HIGH Steel News
Information from High Steel Structures Inc.
Fall 2011

New Interchange 142 Connects Garden State Parkway with I-78

The work has been completed for the New Jersey Department of Transportation's improvement project to provide the two missing movements at Garden State Parkway Interchange 142 and Interstate 78. The project was intended to improve traffic flow and eliminate barriers to interstate commerce, since this section of highway experiences a high volume of truck traffic from shipping ports. The new ramps now allow NB Parkway traffic to travel West on I-78 and SB Parkway traffic can now head East on I-78.

The large-scale, $165 million rehabilitation and reconstruction project was completed in December 2010. It involved three curved structures including Ramp NW, which was done in September 2009, Ramp B, which was finished in July 2010, and Ramp SE, which was completed at the end of 2010. The project also included numerous retaining walls and bridge widenings along I-78.

Overhead view of the new 142 Interchange connecting the Garden State Parkway and I-78.

High Steel Structures Inc. fabricated 4,103 tons of steel for the three ramps which were designed by Gannett Fleming of Harrisburg, Pa. and South Plainfield, N.J., and Modjeski & Masters of Mechanicsburg, Pa. and Moorestown, N.J. The contractor was Union Paving and Construction Co. Inc. in Mountainside, N.J.

The main structural challenge on this project was to accommodate the curved and sharply skewed ramp crossings with minimal impacts to span lengths, structural depths and profile grades. The use of transverse steel box cross-girders built integrally with curved steel longitudinal girders resulted in reasonable span lengths and girder depths. This allowed for realistic and practical profile grades. All supports were skewed at 90 degrees thereby eliminating any adverse skew effects.

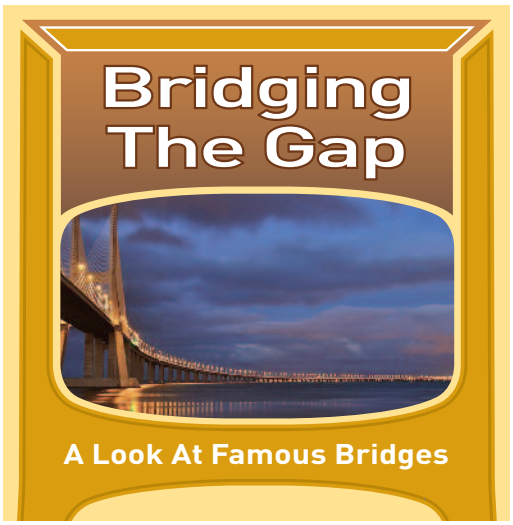
Overhead ramps B and SE at Interchange 142 (photos courtesy of Gannett Fleming)

Ramp NW-D, a nine-span structure that measures 34 feet wide and 1,365 feet long, was designed by Gannett Fleming. The alignment of Ramp NW-D required curved girder construction, with a baseline radius of 590 feet along most of the structure length. Straddle bents over existing roadways consist of steel cross girders and circular columns at Piers 3, 4 and 6. At Pier 6, drilled shaft foundations were used to compensate for footprint constraints due to the Elizabeth River's steep sloping banks.

Gannett Fleming also designed Ramp B, which is a two-span structure over Ramp E-SB. The overall length is 286 feet and width is 32 feet. Carrying traffic over Ramp E-SB, the alignment required curved girder construction with a varying baseline radius minimum of 450 feet. Due to the sharply skewed crossing, a straddle bent consisting of a steel cross girder supported on circular columns was required.

Modjeski & Masters designed the eight-

continued on page 5



Vasco De Gama Bridge

Spanning the Tagus River near Lisbon, Portugal, the dramatic Vasco da Gama Bridge is one of the longest bridges in Europe. The 10.7-mile (17.2 km) cable-stayed bridge is flanked by viaducts and roads. It was built in 1998 with the purpose of alleviating the congestion on Lisbon's 25 de Abril Bridge and joins previously unconnected motorways radiating from Lisbon.

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

State DOTs Can't Wait for Money from Washington, D.C.

