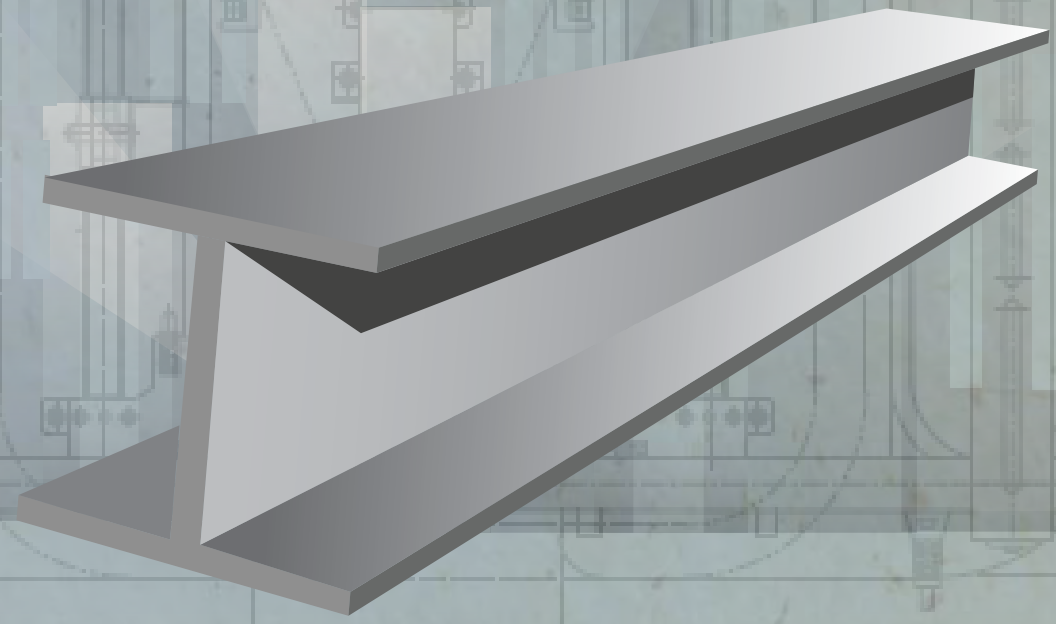
Recommended Details *for* Hot-Dip Galvanized Structures



A manual for steel detailers, engineers & fabricators, containing working drawings & details for hot-dip galvanized structures

Table of Contents

Recommended Details *for* Hot-Dip Galvanized Structures

1. THE CONTENTS OF THIS PUBLICATION ARE THE RESULT OF A WIDESPREAD SURVEY CONDUCTED AMONG AGA MEMBERS. SOME GALVANIZERS MAY PREFER DIFFERENT DETAILS, BASED UPON THEIR OWN EXPERIENCES, TO ACHIEVE DESIRED RESULTS IN THE GALVANIZED PRODUCT.

2. CERTAIN DETAILS CALL FOR WELDING AFTER GALVANIZING. MORE INFORMATION CONCERNING WELDING AND SUBSEQUENT TOUCH-UP OF GALVANIZED STEEL IS AVAILABLE IN THE AMERICAN GALVANIZERS ASSOCIATION'S (AGA) *WELDING & HOT-DIP GALVANIZING* PUBLICATION. IF POSSIBLE, STEELWORK SHOULD BE DESIGNED TO BE BOLTED RATHER THAN WELDED AFTER GALVANIZING.

3. WELDING SYMBOLS ARE THOSE DEFINED IN AWS A2.4-2012 *WELDING & HOT-DIP GALVANING* PUBLICATION. SHOP WELDING SYMBOLS ARE USUALLY ACCOMPANIED BY A NOTATION "INTERMITTENT" OR BY "CONT." MEANING CONTINUOUS. IN THE ABSENCE OF ANY OTHER NOTATION, IT IS ASSUMED THE WELD WILL BE CONTINUOUS (AWS A3.0-2010 INCLUDES STANDARD WELDING TERMS AND DEFINITIONS.)

4. **CLASS I**
DETAILS ARE THOSE CONSISTING OF PARTS JOINED TOGETHER BY A FULL SEAL WELD, OR PARTS WHICH ARE BOLTED TOGETHER AFTER GALVANIZING. THIS CLASS REPRESENTS THE HIGHEST DEGREE OF CORROSION PROTECTION ATTAINABLE, BUT DOES REQUIRE MORE FABRICATION COST.

5. **CLASS II**
DETAILS ARE THOSE CONSISTING OF OVERLAPPING PARTS JOINED TOGETHER BY SEAL WELDING AND WHICH HAVE AN OVERLAP AREA LARGE ENOUGH TO NEED VENTING IN ACCORDANCE WITH THE APPROPRIATE GUIDELINES OF NOTE 7. A VERY HIGH DEGREE OF CORROSION PROTECTION IS AVAILABLE WITH THESE DETAILS, ALTHOUGH NOT QUITE EQUAL TO CLASS I. MORE WORK IS REQUIRED THAN IS CUSTOMARY FOR NORMAL FABRICATION STANDARDS. IT SHOULD BE NOTED CLASS II CAN BE UPGRADED TO CLASS I BY PLUGGING VENTS AFTER GALVANIZING.

6. **CLASS III**
DETAILS DO NOT INCLUDE SEAL WELDING AND MAY REQUIRE ONLY SLIGHTLY MORE FABRICATION EFFORT THAN NORMALLY EMPLOYED ON A NON-GALVANIZED STRUCTURE. CLASS III DETAILS ENABLE THE GALVANIZING TO PROVIDE A DEGREE OF CORROSION PROTECTION THAT MEETS OR EXCEEDS THE PROTECTION PROVIDED BY MOST INDUSTRIAL COATINGS TO IDENTICAL DETAILS.

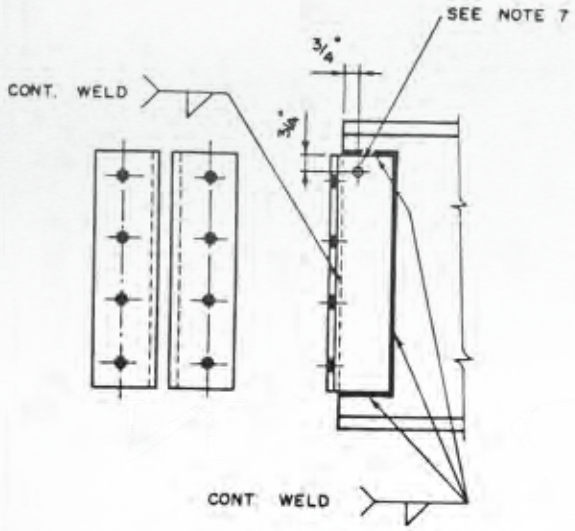
7. PIN HOLES MAY EXIST IN SEAL WELDS AROUND OVERLAPS IN CLASS I DETAILS. LIQUIDS FROM GALVANIZER'S CLEANING BATHS MAY PASS THROUGH THE PIN HOLE AND ENTER THE OVERLAP AREA, WHERE IT WILL REMAIN AS IT IS IMMERSED IN THE MOLTEN ZINC. *POSSIBILITY OF EXPLOSION EXISTS AS THE TRAPPED LIQUID VAPORIZES AND EXPANDS AT A TEMPERATURE OF APPROXIMATELY 850 F. DANGER OF EXPLOSION IS MORE ACUTE FOR LARGER OVERLAPPED AREAS*. IT IS RECOMMENDED THE FABRICATOR PROVIDE A VENT IN ONE OF THE OVERLAPPING PLATES ACCORDING TO THE FOLLOWING GUIDELINES. LOCATION OF THE VENTS NEED NOT BE EXACT, PROVIDED THEY ARE IN THE SAME GENERAL LOCATION AS SHOWN ON THE DRAWING. ARRANGEMENTS MAY BE MADE FOR INSTALLATION OF VENT HOLES BY THE GALVANIZER.

OVERLAPPED AREA (IN^2)	VENTING REQUIREMENTS
< 16	NONE
> 16 AND < 64 WHEN STEEL IS ≤ 1/2" THICK	ONE 3/8" DIA. HOLE, OR LEAVE 1" OF WELD UNDONE ADJACENT TO SAME LOCATION
>16 AND < 64 WHEN STEEL IS > 1/2" THICK	NONE
≥ 64 AND < 400	ONE 1/2" DIAMETER HOLE, OR LEAVE 2" OF WELD UNDONE ADJACENT TO SAME LOCATION
EACH INCREMENT OF 400	ONE 3/4" DIAMENTER HOLE, OR LEAVE 4" OF WELD UNDONE ADJACENT TO SAME LOCATION

8. EMISSIONS FROM THE UNSEALED OVERLAPS OF CLASS II AND CLASS III DETAILS MAY CAUSE A STAIN ON THE SURFACE OF THE COATING. THIS APPLIES WHETHER THE COATING IS PAINT OR GALVANIZING. THE STAIN IS USUALLY SUPERFICIAL AND WILL DISAPPEAR IN TIME AS THE GALVANIZING WEATHERS.

