HIGH Steel News

Information from
High Steel Structures LLC

Winter 2015

New $28 Million Bridge Makes the Connection at Jim Thorpe, Pa.

Known as the "Switzerland of America" and named for the Olympic athlete Jim Thorpe, the town of Jim Thorpe, Pa., relies heavily on tourism.

Visitors to the scenic European-influenced town come for mountain hiking, white water rafting, antiques, fine dining, entertainment and historic charm. There was just one problem.

Accessing Jim Thorpe required navigating the narrow bridge that crosses the Lehigh River, connecting Routes 209 and 903. Larger vehicles, like tractor trailers, had to wind through the narrow streets.

A new $28 million motorist bridge and a new pedestrian trail bridge is expected to improve access and draw people to the community for business and commerce. It's an improvement that is much anticipated. The existing two-lane bridge was built in 1953 and rehabilitated in 1976, so an update is long overdue.

The general contractor for the project is Allan Myers of Worcester in Montgomery County. Seth Myers of Allan Myers reports that working with High Steel Structures has been going well.

According to Kevin D. Sear, P.E., Deputy Structural Department Manager, AECOM (formerly URS), URS performed extensive preliminary design for the replacement of the existing Route 903 Bridge over the Lehigh River. The approved structure was 961′ long with spans of 168′-293′-335′-165′ and used fabricated steel plate girders.

The contract plans included a suggested steel erection plan with three temporary shoring towers.

Unfortunately, shortly before bidding a historic boundary was identified that overlapped one of the towers. Working as the steel fabricator and erector for the low bidder, High Steel decided to avoid any issues associated with a tower in a historic boundary by eliminating the towers and erecting the steel using only cranes. URS worked closely with High Steel as the erection plan was developed to identify the features that limited location and operations of the cranes.

The accepted plan included a total of six different cranes with some picks requiring three cranes simultaneously. One pick was over 200,000 lbs and involved two adjacent girder segments connected by crossframes. The heaviest pick, when including the 150% factor required by the railroad, was almost 220,000 lbs.

continued on page 5

BRIDGES of the WORLD

Gateshead Millennium Bridge
Gateshead, England

This is the first tilting bridge in the world. It is sometimes called the Blinking Eye Bridge, because when it opens and closes it looks like a blinking eye. Spanning the Tyne River in England, this steel masterpiece was designed as a pedestrian and bicycle crossing. It was lowered into place in one piece by Europe's largest floating crane, Asian Hercules II. Then Queen Elizabeth officially opened it in 2002.
https://www.youtube.com/watch?v=S7nXXy1NhpM

Message from the President Brian W. LaBorde

A Tradition of Innovation and Building Trustworthy Relationships

Our company founder, the late Sanford H. High, was recently inducted into the ARTBA Foundation's Transportation Development Hall of Fame. This is a huge honor for his family and for all the past and present co-workers of High Steel Structures LLC.

Sanford High's innovation began with the "game changing" process of welding highway bridges instead of using the riveting process. While engineers were skeptical that highway bridges presented a new frontier for welding, High's tenacity paid off in 1933, with the completion of a experimental welded bridge project in York County, Pennsylvania. Then in the late 1950s automated welding equipment was adopted thereby revolutionizing heavy girder fabrication and leading the movement to faster, lower-cost submerged arc welding.

Since those pioneering days High Steel has facilitated the development and implementation of high performance steel and also lead efforts to use CNC equipment for advanced drilling and fitting, technologies that continue to improve the bridge building industry.

We are honored to carry on the tradition of innovation but perhaps in a different way. Our company's High Philosophy has two tenets: 1) Building Trustworthy Relationships, and 2) Being Innovative Leaders.

Because we know that "new" and "improved" brings change to established protocols, High Steel is eager to build those trustworthy relationships by working with owners, designers, customers, and vendors. Whether we prove that new technologies, processes or products can be safer, provide higher quality, or provide faster turnaround, ultimately we can reduce costs and build better bridges!

We are in a rapidly changing environment, and every industry needs to be eager to make advancements and improvements. How are we promoting innovation differently in this now complex industry with its inveterate disciplines? Rewire the mindset. Instead of working alone to get possible innovations done faster, we promote working together to go further, making those possibilities a

reality, and even better.

