

Observed defects in the trusses:

1. The horizontal out of plane movement of the inboard ends of several of the hammer beams is of great concern. It represents a buckling of the hammer beam that must not be permitted to continue.
2. The tops of the walls at wall sections 'A' and 'B' have moved outward less than the tops of the walls at 'C', 'D' & 'E' (as shown on the attached drawings) but still enough in my opinion to cause some of the observed opening up of truss joints, cracking of members, and distress in the trusses – in addition to normal drying shrinkage in the timber.

Proposed solutions :

1. The solution to the horizontal out of plane movements of the inner ends of the hammer beams is to add horizontal bridging between the hammer beams. The least obtrusive bracing would be pipe bracing in my opinion. The hammer beams should be forced back into the original plane prior to installing the bridging in my opinion. The pipe bridging north-east of line 'A' and south-east of line 'E' will need to return diagonally to the side walls.
2. The observed cracking and the opening of some joints between truss members can be arrested by the use of some very long lag bolts installed in pre-bored holes oriented perpendicular to the cracks in addition to epoxy injected under pressure into the cracks. The straightening of the hammer beams and the installation of the proposed bridging should take place prior to the installation of lag bolts and epoxy to strengthen the cracked members and opened joints between members. Also prior to installing epoxy and lag bolts, the existing through bolts should be tightened. Such bolts often loosen due to wood shrinkage. To tighten these bolts, the wood plugs covering the recessed heads of the bolts will need to be removed and later replaced.

The walls should be monitored for any continuing movements. If there are ongoing outward movements of the tops of the walls, the tie rod solution originally proposed by Sheppard Engineering in 1975 but never implemented may have to be employed.

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CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO FABRICATION

STRUCTURAL NOTES

General

1. These notes are to be read in conjunction with the drawings. In the event of conflict between the information on the drawings and these notes, the more stringent requirements shall govern.
2. Contractor shall verify all dimensions and existing conditions before beginning work. Contractor shall take field measurements and be responsible for same.
3. It is the contractor's responsibility to provide adequate shoring and bracing during construction to account for all forces, including but not limited to; forces from gravity, earth, wind, and unbalanced forces due to construction sequence.
4. For conditions not expressly shown use details shown for obviously similar conditions.
5. No openings shall be made in any structural member unless specifically shown on the structural drawings or unless approved in writing by the Structural Engineer.
6. Reproductions, in whole or in part, of Engineer's design documents, shall not be used as shop drawing plans and/or details. Shop drawings that are prepared from Engineer's design documents will be rejected.

Design

1. The design of the structure is in accordance with State of Michigan Rehabilitation Code 2009 Edition, including the referenced standards given in Chapter 35. Additional referenced standards shall be the latest edition published by the named organization.
2. Warning: The structural integrity of the building shown on these plans is dependent upon completion according to plans and specifications. Structural members are not self-bracing and shall be shored and/or braced by the contractor as necessary until stabilized by virtue of completed connections.

Existing Masonry - Patching, Filling-in, Rebuilding, Tuck Pointing

1. All masonry construction shall conform to:
 - A. Building Code Requirements for Masonry Structures, ACI 530/ASCE 5.
 - B. Specifications for Masonry Structures, ACI 530.1/ASCE 6.
 - C. Technical Notes on Brick Construction, Technical Notes 1-48, BIA.
 - D. Guide Specification for Brick Masonry, Technical Notes 11A-E, BIA.
 - E. Hot and Cold Weather Masonry Construction by the Masonry Industry Council.
2. Salvaged masonry units shall be used with caution, especially if the units to be reused are common building bricks. The masonry contractor shall read "Technical Note 15- Salvaged Brick" published by The Brick Industry Association, (BIA). Care shall be taken to not re-use any soft under burned units from interior wythe brick. The mason contractor shall coordinate all activities and methods through the Architect.
3. New masonry construction shall be solidly toothed into existing masonry to the full thickness of the existing construction. See detailing this sheet for further notes and details.
4. Mortar for toothing in, repairing and tuck pointing shall conform to ASTM C 270, Type N with the highest permissible lime content for Type N.
5. Tuck pointing shall be performed in accordance with instructions found in "Technical Note 46 – Maintenance of Brick Masonry" published by The Brick Industry Association. All tuck pointing mortar shall be pre-hydrated, per Technical Note 46.

All dry ingredients should be thoroughly mixed. Only enough clean water should be added to the dry mix to produce a damp consistency which will retain its shape when formed into a ball. The mortar should be mixed to this dampened condition for 1 to 1½ hr before adding water for placement.... Water should be added to the pre-hydrated mortar to bring it to a workable consistency; (somewhat drier than conventional mortar).

6. New multi-wythe masonry wall sections shall be constructed similar to the existing construction. Bond in multi wythe brick walls shall be accomplished through the use of masonry header courses between wythes at every sixth course. The collar joints of all walls shall be filled solidly with mortar as the wall is built up. Bond between wythes in brick and block walls shall be accomplished through the use of metal ties of similar design to the existing ties. Frequency of metal ties shall be one per 1.77 square foot of wall typically and one per .88 square foot at heads, jambs, and sills of openings.

