



By Michael G. Barker,
P.E., Ph.D., and
Karl E. Barth, Ph.D.
Contributing Authors

In short order

New tool makes it easy to design smaller bridges

A new web-based tool that streamlines the design process for culverts and short-span steel bridges up to 140 ft is being introduced this June.

The tool provides significant time and cost savings for county, consulting and state engineers and is free to use.

The tool was developed by a dedicated team of professionals from the Steel Market Development Institute, a business unit of the American Iron and Steel Institute (AISI); the steel industry; and the Short Span Steel Bridge Alliance (SSSBA), which is made up of bridge technology stakeholders, county and state bridge engineers, bridge engineering consultants, service centers, industry associations, fabricators and university researchers. The team reviewed more than 3,000 potential designs over several years in its efforts to advance the technology, design resources, training activities and future products for short-span steel bridge and culvert construction.

Everything in one place

The new web-based tool contains optimum standard short-span steel bridge and culvert designs that incorporate economical and desirable steel fabrication and erection details. It includes information about rolled beam, plate girders, corrugated steel pipe and structural shapes. It also includes design details such as elastomeric bearings, bearing stiffeners, intermediate and end diaphragms and connections, as well as specific modular bridge and coating systems offered by SSSBA member companies. All of this information has been incorporated into an interactive web-based design application named eSPAN140 that will be available to users in June.

The eSPAN140 application is a facet of the comprehensive SSSBA website (www.shortspansteelbridges.org) that also offers users several support structures for those considering or designing steel-bridge options. eSPAN140 will take a lot of guesswork out of the design process by simplifying the sizes of steel needed, making the process more time- and cost-efficient for bridge-design professionals. It also provides a “one-stop shop” for



identifying the various types of steel solutions available based on the specific details of a given project.

Group of four

The scope of this work was to develop optimized steel girder designs at 5-ft increments for bridges with spans between 40 and 140 ft. To encompass the different bridge-design parameters and practices of bridge engineers, four different girder spacings (6, 7.5, 9 and 10.5 ft) and four different girder-design approaches were investigated. The four design approaches include limited depth rolled girder sections, lightest weight rolled girder sections, homogeneous steel-plate girder sections and hybrid steel-plate girder sections.

From the optimized rolled girder designs, practical rolled shape sections that consider availability, service center supply and commonality were selected that cover a range of span length and girder spacing combinations. (It should be noted that early coordination with service centers yields the best availability and economies.) This enveloped approach was used to delineate a limited number of shape sections as the standard for rolled shape bridge designs. The same process was used for limiting the number

of different widths and thicknesses of plates to be used in the standard plate-girder sections. Limiting variations in shape and plate sizes leads to economies in storage, staging, fabrication, detailing and erection as the standard designs become common. For the lightest weight rolled shape configuration, Table 1 illustrates the optimized design for each variation of span length and girder spacing, the selected design for each span length for any girder spacing and finally the standard shapes for the limited rolled shape sizes. For instance, a W40x167 would be adequate for a span between 60 and 70 ft for any girder spacing.

Opening a book

The standard bridge database is incorporated into eSPAN140. The user (bridge owner, designer, etc.) inputs the general information for the anticipated bridge project, i.e., span length, number of lanes, roadway width, skew angle, ADT and other details, in order to create a profile in the eSPAN140 system. The application then produces a unique “Solutions Book” for the user in a PDF file format for the specific project.

ESPAN140 delivers standard design solutions, drawings and details for both rolled beam and plate-girder bridges

for the user’s bridge configuration. Figure 1 illustrates the types of drawings and details provided to the user. The Solutions Book also includes various options and considerations for the bridge configuration, such as corrugated steel pipe and structural plate solutions from the National Corrugated Steel Pipe Association, other girder and truss designs from SSSBA fabricators and manufacturers, and coatings recommendations from SSSBA affiliate members. After reviewing the design options, users can request additional, free personalized technical input from the SSSBA’s Bridge Technology Center. Although the Solutions Book cannot be presented here due to its size, Figure 2 depicts the types of solutions that are included with the eSPAN140 application tool.