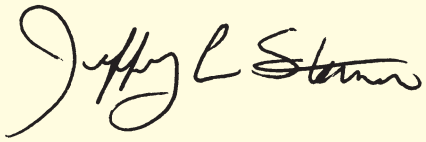
By now, I don't think there are any state DOTs that are confidently waiting for Washington, D.C. to send them additional money to fix the crumbling roads and bridges in their state. Perhaps it will happen in a few years, when the economy starts growing more robustly and our elected officials feel that they have made enough progress on eliminating our national deficit. But then again, I may be just dreaming or fantasizing. I hold on to hope that our federal government will again see the value of having a "national" priority regarding our transportation infrastructure, adequately funded by the users of that system, as a matter of economic growth and national security. But waiting for that sea to change has become more frustrating than I can bear. I think the sense of reality has firmly set in that the only way out of this mess, at least for now, is for the states to take matters into their own hands.

In the state of Pennsylvania, where all of High Steel Structures' manufacturing plants are located, the funding shortfall in transportation has been well publicized. A few years ago, a plan was developed to generate additional funding by tolling I-80 through the state, but that was disallowed because it failed to comply with FHWA guidelines. Newly elected governor Tom Corbett is going at it again. He named a commission to come up with new ideas to increase transportation funding by $2.5 billion per year without raising the gasoline tax. That commission's report was delivered to the governor on August 2. You can review that at their website, www.tfac.pa.gov.

What this commission came up with is a rather eclectic assortment of tactics to increase funding. They recommended using consolidation and modernization in certain areas to save money and improve services at the same time. They also recommended increasing certain fees and fines, eliminating the cap on the existing oil company franchise tax, and reducing or eliminating the payments to the Pennsylvania State Police budget from the transportation funds. If the governor accepts all of the recommendations—and then corresponding legislation is passed by the state legislature— it would indeed add $2.5 billion dollars per year for transportation in the state. But not until five years from now. Current projections show that by that time, the difference between existing funding sources and the transportation need will have grown to $5.3 billion!

The funding commission in Pennsylvania also recommended passage of the legislation to enable Public Private Partnerships (PPPs) that could take on the financing of major transportation projects. We need more states to do that as well. PPPs are not the total solution, but it is another tool that can help.

The size of this problem is huge, and we have to get started. This "Pennsylvania" story is essentially the same in most states. We absolutely must start cobbling together a funding strategy, equitably paid for by those who use the transportation system, to restore our roads and bridges. When gasoline taxes paid at the pump adequately served as the sole funding stream for roads and bridges, politicians only had to consider and act upon one piece of legislation. In today's reality, it won't be so easy. We need our elected officials to put together several complimentary pieces of legislation to attack the problem from several angles simultaneously. That means that we, their constituents, need to keep the pressure on until the job is done.



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

Building Bridges Online

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

About 10 years ago, I would have been very surprised if anyone would have told me that highway construction industry professionals would be regularly communicating by email, let alone searching for bidding advertisements, downloading plans and actually bidding for projects online. How quickly things have changed!

In the last decade, these electronic tools, along with others such as electronic transfer and approval of shop drawings, have made the way we communicate with project owners and each other throughout the project cycle much more efficient, allowing us to do much more with less time.

A couple of years ago, we upgraded the High Steel website (www.highsteel.com) and incorporated some useful budget pricing, shipping and technical information request forms that have helped us do a better job at meeting our customers' needs for information.

The next logical step in this process is to begin using social media for marketing communications. Until recently, like perhaps many of you, making an account on LinkedIn, the professional networking site, was about as far as I had personally gone into social media. There wasn't much talk around the company or around the industry about sites such as Facebook or Twitter – those were more for young kids and movie stars. But in the past couple of years, businesses and government entities, including some in our own industry, have begun to embrace these popular communications tools and found ways to make them useful.

continued on page 5

High Steel Provides Steel for New York State's First Overhead SPUI

New York's Capital Region has opened its first Single Point Urban Interchange (SPUI), marking progress toward improved infrastructure in New York State.

The Single Point Urban Interchange is the first of its kind in the Capital Region, and the first overhead SPUI in New York. The interchange opened in late 2010, far ahead of its Summer 2011 completion date.

The new $41.9 million Single Point Urban Interchange (SPUI) is located at Exit 6 of Interstate 87, the Adirondack Northway, in the town of Colonie in Albany County.

Representing the trend in designing interchanges that are capable of handling higher traffic volumes, the new SPUI replaces the 51-year-old bridge that carried State Route 7 over the interstate highway.

According to the New York State Department of Transportation (NYSDOT), the completion of the Exit 6 SPUI is an example of how New York State is investing in its transportation infrastructure, which continues to bring jobs and economic benefits to regions all over New York State.