High Steel continues to push the envelope and drive efforts to use digital RT, robotic welding, high-tech measuring devices, advanced CNC equipment, new welding processes, 3D modeling, new coating systems, and use of BrIM technology to name a few. In these efforts, High Steel asks you to work with us so that together, our collaborative efforts will result in innovation for the bridge industry.

Steel – A Bargain at Today's Prices

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

We all know that prices for commodities go up and down. The price of oil goes up over $100 per barrel only to fall to under $40 per barrel. Corn goes for $7 per bushel only to fall to $3. Even eggs are seeing a rise in pricing. The fluctuations are of course driven by the amount of supply versus demand.

Today, steel is in abundant supply and with the world economy remaining sluggish the price for steel is being forced downward.

A little history lesson, for many decades the price of steel remained in a very narrow price window between $300 and $350 per ton. That all changed in early 2004 when a collection of issues drove the price up to nearly $800 per ton where it remained for the next four years. This we thought was the new normal. Wrong again, 2008 saw a spike to over $1,400 per ton only to see it plummet back to $800 per ton with the Great Recession. Since then pricing remained in a narrow window rising and falling in minor increments until recently. Since mid-year 2012 we have seen a slow but steady decrease from the $800 per ton level to today's pricing of $566 per ton, a nearly 30% drop in cost.

At High Steel, carbon plate steel is our main raw material. The pricing quoted above is for Grade 36 plate in standard lengths and widths. It does not include grade extras (Grade 50, Grade 50 Weathering, Grade 70 HPS, etc) or length/width extras but the percentage of the pricing changes applies to what we purchase and fabricate.

As you have hopefully seen in the direct mail pieces we have shared in the past, the raw material portion of the cost of fabricated structural steel is only one piece of the total pricing. Labor, overheads and transportation also play into the final structural steel pricing but at least one component is helping keep steel competitive versus its concrete competitor.

Where is plate steel pricing headed in the future? Well, my crystal ball broke back in 2004 so I'm not going to make any foolish predictions. Today, all we really know is that steel is a bargain, and until something changes in the supply to demand ratio, it will remain a bargain.

Carrying the Torch: Upholding the Skills of our Predecessors in Fabrication Assembly – Part 1

By **Robert A. Cisneros, P.E.,** Chief Engineer High Steel Structures

High Steel Structures, LLC is a third-generation, family-owned company striving to remain a leader in its industry. We endeavor to uphold the company founder's challenge to "lay down a sound weld and give good measure", and this legacy percolates through the company's culture, reflecting the pioneering spirit with which Sanford High welded bridge girders (when the standard was riveting). In other words, we've got quite the reputation to uphold.

As a young project engineer (general contractor) observing preparations for the delivery of bridge girders on-site in upstate New York circa 1990, I recall hearing the project superintendent confidently say "You see those red trucks? That's High Steel, so you don't have to worry about their steel fitting up". At the time, I never imagined having the privilege to work in a place with such an outstanding reputation.

Fast-forward twenty-five years later. Times have changed, the world is a smaller place, and it seems we must do more with less to remain competitive. We see whole bridges being assembled off-site, then lifted/rolled into place with increased frequency and with much faster on-site cycles than conventional "stick-built" steel girder erection methods.

How can we at High Steel maintain a reputation for high quality, and yet remain competitive in an increasingly cost/schedule driven, world-marketplace? For starters, rather than merely pine over the good old days which were, in fact, not always better (perhaps just different), we view this as healthy world competition, a wake-up call to re-advance America's edge.

As standards of living creep upward and the world competes on a healthier (if not yet level) playing field in several market areas, we can embrace the now-available, advanced three-dimensional analysis and production tools, as well as the many bright and active minds entering the workplace who are able to develop and use them. CNC-technology, full-sized holes, automatic/robotic fabrication methods, advanced detailing and measurement techniques are definitely steps in the right direction, provided we continue essential, independent checks along the way so that the finished product fully meets specification requirements. In this article, some of the lessons learned in this journey will be explored.

