

Different Angles

BY EDDIE WILLIAMS

Reducing fabrication and erection costs of shelf-angle supports.

A VARIETY OF DETAILS can and have been used for external brick support framing on multi-story buildings. The Steel Erectors Association of America (SEAA) recently conducted a survey of five erectors and six fabricators to determine how fabrication and erection costs compared for a few common details. Each firm was given a sample building plan and asked to provide their assessment of the various details.

The sample building (see Figure 1) is 240 ft by 150 ft in plan and has three framed floors plus a roof. All bays are 30 ft by 30 ft, beams and columns are W-shapes, and the floor construction is concrete on metal deck. The roof construction is insulation on metal deck. Suitable access exists for lifts and hoisting equipment around the entire perimeter.

Each firm compared three systems, as follows:

System 1: Conventional L3x3x¼ angle hanger and diagonal at 4 ft on center with L6x6x½ shelf angle. Shipped cut to length with slotted erection holes. Field welded after alignment. (See Figures 2 and 3.)

System 2: Similar to System 1, except with a vertical frame shop welded in 30-ft sections and diagonals shipped loose. (See Figures 4 and 5.)

System 3: Horizontal HSS14x6x½ shop fabricated in 30-ft sections with shop-welded L6x6x½ shelf angle. HSS is supported at columns with provision for vertical and in-out adjustments. Optional hanger and diagonal at center. (See Figure 6.)

Each firm was asked to estimate the work hours per linear ft for each option. Following is the average of the 11 estimates:

	System 1	System 2	System 3
Fabrication	0.32 hours/ft	0.63 hours/ft	0.16 hours/ft
Erection	0.65 hours/ft	0.47 hours/ft	0.14 hours/ft

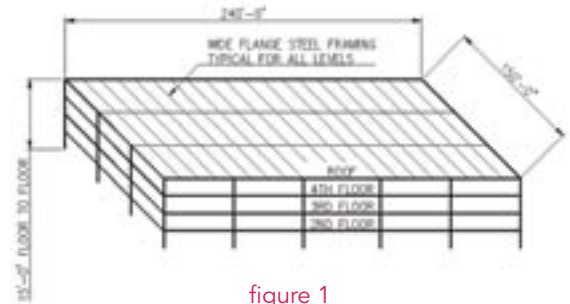


figure 1

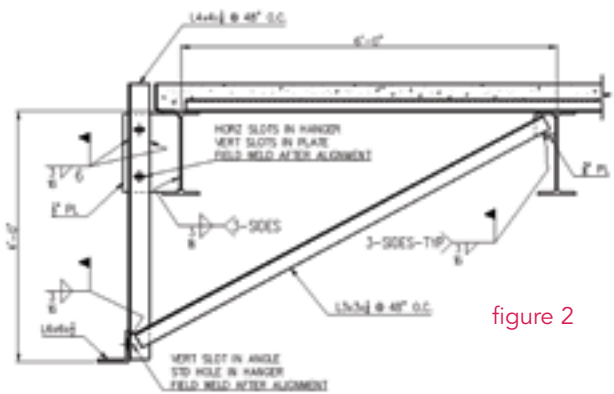


figure 2

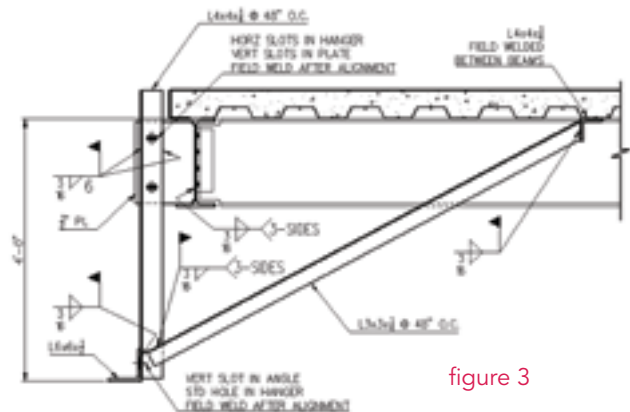


figure 3

For cost in dollars wage rates with overhead, profit, etc. for different geographic areas can be applied.

Material costs also must be considered. At the time of this study, even after allowing for the greater weight of the material used in System 3, its cost was at least 25% less than Systems 1 and 2, which were very close in cost. (While cost was about equal for Systems 1 and 2, it should be noted that System 2 requires less installation time than System 1 and can be a useful approach when this conventional detail is used.)



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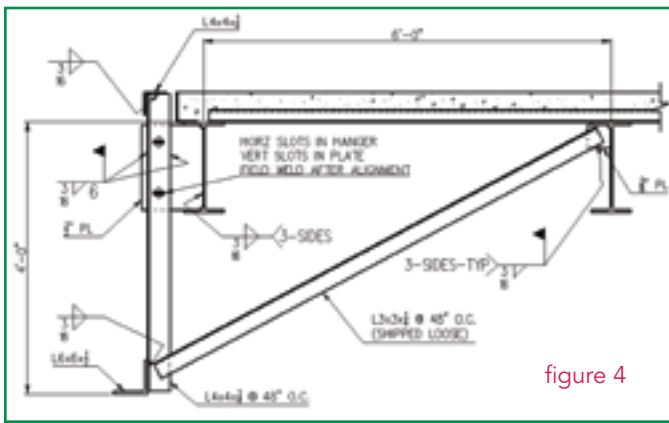