Structural Steel

1. All structural steel work shall conform to the AISC "Steel Construction Manual" 13th edition which includes the AISC 303 "Code of Standard Practice for Steel Buildings and Bridges"; the "Specification for Structural Steel Buildings"; and the "RCS Specification for Structural Joints Using ASTM A 325 or A 490 bolts". It is the contractor's responsibility to erect the steel framing plumb and true within the tolerances specified in "The AISC Code of the Standard Practice" sections 7.12 & 7.13. Grouting beneath column base plates shall be done as noted in "The AISC Code of Standard Practice" section 7.7 after the steel framing above the base plate is plumb and held in place with temporary guying if necessary and prior to pouring any supported slabs on metal deck that are supported by the frame or constructing any engaged walls that would prevent proper plumb of the frame from being achieved.
2. Structural steel shall conform to the latest edition of the following ASTM designations:
 - A. Steel channels, bars, angles, and plates shall be A 36 having a minimum yield strength of 36 ksi unless noted 50 ksi on the plans in which case they shall be ASTM A 572 Grade 50 (Fy = 50 ksi) if structural steel or ASTM 316 if called out as stainless steel.
 - C. Steel Pipe – A 501 having a minimum yield strength of 36 ksi or A 53 Grade B Type E or S having a minimum yield strength of 35 ksi is structural steel or ASTM 316 if called out as stainless steel.
 - D. Square, round, and rectangular tubing – A -1085, having a minimum yield strength of 50 ksi.
3. Bolts shall conform to the following ASTM designation, latest edition: High strength bolts – A 325; anchor rods – F 1554, Grade 36 unless noted otherwise on the drawings. All bolts shall be snug tight unless noted slip critical or S. C. on plans unless otherwise noted. All bolts that carry loads in tension shall be fully pretensioned.
4. All bolts shall be 1" diameter thru-bolts at wall plates, Type 304 stainless steel nuts and washers unless otherwise noted.
5. All welding electrodes shall conform to the E 70 series of the specification for mild steel arc welding electrodes ASTM A 233, latest edition.
6. All welding shall be done by certified, licensed welders and shall be in conformance with the structural welding code of the American Welding Society ANSI/AWS D1.1-latest edition for structural steel and ANSI/AWS D1.6 for stainless steel.
7. No penetrations are permitted through structural steel members unless indicated on structural drawings or approved by Engineer.
8. Approval of the engineer shall be mandatory for the use of cutting torch in the field.
9. All grout under steel plates shall be non-shrink "pre-mix" type and shall have a minimum compressive strength of 2,000 psi, tested in accordance with concrete specifications. Use non-staining grout at exposed locations.
10. All structural steel shall be painted with one shop-applied coat of rust inhibiting primer after surface preparation by the Society for Protective Coatings (SSPC) SP3 "power tool cleaning", unless noted otherwise. Do not paint portions of steel members that are to receive spray-on fireproofing, nor surfaces to receive welded shear studs. Steel structure that is permanently exposed on the exterior shall be hot dip galvanized according to ASTM A 123.
11. Reproductions, in whole or in part, of Engineer's design documents, shall not be used as shop drawing plans and/or details.

Saw Cutting Existing Concrete and/or Masonry

1. Saw cutting of new openings in existing concrete and/or masonry walls shall be done without overcutting beyond the boundaries of the intended opening. Any structural repairs required by the structural engineer as a result of overcutting beyond the boundaries of an opening shall be paid for by the saw cutting contractor. See drawings for additional information.

Field Drilled Adhesive Anchors

1. Basis of design for field drilled adhesive anchors shall be Hilti HIT-HY200 (HIT-HY70 in Masonry) Adhesive Anchors as manufactured by HILTI, or equivalent product by ITW Ramset/Redhead, Powers Fasteners, or Simpson Strong-Tie Anchor Systems. For substitution purposes, signed and sealed calculations shall be provided, indicating the substituted anchor meets the capacity requirements of the detailed anchor.
2. Use only code-approved anchors with valid ICC-ESR evaluation report for use in the base material shown on the Construction Documents. Submit ICC-ESR evaluation report to Structural Engineer and Special Inspection Agent for approval. Do not install anchors until submittal is returned "approved".
3. All post-installed adhesive anchors shall conform to AC-308. Installer of post-installed adhesive anchors shall be trained by anchor manufacturer.
4. Anchors of the diameter and embedment shown on the drawings shall be installed in strict accordance with manufacturer's recommendations under the continuous supervision of an independent testing agency. Where the provisions of the above referenced documents are in conflict, the most restrictive requirement shall govern. Provide minimum 3/4" diameter anchors with standard embedment at locations not indicated.
5. Clean existing concrete surface to solid structural concrete. Grind smooth for full steel contact and to prevent gaps between steel and concrete. Alternatively, provide non-shrink grout in all voids between steel and base material.
6. The contractor shall create a template at each adhesive anchor connection location prior to fabricating holes in connecting plates or rolled shapes. Templates shall be made by first locating existing reinforcing steel using non-destructive testing equipment and then drilling anchor holes such that no conflict exists with the existing reinforcing. Anchor locations in the field may be relocated, if approved by the E.O.R., a maximum of 1 1/2" from the dimensions shown on the drawings to avoid conflicts with the existing reinforcing steel. However, do not exceed minimum or maximum anchor spacings or edge distances per manufacturer's requirements.
7. All abandoned holes drilled in concrete shall be completely filled with structural grade epoxy.
8. Typically, holes in connection plates shall be no more than 1/16" larger than the adhesive anchor rod diameter. If larger diameter holes are used for erection purposes the contractor must provide plate washers. Plate washers must be welded to the connection plate to transfer the load. Welding must take place after holes are drilled, but prior to adhesive installation to avoid burning the adhesive.

