

# NSBA Steel Bridge Forum

September, 2020



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## Cost Effective and Efficient Detailing for Fabrication of Steel Girders

# Agenda

- Raw Material Selection
- Girder Details
- Crossframe Details

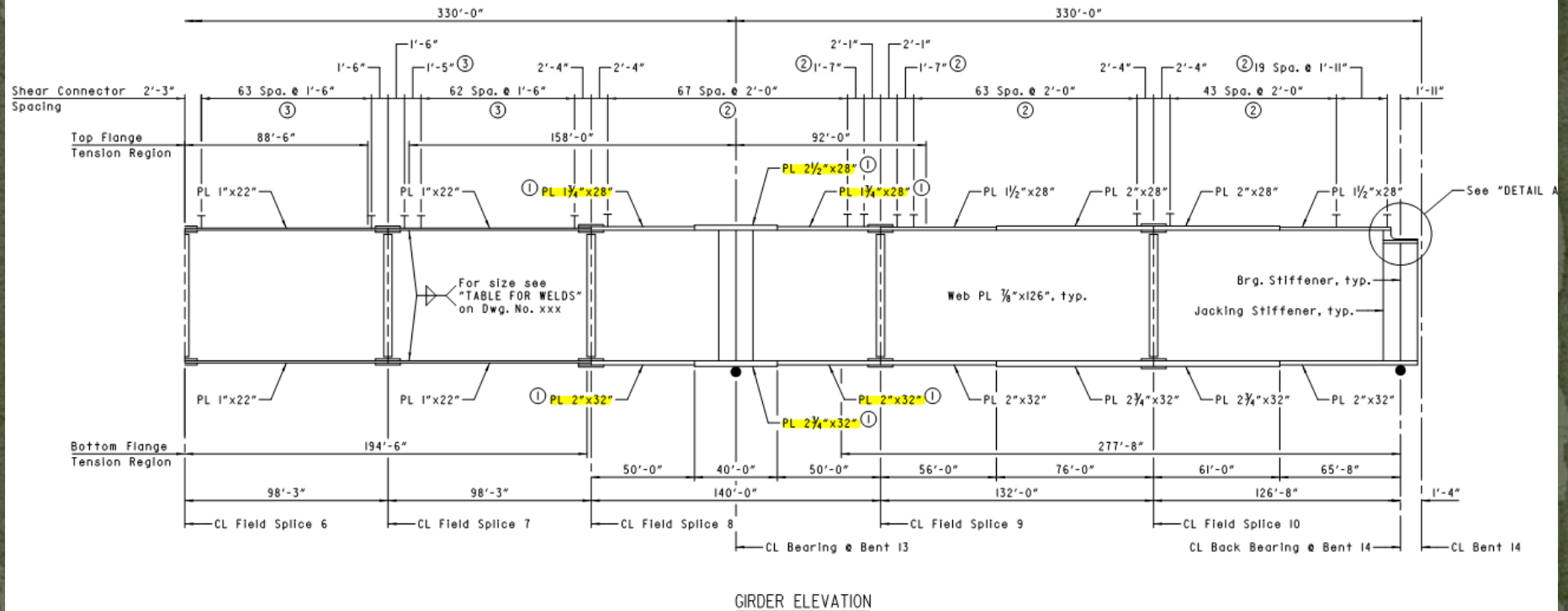
# Raw Material Selection

- We suggest the use of 50W steel in lieu of grade 50 painted. The cost of grade 50 PRIMER ONLY is approximately the same cost as 50W uncoated.
- Due to recent changes in HPS-70W material pricing it may be economical to explore its use. Contact your local fabricator for additional information.
- Plate availability
  - Webs depths DO NOT have to be specified in 3" increments
  - Plates thicknesses are available in 1/16" increments between 1/4" to 4"



