HIGH STEEL NEWS
Summer 2021

# New Kosciuszko Bridge Joins NYC Skyline

## City's first cable-stayed bridge project features metalized steel superstructures from High Steel.

The New York State Department of Transportation's Kosciuszko Bridge replacement project pairs two independent single tower cable stayed bridges. When viewed in elevation, the mirror-image structures combine to enhance New York City's skyline with the striking illusion of a single, dual tower cable stayed bridge.

The bridge connects the boroughs of Brooklyn and Queens over Newtown Creek via the Brooklyn-Queens Expressway. Like its predecessor, the bridge is named for the Polish-born American Revolutionary War general and military engineer, Thaddeus Kosciuszko.

*New Kosciuszko Bridges* *Photo Credit: Bernstein Associates Photographers, Courtesy NYSDOT*

New York State DOT advertised the bridges in two separate contracts, with the Phase I design-build contract supplying the eastbound (Queens-bound) structure and the Phase II design-bid-build contract supplying the westbound (Brooklyn-bound) structure. Both contracts also included a considerable amount of approach work.

High Steel Structures was awarded contracts to supply the steel superstructure for each phase's main cable stay spans, ultimately fabricating, metalizing and delivering a total of 6,249 tons of steel for the two independent contracts.

**A Historic Crossing**

The site of the bridge dates to 1803, when the first toll bridge was built over Newtown Creek. The privately-operated Meeker Avenue Bridge was called the "Penny Bridge" because of the one cent pedestrian toll. Replaced several times over the years, the bridge was taken over by New York City in 1898.

In August 1939, a new through-truss bridge was opened at the site. It was officially renamed the Kosciuszko Bridge in 1940 as a symbol of solidarity with Poland after Germany's invasion. Replacing the earlier swing drawbridge structure, this bridge carried six travel lanes with no shoulders and was designed to carry 10,000 vehicles per day, a number dwarfed by the 180,000 vehicles it would eventually serve.

Over a half-century later, in addition to the local traffic congestion caused by the lack of capacity and ongoing construction work for maintenance, the bridge's narrow lanes and steep approaches created challenges for heavy truck traffic, which had difficulty maintaining speed while crossing the bridge. It was time for the Kosciuszko bridge to be replaced.

**Challenging Bridge Design and Construction**

The new bridge's design posed multiple challenges to correct those structural deficiencies including moving utilities, ensuring proper drainage and addressing environmental issues. Because the bridge spans a Superfund site in a highly industrial area along with the creek, Long Island Railroad right-of-way and local streets, special consideration was also needed to avoid disturbing those sensitive areas. Additionally, the bridge's pylon heights were restricted because of its proximity to the LaGuardia Airport.

The 2009 alternatives analysis for the bridge's design, completed by WSP USA, resulted in the choice of two independent parallel main spans, each featuring a single cable-stayed tower with two free-standing pylon legs, each leg outside the roadway.

The cable-stayed portion is approximately two-thirds of the length for each main span. The Phase I bridge has a main span of 624' and a back span of 377'. The Phase II bridge has a main span of 608' and a back span of 341'-3". To address balance issues caused by this asymmetry, counterweights were added to ends of each back span.

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# President's Message

## CELEBRATING 90 YEARS OF GIVING GOOD MEASURE

This year marks the 90th year of the founding of the High Welding Company in 1931. This small, family-owned welding shop in downtown Lancaster, Pennsylvania has persevered through many challenging times including the Great Depression, World War II and most recently, the global pandemic.

With the High family's commitment and foresight, and a lot of hard work, the company has innovated and grown over the decades into a diversified group of businesses including the industry-leading steel fabricator that High Steel Structures is today.

With the COVID-19 pandemic, the company has once again prevailed in the face of unforeseen challenges, which I am pleased to report have been met with success due to the great amount of commitment, ingenuity and teamwork demonstrated by our dedicated coworkers.

Fortunately, High Steel finished the first quarter of 2020 with a healthy backlog, having won a significant number of projects prior to the slowdown in bidding that occurred as the states responded to the pandemic. As the months progressed, we remained in constant communication with our customers, working closely with them to understand their needs and minimize impacts to delivery schedules.

