

# NATIONAL CONCRETE MASONRY ASSOC. TORNADO SHELTER CASE STUDY

13750 Sunrise Valley Drive  
Herndon, VA 20171

## CASE STUDY-NOT FOR CONSTRUCTION

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### ABBREVIATIONS

±	PLUS OR MINUS	FF	FINISH FLOOR	FR	FAIR
A/C	AIR CONDITIONING	FG	FINISH GRADE	FRFIN	PREFINISHED
AB	ANCHOR BOLT	FIN	FINISH	PROJ(D)	PROJECT/PROJECTED
AC	ACOUSTICAL	FL	FLOOR LINE	FT	PRESSURE TREATED
ACCU	AIR COOLED CONDENSING UNIT	FLR	FLOOR	FNT	PAINT
ADJ	ADJUSTABLE	FLUR	FLOOR	FR	FR
AFF	ABOVE FINISH FLOOR	FRFP	FIBERGLASS REINFORCED FLOOR	GT	QUARRY TILE
ALT	ALTERNATE	FT()	FOOT	R	RISER
ALUM	ALUMINUM	FTG	FOOTING	RAD(R)	RADIUS
ANOD	ANODIZED	FUR	FURNISHING	RA	RETURN AIR
APPRO	APPROXIMATE	FURN	FURNACE	RD	ROOF DRAIN
ARCH	ARCHITECT/ARCHITECTURAL	G	GAS	REF	REFER/REFERENCE
AT	AT	GA	GAUGE	REFRIS	REFRIGERATOR
BD	BOARD	GALV	GALVANIZED	REINF	REINFORCING
BLDG	BUILDING	GB	GRAB BAR	REGD	REQUIRED
BLK	BLOCK/BLOCKING	GC	GENERAL CONTRACTOR	RESIL	RESILIENT
BM	BEAM	GL	GLASS/GLAZING	RO	ROUGH OPENING
BRS	BRICK	GYP	GYP	ROV	RIGHT OF WAY
BRK	BRICK	HB	HOSE BIBB	S	SOUTH
BO	BOTTOM OF	HDYD	HARDWOOD	SAN	SANITARY
BS	BOTH SIDES	HDWR	HARDWARE	SAT	SUSPENDED ACOUSTICAL
BTM	BOTTOM	HM	HOLLOW METAL	SB	SEAL
BUR	BUILT-UP ROOF	HORZ	HORIZONTAL	SC	SEALED CONCRETE
BOV	BOTTOM OF WALL	HPDL	HIGH PRESSURE DECORATIVE LAMINATE	SECT	SECTION
CAB	CABINET	HT	HEIGHT	SF	SQUARE FEET
CB	CHALKBOARD	HVAC	HEATING, VENTILATING & AIR CONDITIONING	SHT	SHEET
CJ	CONTROL JOINT/CONSTRUCTION JOINT	ID	INSIDE DIAMETER	SHWR	SHOWER
CL	CENTER LINE	IN()	INCH	SH	SIMILAR
CLG	CEILING	INT	INTERIOR	SPEC	SPECIFICATIONS
CLR	CLEAR/CLEARANCE	INT	INTERIOR	SQ	SQUARE
CMU	CONCRETE MASONRY UNIT	JAN	JANITOR	SS	STAINLESS STEEL
COL	COLUMN	JT	JOINT	STD	STANDARD
CONC	CONCRETE	JST	JOIST	STL	STEEL
CONF	CONFERENCE	LAV	LAVATORY	STOR	STORAGE
CONST	CONSTRUCTION	LAV	LAVATORY	STRUCT	STRUCTURE/STRUCTURAL
CONT	CONTINUOUS	LF	LINEAL FEET	SUSP	SUSPENDED
CORR	CORRIDOR	LOCN	LOCATION	T	TREAD
CPT	CARPET	LVC	LOW VOLUME CHANGE	T&B	TOP & BOTTOM
CRS	COURSE	MAS	MASONRY	T&G	TONGUE & GROOVE
CT	CERAMIC TILE	MATL	MATERIAL	TB	TACKBOARD
DBL	DOUBLE	MAX	MAXIMUM	TEL	TELEPHONE
DF	DRINKING FOUNTAIN	MECH	MECHANICAL	TEL	TOILET
DIA	DIAMETER	MEMB	MEMBRANE	TO	TOP OF
DIM	DIMENSION	MANF	MANUFACTURER	TOC	TOP OF CURB
DN	DOWN	MANH	MANHOLE	TV	TELEVISION
DO	DITTO	MIN	MINIMUM	TON	TOP OF WALL
DS	DOWNSPOUT	MISC	MISCELLANEOUS	TYP	TYPICAL
DTL	DETAIL	MJ	MOVEMENT JOINT	UCN	UNLESS OTHERWISE NOTED
DWG	DRAWING	MO	MASONRY OPENING	VGT	VINYL COMPOSITION TILE
EA	EACH	MTL	METAL	VERT	VERTICAL
EC	ELECTRICAL	MULL	MULLION	VEST	VESTIBULE
EQ	EQUIPMENT	N	NORTH	W	WEST
EG	EXISTING GRADE	NA	NOT APPLICABLE	W/O	WITH OUT
EIFS	EXTERIOR INSULATION FINISH SYSTEM	NC	NOT IN CONTRACT	W/	WITH
EJ	EXPANSION JOINT	NO (#)	NUMBER	W/G	WITH GROUT
ELEC	ELECTRICAL	NOM	NOMINAL	W	WOOD
ELEV	ELEVATION/ELEVATOR	NTS	NOT TO SCALE	W/D	WOOD
EQUIP	EQUIPMENT	OA	OVERALL	WHD	WATER HEATER
EX	EXISTING	OC	ON CENTER	WH	WATER HEATER
EXIST	EXISTING	OD	OUTSIDE DIAMETER	WNSCT	WAINSCOT
EXP	EXPOSED	OP	OFFICE	WP	WATERPROOF
EPDM	ETHYLENE PROPYLENE DIENE TERPOLYMER	OPNG	OPENING	WVF	WELDED WIRE FABRIC
EXT	EXTERIOR	OVHD	OVERHEAD	YD	YARD
FD	FLOOR DRAIN	PART	PARTITION		
FDN	FOUNDATION	PL	PLATE/PLASTIC/PROPERTY LINE		
FE	FIRE EXTINGUISHER	PLMBS	PLYWOOD		
FEC	FIRE EXTINGUISHER CABINET	PLYWD	PLYWOOD		

### DRAWING SYMBOLS

	EARTH		GYP		RIGID INSULATION
	LVC FILL		STEEL		BATT INSULATION
	GRANULAR FILL		CONT'D FRAMING		AIR
	CONCRETE		WOOD BLOCKING		ASPHALT
	CONCRETE MASONRY		FINISH WOOD		
	FACE BRICK		PLYWOOD		
	CUT STONE		EXISTING CONSTRUCTION		

### MATERIAL SYMBOLS

	NEXT ELEV.		SPOT ELEVATION		BUILDING SECTION		COLUMN GRID LINE
	EXIST. ELEV.		EXISTING CONTOUR		WALL SECTION		WINDOW TAG
	REVISED CONTOUR		DETAIL DRAWING		DOOR TAG		TRADE GROUP DESIGNATION
	ELEVATION DATUM		BUILDING ELEVATION		PARTITION TAG		FIRE RATING HEIGHT EXTENSION
	PROPERTY LINE		INTERIOR ELEVATION		REVISION TAG		PLAN NOTE
	CENTER LINE		ROOM NAME				
	HIDDEN LINE						

### GENERAL NOTES

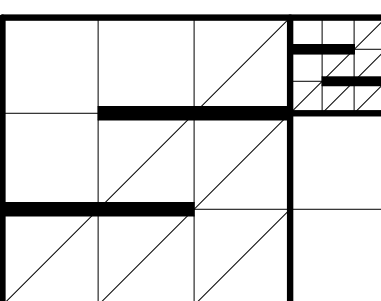
- DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF SCHULTZ SQUARED ARCHITECTS LLC AND MAY NOT BE REUSED OR REPRODUCED IN ANY MANNER WITHOUT EXPRESSED WRITTEN CONSENT.
- THE GENERAL CONTRACTOR SHALL INVESTIGATE ALL FIELD CONDITIONS RELEVANT TO THE PROJECT INCLUDING BUT NOT LIMITED TO DIMENSIONS, ELEVATIONS, GENERAL CONDITIONS, PROPERTY LINES, EASEMENTS AND OTHER MISCELLANEOUS EXISTING CONDITIONS AND SHALL PROMPTLY NOTIFY THE ARCHITECT TO ANY WHICH DO NOT AGREE WITH THOSE SHOWN ON THE DRAWINGS.
- THE GENERAL CONTRACTOR SHALL ALSO VERIFY THE COORDINATION OF DIMENSIONS AND LOCATIONS OF THE VARIOUS TRADE WORK, SUBCONTRACTORS AND SEPARATE CONTRACTS AND REPORT ANY CONFLICTS TO THE ARCHITECT IMMEDIATELY.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETION OF THE WORK THE FULL INTENT OF THE DRAWINGS.
- ALL DIMENSIONS ARE TO FACE OF MASONRY, FACE OF STUD OR CENTERLINE OF COLUMNS UNLESS OTHERWISE NOTED.
- REPAIR DAMAGE TO EXISTING BUILDINGS, CEILING, PAVING, WALKS AND PLANTING AREAS INCURRED DURING CONSTRUCTION. PATCH ALL FLOOR AREAS, WALLS AND CEILINGS ALTERED DURING CONSTRUCTION AS REQUIRED TO MATCH EXISTING.

### SHEET INDEX

TS	TITLE SHEET
CS	SHELTER CODE SHEET
A1.1	FLOOR PLAN
A1.2	REF CLG PLAN & ENLARGED TLT PLAN
A2.1	ROOF PLAN & DETAILS
A3.1	BUILDING ELEVATIONS
A4.1	WALL SECTIONS & DETAILS
A5.1	DOOR/WNDY & PART SCHED
A5.2	DOOR & WINDOW DETAILS
S0.1	GENERAL STRUCTURAL NOTES
S1.1	STRUCTURAL PLANS
S2.1	LINTEL SCHED & DETAILS
S3.1	FOUNDATION SECTIONS
S4.1	FRAMING SECTIONS
S4.2	FRAMING SECTIONS

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Project #: 14121.1  
Date: 4-29-2015  
Sheet Title: TITLE SHEET

Drawn By: SKS  
Checked By: CDS

**TS**

**USABLE AREA, OCCUPANCY & NATURAL VENTILATION CALCULATIONS**

**USABLE AREA CALCULATIONS:**  
**CLASSROOMS:**  
 (4) CLASSROOMS @ 1,185 SF = 4,740 SF GROSS AREA  
 GROSS AREA REDUCED BY 35% WITH UN-CONCENTRATED FURNITURE = 4,740 SF X 65% = 3,107 SF NET AREA

**HALLS:**  
 (2) HALLS @ 70 SF = 156 SF GROSS AREA  
 GROSS AREA REDUCED BY 15% FOR OPEN PLAN = 156 X 85% = 132 SF NET AREA

**CORRIDOR:**  
 TOTAL AREA = 602 SF REDUCED BY 15% FOR OPEN PLAN = 602 SF X 85% = 512 SF

**HANDICAP AREA REQUIRED = 4 OCCUPANTS X 10 SF = 40 SF**  
 602 SF USABLE AREA - 40 SF HANDICAP SPACE = 642 SF

**OCCUPANT LOAD CALCULATIONS:**  
 CLASSROOMS = 3,107 SF NET AREA / 5 SF PER OCCUPANT = 621 OCCUPANTS IN CLASSROOMS  
 HALLS = 132 SF NET AREA / 5 SF PER OCCUPANT = 26 OCCUPANTS IN HALLS  
 CORRIDORS = 642 SF / 5 SF PER OCCUPANT = 128 + 4 HANDICAP = 132 TOTAL OCCUPANTS IN CORRIDOR  
 TOTAL ALLOWABLE SAFE ROOM OCCUPANT LOAD = 621 + 26 + 132 = 779 OCCUPANTS

**NATURAL VENTILATION REQUIREMENTS:**  
 779 OCCUPANTS X 6 SQ IN PER OCCUPANT = 4,674 SQ IN OF FREE AREA REQUIRED.

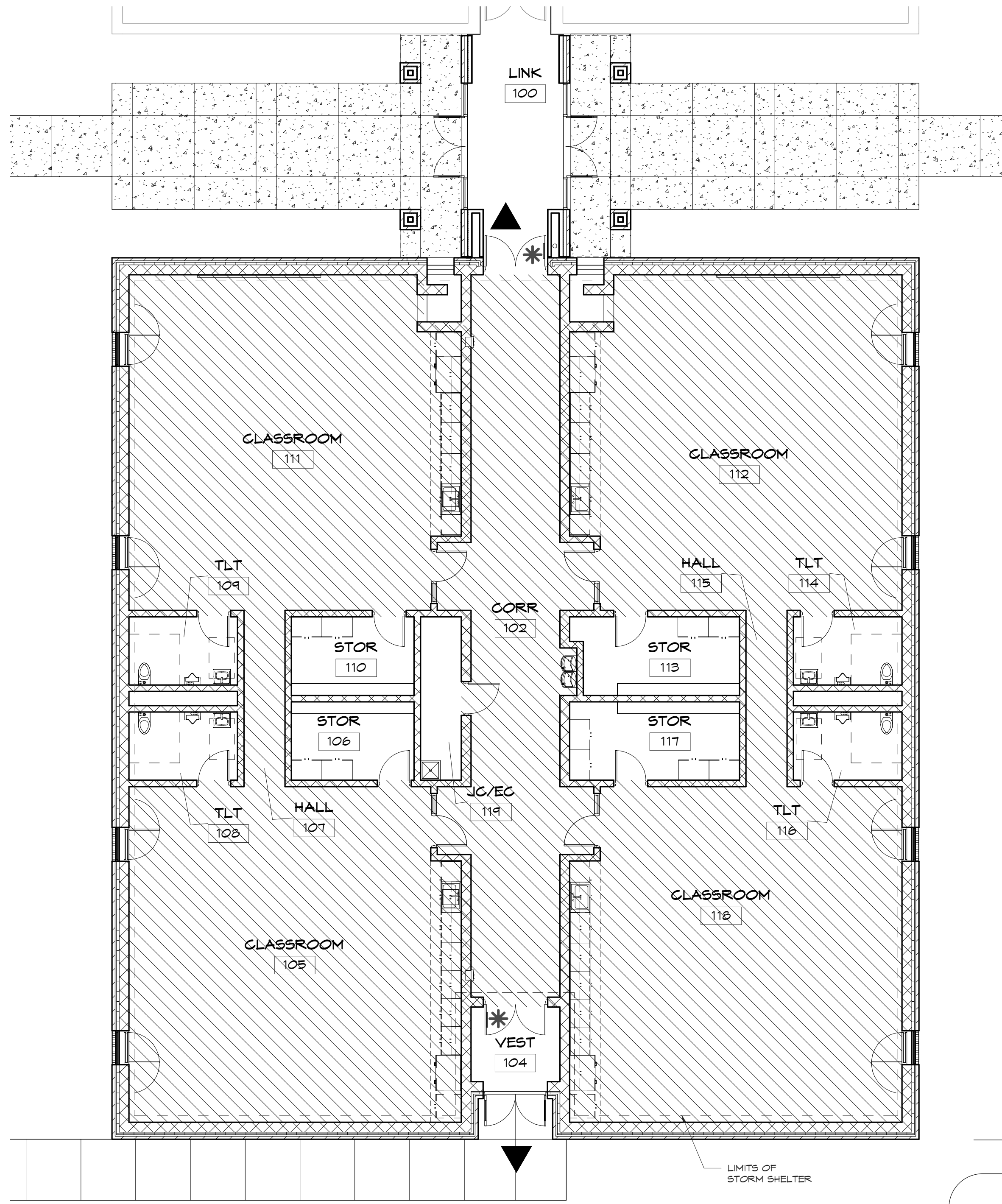
**MINIMUM REQUIREMENTS:**  
 LOW REQUIREMENT = 25% WITHIN 46" OF THE FLOOR = 4,674 SQ IN X 25% = 1,169 SQ IN MINIMUM  
 HIGH REQUIREMENT = 50% WITHIN THE TOP 12" OF THE SHELTER = 4,674 X 50% = 2,337 SQ IN MINIMUM (OR THE BALANCE OF THE REQUIRED FREE AREA WHICHEVER IS GREATER)

**LOW VENTILATION:**  
 (2) 64" X 32" ACTUAL LOUVER SIZE  
 39" X 32" USABLE AREA BELOW 46" MAXIMUM HT = 1,216 SQ IN X (2) LOUVERS = 2,432 SQ IN GROSS LOUVER AREA  
 2,432 SQ IN X 52% FREE AREA = 1,264 SQ IN FREE AREA PROVIDED  
 1,264 SQ IN FREE AREA PROVIDED > 1,169 SQ IN MINIMUM TOTAL REQUIRED LOW VENTILATION AREA

**LOW VENTILATION ABOVE FREE AREA**  
 REFERENCE VENTILATION LOUVER PLAN DETAIL  
 FREE AREA AROUND CENTER PROTECTION WALL = 14'-3/8" X 46" = 661 SQ IN X (2) LOUVERS = 1,322 SQ IN FREE AREA > 1,169 SQ IN MINIMUM TOTAL REQUIRED LOW VENTILATION AREA.

**HIGH VENTILATION:**  
 4,674 SQ IN TOTAL REQUIRED AREA - 1,264 FREE AREA LOW VENTILATION PROVIDED = 3,410 MIN REQUIRED HIGH VENTILATION.

**ROOF VENTILATOR OPENINGS (2) 36" X 60"** (REFERENCE STRUCTURAL FOR PLENUM GRATE DETAILS)  
 FREE AREA OF PLENUM GRATES = 1,728 SQ IN X (2) OPENINGS = 3,456 SQ IN FREE AREA PROVIDED  
 3,456 SQ IN FREE AREA PROVIDED > 3,410 SQ IN MIN REQUIRED HIGH VENTILATION  
 3,456 SQ IN FREE AREA PROVIDED > 2,337 SQ IN MINIMUM TOTAL REQUIRED HIGH VENTILATION AREA



**TORNADO SHELTER CODE INFORMATION**

**PROJECT INFORMATION**

LOCATION: KANSAS  
 COUNTY: GOYALE  
 CITY: CITY  
 OWNER: NATIONAL CONCRETE MASONRY ASSOC.  
 USE: EDUCATION, ELEMENTARY SCHOOL

**DESIGN INFORMATION**

LOWEST FLOOR FFE (M.E.): 1362.33' ± 41'-4"  
 TYPE OF SHELTER: COMMUNITY-TORNADO, NON-PUBLIC USE

THE WIND DESIGN CONFORMS TO THE PROVISIONS OF THE FOLLOWING:  
 IBC 2015  
 ICC 500-2014  
 FEMA 361, 3RD EDITION 2015

SHELTER DESIGN WIND SPEED: 250 MPH (3-SEC GUSTS)  
 WIND EXPOSURE CATEGORY: C  
 INTERNAL PRESSURE COEFFICIENT (C<sub>pi</sub>): ± 0.95  
 TOPOGRAPHIC FACTOR (K<sub>zt</sub>): 1.0  
 DIRECTIONALITY FACTOR (K<sub>d</sub>): 1.05

ADDITIONAL DESIGN FACTORS:  
 IMPORTANCE FACTOR (I): 1.0  
 ENCLOSURE CLASSIFICATION: PARTIALLY ENCLOSED  
 COMPONENTS AND CLADDING: 233 PSF  
 ROOF LIVE LOAD: 100 PSF

SHELTER HAS NOT BEEN DESIGNED/CONSTRUCTED IN AN AREA SUSCEPTIBLE TO FLOODING IN ACCORDANCE WITH CHAPTER 4 OF THE STANDARD.

DESIGN FLOOD ELEVATION: N/A  
 BASE FLOOD ELEVATION: N/A  
 (1% CHANGE OF ANNUAL EXCEEDANCE): N/A  
 (2% CHANGE OF ANNUAL EXCEEDANCE ELEVATION): N/A

DEBRIS IMPACT CRITERIA:  
 MISSILE SIZE: 15 LB, 2X4  
 HORIZONTAL MISSILE SPEED: 100 MPH  
 VERTICAL MISSILE SPEED: 61 MPH  
 REFERENCE SPECIFICATIONS FOR SPECIFIC MATERIALS/ASSEMBLIES

LOCATION OF STORM SHELTER: SEE DRAWING THIS SHEET  
 HEIGHT OF STORM SHELTER: REFERENCE SHEET A3.1  
 LOWEST SHELTER FLOOR ELEVATION:  
 LOWEST FLOOR ELEVATION: 1362.33' ± 100'-0"  
 LOWEST FLOOR FOR MECH/ELECT EQUIPMENT: 1362.33' ± 100'-0"  
 DATUM: NAVD 83

OCCUPANT LOAD OF STORM SHELTER: 779 OCCUPANTS (SEE CALCULATIONS THIS SHEET)  
 USABLE STORM SHELTER FLOOR AREA: 3,921 SF NET AREA (SEE CALCULATIONS THIS SHEET)

VENTING AREA:  
 TOTAL PROVIDED: 4,510 SQ IN (SEE CALCULATIONS THIS SHEET)  
 LOCATIONS:  
 LOW: WALLS IN ROOMS 111 & 112  
 HIGH: ROOF

SANITATION FACILITIES: COMMUNITY > 50 OCCUPANTS  
 779 OCCUPANTS = 500 ± 279  
 (2) FOR FIRST 500 OCCUPANTS + (1) ADDITIONAL PER 500  
 OCCUPANTS OR PORTIONS THEREOF GREATER THAN 500  
 (279) = (3) TOTAL REQUIRED < (4) PROVIDED

MINIMUM FOUNDATION CAPACITY REQUIREMENTS:  
 SOIL BEARING CAPACITY: 2,000 PSF

STORM SHELTER ENCLOSURE: WALLS INDICATED BY HEAVY DASHED LINE  
 REFERENCE SHEET A1.1

STORM SHELTER SIGNAGE: FOR TYPE AND LOCATION OF SIGNAGE REFERENCE THIS SHEET.

STORM SHELTER INSPECTIONS: REFERENCE STRUCTURAL GENERAL NOTES.

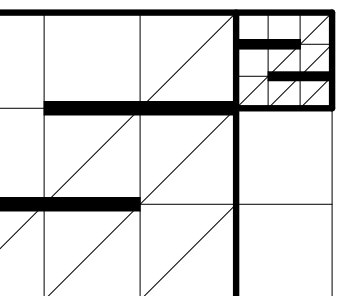
SPECIAL DETAILS: N/A

SPECIAL INSTRUCTIONS: REFERENCE SHEET A1.2 FOR LOCATION OF EQUIPMENT AND AMENITIES REQUIRED.

QUALITY ASSURANCE PLAN: REFERENCE STRUCTURAL GENERAL NOTES.

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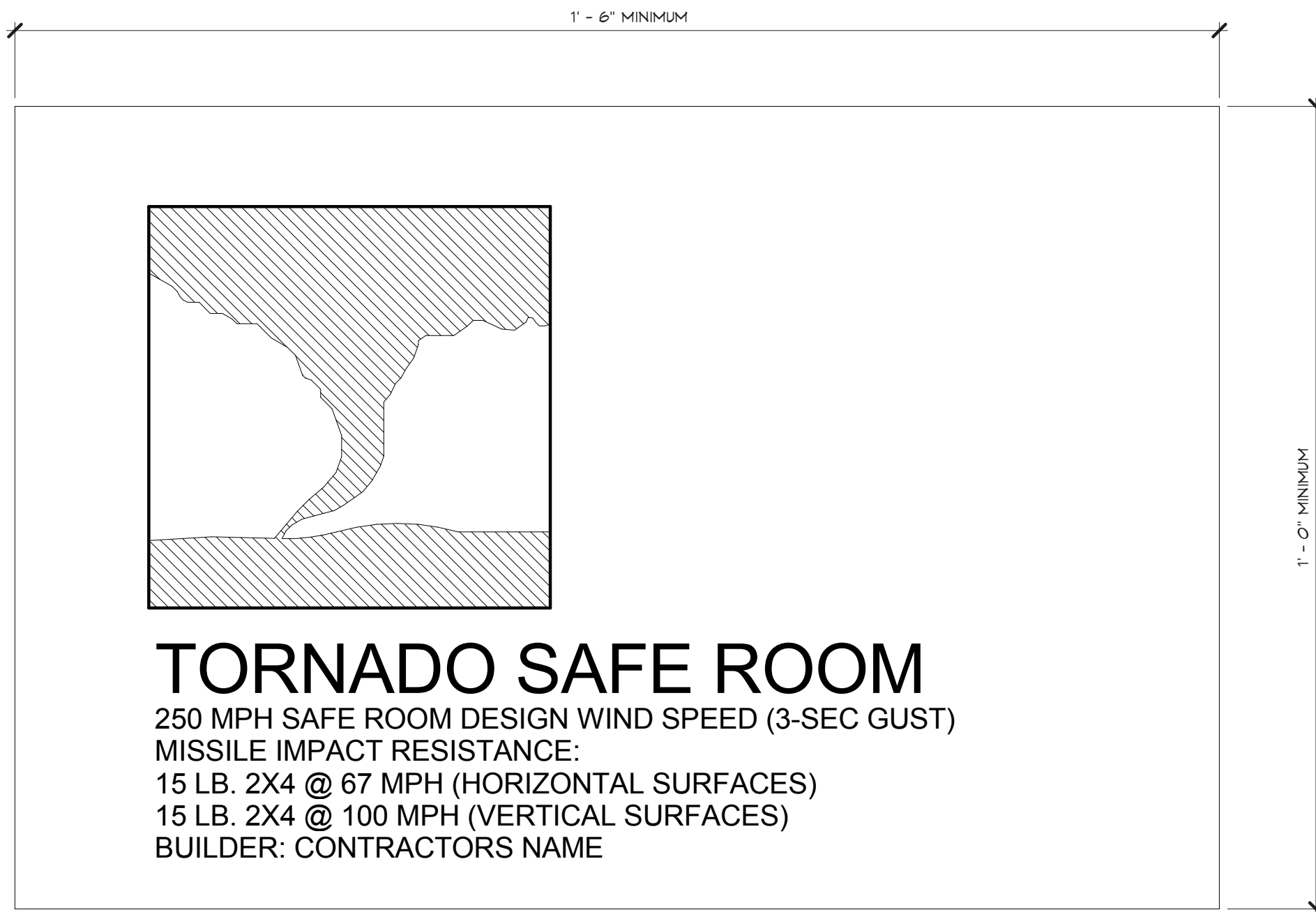
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Revisions:		
No.	Description	Date

Project #: **14121.1**  
 Date: **4-29-2015**  
 Sheet Title: **SHELTER CODE SHEET**

Drawn By: SKS  
 Checked By: CDS

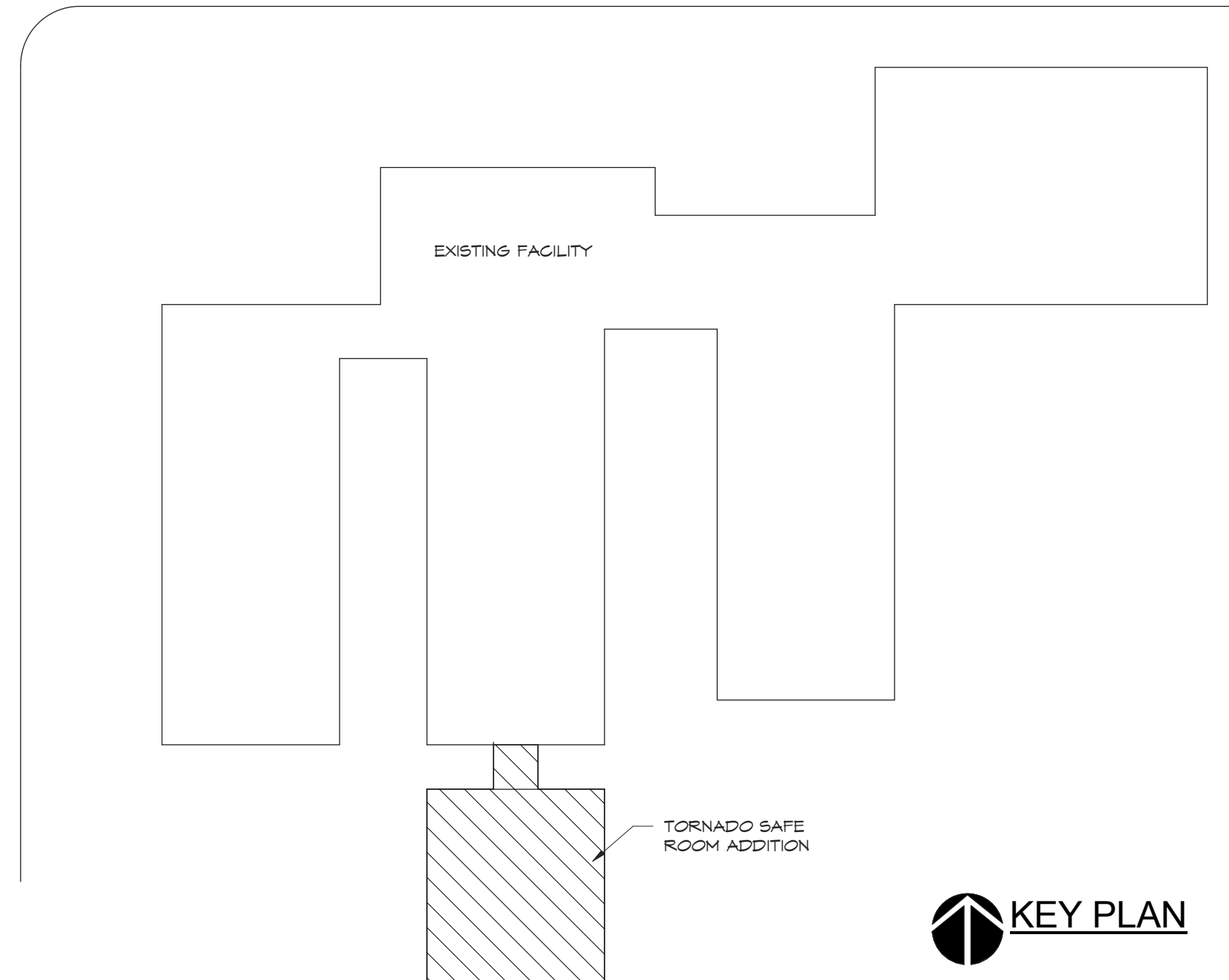
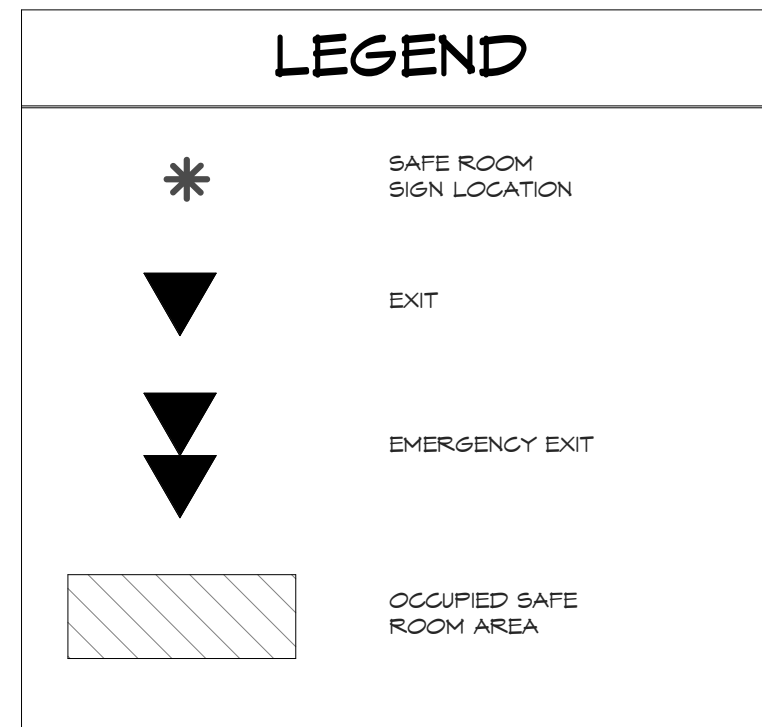
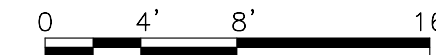
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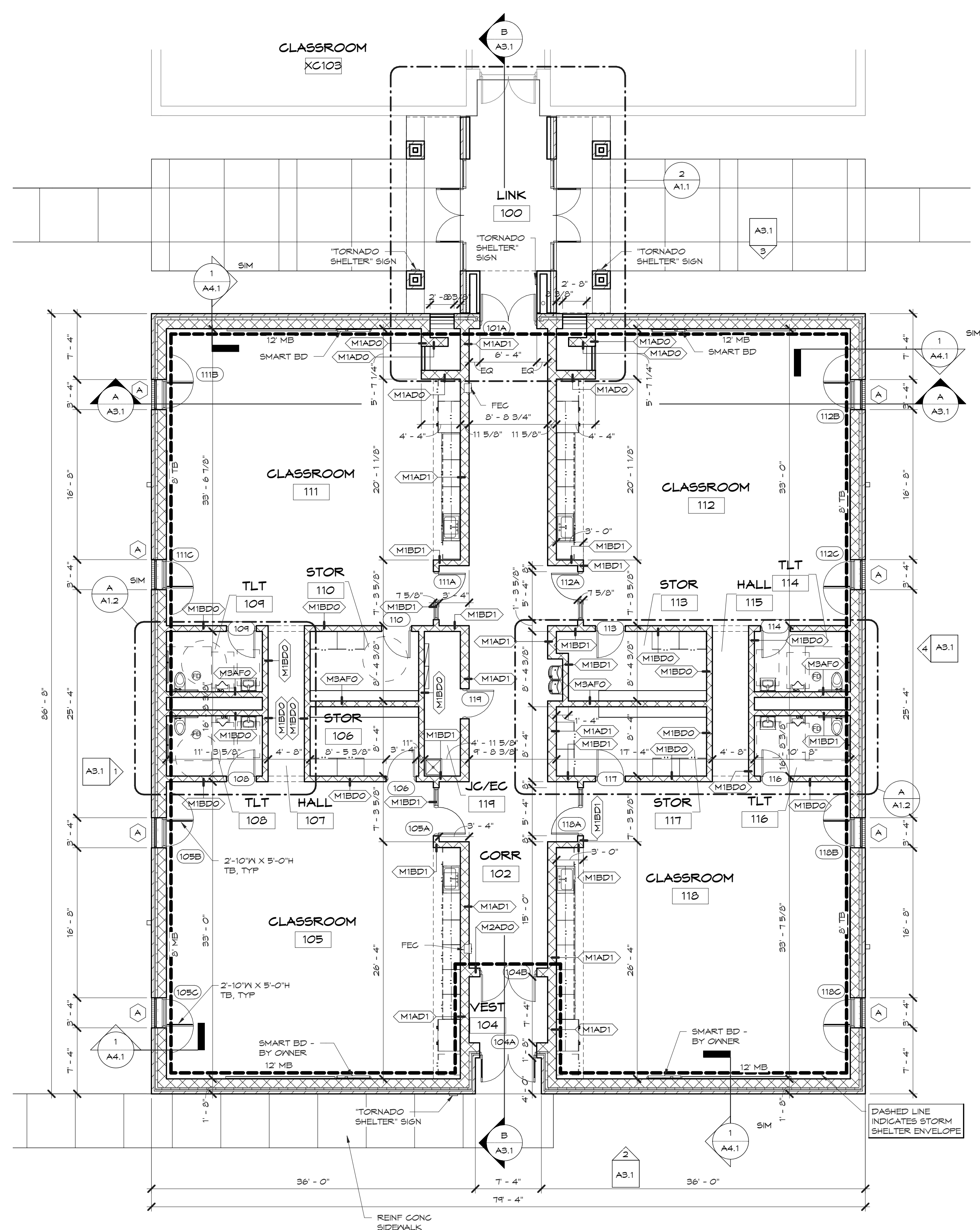
**TORNADO SHELTER SIGN**

BRAILLE SHALL BE PROVIDED ON SIGNAGE AS REQUIRED

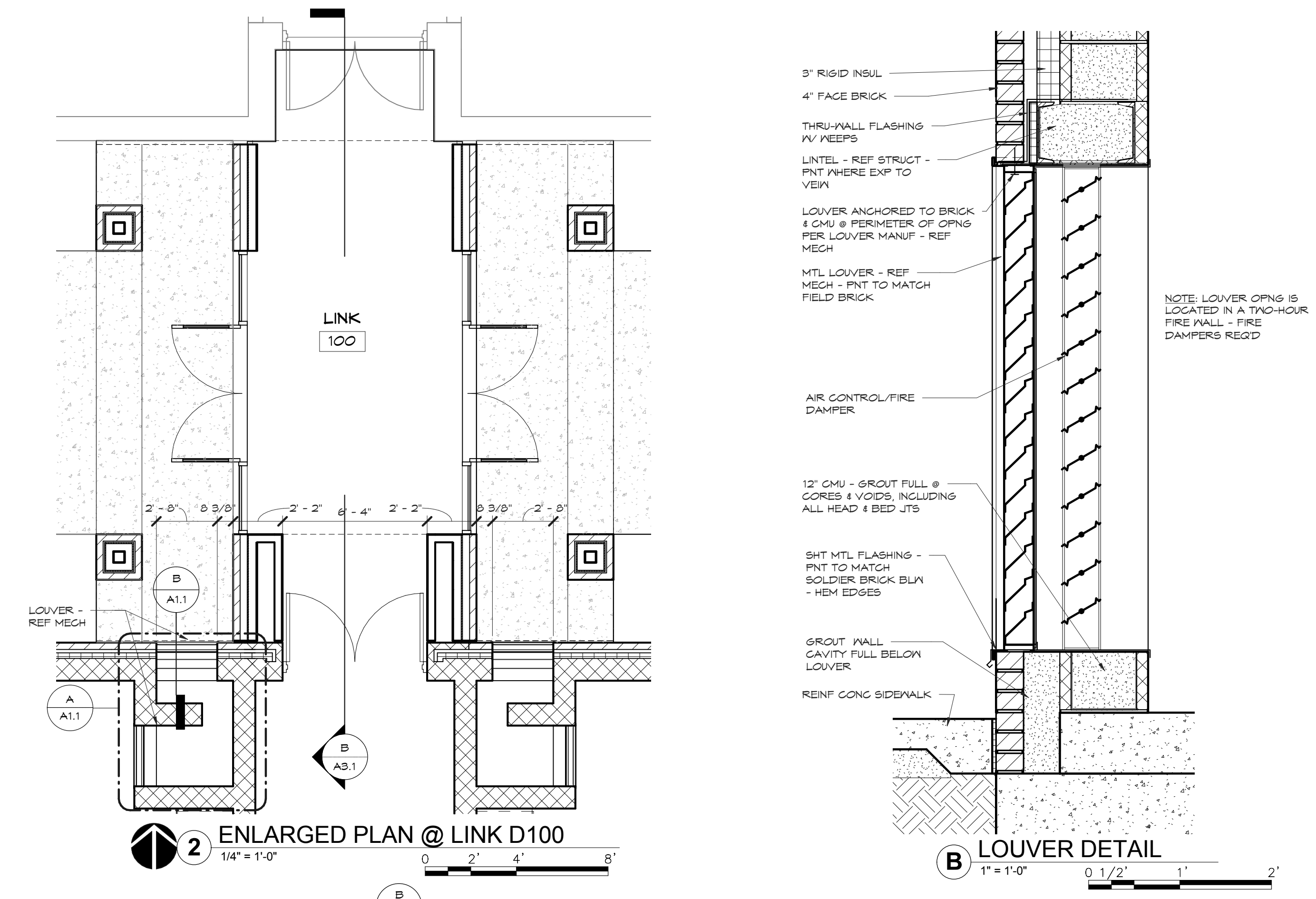
**SAFE ROOM CODE PLAN**  
 1/8" = 1'-0"



