

**PSPE PHILADELPHIA CHAPTER
OUTSTANDING ENGINEERING ACHIEVEMENT AWARD NOMINATION FORM – 2009/2010**

Project Information:

Name of Project:

Bridge Reconstruction - Roebling Steel Plant

Location of Project:

Roebling, NJ

Description of Project, Include specific details (use two additional pages if necessary):

Please see attached.

Construction Cost: \$170,000 Completion Date: _____ Willingness to Provide Site Tour? yes no

Primary Engineering Disciplines Represented by the Project (check those that apply):

Mechanical _____; Electrical _____; Civil _____; Structural X; Chemical _____

Organizations/Firms That Contributed to the Project and are Responsible for the Achievement (provide additional sheets as required): Please see attached

Names: W.J. Castle, P.E. & Associates, P.C.

Phone: 609-261-2268

Address: 1345 Route 38, Hainesport, NJ 08036

Email: bcastle@wjcastlegroup.com

Contact Person: William J. Castle, P.E., S.E.

Title: President & Owner

Client/Owner:

Names: WRS Infrastructure & Environment, Inc.

Phone: 267-540-0048

Address: 925 Canal Street Ste3701, Bristol, PA 19007

Email: tconley@wrsie.com

Contact Person: Todd Conley

Title: Response Manager

Submitted by: William J. Castle, P.E., S.E.

Firm/Organization: W.J. Castle, P.E. & Assoc., P.C.

Phone: 609-261-2268

Signature: _____

Email: bcastle@wjcastlegroup.com

To be Presented on December 4th by: William J. Castle, P.E. or Richard A. Parisi, P.E.

Email bcastle@wjcastlegroup.com;

Cell Phone: 609-209-2029

rparisi@wjcastlegroup.com

215-264-6009

A \$50 Entry Fee is required and is to be submitted with the Nomination Form.

The entry fee is to be made payable to PSPE, Philadelphia Chapter.

Nomination is due: November 14, 2009

Presentations: Thursday, December 3, 2009

Send by Email or Fax Nomination to: oea@pspe-philly.org or 215-885-3732

Payment of the Application Fee may be check or by credit card.

To pay by credit card, click to [PAYPAL BUYNOW](http://www.pspe-philly.org/oea/entryfee.htm) button on our website <http://www.pspe-philly.org/oea/entryfee.htm>

To pay by check please mail to:

Fredric L. Plotnick, Esq., P.E. Chairman, Outstanding Engineering Achievement Awards

Colonade Manor #117, 101 Washington Lane, Jenkintown, PA 19046

Phone: 215-885-3733, Fax: 215-885-3732, email: oea@pspe-philly.org or oea@fplotnick.com or fplotnick@fplotnick.com

Additional Contributing Firm

Names: Hydro-Marine Construction Co., Inc.

Phone: 609-261-6353

Address: 1345 Route 38 West, Hainesport, NJ 08036

Email: jcastle@wicastlegroup.com

Contact Person: Janet L. Castle

Title: President & Owner

PSPE PHILADELPHIA CHAPTER

“ROEBLING BRIDGE

REHABILITATION DESIGN/BUILD”

Part of an EPA Superfund site, the abandoned steel railroad bridge at the Roebling Steel Plant crossing Crafts Creek in Roebling, New Jersey needed to be converted into a roadway bridge able to support construction vehicles up to 110,000 lbs. The bridge was to be rebuilt to allow crews to the north side of the creek for decontamination procedure. *W.J. Castle P.E. & Associates P.C.* (CASTLE) was retained in October 2008 to perform an in-depth inspection of the existing bridge. Our inspection and analysis noted that the substructure and parts of the superstructure were in overall good condition and able to be utilized in the new bridge design with some repairs and modifications.



The inspection found the concrete substructure to be in overall good condition with the exception of a void on the abutment at the intersection of the wingwall. The existing superstructure consisted of six 37'-3" long steel 24Gx129 stringers which formerly supported the railroad above. The steel beams were in overall fair condition with section loss and corrosion in the webs and flanges within the end 6'-0"±. Both the steel stringers and the corroded bearing plates would need rehabilitation and repair prior to use. The void located on the abutment would also

have to be repaired. After the inspection, CASTLE determined that if the repairs were made to the bridge, the structure was more than adequate for the re-design.

CASTLE was awarded the contract for the design/build for the rehabilitation of the structure, which included the engineering for both repair details and the actual bridge design. Prior to any repairs made, our engineers evaluated the existing condition of the substructure and verified which type of repairs would exceed the strength and capacity required. All safety precautions had to be maintained throughout the project and any disposal of contaminants to follow EPA guidelines and regulations. The client was looking to complete this project as fast and as inexpensively as possible and repairing the existing steel stringers and concrete abutments instead of buying and/or building new was very beneficial.

The original stringer configuration was tightly spaced at the center of the concrete abutments with the fascia beams measuring approximately 8'-6". However the client required a minimum of 13'-6" clearance to accommodate the trucks that would be using the proposed bridge, therefore the stringer spacing was expanded measuring approximately 13'-11" edge to edge of the fascia beams.

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The existing diaphragms were removed and the stringers set aside to be prepared for installation. The beams were cleaned and the 3/8” thick by 6’-0” long steel bent plates were attached to each end on both sides to reinforce the deteriorated portions of the stringers. Channel studs were welded at 12” increments along the stringers. Due to the deteriorated condition of the existing bearing plate, the different spacing of the beams, and limited maneuverability and space; a new bearing plate was installed along the length of the bridge seat and anchored into the concrete with 3/4” diameter anchor bolts with 6” minimum embedment. Also, due to the new configuration of the beams, portions of the cheekwalls were removed to accommodate the wider beam layout.

When the stringers were set in their final position the new C8x11.5 diaphragms and the 1½” thick deck pans were installed as well as the ¼” thick bent plate running along the top edges of the fascia beams. Steel guiderail posts were spaced at 6’-3”± and attached to the beams with a ½” thick base plate and to the bridge at the ¼” thick bent plate along the edge of the fascia beams. All steel components of the bridge were covered in epoxy paint with the exception of the galvanized guide rail. The 7” high composite reinforced concrete deck was poured in place in less than one day.



Hydro-Marine Construction Co., Inc., our affiliate condition company, performed all of the construction aspects of the project including all repairs, removal of the existing structure, and installation of the new bridge structure.

Removal of the existing structure began in November 2008, the deck was poured the first week in January 2009, and the bridge was open to traffic by January 23, 2009.

By thinking outside the box, CASTLE was able to save a significant amount of time, money, and labor. The traditional approach or method in designing and building a bridge is to start from scratch, and build new with established procedures. By reusing the existing substructure and steel stringers there was an estimated cost saving of 50%, not to mention the savings in time and labor. Our innovative designs for the repairs to the stringers and substructure as well as alteration of the existing geometry allowed us to successfully utilize the existing components and strengthen them to exceed the capacities and functions required for this project. These techniques and methods of repair could be applicable in similar projects or applications.