Performance-Based Maintenance Contract: Woodrow Wilson Bridge Case Study

Number of word in text: 4,736
Number of figures and tables: 0

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Abstract

Woodrow Wilson Bridge Turnkey Asset Maintenance Services contract is perceived as an example of outstanding maintenance outcomes and positive collaboration between two transportation agencies. Virginia Department of Transportation Central Office Maintenance Division wishes to conduct a case study to learn more about the project in order to identify best practices and lessons learned applicable to other maintenance contracts. The study team has proposed a case study research approach to collect evidence from multiple sources in order to understand the variables and events present in the project. Additionally, the study team has conducted a peer review to identify common denominators among other successful performance-based maintenance projects in the United States. The following report presents the evidence and the conclusions of the case study.
PERFORMANCE BASED MAINTENANCE CONTRACT: WOODROW WILSON
BRIDGE CASE STUDY

INTRODUCTION
The main objective of this case study is to explain how the Virginia Department of Transportation (VDOT), Maryland State Highway Administration (MSHA), and their private sector partner have implemented the Woodrow Wilson Bridge (WWB) performance-based maintenance contract. VDOT intends to use the case study report as a teaching or learning tool for maintenance managers to use in the implementation of performance-based maintenance contracts. A detailed description of the project scope of work will allow potential users to evaluate whether the results are applicable to their projects or not.

A series of unstructured interviews that allowed participants the opportunity to supply information on a wide range of issues related to implementation and operation activities constitute the basis for this case study. The interviewers allowed the participants as much freedom during the interview as possible to ensure that the interviewer did not prejudge in any way the evidence that the participant was offering. A self-administered survey was also sent to a larger group of stakeholders to collect their personal insights into issues related to the implementation and operations activities. In addition, a peer review was conducted to compare similar bridge asset performance-based contracts with the WWB project to identify any potential similarities.

PROJECT DESCRIPTION
The WWB project extends from the Eisenhower connector (VA) to the MD route 414 (MD), including all interchanges and connectors as well as the WWB from abutment to abutment. The total project is 134.00 lane miles, including main lane and ramps. The limits of the maintenance service contract are the Eisenhower connector on the left and the interchange with MD route 414 on the right. The National and Harborview avenues and the portion of I-295 from I-95 until the District of Columbia line are also included within the limits of the maintenance and incident response services. The following is a brief description of the project scope of work which includes ordinary maintenance, bridge operation and inspection, severe weather operations and emergency response.

Ordinary maintenance is defined in the service contract as “any day-to-day activity that is performed to preserve and correct minor defects of transportation assets and highway structures within the right of way during their expected service life that contributes to the safety and comfort of the travelling public” (1).

For the WWB, the ordinary maintenance activities are defined in the bridge operation, maintenance, and inspection manual. The entire bridge, including the bascule span and its machinery and equipment, is included in the service agreement. Contractor personnel operate the bridge bascule span for maintenance, routine, and emergency openings. Contractor personnel also monitor the phone lines that receive requests for opening the bridge, and security personnel patrol the entire corridor 24 hours a day, 7 days a week. Additionally, the contractor is responsible for conducting biennial bridge inspections in accordance with the National Bridge Inspection Standard (NBIS). The contractor personnel record each bridge or structure inspection
using the appropriate method. For example, for bridges and structures located in Virginia, the inspections are recorded as indicated in the VDOT Element Data Collection Manual, and for structures and bridges located in Maryland, the inspections are recorded as indicated in the MSHA Pontis Element Data and Collection Manual and the Guide for Completing Structure Inventory and Appraisal Input Form (1).

