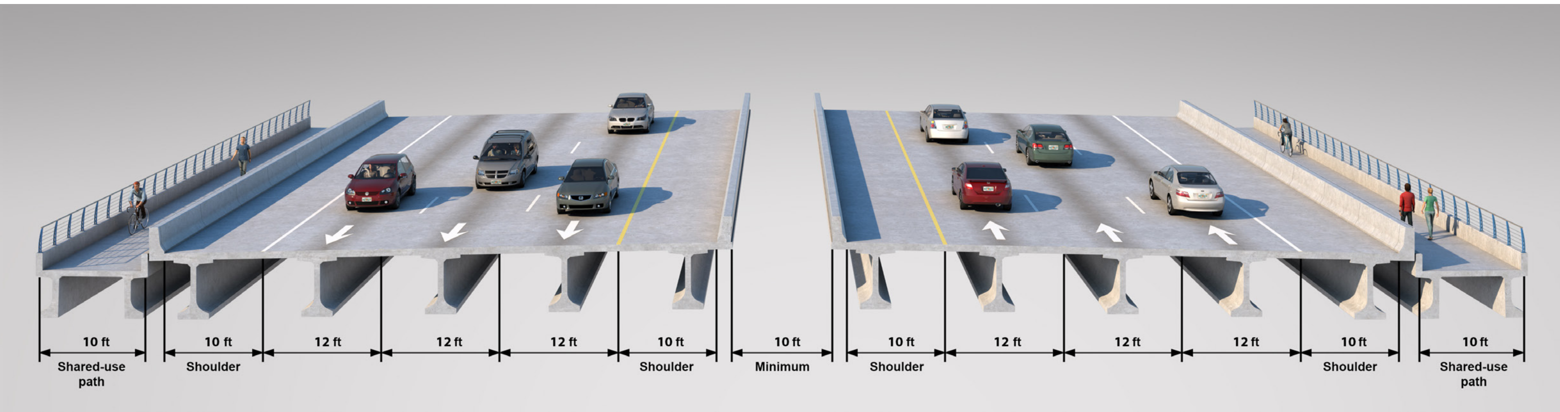
Christopher M. Vanek, Charles Rudie, and Victor Ryzhikov

Pensacola Bay Bridge crown jewel of northwest Florida

- A structurally deficient bridge on a hurricane evacuation route needed complete replacement.
- The new Pensacola Bay Bridge provides increased traffic capacity, including lanes for recreational pedestrian and bicycle transportation.
- This signature bridge is the largest single transportation project in northwest Florida.

As a major east-west transportation corridor and primary hurricane evacuation route, the aging U.S. Route 98 (State Road 30) bridge crossing the Pensacola Bay is nearing the end of its anticipated life span. With only four travel lanes and daily traffic counts of approximately 55,000, traffic congestion is a constant problem. In addition, a lack of auxiliary lanes makes it difficult to respond to traffic incidents or remove disabled vehicles after a collision or breakdown. These deficiencies exacerbate congestion on and near the bridge. Life-cycle cost analyses performed by the Florida Department of Transportation (FDOT) concluded that replacing the 1960-era, structurally deficient structure was the most cost-efficient option.

The new Pensacola Bay Bridge in northwest Florida, shown in this rendering, is a part of a major east-west transportation corridor and primary hurricane evacuation route along US Route 98. Courtesy of WSP.



This cross section of the proposed replacement structure illustrates the various modes of transportation that will be accommodated with the new Pensacola Bay Bridge. Note: 1 ft = 0.305 m. Courtesy of WSP.

To meet increased traffic demands, the plans called for the new Pensacola Bay Bridge to be constructed on a parallel alignment west of the existing structure, with two separate structures to carry eastbound and westbound traffic. Each structure will provide increased traffic capacity through three 12 ft (3.7 m) wide travel lanes alongside 10 ft (3 m) wide inside and outside shoulders. Recreational pedestrian and bicycle transportation modes were accommodated through a 10 ft wide, barrier-wall-separated, multiuse path in each direction of the structure. With seasonal high volumes of recreational patrons, this was a critical operational feature.

Project procurement

FDOT selected design-build procurement for this largest single transportation project in northwest Florida. FDOT's request for proposal emphasized the overall structure type and aesthetics in the corridor by seeking a signature bridge and additional pedestrian features that enhance the user's experience. Simultaneously, a primary project goal was the removal of the existing bridge in service due to the deterioration and constant need for repairs in the more than 200 spans.