# Raw Material Selection

- Good example of HPS-70W material use



THESE DRAWINGS ARE BASED ON DESIGN  
THROUGH AUGUST 28, 2020  
AND SUBJECT TO CHANGE

① Indicates Grade HPS-70W Steel

SHEET 9  
DETAILS OF I365'  
COMPOSITE PLATE

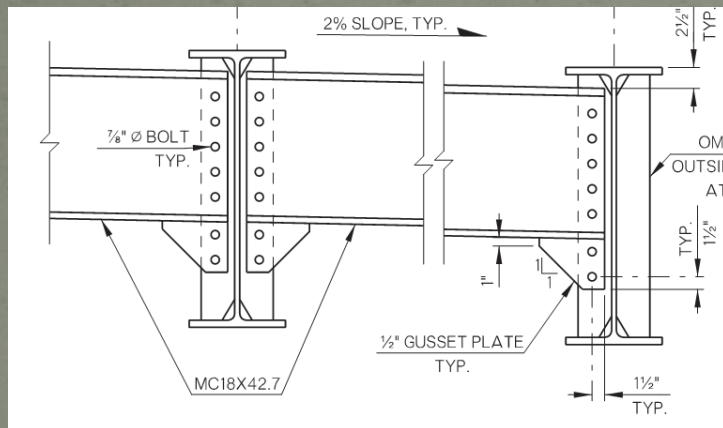
# Raw Material Selection

- When possible avoid expensive sections such as W40s and MCs
- Depending on market conditions and schedule, fabricating a plate girder can be less expensive than W40s. In multiple cases we have seen savings of as much as 10% on the total steel package.

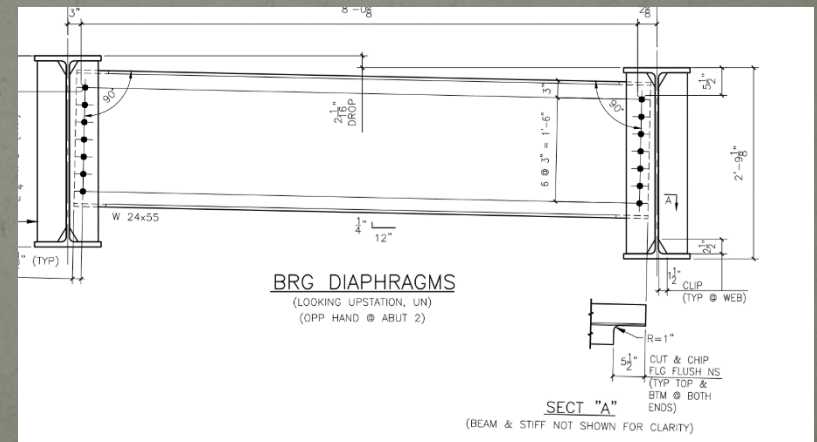
THE CONTRACTOR MAY PROPOSE PLATE GIRDERS USING EQUIVALENT SECTION PROPERTIES IN LIEU OF THE ROLLED BEAM SHAPE SHOWN AT NO ADDITIONAL COST TO THE DEPARTMENT. PROVIDE  $\frac{5}{16}$ " MINIMUM FILLET WELDS BETWEEN WEB AND FLANGES. NON-DESTRUCTIVE TESTING WILL BE REQUIRED AS APPROPRIATE.

# Raw Material Selection

- MC diaphragms can cost up to 60% more than bent plate diaphragms or rolled beams. Especially if tab plates are welded to the MCs.