**John O'Quinn**
*President High Steel Structures LLC*

Our shops fortunately had no lost operating days. However, like most manufacturing companies, we did experience some substantial productivity losses as we closely followed CDC guidelines to safely manage our workforce while responding to positive cases and exposures.

One of the keys to mitigating the forementioned impacts on projects running through this period was the company's versatility; we proactively pulled experienced coworkers from different departments and plant locations to fill in as needed to keep the steel flowing through our shops. We are continuing our dedication to workforce development and growth, having recently debuted significant hiring bonus and wage incentives to attract the absolute best candidates.

As we approach a century in business, we take continued pride in our reputation as an industry leader and steadfast project partner, bidding on every structural steel project in our market area, from the smallest beam replacement to the largest P3 project.

We look forward to continuing to serve you with the same commitment to high quality and service our founder, Sanford High demonstrated with his motto, "Lay down a good weld, and give good measure!"

Celebrating 90

HIGH
1931-2021

# Just the Facts: KOSCIUSZKO BRIDGE

| | Phase I (Eastbound Span) | Phase II (Westbound Span) |
|---|---|---|
| **PROJECT OWNER** | NYSDOT | NYSDOT |
| **CONTRACT AMOUNT** | $555 Million | $318 Million |
| **DELIVERY METHOD** | Design-Build | Design-Bid-Build |
| **GENERAL CONTRACTOR** | Skanska-Kiewit-ECCO III JV | Granite Construction Northeast Inc. |
| **LEAD CONSULTANT** | HNTB | WSP USA |
| **STEEL DETAILER** | Candraft | Candraft |
| **FABRICATOR** | High Steel Structures LLC | High Steel Structures LLC |

## NEW KOSCIUSZKO BRIDGE JOINS NYC SKYLINE

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With the creek no longer serving marine traffic, the roadway incline for the new bridge was reduced by approximately 35 feet, lowering congestion by easing the passage of trucks and large vehicles across the bridge. The new bridge is much wider as well, with five eastbound and four westbound lanes, plus full-width shoulders. The Brooklyn-bound structure adds a scenic 20-foot-wide shared use path for pedestrian and bicycle traffic.

The contract for Phase I was awarded via a $555 Million Design-Build contract to the joint venture of Skanska-Kiewit-ECCO III, with HNTB as the lead design consultant. Significant associated roadway work was included also in this contract. Construction began in 2014. Upon its opening to traffic in 2017, the old structure was demolished, and all traffic was shifted to the new span.

Phase II was awarded as a $318 Million design-bid-build contract to general contractor Granite Construction Northeast, Inc., with WSP USA serving as the design consultant. The design on the second phase structure had been completed six months ahead of schedule while the first phase was still under construction, allowing for a smooth transition between the contracts. Construction of the second phase began in 2017, and it was opened to traffic in 2019.

**Fabrication, Coatings and Steel Delivery**

High Steel's contracts for both phases of the project would require a significant amount of complex fabrication and internal coordination, along with application of a metalized coating, an option specified by NYSDOT to protect the structure during its 100-year service life while reducing future maintenance requirements.

"Participating as fabricator for both phases benefitted the overall project because High Steel was able to coordinate with the contractor and design consultant to implement a number of lessons learned from Phase I into Phase II," noted High Steel Director of Project Management Ken Glidden. "Since the final design for the Phase II structure was underway during the construction of Phase I, WSP USA was able to incorporate updates on fabrication and coatings details from Phase I into the project as well."

For example, the welding procedures, metalizing and galvanizing techniques for the complex anchorage pipes which were established in Phase I were continued into Phase II. Glidden also cites the relatively short time period between the two phases as an advantage, because many of the same High Steel coworkers across the engineering, fabrication and delivery processes worked on both projects, including Candraft VSI, which modeled and detailed the structural steel on both phases.