A Single Point Urban Interchange allows traffic to flow more effectively.

The Exit 6 Interchange on Interstate 87 is located in Colonie, N.Y.

The SPUI was designed by New York State DOT and the contractor was Lancaster Development, Inc. of Richmondville, N.Y.

As Jeff Kenyon of Lancaster Development noted, the company worked closely with all of its subcontractors to replace the deteriorated bridge at Exit 6, and dramatically improve traffic flow at the busy interchange.

High Steel Structures provided 649 tons of steel girders and beams used in the project.

"We are seeing more and more SPUIs on major highways," noted High Steel's project manager Kevin Benner. "They are a more effective way to keep traffic moving and allow for vehicles to make left turns at the same time."

Using just one set of traffic signals, the SPUI is designed so that vehicles traveling in opposite directions can make left turns at the same time. This allows more vehicles to clear the interchange during one signal cycle, which significantly reduces traffic delays. The trick is in aligning the turn lanes so that both left-turn lanes can turn at the same time.

According to Congressman Paul Tonko, the new SPUI will greatly improve travel flow and safety for commuters along the Northway Exit 6 corridor. The improvements will also benefit nearby businesses and make it easier for commercial traffic to deliver needed goods and services.

The NYS Route 7/Route 2 SPUI Interchange over I-87, is one of only three SPUIs in the state, and it is the only overhead SPUI in New York State— so far.

As Benner noted, the overhead design has been so successful that similar approaches to SPUI design are being considered. They are especially effective in moving high volumes at some of the nation's busiest intersections.

As Kenyon explains, a SPUI reduces the number of traffic conflict points and allows the interchange to function more safely and efficiently. The bridge over I-87 has an expected life span of 75 years.

The new bridge features nine travel lanes compared to the former bridge's seven, and one traffic signal at the middle of the bridge replaces the two signals that were at either ramp system. This allows traffic to flow more smoothly, greatly reducing congestion and travel times.

The SPUI also increases safety by allowing traffic from each direction on Route 7 to turn left onto the interstate simultaneously.

As an overhead interchange, the bridge and its approaches provide greater vertical clearance over the Northway, allowing larger trucks to pass underneath.

The project was started in 2008 and was completed in summer of 2011.

JUST THE FACTS:

Steel:	649 Tons of Steel
Project:	SPUI at NYS Route 7/Route 2 over I-87
Cost:	$41.9 Million
Owner/Designer:	New York State Department of Transportation (NYSDOT)
General Contractor:	Lancaster Development, Inc., Richmondville, N.Y.
Steel Fabrication:	High Steel Structures Inc., Lancaster, Pa.

(photos courtesy of NYDOT)

Phased Array Ultrasonic Testing promises to speed fabrication, improve weld examination, and lower inspection costs

Phased array ultrasonic testing (PAUT) will bring considerably improved weld examination to steel bridge fabrication.

Like traditional ultrasonic testing (UT), PAUT evaluates full penetration welds by sending sound through the base metal and weld metal and analyzing the sound that bounces back to the probe. Any lack of homogeneity in the metal disturbs the returning sound, and the disturbance is then characterized to establish whether or not defects are present. But unlike UT, PAUT sends a flood of sound through the weld at one time, providing two key advantages:

1) The phased array line scan can be accomplished in one pass of the probe instead of the raster scan of traditional ultrasonic testing.

Figure 1 - This PAUT test provides six display outputs at once; as shown in the bottom two outputs, PAUT provides a picture characterization of the test.

2) Radiography is a 2D scan, whereas PAUT is a 3D scan.

3) An image of the tested weld can be created, evaluated, and stored, creating a test that is analogous to radiography.

The advantages of PAUT over RT are particularly compelling. First, the test result is immediate because no film processing is involved, saving a considerable amount of time. Second, the costs of RT materials and storage are avoided. This year High Steel will spend over $100k in film alone, so the cost of RT is certainly far from nominal. Further, moving away from RT would avoid the safety precautions needed for use of x-ray tubes and sources.

Sector versus Linear

There are two types of PAUT scans: linear and sector. Under a sector scan (S-scan), sound comes from multiple angles at one time, as shown in figure 2. In a linear scan (E-scan), multiple signals are also used, but the signals run in parallel, as shown in figure 3.

