High Steel News
Information from High Steel Structures, Inc.
Summer/Fall 2006

Single Point Urban Interchange Comes To Pennsylvania

If you think it's tough to build a bridge interchange, try doing it twice!

That's what High Steel had to do when they fabricated the steel and erected the SPUI— Single Point Urban Interchange— at the Market Street Bridge in Williamsport.

Before the SPUI could be built at its site at the Route 15 and Route 180 junction at the Susquehanna River, it was erected at the High Steel Structures, Inc. yard in Williamsport to make sure everything fit together exactly as it should.

The main members were fabricated in Williamsport, while the diaphragms, cross frames and other parts were fabricated in Lancaster, then transported to Williamsport for assembly that involved putting the ramps together to the detailed elevations. This was a coordination challenge. There were 88 plate girders— some straight, some curved, some full penetration fracture critical— that ranged from 18 feet to 143 feet, from 1.75 tons to 27 tons, from girders with zero curvature to girders with 8 feet of curvature, and from girders with one stiffener to girders with 48 stiffeners. There were also 116 diaphragms, 63 full depth plate diaphragms with strap plates and 412 knockdown angle crossframes.

"This totals more than 20,000 shop man-hours and 1,500 tons of material," said project manager Mike Kennedy, "Due to the complexity of the project, it was required that it had to be 100 percent assembled in our yard prior to sending to the job site. In other words, since they were also the erector, High Steel had to put the structure together twice."

The first stage (west side of the SPUI) was built and shipped in the summer of 2005, while the second stage (east side) is being built with a November delivery date. Both shipments required a full unit assembly in High Steel's yard before painting and shipment. These unit assemblies were

checked by Penn DOT personnel before they were dismantled and painted.

"Every employee at our Williamsport facility had a hand in the project in one fashion or another." says Ron Runk, plant manager in Williamsport.

One of the biggest challenges High Steel faced was transferring from design drawing to detail drawings. They conducted weekly conference calls with the designers, detailers, general contractor and owner to make sure that all parties understood the complexity of the assembly phases.

Each day, the Market Street Bridge in Williamsport carries more than 27,000 vehicles. The most recent bridge had been built in 1951 and the first bridge had been a wooden covered toll bridge that was constructed in 1844.

In 2004, construction began on the new Market Street Bridge, which involved construction of a two-lane bridge over the Susquehanna River at a location just upstream from the 1951 bridge that would carry Route 15 southbound. Northbound and southbound traffic were moved to the new bridge, while the old bridge was removed and a new two-lane structure was built at the same location to carry Route 15 northbound traffic.

Closely integrated with the replacement of the Market Street Bridge was the construction of the elevated SPUI— or Single Point Urban Interchange. Sometimes known as a "Spooey," the Single Point Urban Interchange is a relatively new

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Bridging the Gap

A Look at Famous Bridges

Tallest bridge in the world has "delicacy of a butterfly"

It reaches into the clouds overlooking the River Tarn in Southern France and was designed with the delicacy of a butterfly. Built in 2004, the Millau Bridge in the Massif Central mountains is more than 984 feet high and even taller than Paris's famed Eiffel Tower.

The seven slender piers support the roadway, rising into seven graceful pylons bound to the bridge that resemble cobwebs of steel.

At its highest point, it touches the sky at 1,125 feet and vehicles crossing the bridge travel as high as 885 feet above the valley. The cost of the Millau Bridge was steep as well, costing 394 million euros or $524 million.

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

Differentiated by the High Steel Process

Like all companies, High Steel Structures needs to differentiate itself from its competition. So how do we do that in an industry as heavily regulated and inspected as the fabrication of bridge steel? All fabricators must produce a product that meets the demanding specifications. The states that produce those specifications place inspectors in our shops to ensure that those specifications are being met. Shouldn't it follow then that the product is identical, regardless of where it comes from?

