The Hal Adams Bridge, spanning the historic Suwannee River outside Mayo, FL, is the only suspension bridge in the state of Florida. The L.J. and W.J. Cobb Company of Tampa, FL, built the bridge in 1947. During a routine bridge inspection and assessment in 2001, the Florida Department of Transportation (FDOT) selected the bridge to be repainted. It is 687 ft (209 m) in length, with the suspension span measuring 420 linear ft (128 m) and 50 ft (15 m) high. The bridge consists of riveted box beams, girders, floor beams, H-piles, towers, cables, and cable anchorages.

In the years following selection for repainting, a coating assessment of the existing lead-based coating system was performed, plans and specifications were developed, a construction engineering and inspection (CEI) team was formed, and the project was opened to bidding. The project was awarded in the winter of 2004; construction began in the spring of 2005; and the project was completed in the fall of 2005 (Figs. 1a, b, and c).

This article gives a brief background into the project intent and specification development, and then documents its planning, design, and execution in the field. A history of the actual field experiences and lessons learned are presented from the view of the owner and the third-party inspection firm. The “real world” challenges faced in meet-
ing the design objectives during con-
struction are emphasized.

**Design Intent**

and **Specification Development**

The project was primarily intended to control corrosion of the structural steel members and the cables by cleaning and repainting them. To meet this design intent and other secondary considerations, planning also focused on aesthetics; environmental, health, and safety standards; and the traffic control needed to accomplish the work effectively.

The project used appropriate sections of the FDOT Standard Specifications for Road and Bridge Construction as the basis for preparing the project specification package, including sections specifically applicable to bridge painting.

Recognizing that even the most comprehensive standard specification cannot address structure and site-specific conditions, FDOT procured the services of a consulting engineering firm to develop a site-specific Technical Special Provision (TSP) to address the unique aspects of the project and to supplement the Standard Specification.

Based on differing coating service conditions, requirements, and levels of protection necessary to protect other portions of the structure from damage, the scope of coatings work was naturally divided into two categories: structural steel, including the two towers, the floor system, and the H-piles at the approach spans; and the cable system, including the cable connectors. The scope of work for the structural members required full removal and replacement of the existing lead-based coating system. The surface was prepared to SSPC-SP 10, Near-White Blast Cleaning, and the replacement coating system consisted of an organic zinc-rich epoxy primer, an epoxy polyamide intermediate coat, and a finish coat of aliphatic polyurethane (OZEU system).

In contrast, the work for the cable system focused on cleaning loose debris and any visible rust or oxidation while avoiding any damage to the cable surfaces, which in large part still maintained the original protective galvanizing. To accomplish this, the TSP specified that the typical surface preparation for main cables, suspender cables, and cable connectors consist of an SSPC-SP 7, Brush Off Blast Cleaning. Where the cable system exhibited visible rust, however, SSPC-SP 6, Commercial Blast Cleaning, was required. To accomplish the prescribed blast cleaning, the TSP required the use of an air-impregnated polyurethane foam blast media. The coating system to be applied consisted of two coats of an elastomeric acrylic primer and one coat of waterborne acrylic finish paint. All coating materials had to meet the requirements of the specified system and to be approved by FDOT before use.

**Weather Constraints**

The spring and summer of 2005 brought above-average rainfall for the geographical area where the bridge is located. This led to several problems for the contractor, including flooding of H-pile bases in the north approach spans, water collecting close to containment, and difficulty keeping the recyclable steel grit dry. Figure 2 shows the height of water at the peak of the rainy season. The flooding shown in Fig. 2 caused the contractor to demobilize from the areas and then remobilize to

![Fig. 2: Height of the water during the spring 2005 flooding](image-url)
complete the work once the H-pile area had dried out in the fall.

Additionally, preparation for a possible hurricane strike required temporarily shutting down the project, removing maintenance of traffic (MOT) devices, and securing the containment and other job site equipment.

**Aesthetics**

The TSP specified forest green as the topcoat color for the structural steel, based on an original design determination by FDOT. Before approving the color and ordering the topcoat, FDOT received input from the public and local officials who thought the color should remain closer to royal blue, the color applied the last time the bridge was painted. In response, FDOT changed the topcoat color of the structural steel from forest green to royal blue by selecting an equivalent Federal Standard color designation. The finish color for the cables was selected to match the original and existing silver color, with a specific Federal Standard color designated.