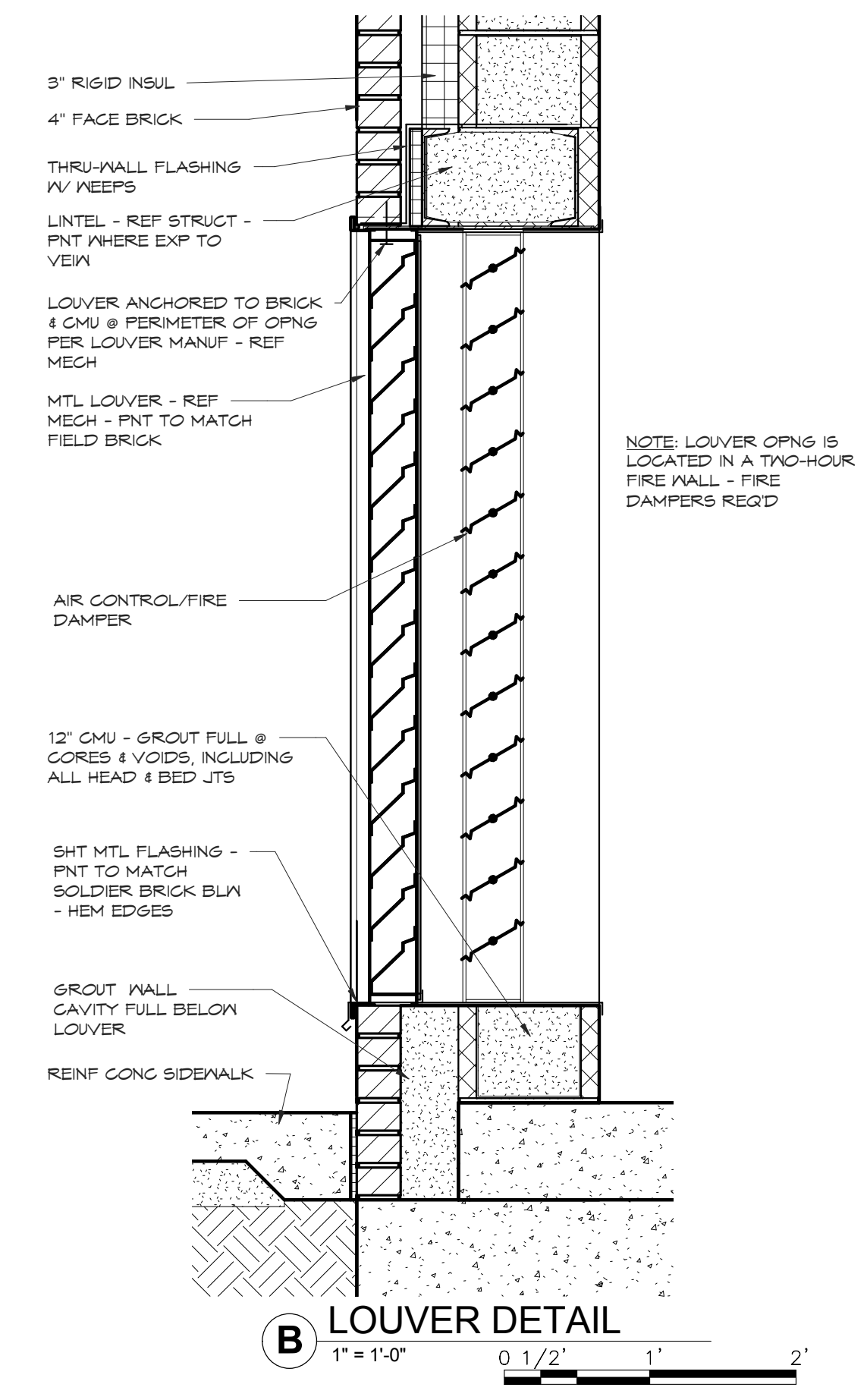
5/15/2015 3:25:09 PM CASE STUDY-NOT FOR CONSTRUCTION



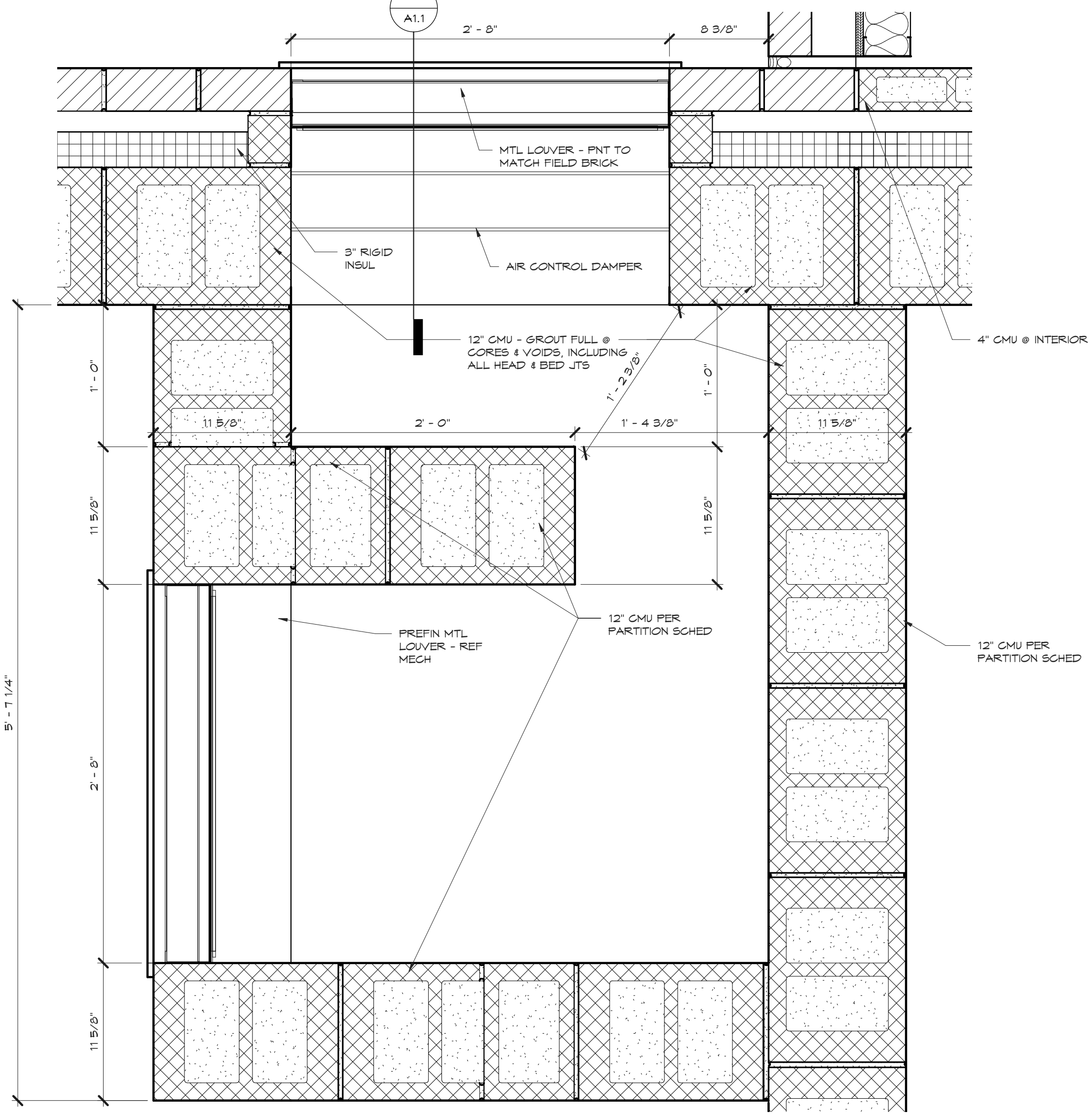
**1 FLOOR PLAN**  
1/8" = 1'-0"  
0 4' 8' 16'



**2 ENLARGED PLAN @ LINK D100**  
1/4" = 1'-0"  
0 2' 4' 8'



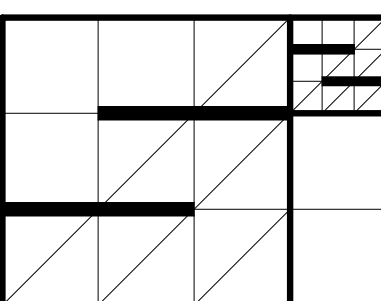
**B LOUVER DETAIL**  
1" = 1'-0" 0 1/2" 1" 2"



**A PLAN DETAIL @ VENTILATION LOUVER**  
1 1/2" = 1'-0"  
0 1' 2'

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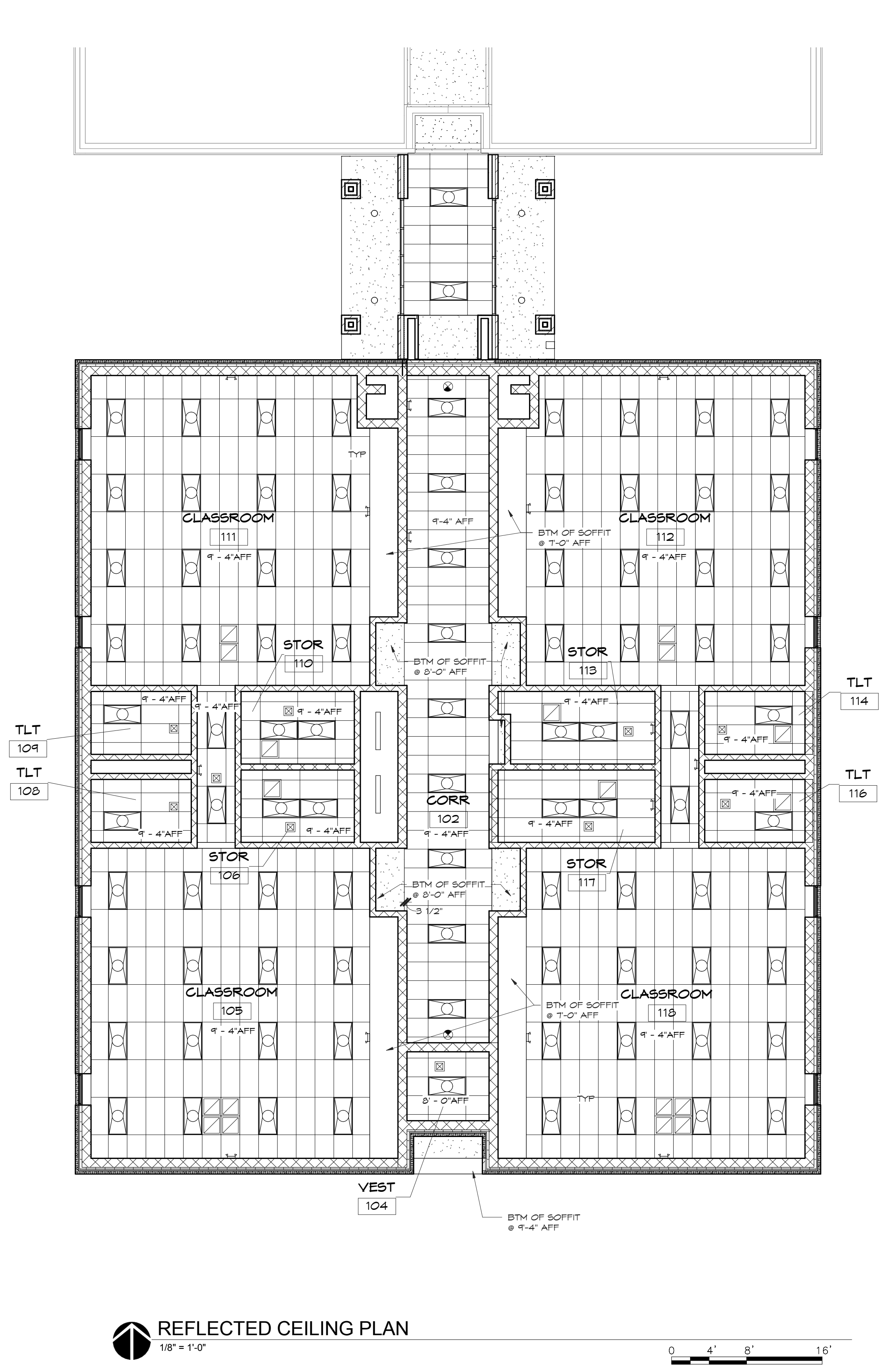
No.	Description	Date

Project #: **14121.1**  
Date: **4-29-2015**  
Sheet Title: **FLOOR PLAN**

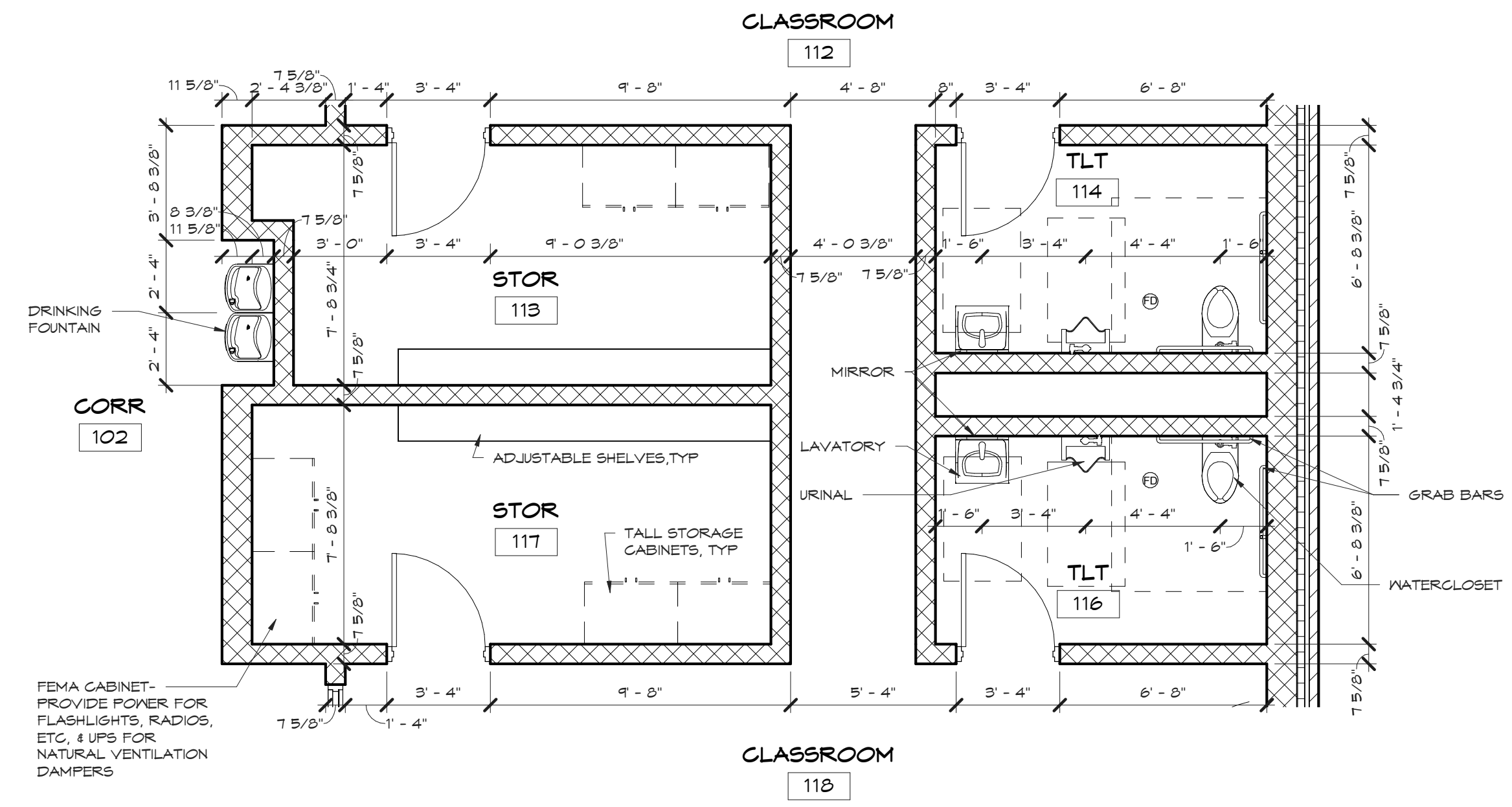
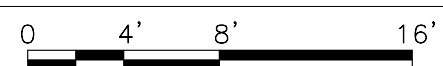
Drawn By: **SKS**  
Checked By: **CDS**

**A1.1**

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**REFLECTED CEILING PLAN**  
1/8" = 1'-0"



**ENLARGED PLAN @ TLTS D112 & D116**  
1/4" = 1'-0"

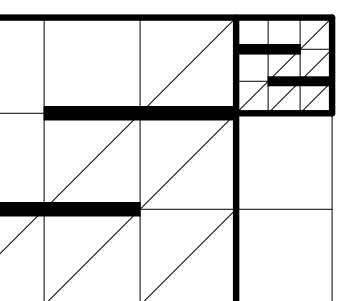


CEILING LEGEND	
	SUSPENDED ACOUSTICAL TILE
	6"X6" BD CEILING (INTERIOR) STUCCO SOFFIT (EXTERIOR)
	2'X4' FLUORESCENT LIGHT FIXTURE - RECESSED
	4' FLUORESCENT LIGHT FIXTURE - SURFACE MOUNTED
	RECESSED CAN LIGHT FIXTURE
	EMERGENCY EGRESS LIGHT
	EXIT LIGHT
	RETURN AIR DIFFUSER
	SUPPLY AIR DIFFUSER

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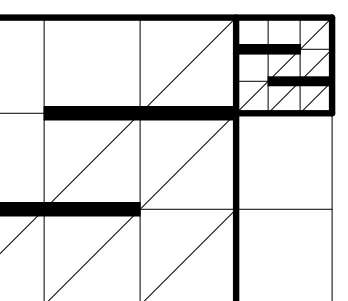
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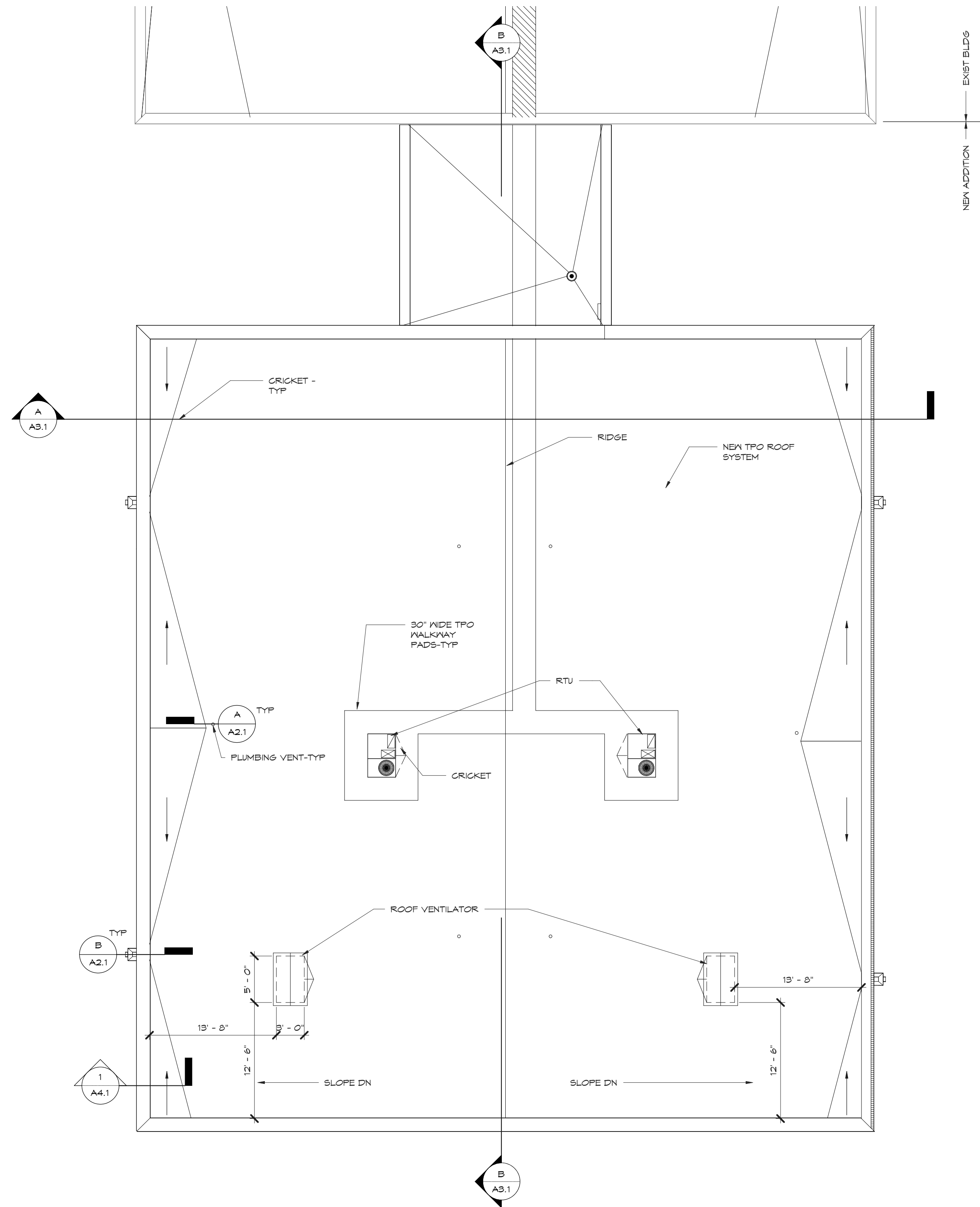


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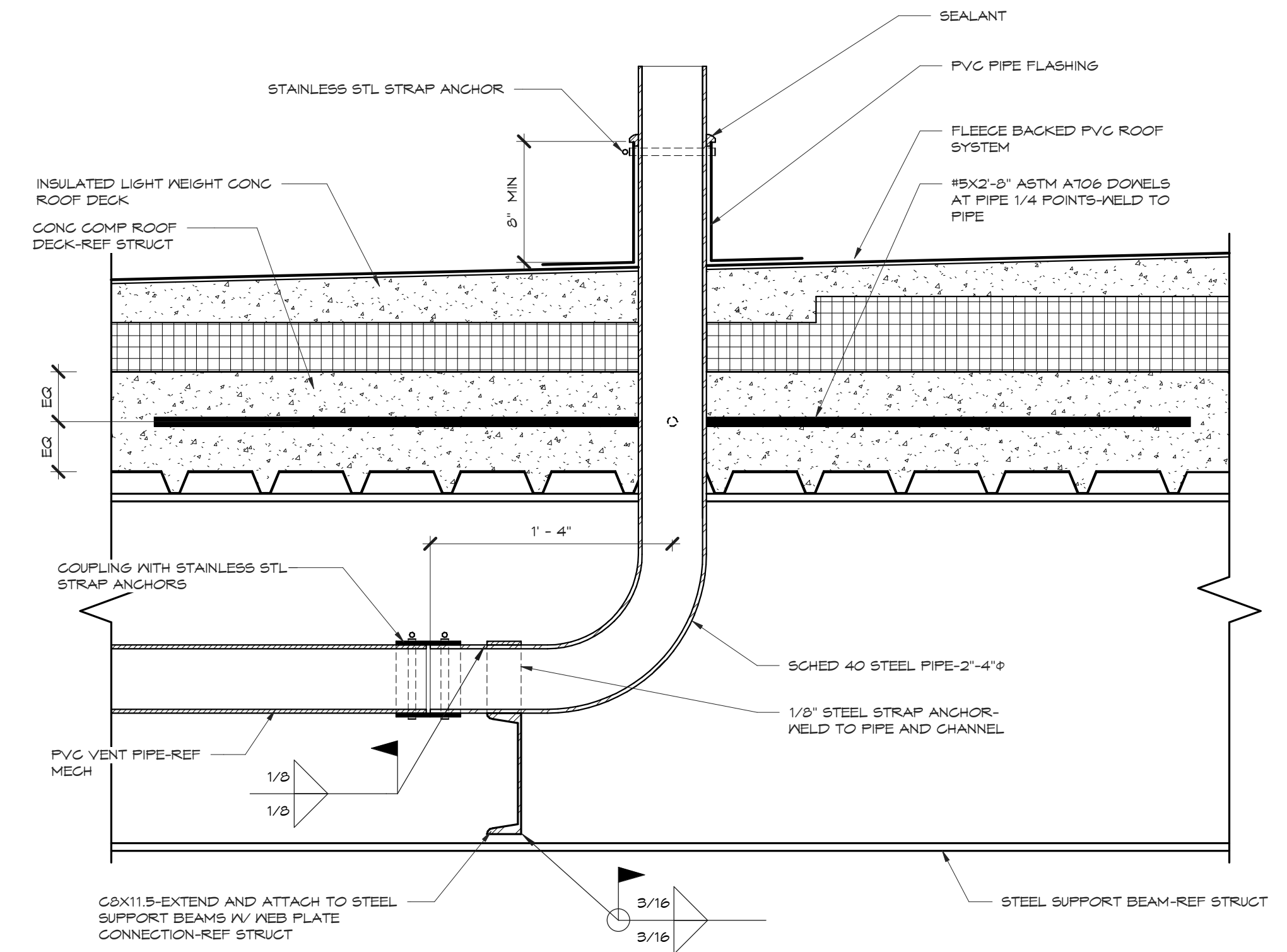
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Project #: **14121.1**  
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 Sheet Title: **ROOF PLAN & DETAILS**

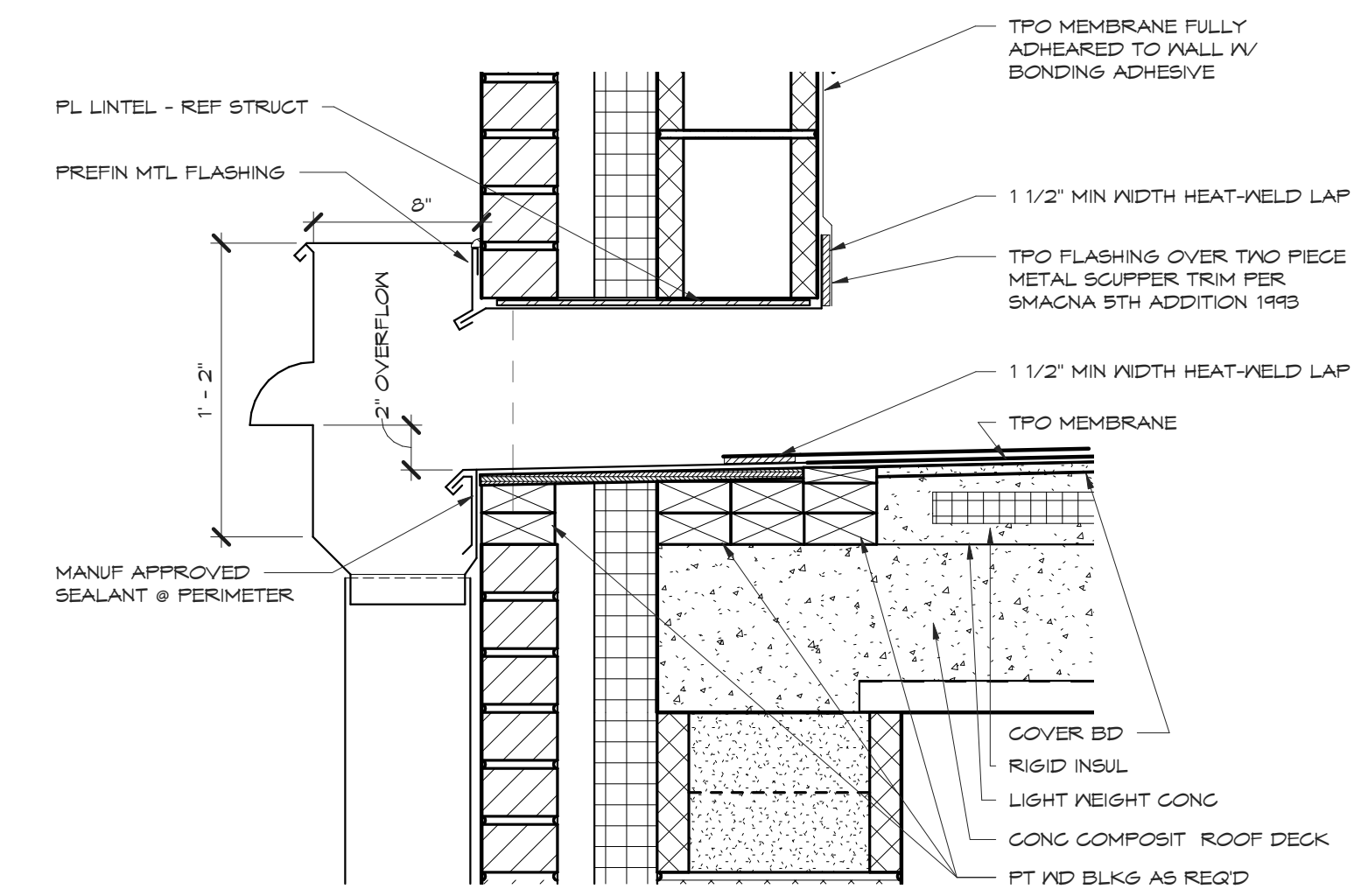
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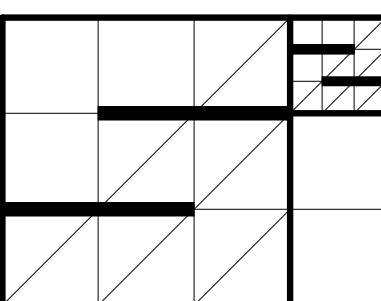
**ROOF PLAN**  
 1/8" = 1'-0"  
 0 4' 8' 16'



**A SHELTER ROOF PIPE PENETRATION**  
 1 1/2" = 1'-0"  
 0 1' 2'



**B ROOF DETAIL @ SCUPPER**  
 1 1/2" = 1'-0"  
 0 1' 2'

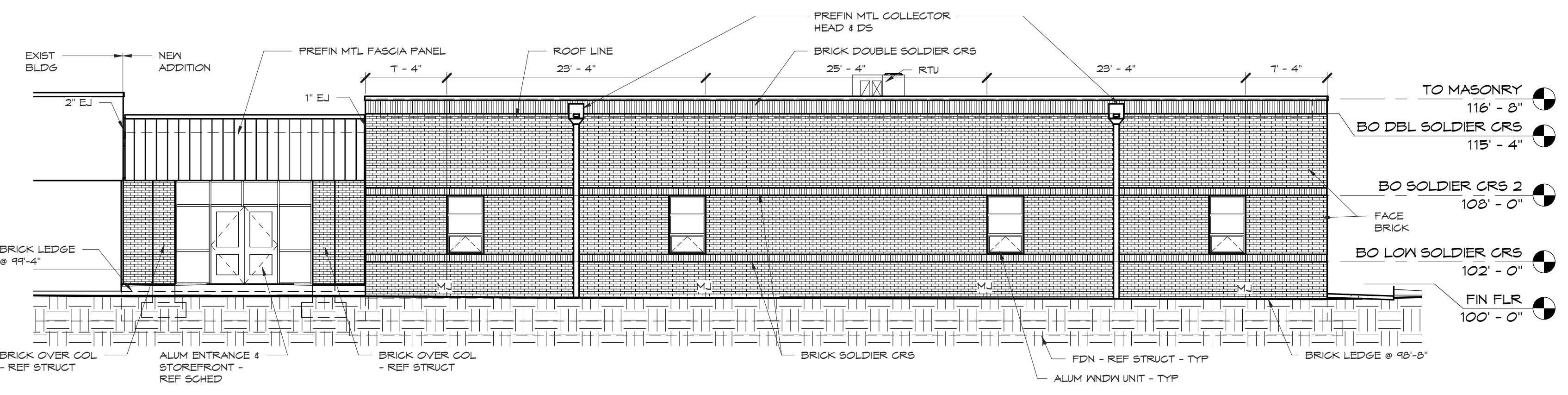


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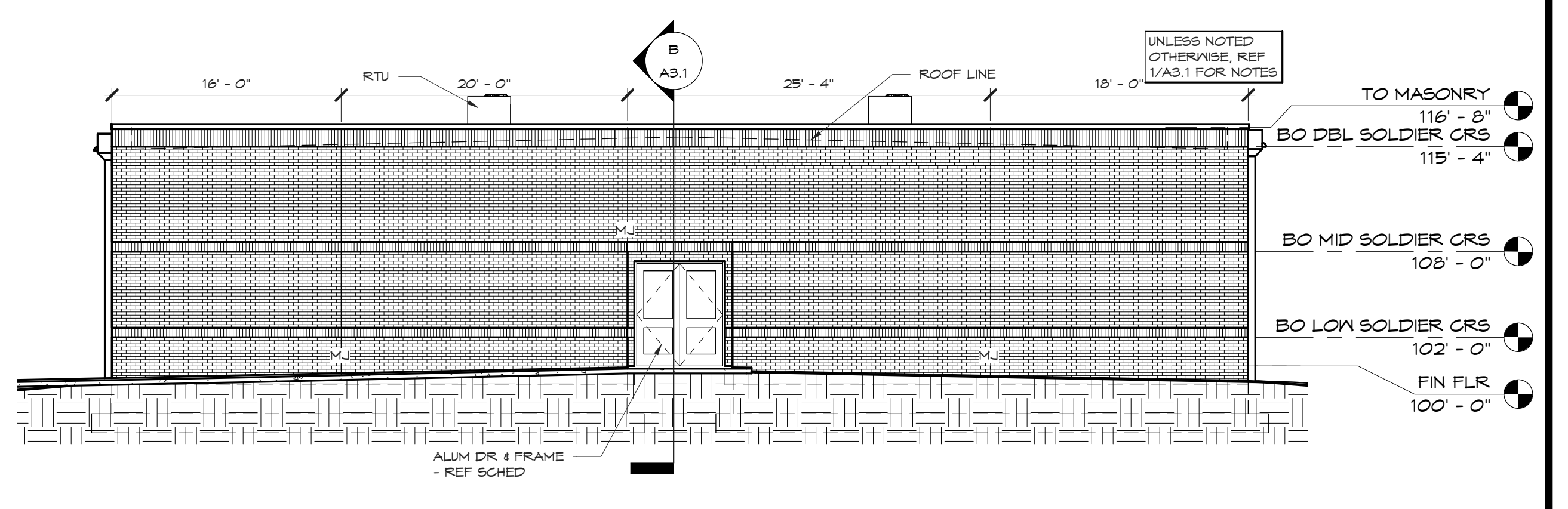
Revisions:

No.	Description	Date

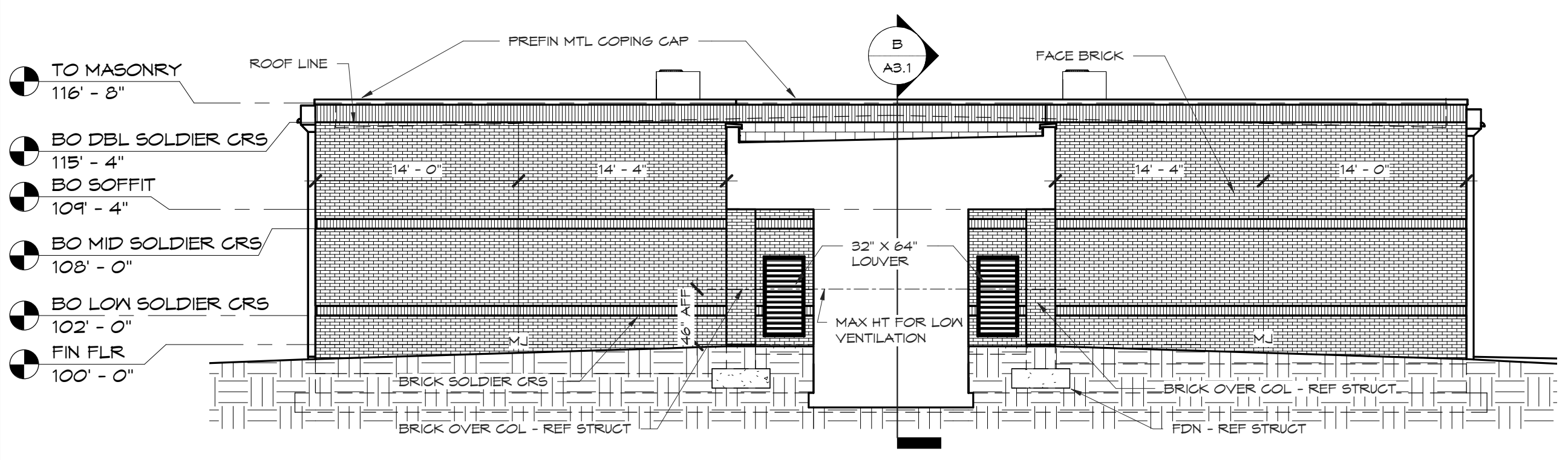
Project #: **14121.1**  
 Date: **4-29-2015**  
 Sheet Title: **BUILDING ELEVATIONS**  
 Drawn By: **SKS**  
 Checked By: **CDS**



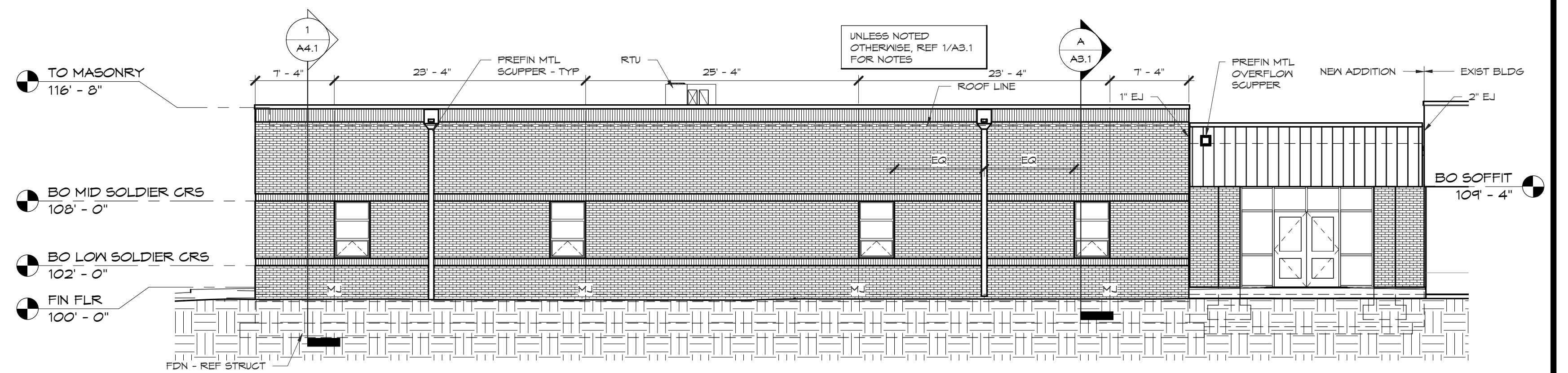
**1 WEST BUILDING ELEVATION**  
 1/8" = 1'-0"  
 0 4' 8' 16'



