HIGH Steel News

Information from High Steel Structures Inc.

Summer 2007

West Virginia Bridge Is Redesigned to Save Time, Money

Putnam County, West Virginia was named after Revolutionary War General Israel Putnam and each July the quiet community comes to life with a carnival, music and agricultural displays at the Putnam County Fair.

Located almost exactly between West Virginia's two largest cities—Huntington in Cabell County to the west and the state capitol of Charleston in Kanawha County to the east— Putnam County's Route 64 and Route 35 intersection along the Kanawha River carries thousands of vehicles each day.

When the West Virginia Department of Transportation's Division of Highways determined that the Route 35 bridge needed to be updated, the initial design called for a concrete structure.

During the early phases of construction, the design was changed to a steel structure, which offered a number of advantages over the original plan. Soon to be completed, the Route 35 bridge uses 1,361 tons of steel, provided by High Steel Structures Inc.

As Project Manager Brian Harvey of Trumbull Corporation in St. Albans, W.Va. noted, the choice of using steel girders helped to save time and money on the project, and compensated for some issues related to the configuration of the geology. In a redesign, it was recommended that steel had advantages in this particular project, which was started in Fall 2005.

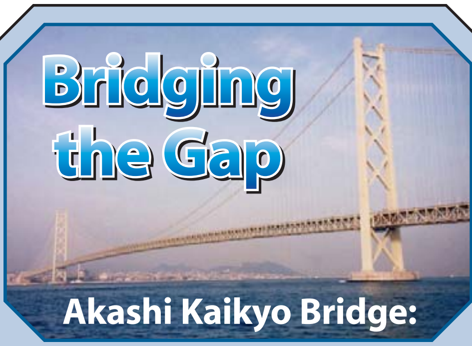
The bridge was part of a $27 million high-priority project by West Virginia Department of Transportation's Division of Highways to widen and reconstruct the U.S. Route 35 corridor in Putnam County.

The designer that performed the redesign was HDR Engineering, Inc. at their Weirton, W.Va. office. Lindy Paving, Inc. was the erector of the bridge steel. In March 2007, the eastbound and westbound lanes of Interstate 64 were closed for a time as the massive steel beams were erected for the new U.S. 35 bridge over Route 64 and the old bridge was removed.

For High Steel Structures, the Route 35 bridge in West Virginia represents some of the reasons why steel can be the superior choice in bridge construction. Business Development Manager Tom Wandzilak and Project Manager Ken Glidden of High Steel worked closely with the designer and contractor on this project.

JUST THE FACTS:

- 1,361 Tons of Steel
- U.S. 35 Flyover Ramp 5:
  6 Spans, 44 Girders – 7'-6" deep, up to 128'-0" long,
  73,000 Pounds each, 1022 Tons of Steel
- U.S. 35 Mainline Over I-64:
  1 Span – Northbound and 1 Span – Southbound,
  18 Girders – 6'-0" Deep, up to 112'-8" long
  47,750 pounds each, 339 Tons of Steel
- Owner: West Virginia Department of Transportation – Division of Highways
- Contractor: Trumbull Corporation
- Redesign Consultant: HDR Engineering, Inc. – Weirton, WV office
- Erector: Lindy Paving, Inc.
- Detailer and Steel Fabrication: High Steel Structures Inc.



World's Longest Bridge

Graceful and streamlined, the Akashi Kaikyo Bridge in Japan is known as the Pearl Bridge, spanning 1,991 meters— or 6,532 feet— across the Akashi Straits. An engineering feat, the bridge took 10 years to complete and used 181,000 tons of steel and enough steel cable to circle the world seven times! Christened by the Crown Prince and Princess of Japan in 1998, the Akashi Kaikyo Bridge cost more than 500 billion Japanese yen— or $3.6 billion— to build, and links the islands of Honshu and Shikoku along the Kobe-Naruto highway. Not only is it the longest suspension bridge in the world, but this Pearl was designed to withstand the ravages of typhoons and earthquakes.

Message from the President Jeffrey L. Sterner, P.E.