As part of the selection process, design-build teams were required to develop and present a corridor aesthetic style package to be approved by FDOT before developing the technical proposal. The aesthetic package required complete overall structure renderings and an outline of the aesthetic plan for the bridge type, pedestrian features, roadway and aesthetic lighting, color palette, pedestrian railing, decorative wall/barrier finishes, and materials.

In addition to the emphasis on aesthetic treatments and structure types, the process of completing 2.26 million ft^2 (210,000 m^2) of bridge construction for the twin 3 mi (5 km) long structures within a 1770 calendar day contract duration was at the forefront. FDOT further accentuated the schedule by introducing a $15 million bonus for removal of traffic from the existing bridge within 860 calendar days from notice to proceed. The combination of construction timeline and aesthetic demands drove the direction and decisions of the design-build team's project strategy.

Design-build team strategy

WSP teamed up with Skanska to develop the apparent best value proposal for FDOT. The design-build team selected a strategy that optimizes efficiency and maximizes the number of precast concrete structural elements while enhancing these elements with a modern, sleek design centered around a signature 375 ft (114 m) tied-arch main span.

The first critical design element involved separating the pedestrian multiuse path from the mainline vehicular bridge for the entire crossing. This separation allowed the entire path to be isolated from vehicular vibration while offering a distinct, lower walkway surface below the roadway that reduces sound levels and enhances safety and the overall pedestrian experience. A complete precast concrete structural solution was used for this element, while the mainline superstructure is a more conventional structure with a cast-in-place (CIP) deck. This separate lower path is carried through the main span steel tied arch, providing the desired signature elements. This option helped meet the construction schedule by not introducing a critical-path-driven structure for the entire main span.

The project's second key aesthetic consideration involved the substructure pier elements. FDOT selected single-column hammerhead piers with rustication. These piers can be aesthetically pleasing in the high levels of the bridge, but because 85% of the piers are approximately 15 ft (4.6 m) tall, the majority of the hammerhead piers associated with the initial concept are dominated by a disproportionately large cap. Working on a large waterway project allowed the team to use precasting and repetition in the substructure to meet schedule demands. Furthermore, by splitting this sub-


The precast concrete elements for the Pensacola Bay Bridge were fabricated at this on-site facility. Courtesy of WSP.

structure element into two piers, the team achieved an aesthetically pleasing, open V-shaped column that can be set in one piece.

With an overall structure width of 70 ft 1 in. (21 m) and a low chord elevation of approximately 18 ft (5.5 m), the requirement of a single hammerhead column introduced several challenges. The size of the cap, single foundation, and very short column in the lower approach areas create heavier picking requirements. As these piers get closer to the channel, the single-column footings increase in size to resist the greater potential for ship impact. This also causes an increase need for column capacity, which drives denser connections that are a challenge for field construction tolerances. The design-build team's substructure strategy was to develop a two-stage, split, twin-curved V pier, which offers benefits in precasting and optimizing lower- and higher-level pier aesthetics. The V piers proportionally increase in size as the pier approaches the higher-level areas, changing in geometry and construction methodology.

Another key component involved introducing design elements that offer pedestrian-friendly features across the entire structure and in the parks at each end of the project. These elements included 30 × 6 ft (9 × 2 m) overlooks at 10 locations on both the eastbound and westbound sides of the bridge. These overlooks contain sleek, architecturally detailed shade structures, benches, and informational plaques, providing a space for refuge and reflection. The path is contained with a modern stainless-steel cable railing system on the outside, while the backside of the traffic barrier is inset with a wave pattern detail. Ramps, wayfarer signs, and pedestrian amenities are provided in the parks for ease of access and enjoyment of use.

Numerous bridge elements are accentuated with a color-changing LED architectural lighting system. White lights embedded in the curb of the multiuse path, along with color-changing exterior fascia beam lights, will create a ribbon across the bay. The tied arches and piers contain color-changing lights as well. The entire system is preprogrammed with multiple color combinations, including a pattern with wavelengths that are safe for turtles, all of which can be controlled remotely. Demonstrating special event options through the use of three-dimensional (3-D) modeling helped the community and local officials visualize the lighting impact and buy into the architectural theme.

Several architectural features were developed through an outreach program with an emphasis on involving the community in the choice of specific items on the project. This process helped the community support the project and increased public perception of the bridge design.