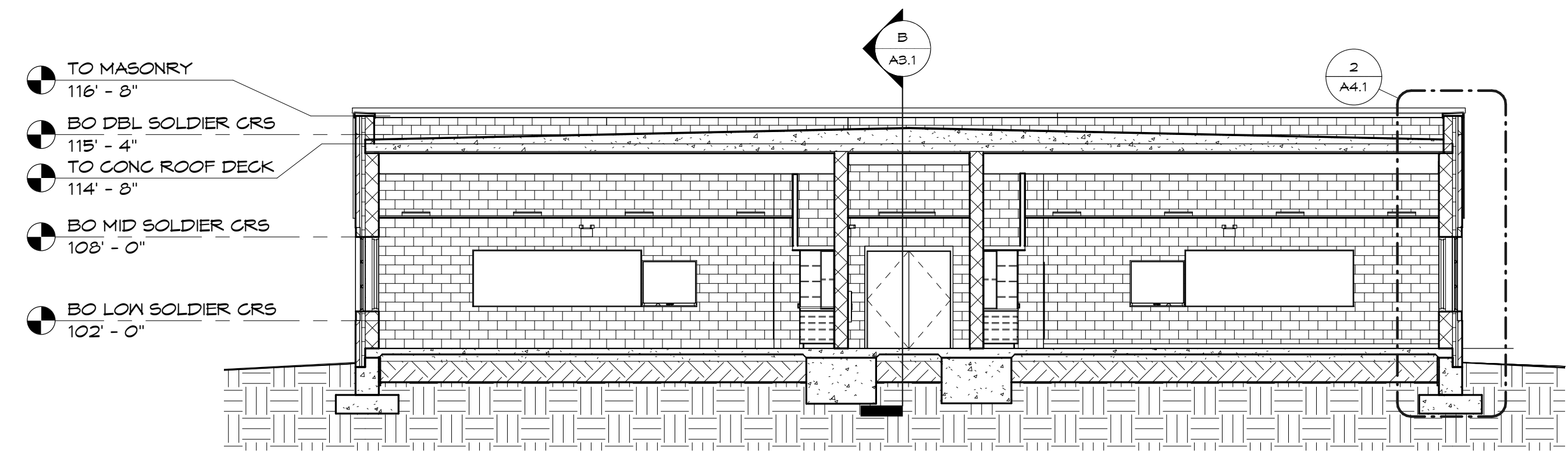
**2 SOUTH BUILDING ELEVATION**  
 1/8" = 1'-0"  
 0 4' 8' 16'



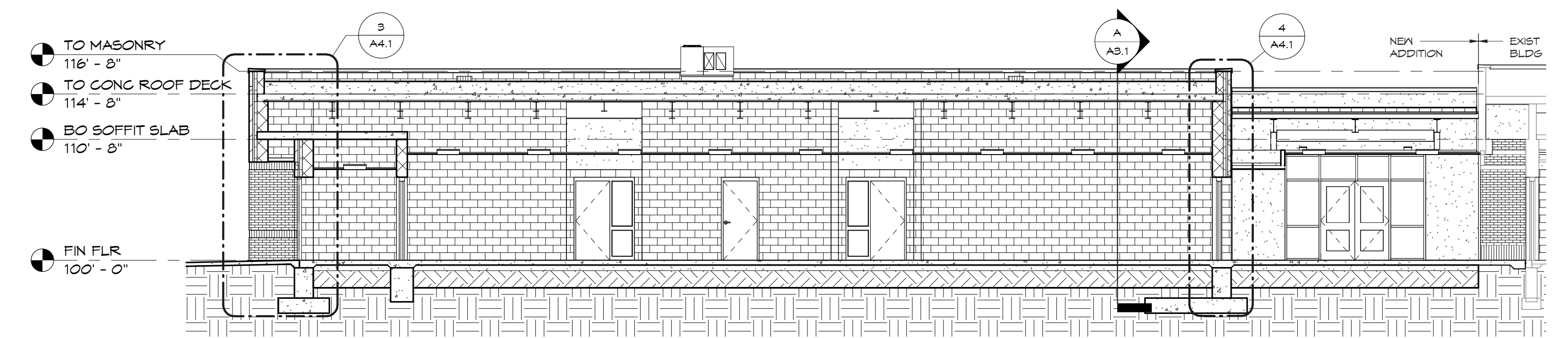
**3 NORTH BUILDING ELEVATION/SECTION**  
 1/8" = 1'-0"  
 0 4' 8' 16'



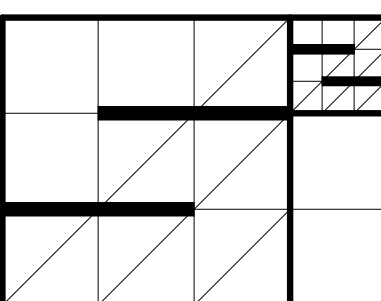
**4 EAST BUILDING ELEVATION**  
 1/8" = 1'-0"  
 0 4' 8' 16'



**A TRANSVERSE BUILDING SECTION**  
 1/8" = 1'-0"  
 0 4' 8' 16'



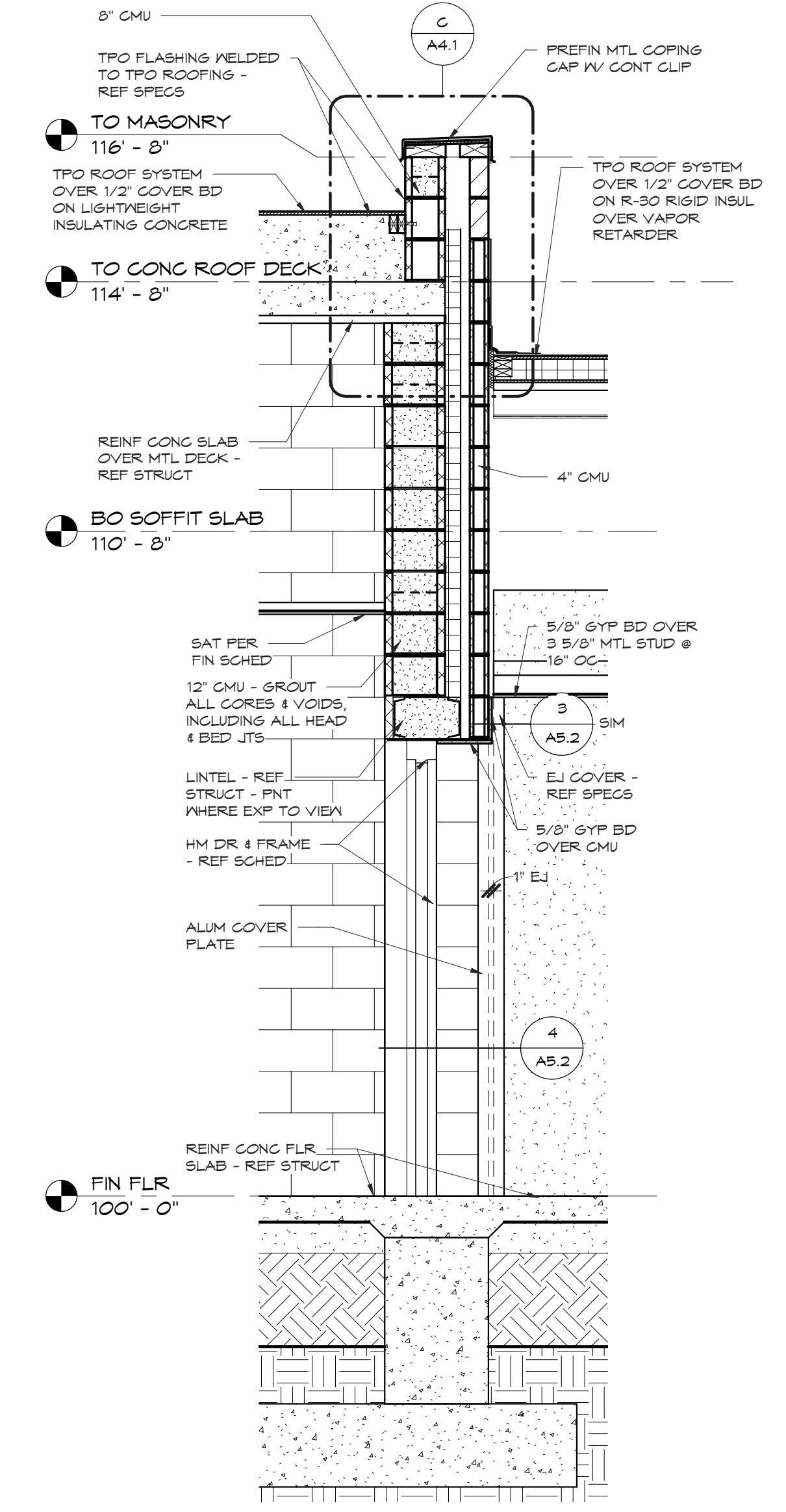
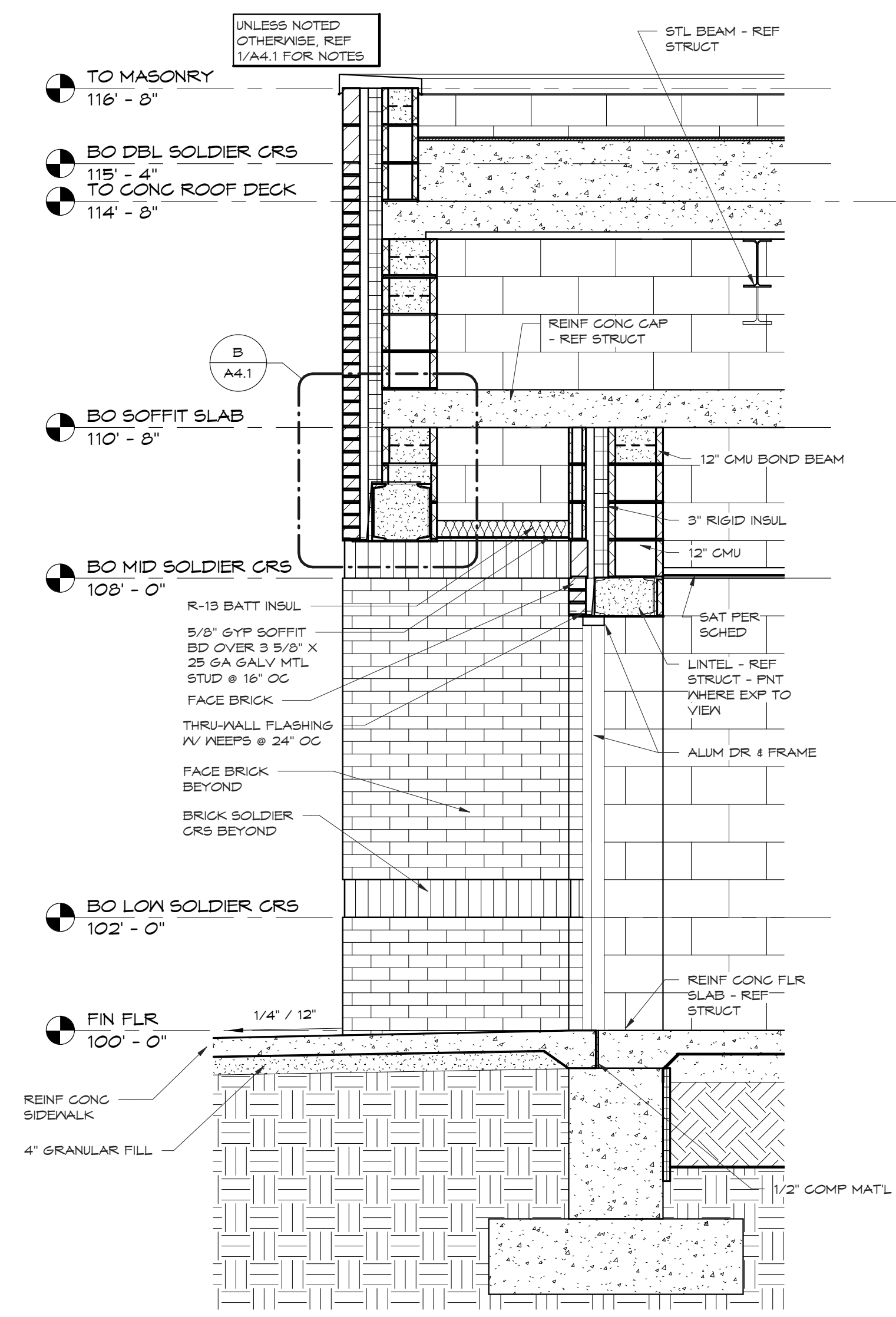
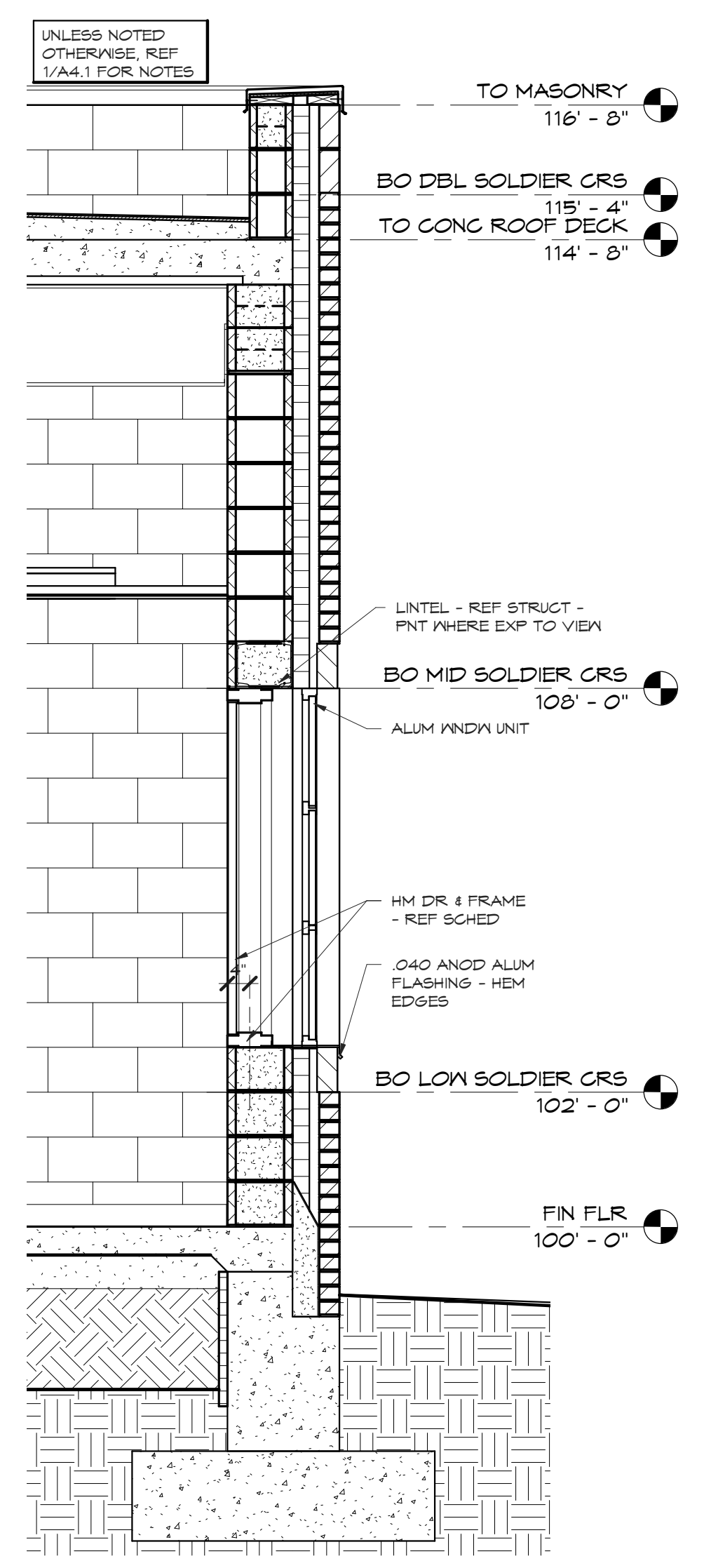
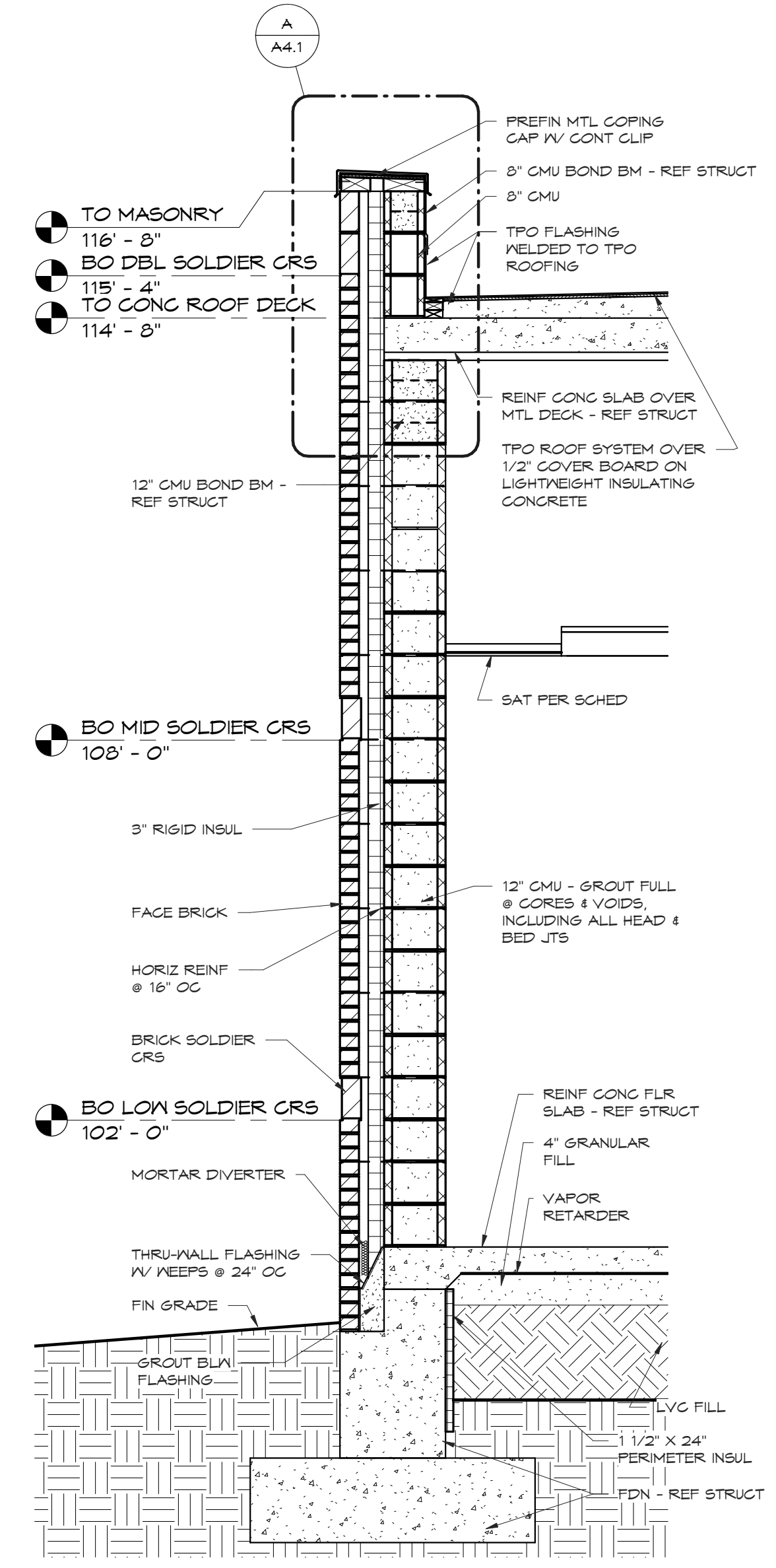
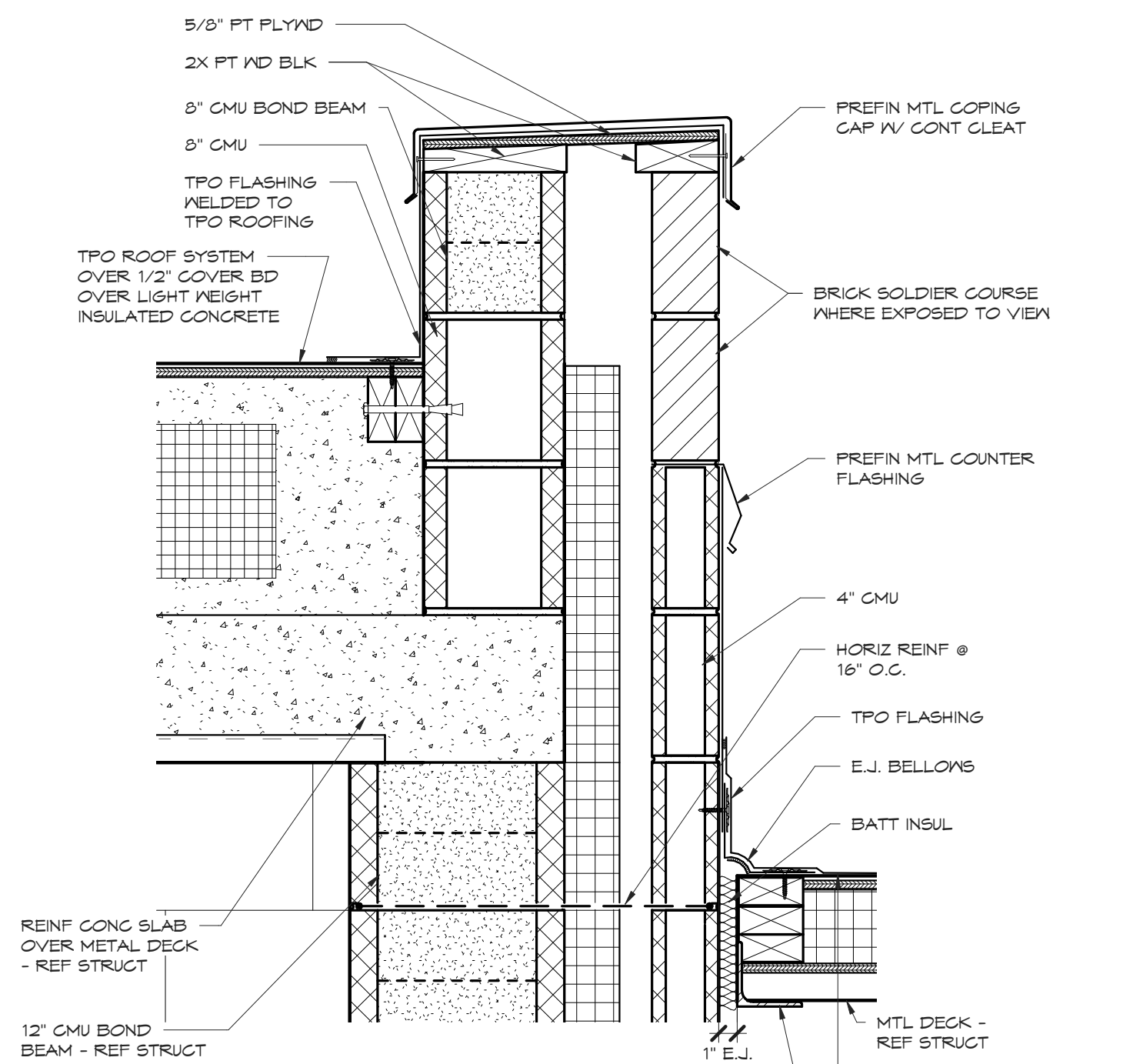
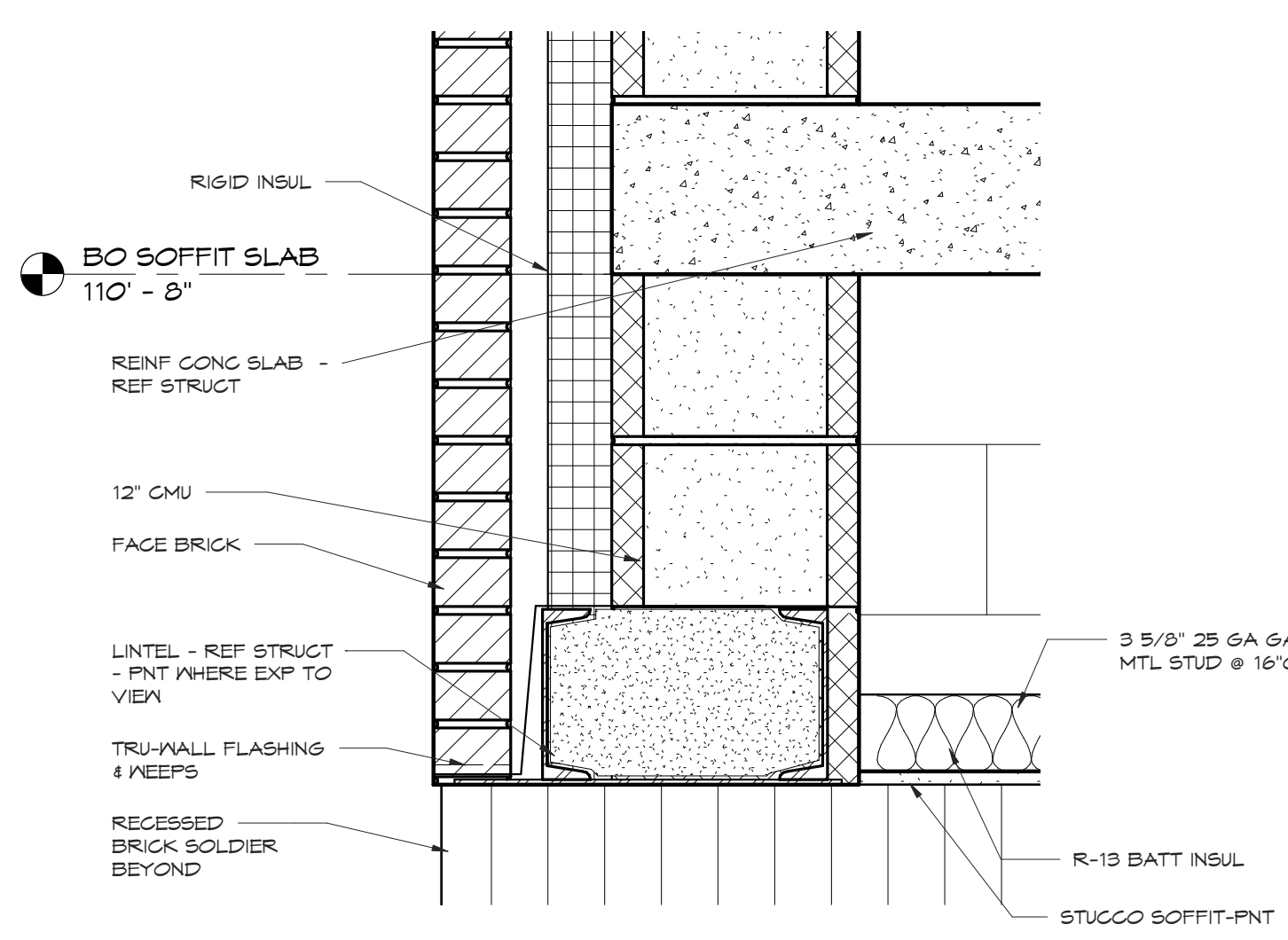
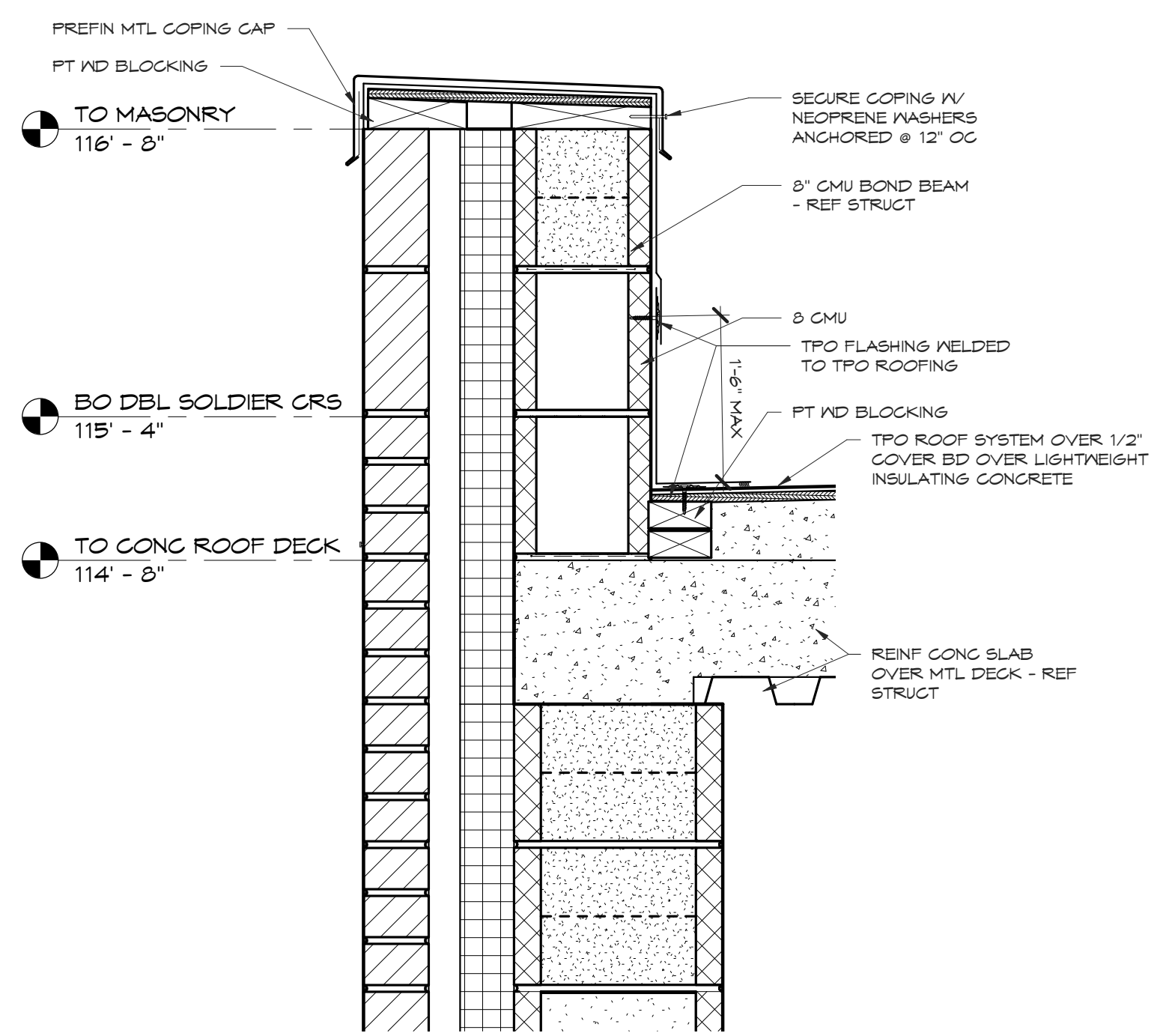
**B LONGITUDINAL BUILDING SECTION**  
 1/8" = 1'-0"  
 0 4' 8' 16'

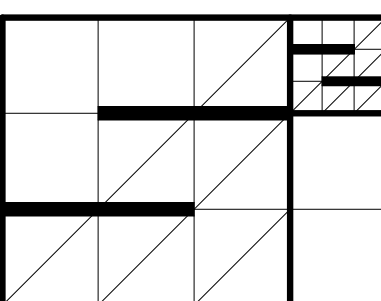


Revisions:

No.	Description	Date

Project #: **14121.1**  
Date: **4-29-2015**  
Sheet Title: **WALL SECTIONS & DETAILS**  
Drawn By: **SKS**  
Checked By: **CDS**





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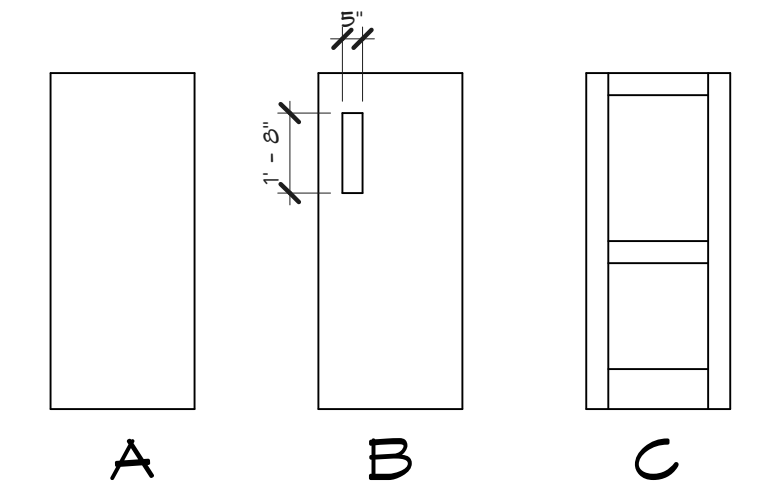
Revisions:		
No.	Description	Date

Project #: **14121.1**  
 Date: **4-29-2015**  
 Sheet Title: **DOOR/WNDW & PART SCHED**

Drawn By: **SKS**  
 Checked By: **CDS**

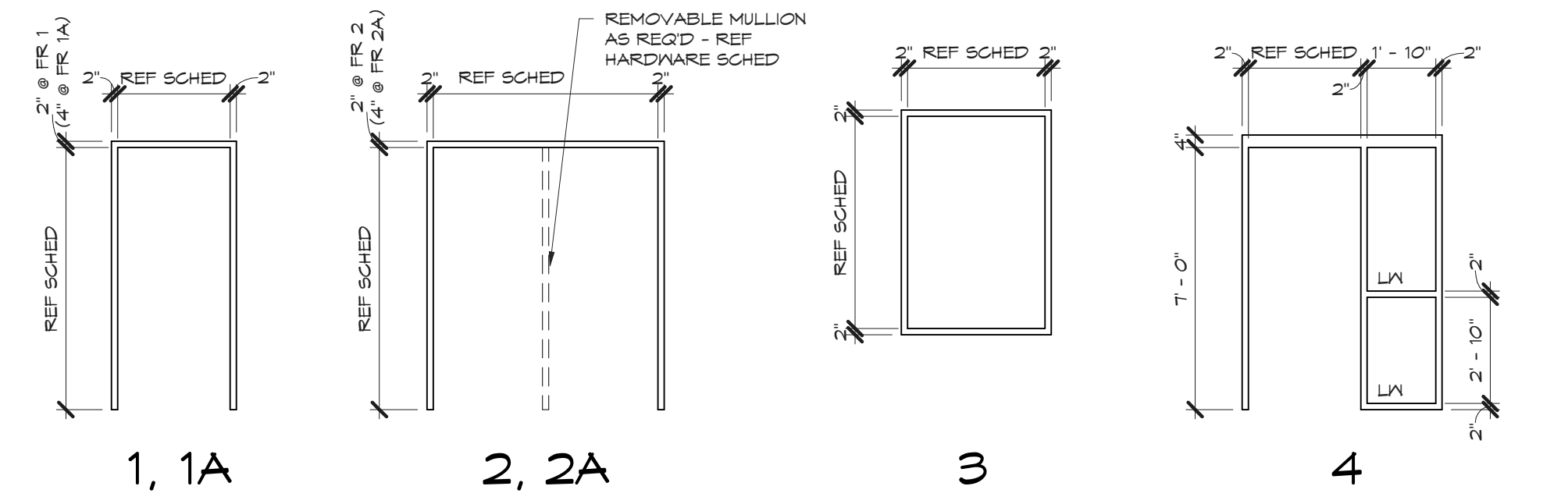
DOOR SCHEDULE													
DOOR NUMBER	TYPE	DOOR				FIRE RATING	FRAME					NOTES	
		WIDTH	HEIGHT	MATERIAL	FINISH		TYPE	MATERIAL	FINISH	HEAD	JAMB		SILL
101A	A	6'-0"	7'-0"	HM	PT	90 MIN	2	HM	PT	3/A5.2	4/A5.2	--	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
104A	C	6'-0"	7'-2"	ALUM	ANODIZED	-	2	ALUM	ANODIZED	5/A5.2	6/A5.2	7/A5.2	--
104B	A	6'-0"	7'-0"	HM	PT	-	2	HM	PT	2/A5.2	2/A5.2, SIM	--	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
105A	B	3'-0"	7'-0"	WD	STAIN	45 MIN	4	HM	PT	1/A5.2	1/A5.2, SIM	--	45 MIN RATED DOOR & FRAME ASSEMBLY
105B	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
105C	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
106	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
108	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
109	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
110	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
111A	B	3'-0"	7'-0"	WD	STAIN	45 MIN	4	HM	PT	1/A5.2	1/A5.2, SIM	--	45 MIN RATED DOOR & FRAME ASSEMBLY
111B	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
111C	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
112A	B	3'-0"	7'-0"	WD	STAIN	45 MIN	4	HM	PT	1/A5.2	1/A5.2, SIM	--	45 MIN RATED DOOR & FRAME ASSEMBLY
112B	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
112C	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
113	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
114	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
116	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
117	A	3'-0"	7'-0"	WD	STAIN	--	1	HM	PT	1/A5.2	1/A5.2, SIM	--	--
118A	B	3'-0"	7'-0"	WD	STAIN	45 MIN	4	HM	PT	1/A5.2	1/A5.2, SIM	--	45 MIN RATED DOOR & FRAME ASSEMBLY
118B	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
118C	A	3'-0"	5'-0"	HM	PT	-	3	HM	PT	8/A5.2	9/A5.2	10/A5.2	TORNADO STORM SHELTER TESTED ASSEMBLY PER CODE PROTOCOL
119	A	3'-0"	7'-0"	WD	STAIN	20 MIN	1	HM	PT	2/A5.2	2/A5.2, SIM	--	--

WINDOW SCHEDULE										
MARK	R.O.		MATERIAL	FINISH	HEAD	JAMB	SILL	GLAZING		NOTES
	WIDTH	HEIGHT						THICKNESS	TYPE	
A	3'-4"	5'-4"	ALUM	ANODIZED	8/A5.2	9/A5.2	10/A5.2	1"	INSUL	OUTSIDE PANE OF GLASS UNIT SHALL BE LAMINATED GLASS