The first of these is the value of bridge pre-assembly. When is it needed? When can virtual assembly substitute for actual assembly (and when should it not)? How much assembly is needed? The following case studies explore three types of structures: transfer frames for a high-rise building column, rigid frame park/skyscraper foundations, and a skewed, curved multi bridge, in the hopes of providing some answers.

Case Study #1. The East Side Access Project –Virtual, and Limited Actual Assembly

To allow for expansion of Grand Central Station in New York City, frame structures in the East Side Access project were pre-bolted to existing columns which supported high-rise buildings (see Figure 1). Load was then transferred to our frames, the existing column bases removed and escalators installed leading to new rail platforms below.

Many frames for this project were quite stiff, short-span thru-girder assemblies, with very little "play" in their connectivity; they either fit with very little adjustment... or they don't. However, the frames were relatively similar and so, with the owning agencies' conditional acceptance, complete virtual assembly of the first structure was performed, with appropriate reduction of subsequent assemblies upon satisfactory fit, as follows:

1. Theoretically perfect models were made of the transfer girders, floor beams, jacking beams and connecting hardware (except field bolts).
2. These model members were virtually assembled.
3. Imperfections representative of individual (piece) & stacked (assembly) fabrication tolerances were introduced into this assembly.
4. Actual fabricated member deviations (camber, length, web-to-flange alignment, depth) were then measured, being held within project piece tolerances.
5. To test the virtual assembly, the first frame was shop assembled and inspected. Girders and floor beams were found to fit; one sub-framing member was found to present a hard fit, and so subsequent checks of similar components was emphasized.

continued on page 4

3D Virtual Assembly (High Steel Structures, LLC) | Assembly of Tight-tolerance Components (Fabricator: High Steel Structures, LLC) | Field Assembly (Dragados/Judlau JV)

Figure 1

Greenfield Bridge in Pittsburgh: A New Tradition Begins


Project Rendering Courtesy of HDR

Pittsburgh's Greenfield Bridge was built in 1921.

To put that in perspective, that same year, Albert Einstein was lecturing on his new Theory of Relativity, and the first U.S. transcontinental airmail flight arrived in New York City from San Francisco.

The world has seen many changes since then, and the Greenfield bridge has weathered them all in the past century, finally ending its lifespan at the grand old age of 94. Its end will finally come the week after Christmas, when the bridge's massive concrete arches will be wired with explosives and imploded onto the roadway below, landing on a 12-foot-deep protective cushion of dirt that will be spread over the highway.

For decades, the Greenfield Bridge has been deteriorating, with debris falling from the bridge onto Route 376 and causing injury to a motorist in 2003. In 2004, a $700,000 steel "under-bridge" was built and netting was installed to catch the falling concrete.

In keeping with the arch design of the original bridge, HDR has designed a new state-of-the-art steel open spandrel arch, which will be built on the existing alignment. According to Patrick Hassett, Assistant Director of the Bureau of Engineering for the City of Pittsburgh, the bridge "incorporates elements of the existing bridge's original grandeur by salvaging and incorporating the decorative urns and pylons built in 1921. The new bridge combines a graceful design with improved accommodations for pedestrians and bicyclists."

The project's general contractor, Mosites Construction Co., Inc. has awarded High Steel Structures a contract to fabricate 950 tons of steel for the new bridge. In the coming months, a new iconic structure will rise to face the changes coming over the next century. We look forward to sharing more news about this project as the new bridge takes shape.

Tech Talk - Carrying the Torch: Upholding the Skills of our Predecessors in Fabrication Assembly- Part 1

continued from page 3

Results: The first assembly was erected without issue; the components for remaining frames were shipped to the jobsite unassembled and successfully erected. Two sub-framing members were found to require some field reaming/connection angle re-work, which was re-installed with relatively minor nuisance to the project.