Listening To The Needs Of Our Customers

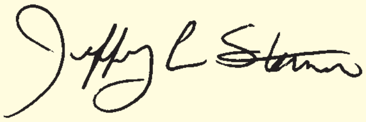
Meeting the needs of our customers has always been the driving force behind the success of High Steel Structures. But what are those needs? What are the things that are most important to the people and businesses that we want to buy our products? Listening to and understanding the "voice of the customer" is not easy. In the midst of any relationship between buyers and sellers, there are roles that are played which often mask the truth, and prevent people from talking honestly about the true objectives on both sides.

I am very grateful to our many customers that pick up the phone and call us when they have a problem, and also those who take the time to say thank you when things go well. Over the years, some close relationships have been forged with our repeat customers, and in those relationships some open and honest dialogue can take place to help all of us improve at our businesses. Sometimes though, too much is left unsaid.

Customer satisfaction surveys do not always provide the kind of insight needed to drive decisions, so last year High Steel Structures, Inc. overhauled the way in which we survey customers and prospective customers to better ascertain the key drivers to their buying decisions. We are trying to understand what the most important attributes are that you look for when making a buying decision about steel fabrication, and then, how High Steel Structures rates in those specific attributes. We also broadened our survey methods to seek out the input of those potential customers that have never purchased from High Steel Structures in the past. Their input is vital for us to get the broadest understanding possible.

Not surprisingly in this competitive industry of ours, the survey confirms that price remains at the top of the list when it comes to buying decisions. Right behind price are issues that relate to quality and delivery. We are pleased that our survey data reveals that High Steel Structures is rated very highly in those regards, but we will continue to work hard to listen to our customers, and meet their needs. As our industry continues to change, so will those needs, and so will High Steel Structures in order to meet those needs.

If you are contacted to participate in one of our surveys, I hope you will take the opportunity to give your candid input. You are who we are working for, so help us to get it right. Thanks for your cooperation!



Jeffrey L. Sterner, P.E.
President
High Steel Structures, Inc.

Public – Private Partnerships (PPP)

by **Steve Bussanmas**, Senior Vice President of Sales & Marketing

The tragedy of the Mississippi River bridge collapse in Minneapolis puts perspective on what many have seen as a deadly problem in this country.

With this disaster, there is no way that we can deny the seriousness of our crumbling U.S. infrastructure. The facts are simple: Our nation's roads and bridges are deteriorating and traffic congestion is increasing. We cannot continue the status quo. We need a solution now.

Obviously, maintaining and repairing the existing infrastructure and adding to the system requires more money than is currently being allocated. How can these extra funds be generated? Raise the gas tax? (May you be slapped into unconsciousness for even thinking such a blasphemous thought!) Our politicians don't have the stomach for such a solution.

It seems that charging tolls is more palatable to the public, at least for now, and thus is less job-threatening to our public officials.

One promising and relatively new method of generating transportation funding is Public-Private Partnerships (PPP). PPP is a system in which a government service or private business venture is funded and operated through a partnership of government and one or more private sector companies. In the case of PPPs for roads or bridges, capital investment is made by the private sector on the strength of a contract with the government to operate and collect toll revenue for the particular roadway and/or bridge.

In some cases, a PPP might occur when existing infrastructure is sold to a private company, generating funds for the owner, which theoretically can then be reinvested into the owner's transportation system. Examples of these include the Indiana Toll Road and the Chicago Skyway.

A second case is where the project adds new roads and bridges to the existing systems. Here the private entity takes the risk that tolls will generate enough revenue to pay for the building, operating and maintaining of the roadway. This is especially appealing as the government is out no money, the overall system is enhanced, congestion is reduced and only those that want to use it pay for it.

PPPs do have their critics. House Transportation & Infrastructure Chairman James Oberstar (D-MN) and Highway and Transit Subcommittee Chairman Peter DeFazio (D-OR) have released a position paper that cautions government officials to protect the public from unreasonably high toll rates and excessive profits, use of non-compete clauses and excessively long concession agreements. The paper also encourages relief from tolls for low income drivers. This said, they still acknowledge that PPPs can be an effective supplement to public investments in transportation improvements.

Now, more than ever, it is clear that we can no longer wait. The PPP is one tool in the toolbox that may prove to be a highly effective solution for funding our infrastructure of deteriorating roads and bridges.

