Forty Foot Pedestrian Bridge
Towamencin Township, Montgomery County, PA

Team

Owner: Towamencin Township, PA
Designer: Simone Collins Inc. Landscape Architecture, Berwyn, PA
Structural Engineer: QBS International Inc. Pennsauken, NY
Civil Engineer: McMahon Associates Inc. Ft. Washington, PA
Geotechnical Engineer: GeoStructures Inc., King of Prussia, PA
General Contractor: RoadCon Inc. West Chester, PA
Reinforcing Bar Fabricator: ReSteel Supply Co., Eddystone, PA
Concrete Supplier: Berks Products Allentown, PA
Precaster: Schuylkill Products, Inc. Cressona, PA (Box Beams); The Reinforced Earth Company, Vienna, VA (MSE Wall and Cap Finals); Architectural Precast Inc., Burlington, KY (Finials and Pylon Caps)
White Cement Supplier: Berks Products Allentown, PA
Total Project Cost: $1 million
Total Project Size: 80 ft (long -40 ft wide)
Photography: Simone Collins Inc. Landscape Architecture, Berwyn, PA

_STRUCTURAL FRAMING SYSTEM_

The new reinforced concrete pedestrian bridge in Montgomery County, PA, is an 80-foot long by 40 foot wide context-sensitive, signature structure that spans five lanes of traffic as the central feature of an 8,100-foot-long highway improvement project on the state highway known as Forty Foot Road. The roadway was depressed and the bridge raised to create a safe, accessible and grade-separated pedestrian link between the two halves of the new Towamencin Town Center.

Precast reinforced concrete and cast-in-place reinforced concrete elements were both used in the design, for economy, durability and to display the versatile, plastic qualities of concrete. The choice to use reinforced concrete allowed the designers to exploit the artistic capabilities of the material and create a seamless aesthetic that carries through all elements of the structure.

The design consciously enhances or disguises specific geometric proportions. Fascia beams were engineered as structural members, with integrally formed architectural arches and artistic relief. Beam depths were designed to create parapets that cloister the pedestrian environment from the traffic below. Cast-in-place reinforced concrete planters on both sides of the concrete deck modulate space inside the parapets by defining a sweeping, variable-width promenade.

The fascia beams are uninterrupted, full-span, full-height beams that extend above the deck elevation to create the appearance of a rigid frame. They are, in fact, simple-span reinforced concrete beams, cast-in-place on cast-in-place concrete abutments. The beams act as standard load-bearing concrete stringers, serving as hybrid members with modified geometry that allow the beams to include the safety functions of concrete parapets, the sound-dampening functions of sound walls and the expansive surfaces for art forms.

Within each fascia, 15 epoxy-coated #7 rebar provides the primary flexural reinforcement, and epoxy-coated #4 stirrups act as shear reinforcement. The beam ends cantilever behind the abutments toward structural pylons clad with precast concrete architectural wing-wall panels. This decision allowed deck edges to be hidden behind the fascia beams, exposing the structural deck only as the wearing surface with aesthetic treatments. Concrete buttresses hidden within the cast-in-place planters tie the fascia beams structurally to the deck. The concrete deck is also supported by three interior precast, prestressed reinforced concrete box beams, haunched to simplify the forming and casting of the cambered deck.

The sculptural potential of concrete inspired a collaborative process between the bridge designer and engineer to acknowledge such traditional structural features as corbels, spring points, camber, hinges and keystones. The result of this close collaboration is a practical synthesis of conventional reinforced concrete materials and techniques with innovative treatments that achieve pleasing Art Deco aesthetics in high-priority visual elements. A jury of the 2008 PCA Biennial Bridge Competition Awards said the Forty Foot Bridge “…is in itself a work of art.”

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