - Plastics* — Nom 3/4 or 1 in. (19 or 25 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
See Plastics* (MIFZ2) Category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL94 Flammability Classification of 94-5VA may be used.
5. Packing Material* — (Not Shown) — When pipe sizes are less than those shown in the table in Item 3, min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool insulation shall be firmly packed to the fullest extent possible within the device flush with top surface of device.
*Bearing the UL Classification Mark

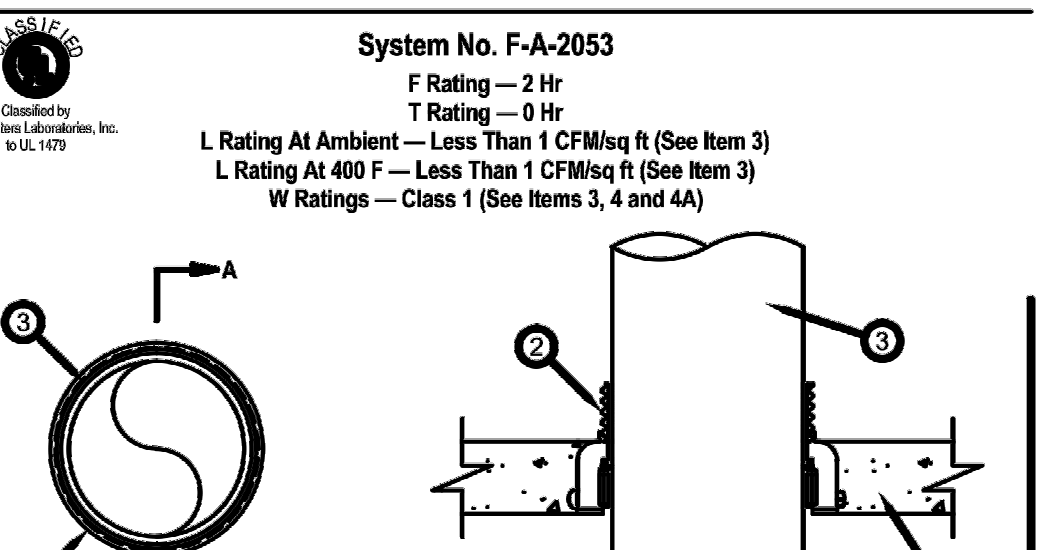
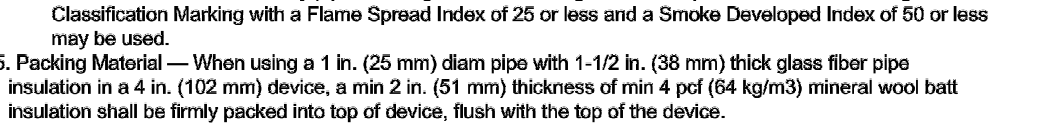


System No. F-A-5017
F Rating — 2 Hr
T Ratings — 3/4 and 1 Hr (See Item 3)

1. Floor Assembly — Min 2-1/2 in. (38 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
1A. Floor Assembly — (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series Designs in the Fire Resistance Directory and as summarized below:
A. Concrete — Min 2-1/2 in. (38 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the Individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete floor assembly in accordance with accompanying installation instructions with a max 2 in. (51 mm) projection above the top surface of the concrete.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-75/2.5"N, CP 680-110/4"N, CP 680-160/6"N, CP 682-75/2.5", CP 682-110/4", CP 680-M 2", CP 680-M 3", CP 680-M 4", CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"

Nom Pipe Diam, in. (mm)	Nom Pipe Covering Thickness, in. (mm)	Firestop Device	T Rating, Hr
1/2 (13)	1 (25)	CP 680-75/2.5"N, CP 682-75/2.5" CP 680-M 2", CP 680-P 2"	3/4
1 (25)	1 (25)	CP 680-M 3", CP 680-P 3"	3/4
1 (25) (See Item 5)	1-1/2 (38)	CP 682-110/4" CP 680-M 4", CP 680-P 4"	3/4
2 (51)	1 (25)	CP 680-110/4"N, CP 682-110/4" CP 680-M 4", CP 680-P 4"	1
2 (51)	2 (51)	CP 680-160/6"N CP 680-P 6"	3/4
4 (102)	1 (25)	CP 680-160/6"N CP 680-P 6"	3/4

4. Pipe Covering* — Nom 1, 1-1/2 and 2 in. (25, 38 and 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units, jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied SSL tape. Transverse joints secured with metal fasteners or with built tape supplied with the product.
See Pipe and Equipment Covering-Materials (BEROU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
5. Packing Material* — When using a 1 in. (25 mm) diam pipe with 1-1/2 in. (38 mm) thick glass fiber pipe insulation in a 4 in. (102 mm) device, a min 2 in. (51 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation shall be firmly packed into top of device, flush with the top of the device.
*Bearing the UL Classification Mark

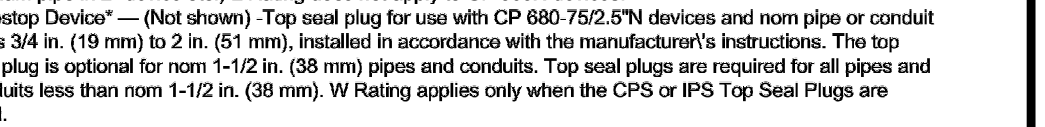


System No. F-A-2053
F Rating — 2 Hr
T Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft (See Item 3)
L Rating At 400 F — Less Than 1 CFM/sq ft (See Item 3)
W Ratings — Class 1 (See Items 3, 4 and 4A)