Employee Spotlight: Bob Urban

The words "High Steel" take on a double meaning for the company's Field Operations group, as they go about lifting and connecting massive pieces of bridge steel high above the ground. Leading this group is Bob Urban, High Steel's Director of Field Operations, who began his career at High Steel in 1979 as an ironworker. Over the years, he has served in various positions including crane operator, Ironworker Supervisor and Field Operations Superintendent. Along the way, he has been involved in many unique and memorable projects.

"In 1992, we built a truss bridge in Rome, NY, on top of a 235-foot barge and floated it down the canal to place it on the abutments," Bob recalled. "In 2000, I went to the United Kingdom and worked with a fabricator there, Fairfield – Mabey, to show them how to heat straighten a girder that was hit over a roadway, which was a first for them."

Now, as Director of Field Operations, a position he took over in January of this year, Bob is responsible for all the aspects of High Steel's twenty-eight member Field Operations group, including safety, manpower scheduling, and equipment utilization, as they work on an average of 35 to 50 projects each year.

Bob married his wife, Shirley, in 1980. Together they have raised two daughters, Kristy and Lindsey. He enjoys hunting and fishing, and restoring old cars. He's rebuilt three— a 1934 Ford coupe, a 1939 International pickup, and a 1941 Chevy two-door sedan.

Tech Talk The High Tech Corner

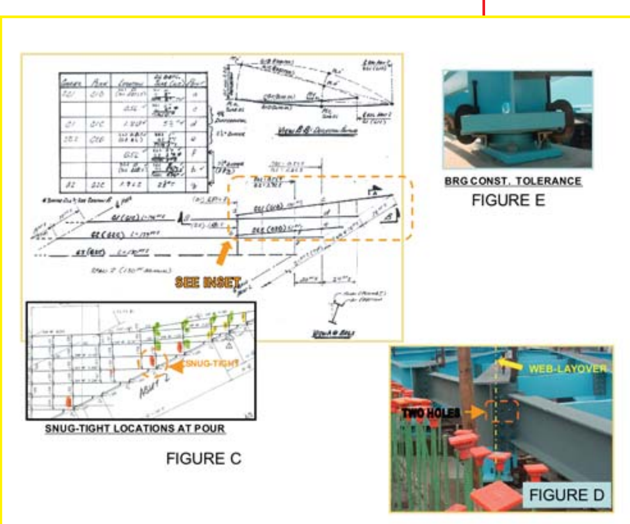
(Part three of a four part series.)

CHAPTER THREE: Detailing, Fabricating and Erecting Skewed Structures

by **Bob Cisneros,** P.E., Chief Engineer

Skewed bridges are fairly common, especially in congested urban areas; today's longer spans and higher material strength (F_y, F_u) occasionally result in temporary twisting behavior observed during construction. Such behavior is not a mystery, but has been referred to as "wringing a wet towel" while bending it at the same time.

There are geometric and stiffness concepts of which the bridge builder should be aware; refer to our skewed bridge presentation at www.highsteel.com/HSS/ContactUs/NewsRoom/FreeInfo/, (especially pp.5-7).



Geometry. Skewed bridge detailing geometry is a function of:

- effective span, L: bearing length for a simple span girder; for a two-span symmetrically continuous girder, twisting occurs about the pier
- girder depth, D: most twisting occurs during non-composite phase
- slab DL + SDL deflection (δ) is what will un-twist the girder after the steel is erected & supporting its own weight
- bridge skew with respect to substructure, right angle $\alpha = 90°$ (or $\alpha = 90$-skew, PA).

The detailer computes the girder end rotation, $\Theta_{\text{conc DL, SDL}} = 4\delta/L$ (see bearing design manuals); then, rotates the cambered web (no account for stiffness made) about skewed c.l. brg. (the line parallel to end crossframes & substructure), and assumes rigid crossframes using a migraine-forming but accurate web lay-over equation: $L.O. = D\sin[\tan^{-1}(\Theta)]/\tan(\alpha)$. Work through the examples on p.7 (keep units consistent), and call us if you have questions.

