HIGH Steel News
Information from
High Steel Structures Inc.
Summer 2010

High Steel Delivers on Fast-Track Emergency Bridge Projects

Damage to a seaside bridge leading to Maryland's biggest tourism destination. An explosion on one of the most heavily trafficked bridges on the interstate near Detroit.

When a bridge emergency occurs, whether caused by a manmade accident or Mother Nature, it is crucial to get repairs made quickly and efficiently, with safety as the top priority. When the unexpected happens, High Steel Structures Inc. has the material, engineering, and production resources to respond quickly, as illustrated by the company's recent involvement in two very different – yet equally urgent - emergency projects.

In July 2009, a fiery accident on the Nine Mile Bridge at the Detroit, Michigan suburb of Hazel Park forced immediate closure of that bridge. A fuel tanker struck the bridge after a speeding vehicle switched lanes, setting off a violent explosion and damaging a two-mile stretch of one of the most highly traveled sections of Interstate 75 between Interstate 696 and 8 Mile Road.

There was no time wasted after an inspection of the Route 90 Bridge over the Assawoman Bay in Ocean City, Md. revealed substantial structural damage in September 2009. The bridge was promptly closed for repairs of the damage that had been caused by wind, rain, sea and storms.

The Route 90 Bridge showing the erected steel

In both cases, High Steel provided the structural steel used in the reconstruction of the bridges. Not only were the repairs done with the utmost concern for public safety, but they were completed as quickly as possible, in one case in far less time than originally anticipated.

Beach-goers and residents of the shore community of Ocean City regained access for beach vacations and for emergency evacuations in case of storms. Commuters near Detroit could once again get from home to work and back again with streamlined efficiency.

Thanksgiving at the Beach

Residents, businesses and tourists were thankful when the Route 90 Bridge over the Assawoman Bay in Ocean City, Md. reopened just in time for Thanksgiving 2009.

The bridge is one of two connecting the Ocean City resort area to the Maryland mainland. A month earlier, a routine inspection showed substantial structural damage to the concrete superstructure of the 38-year-old bridge's navigational span. With the safety of drivers as a critical concern, the bridge was closed for emergency repairs.

A steel girder superstructure was selected for the design of the span replacement, because it weighed less than other replacement alternatives. This weight reduction

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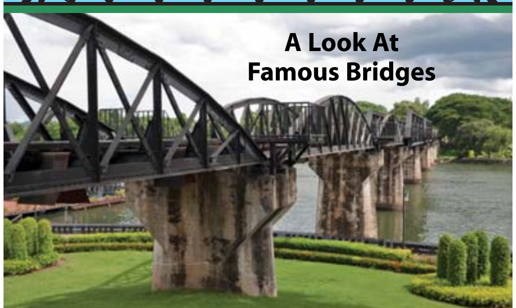


The Bridge over the River Kwai

Made famous by the fictional story by French author Pierre Boulle and the 1957 film directed by David Lean, The Bridge over the River Kwai is a real bridge in Thailand. Interestingly, the bridge was not over the River Kwai, but on the Mae Klong River. When the mix-up was discovered, the Thais graciously renamed that portion of the river! The two parallel bridges— one wood, the other steel— were built in World War II when the Japanese forced nearly 65,000 Allied prisoners of war to construct what was known as the "Railway of Death" to Burma. More than 13,000 died. Allied Forces bombed the bridge, which was later restored and still stands.

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

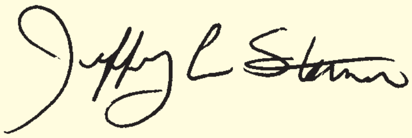
Modern Steel Fabrication for Higher Quality and Affordability

If you are old enough, you remember that cars used to be much less comfortable, much less complicated, and much less reliable. I was not what you would call a grease monkey growing up, but I had some basic mechanical ability. It really was not even an option because cars in the 1960s and 1970s needed constant attention. If you were going to own a car, you better learn how to fix some things. Replacing water pumps was one of my specialties, and that was simply because a water pump only seemed to last about 30,000 miles in those old cars. Now, I can't even remember the last time I had a water pump problem in a car. That's a good thing too, because I doubt that I could even point out the water pump on one of today's car engines.