1. Floor Assembly — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
1A. Floor Assembly — (Optional - Not Shown) — The fire rated unprotected concrete and steel floor assembly shall be constructed of the materials and in the manner specified in the individual D900 Series designs in the UL Fire Resistance Directory and as summarized below:
A. Concrete — Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete.
B. Steel Floor and Form Units* — Composite or non-composite max 3 in. (76 mm) deep galv steel fluted units as specified in the Individual Floor-Ceiling Design.
2. Firestop Device* — Cast in place firestop device permanently embedded during concrete placement or grouted in concrete assembly in accordance with accompanying installation instructions. The 3, 4 and 5 in. devices may extend a max 2 in. (51 mm) above the top surface of the concrete. The max extension above the slab for the 2 and 2.5 in. devices is not restricted.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 680-110/4"N, CP 680-160/6"N, CP 680-P 2", CP 680-P 3", CP 680-P 4", CP 680-P 6"

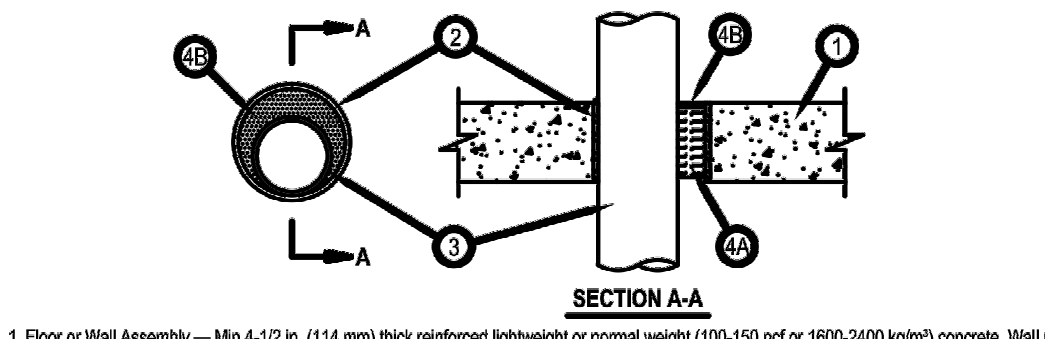
Nom Pipe Diameter	Firestop Device
1/2 in. to 2 in. (19 mm to 51 mm)	CP 680-75/2.5"N CP 680-P 2"
3 in. (76 mm)	CP 680-110/4"N
3 in. to 4 in. (76 mm to 102 mm)	CP 680-110/4"N
6 in. (152 mm)	CP 680-160/6"N CP 680-P 6"

3. Through Penetrants — One metallic pipe or tubing to be installed within the firestop device. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types of pipe or tubing may be used:
A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
C. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
The firestop device, metallic penetrant and pipe covering shall be sized as follows:
++ L Rating applies only to CP 680-P devices and only when the nom diam of pipe equals size of device (2 in. diam pipe in 2" device etc). L Rating does not apply to CP 680N devices.
4. Firestop Device* — (Not Shown) — Top seal plug for use with CP 680-75/2.5"N devices and nom pipe or conduit sizes 3/4 in. (19 mm) to 2 in. (51 mm), installed in accordance with the manufacturer's instructions. The top seal plug is optional for nom 1-1/2 in. (38 mm) pipes and conduits. Top seal plugs are required for all pipes and conduits less than nom 1-1/2 in. (38 mm). W Rating applies only when the CPS or IPS Top Seal Plugs are used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CPS and IPS Top Seal Plugs
4A. Firestop Device* - Water Barrier Module — (Optional, Not Shown) — Applies to nom 2", 3" and 4" water barrier modules used in conjunction with the CP 680-P 2", CP 680-P 3" and CP 680-P 4" devices, respectively, and supplied by device manufacturer. Module is threaded onto top of device. W Rating applies only when water barrier module is used.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — Water Barrier Module
*Bearing the UL Classification Mark

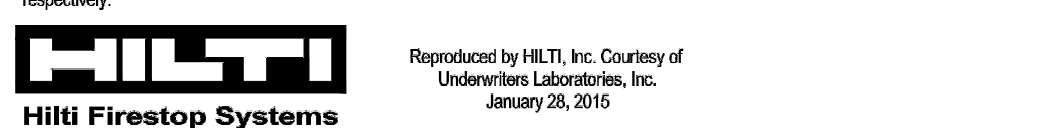


System No. C-AJ-1421

ANSI/UL1479 (ASTM E814)	CANULC S115
F Ratings — 2 or 3 Hr	F Ratings — 2 or 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 2 or 3 Hr
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft
	L Rating at 400 F — Less Than 1 CFM/sq ft

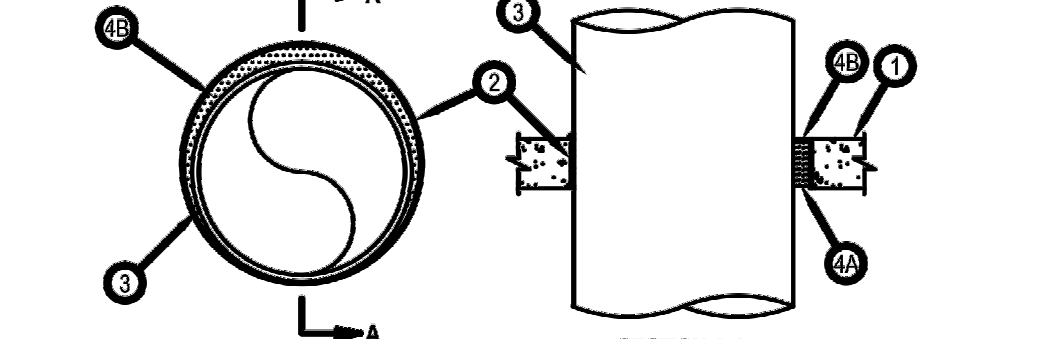


1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 6 in. (152 mm).
See Concrete Blocks (CAZ1) category in the Fire Resistance Directory for names of manufacturers.
2. Metallic Sleeve* — (Optional) Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surface.
3. Through-Penetrant* — One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, tube or conduit and periphery of opening shall be min 9 in. (point contact) to max 5-3/8 in. (137 mm). Pipe or conduit to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or conduits may be used:
A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System* — The firestop system shall consist of the following:
A. Packing Material* — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.
B. Fill Void or Cavity Material* — Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. For 3 Hr rated assemblies, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete/pipe interface at the point contact location on the top surface of floor and on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL, CFS-S SIL, CFS-S SIL, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP604 Self-Leveling Firestop Sealant, CP604 and CFS-S SIL shall be used in floor applications only.
When CP604, CFS-S SIL or CFS-S SIL (floors only) is used, F Rating is 2 Hr.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