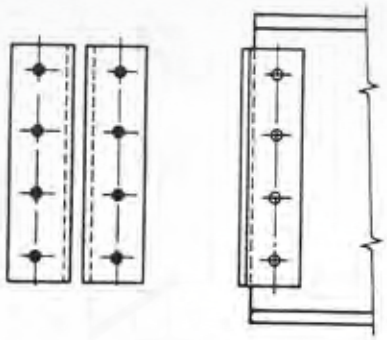
9. MOISTURE STEAMING FROM UNSEALED OVERLAPS IN CLASS II AND CLASS III JOINTS MAY RESULT IN SLIGHT BARE SPOTS ALONG THE LINE OF THE EXHAUST. IF TOUCH-UP OF THESE IS REQUIRED IT MAY BE ACCOMPLISHED BY ANY OF THE MATERIALS DESCRIBED IN ASTM A780 *STANDARD PRACTICE FOR REPAIR OF HOT-DIP GALVANIZED COATINGS*.

10. AFTER GALVANIZING, FINISHED ENDS OF COLUMN SECTIONS SHALL BE GROUND SMOOTH TO REMOVE PROJECTIONS.



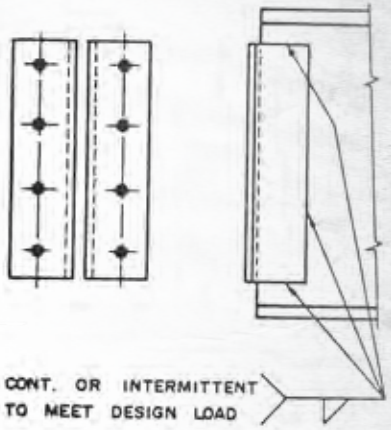
CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7



CLASS I

BOLT AFTER GALVANIZING

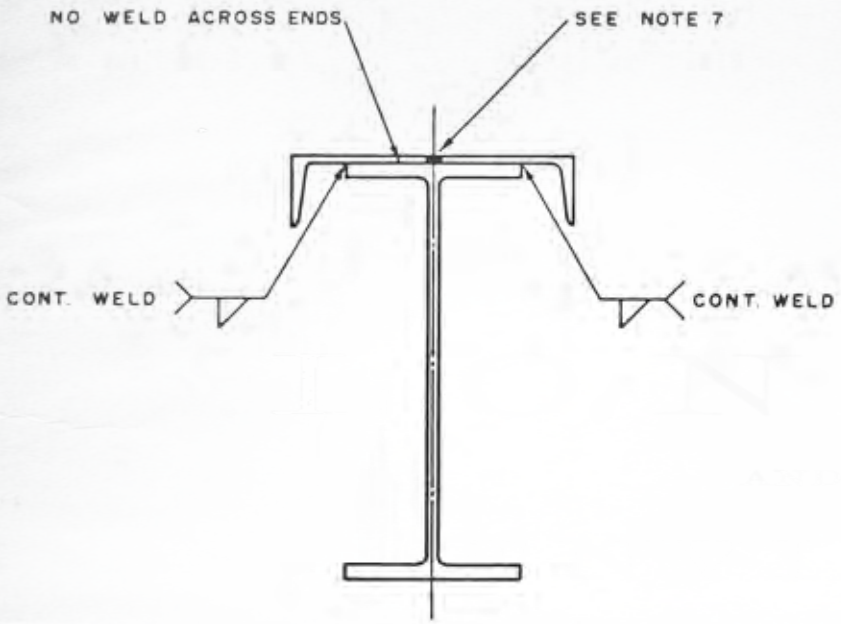


CLASS III

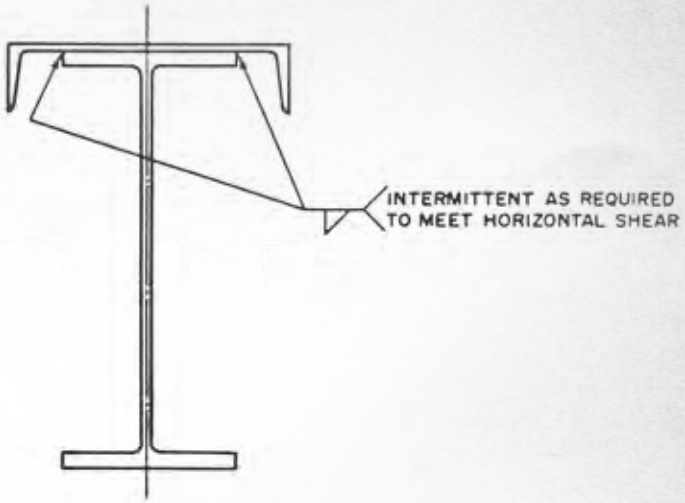
CLASS II

IF VENT HOLE IS REQUIRED

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
FRAMED BEAM CONNECTION
DRAWING 1