The contractor is responsible for responding to weather and non-weather emergency-related incidents, such as tornado, hurricane, flooding, major and minor crashes, hazardous material release, abandonment of hazardous material, and terrorist attacks. The contractor is also responsible for assisting MSHA and VDOT in the event of an evacuation. Prior to snow and ice events, VDOT and MSHA communicate with the contractor to set the level of mobilization and minimum equipment requirements in accordance with the severe weather plan. Then, the contractor is responsible for deploying equipment and personnel to completely remove snow and ice from all travel surfaces, including gore areas and crossovers, within 2 hours after the cessation of precipitation. During the removal operation, contractor personnel provide updates on roadway conditions to the Virginia Traffic System and the MSHA Maintenance Engineer. The contractor is subject to non-performance deductions if the agreed outcomes are not achieved or the performance criteria are not met (1).

Emergency response is a critical service. Traffic operations staff from one of the transportation agencies initiates the emergency response request. Upon notification, the contractor is required to arrive at the location of the emergency within the hour (within 2 hours when the incident occurs outside normal business hours) with the necessary equipment, material, and personnel to address the emergency incident. The contractor’s main responsibility is to support the emergency response team and provide all aspects of traffic control related to the incident, including notifications to the traffic operator with regard to roadway closures and openings. When the incident involves the release of hazardous material, the contractor is responsible for handling the material in accordance with agency, local, State, and Federal laws (1).

For any work that requires restriction or diversion of the traffic, the contractor is responsible for performing the work in accordance with agency’s policies. The contractor follows the weekly traffic control plan approved by the agencies and informs the appropriate agency traffic operators of any roadway closure and reopening. The main requirement is to maintain the corridor fully open to the public 24 hours per day, 7 days a week, although the contractor is allowed to close the road completely for a short period of time (20 minutes) with prior approval from the corresponding agency. The weekly traffic control work plan adheres to the lane closure hours of operation dictated by both agencies and any additional restrictions due to special events (1).

**PROCUREMENT PROCESS**

Both VDOT and MSHA participated in the procurement of the maintenance and operations services for the WWB connection. VDOT took the role of contract administrator and MSHA participated in all aspects of the procurement process, including the negotiations.

Due to the complexity of the project and the importance of the connection from a national security standpoint, the agencies determined that a competitive sealed proposal process, as
described in Annex 7-A of the VDOT Agency Procurement and Surplus Property Manual, was the most appropriate method for contracting the maintenance and operation services. This contracting method is commonly referred as a request for proposal (RFP). This method was instrumental in developing the optimal risk allocation. The request for proposal was issued on August 21, 2009. The initial proposal due date was September 24, 2009 and then modified to September 28, 2009.

The project was eligible to receive Federal funds and, therefore, DOT Disadvantage Business Enterprise (DBE) regulations, as described in 49 CFR Part 23, applied. DOT DBE regulations require that State transportation agencies that receive DOT financial assistance have to establish goals for the participation of DBE firms. The agencies established the DBE goal for the contract at 18 percent.

The evaluation panel narrowed the review process to three proposals from three outstanding firms. The evaluation criteria were as follows:

- Experience and Qualification (15 points),
- Quality of Ordinary Maintenance Plan (30 points),
- Quality of Emergency Response Plan (15 points),
- Small Business Subcontracting Plan (20 points), and
- Proposed Pricing Schedule (20 points).

The proposals were scored within a 12-point range, with the top score being around 78 points and the lower score around 66 points. Two proposals were dismissed because the contractors failed to demonstrate good faith efforts in attempting to meet the stated DBE contracting goal, and the agencies entered into a negotiation process with the remaining firm, which was the top-ranked firm. During the negotiations, both parties had input in determining the scope service, contractors’ organizational structure and strategic approach. This engaged both parties to be vested in the success of the project. At the end, the contractor agreed to provide the level of resources suggested by the agencies at a cost lower than originally proposed. These actions allowed for the best contract with the Agency that may not be obtainable through simple, low bid procurement methods.

VDOT posted the intent to award notice on March 26, 2010 and the contract was awarded on May 21, 2010 after reviewing the contractor’s insurance and bonds. The duration of the procurement process, excluding the preparation of the RFP, was approximately nine months.