Recognizing its importance to the finished product, especially with a historical structure, appearance was also emphasized during the daily inspection process and final inspection by FDOT. The contractor made an extra effort to minimize runs, drips, and sags and provide an appealing appearance in addition to a sound coating system.

**Maintenance of Traffic**

The Hal Adams Bridge is located on SR 51, a two-lane road through the central portion of north Florida. It carries commercial traffic, including farm vehicles and logging trucks. The contractor’s traffic control plan included having one lane closed for nearly the entire duration of the project. To avoid the use of flagmen around the clock for the project’s duration, temporary traffic light signals were proposed and approved for use at each end of the bridge. The signal system operated using traffic detecting sensors, timers, and radio communication. Due to the limited lane size, the contractor removed all mobile equipment from the bridge each night and during holidays or periods of inactivity.

**Environmental, Health, and Safety Compliance**

The contract required the contractor to properly contain and control any contaminants generated during project operations, such as pressure washing, blast cleaning, vacuuming, painting, containment movement, waste collection, and storage. FDOT District 2 used an environmental consultant to assist in the transportation of the hazardous waste and to monitor the contractor’s environmental protection of the project and the surrounding areas. Due to strict environmental standards and the historical significance of the Suwannee River, the contractor, the FDOT, and the inspection team were aware that neither the site nor the river could be impacted by project operations. Good communication between the CEI team and the environmental consultant provided for quick identification of potential issues, large or small, that could turn into significant problems if not addressed.

Communicating these items to the contractor in a timely manner facilitated immediate correction and timely re-inspection, thereby ensuring the problems were resolved expeditiously.

In relation to general health and safety, the contractor also implemented safety measures required for compliance with the OSHA Lead in Construction Standard and general construction work site safety.

**Lead Abatement**

Testing of coating samples from the bridge showed that the levels of lead and chromium in the coating system were high enough that precautions...
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would have to be taken. The requirements for controls during the removal of lead- and chromium-containing coatings were addressed in the TSP developed by the consultant design team. The TSP took into consideration the sensitive environment and the protection of the traveling public because the work mandated a single lane closure for the duration of the project.

The TSP notified potential bidders of the levels of hazardous materials measured in coating samples from the bridge by including a table listing these values (Table 1 on p. 28).

The TSP also required that the contractor be SSPC-QP 2 certified at the time of bidding and that the certification remain in effect throughout the project duration. In accordance with the TSP, the contractor was responsible for pollution control and compliance with all federal, state, and local rules. Failure to comply would result in job work suspension, and the contractor would be required to submit written corrective measures and receive approval before returning to work.

The TSP established responsibilities and criteria for protection of the environment and management of waste. The contractor was responsible for pre- and post-job soil sampling and analysis and assessing visible emissions per EPA Method 22, with a Level 1 emissions criteria established. The contractor's responsibilities also included collecting, classifying, labeling, and storing waste and preparing waste drums for shipment.

The CEI firm and environmental consultant contracted by the FDOT oversaw the contractor's ambient air monitoring and pre- and post-job soil sampling required by the TSP. The contractor was responsible for inspecting the waste drums for material, weight, and tightness, and meeting the waste transporter on site to ship hazardous waste within the required 90 day storage term.

The contractor was required to establish and monitor regulated areas around the job site where exposure to lead or other toxic metals might exceed OSHA action levels (i.e., 30 µg/m³ for lead), which was especially important due to the lane closure and resultant proximity of traffic on the two-lane bridge. OSHA compliance was required and wholly the responsibility of the contractor.

The contractor was also responsible for designing and erecting containment systems. The TSP required that the contractor's containment designs be signed and sealed by a professional engineer licensed in the state of Florida. The design drawings had to include analysis establishing that the structure could withstand live and dead loads imposed by the painting operations and the containment system itself, including wind loads. All drawings had to be submitted, reviewed, and accepted before work began.

Each containment system had to be built to Class 1W for any washing required and Class 1A for all abrasive blasting per SSPC Guide 6. The contractor had to collect all pre-cleaning waste and abrasive blast waste from the containments. The containments constructed for the floor system, floor truss, towers, and cables are shown and described below.

Figure 3 (p. 28) shows the containment system to protect the traveling public during blasting and coating operations. Note the solid plywood used on the live traffic side. The contractor also used a heavy rubber mat material to

Fig. 4: The floor system consisted of cables, hangers, chain link fence, and tarps, all consistent with SSPC-Guide 6 requirements.