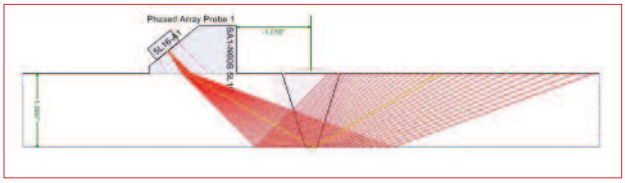


Figure 2 - A PAUT "sector" scan uses multiple sounds paths at different angles.

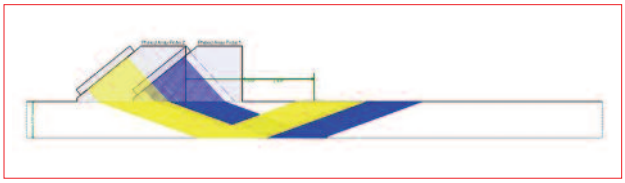


Figure 3 - A PAUT "linear" scan uses multiple sounds paths at the same angle. This computer image depicts simultaneous linear scans at 45, 60 and 70 degrees.

Sector scans are the preferred PAUT scan method because they more readily reveal defect geometry, but for bridge work the use of linear scans is more likely because linear results are suited to AWS D1.5 acceptance / rejection criteria for ultrasonic testing. Perhaps the future of phased array in bridge fabrication will be linear scans to the present UT criteria first, and then in the future sector scans to newly develop acceptance criteria, which could be based on present RT criteria.

High Steel's PITA Project with Olympus and Lehigh

To help advance the implementation of PAUT in bridges, High Steel joined Dr. Sougata Roy of Lehigh University and Michael Moles of Olympus on a small Pennsylvania Infrastructure Technology Alliance (PITA) funded research grant. The alliance is a Pennsylvania Department of Community and Economic Development (DCED) program that provides economic benefit to the state through advancement of the state-of-the-art and technological development.

In late August, Dr. Roy, Michael Moles of Olympus, and Shane LaPann of David NDE visited High Steel to conduct some trial examinations. The team scanned one-inch thick and two-inch thick mock-up butt splices with known built-in defects and an actual flange butt splice (shown in Figure 4). Dr. Roy will conduct further examination of the mock-up butt splices at the ATLSS research center to establish a correlation among the PAUT readings and the AASHTO/AWS D1.5 RT and UT acceptance criteria. An orthotropic rib-to-deck joint mock-up was also examined to demonstrate PAUT's suitability for determining the depth of penetration in the rib to deck joint.

Figure 4 – High Steel's Jim Leeser, front left, Robin Dunlap, front right, and Greg Freyberg, rear left, join Shane LaPann of David NDE, front center and Olympus' Michael Moles, back right, for a phased array flange splice trial examination.

The Future of PAUT

The use of phased array in steel bridge fabrication has often been discussed due to the superiority of the method, and now there is momentum behind a shift to this method. Both the AWS D1.1 and D1.5 committees are actively discussing implementation, and the PITA trial will help Scott Kopp, who is a member of the AWS D1 committee push PAUT along. Owner interest is high, and High Steel is in discussion with MD SHA to conduct a trial project.

Phased array shows considerable promise for speeding fabrication, improving weld examination, and lowering inspection costs. Given these compelling factors, High Steel will work to keep phased array at the leading edge of steel fabrication state-of-the art.

New Interchange 142 Connects Garden State Parkway with I-78 *continued from page 1*

span Ramp SE structure. For this curved and skewed 34' wide and 1,384' long ramp, steel cross girders were used at Piers 2 and 5. For all the curved ramps, the longitudinal and cross girders rest on POT bearings, with restraint requirements and horizontal orientation based on points of fixity and expansion lengths.

"In order to meet the project completion schedule, the fabrication of the various structures were split between our Lancaster and Williamsport facilities," noted High Steel project manager Mike Kennedy. "Both facilities fabricated and yard assembled the heavy cross-girder boxes along with the girder lines that tied into each box on structures Ramp SE, Ramp B and the Ramp NW-D as required by owner specifications."

Kennedy added that the extreme weather conditions, with a very cold winter and a very hot summer, added to the challenges for fabrication. The High Steel crews managed to overcome the temperature issues throughout the duration of the project.

JUST THE FACTS:

Steel:	4,103 Tons of Steel
Project:	Interchange 142, Garden State Parkway/ I-78
Cost:	$165 Million
Owner:	New Jersey State Department of Transportation (NJDOT) General
Contractor:	Union Paving and Construction Co. Inc., Mountainside, N.J.
Designers:	Modjeski & Masters, Mechanicsburg, Pa. and Moorestown, N.J., and Gannett Fleming, Inc. Harrisburg, Pa. and South Plainfield, NJ.
Steel Fabrication:	High Steel Structures Inc., Lancaster, Pa.