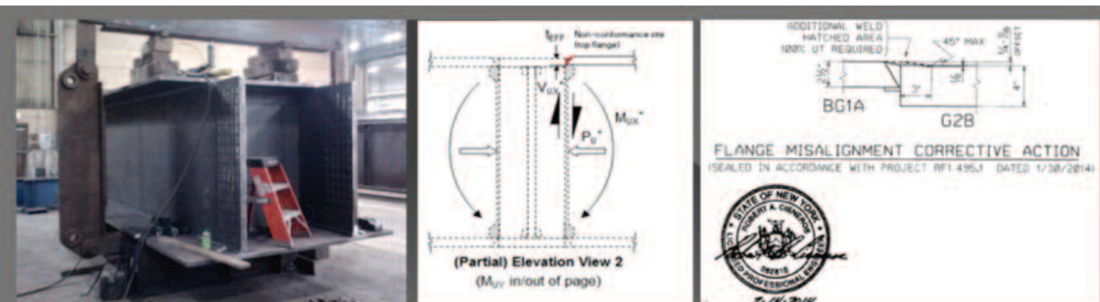
Case Study #2. Brookfield Yards – Virtual Assembly and Select Partial Assembly

Beneath a new city block that supports a park with skyscraper complex above, components for a complex, trestle-like rigid 3D-frame were fabricated and delivered to the Brookfield Development Project in Manhattan. Five foot deep longitudinal box girders are field-welded into heavy cross girders, in turn supported by boxed-in braced W14x370 columns. 3D modeling was performed to help visualize the complex framing elements. (see Figure 2)

Primary longitudinal connections are field-welds, so it was impractical to pre-assemble most box girders; nevertheless, flange

continued on back page

Figure 2



Despite strong-backs (above) and other weld distortion controls, some fit-up adjustment may nevertheless be needed for large box sections with heavy web-to-flange shop weldments. These are corrected by first analyzing the significance of the section loss, restoring full weld throat as required, and then testing the weld built-up weldment for through-thickness clarity by Ultrasonic (UT) methods.

Figure 3

New $28 Million Bridge Makes the Connection at Jim Thorpe, Pa. *continued from page 1*

According to Bob Urban, Director of Field Operations, High Structural Erectors LLC, the job was a real challenge for several reasons. Crane locations were limited because of the steep slopes, river and railroad tracks. Historic canal locks were discovered in the river, placing the causeway in a location that could not utilize shoring towers to support the steel dead load per the design drawings.

"Working closely with URS, we changed our procedure to erect girders in pairs and eliminate the need for towers 100'-120' in the air. It all worked out well and it was a great job for High Structural Erectors to erect," said Urban. "High Steel's Engineering Department's hard work both in splice location changes and the erection procedure resulted in a very successful job for us."

Mike Kennedy, Senior Project Manager for High Steel Structures reported that the four span structure included long span lengths.

"We delivered 56 girder loads with the largest in the "Super Load" category. All girders were over ten feet deep with the longest over 133' and weighed over 142,000 pounds," he said, adding that the Engineering group and High Structural Erectors worked together to revise and add 10 bolted field splice locations. This allowed for optimum manageable beam configurations.

The challenges were also great for High Transit, with deliveries required on both the east side and west side of the river. The general contractor, local police and market owners are to be commended on assisting with smooth deliveries with limited traffic interruptions. Both the field ops group and transit team represented the High companies with great professionalism.

"Hats off and job well done to all the project teams," said Kennedy.

The Jim Thorpe Memorial Bridge project is expected to be completed by July 2017, using both federal and state funds in an 80/20 split. Progress has been evident this year, with a steady flow of huge girders being transported into town by High Steel Structures.

According to Ron Young, of PennDOT, the bridge will serve as a vital artery connecting Routes 209 and 903 at a new point, which will allow for more direct access to the town and better traffic flow in a town that is divided by the Lehigh River.

When it is finished, the Jim Thorpe Memorial Bridge will span the Lehigh River, Lehigh Canal, Reading Blue Mountain Northern Railroad and Norfolk Southern Railroad. The bridge will be approximately 58 feet wide. As Young notes, the project also includes construction of three retaining walls, milling and paving of a portion of Route 209 and removal of the old bridge.

According to Young, the work has been planned so that any negative effects during construction can be minimized. Traffic will continue to travel on the existing bridge during construction. When the new bridge is completed, traffic will be rerouted to the new bridge. Then the existing bridge will be demolished.