INTERVIEWS AND SURVEY

A group of six management and operations staff was selected for the focused interviews. Most of the interviews were conducted at the participant’s office; only two interviews were conducted over the phone due to conflicts in the work schedule. The duration for the interviews ranged between 1 hour and 3 hours, and a minimum of two interviewers were present on each interview to maximize data capture. No electronic recording devices were used during the interviews and the interviewers used a list of discussion topics to guide the discussion.
During the interviews the participants were asked to define “success” and whether they believe the project was a successful one or not. While everybody agrees that the WWB project was successful, the definition of success varied among the participants. According to the study participants, the following attitudes have been instrumental in achieving successful outcomes:

- Build relationships,
- Respond quickly to emergencies,
- Be cooperative with other local projects,
- Address critical issues,
- Develop trust,
- Meet contract requirements,
- Keep everyone safe, and
- Demonstrate pride in the work.

Concurrent with the focused interview, the study team launched a self-administered survey in order to reach a broader group of project stakeholders. Completing the survey was voluntary and the responses are anonymous. The information collected with the survey was used to validate interviewee’s perception about project performance.

Four participants returned a complete survey. On the first item of the survey, 75 percent of the participants strongly agreed that the right people were participating in the Woodrow Wilson Bridge project. The remaining participant agreed with the same statement. Excellent, motivated, and skillful were some of the adjectives used to describe the project staff.

The next item of the survey inquired about the contract requirement definition. Here, 50 percent of the participants strongly agreed that the project scope of work and required outcomes were well defined. The other 50 percent of the participants agreed with the same statement.

The third item of the survey was about the communication process. Once again, 75 percent of the participants strongly agreed that the communication process among stakeholders was both effective and efficient. The remaining participant agreed with the same statement. One participant indicated that the communication process was not only effective between the contractor and the agencies but also between the contractor and subcontractors.

All the survey participants strongly agreed that the WWB project is a successful maintenance transportation maintenance project. According to the study participants, the people and the level of communications were the features or characteristics that make the project successful. One participant perceived that both agency and contractor were dedicated to making the project a success, and the contractor was acting as a representative of the agency.

**PROJECT MANAGEMENT**

A critical element of success in performance-based maintenance contracts is the level of experience that the Agencies bring to the project with regard to the use of the contracting method. In this case, VDOT can be considered as a mature owner with more than 20 years of experience in managing performance-based contracts. On the other hand, MSHA had very little
exposure to the contracting approach and had to adjust to a contractor that decides “what and when” activities are taking place. Both agencies act as the owner, and a contract administrator representative from the VDOT staff manages all the contractual communications. The following is a brief description of the management process followed by the agencies and the contractor:

The contractor has complete control over the planning process. The maintenance activities for the main bridge are based on the bi-annual bridge inspection and the preventive maintenance schedule indicated in the bridge operation manual. Critical services, such as snow and ice removal, are jointly coordinated among both the agencies and contractor.

The communication process was described by the study participants as friendly, open, and honest. The preferred method of communication is email (MS Outlook). The contractor distributes the work plan to both agencies on a daily basis. The work plan indicates the location of all the active maintenance activities. Any standard maintenance issues are managed in the field by the inspectors and monitors. Should a problem not be resolved, the contract administrator representative gets involved. All high-level concerns are managed by the contract administrator representative.

An activity that was originated in the Woodrow Wilson Bridge project and since replicated by VDOT in other maintenance contracts in Northern Virginia is a joint drive through inspection-meeting. For a drive through inspection-meeting, all key managers, including the contract administrator representative, drive through the project together in a minivan. This event takes place every other Thursday. The ride allows for a quick understanding of the problems and agreement of actions since everybody is looking at the same things at the same time. Most of the actions discussed and agreed during the inspection-meeting are incorporated in the weekly plan. This process prevents the creation of too many incident reports (non-conformities) and places everyone in agreement with the current performance conditions of the project. The drive through also allows the agencies to gauge the level of responsiveness of the contractor indicated by the number of action items completed from previous inspection. Several of our interviewees pointed toward this action as a key component in successful execution of the project.

