

## Focus of This Issue: Bridges

### New Jersey Route 70 Bridge over Manasquan River



PCEF Bulb Tee Beams, Pier Caps and Columns installed over the Manasquan River

All Photos by Schuylkill Products, Inc.

The challenge issued by the FHWA and the NJDOT was to design a system that would allow for accelerated construction of the project. Arora and Associates, P.C. designed the precast prestressed units that would be fabricated off site, shipped to the project and quickly assembled with minimum disturbance to the environment. The substructure portion of the project is very unique, offering innovative use of heavy structural precast prestressed concrete components combined with post tensioning.

The \$52 million project to replace the Route 70 bridge over the Manasquan River in Brick Township, Ocean County and the Boro of Brielle, Monmouth County began in early 2006. George Harms Construction Company, Inc. of nearby Howell, New Jersey is the successful contractor performing the work. Schuylkill Products Inc., Cressona, Pa. fabricated and delivered the precast prestressed post tensioned components.

The 724-ft. long, fixed bridge will consist of twin structures, each having two three-span continuous superstruc-

ture units comprised of bulb tees spaced at 8'-0" on center. The superstructure will be supported on two abutments and five architecturally treated in-water piers with pile foundations. The project calls for two-stage construction to replace the existing drawbridge constructed in the 1930's. Completion of construction is scheduled for December 2010. The completed structure will provide a 47' width allowing two travel lanes, shoulders and sidewalks for both east and westbound traffic.

Phase 1 & 2 precast concrete cofferdam shells, 41' x 30' x 6'-8", with a random stone cut form liner finish were match cast in four (4) segments for each phased pier location. The cofferdams were delivered by Schuylkill Products Inc. Harms Construction unloaded the sections onto barges, and then set the pieces onto a driven pile support platform. The precast concrete cofferdam sections contained a series of 30" diameter holes as a driving template, through which 24" diameter steel pipe piles

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**New Jersey Route 70 Bridge** *(continued from page 1)*

were driven. Once driven and filled, the annular spaces around the pile heads were sealed with an underwater non-shrink grout and an eight inch tremie seal poured. *(pictured right)*

Harms Construction installed eight (8) post tensioning dead end anchorages and accommodations for eight (8) - 2" Ø epoxy-coated post-tensioning bars for each precast concrete column location on the cofferdam segment. Once the reinforcement was complete the cofferdam was filled with concrete encasing the post tensioning material ready to accept the precast concrete pier column segments.

The precast concrete pier columns are oval in shape, cast as straight columns for the interior supports while the exterior precast columns were tapered. The precast concrete pier columns contained the post tensioning ducts corresponding to the locations cast in the cofferdams and the grout and vent tubes for the post-tension grouting. At the base of the columns, blockouts were provided to allow construction personnel to couple sleeves to complete the post-tensioning duct work at each location.

The precast concrete columns were set into a six (6) inch deep re-



**Precast Pier Segment Being Installed**

cess cast into the top of the footing. This recess allowed for shimming of the columns to level and a grout bed. Once in place, four (4) of the 2" Ø post-tensioning rods were set in place and the columns post tensioned between 160,000 and 290,000 lbs. each, which connected the column to the footing.

Each pier cap was cast as a single piece, 47' long x 7' deep x 5' wide, and weighed 71 tons (28-day concrete strength required was 8,000 psi). Each cap utilized forty-six (46) 1/2" Ø grit impregnated, epoxy coated, 270k low relaxation prestressing strand. Post tensioning accessories cast in the pier caps correspond to locations cast in the pier columns. Projecting reinforcement provided for field pour operations of keeper blocks and beam seats. After each pier cap was post tensioned to pier columns, ducts were pressure grouted, followed by casting of keeper blocks and beam seats to receive the Prestressed Concrete PCEF Bulb Tees beams.

A total of 72 PCEF bulb tee beams were manufactured for the structure. The beams are 32/71" x 119.25', and weigh 65.06 tons each; fascia beams were cast using a New Jersey DOT High Performance concrete requiring 8,000 psi 28-day strength. Each beam contained 52 prestressing strands (6/10" Ø uncoated, 270 ksi strand tensioned to 44 kips each), of which 20 strands were in a deflected pattern; interior beams used 48 strands with 18 strands in the deflected pattern.



**Tapered Precast Columns After Removal from Forms at Precast Plant**

*(continued on page 3)*





Massive Tapered End Pier Caps Ready to Ship

The efficiency associated with use of precast concrete substructures is obvious when compared to conventional cast-in place construction. Valuable time would have been lost for construction of temporary cofferdams, forming of the pier footings, columns and cap beams, curing and finishing the substructure concrete. As the industry continues to gain experience in this type of construction, it is expected that even greater efficiencies will be realized. Many thanks to Dennis Campbell, Schuylkill Products Inc., for this story and all the photos.

BASIC BEAM PROPERTIES								
D (in)	CONC. (CY/FT)	AREA (in. 2)	Yb (in.)	I (in. 4)	Z1 (in. 3)	Zb (in. 3)	WT./FT. (KIPS)	V/S
31	0.180	688	15.22	81190	5145	5396	0.728	3.7194
39	0.194	755	18.77	148321	7332	7902	0.787	3.7022
47	0.208	811	22.39	236351	9724	10692	0.845	3.6875
55	0.223	867	26.05	356133	12302	13671	0.903	3.6748
63	0.237	923	29.76	500495	15055	16820	0.962	3.6637
71	0.252	979	33.50	674258	17978	20130	1.020	3.6539
79	0.266	1035	37.26	879241	21066	23596	1.076	3.6452
87	0.280	1091	41.05	1117250	24317	27214	1.137	3.6375
95	0.295	1147	44.87	1390094	27727	30983	1.195	3.6305

PCEF

PCEF 7" Web, 9" Bottom

DRAWN: TMJ	DATE: 10/25/04	SHEET
CHKD: TMJ	DATE: 10/25/04	2 of 4
S-NO: S-XXXXX	JOB NO: XXXXXX	

PCEF – Prestressed Concrete Committee For Economic Fabrication



Route 70 Bridge over Manasquan River

## Welcome to CDM

Benjamin C. Choroser, Jr., PE, Project Manager/Sr. Project Engineer, is our contact at the newest Professional Member, CDM, located at Salina Industrial Park, One General Motors Drive, Syracuse, NY. They offer Consulting, Engineering, Construction & Operations services.

## Quinn Consulting becomes Plant-Tech Concrete Solutions

Kurt Damery, Sales and Operations Manager, has advised that Quinn Consulting is now Plant-Tech Concrete Solutions, LLC in Bladensburg, MD. They offer the concrete industry products and services, including turnkey plant design and installation, and even buying and selling refurbished equipment.

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PRECAST CONCRETE ASSOCIATION OF NEW YORK

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## Basic Prestressed Concrete Design Seminar

This course is geared toward professionals who have not completed a college-level course on prestressed concrete design but have a basic understanding of reinforced concrete design. Classes are scheduled October 3 at Unistress Corporation, October 10 at Oldcastle Precast, and November 7 at Blakeslee Prestress. Register online at [www.pci.org/education/seminars](http://www.pci.org/education/seminars).

## PCANY Meetings October 9

Board Meeting at 9 am and General Meeting at 10 am, AGC Conference Room, Latham; Joint Meeting with NYSDOT in the afternoon at 50 Wolf Road, Albany; agenda to be emailed to members.

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