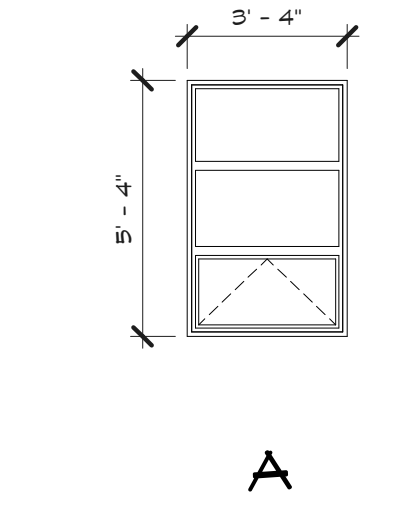
DOOR TYPES

1/4" = 1'-0" 0 2' 4' 8'



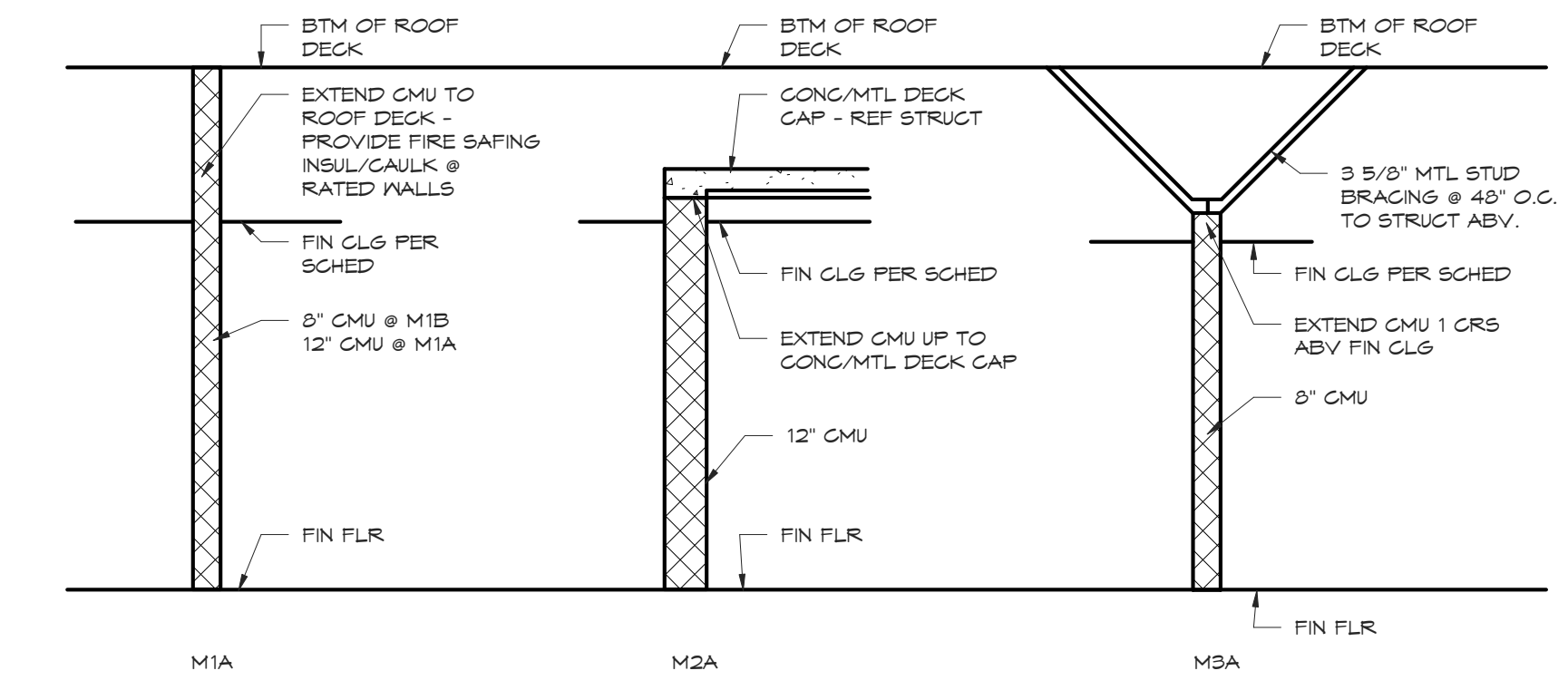
FRAME TYPES

1/4" = 1'-0" 0 2' 4' 8'



WINDOW TYPES

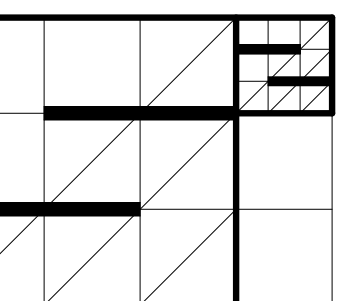
1/4" = 1'-0" 0 2' 4' 8'



PARTITION SCHEDULE

1/4" = 1'-0" 0 2' 4' 8'



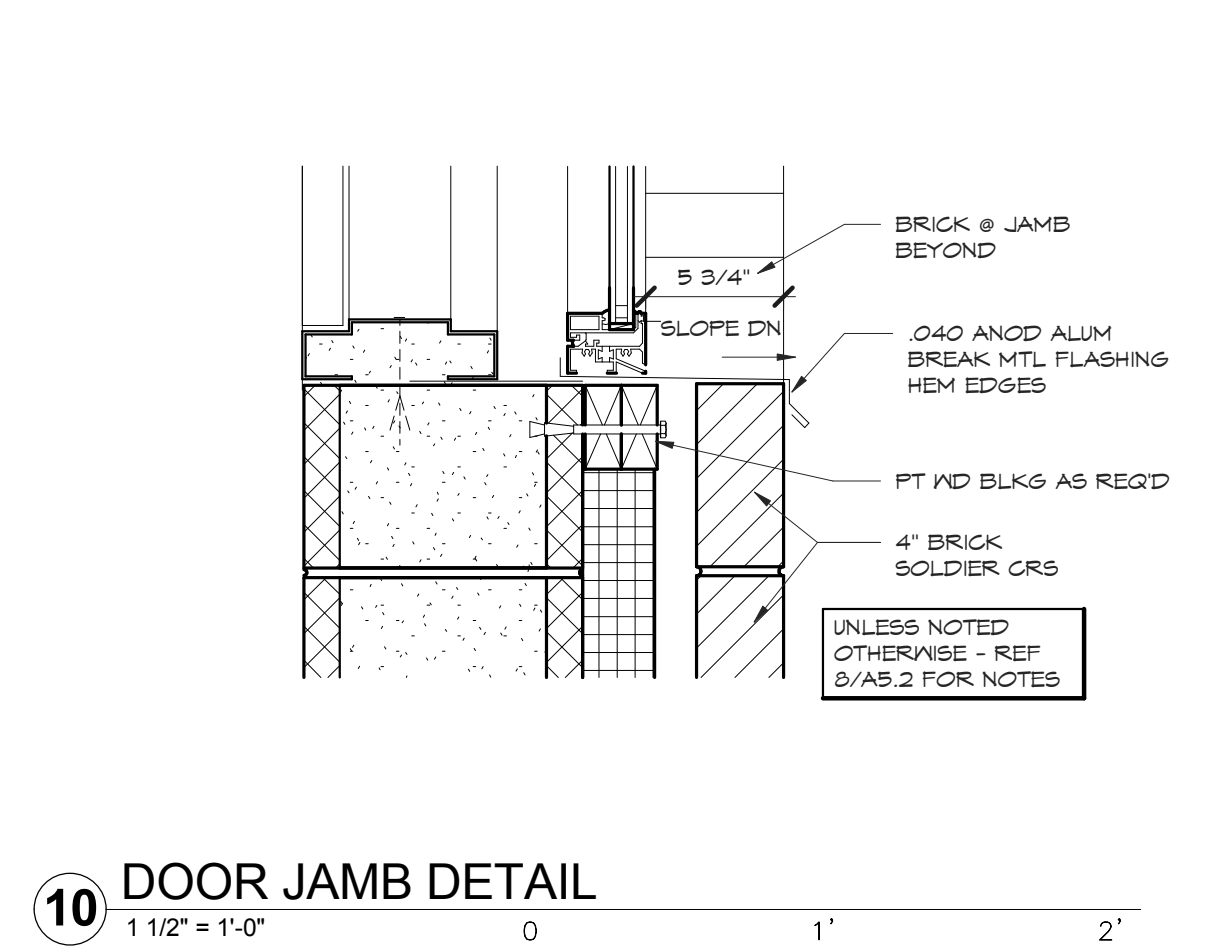
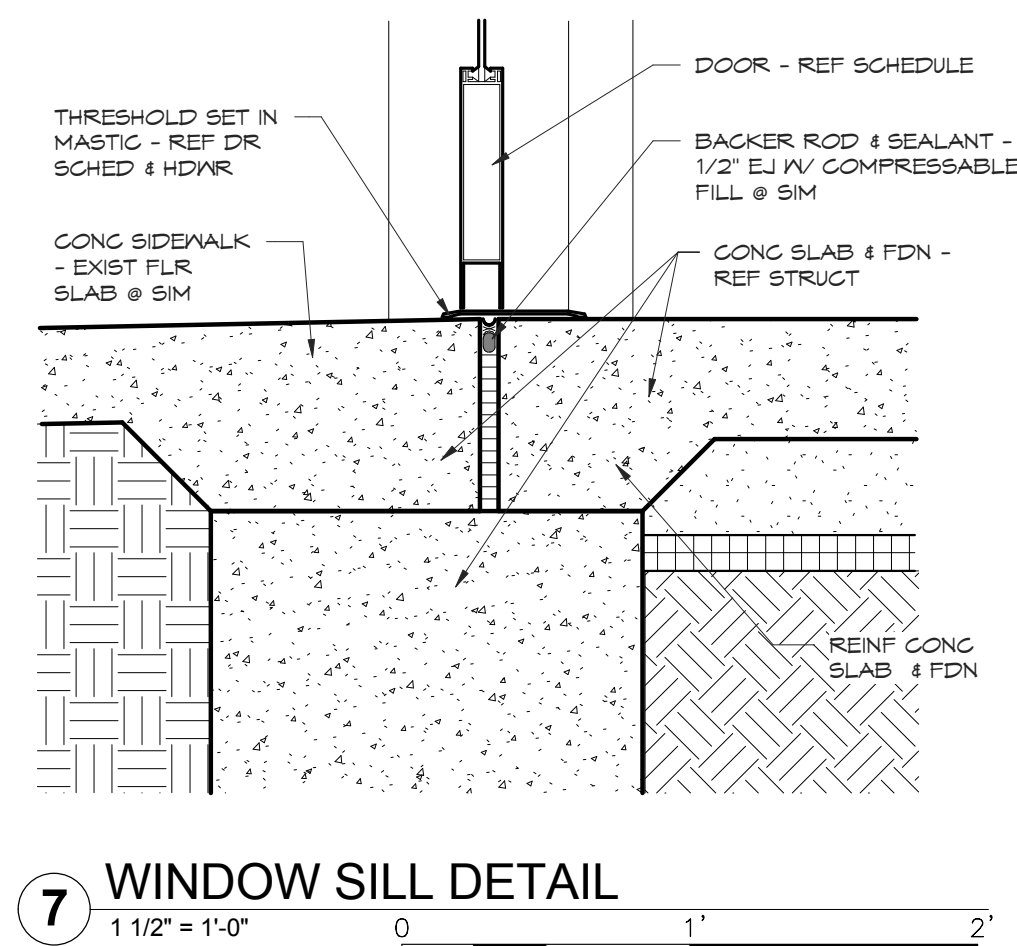
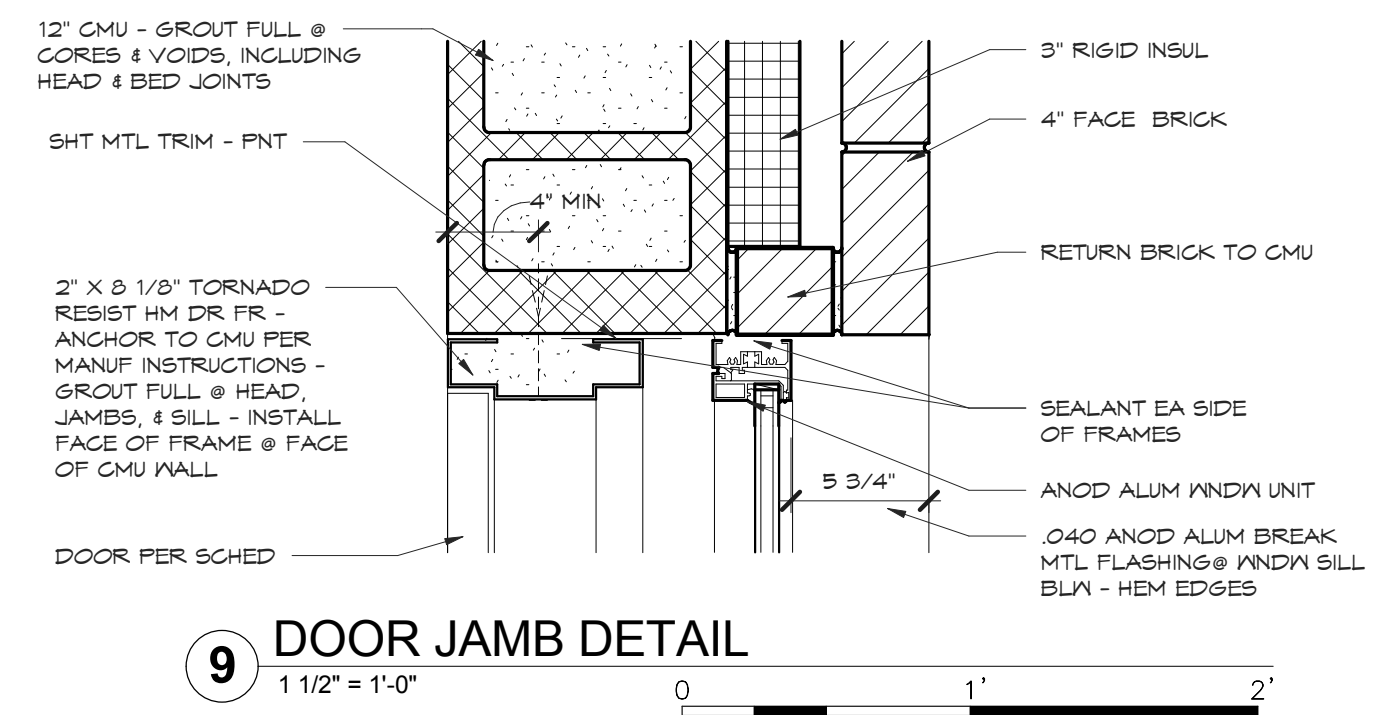
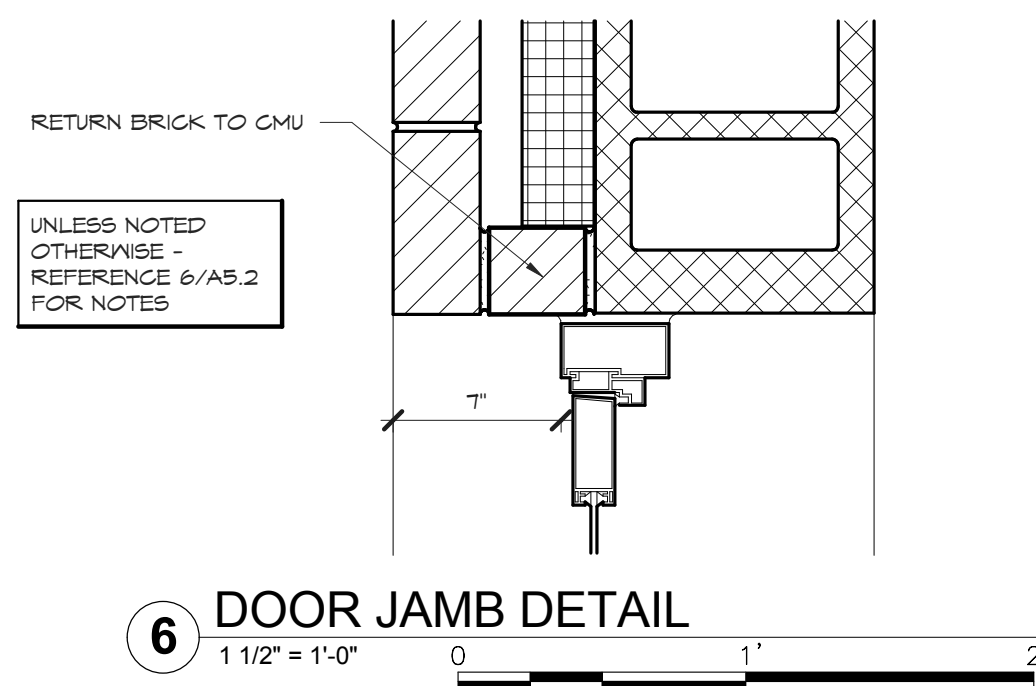
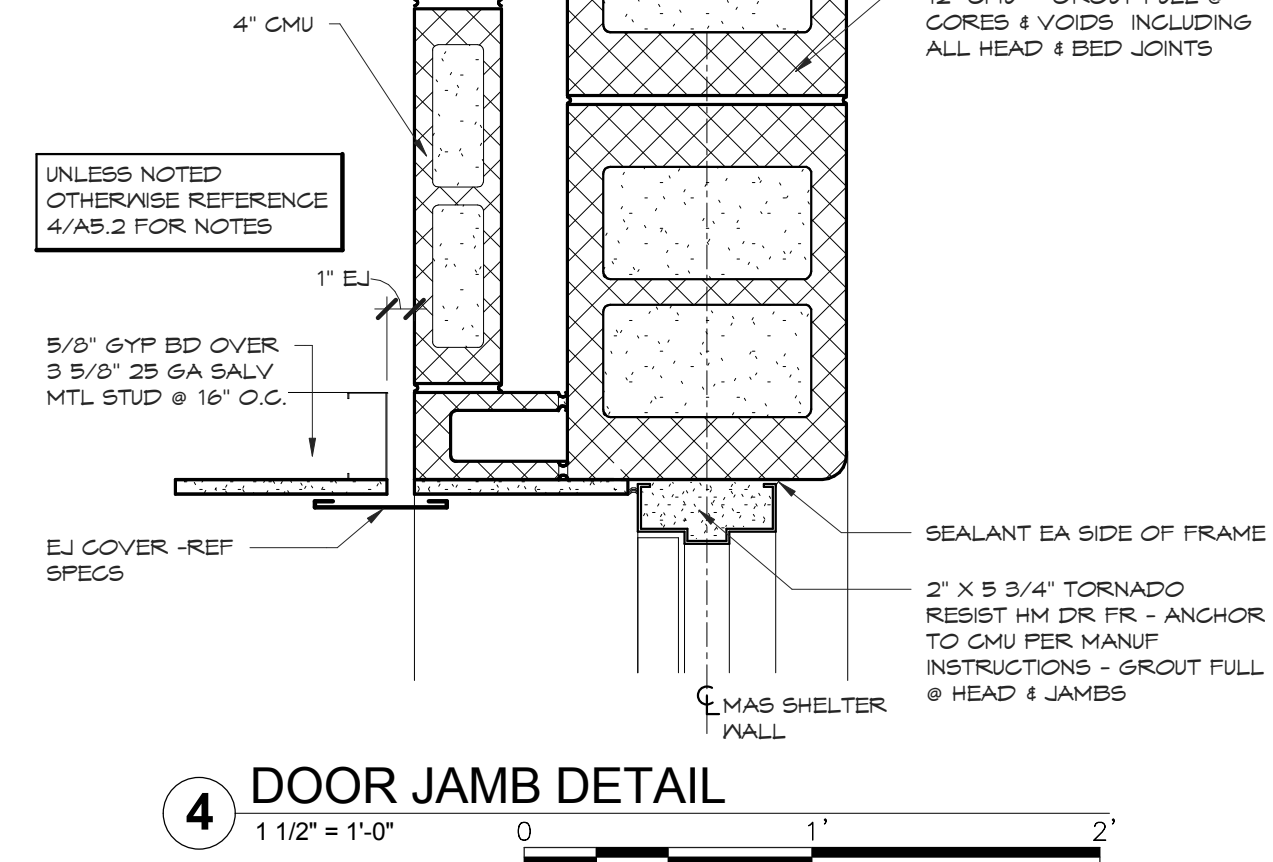
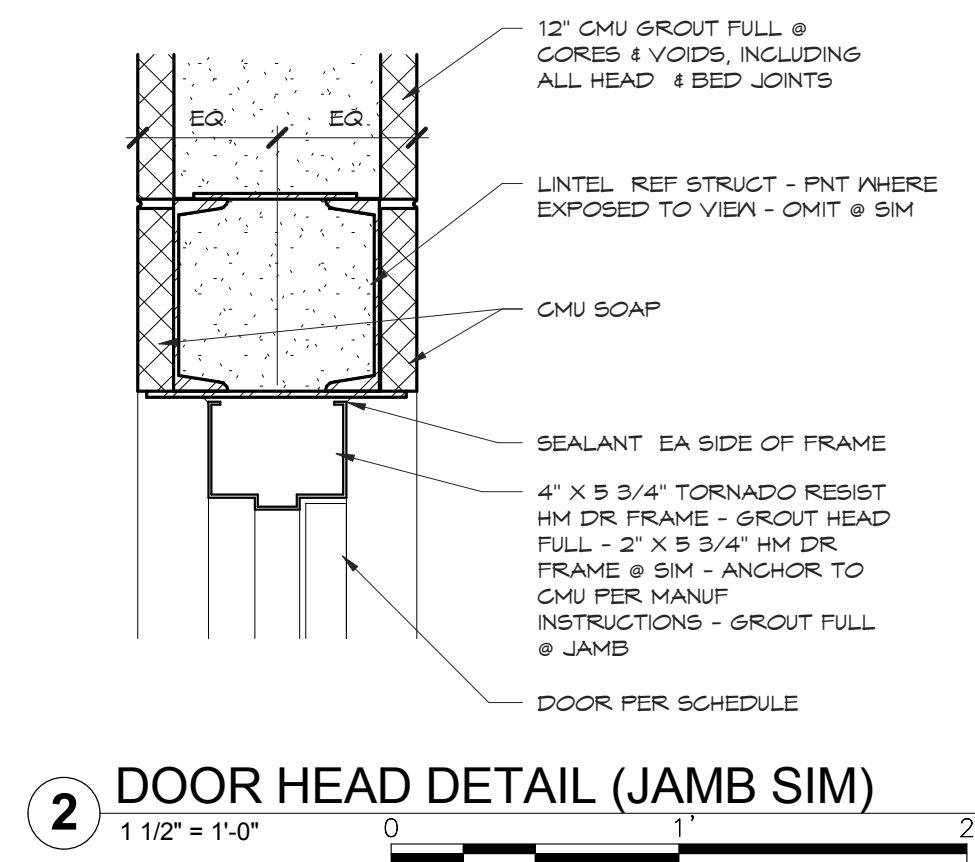
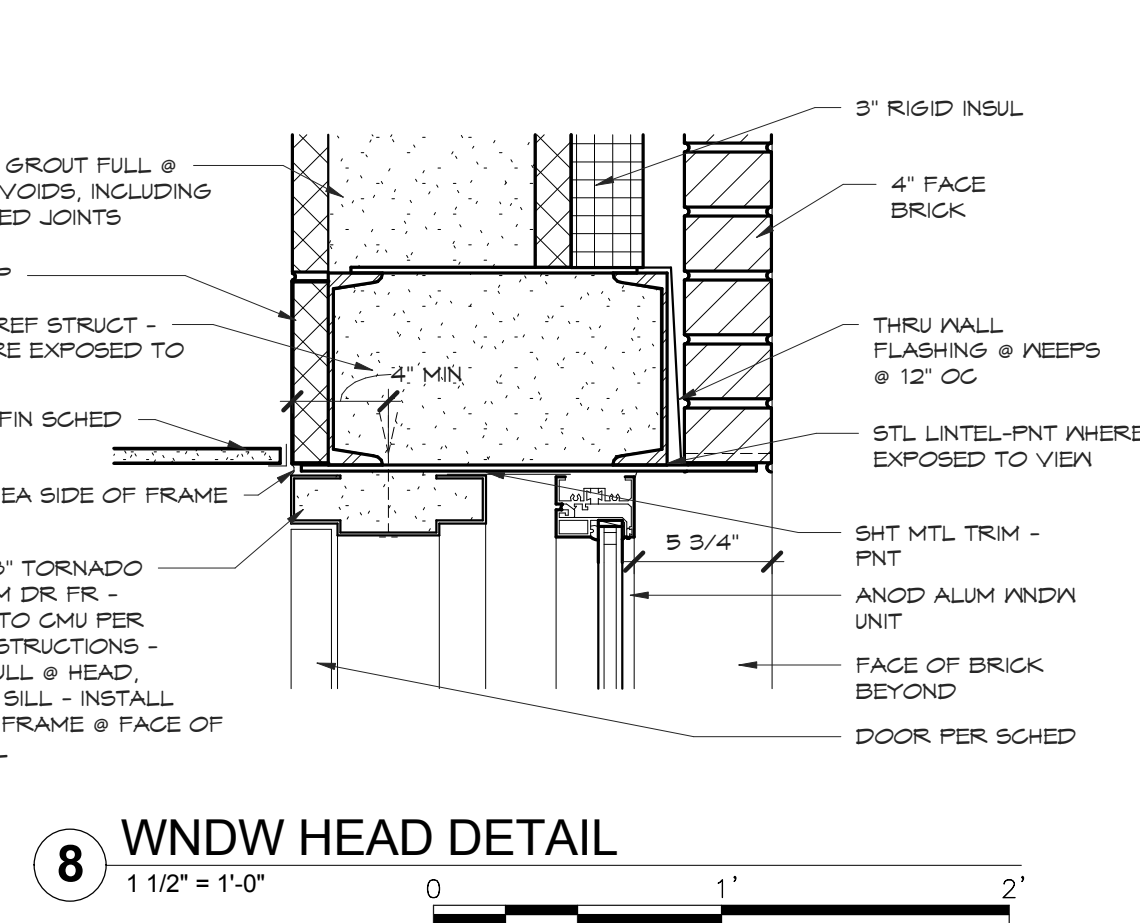
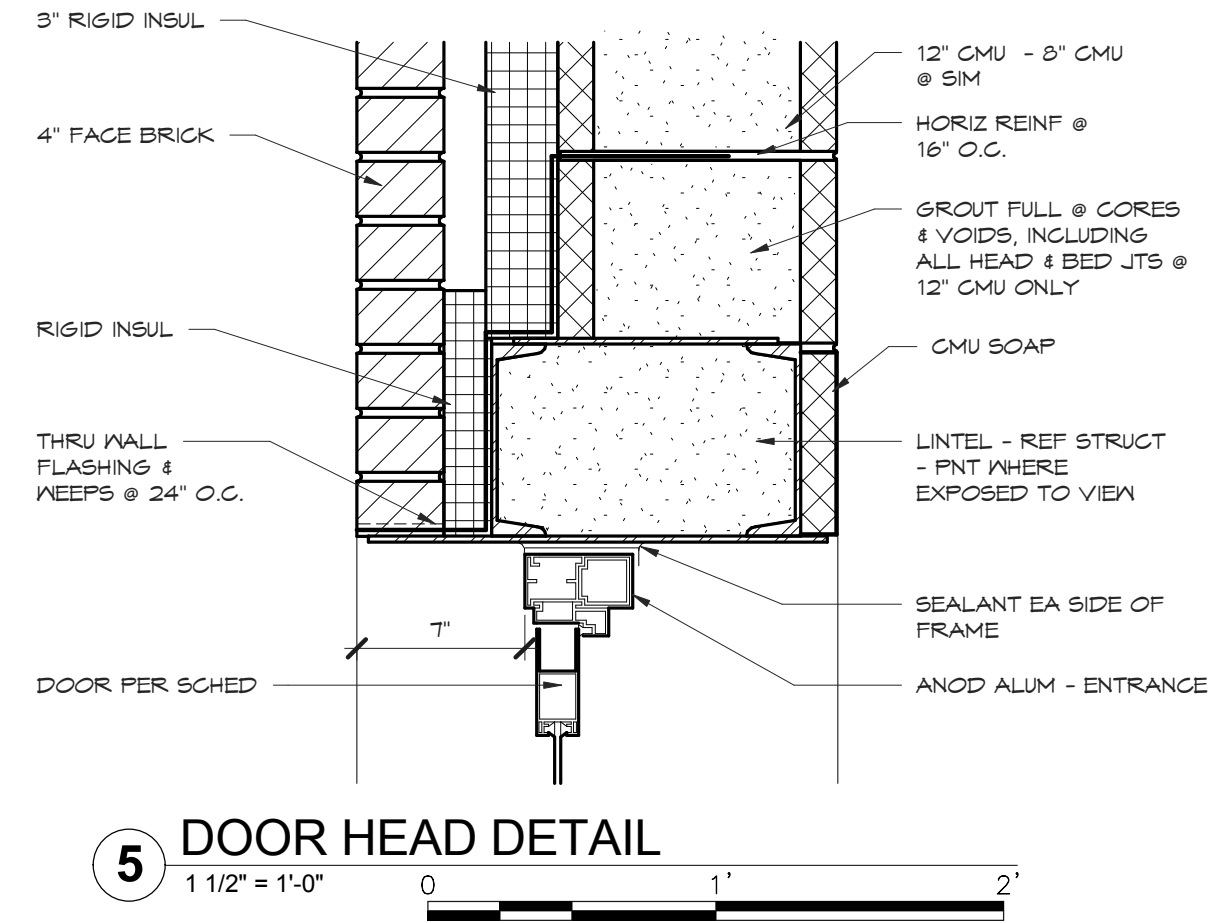
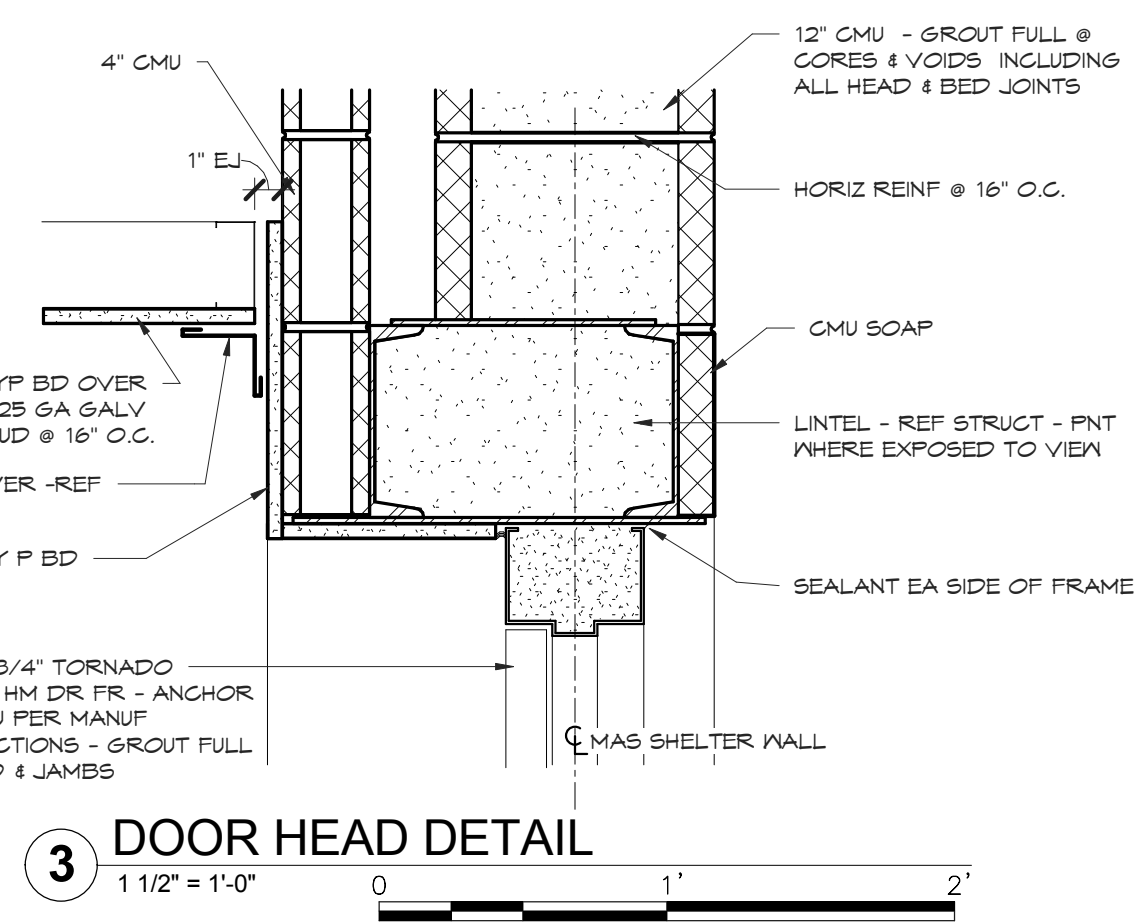
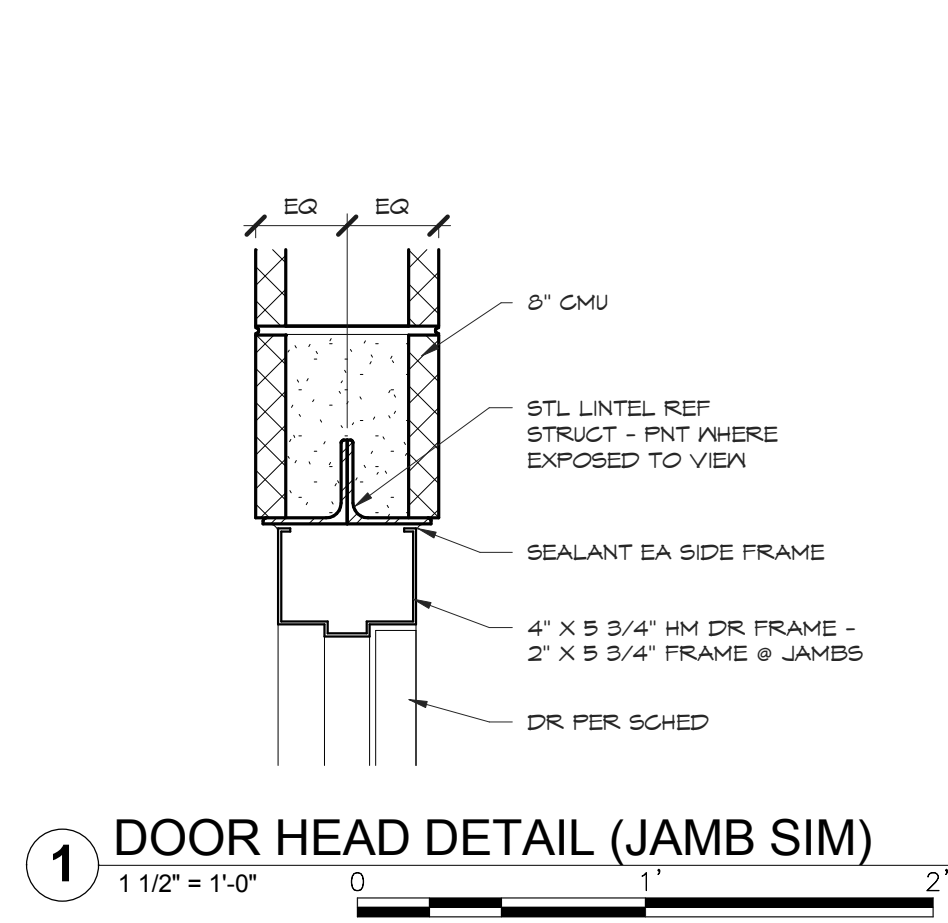


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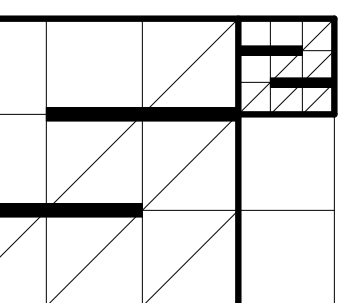
Revisions:		
No.	Description	Date

Project #: **14121.1**  
 Date: **4-29-2015**  
 Sheet Title: **DOOR & WINDOW DETAILS**