This would be the first New York State Department of Transportation project self-performed by High Steel at its new, state-of-the-art indoor metalizing facility. Before proceeding, the company worked closely with NYSDOT for approval on its planned coatings processes and ensured that all stakeholders across the project team were in agreement.

Galvanizing was used rather than metalizing for select components. Because the length and interior diameter of the anchorage pipes prohibited the application of a metalized coating, these pieces were instead sent out to be hot-dip galvanized. Prior to assembly to the metalized edge girders, samples of the galvanized-to-metalized connections were laboratory tested to ensure the proper friction coefficient was achieved.

*The bridges' metalized coating was chosen to reduce maintenance costs over a 100-year service life. Photo courtesy of Granite Construction Northeast*

For time and cost savings, galvanizing was also used on selected secondary members. *(Please see the Tech Talk article, page 5, for further information.)*

A notable difference between the projects involved the process for cable installation during erection. The Phase I construction plan required the bridge's final cable lengths to be determined during erection, based upon actual length measurements obtained from the as-built field survey condition, then installed accordingly.

To shorten the Phase II project duration and expedite the overall project schedule, the designer and contractor came up with a plan to prefabricate the cables and install them progressively, at the same time the bridge was being erected.

This required High Steel to provide as-built information to Granite Construction's erection engineer, COWI, so that they could load actual fabrication data into their theoretical bridge model in order to compare it and determine required cable dimensions.

High Steel Project Manager Dave Painter explains the internal coordination and resources required to provide this data, which included the purchase of 3-D scanning equipment and training for the fabrication team.

"Together, our planning group, continuous improvement team and CAD-CAM department developed a plan to gather this information using 3D scanning technology to scan data from actual members, which we then used to virtually assemble the structure in a 3D model," explains Painter. "As a result, we were able to provide our customer with the information they needed to successfully move forward with cable fabrication ahead of the steel being erected in the field."

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*Phase II edge girder super-loads prepare to depart High Steel's facility in Williamsport, PA*

## NEW KOSCIUSZKO BRIDGE JOINS NYC SKYLINE

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**Super-load Deliveries**

Steel fabrication and delivery for Phase I was completed between July 2015 and January 2017. Steel fabrication and delivery for Phase II was completed between January 2018 and July 2019.

For both phases, the two largest edge girders were designed to accommodate five anchorage pipes. Because of routing and permit restrictions, in Phase I, the anchorage pieces for these two especially heavy loads were shipped separately from the girders and were field assembled.

However, for Phase II, the girders were to be shipped with the anchorage pipes attached, requiring detailed delivery planning for heavy-hauler High Transit LLC. With a gross weight of 157 tons on 16 axles, these massive loads had an overall length of 129'6", an overall width of 14'9", and an overall height of 12 feet.

The delivery route for this shipment required a full engineering review and route survey to ensure safe transport. In New York City, crawl speed restrictions and careful positioning were employed for the Outerbridge Crossing, Verrazano Narrows Bridge and the Gowanus Expressway structure at Exit 21.

A portion of the Verrazano Bridge required a cantilever (crabbing) maneuver in order to satisfy the stress calculations on the bridge. Peak Engineering, who prepares the Geometric Surveys for High Transit, accompanied the loads as they crossed these critical structures.

In all, these loads took over 20 hours to travel 306 miles between Williamsport, PA and the jobsite.

*"High Steel is proud to have served as fabricator for both phases of the new Kosciuszko Bridge project, which will serve New York City for the next century,"* said High Steel President John O'Quinn.

*"By pulling our resources together and working with the project teams to overcome the challenges inherent in building a signature bridge, we have once again proven that High Steel can be counted on for the most complex projects."*

**Grand Opening Celebrations**

On April 27, 2017, the opening of the first span of the new Kosciuszko Bridge was marked with a ribbon-cutting ceremony which included a celebratory march across the bridge, with delegations from both the Queens side and the Brooklyn side meeting in the middle. New York's Governor also marked the occasion by driving President Franklin Delano Roosevelt's 1932 Packard across the bridge.