To our great pleasure, most of our customers disagree, and say that the product from High Steel Structures is differentiated by superior fit and finish. But that is not what I wanted to point out. For any sales transaction, there is the product or service being purchased, and there is the process that you have to go through to make this transaction. For High Steel, making the process easy for the customer is just as important as the quality of the product itself.

Is the process simply a by-product of having great men and women of integrity working for us? Certainly our co-workers at High Steel are tremendously talented people, and we think they are the best; but that too sounds like a claim that our competitors might make as well. It would be a sad commentary to think that Lancaster, PA was the only place in this great country where you could hire good, hard-working and honest people. And I don't think something is a true differentiator if you can read the same statement in the brochures of each potential supplier.

I've realized that there are two very distinct differences at High Steel Structures that ensure a better "process" for our customers. The first is the fact that we have chosen to vertically integrate our company to control more of the process ourselves rather than to rely on subcontractors. From the confirmation of the bridge geometry and the development of the approval drawings, to the permitting and shipping of the steel from our fabrication plant to the job sites, High Steel has its own team of professionals in all of these disciplines that work together to complete a project. We all have the same objectives, the same guiding principles, and the same motivations. And when a problem does occur, we can work together as a team to come up with a solution quickly.

The second reason that the High Steel process is consistently better is that we invest in the drivers of process just as much as we invest in our fabrication plants. We actively and intentionally recruit, develop and train our work force to make them the best. We also provide these highly trained individuals with the tools that they need to perform. High Steel's investment in technology is second to none, and we continue to drive for improvements that will lead us successfully into tomorrow. High Steel Structures, along with the other High companies, is also in the process of upgrading our corporate-wide Enterprise Resource Planning (ERR) software system to SAP, which will open even more opportunities for us to improve our business processes, and integrate with our suppliers and customers.

We are very proud of our leadership role in the bridge steel industry, and we will continue to drive to continuous improvement of our products, and the processes by which we deliver those products to you.

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

An Old Friend Turns 50

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

The Interstate Highway System turned 50 years of age this year and I couldn't help but think back to just how much that collection of roadways has affected my life.

I remember as a kid (a very young kid!) when Interstate 35 was being built. I grew up in Iowa, south of Des Moines, about half way between Minneapolis and Kansas City. Route I-35 cut through part of our family farm and we lived only two miles from an entrance / exit. It's hard to believe now, but what was a five hour, or longer, trek to Kansas City became just three hours. No more going through small towns, stopping at stop lights, getting stuck behind Grandma Moses on a two lane road.

Imagine the Trillions (is there something higher than Trillions?) of dollars saved by business and individuals due to the efficiency of the Interstate Highway System! Also, have you thought about how many lives have been saved?

I have lived in Memphis, Kansas City, Minneapolis, Dallas, Atlanta and finally Lancaster, Pennsylvania. I've traveled extensively through all parts of the country. I shudder to think of the lost time and productivity I would have experienced had there not been an Interstate Highway System. It literally allowed me to be within a couple days drive of nearly everyone in this nation.

Efficient and safe, those are two adjectives that describe the limited access roads we call the Interstate System. They comprise less that 1 percent of our nation's roads but they carry more than 24 percent of travel, including 41 percent of total truck miles traveled. They can also be described as an investment. Investing in our country's infrastructure is critical to driving the US economic engine. At a time when the world is catching up economically in many ways, the ability to transport goods and services more efficiently remains a competitive advantage. But for how long? I recently read an editorial by a gentleman named Thomas Caramanico, who addressed the current condition of the Highway System as a whole by saying, "What should concern all of us is the steady deterioration of our aging infrastructure, and what it will cost us if we don't begin finding ways to fix it – all of it."

He's right, we should all be concerned. We need leaders with a plan to revitalize and improve our roadway system before it's too late.

I started this article talking about the affect the Interstate Highway System had on me. I'm sure you could write your own story and its affects on you. What if there never was an Interstate System? Would your life have been as easy? Would you have been as productive?
Just a thought....