"The bridge connecting Route 209 and Route 903 will be very important to the infrastructure. It will allow vehicles to come into town via Route 903 through a straight approach rather than a winding, downhill approach," said Kathy Henderson, director of economic development for the Carbon Chamber & Economic Development Corporation in nearby Lehighton. "It will also be a vital link to the Pennsylvania Turnpike for commerce."

Henderson added that a pedestrian bridge is also being planned just downstream from the Jim Thorpe Memorial Bridge. That, she says, will enhance foot traffic in the tourist-based town. It's part of the Delaware & Lehigh Trail connectivity project that draws hikers to the region.

JUST THE FACTS:

Location:	Carbon County, PA
Project Owner:	PennDOT, District 5
Designer:	URS (now AECOM)
General Contractor:	Allan Myers
Total Contractor Bid:	$31,862,312
Total Steel Tonnage:	2,199
Material:	A588/GR50W

Recent Contracts Awarded

Shore (Belt) Parkway / Mill Basin
Brooklyn, NY
Halmar International LLC • 7,428 Tons

MBTA Greenline Extension
Cambridge, MA
Saugus Construction Corporation • 4,081 Tons

I-95 Turnpike Interchange, Section D20
Bucks County, PA
Nyleve Bridge Corporation • 2,208 Tons

SEPTA Crum Creek Bridge #11.87 – Design/Build
Delaware County, PA
Walsh Construction • 1,843 Tons

Rt. 146 / Mohawk River - Design/Build
Saratoga, NY
Tioga Construction Co., Inc. • 1,248 Tons

VDOT Rt. 29 Solutions - Design/Build
Charlottesville, VA
Lane Construction Corporation • 1,032 Tons

Greenfield Avenue Bridge
Allegheny County, PA
Mosites Construction Co., Inc. • 921 Tons

SR 119 Sec 454 -Home RR Bridge
Indiana County, PA
Swank Associated Companies, Inc. • 380 Tons

121 Seaport Drive (Plate Girders)
Boston, MA
Cives Steel Company • 214 Tons

HIGH STEEL STRUCTURES LLC
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 Masters, at lmasters@high.net

HIGH Steel News

In This Issue

Bridge Makes Connection at Jim Thorpe . . Page 1
Bridges Of The World . . . . Page 1
Message from the President . . . . Page 2
Steve Bussanmas: Steel- A Bargain . . . . . . Page 2
TECH TALK: Carrying the Torch . . . . Page 3
Greenfield Bridge in Pittsburgh . . . . Page 4
Recent Contracts Awarded . . . . Page 5

Tech Talk - Carrying the Torch: Upholding the Skills of our Predecessors in Fabrication Assembly- Part 1

continued from page 4

flatness was checked to facilitate joint fit-up within pre-qualified AWS joint tolerance. Trial assembly was performed for the first of four rigid "spider" column assemblies, and found to fit within stacked tolerances; remaining pieces were held to this control, and then shipped to the jobsite un-assembled.

Results: Some field variances were observed in box girder land (f dimension), when field-stacked to cross girder depth tolerance at the the TC-U4 field-welded joints; the corrective measure was the building up of additional weld to achieve the required throat (see figure 3). A previously inaccessible, concrete encased tie-in to the existing Pennsylvania Station roof structure also necessitated some field trimming.

Some Lessons learned in using Virtual Assembly

The above projects have helped us maintain High Quality, getting more done with less effort:

- Virtual assembly facilitates visualization of complex framing systems.
- Partial virtual assembly of complex sub-assemblies can help predict fit of field-bolted/reamed/drilled/welded connections at No-Load Fit detail condition.
- 3D models can, with sufficient detail, work directly to finish parts; 2D virtual projections aid builders with reduced need for large-scale hardcopy drawings.
- Virtual assembly data comparison to measurements, is an effective QA/QC tool.
- Full 3D virtual bridge assembly is data intensive and not needed for routine projects (e.g., those not subject to framing complexities such as those listed above).

In the next issue of High Steel News, Tech Talk will explore Case Study #3 on the Mohawk Valley Gateway Overlook Bridge.