



# Pearl Harbor Memorial (Q) Bridge

Contract B (State Project Number 92 - 532)



**Contract Value**  
\$416 million

**Contract Start Date**  
September 2009

**Contract Completion Date**  
November 2015

**Contractor**  
Walsh Construction / PCL JV



*The gold leaf lettering of the Pearl Harbor Memorial Bridge was unveiled during a dedication ceremony honoring those who lost their lives during the attacks on Pearl Harbor*

### Did you know?

The Pearl Harbor Memorial Bridge was originally named the Quinnipiac River (Q) Bridge when it opened in 1958. Special legislation was enacted and it was renamed in 1995.

The inside of the new Q Bridge main span is hollow and if filled with water could hold approximately 11,119,000 gallons.

The new Pearl Harbor Memorial (Q) Bridge encompasses 0.8 miles of I-95 over the Quinnipiac River in New Haven. It is the centerpiece of the I-95 New Haven Harbor Crossing Corridor Improvement Program and a distinctive landmark on the New Haven skyline.

The new bridge provides five travel lanes and full shoulders in each direction. The bridge has a 100 year service life and will provide benefits for years to come. The original Q Bridge, a girder and floorbeam design opened to traffic in 1958, had only 3 traveling lanes in each direction and was unable to accommodate the more than 140,000 vehicles traveling I-95 each day.

The new bridge is an extradosed bridge, the first of its kind in the United States. Extradosed bridges have structural characteristics similar to those of concrete box girder and cable-stayed bridges and have been used successfully for many years in Europe and Japan.



*Aerial view of the Pearl Harbor Memorial Bridge completed in September 2015*



*The weekend before shifting all I-95 Southbound traffic over the new southbound bridge, the community was welcomed to walk, run or bike across the main span*

One of the benefits of an extradosed bridge is longer main spans. This allowed for the old Q Bridge foundations to remain in place and remain open to traffic throughout construction of the new bridge foundations.

Given its close proximity to the Tweed New Haven Airport, height limitations were also a consideration during bridge design. Extradosed bridges have shorter towers and shallower cable angles than cable stayed bridges, allowing the new Q Bridge to be constructed in compliance with Federal Aviation Administration height restrictions while creating a signature new look in the harbor.

On September 19, 2015, a Grand Opening Celebration was held on the new southbound bridge. Thousands joined, including Pearl Harbor veterans and their families, as the Pearl Harbor Memorial Bridge was dedicated during a ceremony with State and City Representatives, to those who lost their lives in the December 7, 1941 attacks.



## Pearl Harbor Memorial Bridge Timeline

- April 28, 2008- Construction began on the new bridge foundations and northbound west approach under Contract B1
- September 14, 2009- Construction of the new northbound Q Bridge commenced under Contract B
- June 22, 2012 - Ribbon Cutting Ceremony for the new northbound Q Bridge
- June 23, 2012 - New northbound Q Bridge opened to traffic
- July 26, 2013 - I-95 Southbound traffic shifted onto the new northbound Q Bridge
- May 22, 2015 - The last closure pour on the southbound Q Bridge was completed, connecting the East and West sides
- July 2015 - Construction of the new Pearl Harbor Memorial Bridge was completed
- September 2015 - Southbound West Approach Structure construction was completed under Contract E
- September 19, 2015 - Grand Opening Celebration and Dedication Ceremony was held on the new southbound bridge
- September 27, 2015- All I-95 Southbound traffic was shifted over the new southbound Q Bridge

## Interface with other Contracts

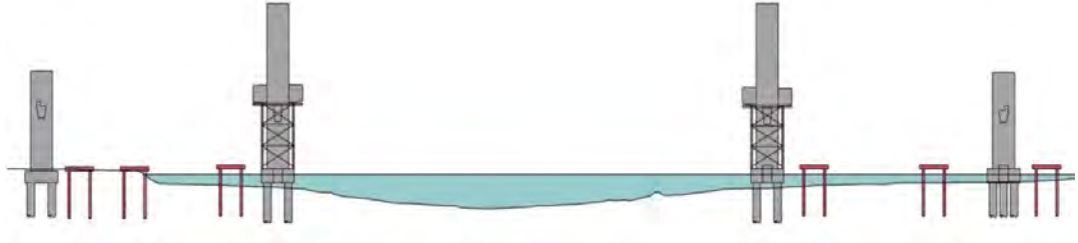
- May 2016 - The fifth travel lane over the new southbound bridge was opened to traffic
- July 3, 2016- The inaugural lighting of the Pearl Harbor Memorial Bridge in red, white and blue with memorial light cannons took place
- August 2016 - The fifth travel lane over the northbound bridge was opened to traffic