Another venue to discuss problems and action items is the monthly operation meetings. These meetings are attended by VDOT, MSHA, the contractor’s project managers, the contract administrator representative, inspectors and monitors, and key operation personnel. The study team observed the atmosphere in the meeting room to be relaxed and calm. The distribution of the participants in the room is mixed, as opposed to cluster by organization, indicating a collaborative group of people accustomed to interacting with each other on a regular basis. The meeting agenda allocates times to the agencies and the contractor staff to express their concerns and opinions about the current condition of the project. The meeting minutes are distributed at the end of the meeting and any action items agreed during the meeting are incorporated into the work plan.

Each agency has its own inspectors patrolling the entire length of the project on a daily basis. These inspectors conduct routine asset condition assessments in the field, record any deficiencies, and hand over to the contractor the results of the inspections. They pay particular attention to the electro-mechanical components of the main bridge and any deficiencies are communicated directly to the contractor’s personnel responsible for maintaining the facility. These interactions at the main bridge take place as often as twice a week.
Twice a year, a third party firm conducts an evaluation of the condition of the non-bridge assets and reports on the level of compliance with contractual requirements. This evaluation is part of the VDOT Maintenance Rating Program (MRP) and provides the agencies with another opportunity to inspect the assets in conjunction with the contractor. Also, all the bridges in the connection, including the main bridge, are inspected through the NBIS system once every other year. The bridge inspection firm selected by the contractor was also part of the design-bid-build team responsible for the construction of the connection. The report generated from the bridge inspections is the reference for planning maintenance activities on the bridges, in particular for the main bridge.

**LEADERSHIP STYLE**

The opinions collected during the focused interviews and the results of the survey administered to several project stakeholders, including subcontractors, support the perception that the leadership style adopted by the project managers has contributed to the success of the project by fostering a collaborative environment, maintaining open communication at all levels, and making fair and reasonable interpretations of the scope of work.

Moreover, study participants have agreed that the managerial style of the contractor’s project manager has contributed significantly to the success of the project. He was described as a reasonable manager with good negotiation skills and always willing to sit down to discuss project issues. The following are the highlights of his managerial style:

- Treats both agencies as the primary client,
- Demonstrates the importance of building relationships,
- Is a hands-on participant in the project,
- Routinely reviews performance measures with his staff to make sure everyone understand the scope of the work,
- Maintains open communication,
- Acknowledges client’s role in the project and includes client’s suggestions in the work plan, and
- Demonstrates careful planning and preparation.

The contractor’s project manager has 46 years of experience in transportation construction and maintenance. He worked 41 years with VDOT and understands the general public’s expectations with regard to a facility like the WWB connection. Other members of the project team have a similar number of years of experience in transportation maintenance. VDOT’s contract administrator and his representative have 35 years and 23 years of experience, respectively. MSHA’s representative has 26 years of experience with roadway maintenance and MSHA’s principal inspector has worked at MSHA for 29 years. The individual responsible for the maintenance of the electro mechanical components of the connection, including the main bridge, has 32 years of experience in his field.

In summary, the project team benefits from a good managerial style and a group of people with vast experience in maintenance of transportation facilities. “Superior performance is
ultimately based on the people in an organization. The right management principles, systems, and procedures play an essential role, but the capabilities that create competitive advantage come from people – their skill, discipline and capacity to solve problems and to learn.” (2)

PEER REVIEW
Similar bridge asset performance-based contracts exist at the Florida Department of Transportation (FDOT) and the South Carolina Department of Transportation (SCDOT). Both these contracts include primarily bridge structure assets with some additional ancillary assets associated with the bridges and other roadway assets within close proximity to the bridges.

For the peer review, we interviewed agency leadership with direct knowledge of the contracts: Lee Floyd, SCDOT State Bridge Engineer and Jim Jacobsen, FDOT District Bridge Engineer - District 7. The main objective was to discuss the performance of the contracts with both agencies searching for any potential similarities to the Woodrow Wilson Bridge project. On both occasions, the agencies indicated their performance-based bridge contracts were considered successful examples within their agencies. The following are brief descriptions of the two projects.

