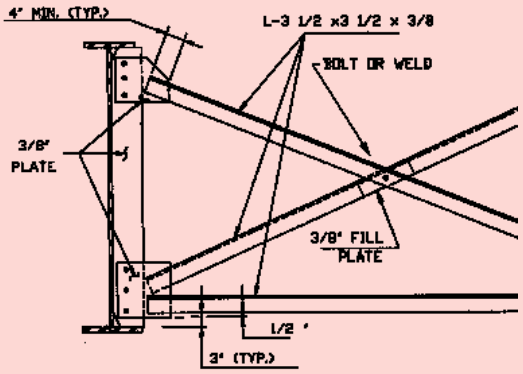


BRIDGE CROSSINGS

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Practical Information For The Bridge Industry

# WELDLESS DECKING EXPANDS BRIDGE OPTIONS

**By Ronald W. Mangone**

No one questions that a huge number of bridges in the United States are in need of repair or replacement. Often, however, major repairs are not needed to the supporting steel in the superstructure, but rather to the bridge deck.

In August 1996, representatives of American Grid met with West Virginia DOT personnel and presented information on a newly developed Weldless Bridge Deck Grating. The product features an interlocking assembly, thereby eliminating the need for welds but maintaining the load capacity and weight advantages of steel bridge deck. Because of the lack of welding, the deck can expand or contract freely in varying weather conditions. Also, the deck sections remain distortion-free through fabrication, galvanizing and installation. Finally, in most applications the weldless system should be less expensive then traditional welded grids.

Present at the meeting was Steve Faulkner, District 9 Bridge Design Engineer. Coincidentally, Faulkner was beginning work on a bridge over the Greenbrier River on County Route 43 in Fort Springs, WV. The structure consists of a 160'-10" Pratt through truss span with two 39'-2" SSWB (simple steel wide beam) approach spans on the north approach. The roadway width is 20'-0" curb-to-curb and consists of a 6¼"-thick reinforced concrete deck. Though built on its present site in 1957, the truss span was one of three originally erected 32 years earlier on U.S. 60 across the Gauley River at Gauley Bridge, WV. The design live load was 2-H 15 trucks or 76 lb./sq. ft. of roadway plus 15% live load impact. In 1951, a new bridge was built and U.S. 60 was relocated. The trusses were

dismantled and later re-erected at three different sites throughout West Virginia.

The existing truss has now been in service for almost three-quarters of a century and was recently rated as being in fair condition. The truss has had some repair work done, the most significant being the addition of structural tees to all stringers and floorbeams in 1978. The bridge deck, however, was rated poor to critical with some complete failures of the concrete. After considering several options, including replacing the bridge and redecking using an exodermic bridge deck, Faulkner opted for the weldless deck. The West Virginia project is the first in the world to utilize the new system.

Re-decking included the two approach spans and the truss main span—a total of 5,145 sq. ft. For the approach spans, a 4" on-center main beam open grid deck with poured concrete haunches was utilized, while a 6" on-center main beam open grid deck with HP concrete poured haunches was used for the truss span. The grid was anchored to the steel beam using Nelson stud welds; the guide rail posts were attached without the use of welding.

The work was completed on four consecutive weekends beginning September 12, 1997. The bridge was open to traffic Monday at 7 a.m. through Friday at 5 p.m. between installation periods.

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One reason the weldless deck was chosen over an exodermic concrete grid was the latter system would not have yielded any significant increase in live load capacity. In contrast, the weldless system provided for increased live loads to HS23 for both the floor system and the truss, a 55% increase from the pre-existing HS15 rating for the truss and HS20 rating for the floor system. This live load increase was important, since the surrounding communities include both farms and a limestone quarry, which ships approximately half-a-million tons of limestone by truck across the bridge each year.

The project was originally estimated at $300,000. However, even with the added learning costs associated with using a new system, the deck replacement using the weldless system cost on $270,000, a 10% saving compared with the original estimate.

*Ronald W. Mangone, American Grid, is the inventor of the weldless grid system and president of Mangone Enterprises, Inc., in New Kensignton, PA. Voigt and Schweitzer, Inc., Columbus, OH, worked with Mangone to develop the galvanizing process.*

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