Today's cars are made to very exacting tolerances. They have engineered out past maintenance problems. On-board computers now constantly monitor and control the engine's systems. The same types of advances have occurred in the steel fabrication industry as well. The industry now uses tools that were not available to past generations, and computerization is playing an increasing role.

High Steel Structures continues to benefit from a tremendous workforce of skilled craftsmen, but we don't mind giving them a helping hand wherever we can. Layout used to require an experienced worker to read off the engineer's prints, measure with tapes and string lines, and mark the steel with soap stones or grease pens. Today, a computer program can do that for us, faster and more accurately. Welders worked in uncomfortable positions, looking through dark eye shields, guiding the arc with a steady hand. Today, the welder is more productive using machines to hold and guide the welding gun as he or she uses digital controls to set precise voltage and amperage values to lay down a perfect weld. High speed plasma torches now cut through steel according to a computer program instead of hand held acetylene torches following a guide or layout line. And, when it comes to the precision required for placing holes for bolted connections, computed numerically controlled (CNC) machines provide the speed and accuracy required.

All of these advances allow us to deliver a higher quality, more affordable product in less time and with less human effort. And we are not finished yet! We continue to innovate and advance the industry wherever we can, providing our country with cost-effective, quality steel bridge fabrication to help replace our crumbling infrastructure.



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

Bridges and Straight Lines

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

We have been taught that the shortest distance between two points is a straight line. Many times it is a bridge that allows the motoring public to achieve the "shortest distance" between where they start and where they want to go.

No better example exists than the current situation between the towns of Crown Point, New York and Addison, Vermont. The two towns had been joined by a 2,200 foot bridge over Lake Champlain since August 26, 1929. The bridge was opened to traffic on that date following a ribbon cutting ceremony on the bridge by then New York Governor Franklin D. Roosevelt and Vermont Governor John E. Weeks. Since then, commerce grew between the two towns making them virtually inseparable.

But that straight line no longer exists between Crown Point and Addison, because the old bridge had to be closed to traffic and demolished. An inspection by DOT officials on October 16, 2009 revealed severe structural deterioration forcing the closure. In this case, loss of the bridge meant a nearly 100-mile detour around the lake.

Obviously the detour length was totally unacceptable to the people who live and work in Crown Point or Addison, so the states of New York and Vermont provided a ferry to make the round trip crossing every half hour to mitigate the traveling public's delay. And yes, the ferry can operate year around, even as ice forms in northern New England in the winter.

A replacement bridge became the highest priority and at this point could be termed an emergency project. The design consultant, HNTB out of New York, New York, received design approval from FHWA and the DOT for the replacement bridge on February 5, 2010. They immediately deployed the resources necessary to meet a March 17, 2010 project advertisement date and April 15, 2010 letting date. They were obviously challenging target dates for such a large structure... but were successful.

The bid opening was held on April 15, 2010 with Flatiron Construction Corporation of Lafayette, Colorado being read out as the low bid. They were officially awarded the job on May 27, 2010, the only job that had been awarded by the state of New York since March, due to a politically driven budget impasse, underscoring the importance of the project.

High Steel Structures Inc. was awarded the 4,234 ton steel package by Flatiron Construction Corporation. High Steel employees are thankful for the opportunity to serve this General Contractor, the

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Introducing the High Bridge Team

On the forefront of bridge innovation with the NEXT Beam

With a name like High Steel Structures Inc., the logical assumption would be that the components High Steel produces are made of steel.

However, High Steel is also part of a combined effort which expands the company's services with its newest product offering, The Northeast Extreme Tee Beam or "NEXT Beam." A precast concrete bridge double-tee beam with a 13" wide tee leg that is much stouter than those used in parking structures, The NEXT Beam is a new alternative to concrete box beams for spans of 30 feet to 90 feet.