Transportation was another huge hurdle. With a project of that scope, High Steel's transportation department was dealing with extremely large and heavy boxes. That required special equipment, permitting, police escort and staging areas prior to field erection at night.

"Once again our transit department did an outstanding job of insuring the product arrived on time, per our customer requests and within the required constraints," said Kennedy.

He thanked the project team with Union Paving, the erector, Structural Services, and the owners' representatives for working so effectively to complete a very challenging project.

Completion of the two new flyover ramps between Garden State Parkway NB to I-78 WB and the Garden State Parkway SB to I-78 EB has resulted in tremendous improvement of traffic flow and safety at the interchange of these two superhighways. It is anticipated that 23,000 vehicles will use the new ramps, eliminating the need for 1,200 vehicles to make a two-mile u-turn on an hourly basis.

A view of Ramp NW-D at Interchange 142 of the Garden State Parkway.

Building Bridges Online *continued from page 2*

On the Federal level, Transportation Secretary Ray LaHood has a thriving page with more than 7,700 followers **(http://www.facebook.com/sec.lahood)** that he uses to advocate for transportation funding, economic development, and safety. On the state and local levels, project owners such as the District of Columbia DOT, Michigan DOT and Maryland Transit Authority, are using Facebook and Twitter to communicate directly with the public.

Grass-roots groups abound on Facebook as well. For example, local residents and the business community surrounding the Lake Champlain Bridge project in New York and Vermont have joined together and formed the Lake Champlain Bridge Coalition, a Facebook-based group that uses the site as their home base – a way to quickly share progress photos and project updates as well as to communicate and connect with other project stakeholders.

In June, High Steel took its first step into social media by launching our Facebook page at **www.facebook.com/highsteel**. Using this page, we can reach out to our friends in the industry and share some of the notable projects, company milestones, relevant industry information and ideas that are a part of our company's ongoing legacy. Unlike a formal press release or the newsletter you are reading now, the page helps us connect in a conversational manner, and get your feedback as well. If you are on Facebook, we invite you to "like" our page, and join our community.

Recent Contracts Awarded

I-95/I-91/Route 34 Interchange, Q Bridge, Contract E
New Haven, CT
O&G Industries, Inc.
17,290 Tons

PA Turnpike SR 29 Interchange, MP 320.00
Chester County, PA
Allan A. Myers, Inc.
2,224 Tons

I-190 (Niagara Expressway)/ Lockport Street & CSX
Niagara County, NY
CATCO
788 Tons

PA Turnpike MP A20.31 to MP A25.67, 7 Mainline Bridges
Montgomery County, PA
Walsh Construction
661 Tons

Novartis Bldg 1, Plate Girders
East Hanover, NJ
Lynchburg Steel
451 Tons

NJ Turnpike, P100.124, Watchung Ave Bridges at MP 152.4
Essex County, NJ
Union Paving & Construction Co., Inc.
430 Tons

SR 70 Sec. Y20 over SR 519
Washington County, PA
Golden Triangle Construction Company, Inc.
402 Tons

HIGH STEEL STRUCTURES INC.
An Affiliate of High Industries Inc.

1915 Old Philadelphia Pike ■ P.O. Box 10008 ■ Lancaster, PA 17605-0008
(717) 299-5211 ■ Fax (717) 399-4102 ■ www.highsteel.com
Additional plant location: Williamsport, PA

PRSRT STD
US POSTAGE
PAID
LANCASTER, PA
PERMIT #453

ADDRESS SERVICE REQUESTED

"Lay down a good weld and give good measure"

Sanford High 1931

www.highsteel.com

Fast Answers to Your STEEL Questions

Please address comments or requests for additional subscriptions to editor, Lisa Fulginiti, at LFulginiti@high.net

HIGH Steel News

In This Issue

Certified System ISO 9001

NSBA National Steel Bridge Alliance Founded 1998

AISC American Institute of Steel Construction Founded 1921 — AISC CERTIFIED FABRICATOR AND ERECTOR

High Steel makes the connection with 4,103 tons of steel to NJ Interchange of Garden State Parkway and I-78 (Page 1)