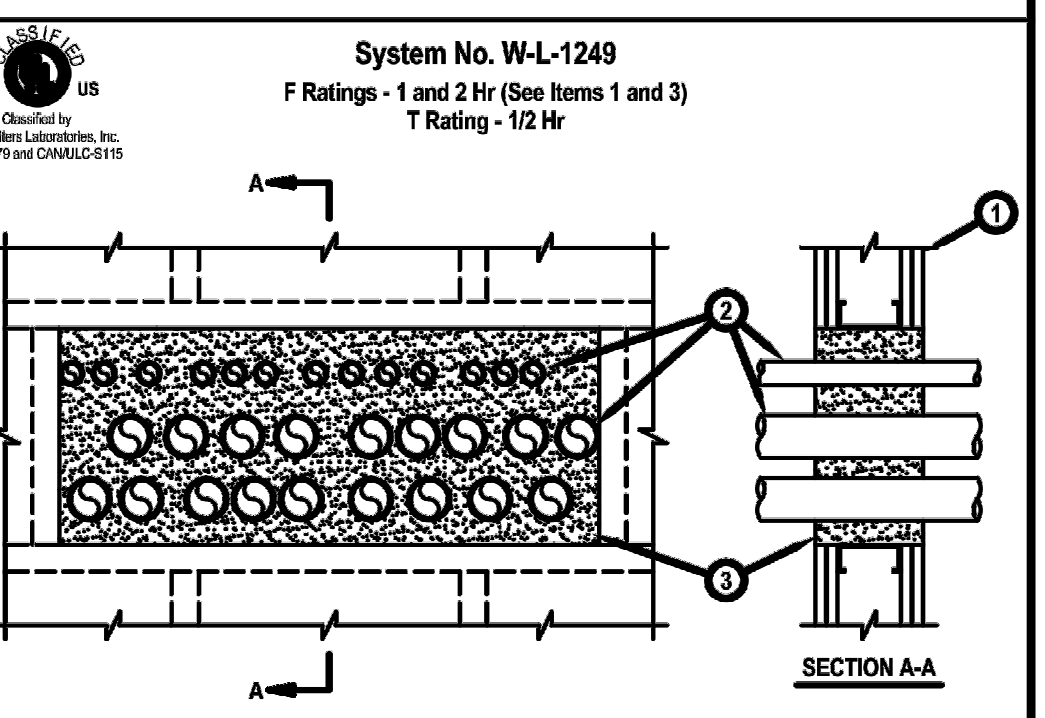
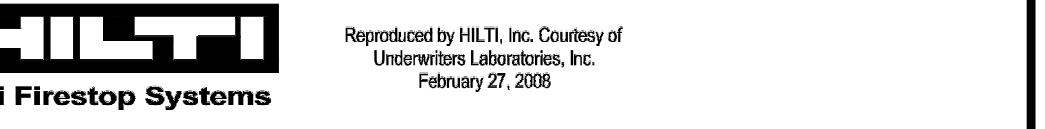
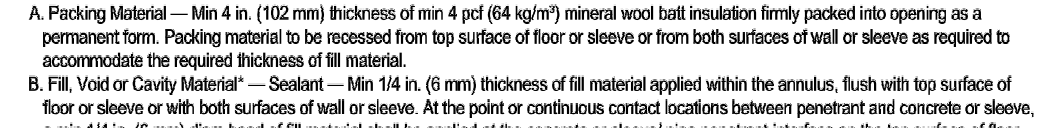


System No. C-AJ-1226

ANSI/UL1479 (ASTM E814)	CANULC S115
F Rating — 3 Hr	F Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 2 or 3 Hr
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 0 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft

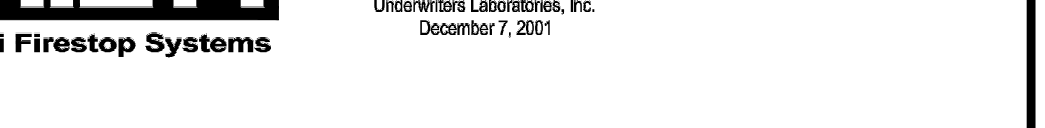


1. Floor or Wall Assembly — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 32 in. (813 mm).
2. Metallic Sleeve* — (Optional) Nom 32 in. (813 mm) diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surface or extending a max 3 in. (76 mm) above floor or beyond both surfaces of wall.
2A. Sheet Metal Sleeve* — (Optional) Max 6 in. (152 mm) diam, min 26 ga. galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.
2B. Sheet Metal Sleeve* — (Optional) -Max 12 in. (305 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. (102 mm) below the bottom of the deck and a max of 1 in. (25 mm) above the top surface of the concrete floor.
3. Through-Penetrant* — One metallic pipe, tube or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 9 in. (point contact) to max 1-7/8 in. (46 mm). Penetrant may be installed with continuous point contact. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic penetrants may be used:
A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit — Nom 6 in. (152 mm) diam (or smaller) steel electrical metallic tubing (EMT).
F. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System* — The firestop system shall consist of the following:
A. Packing Material* — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall or sleeve as required to accommodate the required thickness of fill material.
B. Fill Void or Cavity Material* — Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sleeve or with both surfaces of wall or sleeve. At the point or continuous contact locations between penetrant and concrete or sleeve, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the concrete or sleeve/pipe penetrant interface on the top surface of floor and on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



System No. W-L-1249
F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Rating - 1/2 Hr