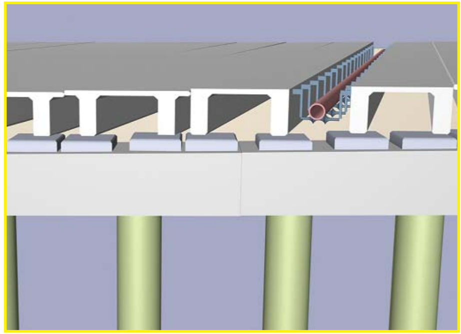
The High Bridge Team is the complementary efforts of High Steel and fellow High Industries Inc. affiliate High Concrete Group LLC. High Steel is responsible for product sales and marketing, while High Concrete, the nation's leading producer of precast concrete for parking structures, will manufacture the NEXT Beams at High Concrete's PCI-Certified precast facility.

"The NEXT Beam represents the next generation of innovative superstructure components in the marketplace for shorter span bridges, and the High Bridge Team is on the forefront," says Jeffrey D. Smith, President and Chief Executive Officer of High Industries Inc. "The collaboration is a natural fit for the two companies and further exhibits the strength of the High organization."

About the NEXT Beam

The NEXT Beam was developed by PCINE, the Precast /Prestressed Concrete Institute Northeast, along with the Departments of Transportation in the region.

Design consultants and project owners will find that the NEXT Beam is a superior alternative to traditional concrete box beams, providing improved durability, lower cost, easier inspection and a means of rapid bridge construction.



Queens Boulevard Cross Section
Courtesy of Hardesty & Hanover LLP

"The NEXT Beam provides greater strength and shallower depths than the concrete box beam," explains High Steel Sales Manager Rich Truxel, who is leading the sales effort for the High Bridge Team.

The NEXT Beam is available in two designs:

- "F" or "Form" Beam- The 4" top flange serves as the form for the traditional CIP concrete deck.
- "D" or "Deck" Beam– The 8" top flange, overlaid with a wearing surface, comprises the deck.

The geometry of the typical NEXT Beams and bridges include:

- Beam Depth – 24" to 36" maximum (beams shallower than 24" can be produced)
- Span range – 30' to 90'
- Beam width - varies from 8' to 12' (beams less than 8' wide can be produced)
- Skew - up to 30 degrees with the present standard

Since the stems of the double-tee NEXT beams are exposed, it is possible to inspect the beams more easily. Enhanced durability comes from the open construction, where there are no closed cells that can hide undetected water or moisture.

Queens Boulevard Bridge

The first NEXT Beam project awarded to High Steel is a New York State Department of Transportation project in Queens, N.Y.

"The Queen's Boulevard Bridge marks the first NEXT Beam project in the state of New York," says Truxel.

The project's General Contractor is ECCO III Enterprises, Inc. and is designed by Hardesty & Hanover, LLP. The project involves five overpasses in the reconstruction of the Kew Gardens Interchange. High Steel Structures will be providing steel for four of the overpasses. The Queens Boulevard Bridge, however, does not lend itself to steel construction, and so the NEXT Beam design was chosen for this overpass.

A total of 114 NEXT Beams will be utilized. In most common applications, the beams span in a direction parallel to traffic. For the Queens Boulevard Bridge, however, the beams are skewed, but not quite perpendicular to the direction of traffic.

Inserts will be precast into the NEXT Beams to allow for installation of the steel supports for the water main and conduits, which will run between stems of the NEXT Beams. The entire deck area will be 69,858 square feet. Installation of the NEXT Beams is planned for 2012.

For more information about the suitability of the NEXT Beam for your next project, please contact Rich Truxel at 717.207.4303 or RTruxel@high.net.