SCDOT and The Arthur Ravenel Jr. Bridge: At 1,546 ft., the Ravenel Bridge is North America’s longest cable stay span bridge and carries travelers on I-526 over the Cooper River between Charleston and Mount Pleasant, South Carolina, on eight traffic lanes with a bicycle/pedestrian lane overlooking Charleston Harbor. This contract includes the Ravenel Bridge System and six additional coastal bridges in Charleston, Berkeley and Beaufort Counties. Services include management, inspection, maintenance, warranty protection and preservation. Maintenance includes sweeping, drainage systems, elevators and travelers, lighting and navigation lighting, fog mitigation system, intelligent transportation system devices, and trash removal. Additional assets have been added to include eight moveable bridges along the South Carolina coast.

Routine maintenance and the preventive maintenance schedule is included in the standard scope, then potential services outside the routine scope is added as a “push button” unit price or lump sum contract as needs are identified. The contractor and agency agree on scope and price then execute the task order. SCDOT conducts a status meeting with the contractor each month. It was noted that many items have been under a warranty period that the maintenance contractor is not responsible for. Mr. Floyd considers this project as a model for the State on all future performance contracts.

FDOT and The Sunshine Skyway Bridge: Stretching over 21,000 ft. in length at 175 ft. above the water, the Sunshine Skyway Bridge is a concrete segmental and cable stayed bridge. The six-year, all-encompassing, complete asset management maintenance and inspection services contract with the FDOT supports and maintains one of Florida’s most high-profile assets. Some of the services provided for the bridge include routine NBIS bridge inspection, vegetation control and removal, drainage systems maintenance, deck/superstructure repair, navigational lighting maintenance, and debris removal. Another contract in FDOT encompasses two districts that include the inspection, operation, and maintenance of all of the State-owned and maintained bridges, including moveables in 16 counties. This is a 6-year, $72 million contract; however the Skyway bridge project is approximately 1 million per year.
Mr. Jacobsen stated that since 2003, the project has had nothing but positive results. FDOT lost many in-house capabilities many years before the contract was let, and the next logical step was to issue an asset management contract with performance measures. Before the contract, they had hundreds of delinquent work orders that were all completed within the first year of the contract. There are no delinquent work orders outstanding today. He further cited the emergency response as another example of improved performance, with several bridge hits that were quickly mitigated and repaired. Procurement was a two-part process that combined an RFP technical score with a price score, similar to the procurement process used for design–build projects. The performance standards are well defined, with established measures and the NBIS inspection program having been in place for many years.

Each agency pointed to the performance of their contractor and project manager as a factor in their respective projects’ success and explained the performance standards were based partly on the NBIS inspections. Both interviewees indicated that since structures were a highly technical asset that required strong professional and technical skills, the project managers tended to be more professional in this area of expertise. Consequently, the agency bridge personnel could easily communicate and mutually agree on a strategic approach with the contractors. They also highlighted the fact that the performance indicators were easily recognizable and agreed upon since deficiencies were identified through the NBIS inspection process.

**SUMMARY**

During the interviews and even during project meetings the concept of value for money was brought up several times by several Agency staff. It is common to define value for money as the benefit-cost ratio of the project. The usual factors included in the equation are the project monthly payments and the attained levels of service, but other factors contribute as well; for example, the level of management effort needed to oversee the contract, the level of preservation of the agency’s investment in roadway assets, and the political cost of having unsatisfied users (3).

The study evidence suggests that the contractor responsible for maintaining the WWB connection is meeting the agencies’ expectation, thereby providing value for the money, as described in previous paragraph. The contractor is perceived as being responsive and having the right group of people in charge of the daily maintenance and operations activities. The outcome is a sustained level of service that meets or exceeds the agencies’ expectations on a routine basis. In the authors’ opinion, the negotiation method that took place during the procurement process has highly contributed to this outcome by vesting both parties in its success. Additionally this process provided the opportunity for both the Agency and the contractor to discuss and agree on performance standards and clearly define the acceptable level of service.