-VS-

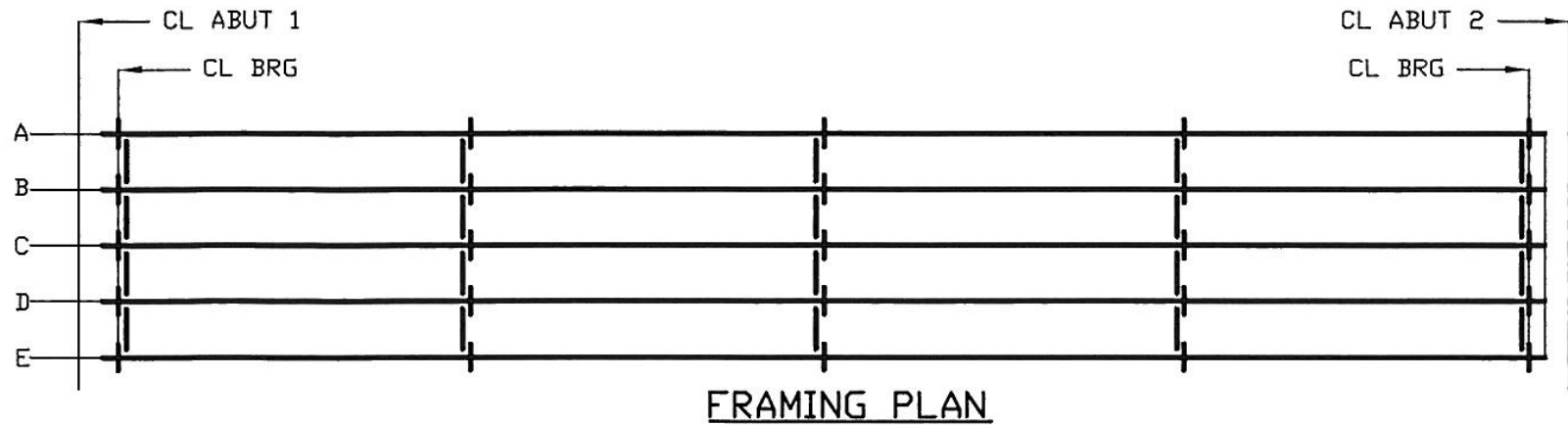




# Girder Details

- What is slab splicing and why does it matter to you?
- Splicing can dictate your delivery schedule.
- Slab splicing is up to 34% more efficient than splicing single flanges.