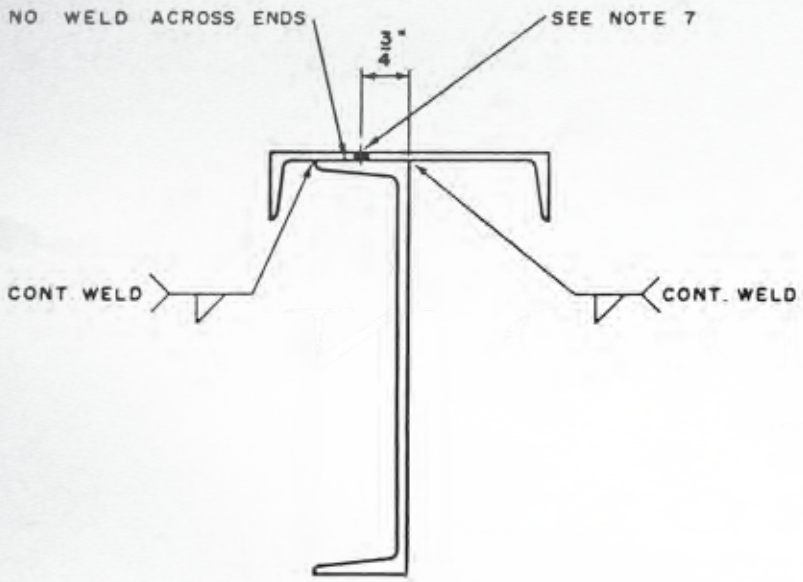
CLASS II



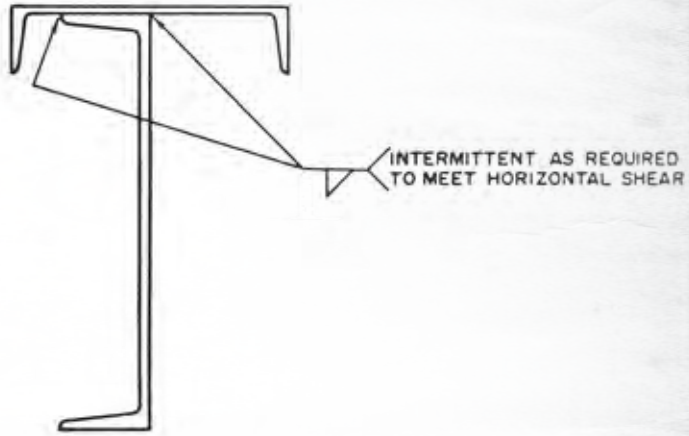
CLASS III

CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COMBINATION SECTION
FLANGE & CHANNEL
DRAWING
2



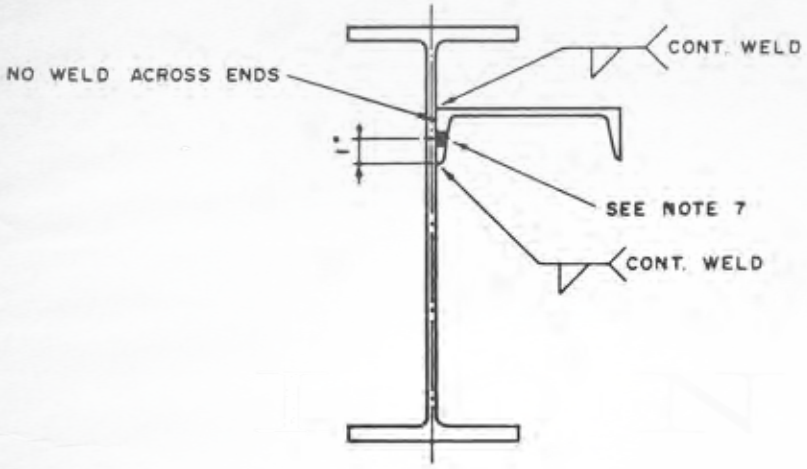
CLASS II



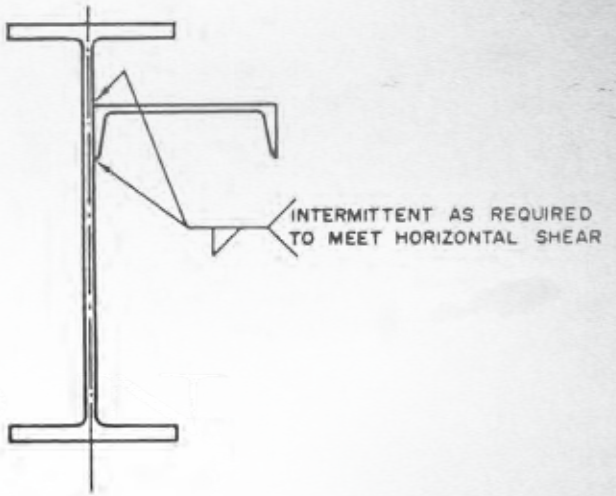
CLASS III

CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COMBINATION SECTION
TWO CHANNELS
DRAWING
3



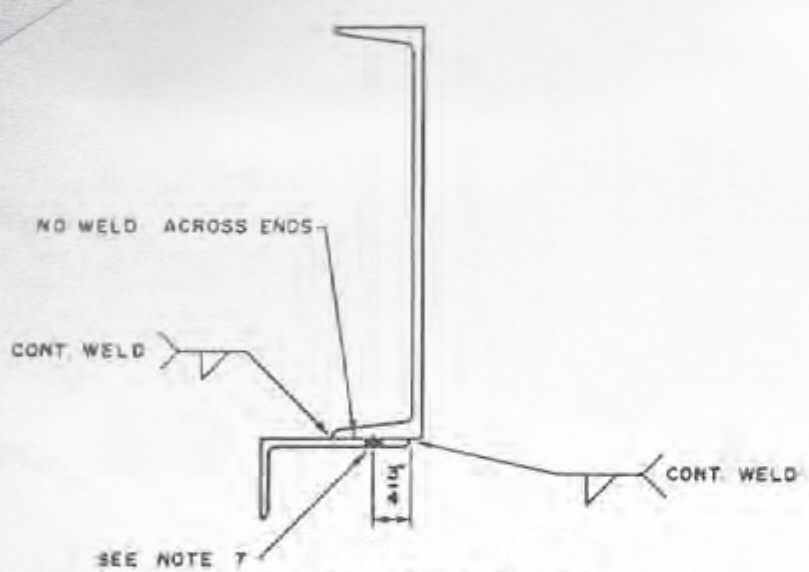
CLASS II



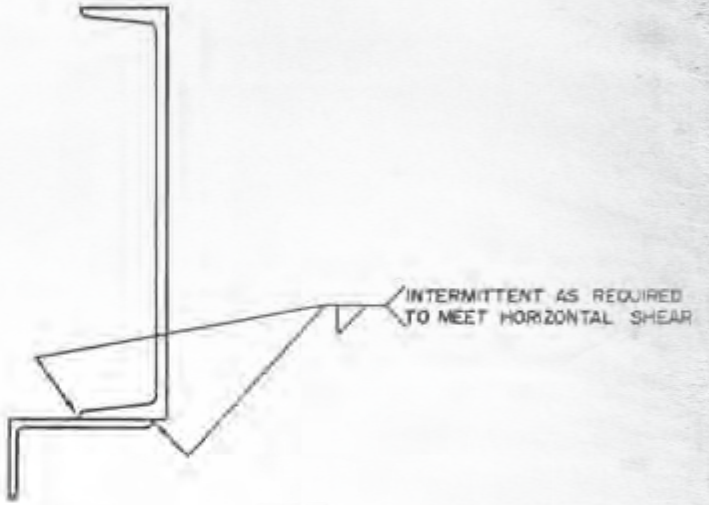
CLASS III

CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COMBINATION SECTION
WIDE FLANGE & CHANNEL
DRAWING
4



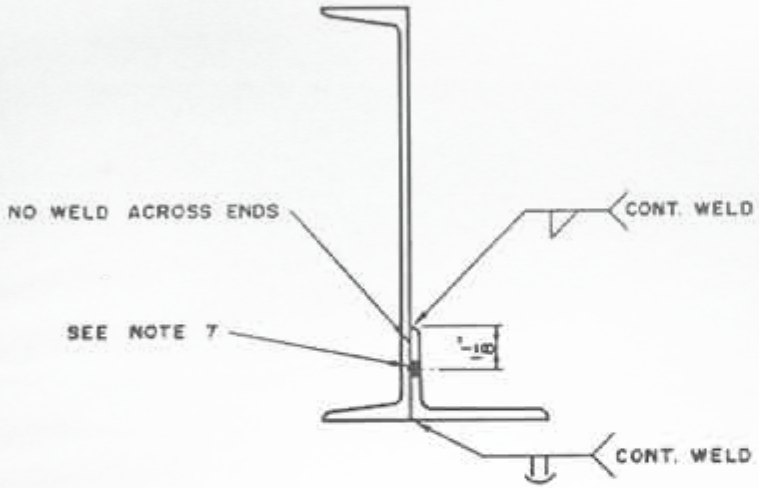
CLASS II



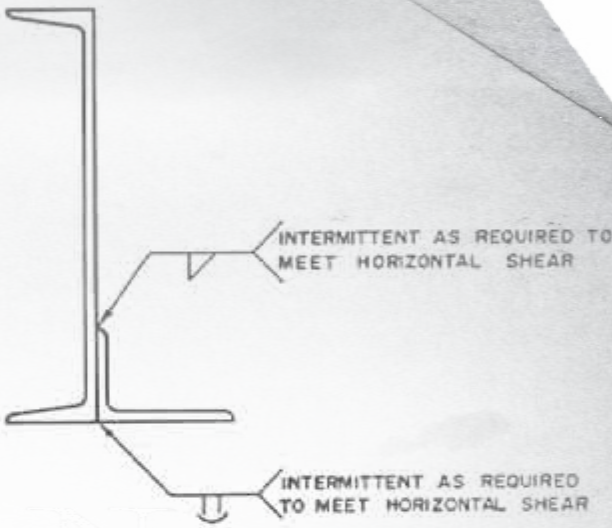
CLASS III

CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COMBINATION SECTION
CHANNEL & ANGLE
DRAWING
5



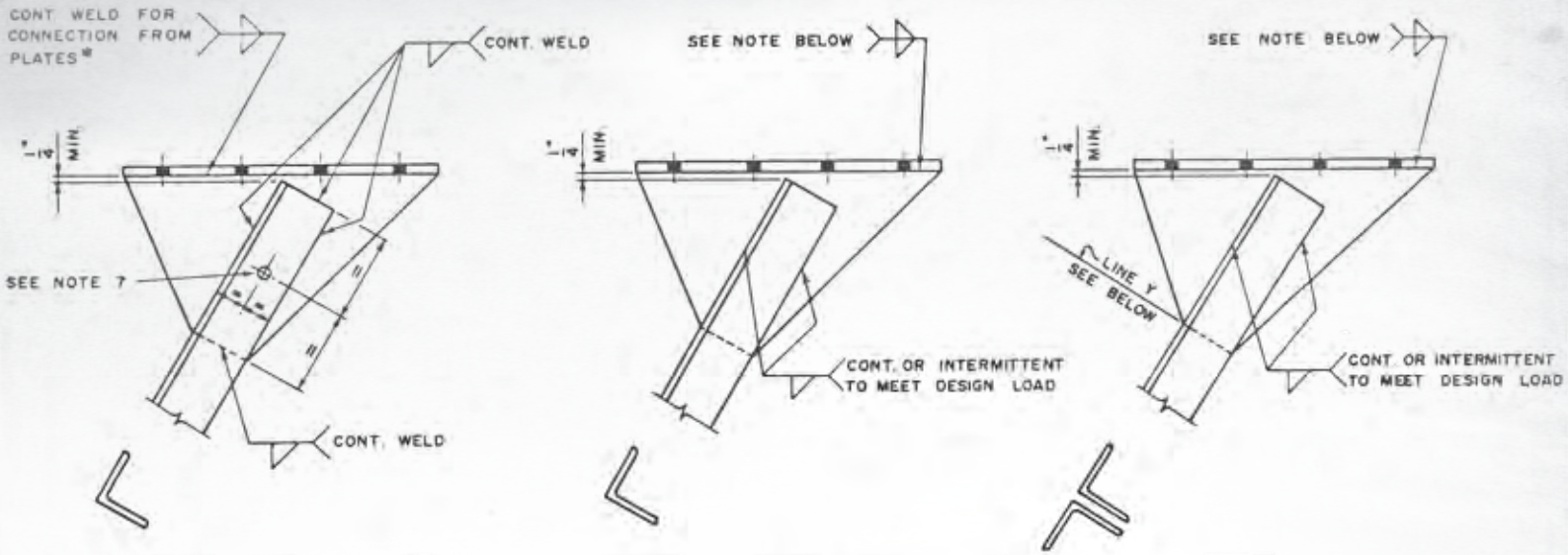
CLASS II



CLASS III

CAUTION: THIS SECTION IS SUBJECT TO WARPAGE AND MAY REQUIRE STRAIGHTENING AFTER GALVANIZING. TO MINIMIZE WARPAGE, REFER TO THE RECOMMENDATIONS OF THE AGA AND ASTM A384.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COMBINATION SECTION
CHANNEL & ANGLE
DRAWING
6



NOTE: FOR CONNECTION FROM PLATES* USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD

CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II

IF VENT HOLE IS REQUIRED

(FOR GUSSETS USED WITH SINGLE SECTIONS)

CLASS III

CLASS III

(FOR GUSSETS USED WITH COMBINED SECTIONS)

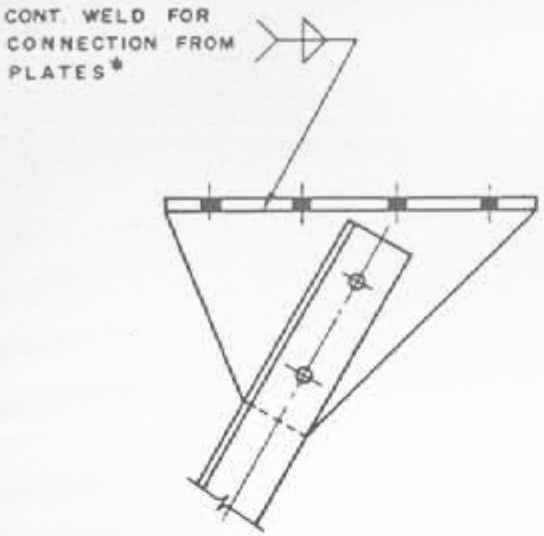
CLASS I IS NOT USUALLY ATTAINABLE FOR THIS DETAIL WHEN COMBINED SECTIONS ARE USED, EXCEPT WHEN GUSSET AND ANGLE DIMENSIONS PERMIT A SEAL WELD ON BOTH ANGLES ALONG "LINE Y" THEN SEE CLASS I FOR VENTING.

