HIGH Steel News

Information from
High Steel Structures Inc.

Spring 2007

Troup Howell Bridge Creates Iconic Image for Rochester, NY

Its dramatic steel arches rise from the Genesse River in Rochester creating an iconic image that spans 1,165 feet and carries 100,000 drivers each day.

Set for completion in Summer 2007, the $37 million Troup Howell Bridge is indeed an architectural landmark for the city of Rochester, connecting Troup Street to the west and Howell Street to the east. Its triple arch design rises 70 feet at its highest point and measures 433 feet long, making it one of the first of its type in the United States.

Photos courtesy of NYSDOT

More than just utilitarian, the Troup Howell Bridge makes a powerful visual statement— like the Eiffel Tower in Paris or the Gateway Arch in St. Louis.

High Steel Structures Inc. produced the steel arch ribs for the fan-like structure and the steel braces, using 5,391 tons of steel. The hollow box beam structures enable inspectors to access the interior components and will house the lighting.

According to Bob Cisneros, Chief Engineer for High Steel Structures, "The biggest challenge on this job was staged construction. Working with our detailer (Upstate Detailing, Inc.), it soon became apparent that differential deflection between traffic stages could be problematic where the transverse braces framed into the arch ribs. So the project team concluded all three arches should be erected in the same phase, and High Steel stepped up its fabrication schedule accordingly."

High Steel fabricated the steel at its Lancaster, Pennsylvania plant, using a three-coat paint system in silvery white. The heavy loads of steel girders, braces, beams and stiffeners were transported by truck from Pennsylvania.

The project is part of the New York State Department of Transportation's $92 million, six-contract Western Gateway program to rehabilitate 3.5 miles of Interstate 490 through the center of Rochester.

The general contractor is Edward Kraemer & Sons of Plain, Wisconsin. It was designed by architects Erdman, Anthony and Associates in Rochester. Design consulting was provided by H2L2 in Philadelphia.

The 433-ft.-long main span that crosses the river will connect to cables suspended from each of the arch's three steel ribs. Each rib has 19 pairs of 3.1-in. diameter cable, totaling more than 5,000 ft. of cable for the project. At the center of the bridge, the cables reach vertically to 65 ft. above the deck.

"We took care of all the aesthetic issues we could and made them structural," said Howard Ressel, Project Design Engineer for the Department of Transportation's Region 4 unit.

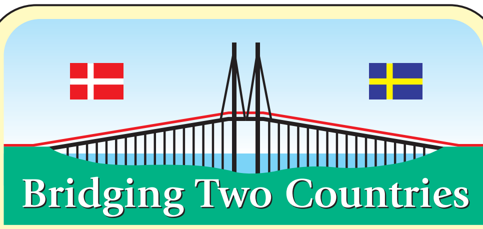
Replacing the 50-year-old plate girder bridge, the new Troup Howell Bridge gives Rochester an exciting new sky line.

JUST THE FACTS:

Specifics: 5,391 Tons, 39 Fracture Critical Member (FCM) Box Girders, 38 FCM Floor Girders, 320 Roadway Stringers

Fabricated: Lancaster North, South, and West bay, two-toned silver, reddened earth paint

Shipping: 125 Truck Trips



Øresundskonsortiet

Denmark and Sweden linked by Øresund Bridge and Tunnel

It spans the deep blue Øresund Sea and links Denmark and Sweden together from Copenhagen to Malmö. More than a bridge, Øresundskonsortiet is a bridge, a tunnel and an artificial island that stretches 16.4 kilometers. At a cost of DKK11.68 billion, the Øresund Bridge is the longest cable-stayed main span in the world. The two-level superstructure is fabricated from steel and concrete, with steel girders supporting the upper deck. To the west, the 4 kilometer tunnel links the island of Peberholm and peninsula at Kastrup, as the longest immersed tube tunnel for both road and rail traffic in the world. The Øresund Bridge was inaugurated in July 2000.

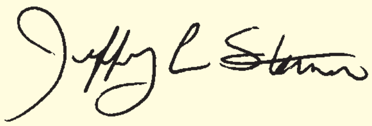
Message from the President Jeffrey L. Sterner, P.E.

Something Great Going On Around Here

There is definitely something going on at High Steel Structures these days. You can just feel it. There is a positive momentum that is picking up speed. That type of phenomenon is often linked to a robust marketplace that puts a strong wind in your sails, lifting profits and making it easier to run a profitable business; but unfortunately we can't claim that circumstance. Although the marketplace has improved since the SAFETEA-LU bill was signed in the summer of 2005, we continue to operate significantly below our capacity because the buying power of the transportation dollar simply does not buy as many tons of steel as it used to. No, what we have going on here is of our own making.