These key elements of the design-build team strategy focused on providing a more balanced overall structural solution that meets the project schedule demands while offering cost-effective and affordable architectural elements. The team's $398.5 million bid for the project was the only proposal within FDOT's budget that met all project requirements. The next section provides an overview of the key structural detailing and design requirements to achieve the design-build team's vision.

Design

The design of the structural system for the Pensacola Bay Bridge required a balance between structural optimization and aesthetic considerations. The size and volume of materials required for the construction was developed with a rigorous and detailed series of refined finite element models to produce a structure composed of 106 spans from 23.6 million lb (10.7 million kg) of steel and 162,000 yd^3 (124,000 m^3) of concrete. The structure was compartmented into nearly 4000 precast concrete elements fabricated at an on-site casting facility.

The structural system selected is composed of an approach structure with conventional 72 in. (1800 mm) precast, prestressed concrete girders at a span length of approximately 150 ft (46 m). The main-span channel unit uses a three-span, constant-depth, continuous steel-plate girder with spans of 225-375-225 ft (69-114-69 m). The substructure system is founded on the twin V-pier substructure units supported by prestressed concrete driven piles. A major focus of the extensive modeling techniques was the development of a manageable single-piece substructure unit that can be precast and erected while maintaining a highly aesthetic appearance.

Structural loading and modeling

The project site, which is located in a highly corrosive coastal environment and in an active shipping area, required a series of loading demands on the structure. The coastal area located in the upper Florida Panhandle has experienced several significant storm events within the past 15 years that caused extensive damage to the local infrastructure. Project-design resiliency criteria dictated a "service immediate" level due to the hurricane evacuation route under the controlling storm events.

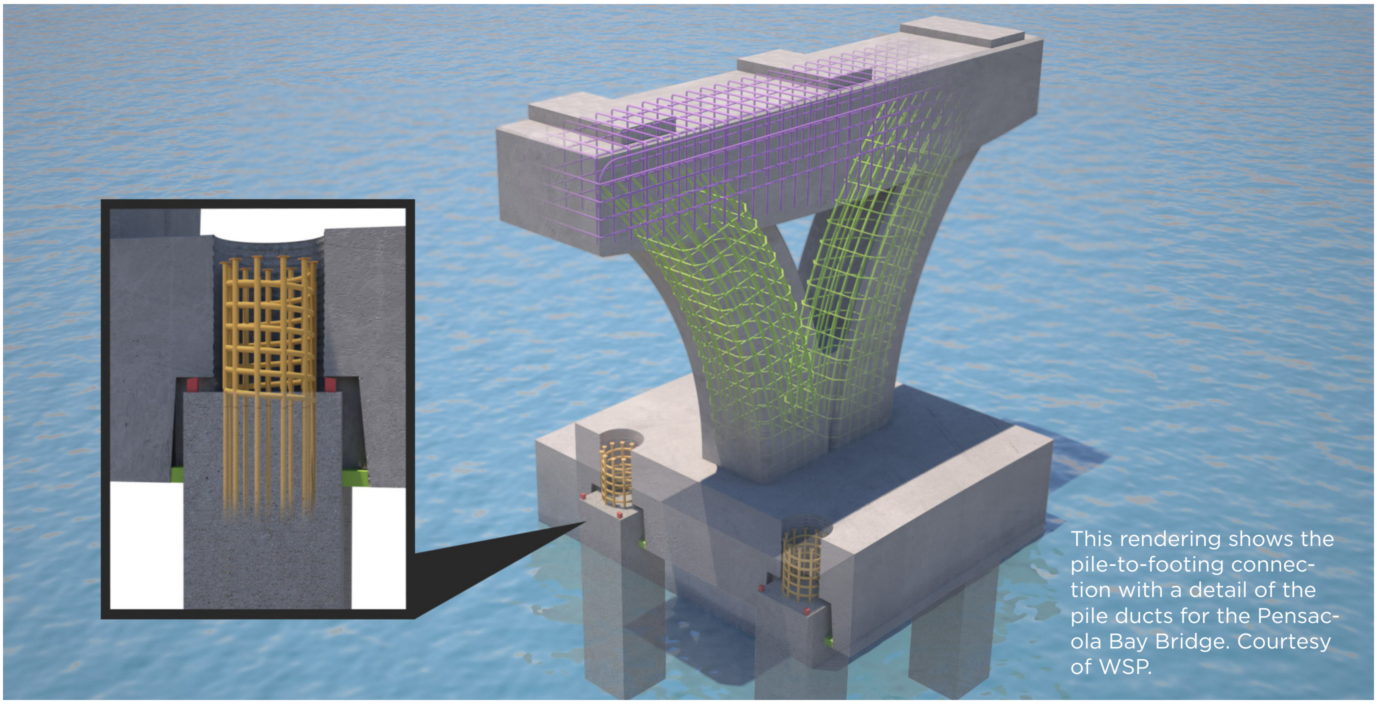
These events cause significant scour, wind-generated wave loading and 150 mph (240 km/h) hurricane wind forces on the structure. These conditions, coupled with the significant ship impact forces and relatively deep water depth of 30 to 35 ft (10 to 12 m), placed a series of stringent demands on the structural system. To assess these loading conditions, a series of detailed sets of finite element models were developed to increase load distribution and analyze the complex structure geometry.