Employee Spotlight: **James Daub**

James Daub began his career with High Steel in 2001 as an estimator. A significant portion of his early time with High Steel was spent in assisting with the programming and development of the KAPES estimating system. Later, James shifted over to managing the contract extras process. Just recently, he left Sales & Estimating and moved into Project Management. He is getting his feet wet by managing projects in the states of New Jersey and Connecticut, with more states to come.

Before High Steel, James worked in the metal stamping industry. He also has a degree in Civil Engineering from Mississippi State University. After college, he served four years in the U.S. Navy at the Naval Construction Battalion ("Seabees") training center. James grew up, for the most part, in Ocean Springs, Mississippi on the Gulf Coast. His family, who still lives there, was fortunate to be spared the worst of Hurricane Katrina.

Coming from the Deep South, the crossing of the Mason Dixon line was a gradual cultural shift. Before moving to Pennsylvania, he also spent several years in Virginia, where he met his wife Debbie. They have lived for the last 11 years in West York—probably the High Steel employee living farthest west. They love the change in seasons, but not the high pollen. Their nine-year-old daughter and chocolate Labrador Retriever especially love the snow.

James enjoys spending time with his family, working in the yard, reading a book, and an occasional jog. James states that he has been blessed with his opportunities at High Steel, and looks forward to the challenges of his new position.

Tech Talk

Fabricating a Complex Steel Superstructure

by **Bob Cisneros,** Chief Engineer

As the AASHTO LRFD Bridge Design Specifications, 3rd edition comes into its own— unifying straight and horizontally curved bridge design methodologies— steel bridge fabricators have had to adapt and recognize that ever more advanced structures are achievable. Furthermore, the advent of HPS 70W, HPS 50W & even (in certain tensile applications) HPS 100W have enabled the construction of lighter and longer members, often with larger Dead Load (DL) deflections.

In addition to increased vertical camber ordinates (to accommodate gravity loads), increased dead load deflections have also manifested as twists to counteract web layover (out of plumbness) in the cases of highly skewed and sharply curved structures. Such deflections, and the secondary stresses which accompany them, routinely dissipate with correct understanding of design intent.

Most steel highway bridge superstructures are sufficiently flexible during construction to accommodate temporary deflections/distortions with reasonable construction effort. However, in cases where the framing is exceptionally rigid, additional measures may be necessary to ensure fit. Examples when special measures may be warranted include:

- Relief (softening) of intersecting crossframes at skewed substructures (see Figure A)
- Partially loaded assembly where trapezoidal box girders frame rigidly into other boxes at significant skew/curvature (see Figure B).

This series of articles points out tools that have been learned in the steel bridge fabrication industry. In upcoming issues, we will illustrate general concepts for handling the following situations:

1) Overall components of successful complex fabrication
2) No-load, steel-DL and final DL position
3) Detailing for high skew and/or curvature
4) Complex assemblies/sub-assemblies, mill-to-bear fits
5) Staged construction, partially composite and other differential deflection concepts

Overall Components of Successful, Complex Fabrication:

Number one is communication. In today's era of high-calibre software tools, we can achieve bridge geometry wonders and mechanical marvels. But, the designer may not have ready access to what the industry finds economically or practically constructible.

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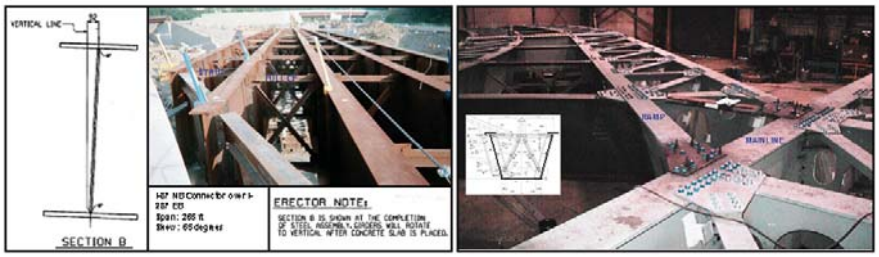