1. Wall Assembly The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 Series Wall or Partition Design in the UL Fire Resistance Directory and as summarized below:
A. Studs Steel studs 3-1/2 in. deep, fabricated from 25 MSG galv steel, spaced max 24 in. OC.
B. Gypsum Boards* The gypsum board type, number of layers, fastener type and sheet orientation shall be as specified in the Individual Wall and Partition Design. Max area of opening is 360 sq in. with max dimension of 30 in.
The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants One or more nom 2 in. diam (or smaller) rigid steel conduit or electrical metallic tubing (EMT) to be installed within the opening. The annular space between conduits or tubing shall be min 0 in. (point contact) to max 3-3/8 in. The annular space between conduits or tubing and periphery of opening shall be min 0 in. (point contact) to max 3 in. Conduit or tubing to be rigidly supported on both sides of wall assembly.
3. Fill Void or Cavity Material - Foam* Fill material applied within annulus flush with both surfaces of the wall. Min fill material thickness for 1 Hr F Rating is 4-3/4 in. Min fill material thickness for 2 Hr F Rating is 6 in.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 620 Fire Foam
*Bearing the UL Classification Mark



KING+PARKS MULTI-FAMILY RESIDENCES

PROJECT SITE: NE Martin Luther King Jr. Boulevard & N Rosa Parks Way
OWNER: Portland Community Reinvestment Initiatives Inc. (PCRI)
6329 NE Martin Luther King Jr. Blvd. Portland, Oregon 97211

PROJECT NO.	ISSUE DATE
16-0602	01.05.2017
REVISIONS	

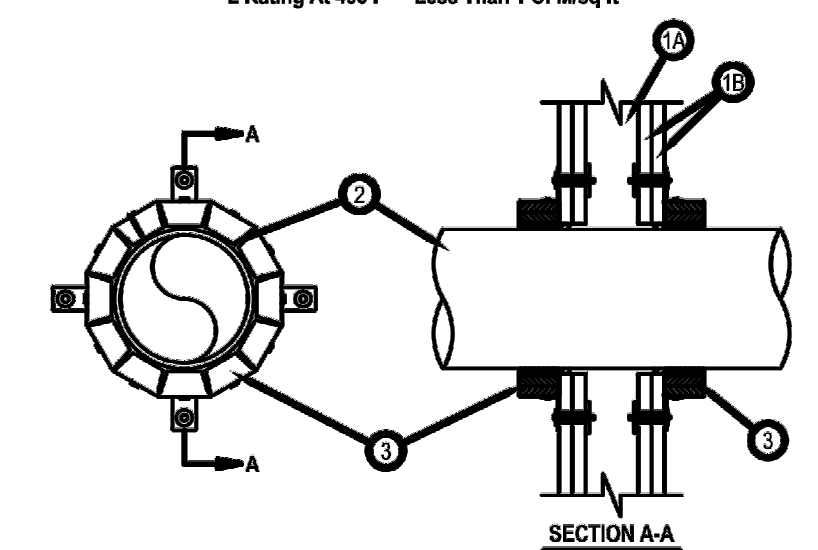
MECHANICAL
DETAILS
M6.8
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System No. W-L-2078

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1 and 2 Hr (See Items 2 and 3)
L Rating At Ambient — 3 CFM/Sq ft
L Rating At 400 F — Less Than 1 CFM/Sq ft



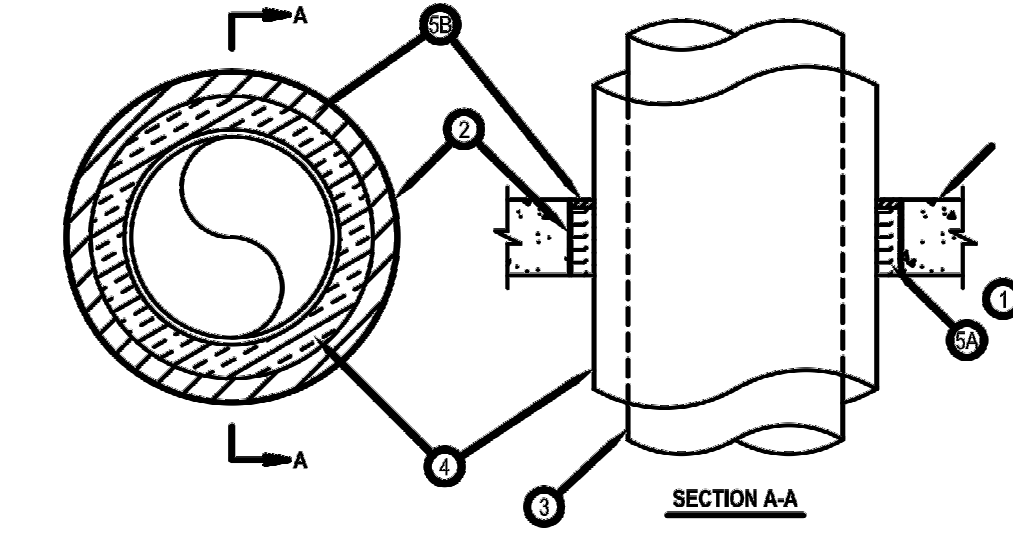
- Wall Assembly** — The fire-rated gypsum board/wallboard assembly shall be constructed of the materials and in the manner specified in the individual UL300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the construction features noted below:
 - Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
 - Gypsum Board — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max dim of opening is 11-1/2 in. (292 mm).
- Hourly F Rating of the freestop system is equal to the hourly fire rating of the wall assembly in which it is installed.**
- Through-Penetrations** — One nonmetallic pipe, conduit or tubing to be installed within the freestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes may be used:
 - Polyvinyl Chloride (PVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - Chlorinated Polyethylene (CPVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid-core or cellular core CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 8 in. (152 mm) diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - Flame Retardant Polypropylene (FRPP) Pipe — Nom 8 in. (152 mm) diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
 - Polyethylene Glycol (PEG) Pipe — Nom 4 in. (102 mm) diam (or smaller) PEG pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
- When min 6 in. (152 mm) diam pipe is used, F Rating is equal to the hourly fire rating of the wall. When nom 8 in. or 10 in. (203 or 254 mm) diam pipe is used, T Rating is 0 hr.
- Firestop Device** — Firestop collar — Firestop collar shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to both sides of the wall using the anchor hooks provided with the collar. (Minimum two anchor hooks for 1-1/2 and 2 in., three for 3 in. and four for 4 in., (76 and 102 mm) diam pipes, three anchor hooks for 6 in., (152 mm) diam pipe, four anchor hooks for 8 in., (203 mm) diam pipe and twelve anchor hooks for 10 in., (254 mm) diam pipe). The anchor hooks are to be secured to the surface of wall with 3/16 in. (4.8 mm) long 2-1/2 in. (64 mm) long toggle bolts along with washers. As an alternate for pipe sizes nom 4 in. diam or less, min No. 10 by 1-1/2 in. (254 by 38 mm) long drywall self-tapping screws with min 3/4 in. (19 mm) steel washers may be used. When the drywall or laminate screw is used, F Rating shall not exceed 1 hr.
- HLTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.**
- HLTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — CP-645 501/17N, CP-645 632/21, CP-645 903/2N, CP-645 110/47N, CP-645 180/2N, CP-644 200/18 and CP-644 250/17 Firestop Collars**
- Fill, Void or Cavity Material** — Sealant — (Not Shown) — Min 1/2 in. (13 mm) thickness of sealant applied within the annular space for nom 8 in. and 10 in. (203 and 254 mm) diam pipes flush with each side of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with each side of wall, to attain the L Rating for max 6 in. (152 mm) diam pipes.