To account for the exact geometry of the curved V piers and soil structure response, all models employed a coupling of the foundation stiffness of the foundation elements extracted from nonlinear soil structure interaction finite element models by entering a coupled 6×6 foundation matrix for each foundation type.

First, foundation stiffness matrixes were generated with the associated foundation arrangement and geotechnical parameters prescribed by the geotechnical engineers. Next, a 3-D beam line finite element model was completed in the commercially available finite element modeling program. The structure was modeled as linear elastic, and no secondary effects from geometric or material nonlinearity were considered in the structural model. These models were developed to generate structural responses to each hazard by modeling the superstructure elements with the associated boundary conditions to capture distribution within the system in all directions.

The two loading scenarios that controlled the foundation elements included strength and service loading conditions under hurricane-level conditions for the approach low-level substructure and ship impact loads at the high-level channel areas. For the low-level areas, the wave loading at a "service immediate" level required an elastic structural response, which drove the design team to consider not only the load distribution but also the spatial and temporal variation in loading by employing the use of dynamic time history analysis. First, hydraulic modeling was completed by coastal engineers to generate the wave-loading scenarios on the representative piers on the project. Here, different foundation types and locations along the bridge were selected that have a combination of the critical design 100-year scour elevation and significant wave heights. Once selected, the *Guide Specifications for Bridges Vulnerable to Coastal Storms*[1] was used to generate the wave loading using the Morison equation (or MOJS equation). The time history sets were then offset in the time domain due to the spatial characteristics of the structure and entered in the global finite element models.

For ship impact modeling, a series of piers in Pensacola Bay were connected within a single finite element model. Nonlinear effects were considered for the soil–pile interactions and structural elements in the design. Nonlinear effects were considered for the soil–pile and pier elements in the design. The transfer of forces from the substructure through the superstructure was accomplished using 3-D beam elements with rigid links between the beam seats and 3-D beam element. This model was chosen based on the use of end blocks provided at each pier location. The beam element properties were determined using an equivalent torsional stiffness method carried out in a finite element model of each typical bridge deck section. The beam sets were connected to the pier cap using only transverse restraint and a longitudinal stiffness representative of the bearing pad properties. This connection is accomplished with shear keys placed on the pier cap that are to be developed to ensure that sufficient capacity is provided to the distribution required. A number of load cases were run for both



This rendering shows the pile-to-footing connection with a detail of the pile ducts for the Pensacola Bay Bridge. Courtesy of WSP.

transverse and longitudinal loading at both expansion and nonexpansion piers to verify that the distribution of the ship impact loading was sufficient under all support (erosion) scenarios and specified load cases.

Based on these modeling assumptions, the modified extreme event II limit state was applied to each group of piers, whereby extensive damage and local failure of substructure elements including piles is accepted, provided sufficient ductility and redundancy of the remaining structure exists to prevent catastrophic superstructure collapse. Therefore, plastic hinges are expected to form in the piles and appropriate detailing was carried out to ensure that system capacity was maintained. As a result, the intent of the models is to confirm the overall stability of the system under the design impact force, verify that the nominal bearing resistance of the axially loaded piles is not exceeded, and determine the design loads on the pier elements under ship impact. To ensure that the requirements are met, the nonlinear analysis carried out in soil structure interaction was investigated to ensure that the mathematical solutions are physically reasonable. To investigate the structural response, a pushover analysis was performed on a typical pier foundation.