* CONNECTION MAY BE CUT FROM W, M, OR S SHAPES AT DESIGNER'S OPTION

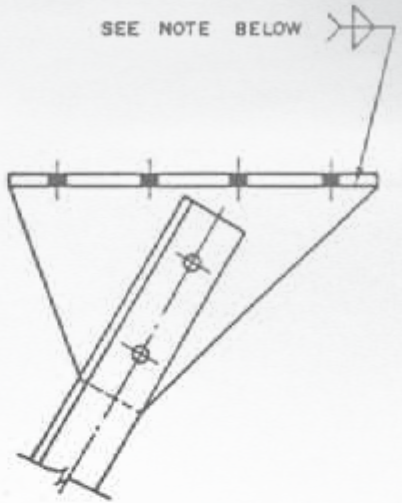
AMERICAN GALVANIZERS ASSOCIATION EST. 1935

GUSSETED CONNECTION WELDED

DRAWING 7



BOLT AFTER GALVANIZING



BOLT AFTER GALVANIZING

NOTE: FOR CONNECTION FROM PLATES* USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD

CLASS I

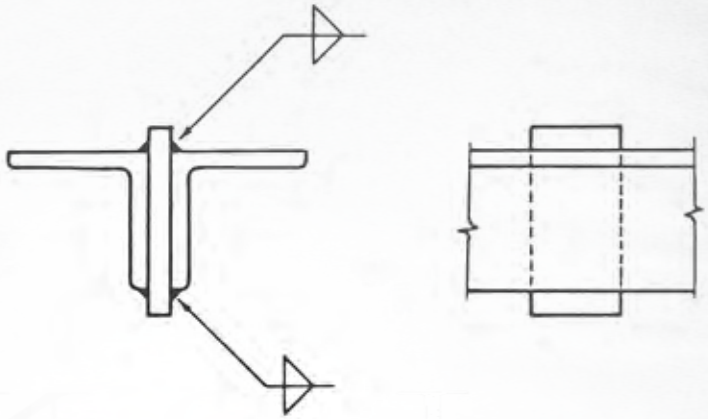
(FOR GUSSETS USED WITH SINGLE OR COMBINED SECTIONS)

CLASS III

(FOR GUSSETS USED WITH SINGLE OR COMBINED SECTIONS)

* CONNECTION MAY BE CUT FROM W, M, OR S SHAPES AT DESIGNER'S OPTION.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
GUSSETED CONNECTION BOLTED
DRAWING 8

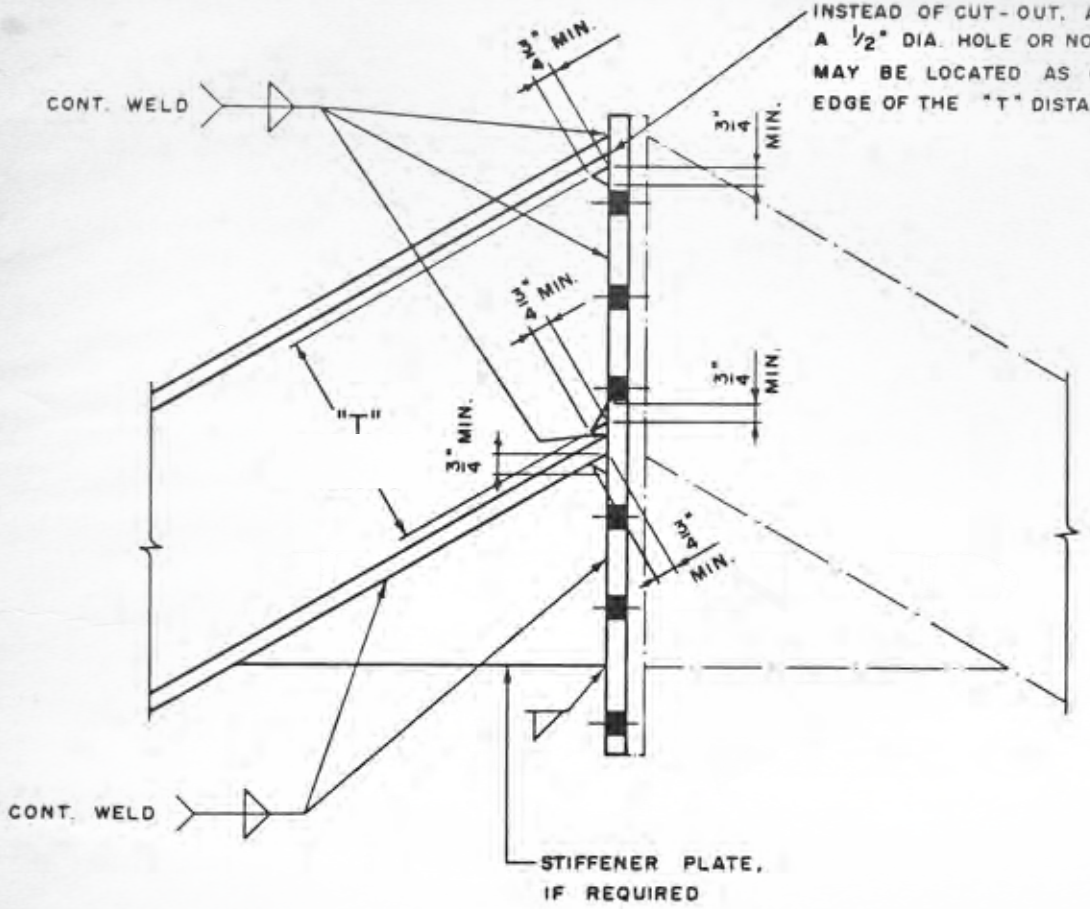


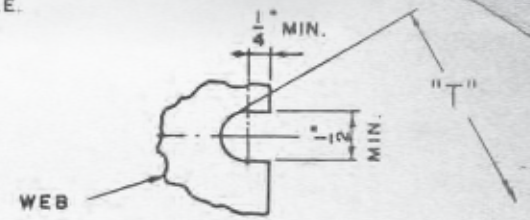
CLASS I

BOLT AFTER GALVANIZING

CLASS III

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
DOUBLE ANGLES
DRAWING 9

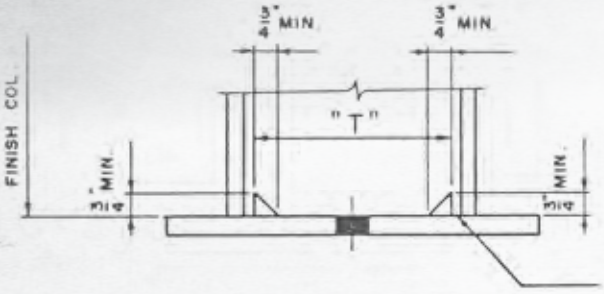




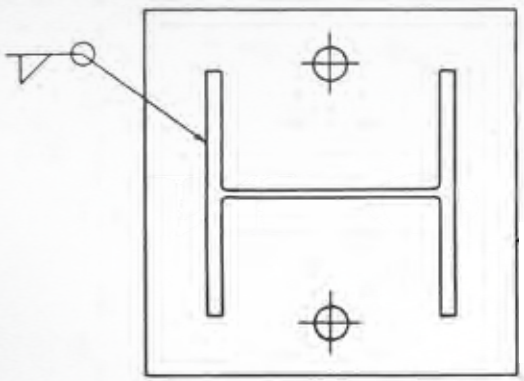
ALTERNATE DETAIL FOR
DRAIN IN WEB

CLASS I

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
MOMENT SPLICE AT RIDGE
(FIELD BOLTED)
DRAWING
10

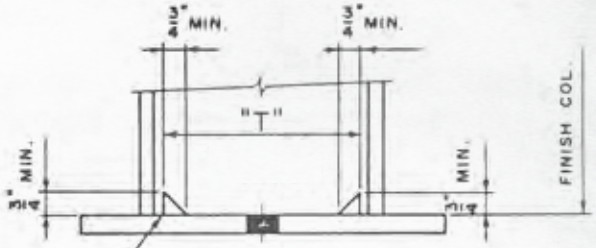


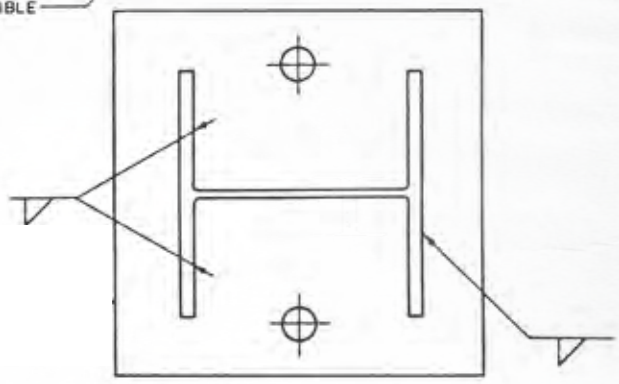
INSTEAD OF CUT - OUT, AS SHOWN, A 1/2" DIA. HOLE OR NOTCH (SEE DETAIL) MAY BE LOCATED AS CLOSE TO THE EDGE OF THE "T" DISTANCE AS POSSIBLE



BASE PLATE SHOP WELDED TO COLUMN SHAFT BEFORE GALVANIZING

CLASS I

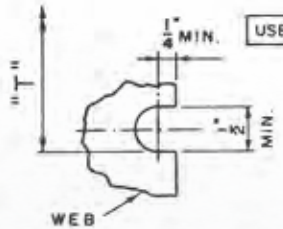




BASE PLATE SHOP WELDED TO COLUMN SHAFT BEFORE GALVANIZING

USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD.