Field Drilled Expansion Bolts

1. Field drilled expansion bolts shall be HILTI KWIK Bolt 3 anchor bolts as manufactured by the HILTI Corp., or ITW, Powers Fasteners, Simpson-Tie Anchor Systems equivalents. Submit I.C.C. ES report or similar data for each type of anchor proposed for use. Do not install anchors until submittal is returned "approved".
2. Only one length bolt shall be present on the job site for a given bolt diameter, unless otherwise specified on the drawings.
3. Expansion bolts of the diameter and embedment shown on the drawings shall be installed in accordance with the contract documents and the recommendations of the manufacturer. Where provisions of the above referenced documents are in conflict, the most restrictive requirement shall govern.
4. Expansion bolts shall be installed perpendicular to the face of the concrete being drilled. The maximum tolerance for deviation from perpendicular shall be 10 degrees. All expansion bolts installed outside of the specified tolerance shall be considered unacceptable.
5. The contractor shall create a template at each expansion bolt connection location prior to fabricating holes in connecting plates or rolled shapes. Templates shall be made by first locating existing reinforcing steel with a pachometer and then drilling bolt holes such that no conflict exists with the existing reinforcing. Bolt locations in the field may be relocated a maximum of 1 1/2" from the dimensions shown on the drawings to avoid conflicts with the existing reinforcing steel. However, do not exceed minimum or maximum bolt spacings or edge distances shown on the drawings.
6. Submit drawings of templates showing hole locations prior to fabrication of connecting plates or rolled shapes.
7. Holes drilled in the concrete shall be the diameter as recommended by the manufacturer. The hole diameter shall not exceed the maximum diameter at any location along the length of the bolt.
8. Foreign material shall not be placed in the holes that receive expansion bolts.
9. All abandoned holes drilled in the concrete shall be completely filled with epoxy.
10. Follow manufacturer's requirements for minimum edge distance and spacing to obtain full anchor capacity.
11. Installation of expansion bolts shall be monitored by the testing laboratory to insure bolts are installed correctly and that manufacturer's required installation torques are obtained.
12. Typically holes in connection plates shall be no more than 1/16" larger than the expansion bolt diameter. If larger diameter holes are used for erection purposes the contractor must provide plate washers. Plate washers must be welded to the connection plate or rolled shape to transfer the load.

ABBREVIATIONS LIST	
WORD	ABBR.
ADHESIVE	ADH
AGGREGATE	AGGR
ALTERNATE	ALT
ALUMINIUM	AL
AMERICAN WIRE GAUGE	AWG
ANCHOR BOLT	AB
APPROVED	APPD
APPROXIMATE	APP
ARCHITECTURAL	ARCH
AVERAGE	AVG
BASE PLATE	BP
BEAM	BM
BENDING MOMENT	M
BETWEEN	BTWN
BOARD	BD
BOTH FACES	BF
BOTH SIDES	BS
BOTH WAYS	BW
BOTTOM	BOT
BOTTOM CHORD	BC
BOTTOM FACE	BF
BOTTOM OF STEEL	B.S.
BUILDING	BLDG
CALCULATE	CALC
CAPACITY	CAP
CEILING	CLG
CEMENT	CEM
CENTER	CTR
CENTER LINE	CL
CENTER TO CENTER	C TO C
CLEAR	CLR
COLUMN	COL
CONCRETE	CONC
CONNECTION	CONN
CONSTRUCTION	CONST
CONSTRUCTION JOINT	CJ
CONTINUOUS	CONT
CONTRACTOR	CONTR
DEADLOAD	DL
DECK	DK
DEPARTMENT	DEPT
DETAIL	DET
DIAGONAL	DIAG
DIAMETER	DIA
DIMENSION	DIM.
DISTANCE	DIST
DOWEL	DWL
DOWN	DN
DRAIN	DR
DRAWING	DWG
EACH	EA
EACH FACE	EF
EACH WAY	EW
EAST	E
ELECTRIC	ELEC
ELEVATION	EL
ELEVATOR	ELEV
ENGINEER	ENGR
EQUAL	EQ
EXISTING	EX
EXPANSION (JOINT)	EXP
EXTERIOR	EXT
FABRICATE	FAB
FAR SIDE	FS
FEET	FT
FINISH	FIN
FLOOR	FL
FLOOR DRAIN	FD
FLOORING	FLG
FLUSH	FL
FOOT	FT
FOOTING	FTG
FORCE	F
FOUNDATION	FDN
FRAME	FR
GAGE OR GAUGE	GA
GALVANIZE	GALV
GRADE	GR
GRATING	GRTG
GROUND	GRD
HORIZONTAL	HOR
INCH	IN
INFORMATION	INFO
INSIDE FACE	IF
INTERIOR	INT
INVERT	INV
JOINT	JT
KIP (1000 LB)	K
LANDING	LDG
LEFT	L
LEFT HAND	LH
LENGTH	LG
LIVE LOAD	LL
LONG	LG
LONG LEG HORIZONTAL	LLH
LONG LEG VERTICAL	LLV