By using an iterative process of applying forces to multipier and single-pier models, proper load distribution and acceptable performance were achieved in a very efficient system. By taking advantage of strain hardening and developing enhanced pile details acceptable to the contractor and supplier, the individual pile capacities were increased, allowing the team to reduce the overall number of required piles, the size of foundation elements for facilitating accelerated bridge construction goals, and the associated construction schedule, which are outlined in the next sections.

Foundations

With a highly variable subsurface condition consisting of an overburden layer of 30 to 40 ft (10 to 13 m) of silty sand and a bearing layer of medium dense layers located from 120 to 250 ft (37 to 76 m) deep, the geology presented challenges in the foundation elements of the structure. To meet the challenges of avoiding field splices and obtaining capacity at end-of-drive conditions, custom prestressed concrete pile solutions were developed.

The approach piers were founded on a modified standard FDOT solid 30 in. (760 mm) square voided precast concrete pile, with additional prestressing strands and solid construction pile lengths of up to 210 ft (64 m) that can be manufactured and handled in the field. The connections to the precast concrete substructure units will employ corrugated steel ducts cast in the head of the pile, which can easily be extended in the field if bearing is achieved or used for field spices in the event that the pile does not achieve capacity. The length of the production piles, as well as these ducts, was adjusted based on the test pile driving to help reduce work in the field.

The higher-level pier foundations demanded more flexural capacity and less axial capacity, so a custom 36 in. (910 mm) voided precast concrete pile was developed to sustain the higher capacity requirements.

Incorporating these modified pile types was the result of an iterative process in which different pile types and the

A one-piece V pier is set in the field for the Pensacola Bay Bridge. Courtesy of WSP.

associated number of piles were estimated and weighed against the total estimated pile lengths and the implications to the footing size, alignment, and so forth. Taking advantage of the modified piles reduced the required number of piles by more than 20%, resulting in just over 2000 piles on the project for 6 mi (10 km) of bridge.

Substructure

With two different geometric sets of V piers, the construction method and associated design were adjusted to suit the scale of the elements required. In the approach structure area, due to the reduced height and loading demand, the design team developed a single monolithic precast concrete footing, column, and cap unit that can be erected in the field by a single crane pick. The 110 ton (100 tonne) unit will be erected atop a four-pile cluster in the field using ultra-high-molecular-weight shims atop the pile. Each will be sealed and dewatered, with a connection of headed reinforcement that is grouted into preformed ducts in the piles and field closure pour. This accomplishes a very small and highly efficient connection.

The pile pocket connection, which was partially extended into the footing to extend the pile out of the water surface, will develop a full flexural-shear connection. The transfer of forces in the system employs a combination of socket and corrugated duct-type connections to achieve the required loading demands. The reduced embedment depth dictated the use of headed reinforcement because ultra-high-performance concrete is more site restrictive, not locally available, and not as economical for the site conditions.