Innovation is thriving at High Steel Structures. We have new initiatives in almost every aspect of our business that are going to help us fabricate steel and deliver it to our customers better, faster, and cheaper. In 2004 and 2005, the steel bridge industry suffered deeply when two factors combined to create a perfect storm for us; the delays in renewing the highway funding bill and the unprecedented increase in the cost of steel. When that storm hit, it was a shock, and it interrupted our historical drive for new innovations that made High Steel Structures the leader that it is. Well now it's back, and with a vengeance.

I hope that you will join us in our never-ending drive for improvement by sharing with us ideas that you might have about how we can improve. I think you would be surprised how much we value even the smallest suggestions. We live in a mature industry, and there is not one basic concept or new piece of machinery that can change everything. If that was the case, anyone with that magic knowledge, or enough funding to buy the right equipment, could enter this very complex business. No, to the contrary, success is found in the thousands of small ideas that incrementally move us forward, one idea at a time. And we are always hungry for those ideas. You may have some of them. You see this business every day from a slightly different angle, and you have seen some of those wonderful little ideas in action. Please call us to share your thoughts. Call me personally. We all have the same objective in mind, which is to make steel bridges better, faster, and cheaper. This is a win-win situation. Let's work together to make it happen.



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

High Steel... Diversification

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

As many of you know, High Steel has predominately been a fabricator and erector of bridge steel. Through these many years, we have seen the bridge market evolve. Today we see a higher percentage of large complex structures. Parallel flange girders are still the most popular, but with the use of High Performance Steel they are being designed longer and deeper to span greater lengths. Tub girder bridges, arches using box girders and various designs of cable stay bridges have become common today. Fabricators that have the expertise and financial resources to pursue these types of structures are rich with certain core abilities. Those abilities are to cut, fit, weld, drill and paint large heavy pieces of steel.

These core competencies translate well into the fabrication of steel for other industries. At High Steel we have diversified into the steel building systems market. We've done this by supporting metal building fabricators with projects having long clear spans that necessitate girders larger than their plant processes efficiently handle. In these cases they can source just that portion of the job from High Steel, at a lower cost. With strong markets for power plants and sports stadiums come similar opportunities to supplement the fabrication of these structures. Here again, there are pieces within these projects that are unusually large or heavy which fit High Steel's fabrication strength.

There is a current resurgence of large construction projects in New York City. The World Trade Center complex is being rebuilt, Goldman Sachs is in the middle of constructing a new tower in Manhattan, and major subway infrastructure construction is underway. At High Steel we are pursuing these projects from the perspective of fabricating only those pieces, usually large girders, that fit our core competency and strength. We are not a beam and column line type of fabricator, which is the type fabricator that will do the lion's share of the aforementioned projects. But we can take the larger heavier pieces, that don't necessarily fit a beam and column fabricator's process, and help them win the job.

Other areas of pursuit are box girders for overhead crane manufacturers, heavy weldments for large equipment manufacturers, fabricated steel for the rehabilitation of oil drilling platforms and government sponsored projects that call for large steel pieces.

Yes, bridge steel continues to be our highest volume product offering. But as opportunities continue to present themselves, High Steel is diversifying. Let us know if we can be of help on your project... it doesn't have to be bridge steel.

Employee Spotlight: **Ronnie Medlock**

Ronnie joined High Steel in 2006 as Director of Technical Services. He directs the Engineering and Quality Control departments and supports efforts to improve welding and other fabrication processes. Before joining High Steel, he spent 18 years with the Texas Department of Transportation, most recently as Director, Technical Services Section, Bridge Division.

In addition to his duties at High Steel, Ronnie is active in professional organizations. He co-founded the AASHTO/NSBA Steel Bridge Collaboration and founded the Texas Steel Quality Council. He currently serves on the AWS Structural Welding Committee and four Transportation Research Board committees.

A registered professional engineer, Ronnie was raised in El Paso and moved to Austin to earn a Bachelor's degree in architectural engineering and a Master of Science degree in civil engineering, both from the University of Texas. His master's thesis addressed the effect of heat input on welding procedures.

Ronnie met his wife, Ilse, in 1991 in South Africa while doing inspection on the steel for a bridge in Houston. They married in 1994 and have two children, David and Emma. Coming from Texas, the Medlocks are adapting to the cooler Pennsylvania weather. They like that Lancaster is centrally located to major cities, since they enjoy traveling and exploring the many popular attractions along the East Coast.

Tech Talk — The High Tech Corner

(Part two of a four part series.)