Recent Contracts Awarded

NJTPK Interchange 6-9, MP 50.5 to 51.5
Burlington County, NJ
George Harms Construction Co., Inc.
5,889 Tons

NJ TPK T869.120.203
Interchange 6-9, MP 53.4 to 55.1
Burlington County, NJ
Union Paving & Construction Co., Inc.
4,694 Tons

Lake Champlain Bridge Replacement
Essex County, NY
Flatiron Structures Co., LLC
4,165 Tons

Batchellerville Bridge
Saratoga County, NY
Harrison & Burrowes Bridge Const.
3,740 Tons

MTA Second Avenue Subway, 96th Street Station
New York, NY
E. E. Cruz & Company, Inc.
1,828 Tons

I-781, Fort Drum Connector
Jefferson County, NY
Lancaster Development, Inc.
1,070 Tons

I-687 Kew Gardens Interchange
Queens County, NY
ECCO III Enterprises, Inc. • 770 Tons

NJ TPK Interchange 6-9, MP 63.4 to 65.6
Mercer County, NJ
Rencor, Inc. • 870 Tons

Design Build, Atlantic Blvd Extension #1902-053-931, Bridges B674 & B675
Loudoun County, VA
Shirley Contracting Company, LLC • 570 Tons

Rt. 22 Liberty Ave & Conrail Bridge
Union County, NJ
Union Paving & Construction Co., Inc. • 580 Tons

Employee Spotlight:

Bob Thomas, Director of Contract Management

As Director of Contract Management for High Company LLC, Bob Thomas is High Steel's key representative in contract negotiations and interpretation matters. He joined High as contracts manager for High Concrete Group LLC in 2007, and has been responsible for contracts management for both companies since July of 2009.

When asked what he enjoys most about working at High Steel, Bob replies, "Every day is a new challenge. I also like that High is a family owned company based in Central Pennsylvania."

Before joining High, he served as Director of Contracts for DecisionOne Corporation, Devon, Pa., an independent information technology services provider. His other experience includes serving as a Senior Lease Negotiator for Electronics Boutique, West Chester, Pa. and as Contracts Manager for Winstar Communications, Falls Church, Va.

Bob earned a Bachelor of Arts degree in English from The Pennsylvania State University, University Park, Pa. and a Juris Doctorate from The Dickinson School of Law, Carlisle, Pa. He currently serves his community as an elected member of the Cornwall Borough Council in Lebanon, Pa.

Bob, his wife, Pam, and young daughters Elsa and Anya live in Miners Village, a beautiful historic village located in Cornwall, Pa. in a 170-year-old stone home. The family enjoys hiking and biking on the Lebanon County Rails-to-Trails, and they are also big Penn State sports fans.

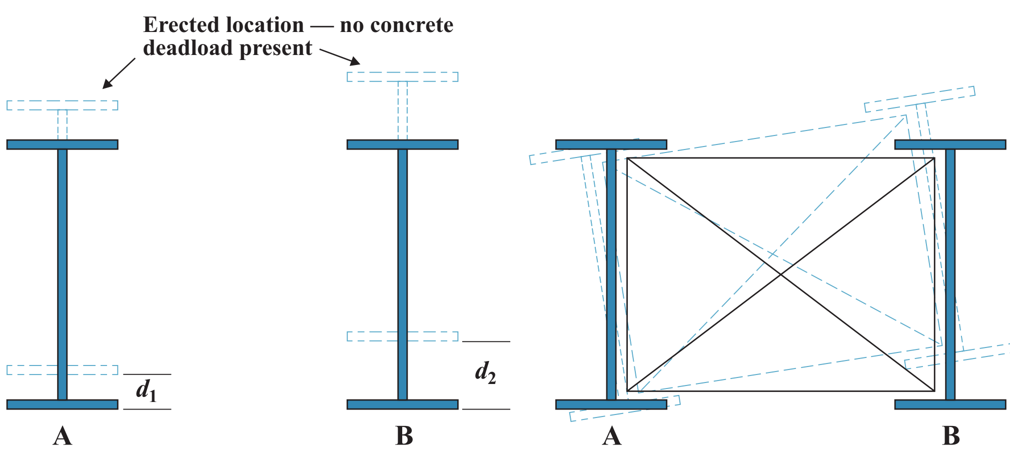
Tech Talk The High Tech Corner

Web Lay-over is Normal

by **Ronnie Medlock, P.E.,** Vice President Technical Services

On skewed bridges, it is normal for girders to lay over (to be out-of-plumb) once they are erected and before the deck is poured. The amount of layover varies with the amount of skew and with the amount of dead load deflections: the greater both of these values are, the greater the layover will be.