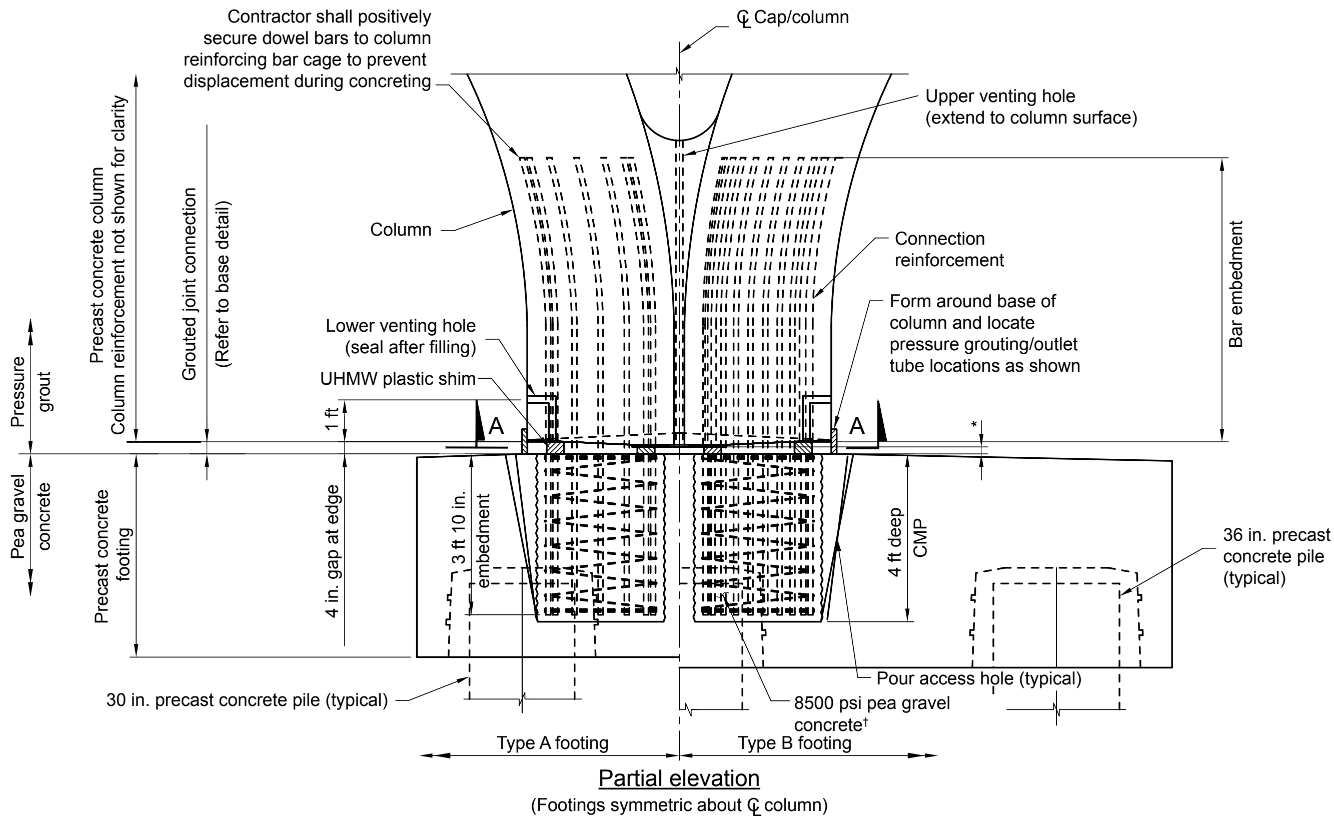
Before switching to the higher-level V-pier geometry, the initial piers entering the vertical curve required extension of the lower-level pier column. Accomplishing this change while maintaining a manageable picking and fabrication size required splitting the footing from the cap and column units. To accomplish this, the footing-to-column joint involved a two-stage, corrugated, duct pocket connection with a pressure-grouted base joint to ensure proper consolidation and durability at this critical location.

For the connection, the pier cap and column unit is erected on the precast concrete footing, which has been grouted to the piles as described. Once erected, a series of dowels extending from the precast concrete column base is concreted into a large corrugated metal duct pocket formed in the base of the footing. Once strength in the concrete is achieved, a series of specifically designed forms and pressure valves/inlets are clamped to the base of the column to allow pressurized grout to be injected from the base. The grout fills the annular space and, through a series of tapered slopes and vents, exits and is ejected from the base of the apex of the V pier. This process promotes an ability to inspect the quality of grout when complete, measure and monitor volumes to reduce void potential, reduce entrapped air pockets, and reduce the field concrete required.

All of the lower-level V piers, including those with and without footings, were cast within a series of intersecting work stations specifically coordinated to maximize form productivity. First the foundation units were tied in place in each casting station while the column and cap reinforcing bar was tied lying on its side on a hydraulic table. Once completed, the table would rotate into position to allow a reinforcing trolley running 90 degrees to the forward and backward casting stations to move the reinforcing bar into position and be placed within the footing. The casting formwork running east and west would move into place after placing the footing and allow the column and cap to be a single monolithic pour. The pier assembly could then be relocated to a curing location and the cycle repeated for a three-day turnover.

Casting yard

Once the profile had raised sufficiently, a larger series of V piers was designed for efficiency and to achieve a more balanced appearance. Due to the change in foundation capacity required, the pile groups increased in size and associated weight as the 5% profile quickly increased member weights. Due to these changes, the construction process also changed. Here, nonstructural precast concrete bathtub forms were used for the CIP footings connected with a prestressed pile strut, while the column and cap were precast and erected on tem-



Footing-to-column pier pocket and grouted connection are shown in this detail. Courtesy of WSP.
Note: CMP = corrugated metal pipe; UHMW = ultra-high molecular weight. 1 in. = 25.4 mm; 1 ft = 0.305 m; 1 psi = 6.895.
* 2 in. minimum gap/shim.
† Cast-in-place plug shall utilize an approved high-slump concrete mixture, which contains no. 89 coarse aggregate (pea gravel) and has a minimum compressive strength of 8500 psi.

porary falsework for a pressure concreted closure pour. The field closure pour length was a consistent length, while the precast concrete column segment varied in height in the precast concrete manufacturing facility. As these members neared 400 kip (1800 kN) and 40 ft (12 m) in length, they were cast horizontally and stored until being rotated and installed in the field.