CLASS III

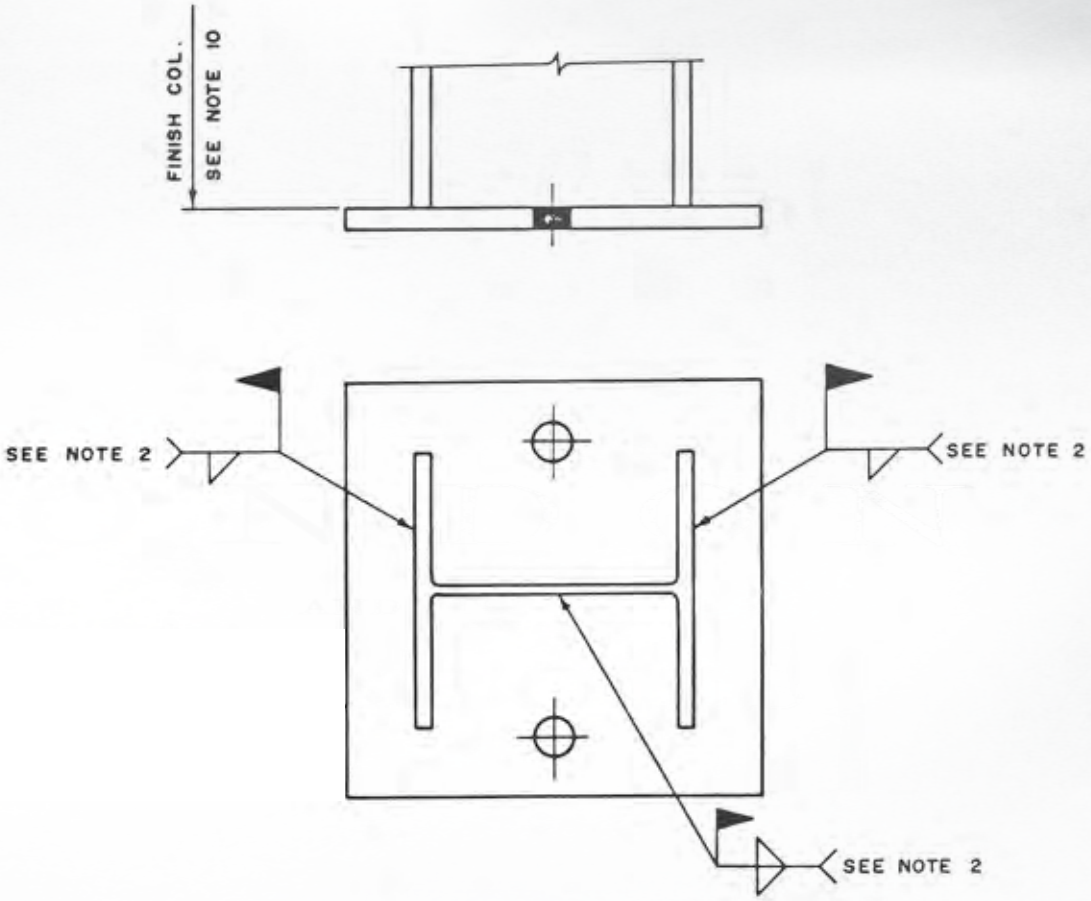


ALTERNATE DETAIL FOR DRAIN IN WEB

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935

SIMPLE COLUMN BASE (BASE PLATE SHOP WELDED)

DRAWING 11

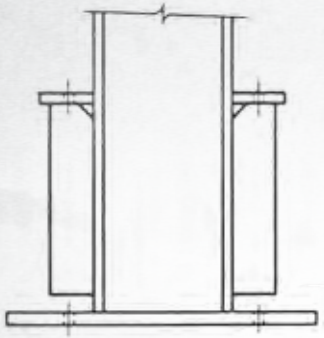


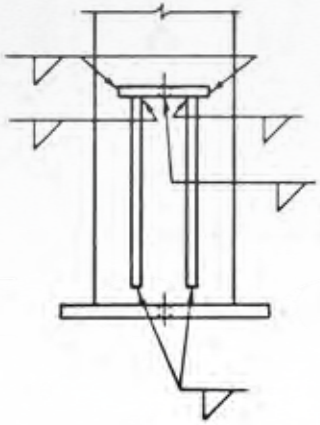
CLASS I

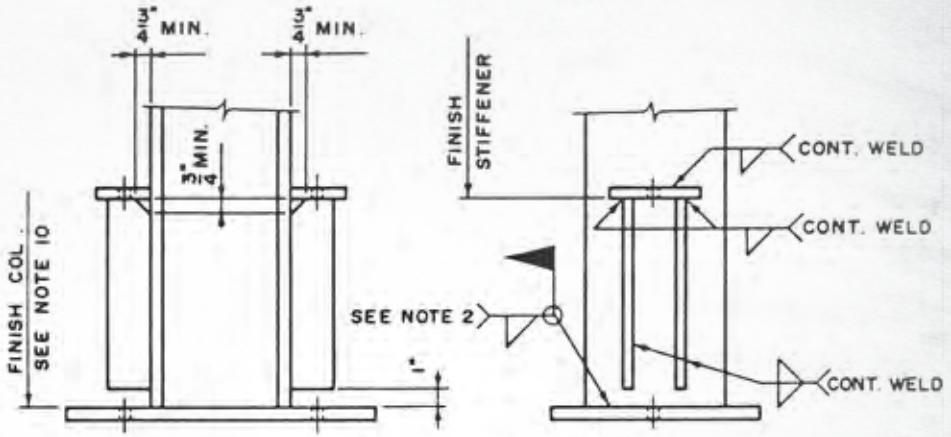
AMERICAN GALVANIZERS ASSOCIATION
EST. 1935

SIMPLE COLUMN BASE
(BASE PLATE FIELD WELDED)

DRAWING
12







CLASS I

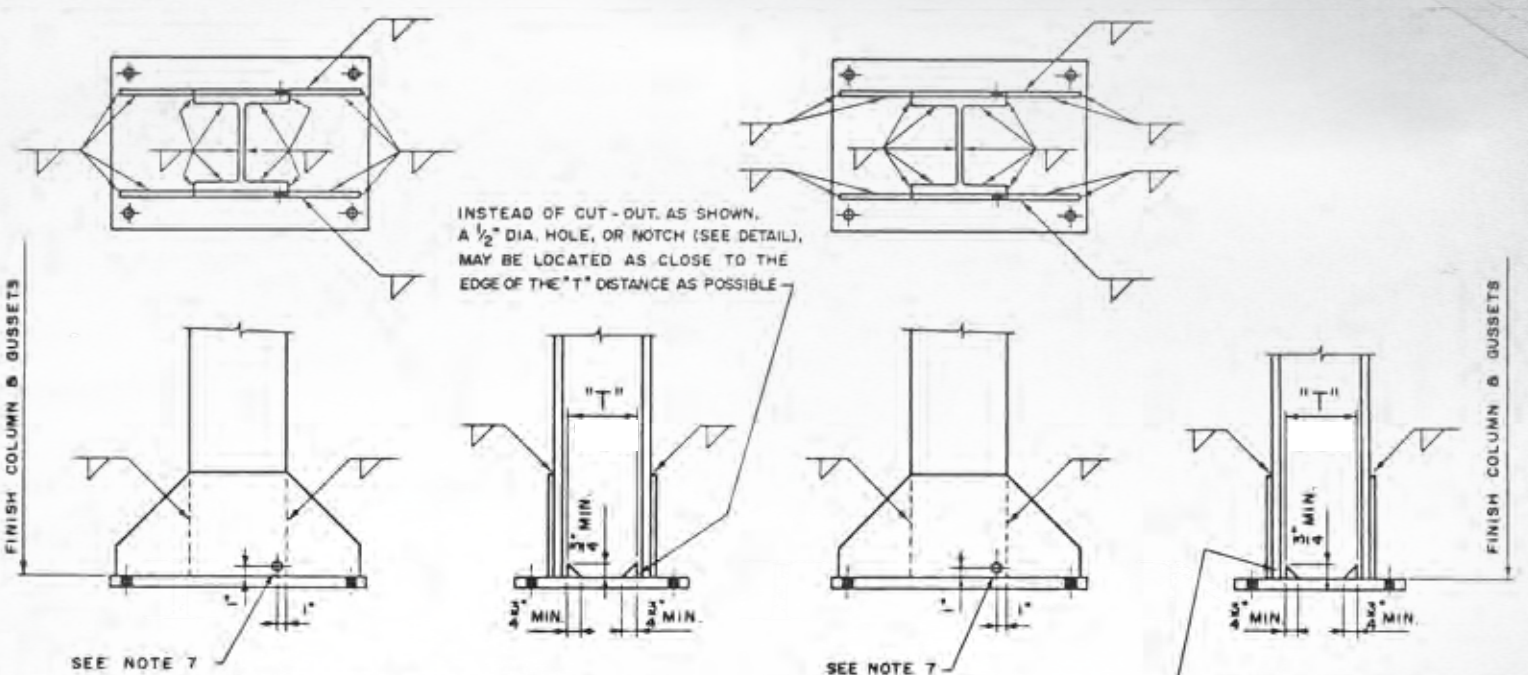
CLASS III

ALL DETAILS SHOWN FOR CLASS III ALSO APPLY TO CLASS I

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935

MOMENT RESISTING COLUMN BASE
(BASE PLATE FIELD WELDED)

DRAWING
13



VENT HOLES (IF ANY) IN OTHER OVERLAP PLATES, ON EITHER FLANGE OF THE COLUMN, SHALL BE LOCATED CLOSE TO THE SAME EDGE, AS ABOVE, REGARDLESS OF WHICH WAY THE OTHER PLATE PROJECTS.