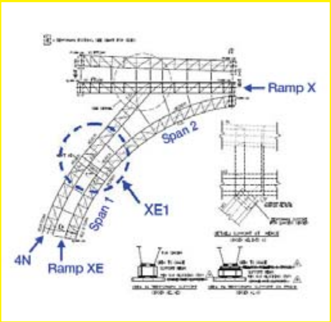
CHAPTER TWO: Fabricating to no-load, steel or full dead load position

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

There are three basic positions to which a steel bridge may be assembled:

1) No-load profile. This is the most common, undeflected or "gravity-off" fabricator's profile. Example: detailing bridge girder field splice to fit in either "lay-down" (girder webs horizontal) or blocked about every 25 feet±. Crossframes (normally detailed to final position) will require routine erection movements between girder lines to permit pinning of connections. The method is consistent with cranage and shoring routinely available to erectors, and is best suited for straight, flexible curved and low skew multi-girder bridges.

2) Steel deadload profile. Occasionally, where the structure is too stiff to facilitate routine erection movements, crossframes will be detailed so that connections readily connect with girders deflected under steel superstructure weight. Note: since deflection necessitates development of girder stress, the crossframes must be connected (or alternate, extensive shoring utilized) while this is happening to maintain stability! Example: stiffer (heavily flanged & crossframed) curved girder bridges are occasionally detailed so girder webs are theoretically vertical at time of erection: at midspan of continuous units, crossframes force girder webs to lean inboard (top flanges toward inside of curve) at "no-load" position (full crane/shoring support), plumb as steel DL stresses develop (crossframes engaged, temporary support removed) and slightly outboard (top flanges toward outside of



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Recent Contracts Awarded

I-95 / I-695 Interchange Contract 1
Baltimore, MD
Contractor: Wagman / Corman / McLean, A Joint Venture
16,254 Tons

Mon-Fayette Expressway Morgans Run Bridge #4303
Monongalia, WV
Contractor: Mosites Construction Co., Inc.
2,693 Tons

Interchange 17 Reconstruction
Orange County, NY
Contractor: A. Servidone, Inc.
1,927 Tons

Southern Expressway, Section 5
Cattaraugus and Erie Counties, NY
Contractor: Cold Spring Construction Co., Inc.
1,219 Tons

Trenton Morrisville Toll Bridge, Contract #T-380B
Bucks County, PA
Contractor: Conti of New York, LLC
1,170 Tons

I-690 Bridges over CSX RR
Onondaga County, NY
Contractor: Vector Construction Corp.
944 Tons

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CHAPTER TWO:
Fabricating to no-load, steel or full dead load position

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curve) upon application of full dead loads.

3) Full deadload. Complex method for the fabricator. Used in railroad/movable highway bridge truss construction (the "Chicago Method"), the structure is detailed to fit in the final, full gravity load position. Members temporarily force-fit into an interim, stress reversal condition which theoretically disappears as gravity loads are applied (see AREMA Chapter 15).

Example: a simple span truss, shop-assembled according to this method, would have an elongated top chord & shortened bottom chord (full assembly of chords and diagonals will be force-fit at field staging point, often launched or floated into position).

Technology has permitted the steel bridge industry to go beyond and even mix classical boundaries of composite multigirder bridge design. Recent years have seen the following initiatives:

a. continuity simple span ($M=wL^2/8$)series retrofits re-decked as continuous for L+I, also SDL ($M=wL^2/10$) to improve structural efficiency and redundancy.

b. new construction whereby girders are spliced at piers (facilitating erection), then decked with continuity diaphragms.

c. projects where members are fabricated, pre-assembled under their own dead load, where underbridge features (e.g., active rail lines) will not permit long-term closures for bridge erection.

Case "a" is, by now, fairly familiar to the industry. Examples of the application of case "b" may be found online in the works by Kolle, Azizinamini et al, Wasserman, and Talbot. For links to these articles, go to our website, www.highsteel.com, click on the "Free Info" link found at the top of the page and browse to "Newsletters."

Case "c" will be illustrated via the trapezoidal box girder (tub) assembly introduced in Chapter 1. This is an asymmetric two-span curved tub system, with rectangular box girder hammerhead pier cap substructure. The curved system diverges in Span 2, the left (outboard) girder merging into a single tub; the inboard girder separately sharing the abutment with the single span tub (see framing plan, page 3). During the course of the project, it was determined that under-bridge rail access at Pier XE-1 (encircled area) would not readily lend itself to the original window for substructure construction; the bridge was reanalyzed to permit erection of Spans 1 & 2 of Ramp XE as a single, longer span with integral cap girder temporarily suspended (pier was later constructed, followed by decking which brought the cap into bearing upon its column; to preclude uplift under L+I, the girders at the short Span 1 (Bent-4N) were counter-weighted (concrete fill).

While this sounds complicated, it was readily achieved via an organized, systematic approach to account for the deflections anticipated. The designer must clearly communicate the intended profile at the time of assembly. Also, the fabricator must have the experience and expertise to understand, as well as assemble, the structure to the profile and alignment indicated. Finally, the contractor and erector must remain active and involved throughout the process, so they understand and plan suitable erection procedures.

Next Issue:
Detailing, Fabricating and Erecting of Skewed Structures.