Two years later, on August 28, 2019, the second grand opening was held upon completion of the Phase II structure, marking the overall project's completion four years ahead of its original schedule with a New York City themed light and sound show showcasing the bridge's LED-illuminated cables and towers.

During General Kosciuszko's time in New York during the Revolutionary War, he could not have possibly imagined the iconic bridge that would one day bear his name. No doubt, Kosciuszko, whose work as a military engineer included disabling bridges to deter the British army, would have been honored to share in the celebration of this modern engineering marvel.

# Tech Talk: GALVANIZE OR METALIZE?

**By Ronnie Medlock, P.E.**
*Vice President -Technical Services*

The Kosciuszko Bridge replacement offers an excellent study in the choice between galvanizing and metalizing. These two structural steel coatings options are similar in that both involve the direct application of molten metal to the steel. When choosing between the two, how the coatings are applied is a key consideration.

Galvanizing is accomplished by cleaning components in an acid bath and then immersing the components in a kettle of molten zinc. There, the zinc reacts with constituents in the steel to build a series of metallurgically bonded zinc-iron layers on the steel surface. This process is highly effective at ensuring that every exposed steel surface is cleaned and coated, with zinc readily flowing into nooks and crannies, regardless of their complexity.

However, one thing is essential for a successful galvanizing project: the component must be able to fit into the galvanizer's kettle. Kettle sizes vary, but larger ones are about 55 feet long by 10 feet deep. This means that pieces up to 50 feet long can be single dipped or larger pieces up to 85 feet can be accommodated with progressive dipping.

The fact that large bridge girders do not fit into galvanizing kettles has helped drive the popularity of metalizing. With metalizing, preparation is by blast cleaning and application is typically by arc spray. Therefore, there is no practical maximum I-girder size limit for metalizing. However, while metalizing is effectively applied on large, flat surfaces like those of I-girders, it is not effectively applied on nooks and crannies or inaccessible areas. Therefore, applications like tub girder interiors are not strong candidates for metalizing.

Hence, when choosing between metalizing and galvanizing for bridges, two rules of thumb apply:

- Galvanize components that have dimensions which fit within a galvanizing kettle, especially if they have complex, difficult to reach surfaces.
- Metalize components that are too large to fit into a galvanizing kettle, if all surfaces are readily accessible for blast cleaning and metalizing arc spray application.

Based on these rules of thumb, for I-girder bridges, if the girders are too large for galvanizing, consider metalizing them but galvanize the cross-frames. Given their many narrow surfaces and nooks and crannies, cross-frames do not lend themselves well to metalizing but are well-suited to galvanizing.

The example of the Kosciuszko Bridge is similar to the I-girder bridge considerations. The anchor assemblies are relatively short in length and not too tall or wide, thus they readily fit into a kettle. Also, they are complex, with many difficult to access surfaces. In particular, cable anchor stay tubes are very difficult to metalize but very easy to galvanize, making the bridge's anchor assemblies great candidates for galvanizing.

Conversely, cable stay bridge edge girders and floor beams are generally too large to fit into galvanizing kettles and but have accessible, wide open surfaces. Thus, on the Kosciuszko Bridge, these elements were metalized.

Other fabrication factors for designers to be aware of regarding galvanizing and metalizing include the following:

- **Project Schedule Impact**
  Coating application adds time to fabrication, and metalizing does so disproportionately. Hand blasting is needed to produce the sharp anchor pattern required by metalizing, and this takes time. In fact, very large girders can take up to an entire shift just to clean. This does not preclude metalizing; however, if a project is time critical, consult with High Steel or other applicators to ensure the chosen coating will facilitate the project schedule.
- **Specify Correct Surface Condition**
  Remember to use a class C surface condition for slip resistant design when galvanizing. If a class B or D is used for connections on galvanized members, special processing will be needed to keep the galvanizing off the faying surface. Not only does this processing require extra effort, but also if the member is galvanized, it is better to have galvanizing on the bolted surface, helping to protect the steel.
- **Cost Considerations**
  For I-girder bridges, galvanizing the bridge or metalizing the girders and galvanizing the cross-frames adds about 40% to the cost of the delivered fabricated steel compared to using uncoated weathering steel. Also by comparison three-coat paint adds about 25%. If both paint and metalizing/galvanizing are used, these premiums can be more or less combined. For complex bridges, these premiums are less. For example, for a cable stay bridge, the premium for galvanizing the anchor assemblies and metalizing the edge girders and floor beams adds about 25% to the cost of the fabricated steel. Note that these are general numbers intended to provide a rough idea of initial premium in this article; actual costs can vary considerably depending on the nature of the bridge.