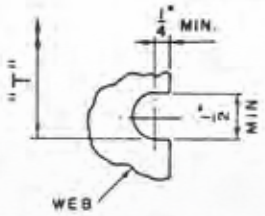
USE CONT. OR INTERMITTENT WELDS AS REQUIRED TO MEET DESIGN LOADS.

CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II

IF VENT HOLE IS REQUIRED



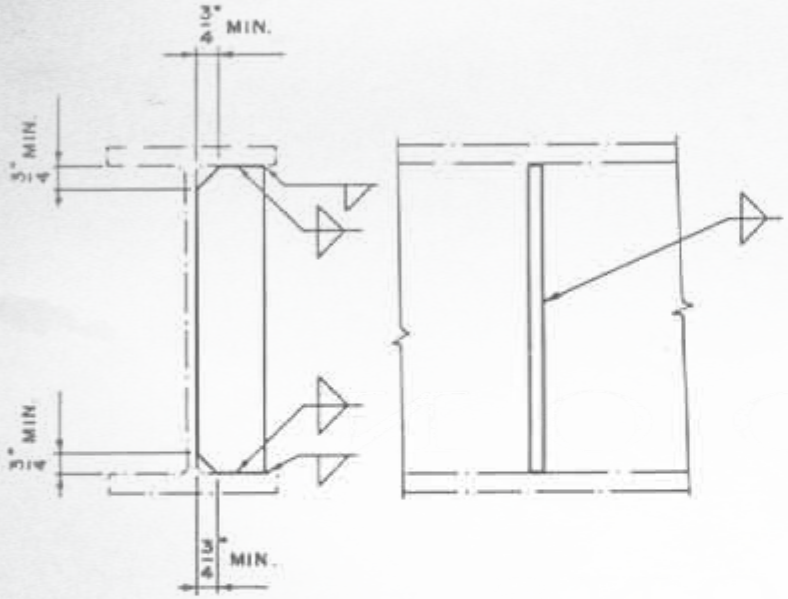
ALTERNATE DETAIL FOR DRAIN IN WEB

CLASS III

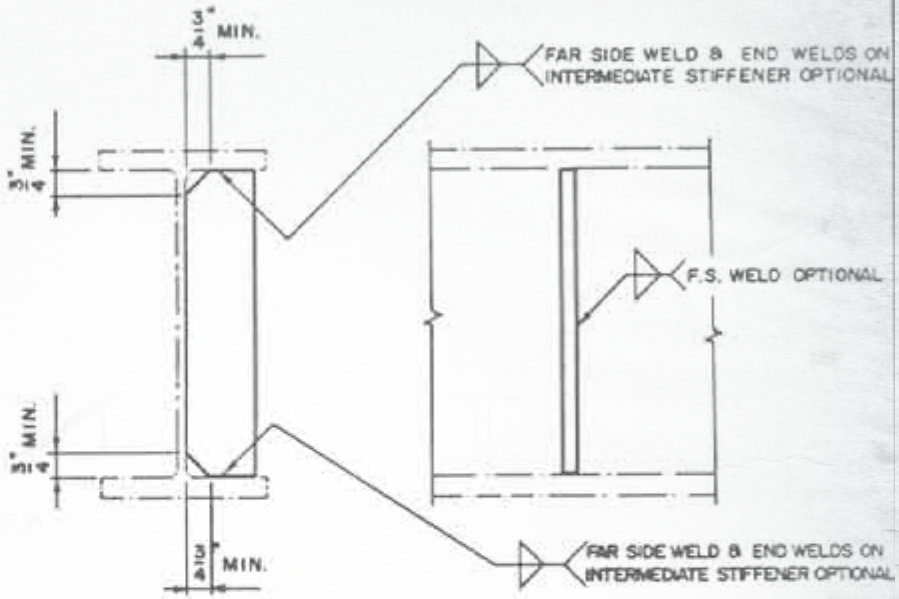
AMERICAN GALVANIZERS ASSOCIATION
EST. 1935

MOMENT RESISTING COLUMN BASE (BASE PLATE SHOP WELDED)

DRAWING 14



CLASS I



USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD.

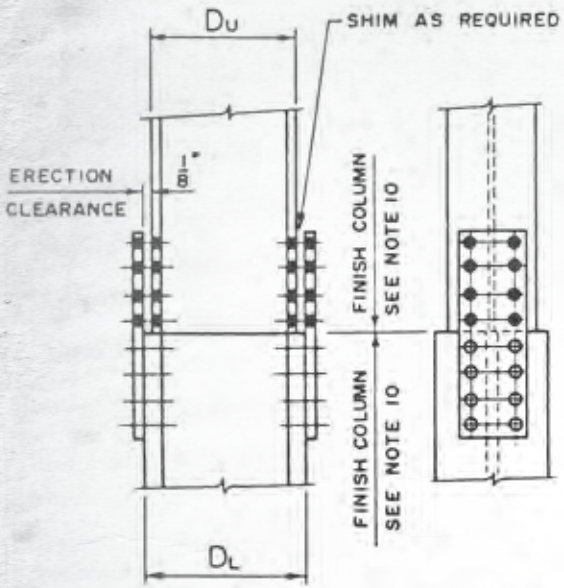
CLASS III

NOTE FOR BOTH CLASSES: BEVEL WELD MAY BE USED INSTEAD OF FILLET WELD, AT DESIGNERS OPTION.