ABBREVIATIONS LIST	
WORD	ABBR.
MACHINE	MACH
MAINTENANCE	MAINT
MANUFACTURED	MFD
MANUFACTURER	MFR
MASONRY OPENING	MO
MATERIAL	MATL
MAUFACTURING	MFG
MAXIMUM	MAX
MECHANICAL	MECH
MINIMUM	MIN
MISCELLANEOUS	MISC
MIXTURE	MIX
NEAR FACE	NF
NEAR SIDE	NS
NEGATIVE	NEG
NORMAL	NOR
NORTH	N
NOT TO SCALE	NTS
NUMBER	NO
ON CENTER	OC
OPENING	OPNG
OPPOSITE	OPP
OUTSIDE DIAMETER	OD
OUTSIDE FACE	OF
OUTSTANDING LEG	OSL
OVERALL	OA
OVERHEAD	OVHD
RADIUS	R
REFERENCE	REF
REFERENCE LINE	REF L
REINFORCE	REINF
REINFORCED CONCRETE PIPE	RCP
REMOVABLE	REM
REQUIRED	REQD
RIGHT	R
RIGHT HAND	RH
ROOF	RF
ROOF DRAIN	RD
ROUGH OPENING	RO
SCHEDULE	SCH
SCREW	SCR
SECTION	SECT
SEPARATE	SEP
SHEET	SH
SHORT LEG HORIZONTAL	SLH
SHORT LEG VERTICAL	SLV
SIDE	S
SIMILAR	SIM
SLOPE	SL
SOUTH	S
SPECIFICATION	SPEC
SQUARE	SQ
SQUARE FOOT	SQ FT
SQUARE INCH	SQ IN
STAINLESS STEEL	SS or SST
STANDARD	STD
STEEL	STL
STIFFENER	STIFF
STONE	STN
STRAIGHT	STR
STRUCTURAL	STR
SURFACE	SUR
SYMMETRICAL	SYM
TECHNICAL	TECH
TEMPERATURE	TEMP
TEMPLATE	TEMP
TENSION	TENS
THICK	THK
TONGUE & GROOVE	T&G
TOP & BOTTOM	T&B
TOP OF CONCRETE	T.C.
TOP OF MASONRY	T.M.
TOP OF STEEL	T.S.
TOP OF WOOD	T.W.
TYPICAL	TYP
UNLESS OTHERWISE NOTED	UON
VERTICAL	VERT
WATERPROOF	WP
WEIGHT	WT
WEST	W
WITH	W/
WITHOUT	W/O
WOOD	WD
WORKING POINT	WP
YARD	YD
YIELD POINT	YP
YIELD STRENGTH	YS