The layover is caused by differential deflections - that is, a different dead load deflection at either end of the crossframes. The deflections differ because the skew shifts the girders relative to the crossframes. By contrast, it is possible to allow the crossframes to follow the skew. When this is done, there is no deflection differential, but this is not recommended for bridges with skew angles greater than 20 degrees (measured using the AASHTO method, from the centerline of the bearings to a line normal to the girder centerline).



A helpful way to grasp this phenomenon is to imagine the behavior of the steel if the bridge is unloaded. First, envision a crossframe in a skewed bridge in its final desired condition with the deck in place: the crossframe is normal to the girders and parallel to the deck. Now remove the deck, and the girders "undeflect," rising up as the concrete deadload deflections are released. This seems straightforward, but how does the crossframe behave? The

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Bridges and Straight Lines *continued from page 2*

New York and Vermont DOT's and the people of New York and Vermont on this very important project. We pledge to do our best to deliver a quality product on time and according to the challenging schedule.

The steel package consists of approach spans totaling nearly 3,300 tons and an arch span of over 900 tons. Deliveries of steel will begin in November with final shipments in March of 2011, a challenging schedule to say the least.

The bridge is scheduled to open in the Fall of 2011, which may seem like a long time to the residents of Crown Point and Addison, but to Flatiron, their subcontractors and suppliers that will be an outstanding accomplishment.

And that "straight line" that was taken for granted will be reinstated, making life just a little easier.

Did you ever equate a bridge to a straight line? Will you now?

High Steel Delivers on Fast-Track Emergency Bridge Projects

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Finishing touches are placed on the new Route 90 Bridge navigational span

eliminated the need for other repairs, thus optimizing replacement costs.

The work was anticipated to take more than two months, but the fast-track repairs enabled the Maryland State Highway Administration to reopen the bridge in just a month.

The bridge contractor for the $1.1 million project, working as a subcontractor to Covington Machine & Welding, Inc., was McLean Contracting Co. of Glen Burnie, MD with High Steel using expedited procurement for steel fabrication and delivery of the replacement girders.

High Steel was given notice to proceed on October 6, 2009, while the design was being finalized and McLean was mobilizing. The first shipment of steel arrived at the jobsite on October 27.

According to High Steel Project Manager Paul Lipinsky, High Steel had the resources available in both material needs and manpower to fit this project into the shop flow, waiving the standard lead times. "Having the material already on hand allowed High Steel to dramatically cut fabrication time and begin delivery of the steel only three weeks after notice to proceed."

McLean built the new section of bridge off-site and transported it to the area by barge, then lifted it into position. The bridge was re-opened on November 24.

"We are often called upon to perform "fast-track" work such as this, and High Steel has proven to be an invaluable asset in accomplishing project goals," stated Robert Rodgers, Superintendent with McLean Contracting.

Explosion under Michigan's Nine-Mile Bridge

The emergency bridge repair of the Nine-Mile bridge in Hazel Park near Detroit was put into play on a July evening in 2009, when a driver who lost control of his vehicle hit a tanker carrying more than 13,000 gallons of fuel. The tanker burst into flames and ignited the bridge, causing the northbound portion of the bridge to collapse onto a tractor-trailer, reducing both the tanker and the tractor-trailer to charred metal. Three persons were injured. The bridge was immediately closed, leaving a two-mile stretch of Interstate 75 heavily damaged and the major north-south artery between Interstate 696 and 8 Mile Road closed to vehicles.

Ironically, the bridge had recently been restored as part of a $16.5 million Michigan Department of Transportation construction project to restore 16 overpasses, including the Nine-Mile Bridge and turn ramp over I-75. According to MDOT spokesman Rob Morosi, replacing the much-used bridge was a top priority.

Work began immediately on the Nine- Mile Bridge. Normally, designing and building the bridge might have taken several years. However, in this fast-track case, a Design-Build contract to rebuild the bridge was bid on September 30. High Steel subcontracted to Walter Toebe Construction of Wixom, Mich., fabricating 317 tons of steel girders, representing $1.1 million of the $16 million bridge replacement.