Drawn By: SKS  
 Checked By: CDS





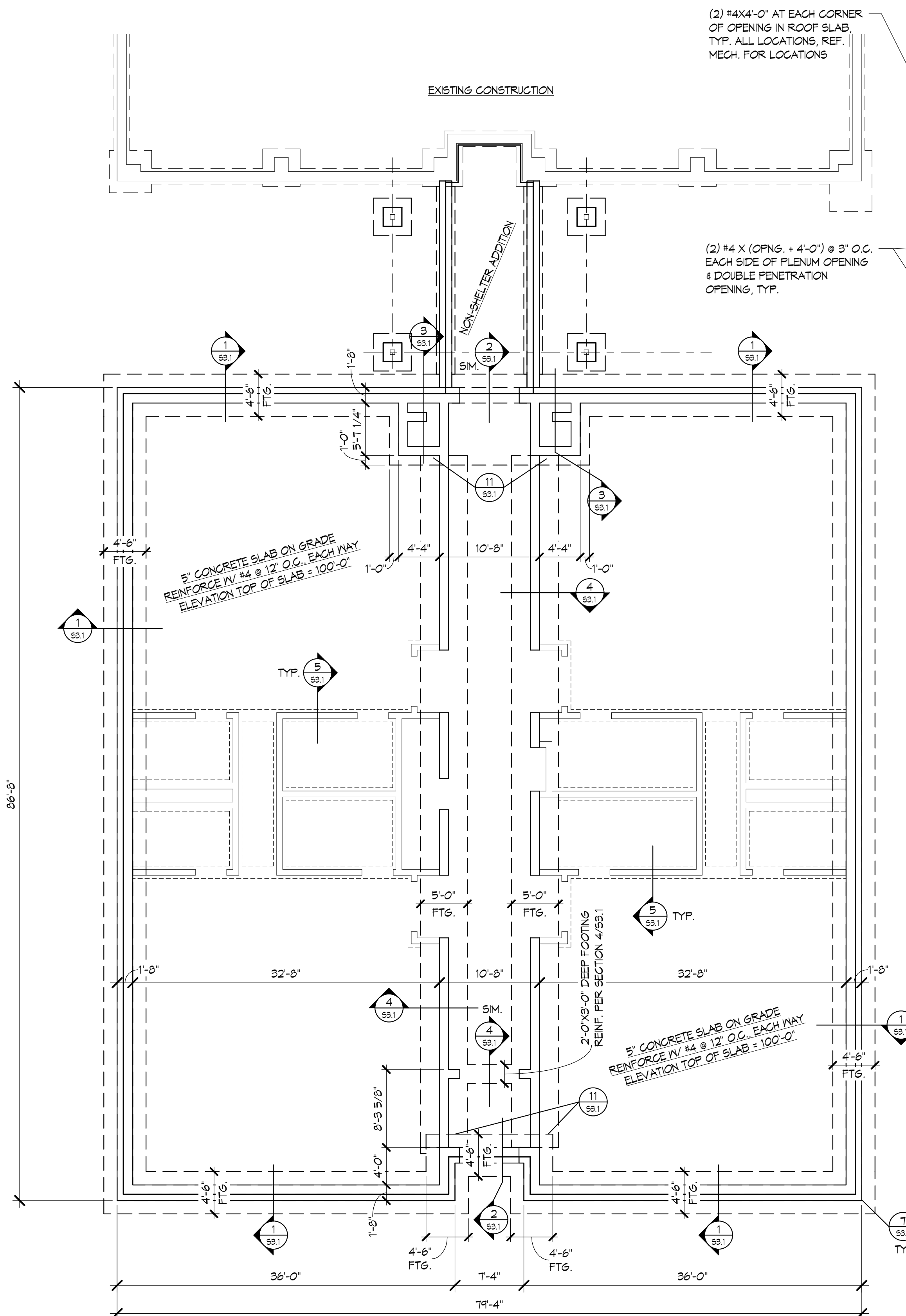


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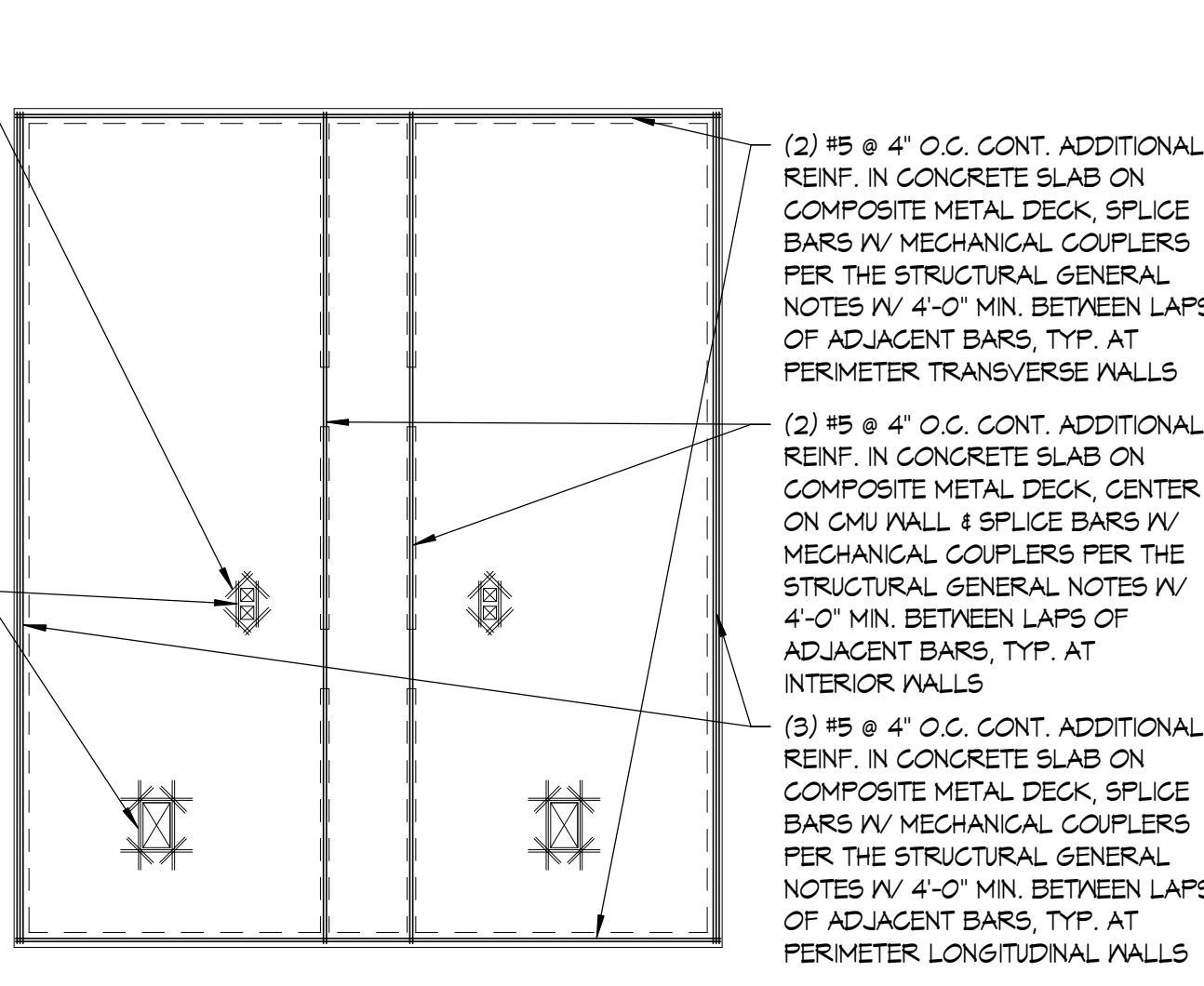
Revisions:  
 No. Description Date

Project #: 14121.1  
 Date: 4-30-15  
 Sheet Title: **STRUCTURAL PLANS**

Drawn By: MCO  
 Checked By: SAM

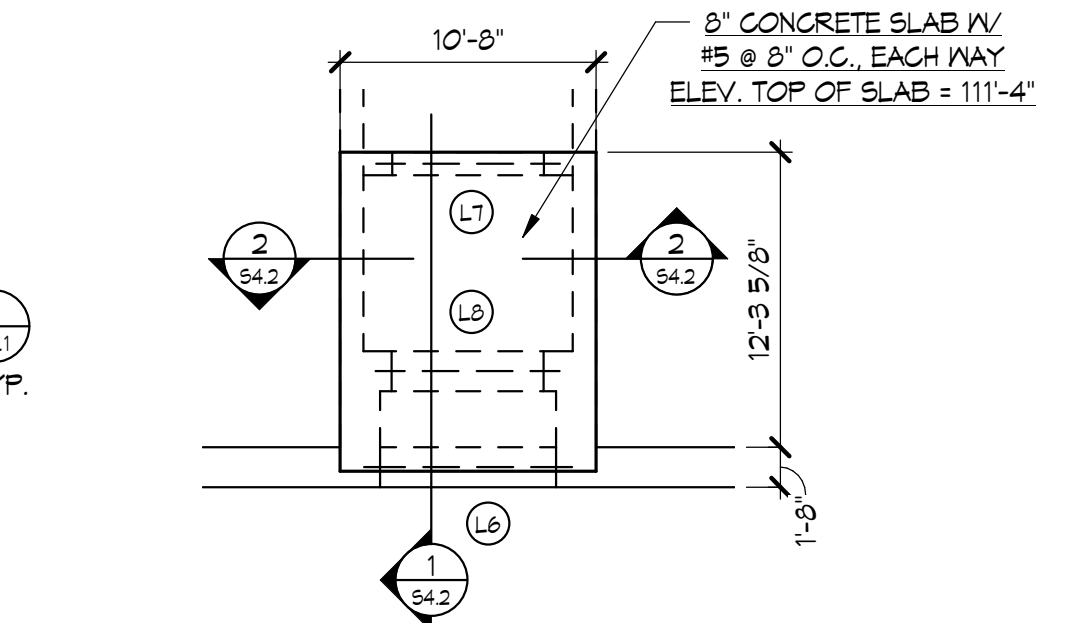


**FOUNDATION PLAN**  
 1/8" = 1'-0"

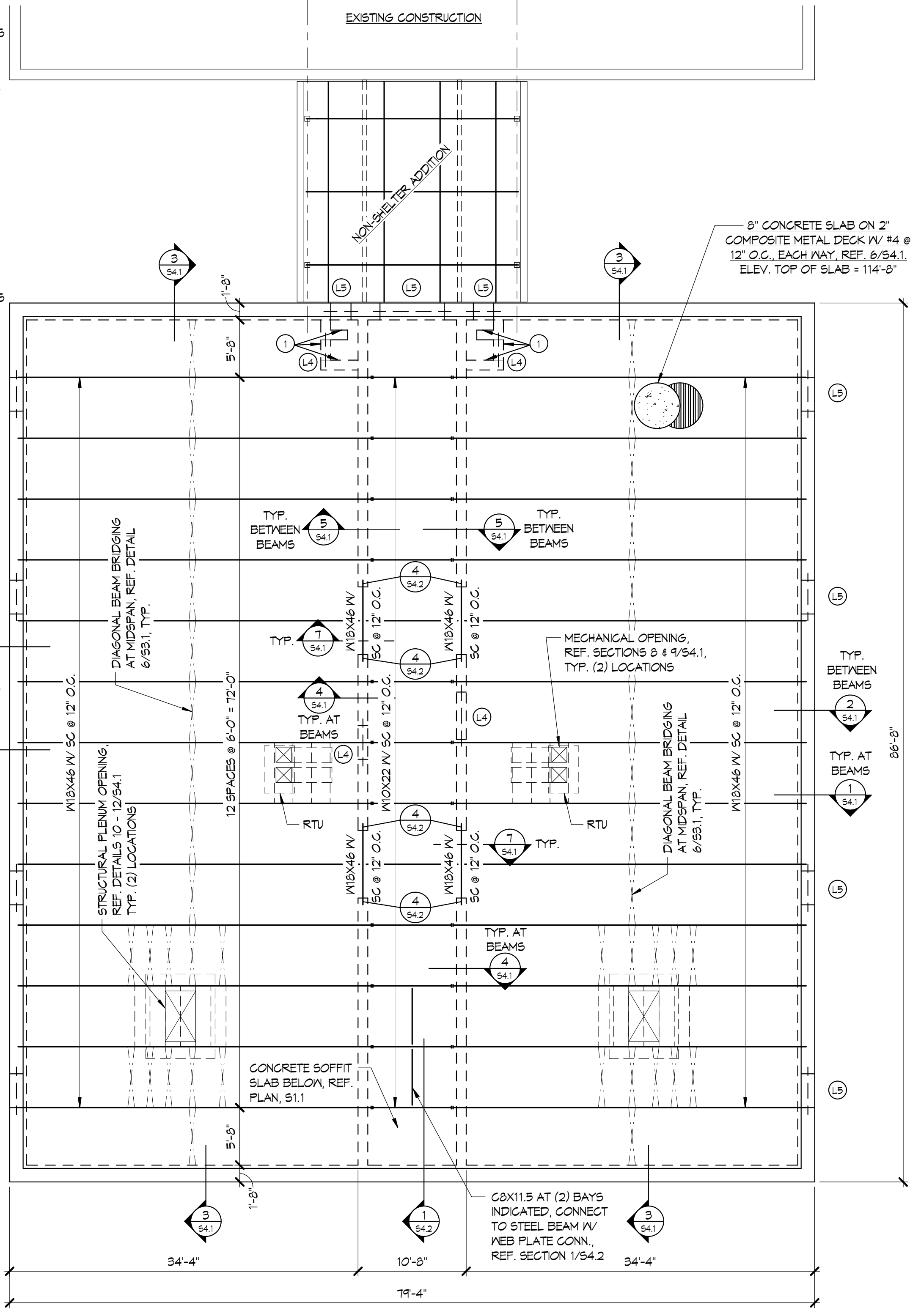


**ADDITIONAL REINF. PLAN AT SHELTER**  
 NTS

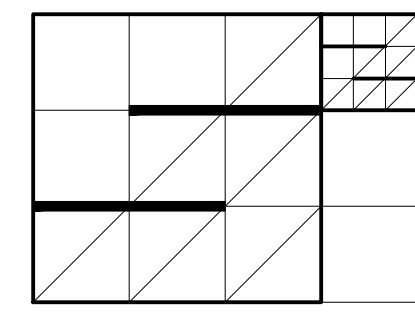
- PLAN NOTES**
- REFERENCE SHEET 50.1 FOR THE STRUCTURAL GENERAL NOTES.
  - PERIMETER FOUNDATION PLAN DIMENSIONS ARE TO THE FACE OF VENEER, TYP.
  - REFERENCE ARCHITECTURAL FOR THE DIMENSIONAL LOCATION OF NON-LOAD BEARING MASONRY WALLS, TYP.
  - CENTER ALL FOOTINGS BELOW WALLS AND COLUMNS, UNLESS SHOWN OR NOTED OTHERWISE.
  - PROVIDE AND INSTALL 1/2" EXPANSION JOINT MATERIAL BETWEEN THE BUILDING WALLS AND EXTERIOR CONCRETE, TYP.
  - REFERENCE DETAILS 6/53.1 FOR THE TYPICAL SLAB ON GRADE JOINT DETAIL. REFERENCE DETAIL 7/53.1 FOR THE TYPICAL CORNER BAR DETAIL IN CONCRETE.
  - REFERENCE DETAIL 8/53.1 FOR THE TYPICAL MASONRY CONTROL JOINT DETAIL. REFERENCE ARCHITECTURAL AND THE STRUCTURAL GENERAL NOTES FOR LOCATIONS.
  - REFERENCE DETAILS 5 & 6/54.2 FOR THE TOP OF WALL BRACING DETAILS AT NON-LOAD BEARING MASONRY WALL LOCATIONS NOT INDICATED ON THE FRAMING PLANS.
  - DOVEL NOTCH CMU WALL INTO CONCRETE ROOF SLAB PER SECTION 3/54.2, REF. ARCH. FOR WALL DIMENSIONS.
- PLAN MARKS**
- LM LINTEL MARK, REF. SHEET 52.1 FOR SCHEDULE
  - SC SHEAR CONNECTIONS, REF. SECTION 6/54.1



**PARTIAL PLAN AT SOFFIT SLAB**  
 1/8" = 1'-0"



**ROOF FRAMING PLAN**  
 1/8" = 1'-0"



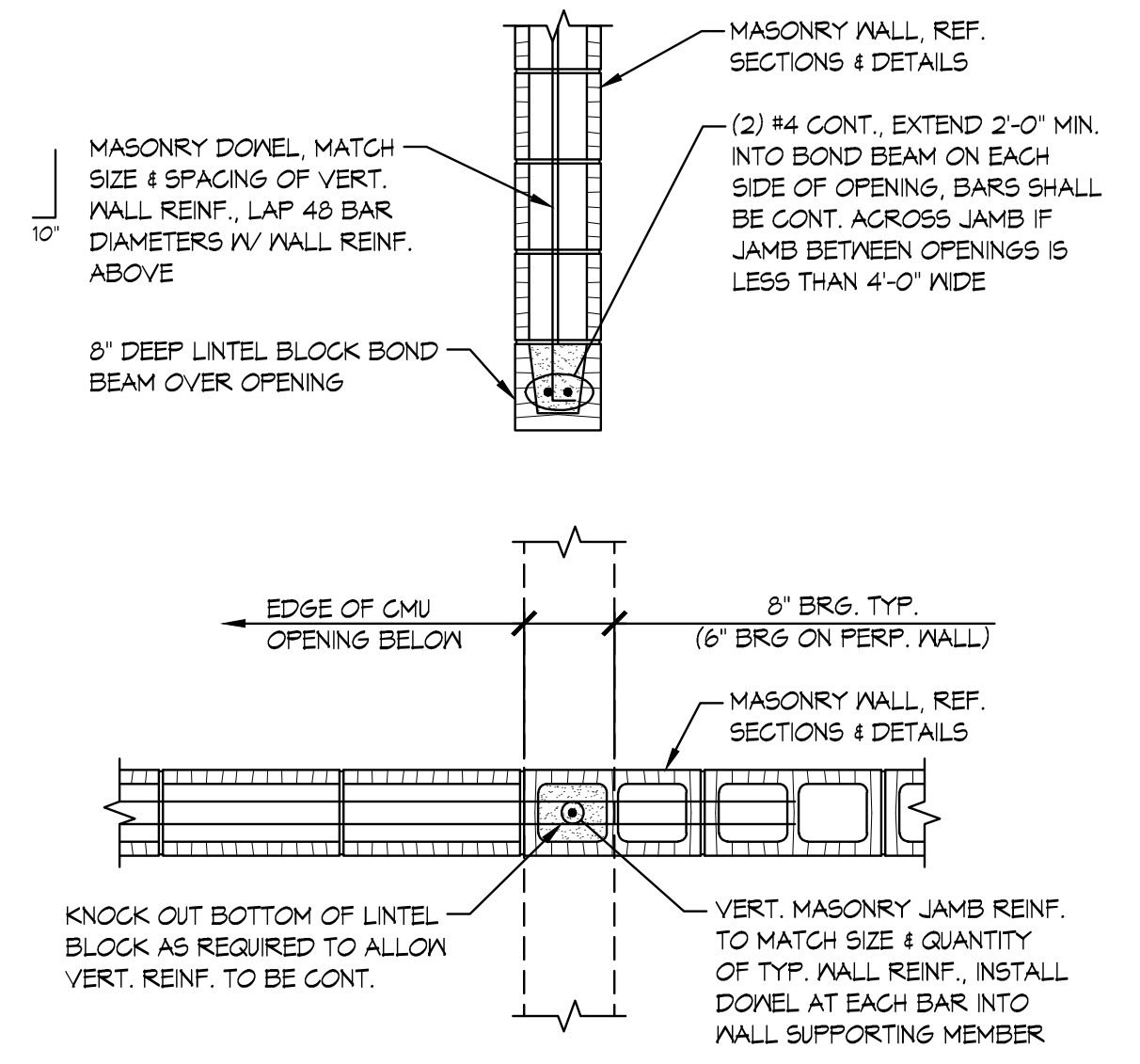
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Revisions:		
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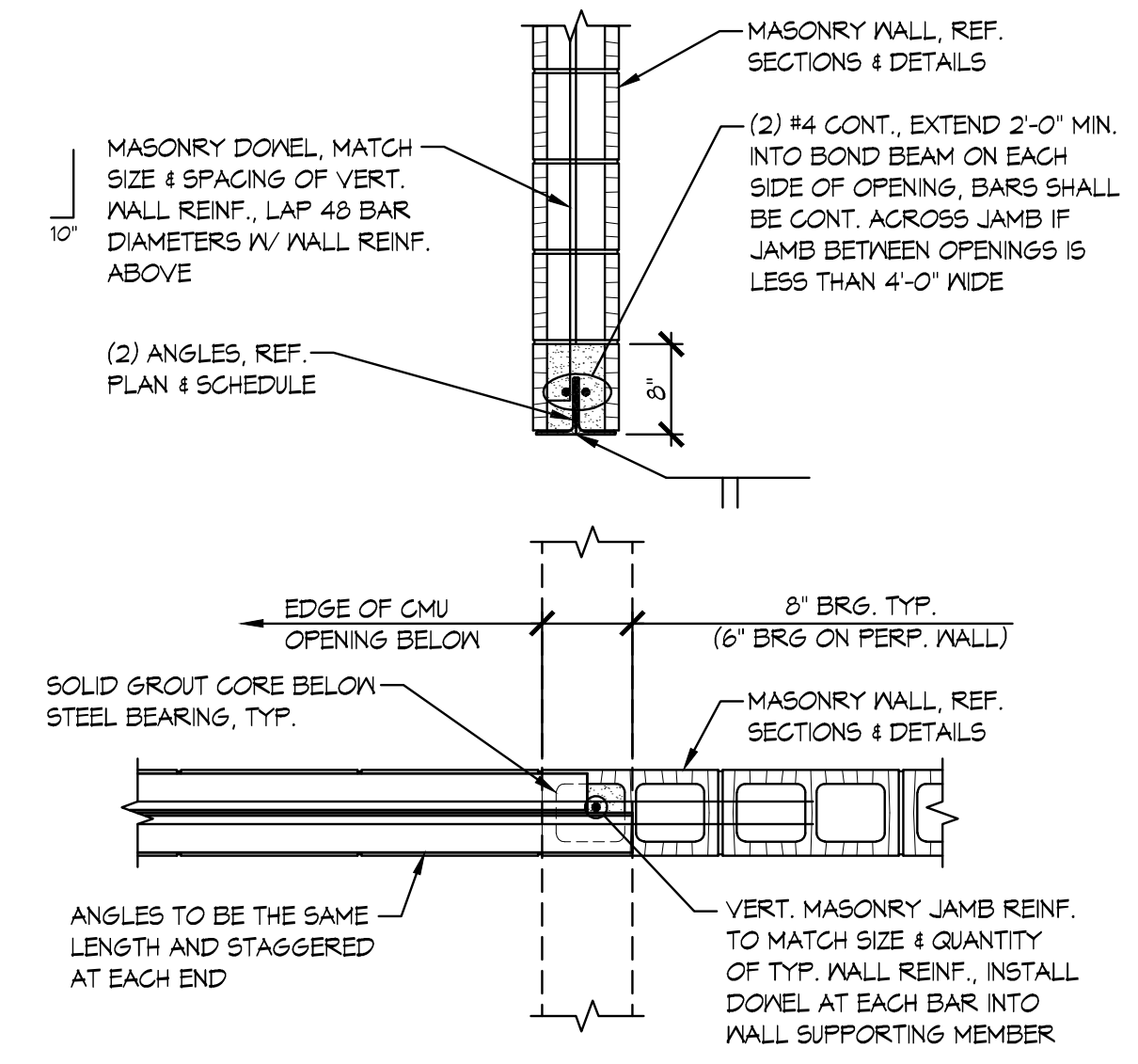
Project #: **14121.1**  
Date: **4-30-15**  
Sheet Title: **FRAMING SECTIONS**  
Drawn By: **MCO**  
Checked By: **SAM**

STEEL LINTEL SCHEDULE				
MARK	MEMBERS SIZES	LINTEL CROSS SECTION	SUPPORTS	
			LEFT	RIGHT
L1	8" DEEP LINTEL BLOCK IV (2) #4 CONT.	1/52.1	1/52.1	1/52.1
L2	(2) L3X3X1/4	2/52.1	2/52.1	2/52.1
L3	(2) L5X3X1/4 (LLV)	2/52.1	2/52.1	2/52.1
L4	(2) C8X11.5	3/52.1	3/52.1	3/52.1
L5	(2) C8X11.5	4/52.1	4/52.1	4/52.1
L6	(2) C12X20.7	4A/52.1	4A/52.1	4A/52.1
L7	(2) C8X11.5	5/52.1	5/52.1	5/52.1
L8	(2) C8X11.5	6/52.1	6/52.1	6/52.1

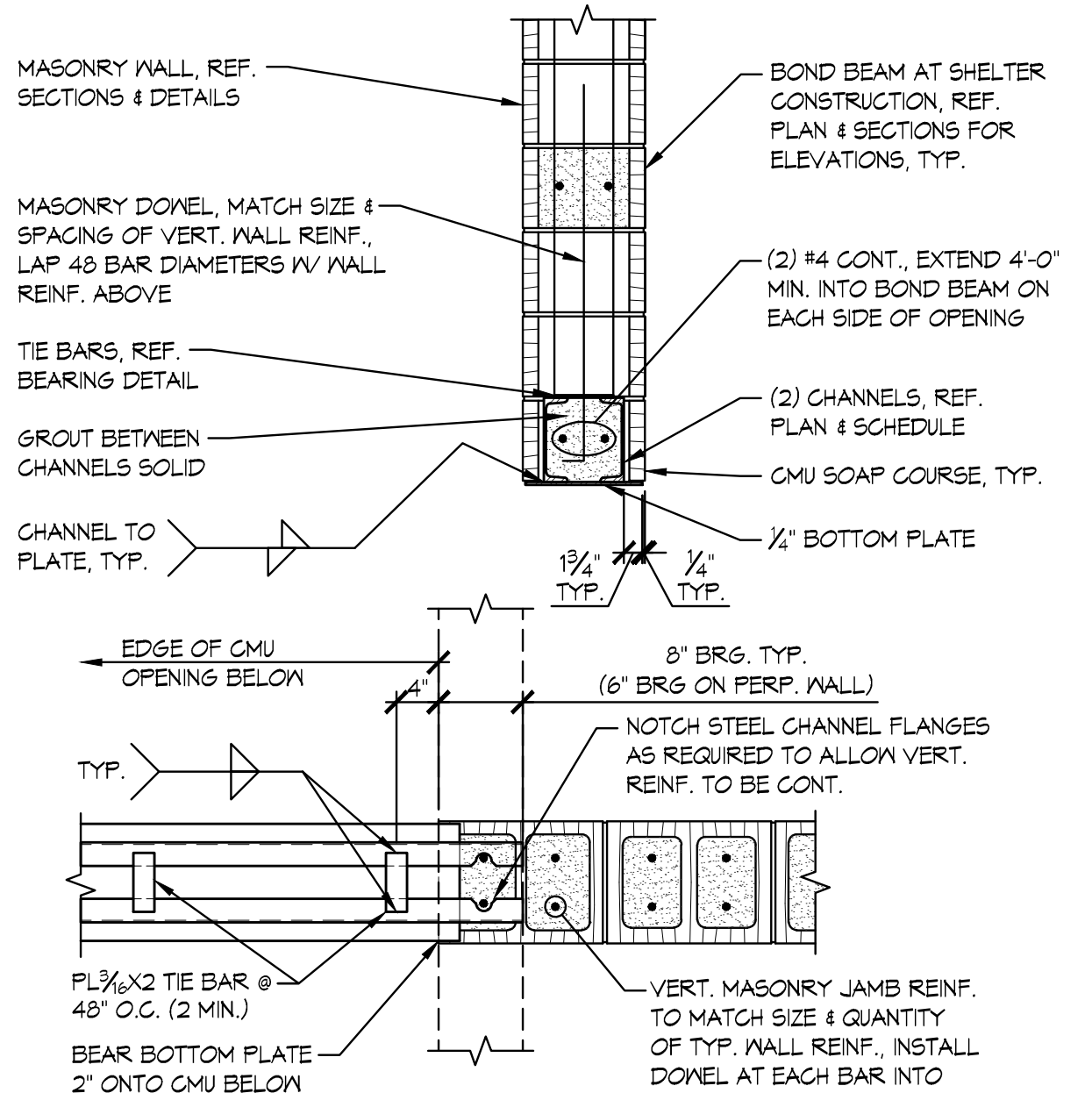
- LINTEL SCHEDULE NOTES:**
- LEFT AND RIGHT SUPPORTS ARE SUPPORTS WHEN VIEWING THE SHEET FROM THE BOTTOM OR RIGHT HAND (TITLE BLOCK) SIDE OF THE SHEET.
  - PROVIDE 6" BEARING LENGTH ON LINTELS AT LOCATIONS WHERE 8" REQUIRED BEARING LENGTH WOULD EXPOSE THE END OF THE LINTEL BELOW THE CEILING ELEVATION.
  - EXPOSED PORTIONS OF LINTELS, TO INCLUDE BOTTOM PLATES, SHALL BE TREATED AS ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS).
  - OPENING DIMENSIONS NOTED BELOW REFER TO THE WIDTH OF THE OPENING IN THE CMU WALL.
  - AT EACH OPENING IN ANY CMU WALL WITH CMU BELOW OPENING: INSTALL AN 8" DEEP BOND BEAM WITH (2) #4 CONT. BELOW OPENING AND (2) 8" DEEP BOND BEAMS WITH (2) #4 CONT. IN EACH BELOW OPENINGS THAT ARE IN THE SHELTER WALLS. EXTEND BOND BEAMS AND REINFORCEMENT 4'-0" MINIMUM ON EACH SIDE OF OPENING. REFERENCE ARCHITECTURAL FOR SILL CONDITIONS EFFECTING BOND BEAM ELEVATION. BOND BEAM IS NOT REQUIRED BELOW MECHANICAL OPENINGS IN NON-LOAD BEARING INTERIOR CMU WALLS THAT ARE LESS THAN 2'-0".
  - FOR EXTERIOR 8" CMU WALLS W/ VENEER: INSTALL A 1/2" PLATE, 1/2" LESS THAN THE WIDTH OF THE WALL ASSEMBLY AND BEARING 2" MINIMUM ON EACH SIDE, AT OPENINGS 1'-4" OR LESS THAT DO NOT OCCUR BELOW OR WITHIN 24" OF A JOIST/BEAM BEARING LOCATION.
  - FOR 8" INTERIOR, NON-LOAD BEARING CMU WALLS: INSTALL LINTEL L1 AT OPENINGS 2'-0" OR LESS, LINTEL L2 GREATER THAN 2'-0", BUT LESS THAN 4'-8" AND LINTEL L3 AT OPENINGS GREATER THAN 4'-8" BUT LESS THEN OR EQUAL TO 6'-4". REFERENCE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL FOR OPENING LOCATIONS (OPENINGS IN NON-LOAD BEARING CMU WALLS ARE TYPICALLY NOT NOTED ON STRUCTURAL PLANS). DO NOT INTERRUPT CONTINUOUS BOND BEAM(S) BELOW THE TOP OF WALL.
  - NO OPENING IN ANY CMU WALL SHALL BE PLACED BELOW OR WITHIN 24" OF A BEAM BEARING LOCATION UNLESS SPECIFICALLY NOTED ON THE STRUCTURAL PLANS OR AS APPROVED BY THE ENGINEER.
  - NOTIFY ENGINEER FOR STEEL LINTEL REQUIREMENTS AT LOCATIONS NOT SPECIFICALLY ADDRESSED ON PLAN OR IN THE LINTEL SCHEDULE NOTES.
  - ALL EXTERIOR LINTELS SHALL BE GALVANIZED, REF. GENERAL NOTES AND SPECIFICATIONS.