The choice of protection system for bridges is important. If using galvanizing or metalizing, choose galvanizing provided components will fit in a kettle, and consider metalizing for the larger components provided they are not too complex or have areas such as the inside of tubes that are inaccessible to metalizing. Finally, if you would like to discuss the best practices in greater detail, remember that you can consult with High Steel for project specific recommendations and the latest details about coating best practices.

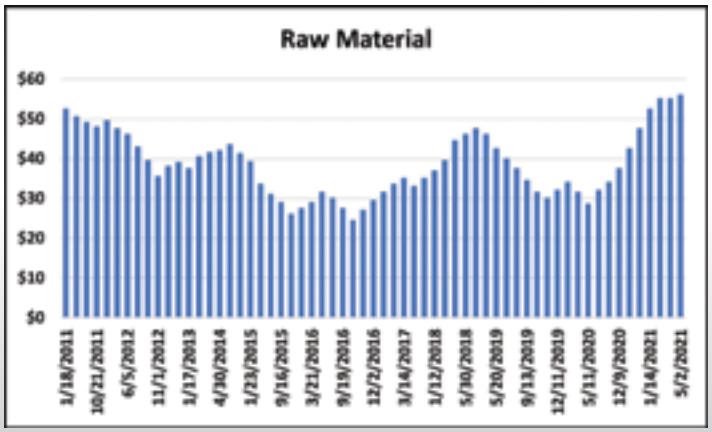
# Structural Steel Remains a Great Value:

**By Rich Truxel**
*Vice President -Sales*

**Like all industrial materials the price of raw steel has risen significantly over the past year. However, over the past decade the steel fabrication industry has become more efficient resulting in stable long-term pricing for fabricated structural steel. The first chart below shows the cost of raw material over time, which is somewhat volatile. The second chart shows the cost of fabricated structural steel, which is relatively stable over time.**

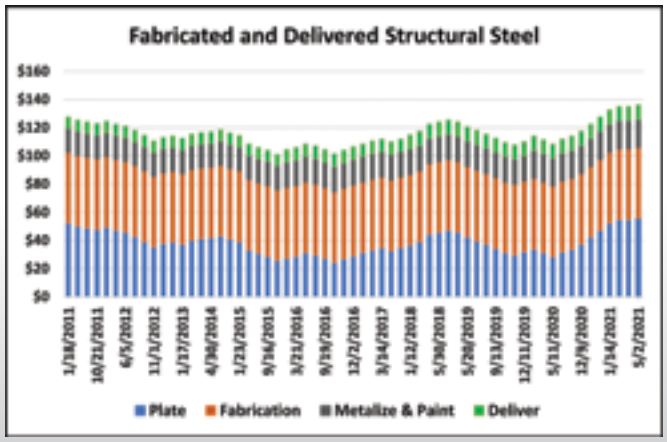
## Cost of Raw Material:

Mill plates represent 30-40% of the price of fabricated structural steel. Following is the price of mill plate since 2011 ($ per 100 lb.):




## Total cost of Fabricated Steel:

Fabrication, detailing, coatings, shipping, etc. make up the balance of the cost. Here we show the cost of fabricated structural steel delivered to the job site ($ per 100lb.):



# High Steel University - "YOU DON'T GET A SECOND CHANCE TO MAKE A FIRST IMPRESSION."

HIGH STEEL UNIVERSITY
*Excellence through Diligence*

**By John Peiffer,** *Director of Talent Development*

The quote above was shared with me approximately 15 years ago by a senior manager. It reflects on the investment of time and energy devoted to helping people learn new skills with their new employers. A good start in business begins with a solid training program.