"High Steel's Design-Build project experience enabled us to collaborate with the bridge designer, Bergmann Associates, to utilize material we already had available for the girders' webs and flanges. Additionally our resources with the steel mill and our capacity allowed us to absorb a rush job into our schedule by increasing overtime," said High Steel Project Manager Kevin Benner. "There was no lead time between operations. Every activity was planned to either overlap the previous activity or start immediately upon completion."

With the structural steel being one of the critical path items of work, pressure was immediately on the team to finalize the steel design. "We had our design team working day and night in order to complete the steel design as quickly as possible. Design plans were completed within two weeks of the notice of award," said Jeremy Hedden, Bergmann Associates Project Manager.

The shop drawing review process was streamlined by the fact that High Steel and Bergmann Associates coordinated details during their development. In less than six weeks after the October 2, 2009 notice to proceed, High Steel delivered the first diaphragms and bolts to the job site, followed by delivery of the steel girders four days later. "It demonstrates how quickly and efficiently we can work on a project like this," says Jamie Gartley, High Steel's fabrication project manager assigned to the project.

"We were very impressed by the entire High Steel Structures team on this project," stated Robert Jones, General Manager and Vice President of Walter Toebe Construction Company. "They aggressively approached every aspect of the fabrication process and ultimately saved several days to the schedule which was critical when building a bridge in the month of December in Michigan."

The restored bridge was reopened to traffic in mid-December, and traffic quickly returned to normal on the main thoroughfare, as images of the dramatic explosion and billowing black smoke faded from memory.

Both project cases illustrate that a true team effort leads to success when faced with the challenge of an emergency, thanks to the fast-track work of the project owners, consultants, contractors, sub-contractors and suppliers. Careful planning and attention to detail meant that safety and accessibility could be quickly restored to the traveling public.

The new Nine-Mile Bridge *Photo courtesy of Bergmann Associates*

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Fast Answers to Your STEEL Questions

Please address comments or subscription requests to
Editor Lisa Fulginiti at LFulginiti@high.net

Tech Talk

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deflections at either end of the crossframe are not the same, so the crossframe does not simply rise up. Rather, it partly rises and partly rotates. The rotation causes the girder to layover a bit; the rotation causes the girders to go out-of-plumb. This condition is not desired, per se, but no matter: once the deck is put back, the girders will deflect and the crossframes will rotate back such that girders are plumb again. So, in an actual bridge, during erection, the crossframes must be rotated and the girders fit to this rotated condition such that when the concrete is added, the girders will go back to plumb as the deflections come out.

Flexibility of the girders is the key to this behavior. The rotation at each frame along the length of the bridge is not the same, but along their length, I-girders are relatively flexible torsionally, and in typical framing systems, the girders are flexible enough to accommodate the crossframe rotation. Recognize that the system flexibility does not come from the crossframe to girder connections. Rather, the connections help facilitate proper behavior of the girders and crossframes, so during erection, it is important that crossframe to girder connection fasteners are at least snug tight.

End diaphragms/cross frames add a complexity that is important to recognize. Unlike the intermediate crossframes that are normal to the girders, the end diaphragms are parallel to the skew at or near the centerline of girder bearings and therefore do not have differential deflections at either end due to zero girder deflections at the bearings. These end diaphragms rotate about centerline bearing as the bridge deflects, but provide torsional restraint for the girders. To ensure that girders have enough torsional flexibility between the end diaphragms and nearby crossframes, which are essentially working against each other until the deck is poured, it is good practice to keep the first crossframe a distance 1 1/2 times the web depth from the end diaphragm.

This is a simple discussion that explains girder layover on skewed bridges. There are other complexities in steel bridge erection that must be understood and properly considered to ensure effective bridge erection, including curve, shoring, staging effects, widening effects, sequence of erection, and the influence of one span on the next in a continuous bridge. But recognize that on a skewed bridge, if the girders are laying over prior to the deck pour, the steel is probably not misbehaving.