FIGURE A
Highly Skewed Superstructure

FIGURE B
Merging Tub girders Curved & Skewed Geometry, Ramp Station LineTerminus

Recent Contracts Awarded

Rte. 280 at Garden State Parkway
Essex County, New Jersey
Contractor: A. Servidode/B. Anthony Const. JV • 525 Tons

I-79 Parkway Ramp at Airport
Allegheny County, Pennsylvania
Contractor: Balfour Beatty Construction • 2174 Tons

Whitestone Expressway
New York, New York
Contractor: Tully Construction • 5000 Tons

I-95/895 Bridges
Baltimore, Maryland
Contractor: Cherry Hill Consruction • 4106 Tons

I-95 & Rte.1/1A Interchange
Dedham County, Massachusetts
Contractor: SPS New England • 1142 Tons

Fishkill Creek Bridge
Dutchess County, New York
Contractor: Halmar International • 320 Tons

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Tech Talk
Fabricating a Complex Steel Superstructure

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Up front communication will maximize constructibility. It is when the designer chooses not to simply "let the contractor figure it out", seeks industry input pre-bid (objectively contacting local fabricators through the NSBA website www.steelbridges.org/pages/nsbaservices), that the design has the best chance of being "bullet-proof" via correct, constructible geometry & processes. Example: as a ramp merges into a curved mainline structure, the ramp geometry must have a clear terminus into the mainline geometry, otherwise the structure is left "open to interpretation" which can lead to unnecessary project delays, unusual deck haunches and cost over-run/claims. A brief call (during design) to NSBA can often bridge the gap of what should be shown on the contract plans.

Numbers two and three are organized information transfer and a culture of trust.
Efficient Request for Information (RFI) and Non-Conformance Resolution chains with reasonable tracking systems, fair response deadlines and electronic submittals (which exponentially enhance the communication lines) will cultivate this culture of on-going, dedicated problem-solving... the best chance of achieving design intent, manufacturing processes, and contractor/erector preferred practice.

Number four is to standardize where feasible.
Your structure is probably not the first of its kind; see the AASHTO/NSBA Steel Bridge Collaboration website www.steelbridge.org for generally accepted design, detailing, fabrication and (in final ballot) erection/constructibility guidelines for common steel bridge superstructures.

Number five is to utilize technology.
Finite Element Analysis, 3D modeling & electronic transfer tools are becoming readily available to the average design consultant, detailing firm & owner's bridge unit. One day we will hopefully be working both upstream (design) and downstream (fabrication) from the same (detailer's) electronic data model. Until then, use electronic transmittal of RFI's, NCR's, shop drawings in pdf or tif format which will shave several weeks from the fabricator's production cycle on sizable projects. At the outset, establish an e-mail chain of command to instantly and reliably get technical information to key offices for these functions.

High Steel Erects SPUI for Market Street Bridge in Williamsport

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variant of the diamond. It provides a compact layout that requires less right-of-way acquisition and the ability for traffic to make concurrent left turns. The new Market Street Bridge is one of only about 60 SPUIs in the United States, with the first one built in Clearwater, Florida in 1974.

The project is tied into the revitalization of downtown Williamsport, and features a direct connection to Interstate 180 utilizing the SPUI design, aesthetic pier shapes, extra width on the bridge for bikes and pedestrians, ramps to the levees and attractive architectural lighting.

On July 11, 2006, the first half of the new Market Street Bridge in Williamsport was officially opened. When the $60 million four-year project is completed, it will use more than 22,000 cubic yards of concrete— enough to fill an entire football field to a depth of over 12 feet— as well as 13 million pounds of steel, 185 million pounds of asphalt, nearly seven miles of pipe and more than four miles of concrete curbing!

"We are proud of High Steel's role in this important project and thank every High Steel employee for their hard work and dedication," says Mike Kennedy.