# Building the Pearl Harbor Memorial (Q) Bridge

## Main Span Construction Sequence

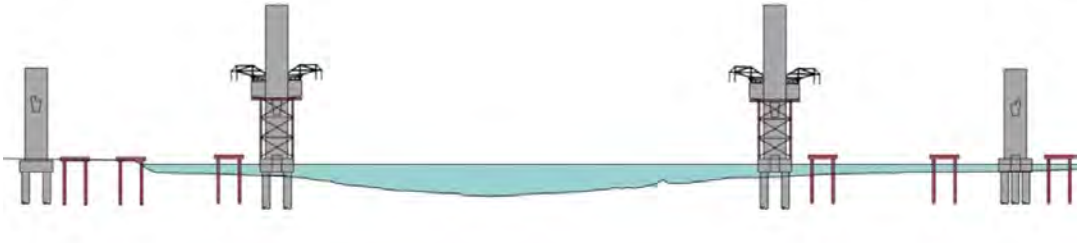
### Stage 1

The Q-Bridge main spans were constructed in four stages. In the first stage, construction of the substructures and pier tables, the location where the deck meets the tower, supported the main span structures.



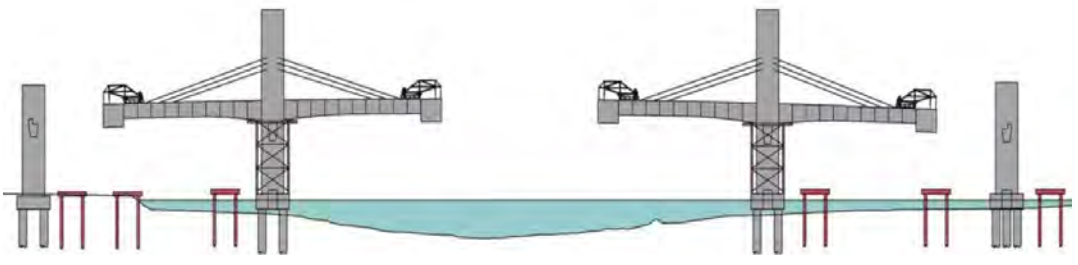
### Stage 2

The second stage included the assembly and installation of the form travelers on the pier tables. For bridge construction, a form traveler is a specially designed piece of equipment that allows for longer and wider spans to be built between piers in challenging site conditions, such as over a river.



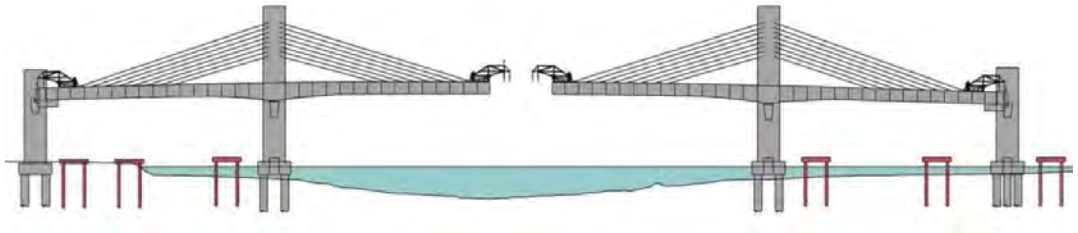
### Stage 3

The third stage included the construction of the deck segments in a balanced cantilever fashion as well as installation of the cable stays.



### Stage 4

In the fourth stage, cantilever construction continued and pier table falsework was removed. Once completed, there were 3 closure pours, the two back side span pours and then the center pour. These pours closed the gap between spans and completed the main span structure.