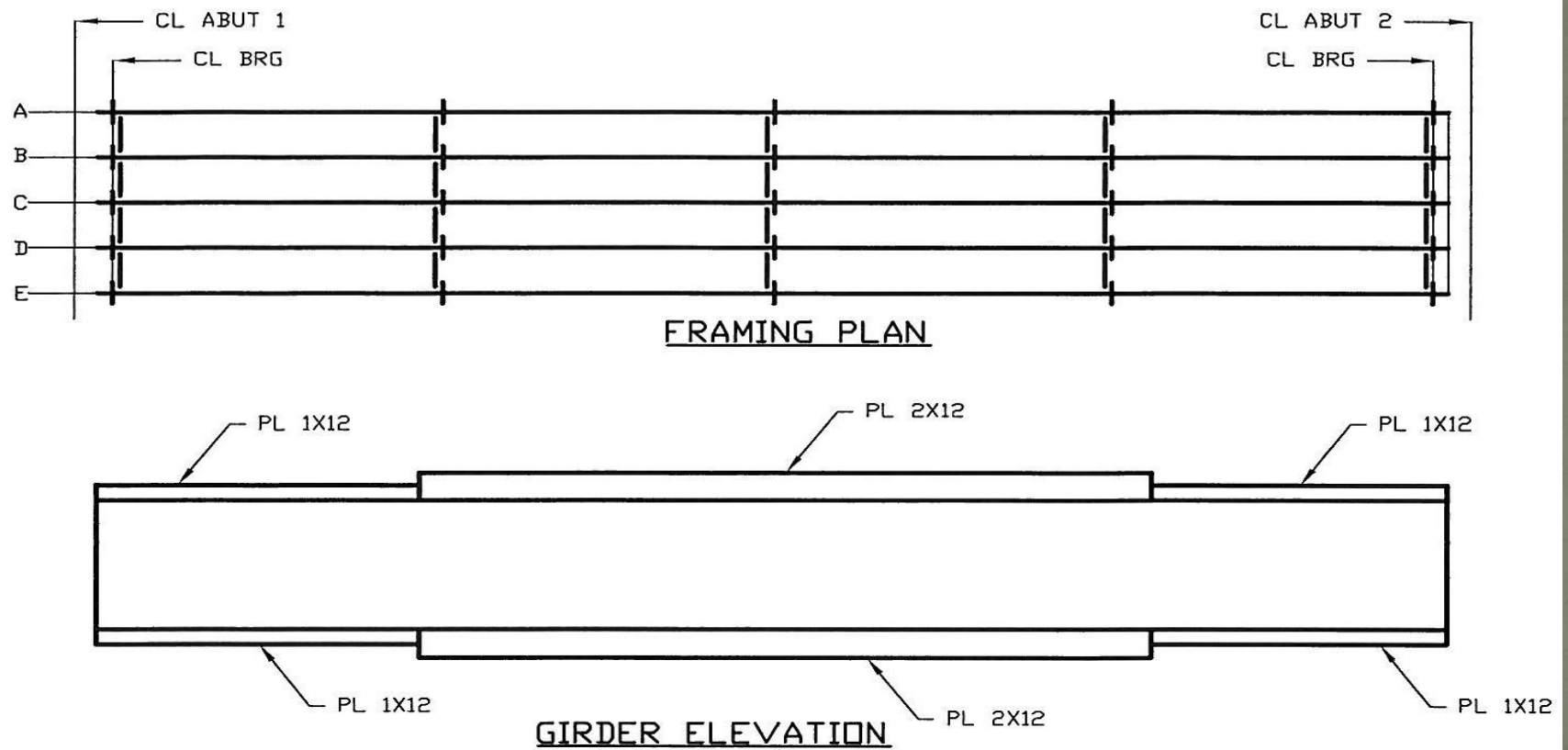
# \*FRAMING PLAN





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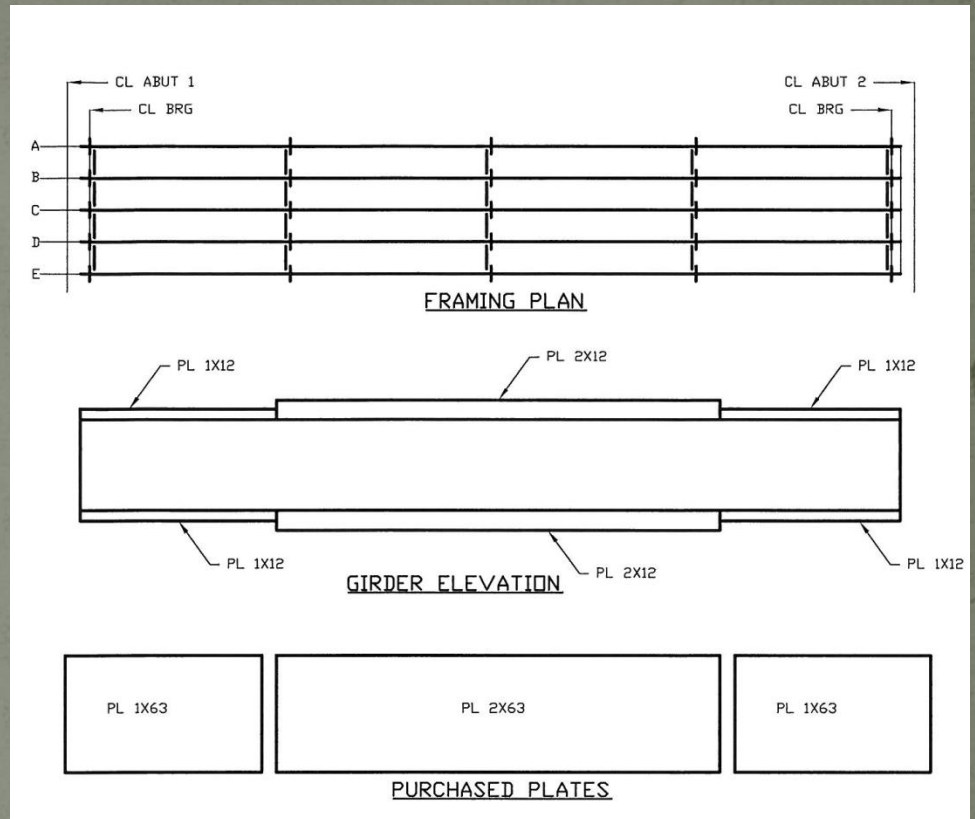
# \*GIRDER ELEVATION