SEAL



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ISSUE DATE AND NAME

JOB NO.
16029-A

DWG. NAME
STRUCTURAL NOTES

ISSUE DATE
09/28/16

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BAC, SMR

DWG. NO.
S0

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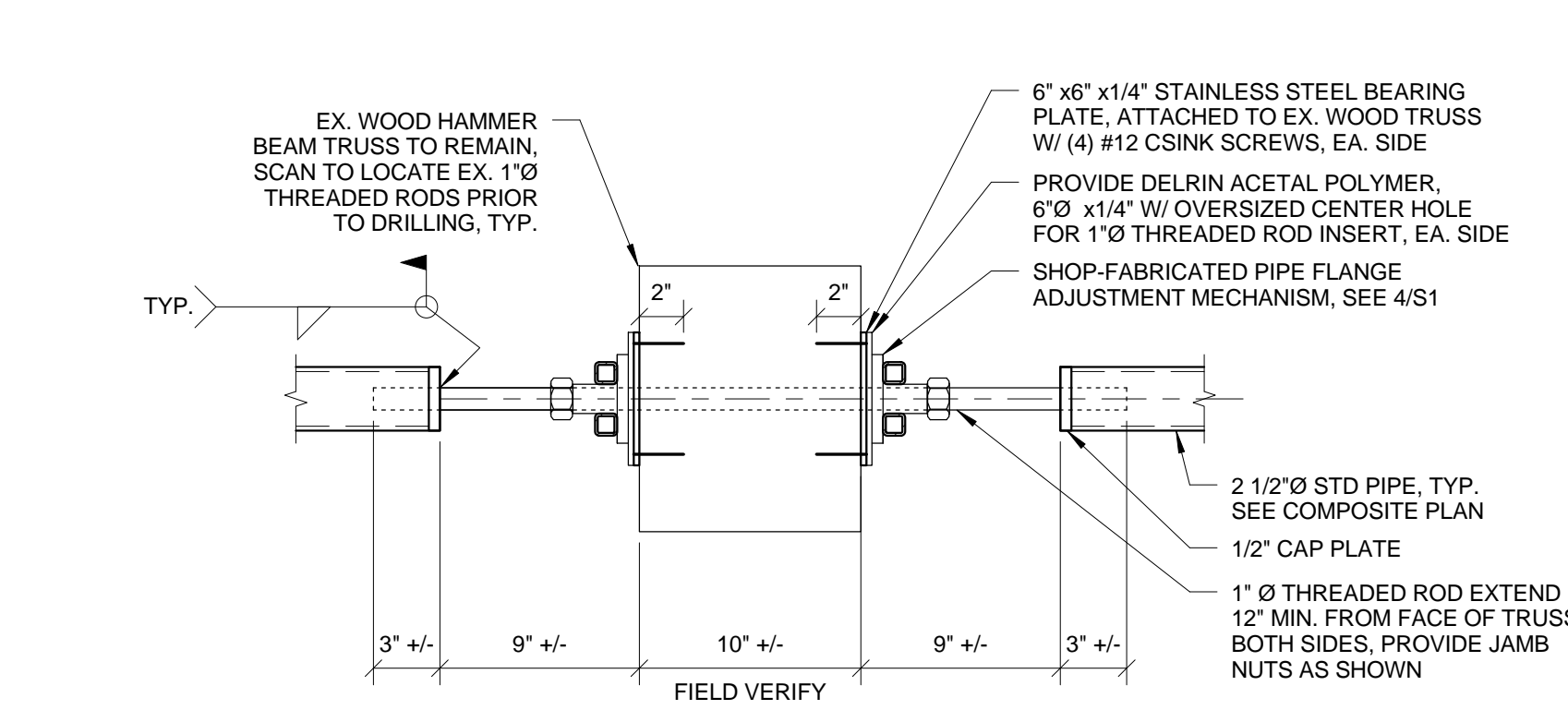
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16029-A