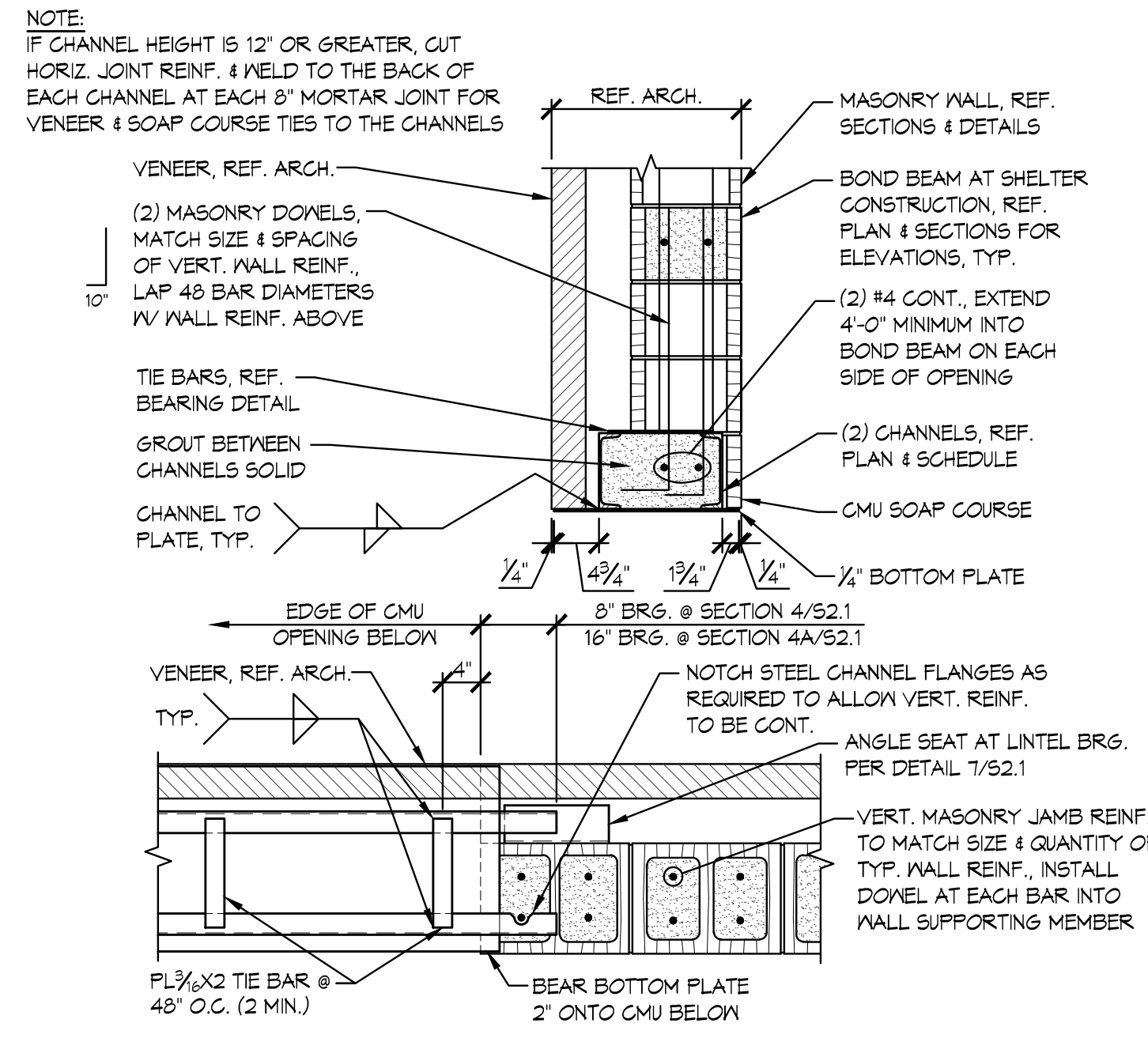
**1 BOND BEAM LINTEL DETAIL**



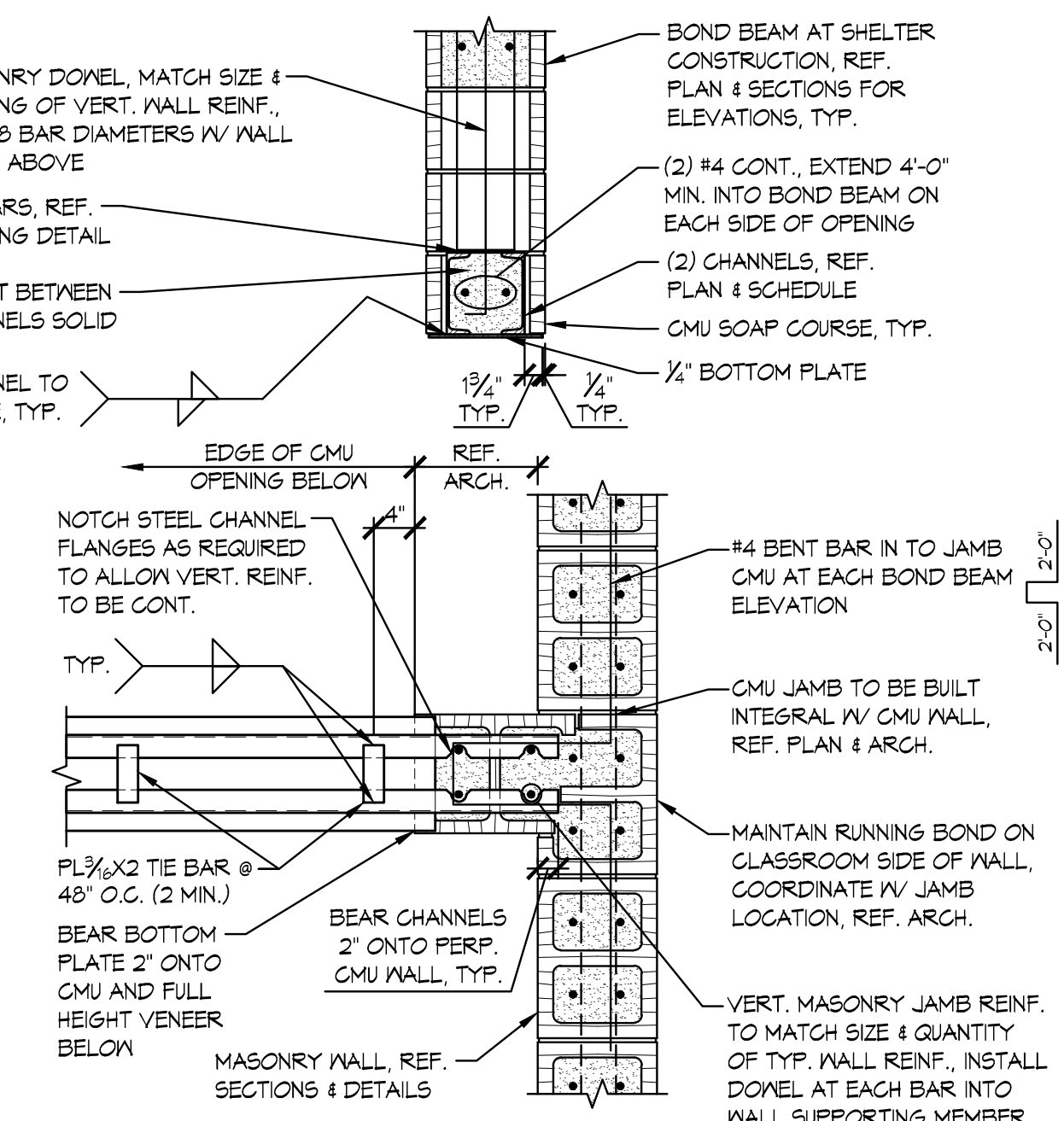
**2 DOUBLE ANGLE LINTEL DETAIL**



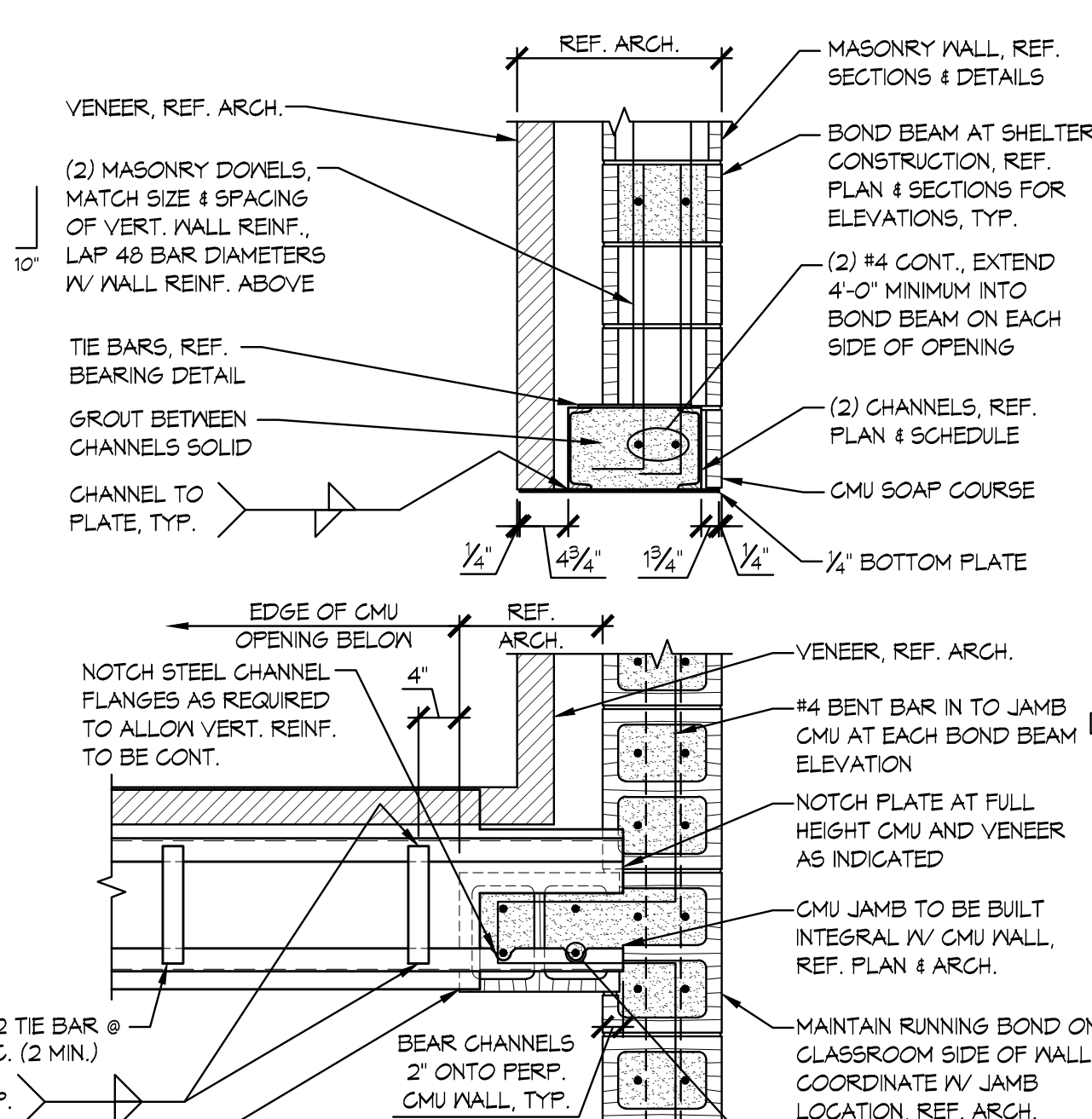
**3 STEEL CHANNEL LINTEL DETAIL**



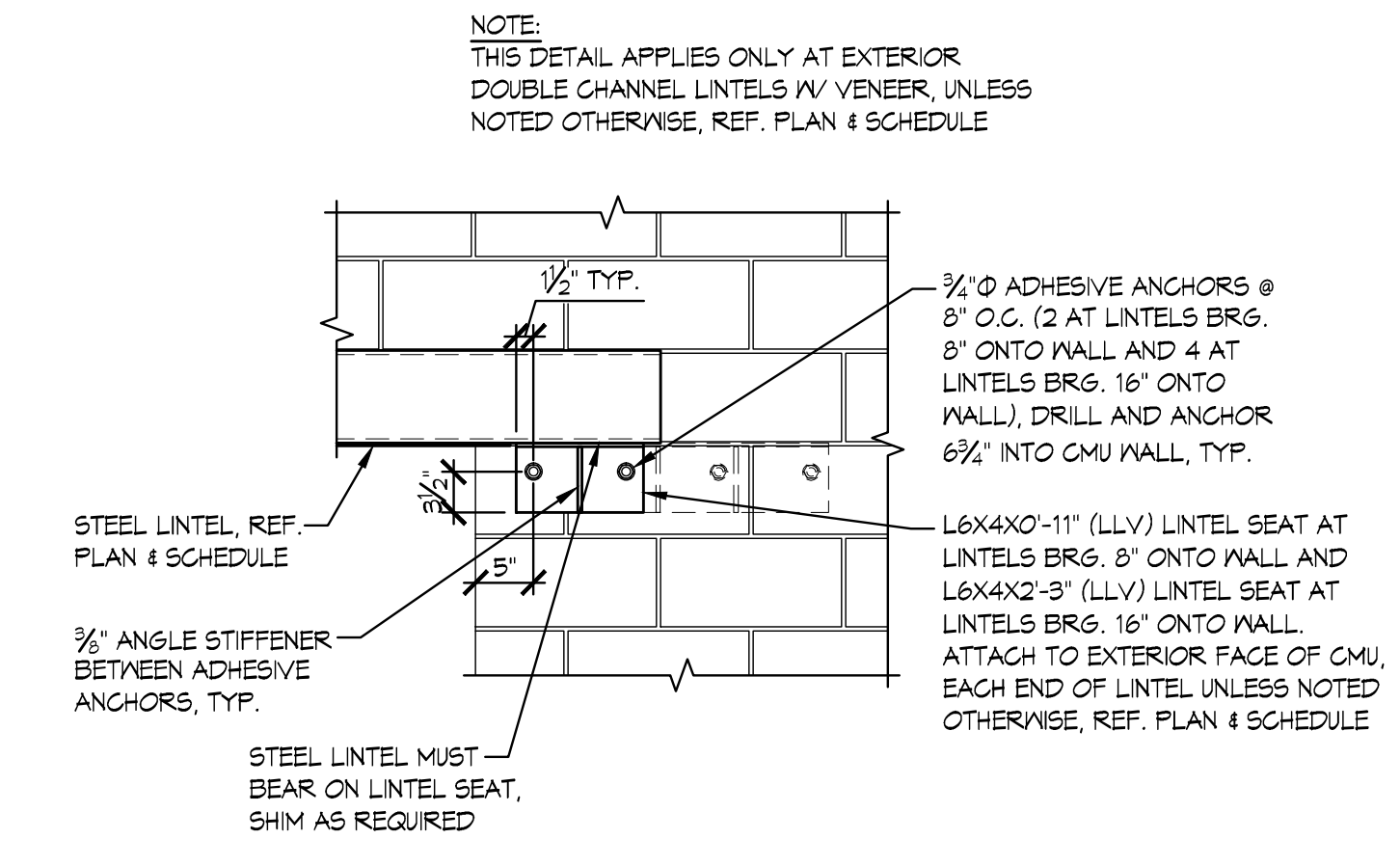
**4A EXTERIOR LINTEL SECTION**



**5 STEEL CHANNEL LINTEL DETAIL**

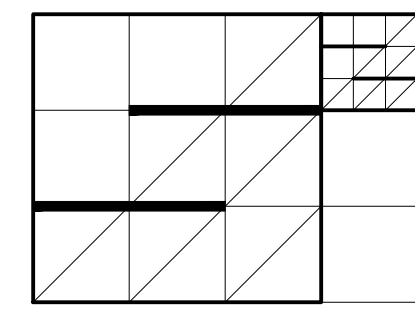


**6 STEEL CHANNEL LINTEL DETAIL**



**7 EXTERIOR LINTEL BEARING DETAIL**

**7 EXTERIOR LINTEL BEARING DETAIL**



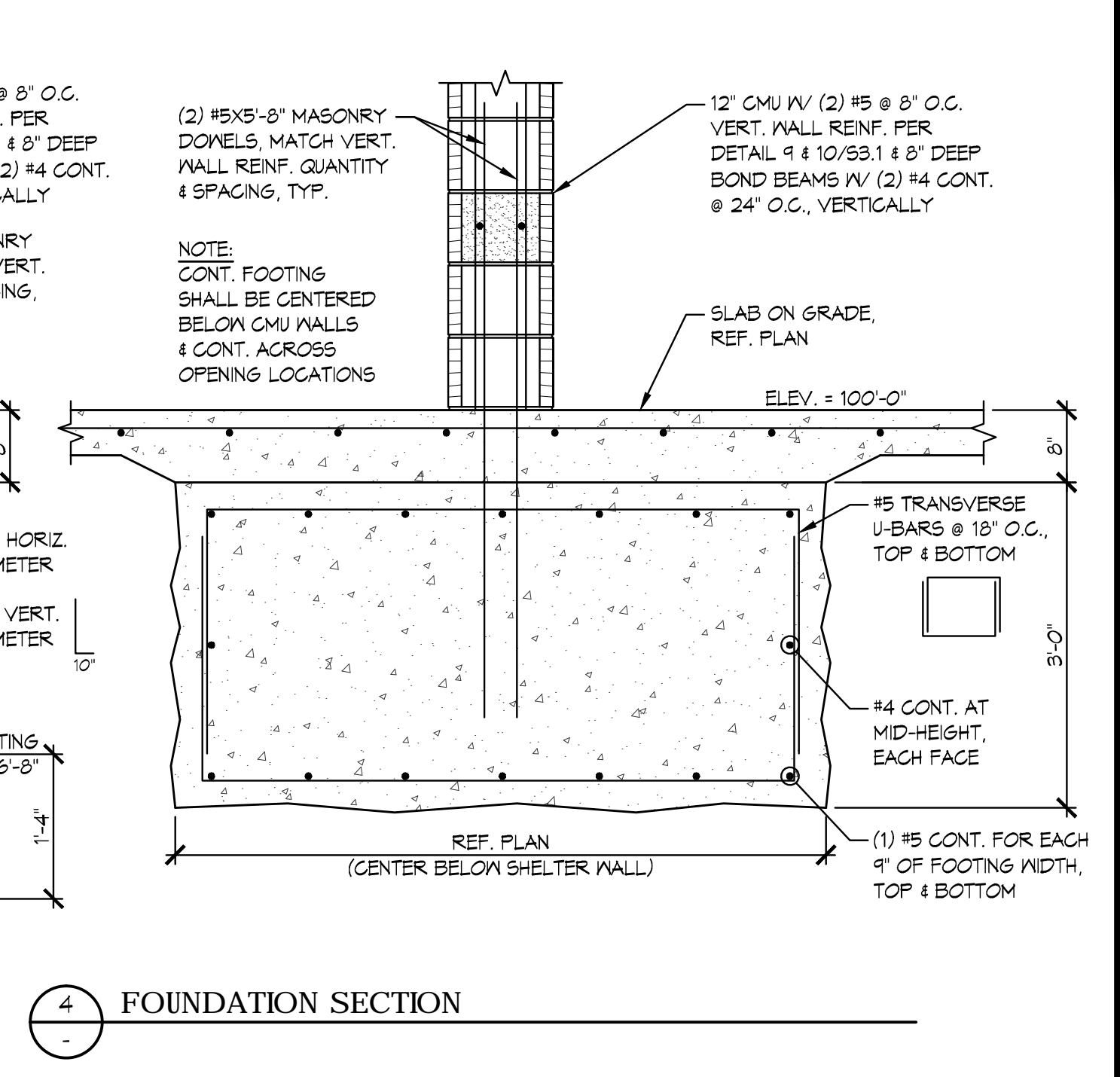
**SCHULTZ<sup>2</sup>**  
**ARCHITECTS LLC**  
 1999 NORTH AMIDON, SUITE 373  
 WICHITA, KANSAS 67203  
 PHONE: 316-625-7745

Revisions:

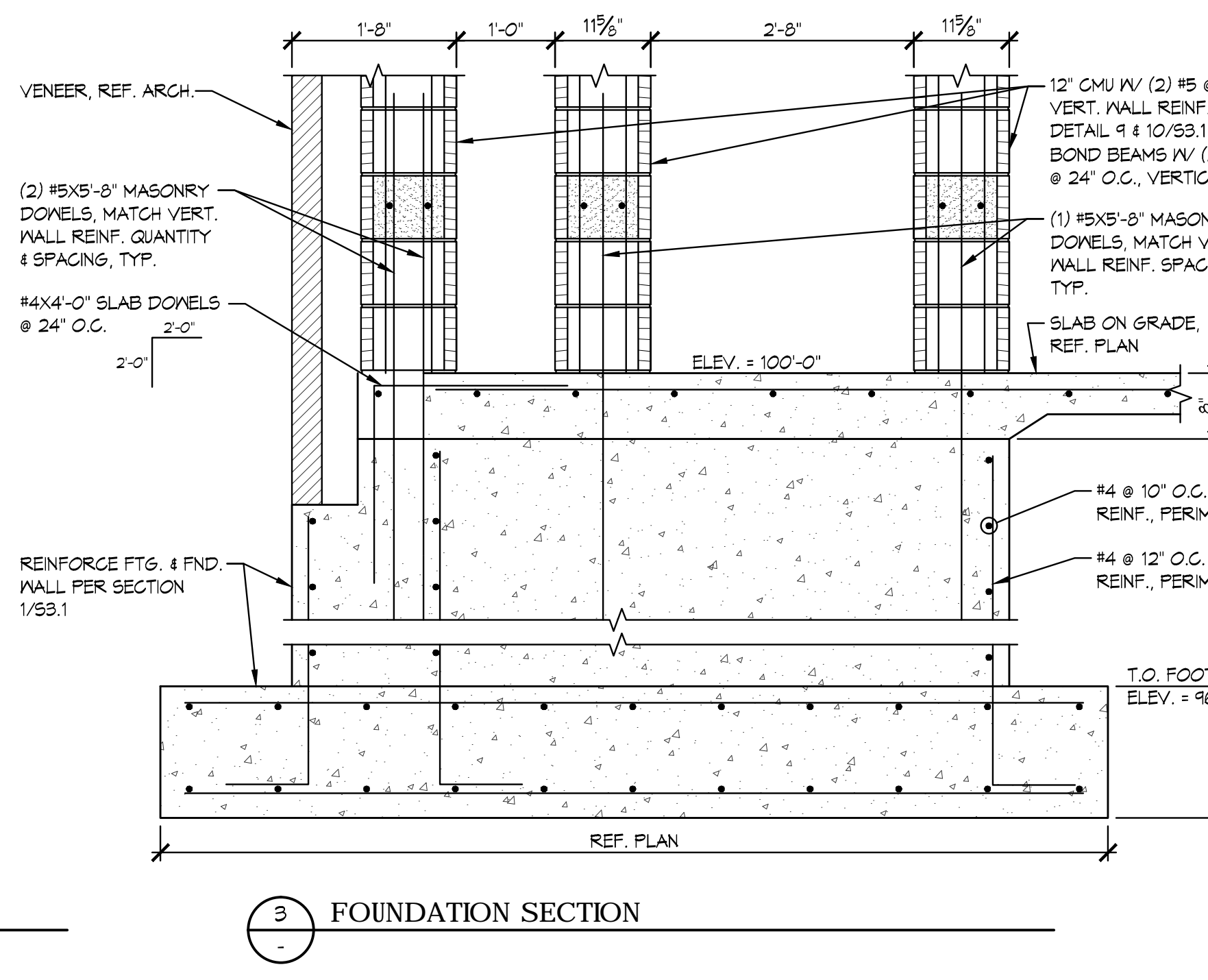
No.	Description	Date

Project #: 14121.1  
 Date: 4-30-15  
 Sheet Title: FOUNDATION SECTIONS  
 Drawn By: MCO  
 Checked By: SAM

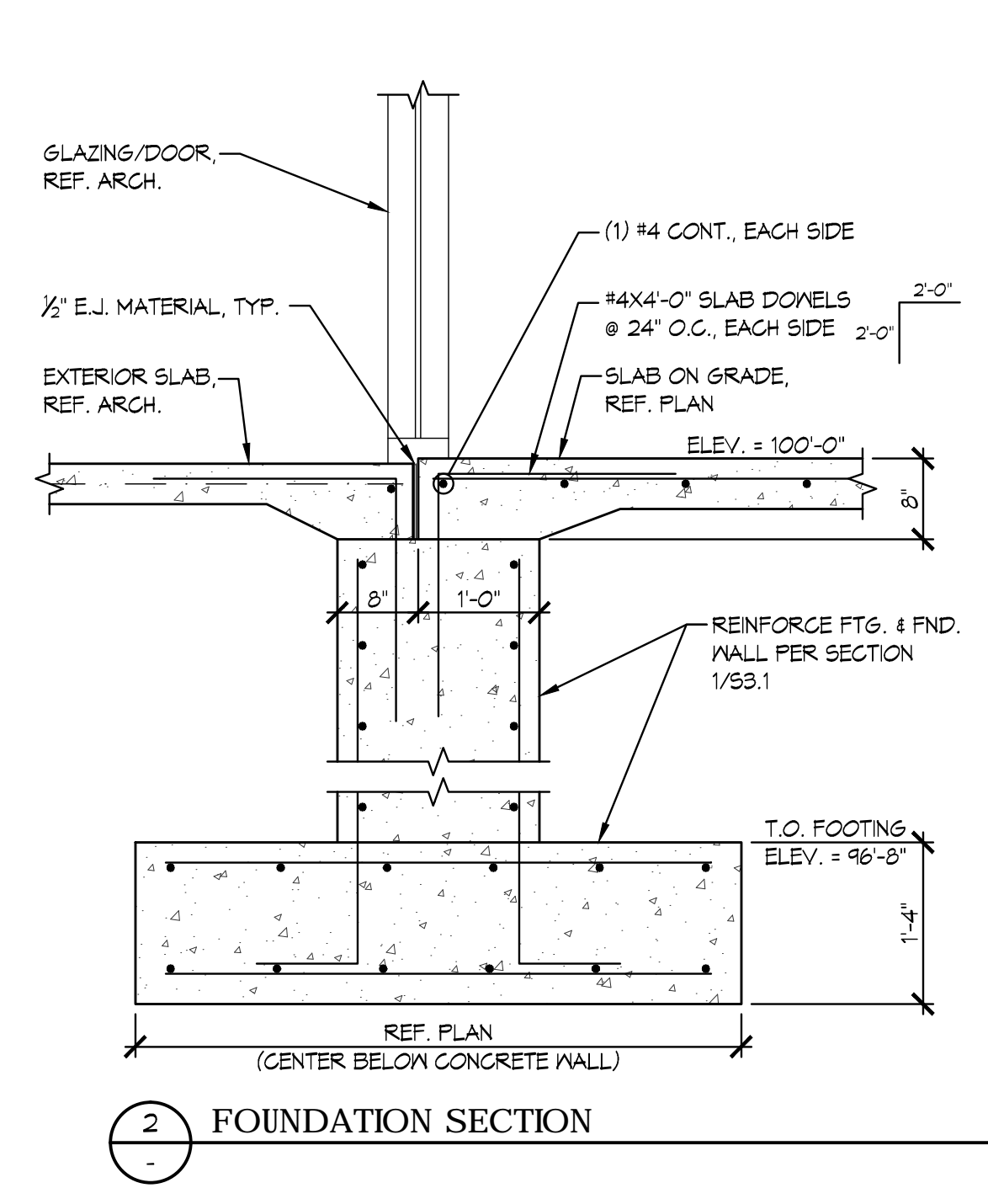
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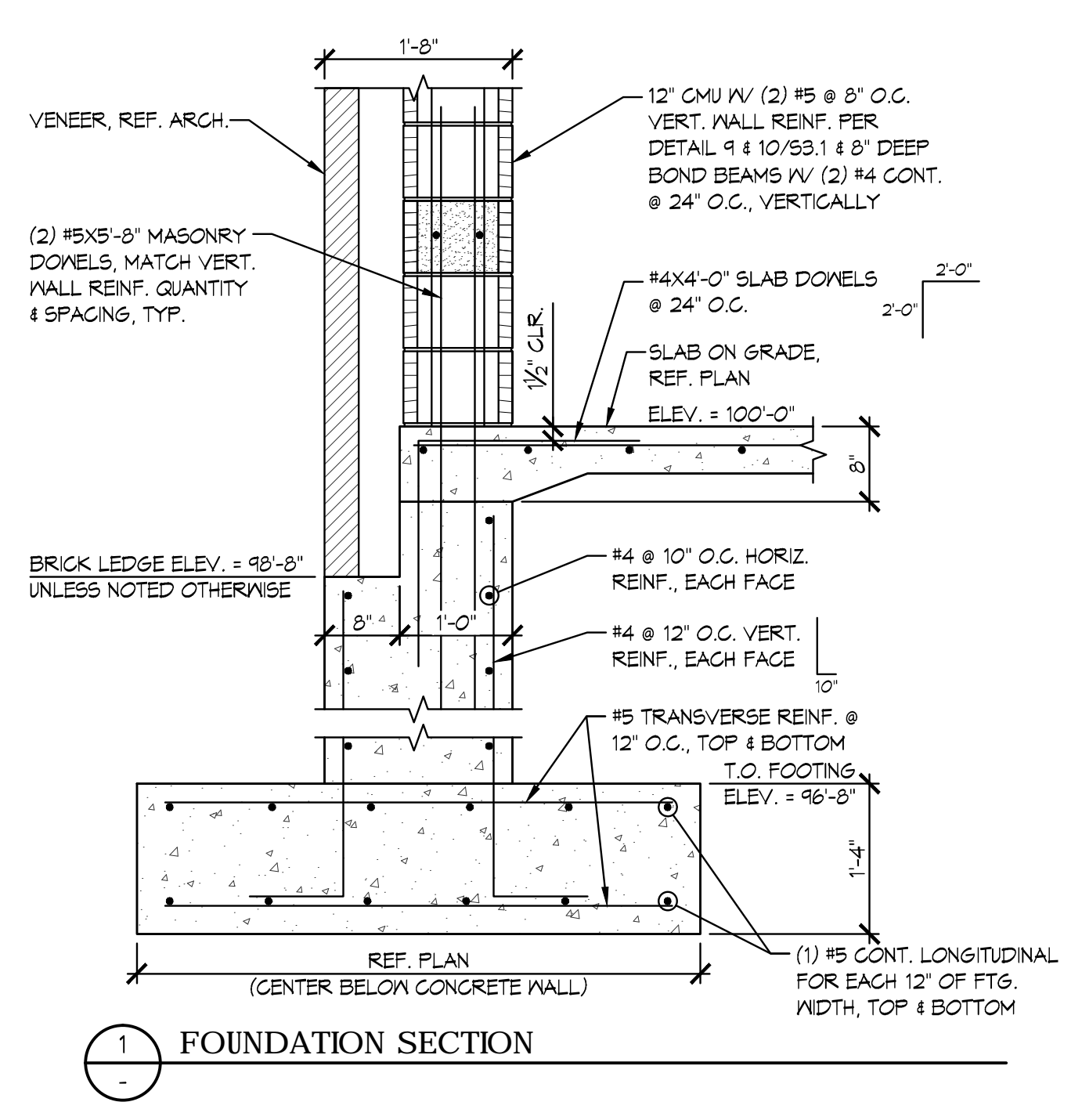
4 FOUNDATION SECTION



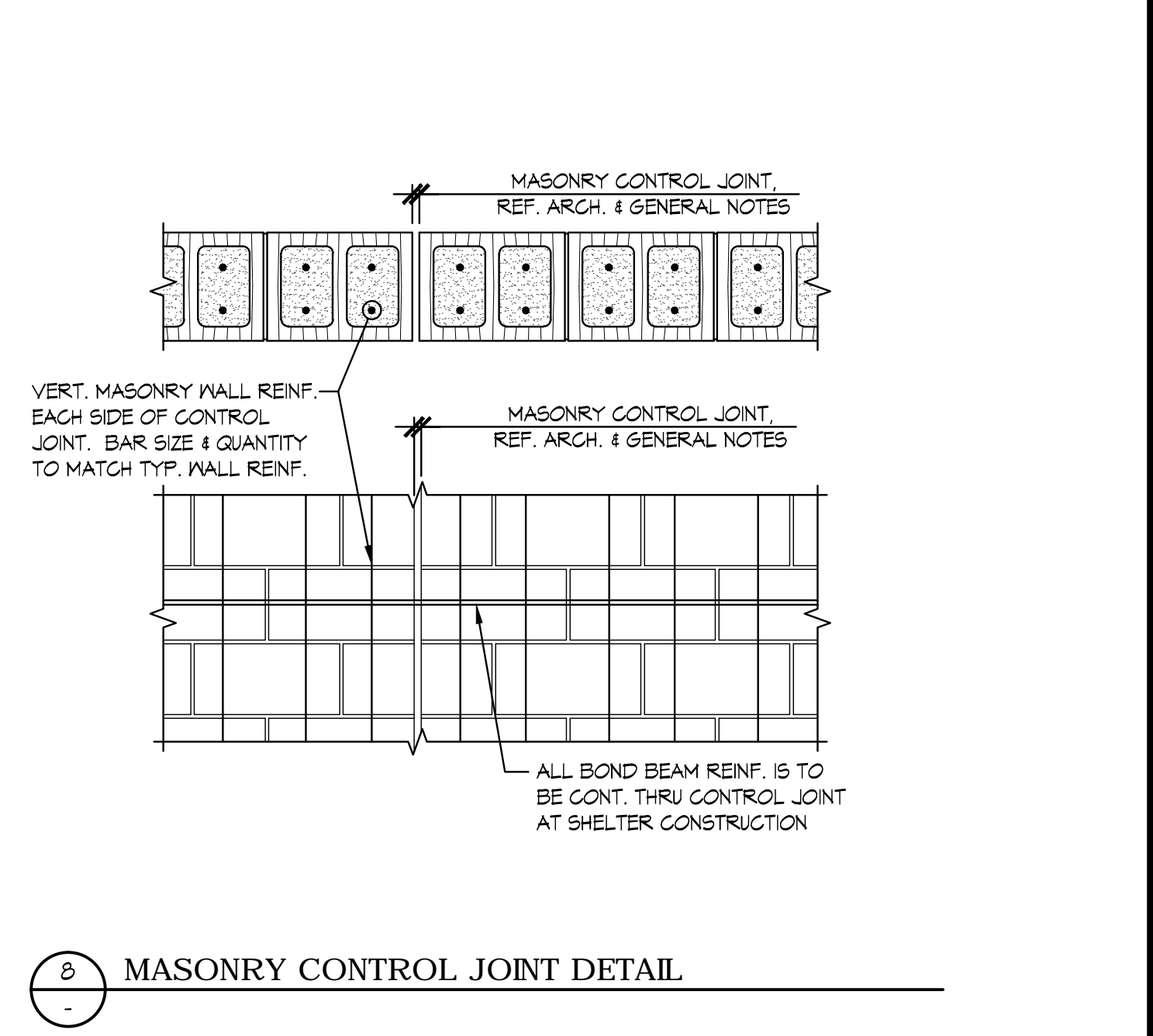
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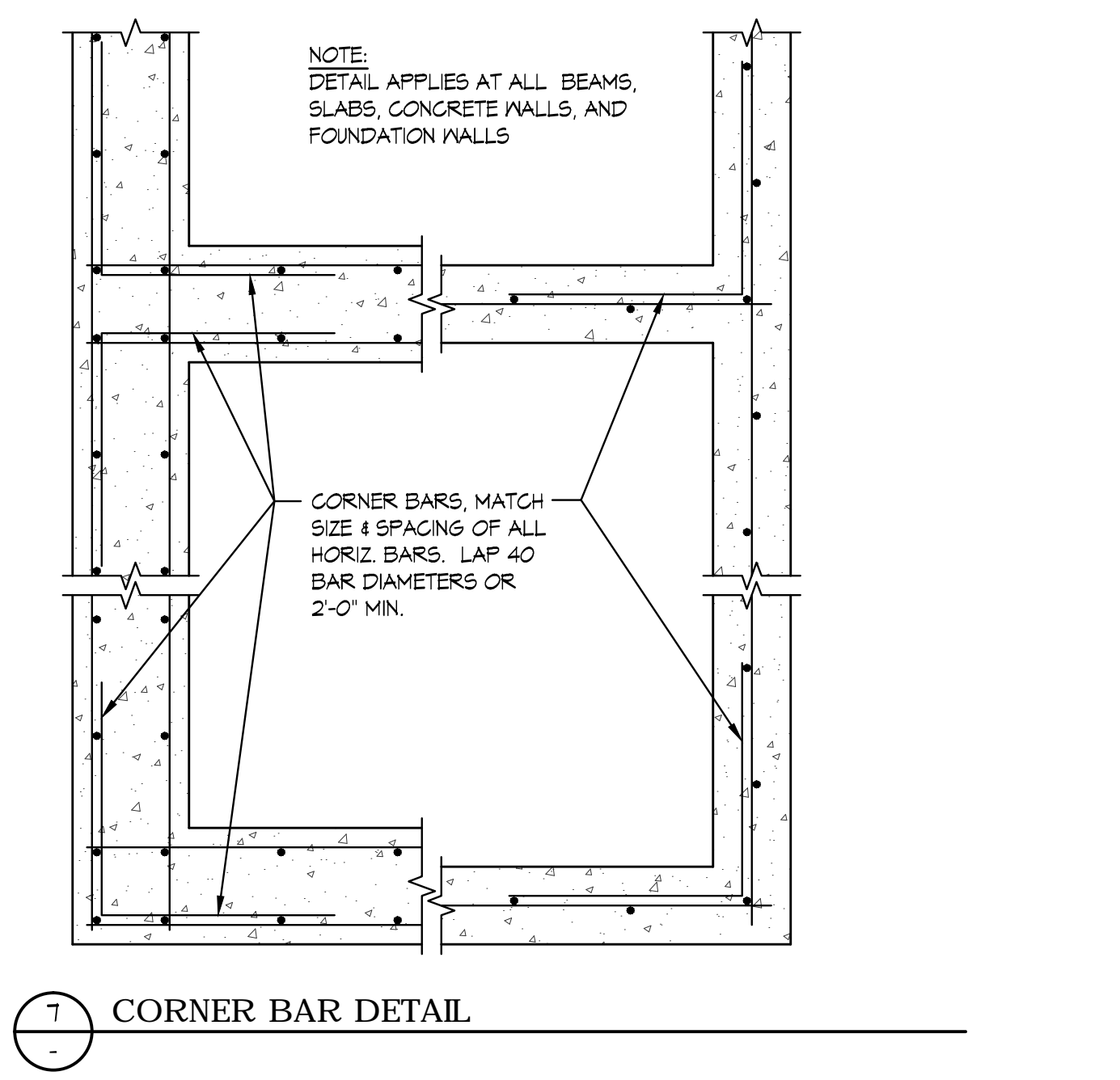
2 FOUNDATION SECTION



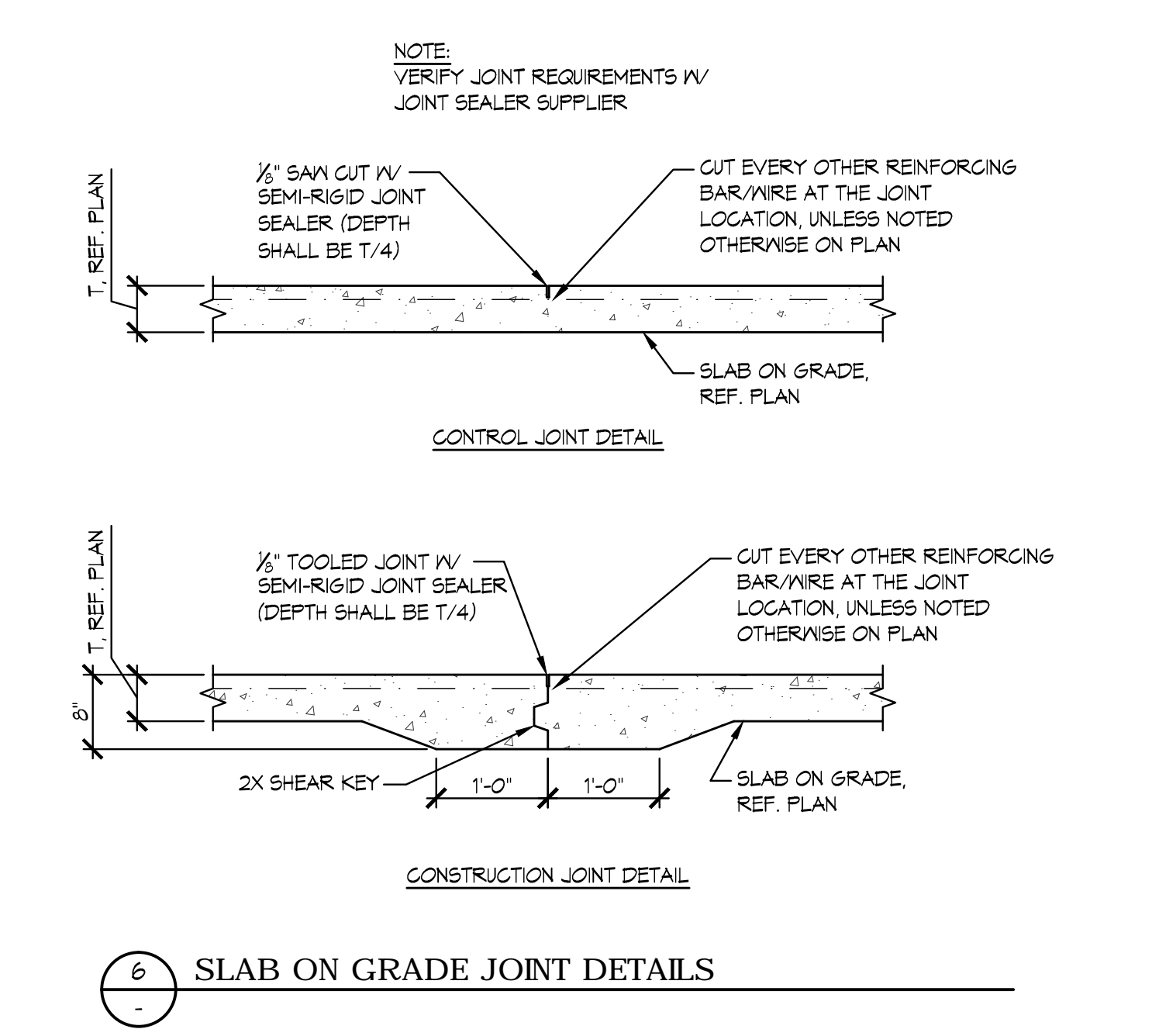
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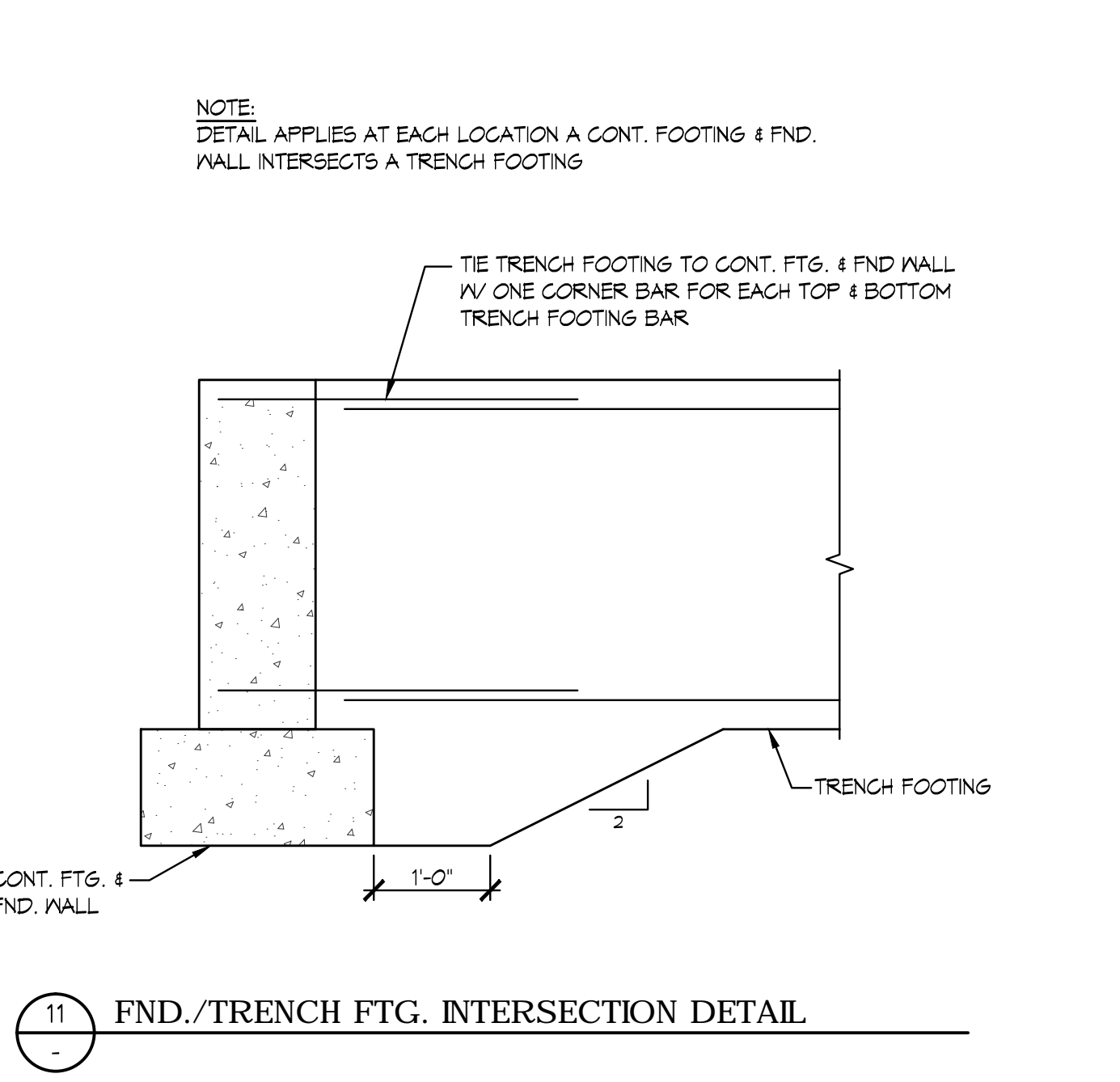
8 MASONRY CONTROL JOINT DETAIL