The final precast concrete pier connection variation occurs with the four piers adjoining the channel. Here, the piers and foundations are the largest on the project, and the main-span channel unit size and loading capacity requirements dictate a combined foundation and joining of the twin split V-pier design into a single-frame unit. In addition, the pier widths change due to the superstructure framing needed to allow the basket-handle tied-arch structure to rise between the multiuse path and vehicular bridge. To accomodate these variables, the construction method for the high-level pier column field splice was combined with a midcap connection using mechanical couplers.

The splice increases based on the width adjustment, while the left and right precast concrete assemblies laterally translate on the footing base to maintain the precast concrete shape geometry and formwork. The bottom portion of the pier was cast in place because the single precast concrete assembly weight neared 440 kip (1960 kN) and its shape is relatively conventional at the base.

Tolerance and mock-up procedures

Due to the unique nature of the proposed connections and stringent tolerance needed for proper fit-up, the plans contained specific requirements in terms of precast concrete fabrication and erection tolerances along with a detailed set of mock-up test requirements. To help ensure the proposed details and construction sequence and that personnel produce a connection free of voids, full-scale mock-ups were required. The mock-ups were detailed for each connection type with a sufficient segment of the overall structure to demonstrate the completed construction. Before fabrication of any production elements, the mock-ups were required to be constructed with the developed construction procedures. The construction procedures were amended based on satisfactory results of the mock-ups.

To assess the performance of the mock-ups, each test segment was to be cut in a minimum of two sections and

Pi girders, shown in the precasting yard, are being used to support the multiuse path bridge portion of the Pensacola Bay Bridge. Courtesy of WSP.

measurements of the voided areas taken over the total sectional area of the joint could not exceed 3% without reconducting the mock-up with revised connection procedures/details. A high quality was obtained in the pile-to-footing connection mock-up, which achieved satisfactory results in a single test, while the column grouted joint required two mock-ups to achieve a passing result. These testing requirements helped refine some of the access/construction procedures that aided in owner acceptance, achieving a higher-quality field connection. The mock-ups also allowed adjustments to be made before a majority of elements would be fabricated.

Superstructure

To support the separated multiuse path along the entire bridge, two different sets of superstructure types were used. With a 59 ft 1 in. (18 m) typical section for the vehicular bridge and a 10 ft (3 m) multiuse path width, precast concrete was the preferred material for the site's aggressive environment. For the approach spans, precast, prestressed concrete girders with a CIP deck were the obvious choice for the vehicular superstructure, while a custom-shaped pi girder supported the pedestrian bridge. At the main-span unit, due to the 375 ft (114 m) pier spacing requirement, the superstructure was a continuous plate-girder system adjoining the steel tied-arch structure.

For the typical approach span, five 72 in. (1800 mm) Florida I-beams (FIB72s) with 12 ft 6.25 in. (3.82 m) spacing and a length of approximately 150 ft (46 m) were found to be the most economical and to maintain clearance from the existing cylinder pile foundations. As discussed, ship impact and wave loads are transferred to the superstructure through shear keys. This transfer typically goes from the shear key to the deck through end diaphragms. The team wanted to avoid end diaphragms and used only a thickened end slab, not only to save costs but also to facilitate an accelerated construction schedule on-site. Therefore, in order to transmit the lateral force transfer required from the substructure to the deck, selected girders featured a thickened end block. The length of the end block was determined by the distribution of the shear force resultants from ship impact models and was allowed to be adjusted by the fabricator to suit the minor variations in beam lengths on the project.

To match this framing arrangement, a custom-modified 54 in. (1400 mm) deep Florida I-girder form was split into two and a drop-in pan was inserted to create a highly efficient double-stem girder shaped to resemble the Greek letter pi. The top flange became integral with the shape and formed the deck surface to which a monolithic 21 in. (530 mm) tall parapet was attached. The girder, once cast, will weigh approximately 200 tons (180 tonnes) and will allow the multiuse path bridge to be erected in a single piece with small link slab closures at the piers. To prevent end-zone cracking, flange distortion, and removal of the top flange to support the link and overlook slabs, a 1 ft 6 in. (0.5 m) thick end diaphragm was cast monolithically with the section. The girders are produced on a single-lane self-stressing bed with integral form vibration and custom deck screed finishing unit. To accommodate the large width of the members, a blockout in the end diaphragm allowed the central hydraulic jack and strut to be placed within the section.