System Stiffness. Steel is flexible; a girder web plate being handled in the Shop (typically via multiple cranes) can elastically deflect several feet. A subsequently built up "I" will be stiffer along primary axes, but will remain torsionally flexible throughout fabrication. In the field,

continued on page 4

Recent Contracts Awarded

Brightman Street (Route 6) over Taunton River
Fall River-Somerset, MA
Contractor: Cianbro Corporation
5,038 Tons

ICC Contract A
Montgomery County, MD
Contractor: Wagman / Granite / Corman
2,540 Tons

I-81 Bridge Rehabilitations
Broom County, NY
Contractor: Economy Paving Co., Inc.
814 Tons

Exterior St Ramp over the Metro N RR
Bronx, NY
Contractor: Ecco III Enterprises,Inc
367 Tons

Hillary Street Bridge
Passaic County, NJ
Contractor: Rosangela Contracting Co., Inc.
318 Tons

HIGH STEEL STRUCTURES INC.
An Affiliate of High Industries Inc.
1770 Hempstead Road ▪ P.O. Box 10008 ▪ Lancaster, PA 17605-0008
(717) 299-5211 ▪ Fax (717) 399-4102 ▪ www.highsteel.com
Additional plant location: Williamsport, PA

ADDRESS SERVICE REQUESTED

PRSRT STD
US POSTAGE
PAID
LANCASTER, PA
PERMIT #453

Please address comments and
suggestions to: Lisa Fulginiti, Editor
email: Lfulginiti@high.net

CHAPTER THREE:
Detailing, Fabricating and Erecting Skewed Structures

continued from page 3

as adjacent girder lines are erected in a skewed framing plan, crossframes (detailed to final position or full DL profile, as described in previous chapter) force the I-girders to assume the twisted configuration in the cambered position. Since bridge cross-sections are generally assumed to remain plane, one can accept that the 265ft long (field-spliced), 10 ft deep bridge (p.7, example 1) is flexible enough to elastically accommodate eight inches of twist along its length in the cambered position (four inches measured in opposite directions at each abutment).

If a stiff structural system design will not accommodate anticipated twist, consider the following:

1. Stiff framing. Will eliminating a crossframe near bridge obtuse corners (especially where a first intermediate crossframe intersects an adjacent girder at a bearing point), eliminate uplift without overstressing the girder or end crossframe (p. 7, framing plan 1)?

2. Bearings. Does reasonable construct-ibility accommodate this temporary twist? See inset photo for an acceptable (within tolerance) example.

3. SIP forms. Industry feedback indicates that flexible corrugated decking and welded form support angles can normally handle skewed framing un-twisting, as deflections occur during deck placement operations.

4. Plumbness: Most owners require the structure, or at least the girder webs at sub-structure bearing points, to be plumb within tolerance after application of deadloads (also known as detailing to final position).

5. Widening of existing structures: Presentation example 4 is dependent on adjacent (decked) stiffness. The new framing, connected to a fully deflected (existing) structure would not un-twist fully.

6. Slotted holes: Caution! One can't have a skewed structure plumb at erected and also final position; it's "either/or". Slotting connection plate holes will create loss of geometric control as random deflections occur (with possible instability).

7. Lean-on crossframes. One innovation may be found in research by University of Texas at Austin (Helwig, Herman, and Chong Zhou, "Lean-On Bracing for Steel Bridge Girders with Skewed Supports").
Note: Sufficient X or K frames still needed (stability).

8. Skewed sub-stringers: See framing detail. Despite a bridge builder's best efforts, stiff and closely spaced/irregular framing may restrain deflection and rotation. The solution? Owner-designer-fabricator-erector-contractor team partnering, sharing data (which diaphragms to be left snug tight). The result? All the bridge connections were made except two diaphragm holes (p.11), for which field reaming was authorized.

So if you are designing a skewed structure that will not allow constructibility twist, contact the NSBA (www.steel-bridges.org) for industry feedback, and solicit erector/contractor input.

A word about plumbness tolerance. Our industry has debated 1/8"/ft of girder height (up to D=10 ft), vs. 1/16"; a compromise may have been reached at 3/32"/ft. For posterity, consider that a four-ft level held vertically along a girder web in final position, measuring a maximum of 1/4", is generally reasonable for a multi-girder bridge (maximum 3/4" on 10 ft); it's not an exact science.

Next Issue: 4) Complex sub-assemblies. Staged construction.