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935

WEB STIFFENER

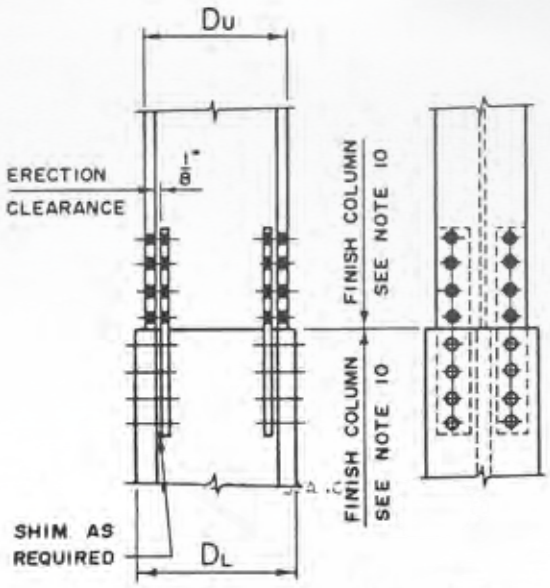
DRAWING 15



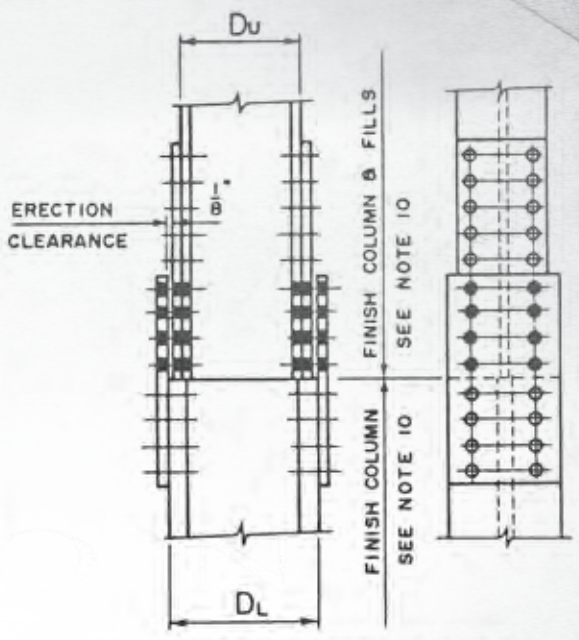
BOLT AFTER GALVANIZING

CLASS I

DEPTH OF D_U AND D_L NOMINALLY THE SAME



BOLT AFTER GALVANIZING

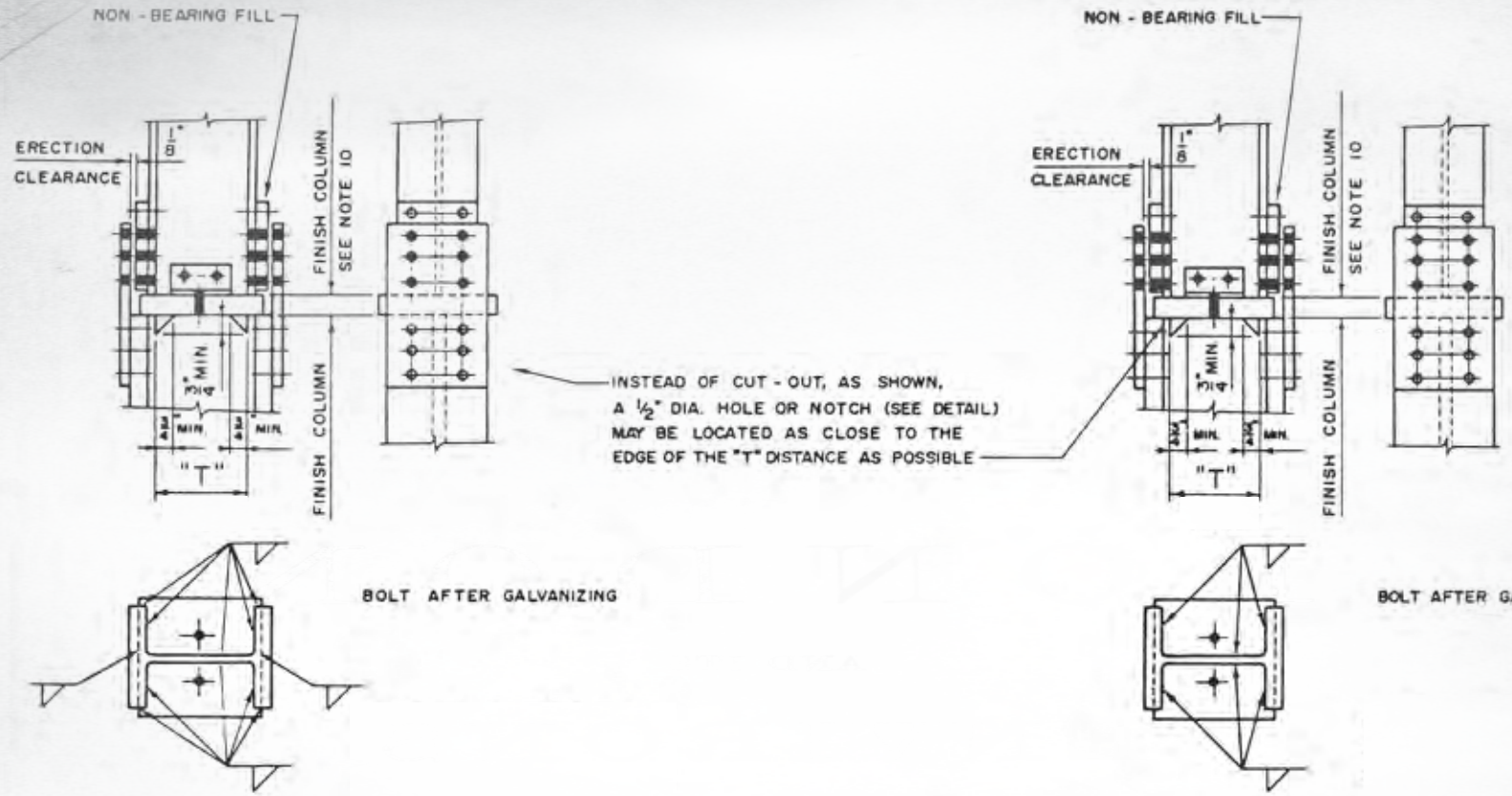


BOLT AFTER GALVANIZING

CLASS I

DEPTH D_U NOMINALLY 2" LESS THAN D_L

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
COLUMN SPLICES - BOLTED
DRAWING 16

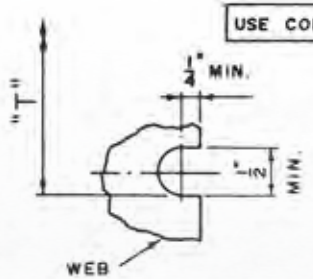


BOLT AFTER GALVANIZING

BOLT AFTER GALVANIZING

USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD.

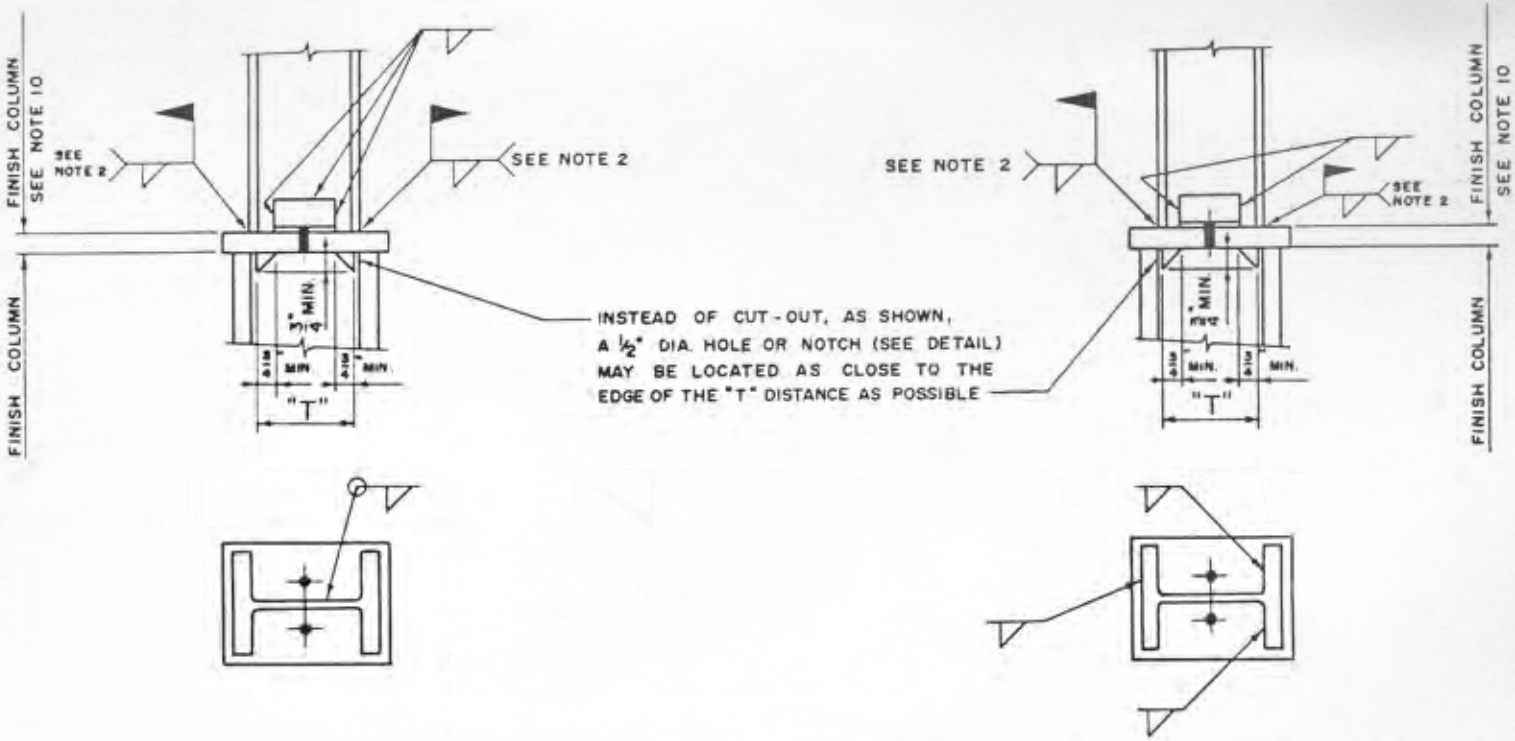
CLASS I



ALTERNATE DETAIL FOR DRAIN IN WEB

CLASS III

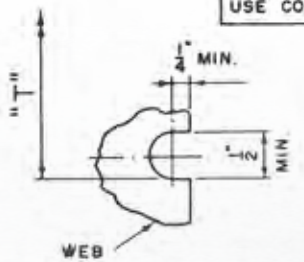
AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
BUTT PLATE COLUMN SPLICE BOLTED
DRAWING 18



USE CONT. OR INTERMITTENT WELD AS REQUIRED TO MEET DESIGN LOAD

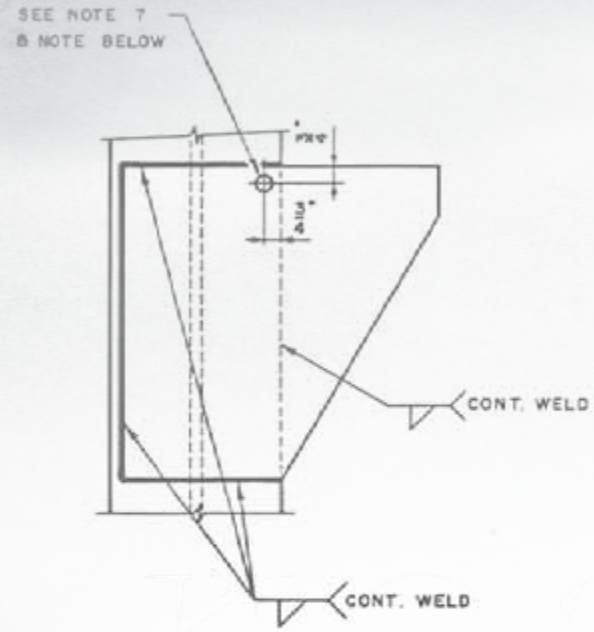
CLASS II

CLASS III



ALTERNATE DETAIL FOR DRAIN IN WEB

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
BUTT PLATE COLUMN SPLICE WELDED
DRAWING 19



NOTE:

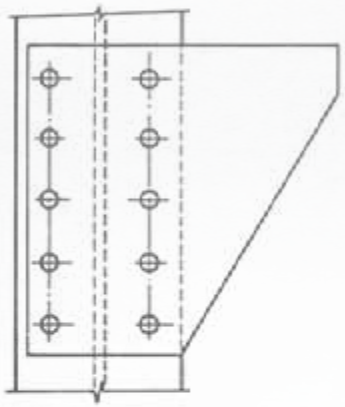
VENT HOLES (IF ANY) IN OTHER OVERLAP PLATES ON EITHER FLANGE OF THE COLUMN SHALL BE LOCATED CLOSE TO THE SAME EDGE, AS ABOVE, REGARDLESS OF WHICH WAY THE OTHER PLATE PROJECTS.

CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7

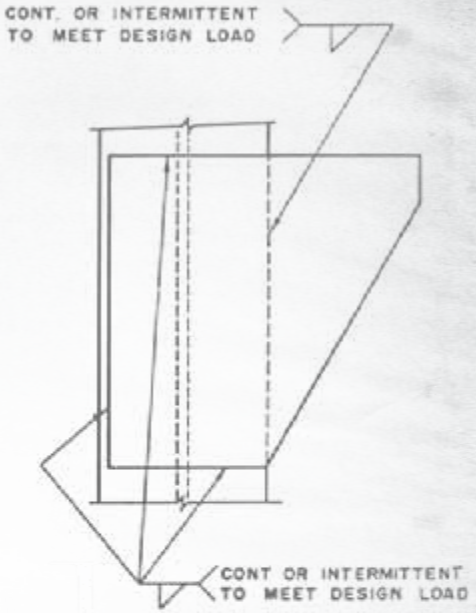
CLASS II

IF VENT HOLE IS REQUIRED



CLASS I

BOLT AFTER GALVANIZING

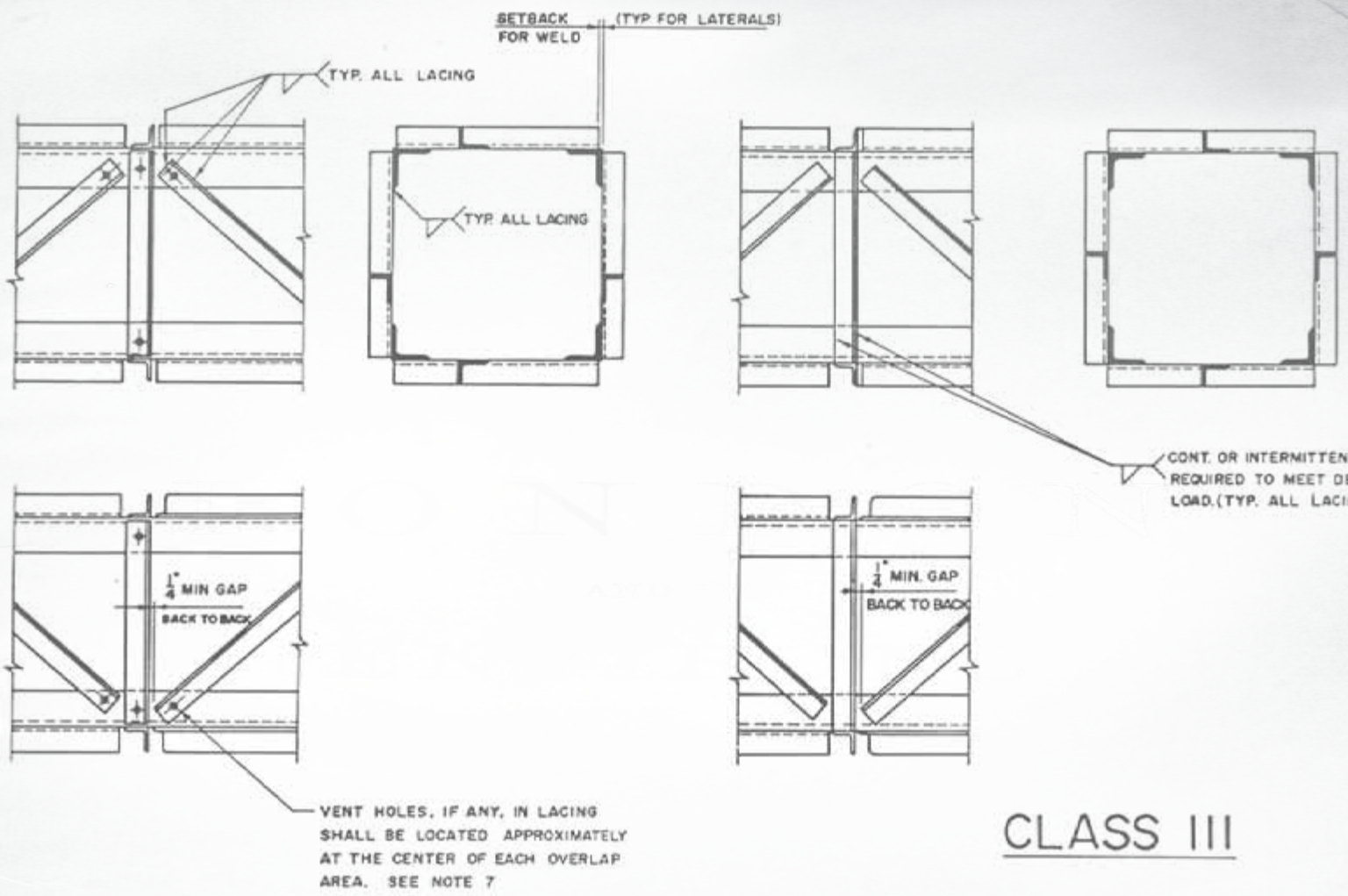


NOTE:

AMOUNT OF WELD IN THIS DETAIL MUST NOT EQUAL AMOUNT SHOWN FOR CLASS I DETAIL.

CLASS III

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
BRACKET PLATE
DRAWING 17



CLASS III

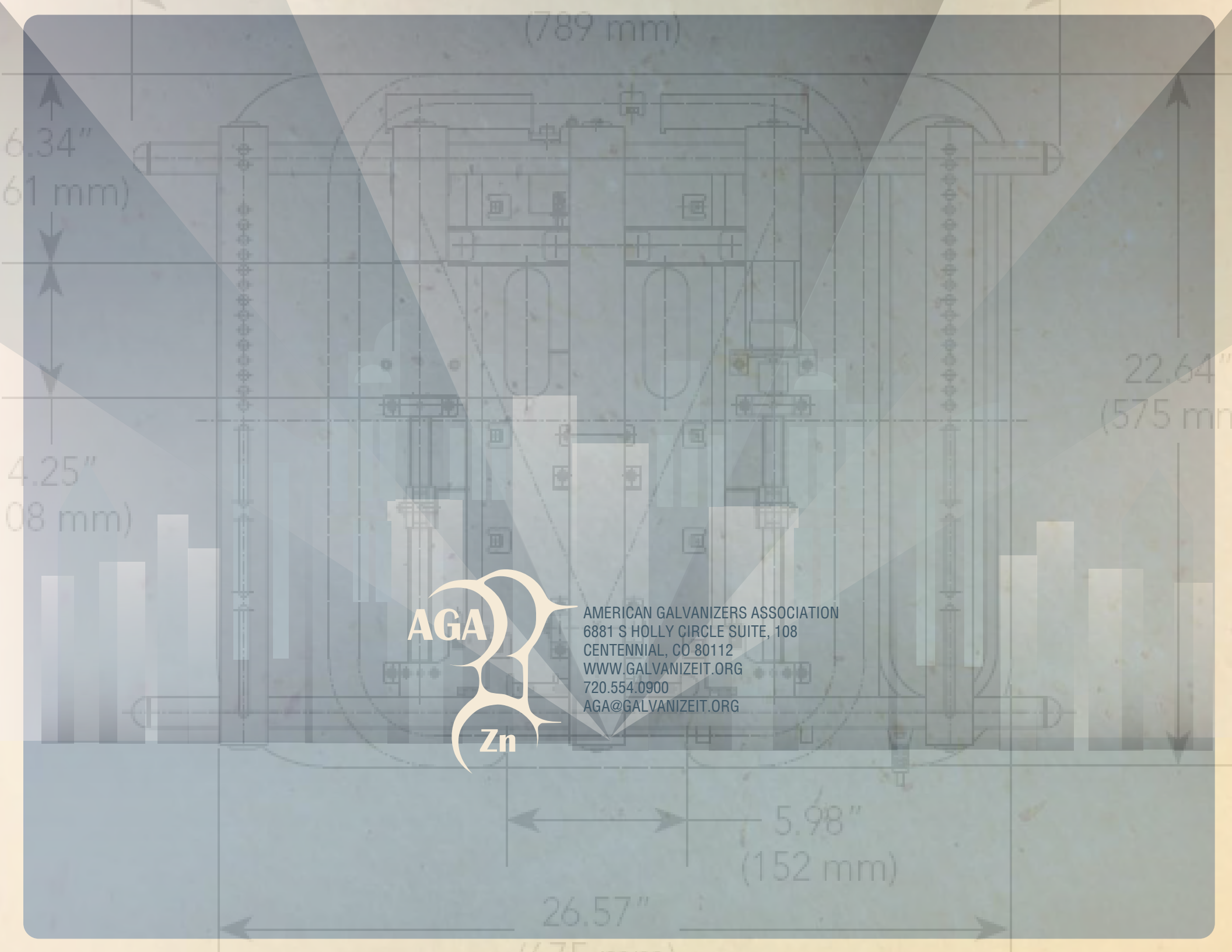
CLASS I

IF NO VENT HOLE IS REQUIRED PER NOTE 7

CLASS II

IF VENT HOLE IS REQUIRED

AMERICAN GALVANIZERS ASSOCIATION
EST. 1935
BOX TRUSS
DRAWING 20



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