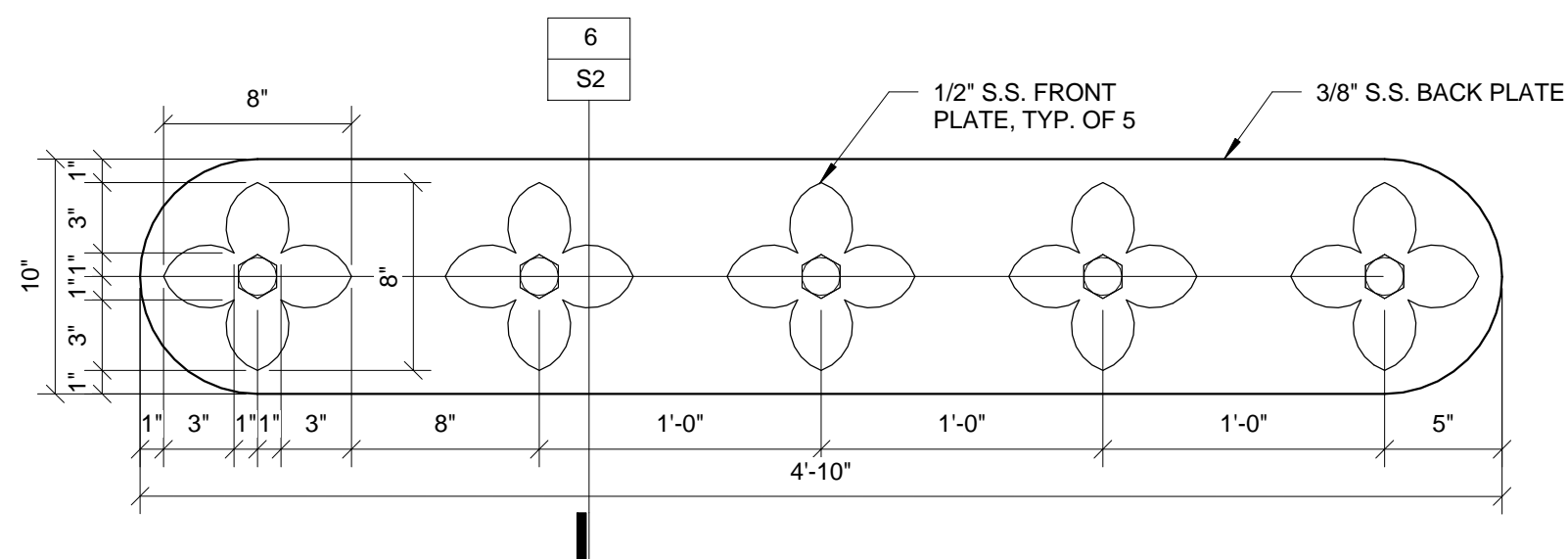
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ISSUE DATE
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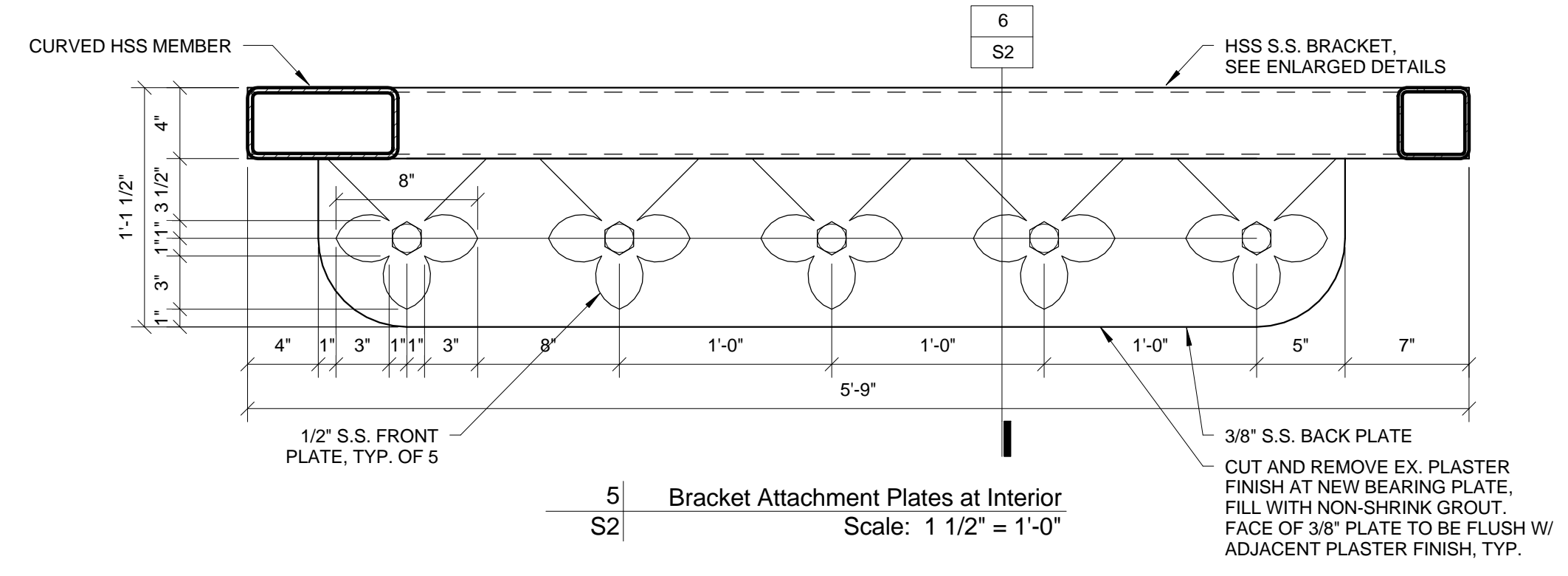
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