figure 4

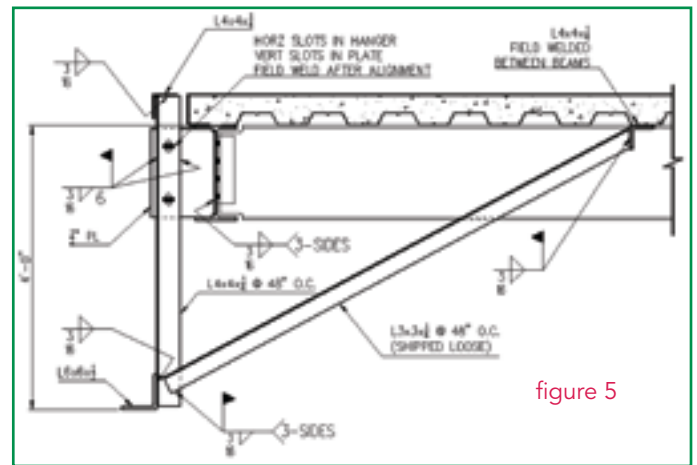


figure 5

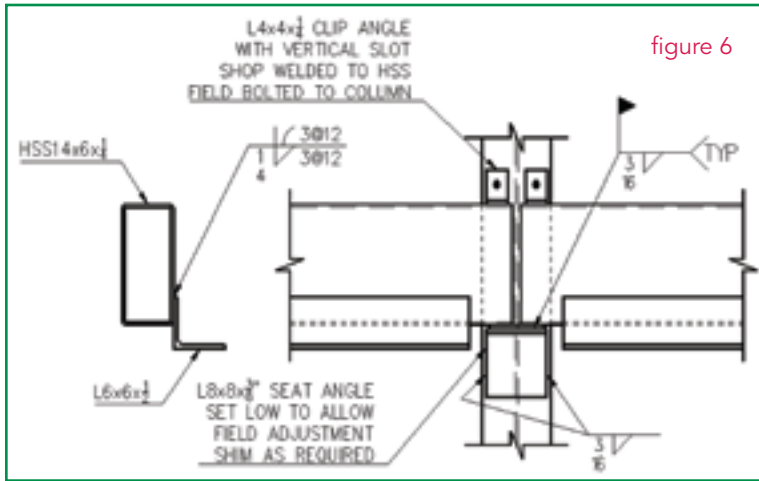


figure 6

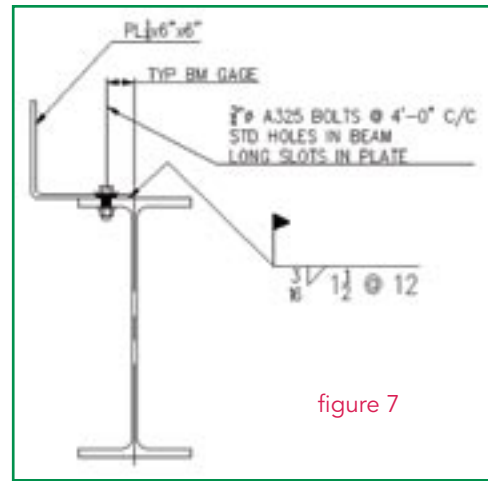


figure 7

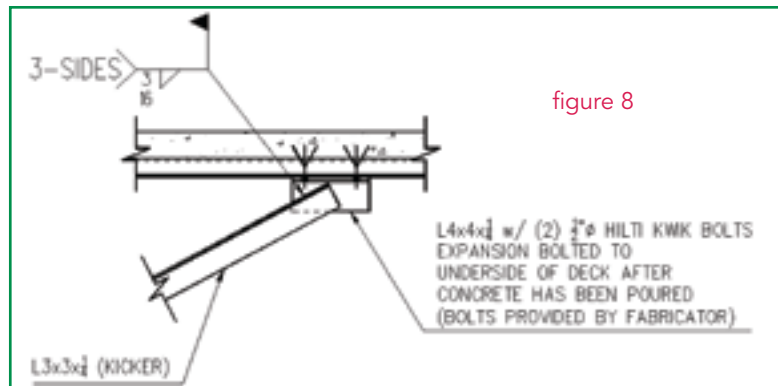


figure 8

All details were provided by Frank Bland with SteelFab, Inc. (an AISC Member Fabricator).

In addition to the potential for lower labor and total cost, System 3 offers several advantages over Systems 1 and 2, including:

- Shorter installation time
- Earlier start for masonry trades and other related material installation
- Lower exposure to safety hazards
- No need to wait for floors to be poured and camber in beams to adjust prior to alignment
- Significant improvement in overall project schedule

Some other comments that may help improve economy in perimeter details:

- Tolerances generally mean that shop attachment of perimeter angles or bent plates is not a viable approach. Instead, consider the use of angles or plates that are temporarily shop bolted with slotted holes that provide for the necessary field adjustment. If required, field welding can be performed for the final connection after field adjustment. (See Figure 7.)

- Field welds should be shown for actual weld required, not as “weld all around.”
- Attachment of diagonal braces to the underside of the deck with post-installed anchors can be very expensive. It may be less expensive to provide an angle or other suitable framing element between beams (see Figures 3 and 5) for attachment of diagonals when the diagonal frames parallel to the beams.

So, what should you do on your project? Send this article to a steel fabricator in your area and ask them how this study compares to the results you might achieve. For further discussion, consider the details and guidance provided in AISC Design Guide No. 22, *Facade Attachments to Steel-Framed Buildings*. There is great information in this guide for a variety of facade systems and support details, including those covered in this article. Should your fabricator agree that the HSS shelf angle support detail is the most cost effective, more extensive details for this option also will be included in the revised NISD/SEAA detailing manual, which will be published later this year. **MSC**