Two other elements have contributed to the success of the project: communication and cooperation. The managerial style adopted by both agencies and contractor representatives has facilitated the exchange of ideas. In the authors’ opinion, the presence of knowledgeable staff and the willingness of upper management to succeed, accompanied by frequent and positive interactions to facilitate the development of trust among the members of the project, are primary factors in the success of the project. The positive interaction of the team members augmented by the willingness of the contractor to include agencies’ recommendations into the planning process has led to the formation of a collaborative environment. One innovative idea that has contributed
to sustaining the positive dialog among project upper managers was the drive-through inspections.

LESSONS LEARNED

A summary of lessons learned from the implementation and management of the WWB project include:

- **Select a procurement process that permits the Agency negotiate the proposed level of resources and scope of work.** The level of commitment of a participant with the success of the project is somewhat associated with his or her confidence in the amount and quality of resources committed to the project. The amount of resources proposed by the Contractor was discussed during the negotiation process and adjusted to meet Agency expectations and needs.

- **Be aware of the managerial style on the performance of the project team.** The agency project managers have promoted open communication and inclusion of all project team members in the planning and execution of the work. This approach was essential for developing trust among team members and established a collaborative environment to sustain the success of the project.

- **Select a project manager with the ability to reconcile governmental, transportation agency, and for-profit organizations’ needs and expectations.** The project manager job is to make decisions that impact the performance of the project to achieve certain goals. These goals will vary depending on the type of organization hosting the project manager. Being able to understand the expectations of all the team members and make compromises in the decision making process is a desirable quality of the project manager in charge of planning the work.

- **Bring and retain highly qualified personnel.** Connections with complex facilities such as drawbridges or stay cable bridges tend to attract more highly qualified personnel than other transportation projects increasing the probabilities of success. Being able to properly manage these human resources is the key to attain a sustained level of service that meets or exceeds the agencies’ expectations.

- **Be innovative.** Innovation is a driving force at the core of the performance-based contracting approach. Most of the time, innovation will manifest in the technical arena, but sometimes it can also manifest in other project areas. In performance-based contracts, innovation is allowed and should be used at all levels to address common problems in a more effective and efficient manner.

- **Define clear performance standards and expectations.** A commonality in the peer review revealed that bridge structures have an industry-established performance expectation rooted in the NBIS inspection program. These performance expectations have been utilized by DOTs for decades, and the expected level of service is easily identified in the NBIS inspection reports. Agencies should clearly define performance standards that are easily recognized by objective analysis to minimize disagreements during the execution of the project.
MEETING FUTURE CHALLENGES

The last portion of the interviews was focused on the future of the project. Each participant was asked to elaborate on areas of concern and challenges to the future of the project. Participants from both agencies have indicated that a change to the current managerial style is a source of concern; for example, should the contractor become less responsive. Also, any future change to the procurement process is another source of concern; for example, adopting a low-bid approach instead of a competitive sealed proposal process.

From a technical standpoint, changes in the traffic pattern and aging assets are two of the main areas of concern among all the participants. Continuing the partnership and maintaining the collaborative environment seems to be the logical approach to addressing these future challenges. The agencies would like to have more control over certain activities, such as snow and ice removal, but overall they are satisfied with the contractor’s technical performance.

Some confidence in future success derives from the lessons learned from the implementation of the contract; for example, one participant has expressed that as long as the contractor possess enough resources and good subcontractors, the performance of the project should not be affected.

ACKNOWLEDGMENT

The study team would like to acknowledge the following individuals for their invaluable contribution to the development of this report: Albert Rollins (VDOT), William Weishaar (MSHA), Milton Thacker (DeAngelo Brothers Inc.), Gayla Hill (VDOT), Paul Partlow (MSHA), Gerardo Romero (DeAngelo Brothers Inc.), Lee Floyd (SCDOT), and Jim Jacobsen (FDOT). This study has been sponsored by the VDOT Maintenance Division.

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