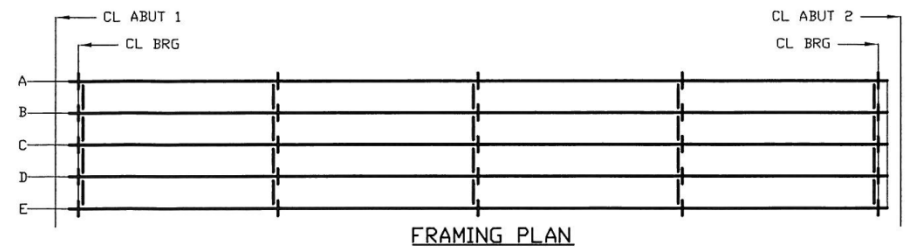
\*FRAMING PLAN

\*GIRDER ELEVATION

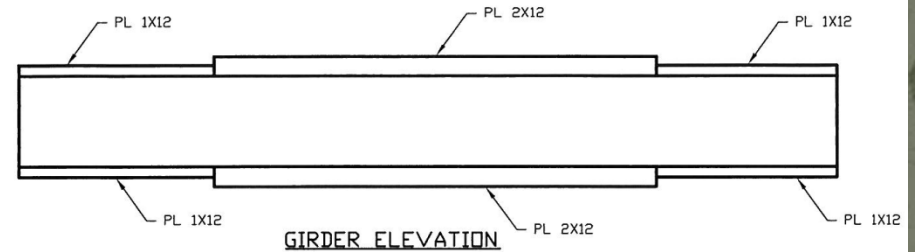
\*PURCHASED PLATES



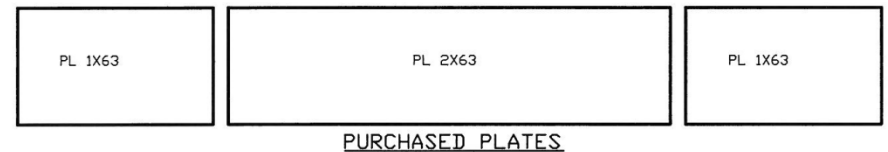
\*FRAMING PLAN



\*GIRDER ELEVATION



\*PURCHASED PLATES



\*SPLICED PLATES





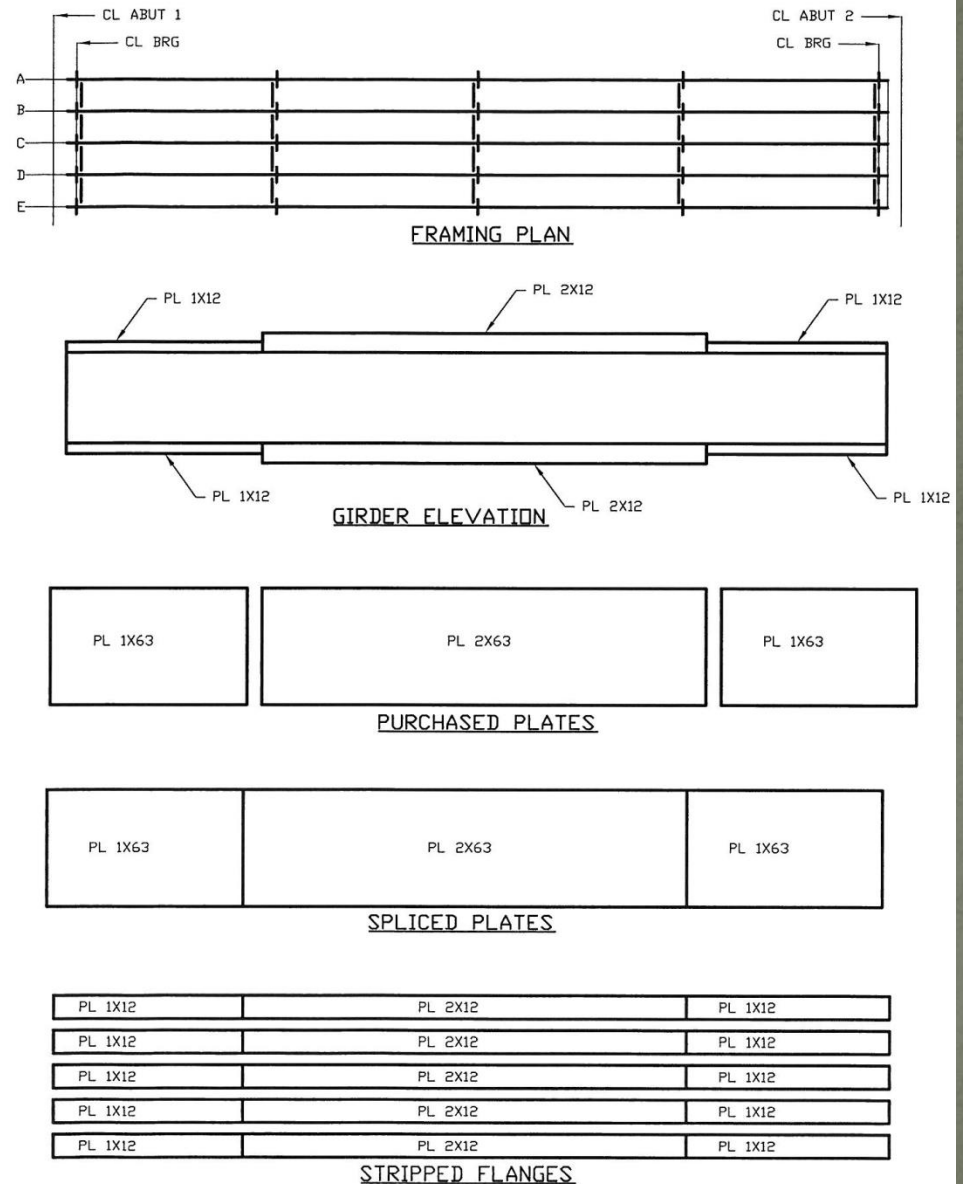
\* FRAMING PLAN

\* GIRDER ELEVATION

\* PURCHASED PLATES

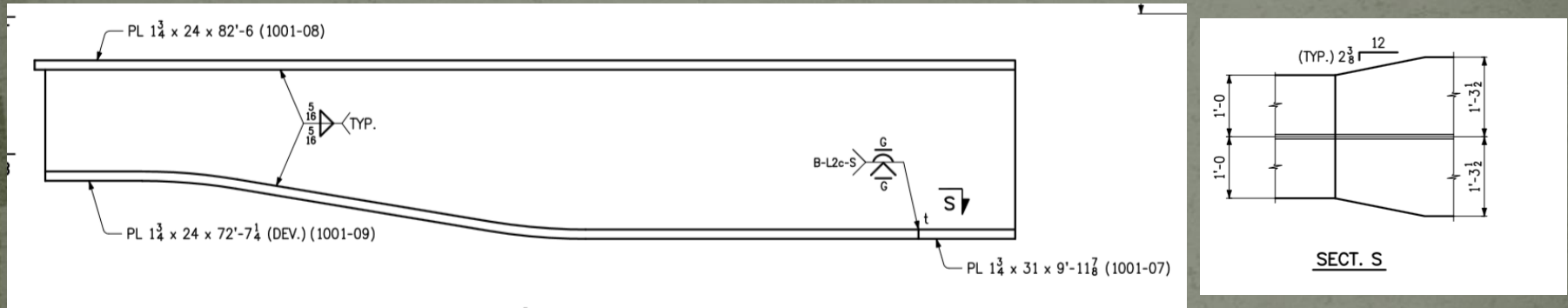
\* SPLICED PLATES

\* STRIPPED FLANGES

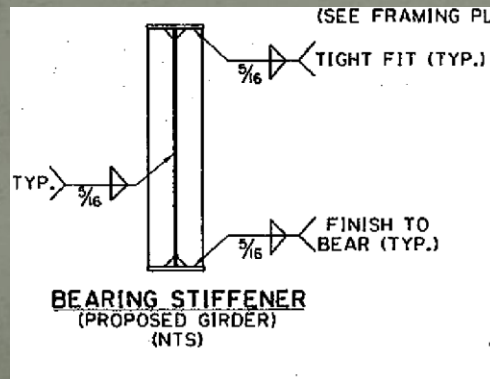


# Girder Details

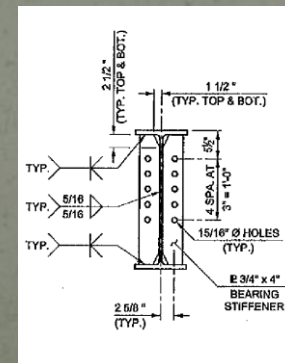
- Limit flange width transitions to field splice locations.



- Finish to bear in lieu of full pen welded stiffeners can save 10-15% on stiffener fitting/welding cost.



-VS-



# Girder Details

- Limit web to flange welds to AWS D1.5 minimum fillet weld sizes (max 5/16"). Anything beyond a 5/16" fillet will at minimum double web to flange welding cost.

**Table 2.1**  
**Minimum Fillet Weld Size<sup>a, b</sup> (see 2.8)**

Base Metal Thickness of Thicker Part Joined (T)	Minimum Size of Fillet Weld	
T ≤ 20 mm [3/4 in]	6 mm [1/4 in]	Single-pass welds shall be used
T > 20 mm [3/4 in]	8 mm [5/16 in]	

<sup>a</sup> Smaller fillet welds may be approved by the Engineer based upon applied stress and the use of appropriate preheat.