HilTI Firestop Systems

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System No. C-AJ-5091

ANSI/UL1479 (ASTM E814)		CANULC S115	
F Rating — 2 Hr	FT Rating — 2 Hr	F Rating — 2 Hr	FT Rating — 2 Hr
T Rating — 0 and 1 Hr (See Items 2 and 4)	FT Rating — 0 and 1 Hr (See Items 2 and 4)	F Rating — 0 and 1 Hr (See Item 1)	FT Rating — 0 Hr
L Rating At Ambient — 4 CFM/Sq ft	FH Rating — 2 Hr	FH Rating — 1 and 2 Hr (See Item 1)	FH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 and 1 Hr (See Items 2 and 4)	L Rating At Ambient — 4 CFM/Sq ft	FTH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 and 1 Hr (See Items 2 and 4)	L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr



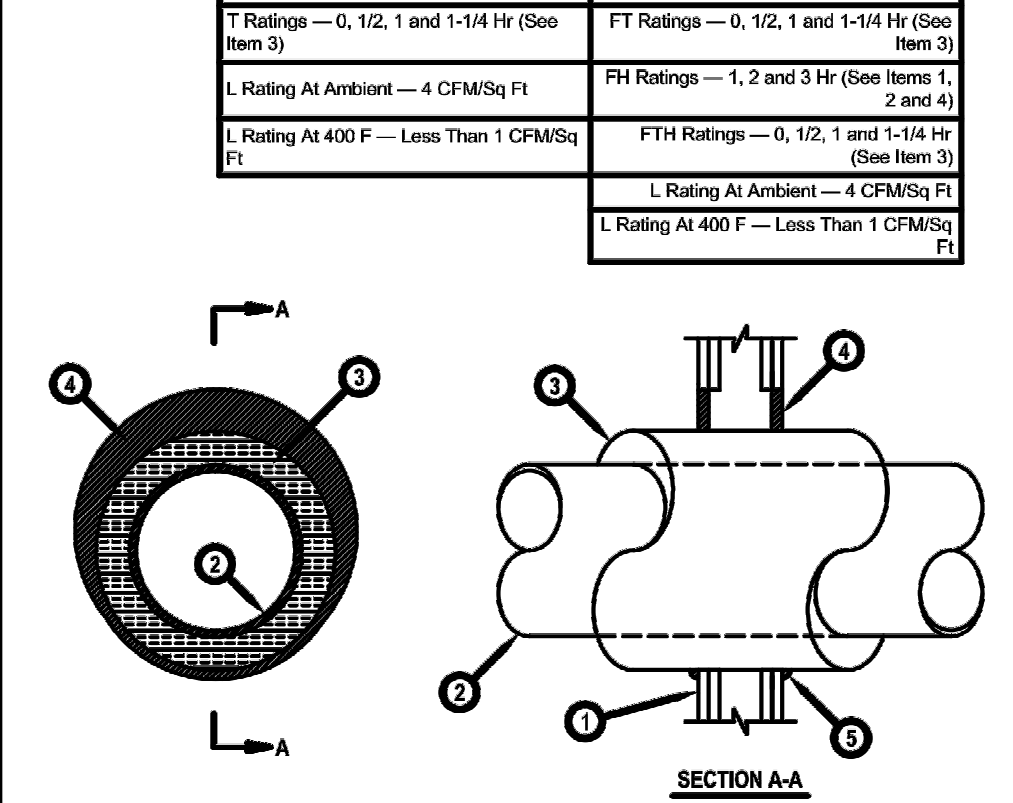
- 1. Floor or Wall Assembly** — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max dim of opening is 20 in. (517 mm).
- 2. Concrete Blocks (CAZ)** category in the Fire Resistance directory for names of manufacturers.
- 2A. Street Metal Sleeve** — (Optional) — Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe sleeve cast or grouted into floor or wall assembly, flush with floor or wall surface or extending a max of 3 in. (76 mm) above floor or beyond both surfaces of wall. If the steel sleeve extends below top surface of the floor or both surfaces of the wall, the T Rating of the freestop system is 0 hr.
- 2B. Street Metal Sleeve** — (Optional) — Max 6 in. (152 mm) diam, min 20 ga galv steel provided with a 20 ga galv steel square flange spot welded to the sleeve at approximately mid-height, or flush with bottom of sleeve in floor, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
- 2C. Street Metal Sleeve** — (Optional) — Max 2 in. (51 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approximately mid-height, or flush with bottom of sleeve in floor, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
- 3. Through-Penetrations** — One metallic pipe or tubing to be installed either concentrically or eccentrically within the freestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
 - Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Tubing — Nom 8 in. (152 mm) diam (or smaller) regular (or heavier) copper tubing.
 - Pipe Covering — Min 1/2 in. (13 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an alternate jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing tape. Transverse joints secured with metal fasteners or with built up tape supplied with the product. The annular space between the jacketed pipe and the edge of the periphery of the opening shall be min 1/2 in. (13 mm) to max 1/2 in. (13 mm). When thickness of pipe covering is less than 2 in. (51 mm), the T Rating for the freestop system is 0 hr.
 - See Pipe Equipment Covering** — Materials — (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
 - Pipe Covering** — (Not Shown) — As an alternate to Item 4, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf or 224 kg/m³) units used to fill outside diam of pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. The annular space shall be min 1/2 in. (13 mm) to max 1/2 in. (13 mm) to max 1/2 in. (13 mm).
- 5. Firestop System** — The freestop system shall consist of the following:
 - Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or wall and be required to accommodate the required thickness of fill material.
 - Fill, Void or Cavity Material — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall.