More on the web

The standard designs in eSPAN140, the additional SSSBA member solutions and recommendations and the Solutions Book are hosted on the SSSBA website. The website also serves as a technical support center for bridge designers and owners. It includes several sections:

- **Bridge Technology Center**—Serves as a technical center for bridge



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the National Steel Bridge Alliance (NSBA) to provide continuing education for engineers on steel bridge design at upcoming NSBA Steel Bridge Forums. An up-to-date schedule of events is available on the SSSBA website.

The SSSBA has developed several new time-saving, cost-effective resources so that county, consulting and state engineers are equipped to readily and easily consider steel bridge and culvert options for their planned bridge

projects. Standard steel-bridge alternatives, design and construction resources and fabricator and manufacturer support are conveniently located at the SSSBA website. In addition to these new tools, SSSBA offers training and

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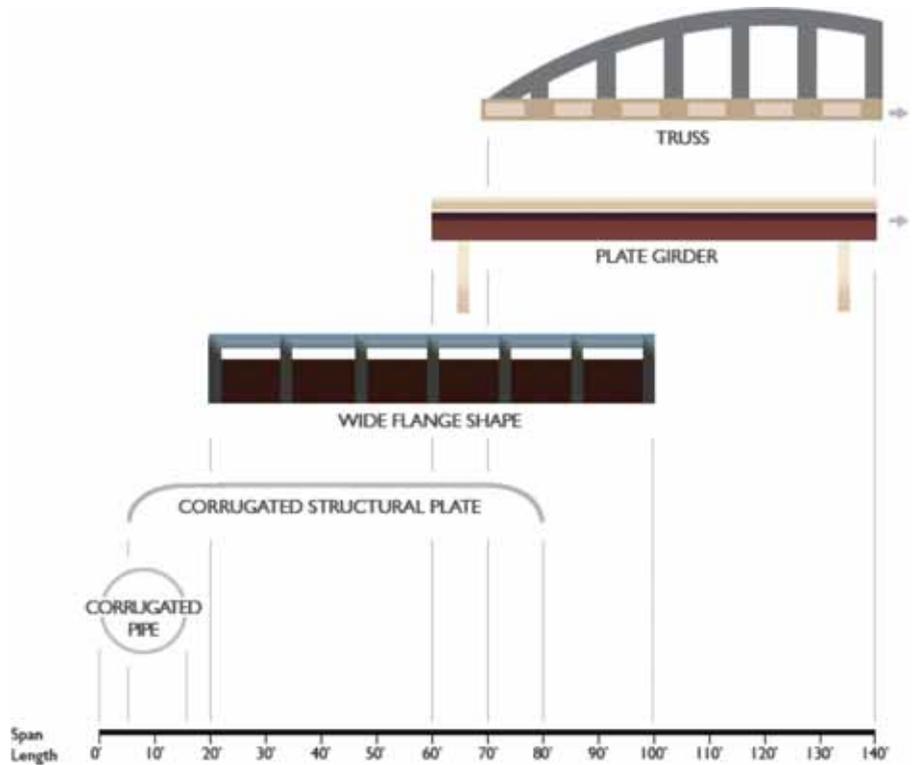
continuing education on the short-span design standards and technical information of interest to the bridge community. The result is a state-of-the-art toolkit from the steel industry to assist bridge design professionals to meet their project objectives. At a time when bridge designers and owners are being asked to meet severe transportation challenges with limited resources, they now have the capacity and resources to design, fabricate, erect and put into service economical steel bridges that meet the nation's increased demand for better bridges.

For more information, please contact the SSSBA at www.shortspansteelbridges.org or e-mail dsnyder@steel.org. **R&B**

Barker is a professor, civil and architectural engineering, at the University of Wyoming. Barth is a Jack H. Samples distinguished professor at West Virginia University.

For more information about this topic, check out the Bridge Channel at www.roadbridges.com

Figure 2. Standard bridge solutions from eSPAN140.



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