<sup>b</sup> Except that the weld size need not exceed the thickness of the thinner part joined. For this exception, particular care should be taken to provide sufficient preheat to ensure weld soundness.

- Use the latest splice design criteria and larger bolts up to 1" dia when it reduces the number of holes.



# Crossframe Details

- Avoid the use of back to back angles.
- K-frames with all welding on one side eliminates the need to flip crossframes in the shop.
- Please specify minimum weld lap sizes. This allows the fabricator to create non-rectangular gussets and reduce the amount of welding required.
- Use larger bolt diameters to reduce the number of bolt holes in crossframes. 1" dia. A325 bolts are readily available.



**NOTE FULL LENGTH WELDS**

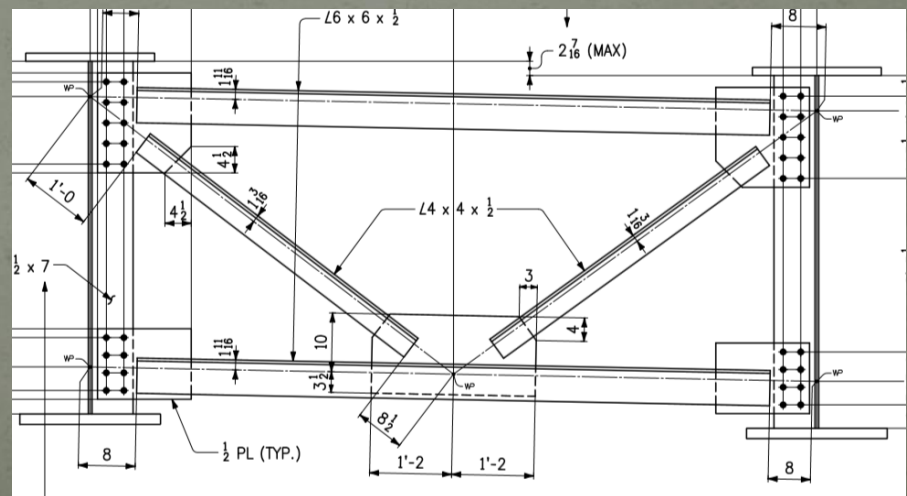
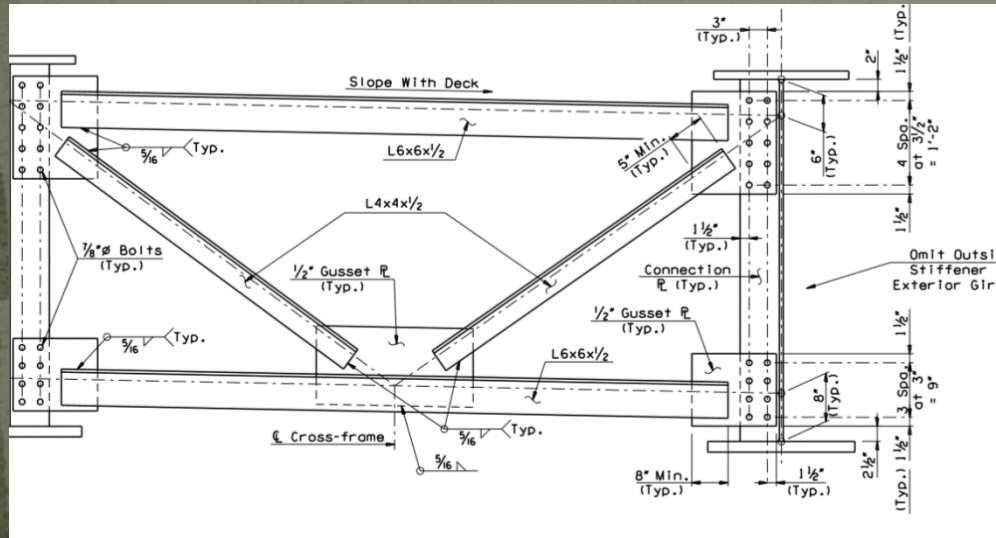


# NOTE PARTIAL LENGTH WELDS





# Examples of Clipped Crossframe Gussets









**LACK OF INNOCENCE REVEALED**



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