# I-95 / I-91 / Route 34 Interchange

Contract E (State Project Number 92 - 531 / 622 / 627)



## Contract Value

\$367 million

## Contract Start Date

June 2008

## Contract Completion Date

May 2017

## Contractor

O&G Industries / Tutor Perini

## Contract E by the Numbers:

- 5 miles of new roadway
- 14 new bridges
- 21 new precast concrete retaining walls
- Removal of 20 old bridges
- 370,000 cubic yards of earth excavation
- Over 2,000 prestressed concrete piles with a total installed length of more than 30 miles
- 65,300 cubic yards of structural concrete
- 5,400 tons of structural steel
- 165,000 tons of Superior Performing Asphalt Pavements (Superpave)

Contract E consists of the reconstruction of the I-95 / I-91 / Route 34 Interchange in New Haven to accommodate the increased number of lanes from the new Pearl Harbor Memorial (Q) Bridge and improve interstate-to-interstate connections. The project extends one mile along I-95, from the western project limit at Sargent / Long Wharf Drive (Exit 46) to the eastern project limit including the West Approach of the Pearl Harbor Memorial Bridge, and 3,500 feet along I-91 from I-95 to approximately Exit 3.

Originally built in the 1960's, the I-95 interchange had an increasing throughput in excess of 140,000 vehicles each day by the 1990's. The need for a new interchange was clear, in order to increase the capacity as one of New England's main thoroughways from New York to Boston. The new interchange readily accommodates approximately 200,000 vehicles presently traveling through the corridor each day.



*This project also included the reconstruction of 18 local roads including: East Street, Long Wharf Drive, Sargent Drive, Brewery Street and Water Street (pictured above).*



*The completed bridge carrying I-95 over Canal Dock Road was designed to provide a distinctive gateway to New Haven's waterfront*

## Construction activities scheduled for completion in 2017:

- Replacement or modifications to overhead signage throughout the corridor
- Pavement markings (line striping) primarily on Interstate 91 and Route 34
- Pavement markings (symbols & green stop bars) on Long Wharf Drive for the new bicycle and pedestrian pathways
- Metal beam rail (guardrail) repairs in various locations throughout of the corridor.
- Seeding and plantings throughout corridor
- Sidewalk repairs along Long Wharf Drive
- Granite curbing repairs on Chapel Street and Sargent Drive
- Sign installation along Long Wharf Drive





# LED Aesthetic Lighting

State Project Number 92 - 670



## *Contract Value*

\$5.7 million

## *Contract Start Date*

June 2015

## *Contract Completion Date*

June 2017

## *Contractor*

Ducci Electrical Contractors, Inc.

## Let there be light!



*A total of 548 light fixtures transform not only the bridge, but the New Haven skyline.*



*Once completed, the new Pearl Harbor Memorial Bridge will have the ability to be lit in a wide variety of colors.*

The LED Aesthetic Lighting Contract provides aesthetic lighting to enhance the appearance of the new Pearl Harbor Memorial Bridge and its structural uniqueness, creating a signature display in the New Haven harbor. The contract includes tower, anchor pier and cable wash lighting, and span lighting that will be lit year round from dusk to dawn. Memorial lighting will be lit on select holidays.

The tower and anchor pier wash lighting includes a combination of twenty-six 140-watt and 100-watt LED fixtures at each external tower pier footing and thirteen fixtures mounted at each external anchor pier footing. To create the same visual effect when driving over the bridge, eight LED fixtures will be mounted on the opposite side of the barrier at each of the center tower and anchor piers, with seven LED fixtures at the outer anchor piers.

The cable stay wash lighting consists of one, 100-watt LED fixtures mounted between 10 and 30 degrees at each of the 128 cable stays located behind the barrier.

The span lighting, similar to the porthole lighting of a ship, are mounted on the inclined web of the bridge fascia, facing downward. There are sixty-seven, 90-watt fiber optic illuminator fixtures on each side of the bridge.

The memorial light cannons are mounted on the two center tower piers, facing upwards into the sky. There are three 2,000-watt xenon beam tracker light fixtures on each of the center tower piers. The light system's narrow distribution will create a column of light with a range of approximately six miles upward into the night sky.

LED lighting was selected for the Pearl Harbor Memorial Bridge not only for long term cost effectiveness, but also to reduce future maintenance. LED bulbs have a 50,000 hour plus lifespan, requiring less maintenance over time.

All upward facing LED fixtures on the bridge will be lit in hues of green and blue throughout the year. These Kelvin colors were selected in order to minimize attraction and disorientation of birds.



*The aesthetic light system uses a programmable DMX network capable of dimming and changing the light's Kelvin color temperature.*

**Memorial light cannons will be lit on select holidays including:**

- Memorial Day (Last Monday in May)
- Independence Day (July 4th)
- 9/11 Day (September 11th)
- Veterans Day (November 11th)
- Pearl Harbor Remembrance Day (December 7th)