All new welder fabricators at High Steel's Lancaster and Williamsport plants begin as co-workers reporting to our training staff. By working with us first, they learn necessary welding skills and become certified with our DOT (Department of Transportation) customers.

We introduce them to a culture where safety and quality are our key values. There are courses specific to sharing our quality focus and emphasizing the importance of working safely. We each are truly "our brother's keeper."

In addition to welding, safety, and quality courses, new co-workers take courses in the fundamentals of the business. These courses emphasize the value we provide to our customers and other stakeholders. Bridge Basics focuses on how a bridge is built and the impact of exceptional quality to the safety of all those people that will drive over that bridge each day on their commute to work or home. The intent of Bridge Basics is to instill an early pride in ownership for the co-worker and help them realize their impact of the product supplied to our customers.

A key component of the skills classes we offer is learning the knowledge and then effectively demonstrating the skills learned. This happens during the evaluation phase of the training class, when a skilled evaluator reviews work performed by the student as the evaluator participates in the training.

All product welded by the student in welding skill classes undergo the same rigorous quality control visual inspections and x-rays that routine production product would undergo in one of our plants. To pass the class, the student's work must pass this inspection.

We started our "new co-worker cohort" in November of 2018 as a pilot program. That was co-worker cohort #1. We are now working with new co-worker cohort #27. An investment in our co-workers is an investment in our future.



*Structure: KY 244 Over CSX and US 23, Greenup County, KY*
*Picture courtesy of Triton Construction*

# HIGH STEEL NEWS

Summer 2021

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*Lay down a good weld and give good measure.*

Sanford High 1931

NATIONAL STEEL BRIDGE ALLIANCE NSBA FOUNDED 1995

AISC CERTIFIED FABRICATOR

## RECENT CONTRACTS AWARDED

**GR4 I95 Widening / Multiple Structures**
Philadelphia, PA – 7,538 Tons
James J. Anderson Construction Company, Inc.

**US35 & I64 IC - Nitro**
Putnam County, WV – 11,575 Tons
Brayman Construction Corporation

**I-84 over Lackawanna RR and Big Run**
Lackawanna County, PA – 7,201 Tons
J. D. Eckman, Inc.

**Raritan River Bridge Contract 1**
Middlesex County, NJ – 6,471 Tons
George Harms Construction Co., Inc.

**Route 295 / 42, Missing Moves**
Camden County, NJ – 5,244 Tons
South State, Inc.

**I-66 Outside the Beltway**
Fairfax County, VA – 4,121 Tons
FAM Construction, LLC

**US 219 - WV IC**
Randolph County, VA – 3,946 Tons
Kokosing Construction Company, Inc.

**I-95 Widening Section BR2**
Philadelphia, PA – 3,473 Tons
Buckley & Company, Inc.

**95 Express Lanes - Fredericksburg Extension**
Stafford County, VA – 2,443 Tons
Branch + Flatiron JV

**Route 3, Route 46, Valley Road and Notch/ Rifle Camp Road Interchange**
Passaic County, NJ – 2,319 Tons
Union Paving & Construction Co., Inc.

**I-95 NB Rappahannock River Crossing**
Spotsylvania County, VA – 2,180 Tons
Wagman Heavy Civil, Inc.

**Hunts Point Interstate Access - Contract 2**
Bronx, NY – 2,142 Tons
El Sol + DeFoe (JV)

**I-390 Interchange at I-490 Stages 3 and 4**
Monroe County, NY – 1,902 Tons
Cold Spring Construction Co., Inc.

**KY 244 over CSX and US 23**
Greenup County, KY – 1,191 Tons
Triton Construction, Inc.

**Route 28 over Esopus Creek**
Ulster County, NY – 1,137 Tons
Harrison & Burrowes Bridge Constructors, Inc.

www.highsteel.com

*Please address comments or requests for additional subscriptions to editor, Lisa Masters, at lmasters@high.net*