HilTI Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 13, 2015

System No. W-L-5029

ANSI/UL1479 (ASTM E814)		CANULC S115	
F Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 3)	FT Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 3)	F Rating — 3 Hr	FT Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr (See Item 3)	F Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — 4 CFM/Sq ft	FH Ratings — 1, 2 and 3 Hr (See Items 1 and 2)	FH Rating — 3 Hr	FH Rating — 3 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	L Rating At Ambient — 4 CFM/Sq ft	FTH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr



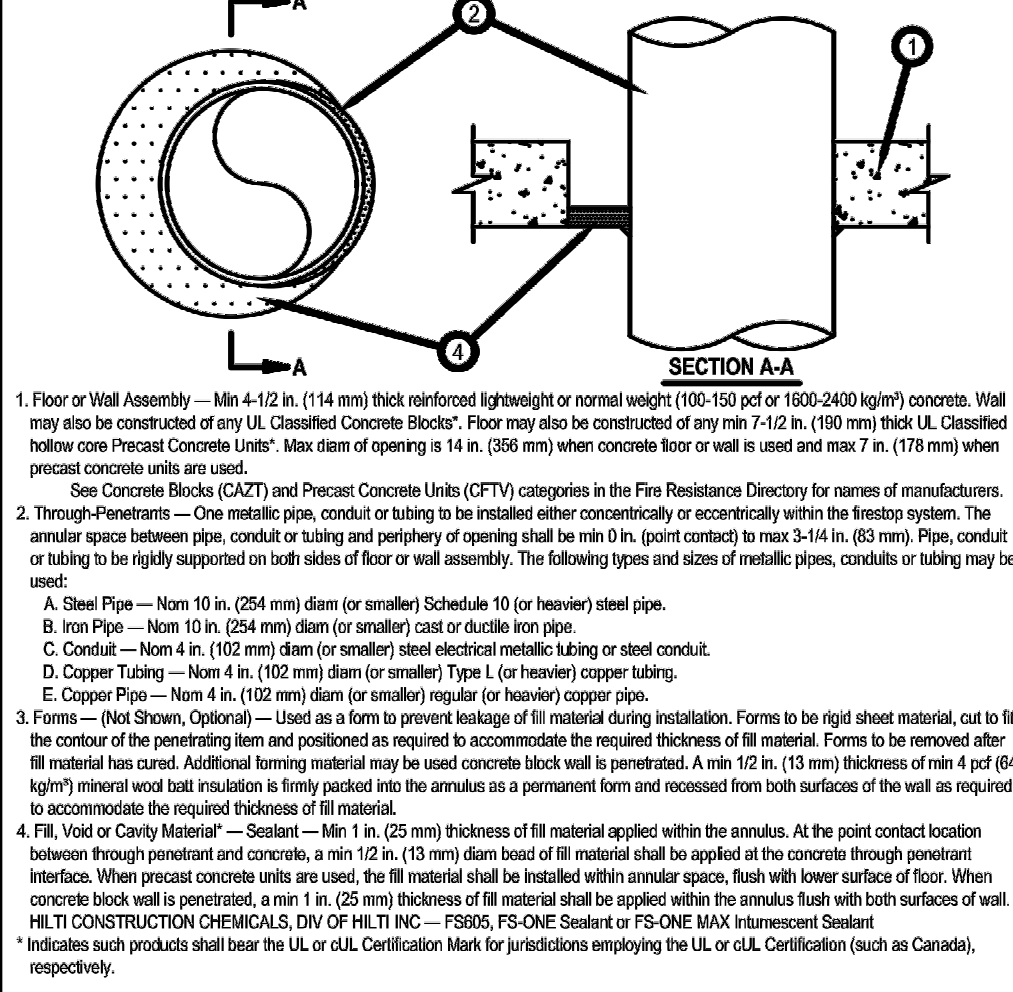
- 1. Wall Assembly** — The 1 or 2 or 3 hr fire-rated gypsum board/wallboard assembly shall be constructed of the materials and in the manner specified in the individual UL300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
 - Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH ratings and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC.
 - Gypsum Board — Nom 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max dim of opening is 16-5/8 in. (423 mm).
 - The hourly F and FH Ratings of the freestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
 - Through-Penetrations** — One metallic pipe or tubing to be installed within the freestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
 - Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type 1 (or heavier) copper tubing.
 - Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe. When the hourly F or FH Rating of the freestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
 - Pipe Covering — Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an alternate jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing tape. Transverse joints secured with metal fasteners or with built up tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
 - See Pipe and Equipment Covering** — Materials (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
- The hourly T, FT, FH Ratings of the freestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FH Ratings when copper and iron pipes are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm).
- Pipe Covering** — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick hollow cylindrical calcium silicate (min 14 pcf or 224 kg/m³) units used to fill outside diam of pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in Item 3 above.
- See Pipe and Equipment Covering** — Materials (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
- Fill, Void or Cavity Material** — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with both surfaces of wall.
- HLTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.**
- Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