Channel spans

The main feature of the Pensacola Bay Bridge crossing consists of a pair of 375 ft (114 m) long × 75 ft (23 m) tall basket-handle steel tied arches over the shipping channel. The tie members and sizes were architecturally chosen to be larger than required by design to make their appearance more striking from the shoreline communities. This choice forces all members to be inspectable with access ladders and openings. The hanger system of the arch uses a cable-stayed system with a four-strand high-density polyethylene coextruded seven-wire galvanized strand system. The system uses crystalline wax for easy replacement during the service life if required. The anchorage of the stay strand features a fork clevis at the rib with a stressing anchorage located inside the tie box.

At FDOT's direction, to accurately encompass the potential wind loading criteria and prevent instability during an event, a sectional model of the arch deck structure was tested at the Boundary Layer Wind Tunnel Laboratory at the University of Western Ontario in London, ON, Canada. As predicted by preliminary static analysis using ACSE 7[2] wind loading procedures for flexible structures and dynamic finite element modeling, the testing indicated no instabilities within the design range loading criteria and wind pressures very close to initial predictions.

For the 225 ft (69 m) back span, a pair of constant-depth plate girders on a CIP deck were chosen. The vehicular unit's 13 ft (4 m) constant-depth steel girders along with all structural steel on the project used metalizing and a topcoat paint system to protect against the corrosive environment. As the single largest metalizing project in North America, the detailing challenges to prevent field welding, drilling, or attachments needed for the miscellaneous apertures, surface preparation, and access limitations required a coordinated effort with the fabricator and metalizer.

Visualization

With a major emphasis on aesthetics and community involvement, the integration of 3-D renderings and bridge information modeling technology played a major role in the design process. First, the conceptual and architectural theme of the project was presented and conceived through coordination of the structural engineer and graphic artist to develop cost-effective, aesthetically pleasing, and maintainable features. Once the conceptual process was accepted, the design-build team used the visualization aids and renderings to develop construction sequencing, fly-through videos, and graphical informational pamphlets to use at public meetings, on the project website, and at public displays.

Use of the visualization process allowed the community to vote on specific bridge features and enabled the design-build team to obtain FDOT approvals more readily and to inform the public on the construction progress, including upcoming traffic changes. This process developed sequencing videos showing stage-by-stage construction erection connection of the precast concrete piers. Once the visualization renderings were fully developed, a 220:1 scale 3-D model of approximately 1500 ft (460 m) of the vertical curve portion of the structure was printed and assembled. This model was used for display at FDOT's public meetings and offices showcasing the project features.

Conclusion

The decision by FDOT to use a design-build contract for the Pensacola Bay Bridge encouraged the Skanska and WSP team to incorporate accelerated construction techniques and innovative precast concrete designs to achieve an efficient system on a greatly reduced schedule. Through close coordination between engineers and contractors, delivering these strategies for U.S. 98 over the Pensacola Bay will place the traveling public on a low-maintenance, six-lane facility in a reduced amount of time while providing several value-added features.

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About the authors

Christopher M. Vanek, a lead engineer in WSP's complex bridge unit, has extensive experience in the development and implementation of accelerated bridge construction, including the areas of lateral slide, self-propelled modular transport, and prefabricated bridge element systems. He is a licensed professional engineer and maintains an active position on ACI Committee 343, Concrete Bridge Design, and ACI Committee 423, Prestressed Concrete, and is a member of the PCI AASHTO LRFD Specifications Review and Implementation Committee.

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Abstract

A structurally deficient bridge on a hurricane evacuation route needed complete replacement. The new Pensacola Bay Bridge provides increased traffic capacity, including lanes for recreational pedestrian and bicycle transportation. The Florida Department of Transportation selected a design-build procurement and emphasized the overall structure type and aesthetics in the corridor by seeking a signature bridge and additional pedestrian features that enhance the user's experience. A primary project goal was the removal of the existing bridge in service due to deterioration and the constant need for repairs. This is the largest single transportation project in northwest Florida.

Keywords

Bridge, Florida I-beam, pi girder, tolerance, V piers.

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