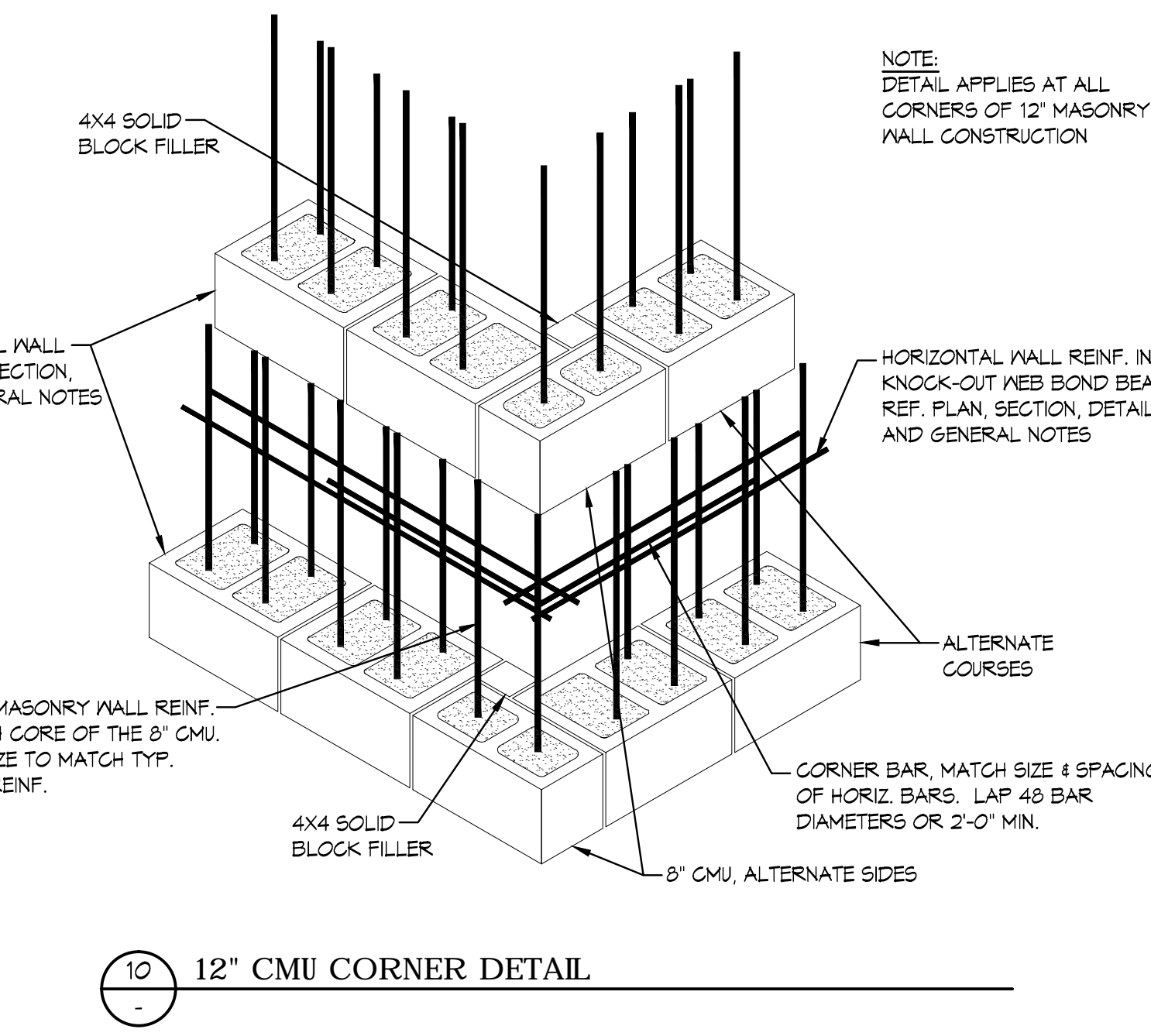
7 CORNER BAR DETAIL



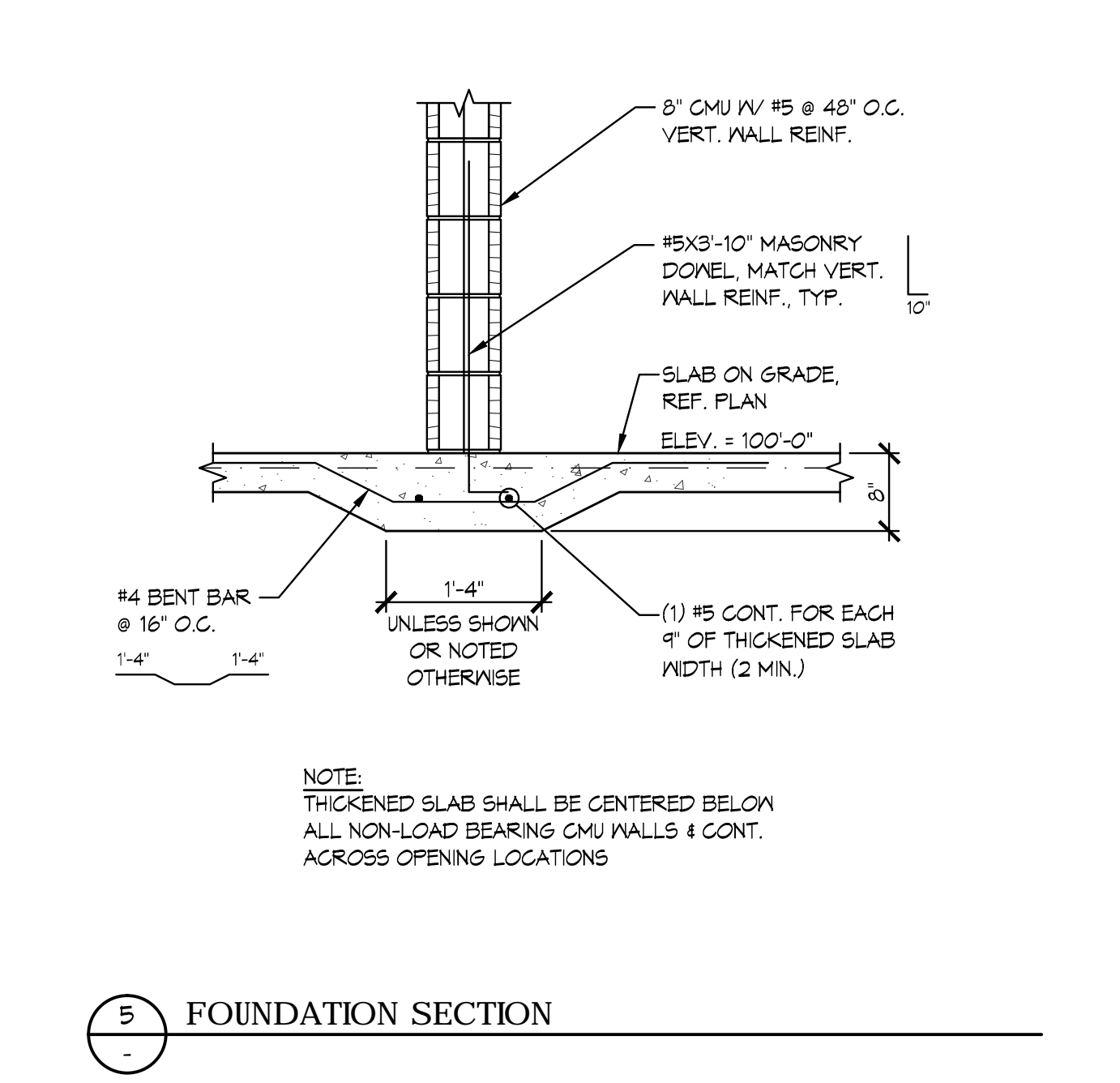
6 SLAB ON GRADE JOINT DETAILS



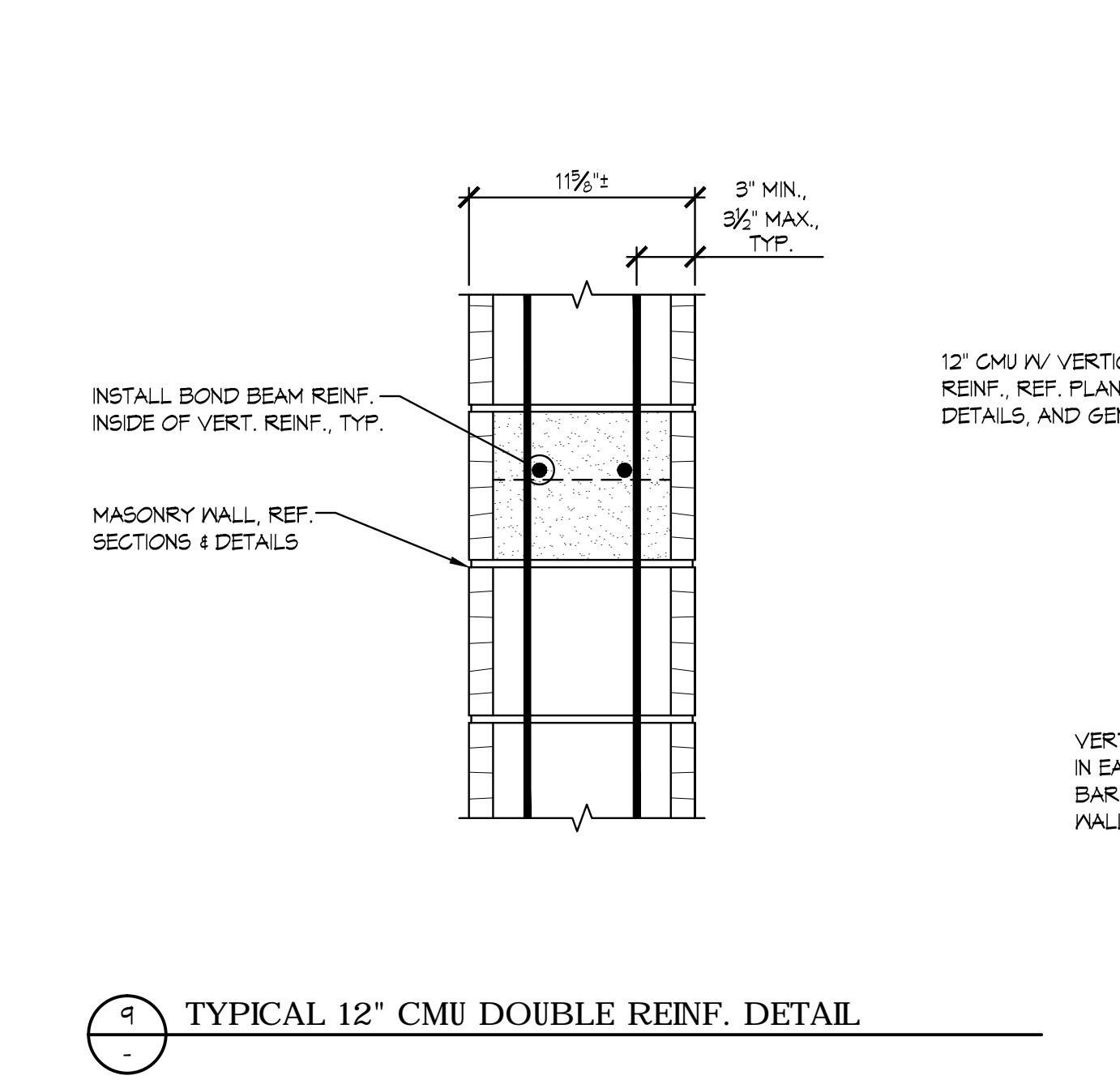
11 FND./TRENCH FTG. INTERSECTION DETAIL



10 12" CMU CORNER DETAIL

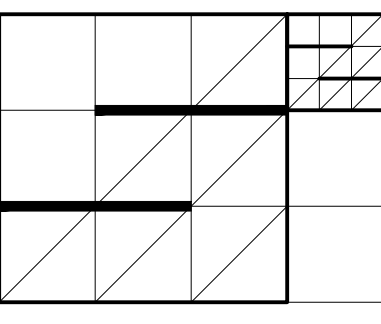


5 FOUNDATION SECTION



9 TYPICAL 12" CMU DOUBLE REINF. DETAIL

5/15/2015 1:51:20 PM

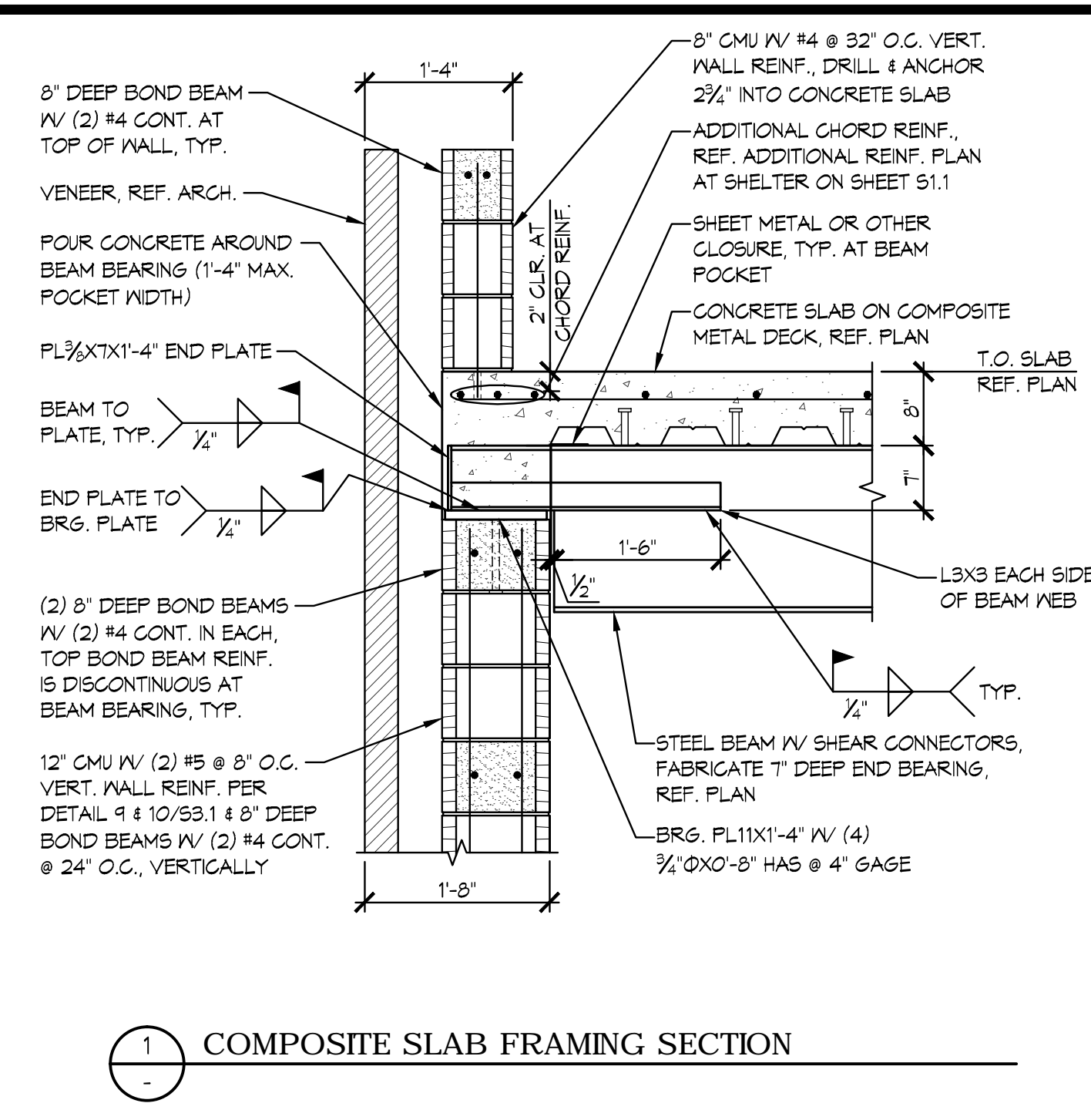


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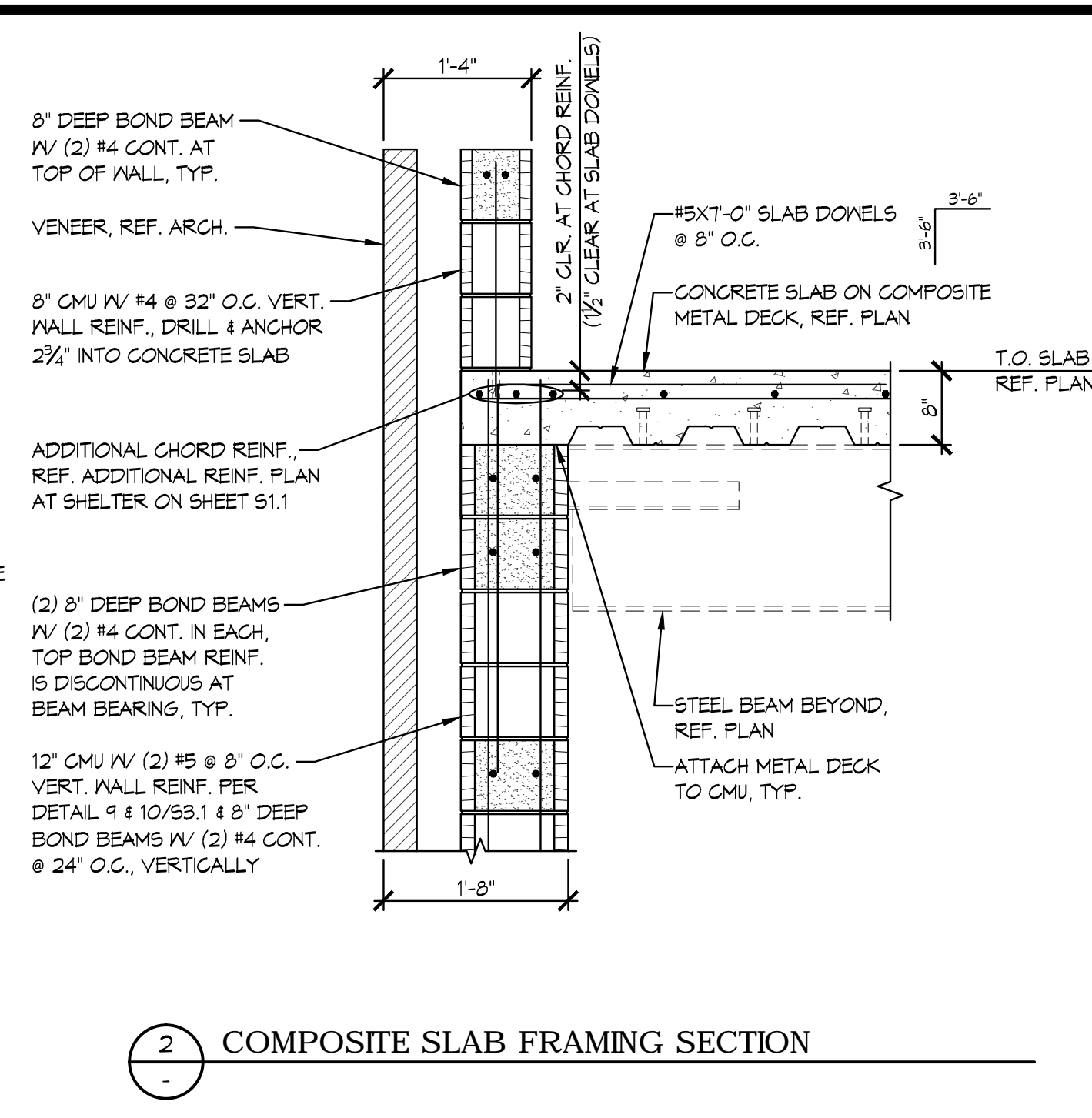
Revisions:

No.	Description	Date

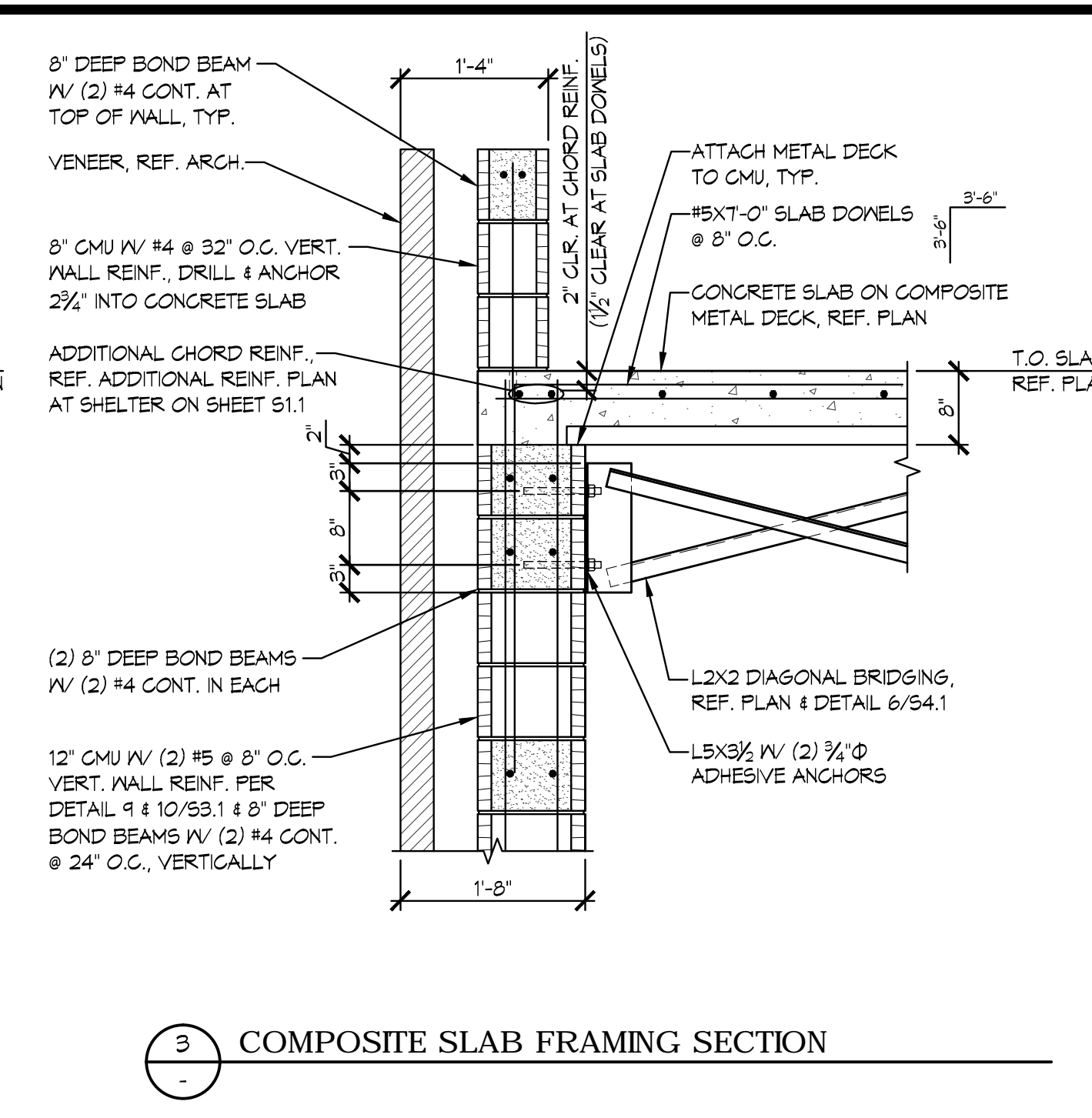
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 Date: **4-30-15**  
 Sheet Title: **FRAMING SECTIONS**  
 Drawn By: **MCO**  
 Checked By: **SAM**



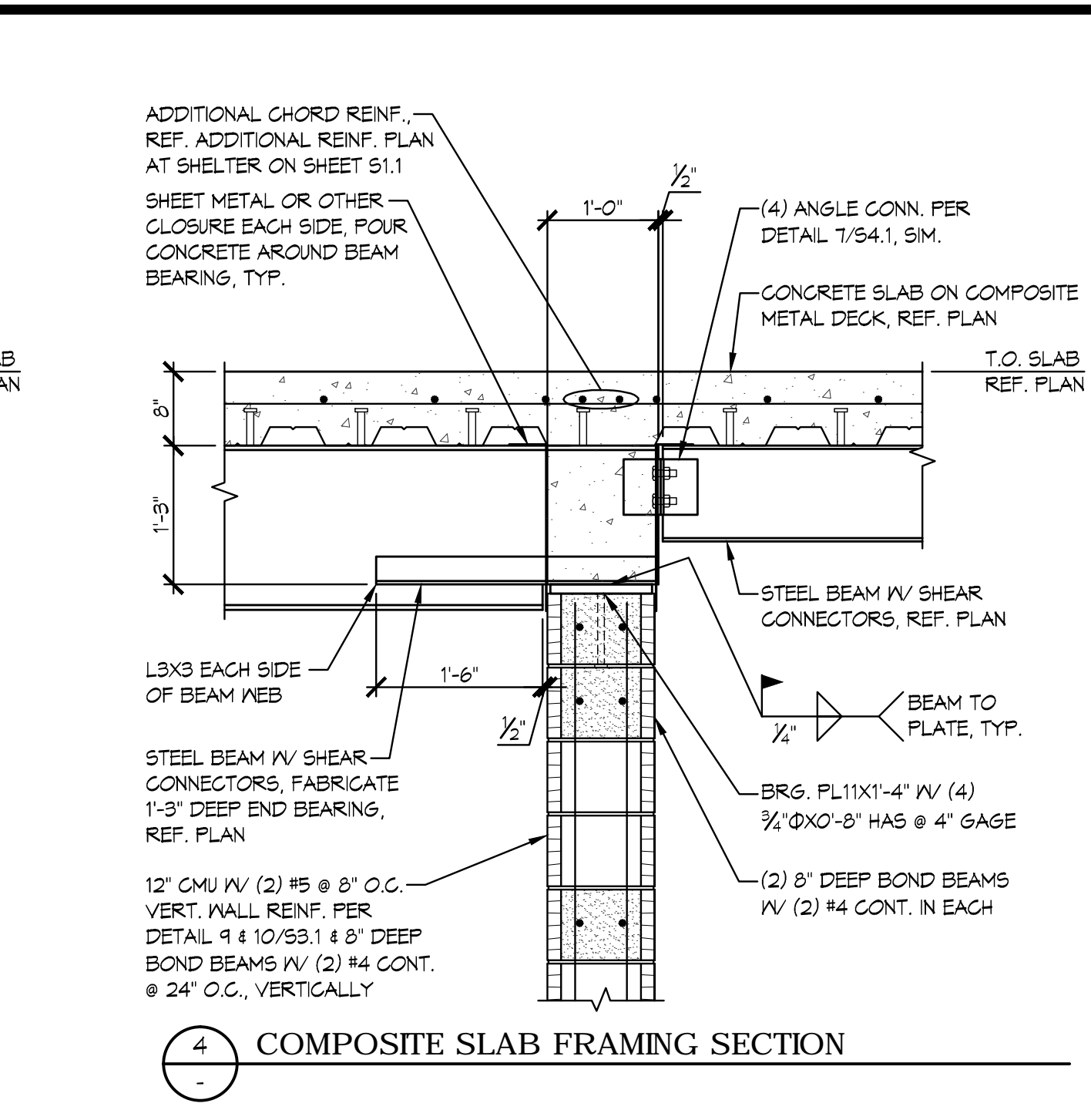
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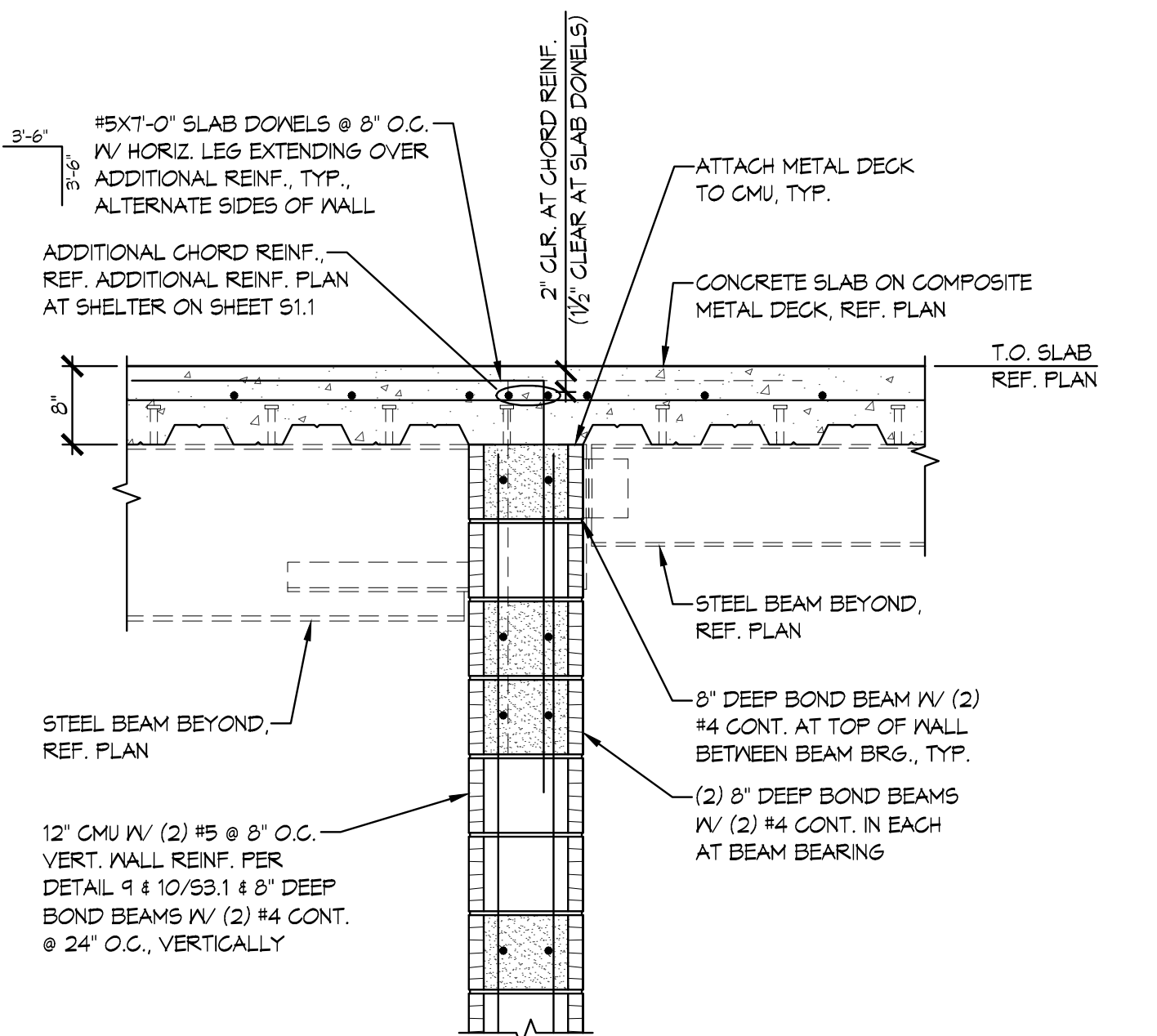
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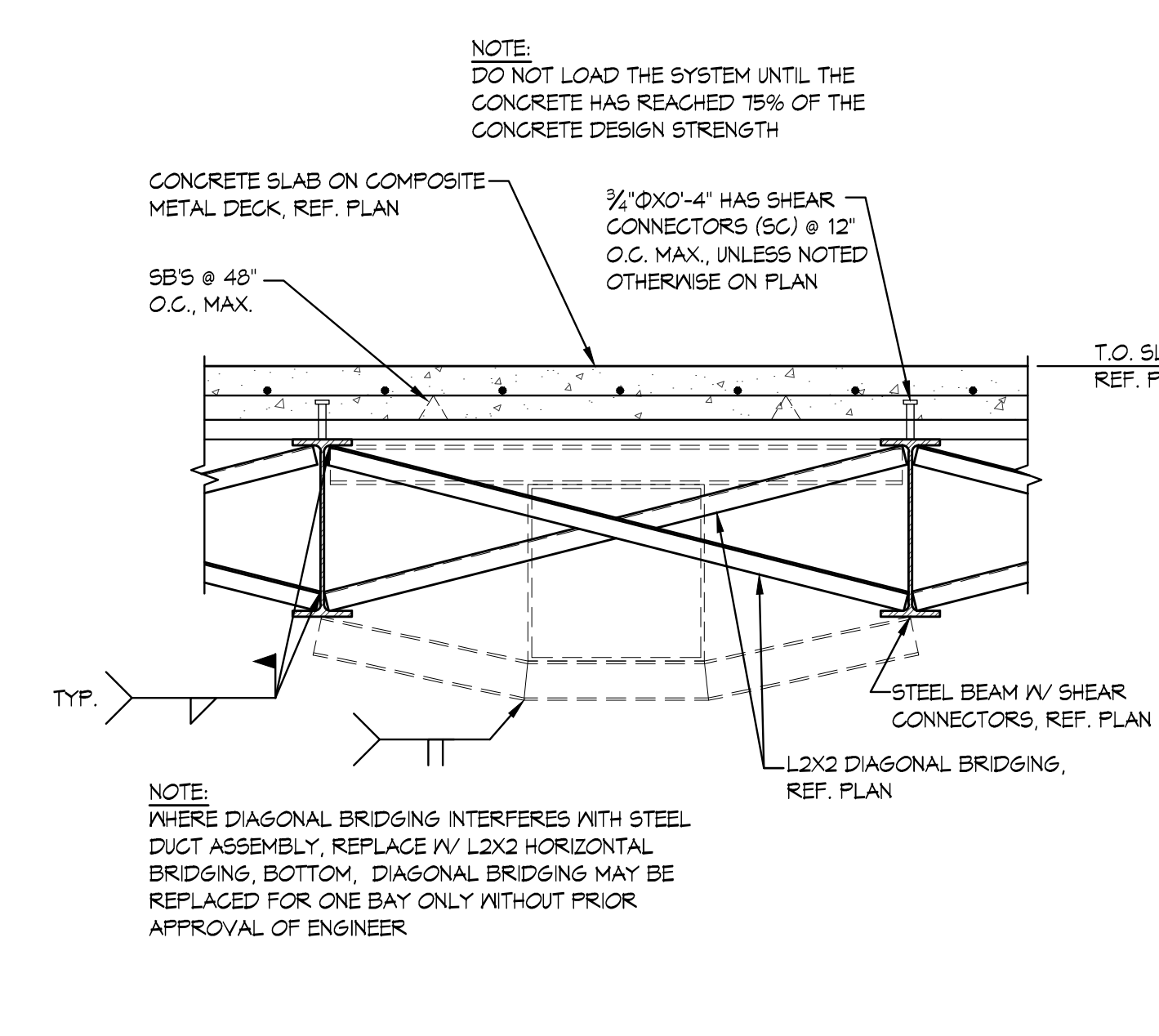
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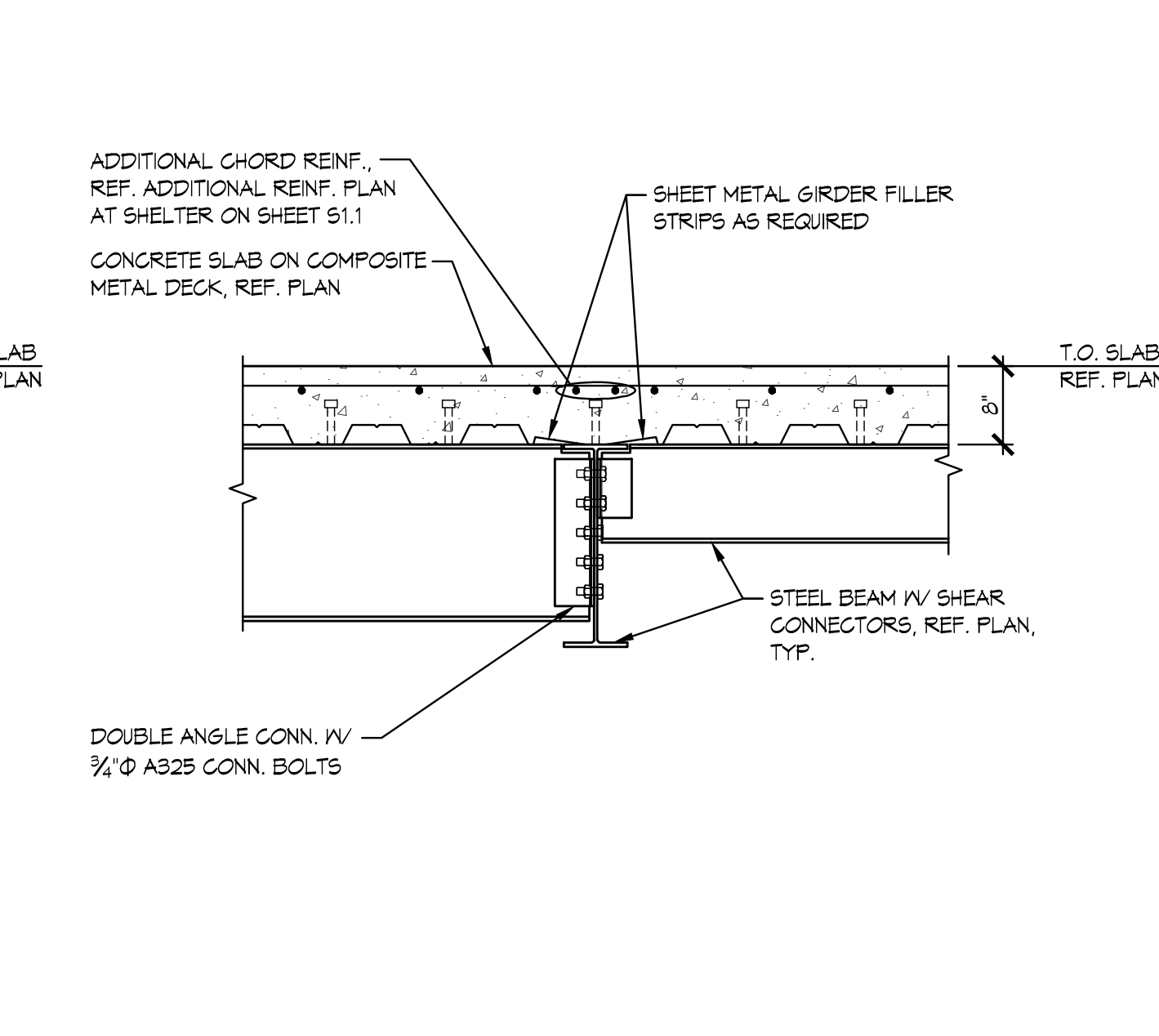
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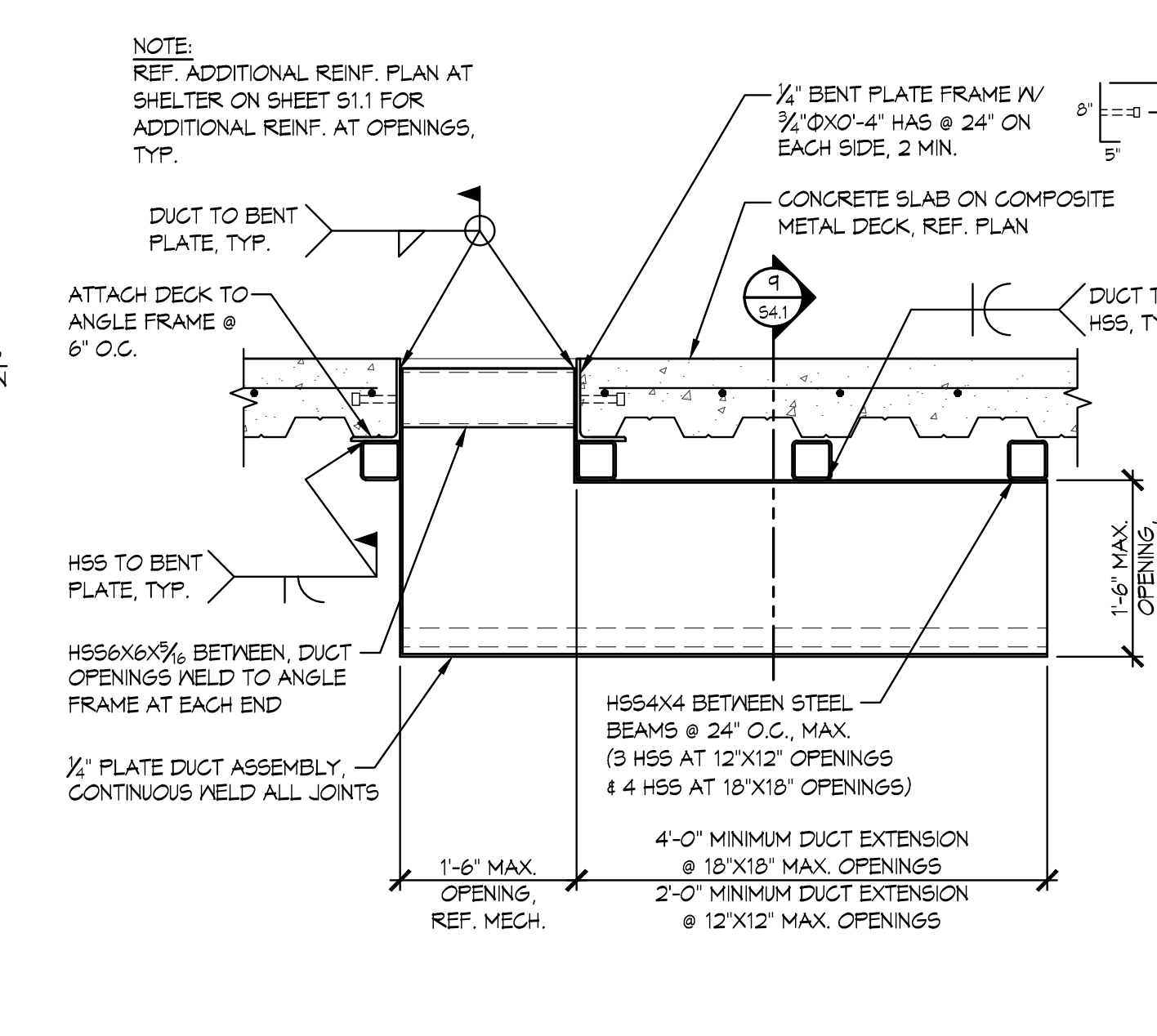
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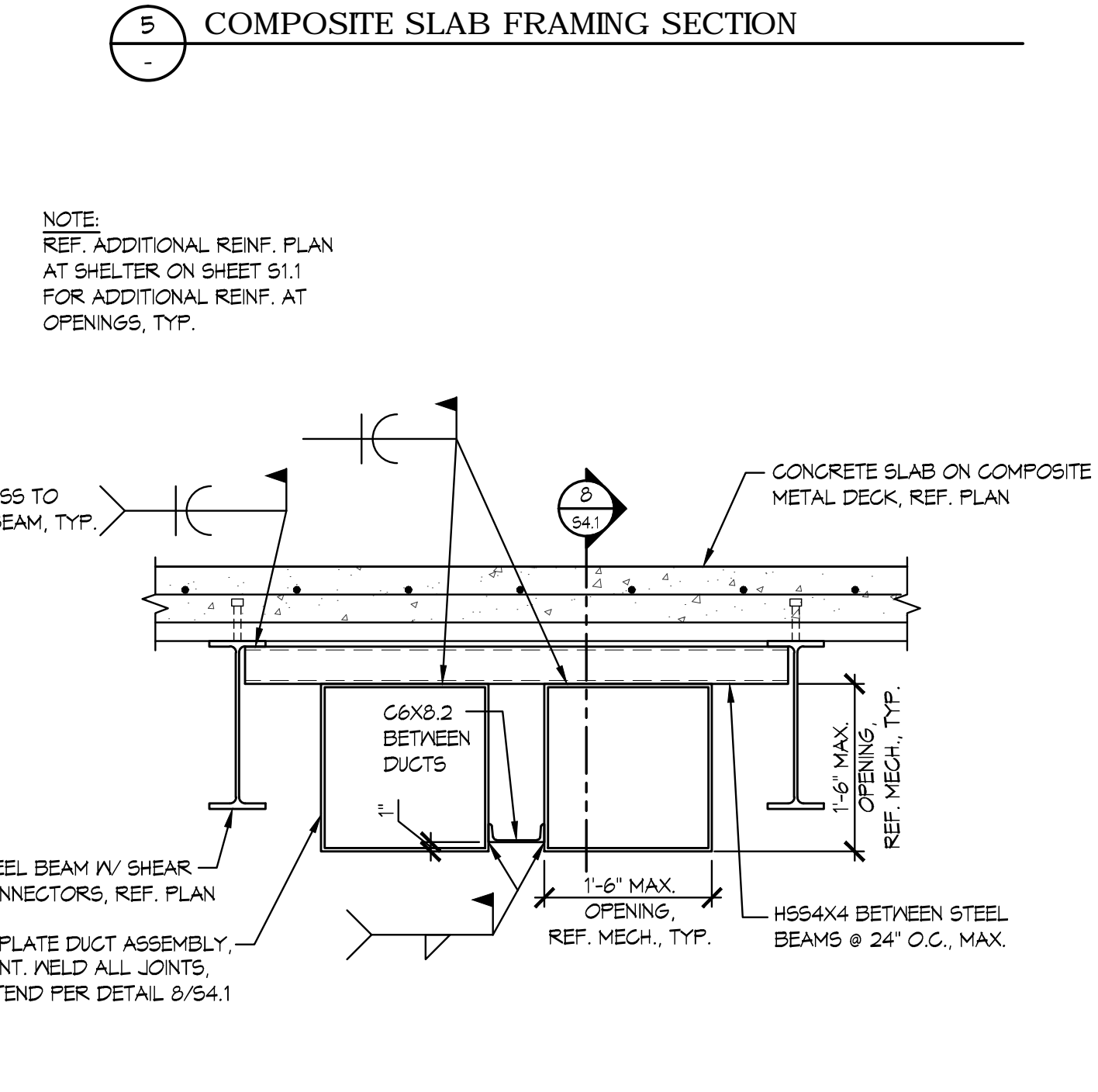
6 COMPOSITE SLAB FRAMING SECTION