Fig. 5: Total containment on the upper tower sections, per SSPC-Guide 6 requirements.
Cover the center grating to prevent emissions during operations.

**Floor System Containment**
The floor containment system, shown in Fig. 4, consisted of cables, hangers, chain link fence, and tarps. All items were consistent with SSPC Guide 6 requirements.

**Tower Containment**
Figure 5 shows the containment on the upper tower sections. The towers were totally contained per SSPC Guide 6 requirements. They had to be sealed completely due to live traffic on the deck during blasting and coating operations.

**Cable and Anchorage Containments**
The containment for the cables could be built only on small sections of the cables due to the weight loading concerns. Figure 6 shows the bracket (attached to the cable) used to lift the containment from the top. Anchorages were covered, and ground tarps were used to protect the area.

The need to adjust the specified surface preparation and coating system in the middle of production operations presented unique challenges. The first of these was a change in the coating system for the steel anchorages and cable connector assemblies. Based on the structural steel make-up of these members and after viewing the flooding that occurred in the anchorage area, the original elastomeric system specified in the TSP was determined to be less appropriate than the OZEU system. The specified coating system was changed to the OZEU system in these areas, and the contractor used a coal slag abrasive in lieu of the steel grit to avoid rust bleed in the anchorage cables and crevices. The finish coat color in these locations remained the same Federal Standard silver color as the bridge cables. The revised coating system was brought up 2 ft (0.6 m) onto the cables to provide a tie-in coat for the elastomeric coating system.

**The Unique Challenges**
In addition to the extreme weather conditions noted earlier, several other unique challenges occurring over the course of the project had to be addressed by the project team.

The second challenge was encountered with the use of air-impregnated polyurethane foam blast media on the...
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cables. As required by the TSP, the contractor set up a test area for surface preparation at the anchorage and provided containment to perform the test surface preparation. The test surface cleaning performed with the foam media revealed two undesirable results. First, fragments of the foam media lodged in between strands of the cables and had to be removed by hand to prepare the surface for coating. Second, the selected type of foam media, which is available with different encapsulated abrasives depending on the application, did not sufficiently clean the residue and contaminants from the cables to meet the SSPC-SP 7 specification requirement. The contractor and the CEI team tested other abrasive blast media and found that a fine coal slag abrasive, used at a low air pressure with a sweeping application, provided a surface that would meet the requirements for SSPC-SP 7 surface preparation of the cables without excess damage to the cables and existing galvanizing. The CEI team on site monitored the air pressure and the blast media type during this operation.

A third challenge was the application of the elastomeric coating to the cables, based on their irregular geometry, which made it more difficult to fully coat the cable surfaces. After testing several methods, the contractor decided to use glove (mitt) application. Although time consuming, the application method worked well, with the primer coat being worked into the cable seams. The process was sufficiently successful that both coats of the elastomeric coating and the acrylic finish coat were all applied by glove. An added benefit to glove application was that no containment was needed during the painting of the cables.

**Conclusion**

The Hal Adams Bridge project was competed in November 2005 (Fig. 7 on p. 32). The project required extensive communication among the stakeholders, including the contractor, the CEI team, and the FDOT. The need for good communication also extended to other stakeholders as well, such as local law enforcement, emergency services, and local governmental and public entities. Each party was concerned that the project be handled in a manner that provided as little disruption to the local citizens and environment as possible. Through the use of regular on-site progress meetings and ongoing communication during the week, concerns or issues could be identified quickly and the resolution process started. This well-organized coordination and communication by all parties allowed...
unique challenges to be identified, faced, and overcome to meet the project goals and achieve a quality finished product.

Editor’s Note: This article is based on a paper presented at PACE 2007, the joint conference of SSPC and PDCA, held February 11-14, 2007, in Dallas, TX.

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Greg Richards is a NACE-certified coatings inspector with nearly 30 years of experience in the protective coatings industry. He has provided project management services on projects involving bridges and other industrial structures in Florida, Ohio, western New York, Michigan, West Virginia, and other states. Immediately prior to joining KTA, Mr. Richards was the field operations manager and safety and compliance director for Vadakin, Inc. He was responsible for the management of high-pressure water cleaning and painting operations for various clients, and assisted with the development and implementation of a safety training program for field personnel. He also has extensive experience with various surface preparation methods and the application of a variety of coating types, including rubber and glass flake linings, metallizing, and others.
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