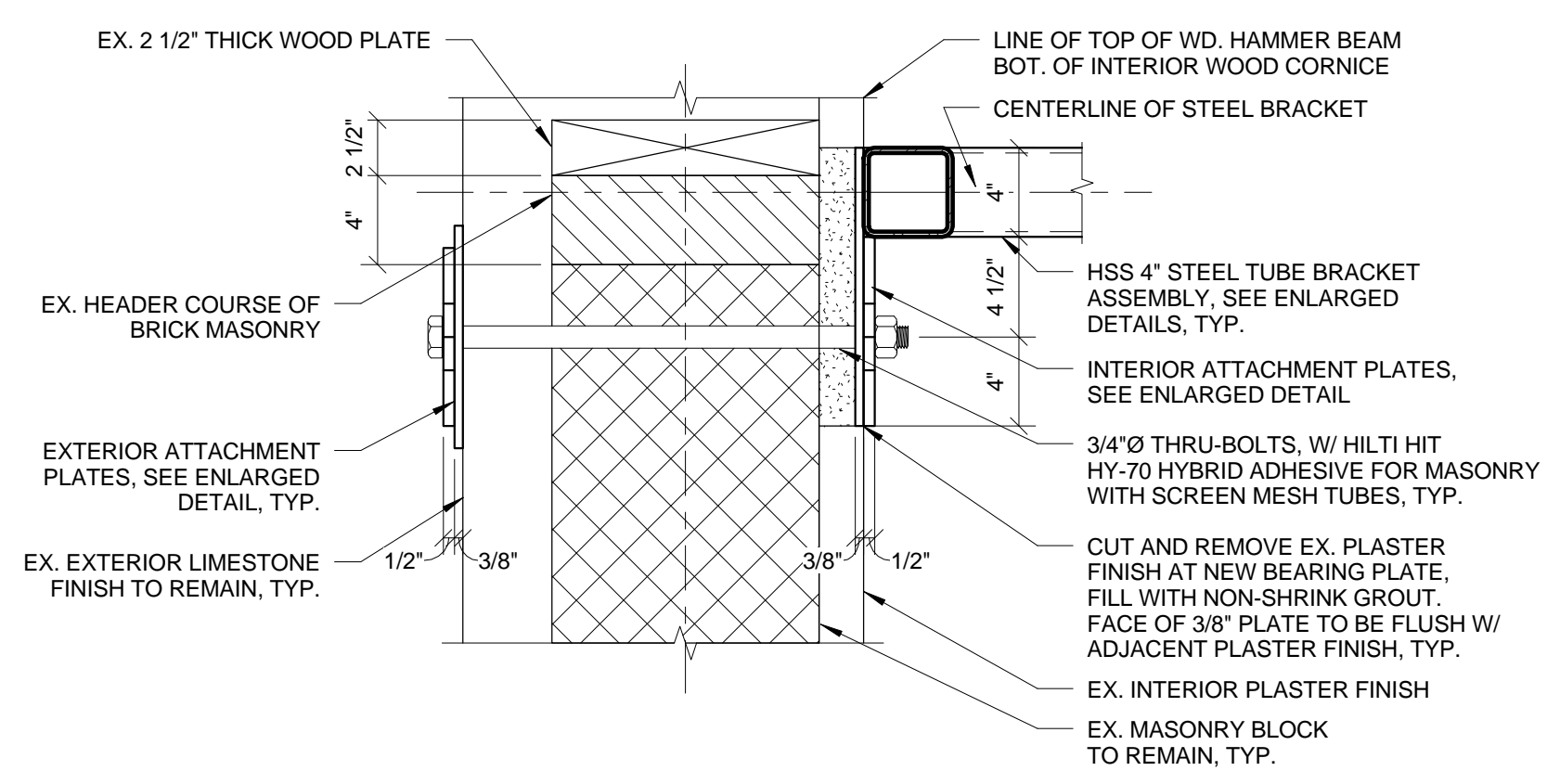
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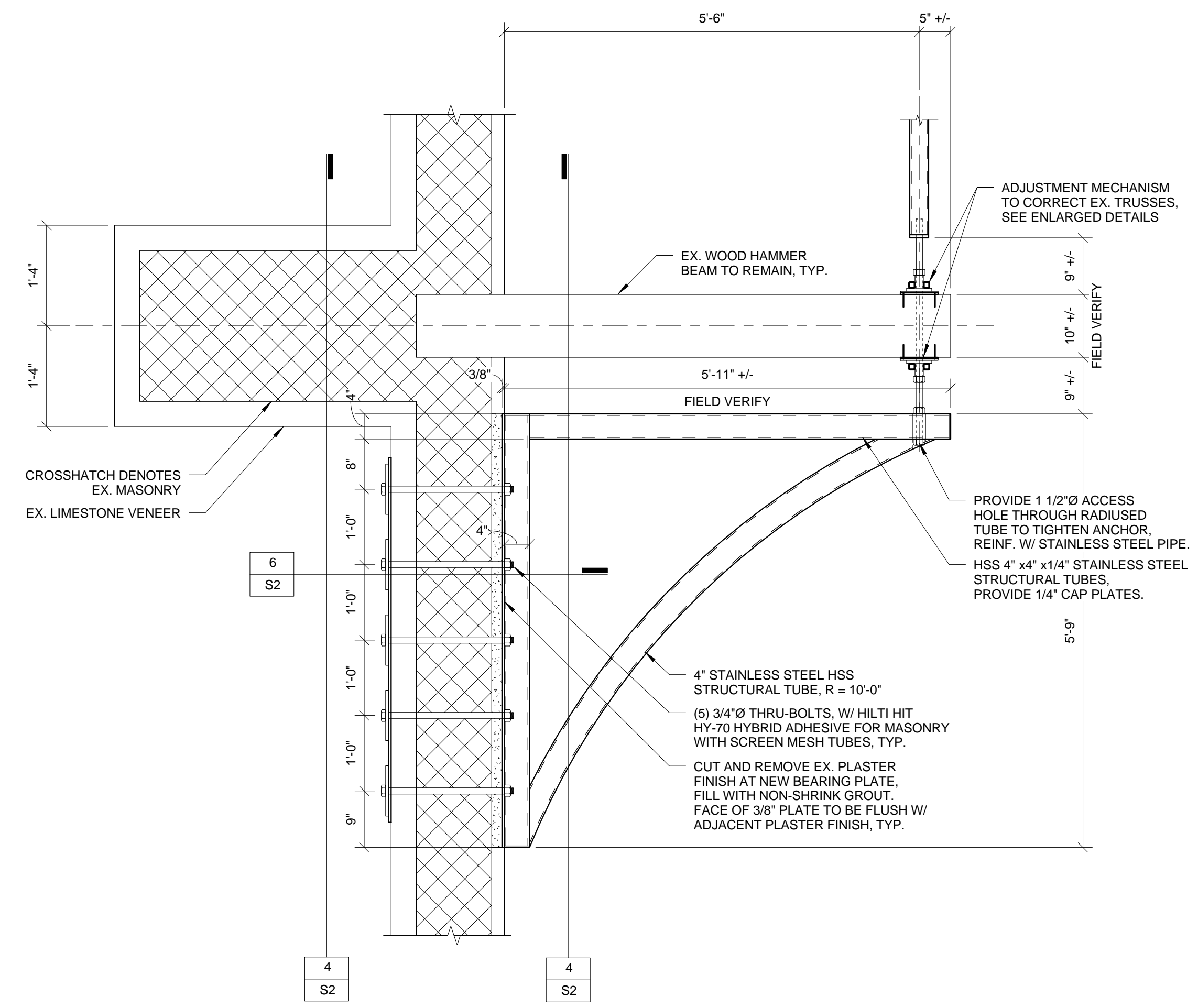
4 Bracket Attachment Plates at Exterior
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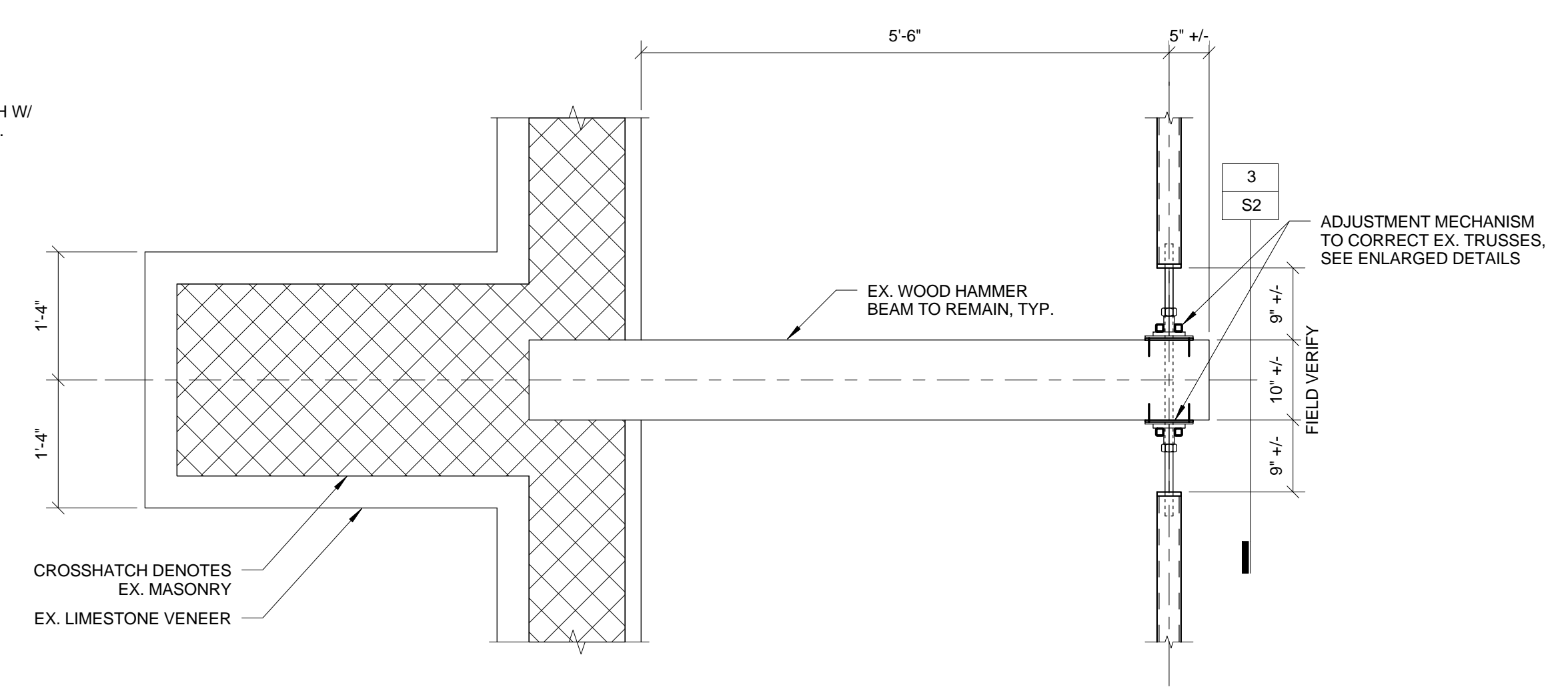
5 Bracket Attachment Plates at Interior
Scale: 1 1/2" = 1'-0"



6 Bracket Attachment Detail
Scale: 1 1/2" = 1'-0"



1 Enlarged Plan at Typical Bracket
Scale: 3/4" = 1'-0"



2 Enlarged Plan at Typical Truss
Scale: 3/4" = 1'-0"