HilTI Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. March 19, 2015

System No. C-AJ-1184

ANSI/UL1479 (ASTM E814)		CANULC S115	
F Rating — 3 Hr	FT Rating — 3 Hr	F Rating — 3 Hr	FT Rating — 3 Hr
T Rating — 0 Hr	FT Rating — 0 Hr	F Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — 4 CFM/Sq ft	FH Rating — 3 Hr	FH Rating — 3 Hr	FH Rating — 3 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At Ambient — 4 CFM/Sq ft	FTH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr



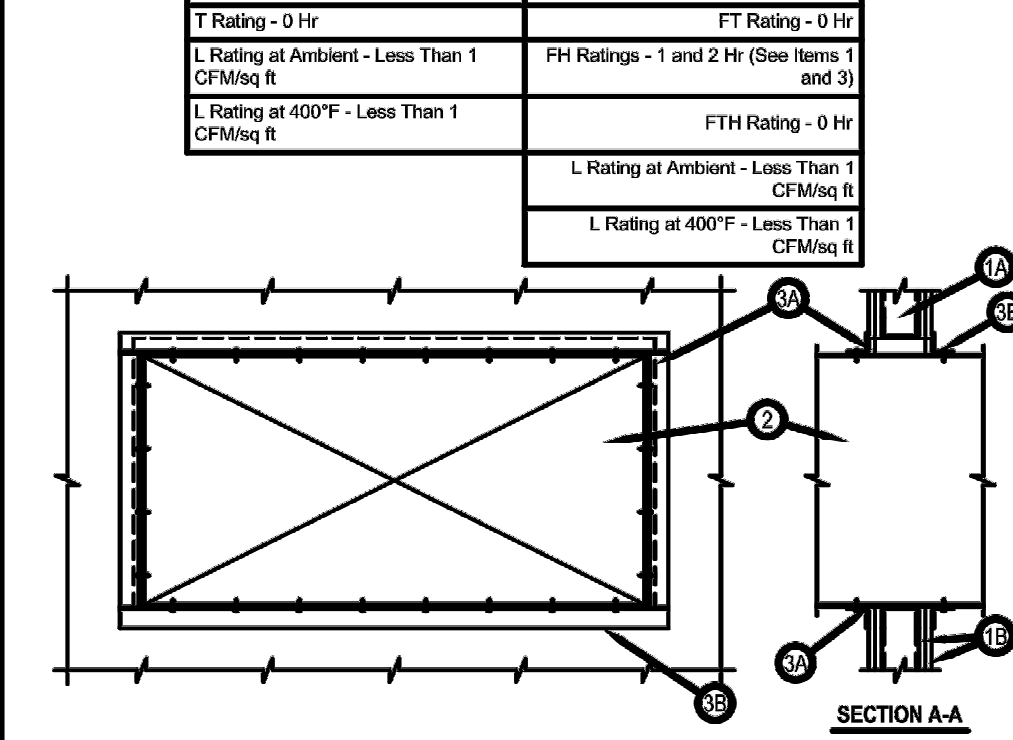
- 1. Floor or Wall Assembly** — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max dim of opening is 20 in. (517 mm).
- 2. Concrete Blocks (CAZ)** category in the Fire Resistance Directory for names of manufacturers.
- 2A. Street Metal Sleeve** — (Optional) — Max 6 in. (152 mm) diam, min 20 ga galv steel provided with a 20 ga galv steel square flange spot welded to the sleeve at approximately mid-height, or flush with bottom of sleeve in floor, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
- 2B. Street Metal Sleeve** — (Optional) — Max 2 in. (51 mm) diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approximately mid-height, or flush with bottom of sleeve in floor, and sized to be a min of 2 in. (51 mm) larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. (25 mm) above the top surface of the floor.
- 3. Through-Penetrations** — One metallic pipe or tubing to be installed either concentrically or eccentrically within the freestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
 - Steel Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe — Nom 10 in. (254 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type 1 (or heavier) copper tubing.
 - Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe. When the hourly F or FH Rating of the freestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
 - Pipe Covering — Min 1/2 in. (13 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an alternate jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing tape. Transverse joints secured with metal fasteners or with built up tape supplied with the product. The annular space between the jacketed pipe and the edge of the periphery of the opening shall be min 1/2 in. (13 mm) to max 1/2 in. (13 mm). When thickness of pipe covering is less than 2 in. (51 mm), the T Rating for the freestop system is 0 hr.
 - See Pipe Equipment Covering** — Materials — (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
 - Pipe Covering** — (Not Shown) — As an alternate to Item 4, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf or 224 kg/m³) units used to fill outside diam of pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. The annular space shall be min 1/2 in. (13 mm) to max 1/2 in. (13 mm) to max 1/2 in. (13 mm).
- 5. Firestop System** — The freestop system shall consist of the following:
 - Packing Material — Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or wall and be required to accommodate the required thickness of fill material.
 - Fill, Void or Cavity Material — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall.

HilTI Firestop Systems

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System No. W-L-7040

ANSI/UL1479 (ASTM E814)		CANULC S115	
F Ratings — 1 and 2 Hr (See Items 1)	FT Ratings — 1 and 2 Hr (See Items 1)	F Rating — 1 and 2 Hr (See Items 1 and 3)	FT Rating — 1 and 2 Hr (See Items 1 and 3)
T Rating — 0 Hr	FT Rating — 0 Hr	F Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/Sq ft	FH Ratings — 1 and 2 Hr (See Items 1 and 3)	FH Rating — 1 and 2 Hr (See Items 1 and 3)	FH Rating — 1 and 2 Hr (See Items 1 and 3)
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At Ambient — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr



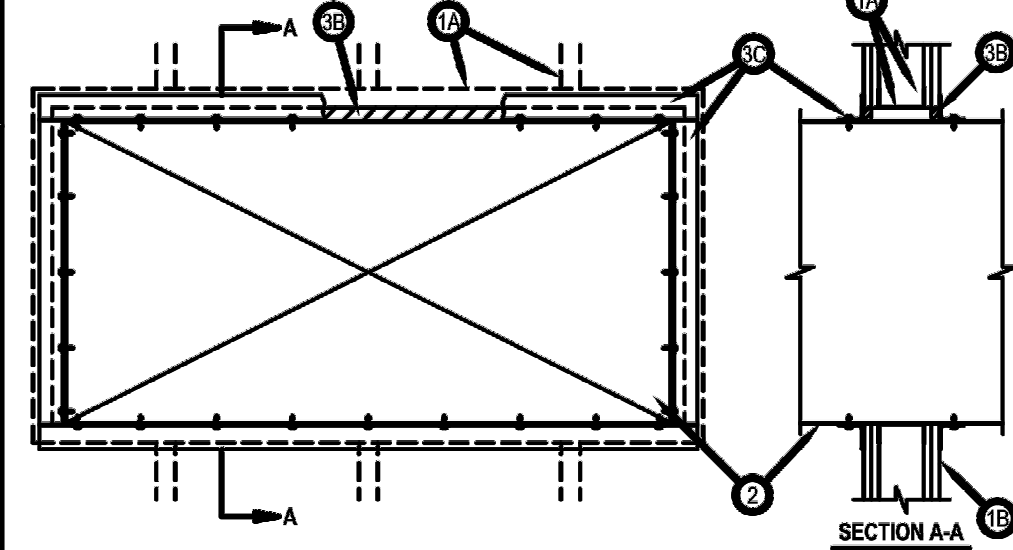
- 1. Wall Assembly** — The fire-rated gypsum wallboard/wall assembly shall be constructed of the materials and in the manner specified in the individual UL300, U400, V400 or W400 Series Wall and Partition Designs in the Fire Resistance Directory and shall include the following construction features:
 - Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm). Additional framing members shall be used to completely frame around opening.
 - Gypsum Board — Nom 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers and sheet orientation shall be as specified in the individual Wall and Partition Design. Max dim of opening is 100 in. (2540 mm) with the dimension of 20 in. (517 mm).
 - The hourly F and FH Ratings of the freestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
 - Through-Penetrations** — One metallic pipe or tubing to be installed within the freestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
 - Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type 1 (or heavier) copper tubing.
 - Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe. When the hourly F or FH Rating of the freestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
 - Pipe Covering — Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an alternate jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing tape. Transverse joints secured with metal fasteners or with built up tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
 - See Pipe and Equipment Covering** — Materials (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
- The hourly T, FT, FH Ratings of the freestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
- Through-Penetrations** — One metallic pipe or tubing to be installed within the freestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
 - Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
 - Copper Tubing — Nom 4 in. (102 mm) diam (or smaller) Type 1 (or heavier) copper tubing.
 - Copper Pipe — Nom 4 in. (102 mm) diam (or smaller) regular (or heavier) copper pipe.
 - Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe. When the hourly F or FH Rating of the freestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
 - Pipe Covering — Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an alternate jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing tape. Transverse joints secured with metal fasteners or with built up tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
- See Pipe and Equipment Covering** — Materials (BR/CI) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
- Fill, Void or Cavity Material** — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with both surfaces of wall.
- HLTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.**
- Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

HilTI Firestop Systems

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System No. W-L-7155

ANSI/UL1479 (ASTM E814)		CANULC S115	
F Ratings — 1 and 2 Hr (See Item 1)	FT Ratings — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)	FT Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr	F Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/Sq ft	FH Ratings — 1 and 2 Hr (See Item 1)	FH Rating — 1 and 2 Hr (See Item 1)	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At Ambient — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr
L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr	L Rating At 400 F — Less Than 1 CFM/Sq ft	FTH Rating — 0 Hr



- 1. Wall Assembly** — The 1 or 2 hr fire-rated gypsum wallboard/wall assembly shall be constructed of the materials and in the manner specified in the individual UL300, U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
 - Studs — Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC. Additional steel studs shall be used to completely frame the opening.
 - Gypsum Board — 5/8 in. (16 mm) thick, 4 ft (122 mm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max dim of opening is 104 in. (2643 mm).
 - The hourly F and FH Ratings of the freestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
 - Through-Penetrations** — One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the freestop system. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. The space between the steel duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.
 - 2A1. Through-Penetrating Product** — As an alternate to Item 2, Fiber cement with galvanized steel facing, 3/8 in. (10 mm) thick composite metallic duct with a max cross-sectional area of 43 sq ft (4 m²) and a max individual dimension of 78 in. (2 m). Duct to be installed either concentrically or eccentrically within the freestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
 - 2A2. Through-Penetrating Product** — As an alternate to Item 2, Fiber cement with galvanized steel facing, 1/4 in. (6 mm) thick, with a max cross-sectional area of 1784 sq ft (164 m²), and a max individual dimension of 42 in. (1067 mm). Duct to be installed either concentrically or eccentrically within the freestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly and installed in accordance with the required thickness of fill material.
 - 2A3. Through-Penetrating Product** — As an alternate to Item 2, Galvanized steel faced duct (panel), with a max cross-sectional area of 542 sq ft (50 m²) and a max individual dimension of 48-1/2 in. (1238 mm). Duct to be installed either concentrically or eccentrically within the freestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
 - DURASTREAMS BARRIERS INC. — Type Duraduct DW.**
 - DURASTREAMS BARRIERS INC. — Type Duraduct SD.**
 - 3. Forms** — (Not Shown, Optional) — Used as a form to prevent leakage of fill material during installation. Forms to be rigid sheet material, cut to fit the contour of the penetrating item and positioned as required to accommodate the required thickness of fill material. Forms to be removed after fill material has cured. Additional forms may be used to completely frame the opening.
 - 4. Fill, Void or Cavity Material** — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
 - HLTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.**
 - Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
- 1. Floor or Wall Assembly** — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max dim of opening is 20 in. (517 mm).
- 2. Concrete Blocks (CAZ)** category in the Fire Resistance Directory for names of manufacturers.
- 2A. Street Metal Sleeve** — (Optional) — Max 6 in. (152 mm) diam, min 20 ga galv steel provided with a 20 ga galv steel square flange spot welded to the sleeve at approximately mid-height, or flush with