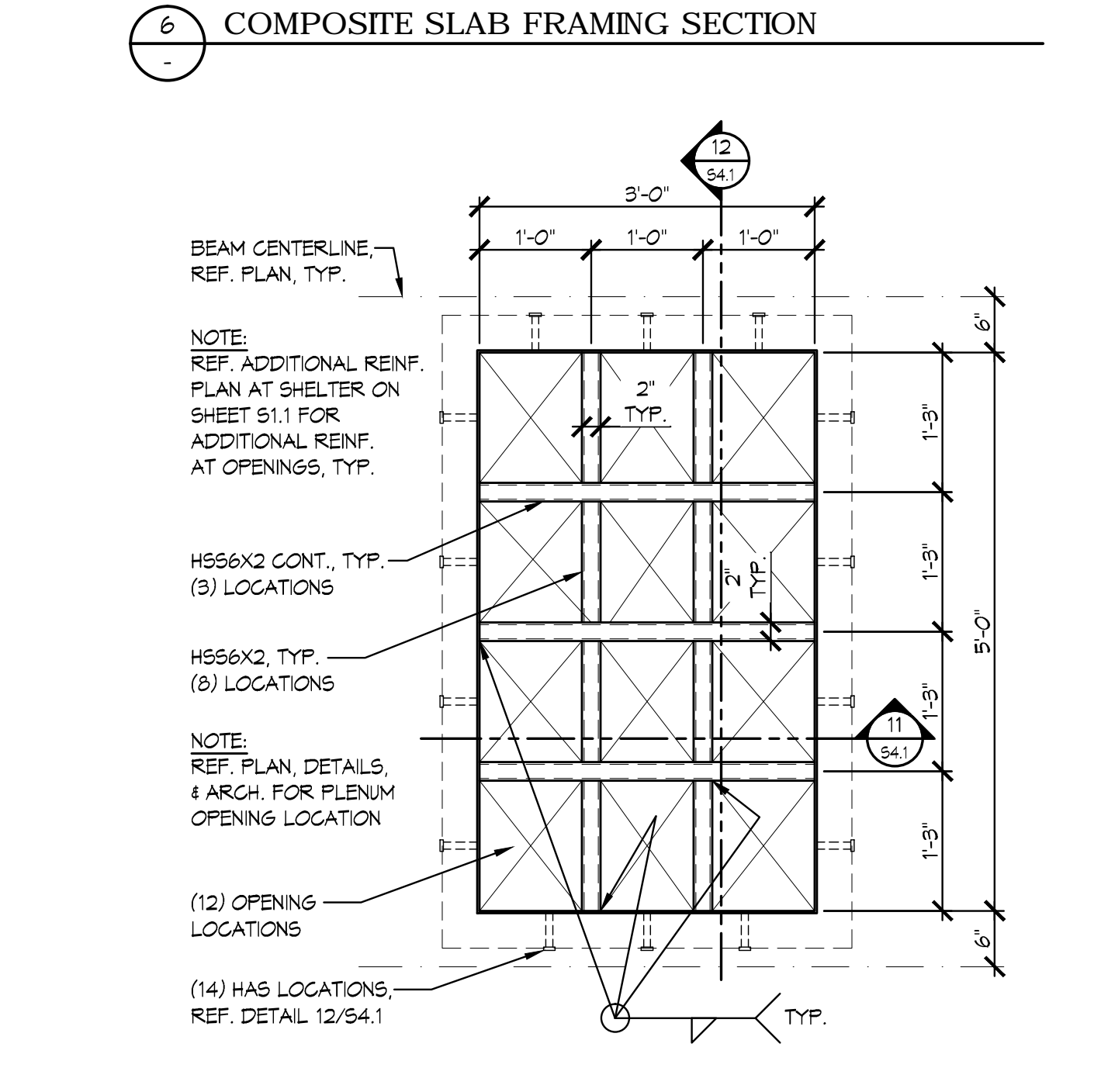
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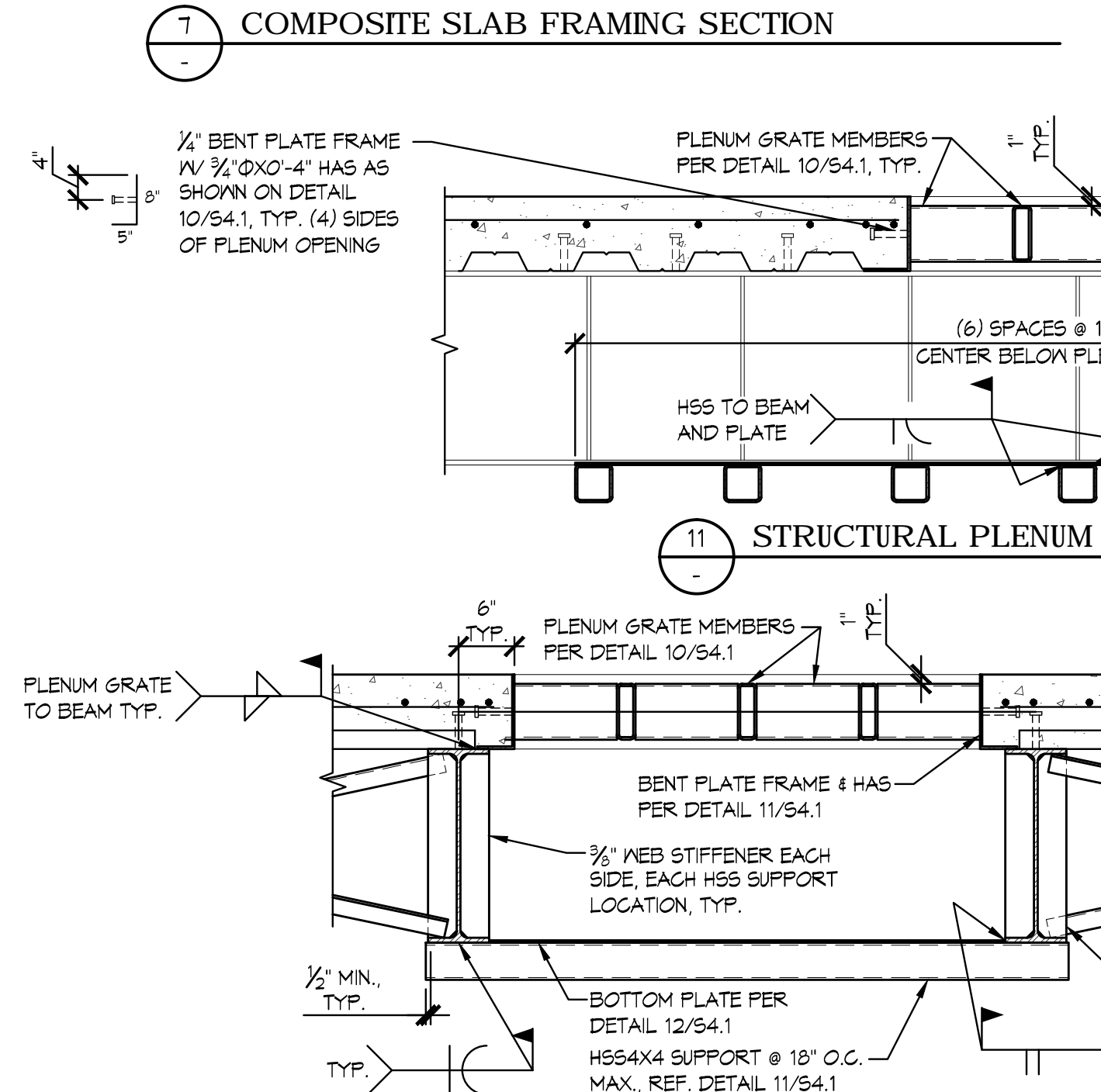
8 STRUCTURAL DUCT ASSEMBLY DETAIL



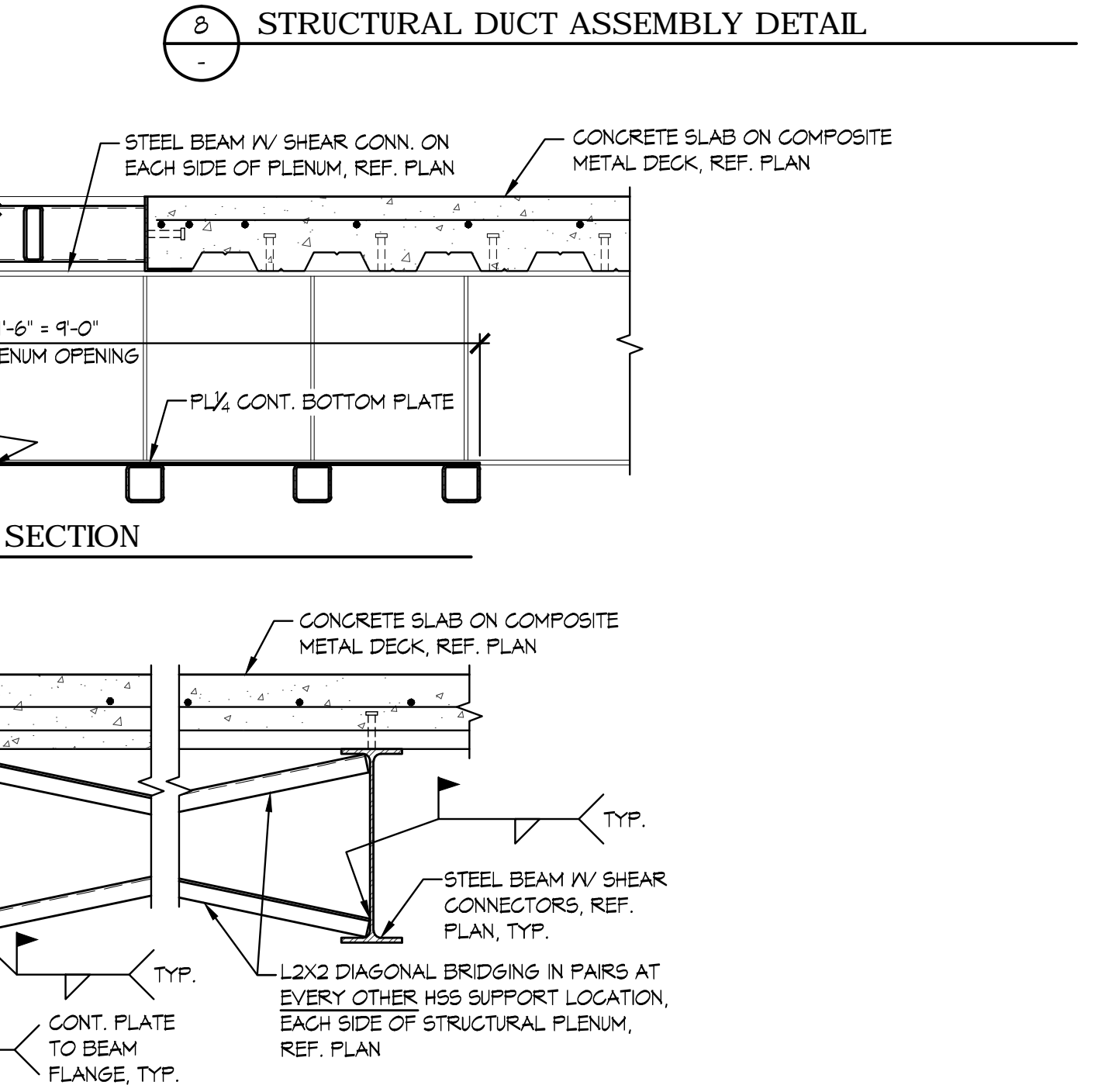
9 STRUCTURAL DUCT ASSEMBLY DETAIL



10 STRUCTURAL PLENUM GRATE DETAIL



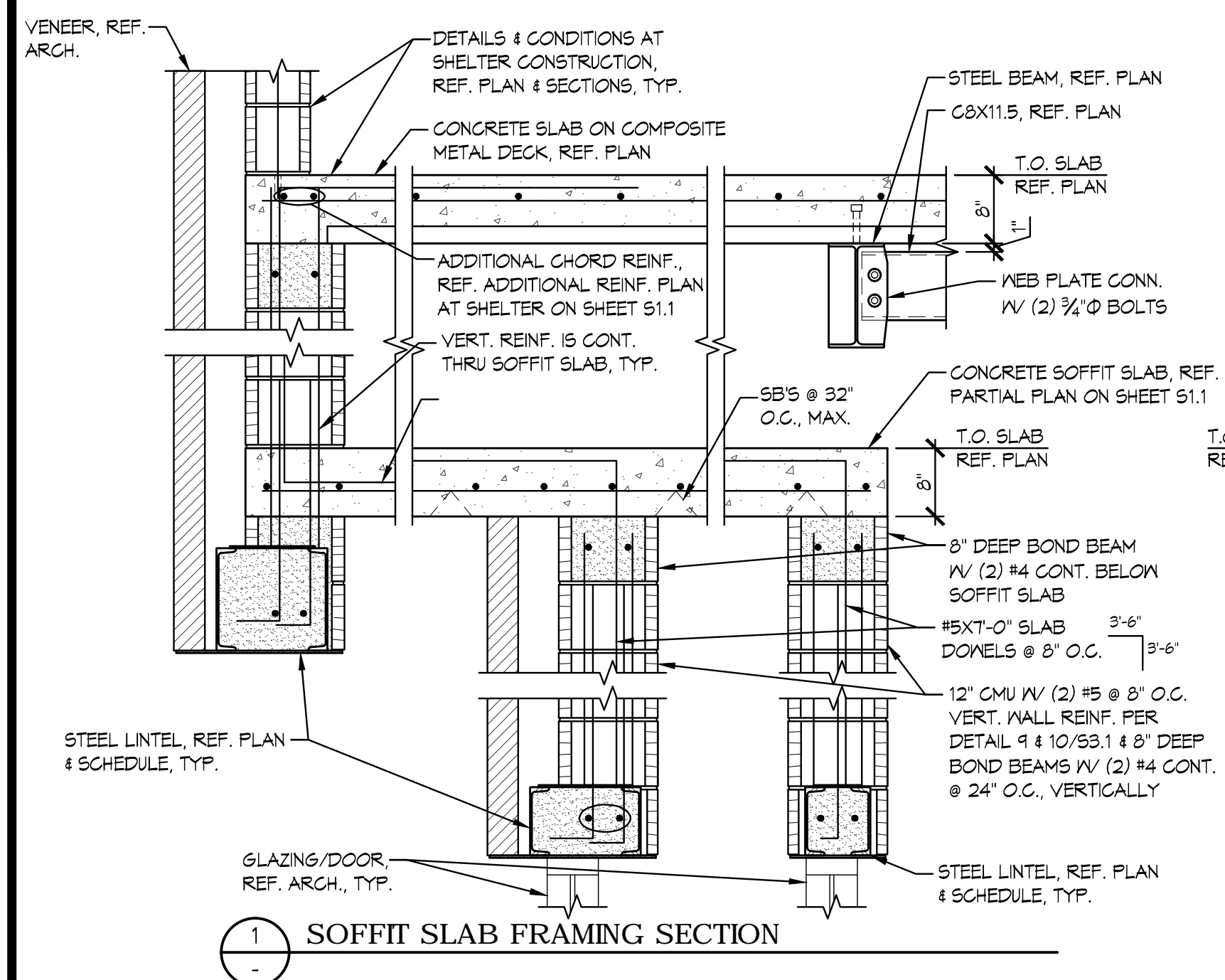
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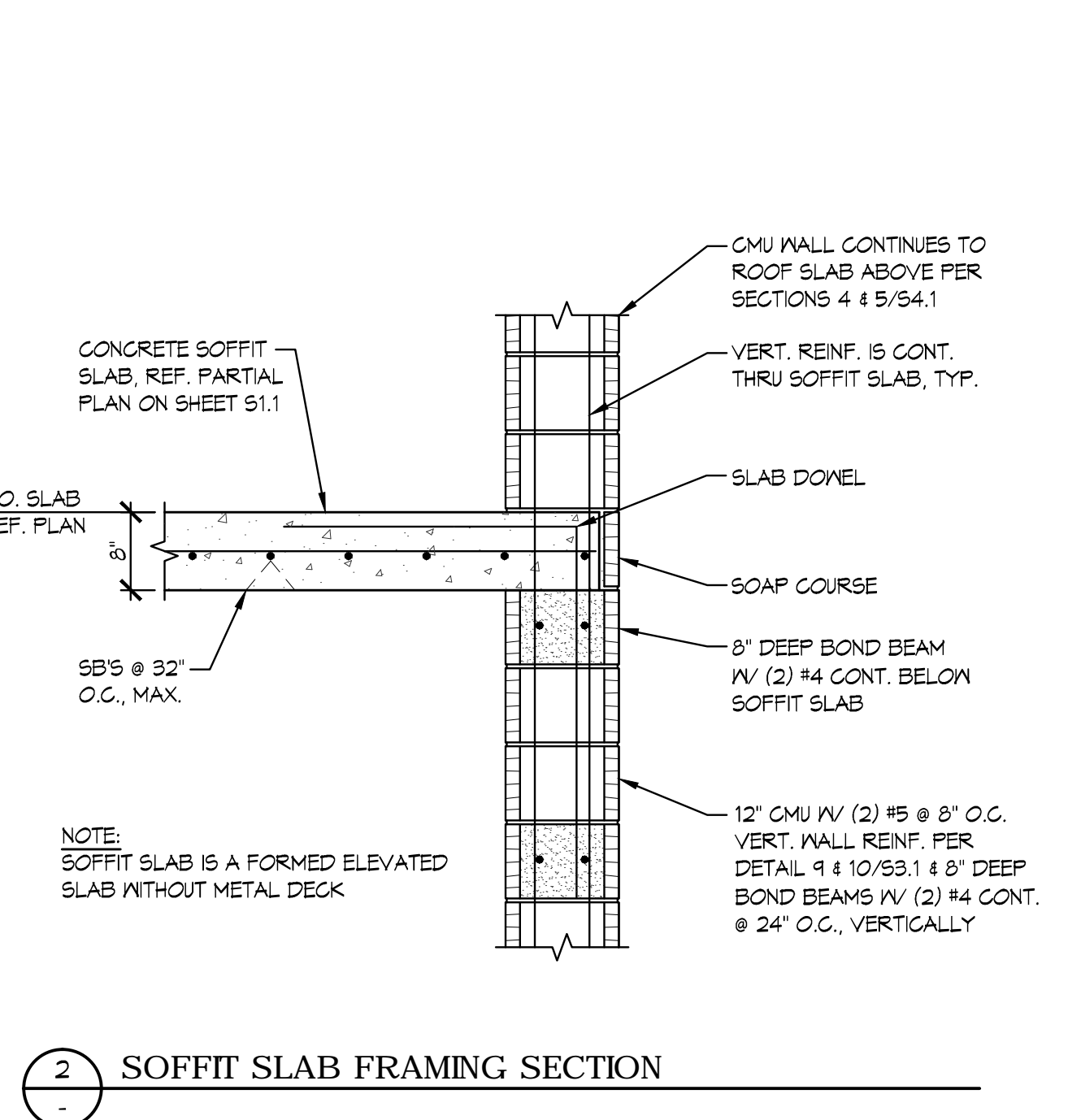
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4/29/2015 8:38:55 AM

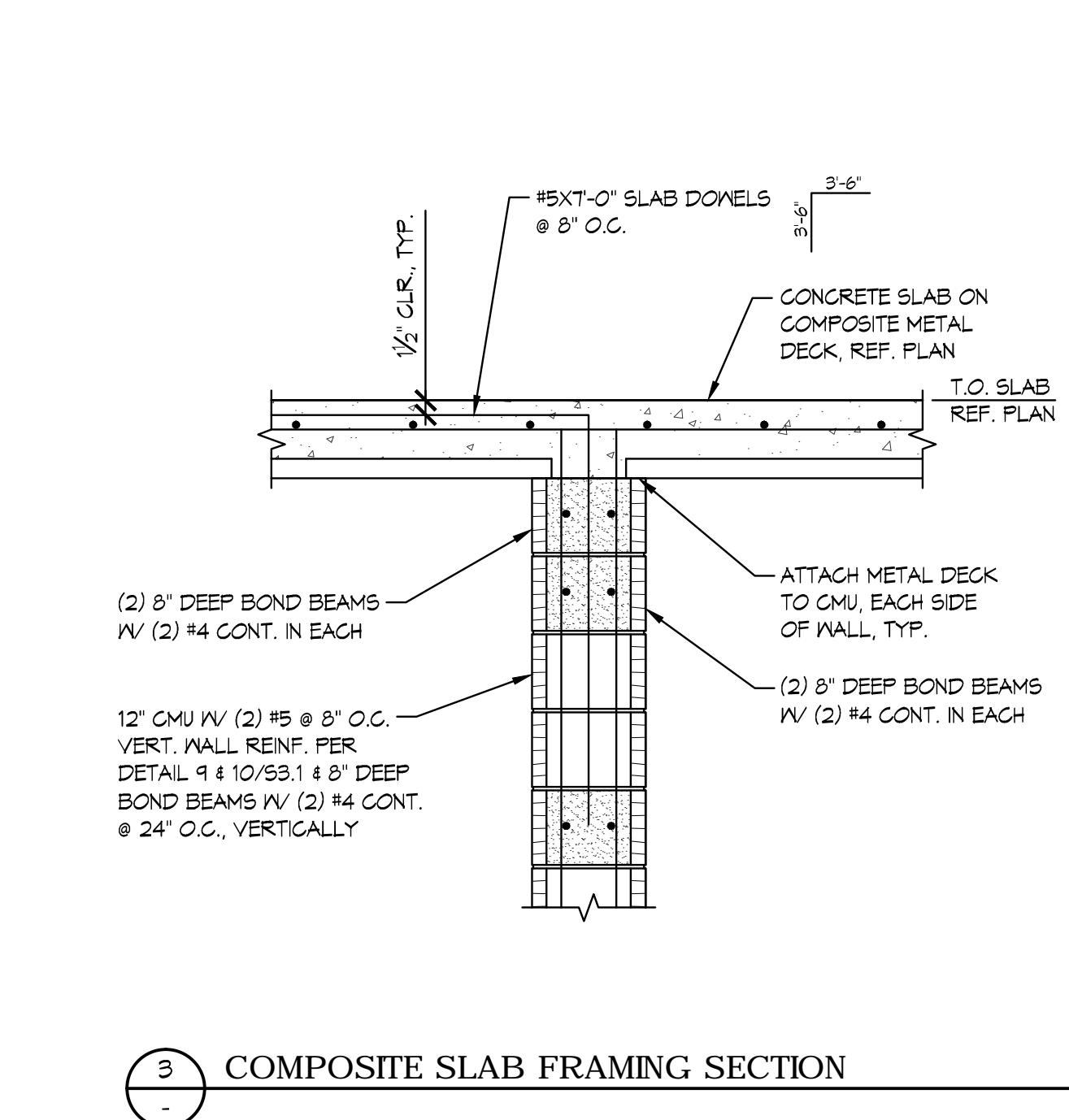
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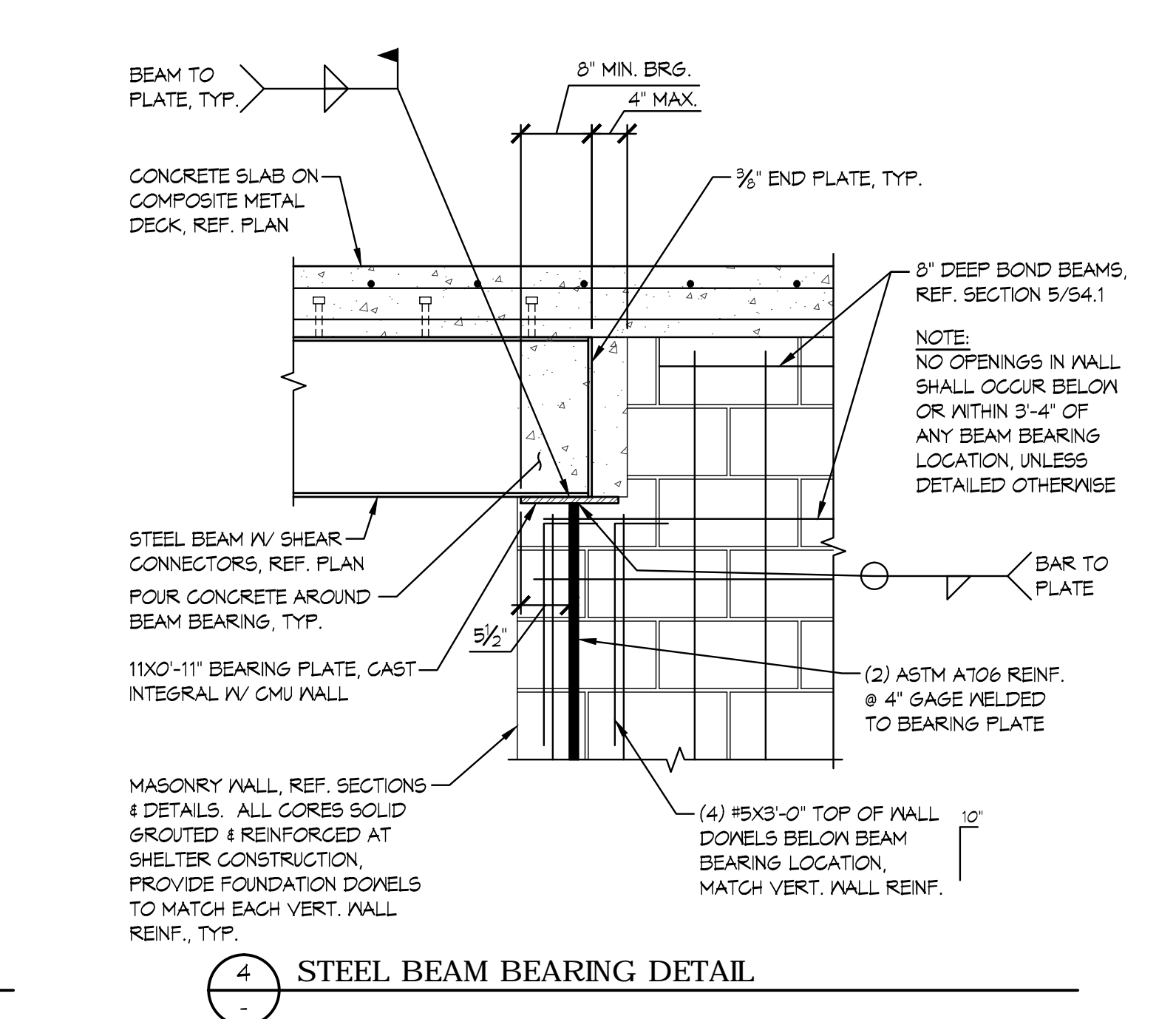
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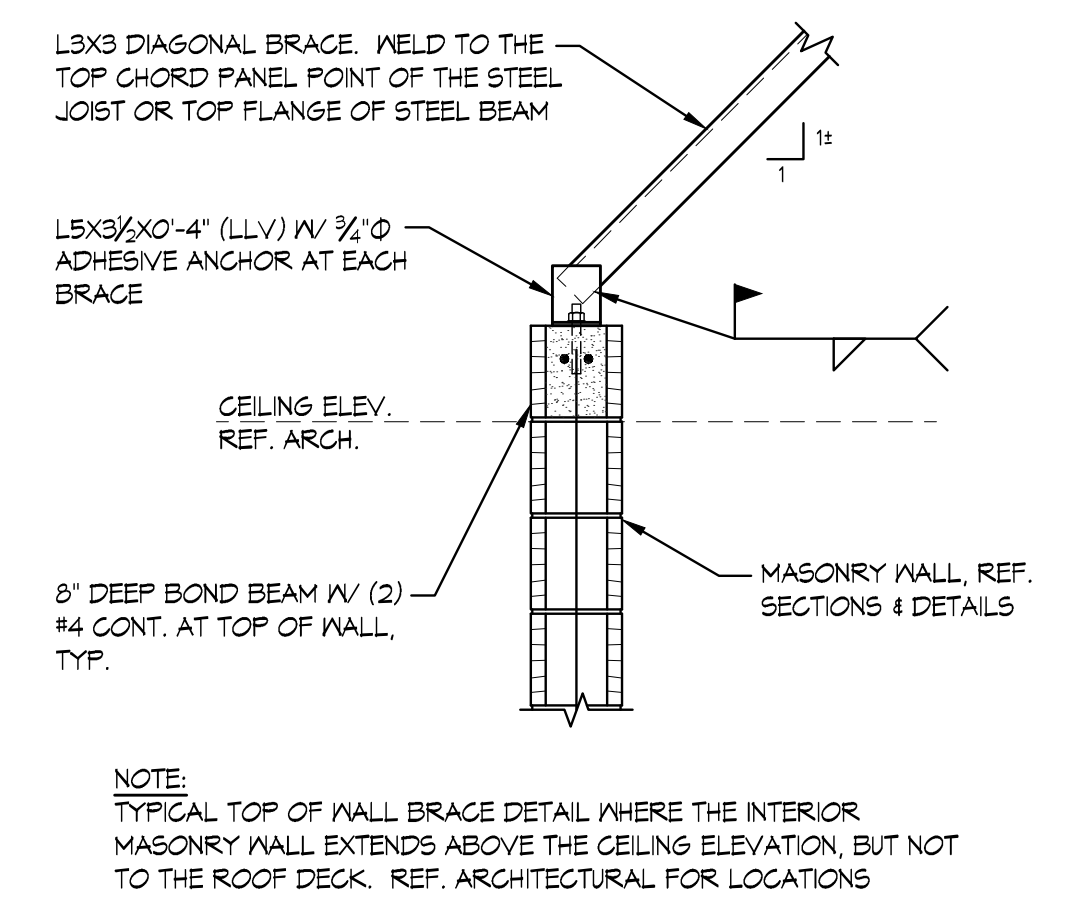
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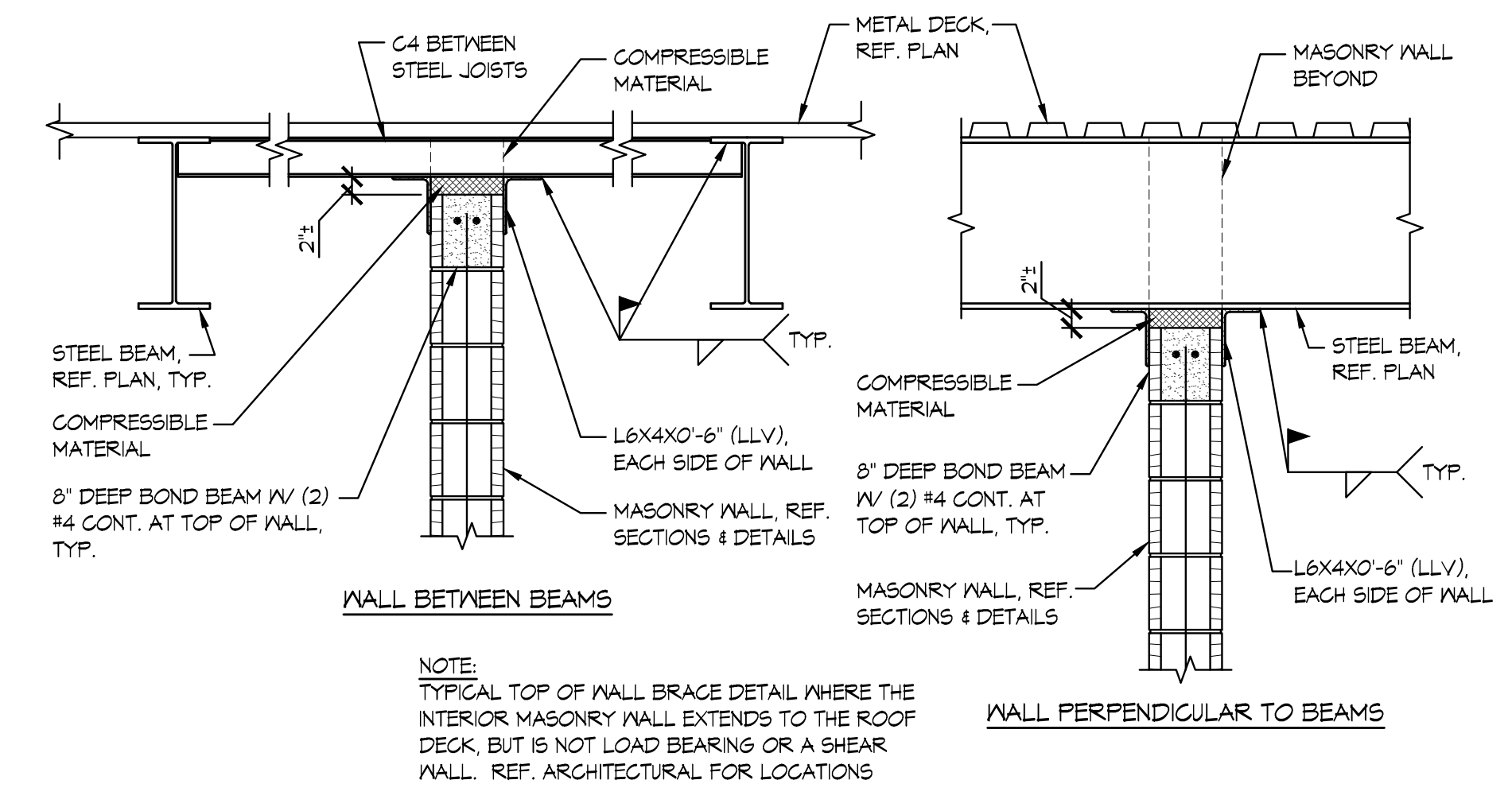
3 COMPOSITE SLAB FRAMING SECTION



4 STEEL BEAM BEARING DETAIL



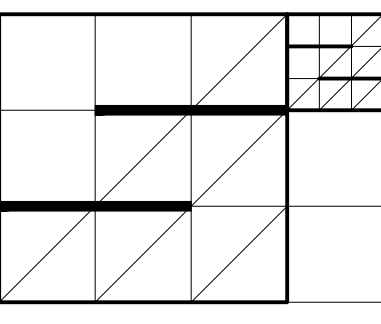
5 WALL BRACE DETAIL



6 WALL BRACE DETAIL

Seal:  
**CASE STUDY**  
 NOT FOR CONSTRUCTION

**NATIONAL CONCRETE MASONRY ASSOC.**  
**TORNADO SHELTER CASE STUDY**  
 13750 Sunrise Valley Drive  
 Herndon, VA 20171



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Project #: 14121.1  
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**S4.2**