The 2007 Ravenel River Bridge Inspection

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Summary

The Ravenel Bridge is a 4km cable stayed bridge which opened in July 2005. It connects downtown Charleston, SC to Mount Pleasant, SC. Freyssinet, supplied and installed the 128 parallel strand stay cables supporting the structure. As part of their warranty, Freyssinet is required to perform an inspection of the cable stays. Standard NBI forms don't address particular issues associated with cable stay systems. Due to this, Freyssinet provided a specific inspection & maintenance manual as part of their contract with Palmetto Bridge Consortium. The first warranty inspection was performed in October 2007; Freyssinet contracted with Advitam to computerize the inspection manual with ScanPrint software. The software was then used during the inspection.

This paper will describe the methodology used to accurately define inspection methods and processes; as well as, the computerized system used to increase the quality of collected data. Finally, the paper will focus on the benefit of electronic inspection manual to efficiently record and manage data.

Keywords: Cable-Stay, Computerized Inspection, Inspection Manual, Defects, ScanPrint, SCDOT, Advitam

1. Introduction

The Ravenel Bridge is a 4km cable stayed bridge which opened in July 2005. It connects downtown Charleston, SC to Mount Pleasant, SC. Freyssinet, LLC (FLLC), supplied and installed 128 parallel strand stay cables supporting the structure. The original contract included a warranty inspection every 2 years for 10 years after the bridge opening, the first inspection occurred in October 2007.

A main objective was to reduce time spent on the inspection process especially on report generation, Advitam's Inspection software: ScanPrint was used by FLLC for this purpose. Another important objective was to make the information easy to access and to further facilitate efficient and accurate inspections in the future.

ScanPrint was initially developed in 1999 for the Inspection and Maintenance management of the Vasco de Gama Bridge in Portugal. It is presently in use on many large cable stay bridges, large suspension bridges and several landmark structures.

2. Setting up the Inventory and the Inspection Manual

The first step of the project for Advitam was setting up the inventory of the bridge and computerizing the inspection manual.

The inventory is entered by breaking down the bridge into a tree view of components. The break

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down is made according to the bridge structural types and in a manner consistent with the way inspections are planned to be performed. This concept is fundamental to ScanPrint. Once the inventory has been entered, no additional data entry will be required for future inspection and only a few steps are necessary to start the next inspection.

After entering the inventory, the inspection manual can be computerized. For this type of unique structure, the standard NBI inspection forms or AASTHO components do not adequately address the particular issues associated to cable stayed systems. A more detailed and specific inspection manual is required. FLLC provided a recommended inspection & maintenance manual defined for the Ravenel Bridge, however, it was written at a high comprehensive level. Advitam worked with FLLC to simplify the questions given to the inspectors. Finally, lists of defects with attributes were entered.

3. Inspection Process

After brief training sessions off and on-site, each team of inspectors were given a Tablet PC loaded with ScanPrint software. They were also equipped with digital cameras and measuring tools. Following the inspection plan, the teams then visually inspected the bridge structure filling out the forms along the way; and if necessary drew defects and attached pictures directly on the Tablet PC.

At the end of each day, the teams performed two small tasks with ScanPrint: Unloaded pictures from the camera to the software this served a dual purpose. First, it allowed the pictures to be automatically linked with to defects and/or the forms. Second, it ensured the pictures were backed up everyday.

4. Report Generation

Once the on-site inspection was performed, the Tablet PC databases and files were merged together.

Advitam worked with FLLC to define the inspection report. Two report templates were implemented:

- Word report: Containing the information gathered on the field: AutoCAD drawings with the defects, defect information, inspection forms, results and pictures.
- Excel Report: Containing only the results of the inspection forms, it allows quick and easy comparison of results between elements

A draft report was first generated in November allowing SCDOT to send comments prior to issuing, the final report in December.

5. Lessons Learned

Following report generation, a brief follow-up with FLLC teams showed that:

- The optimal situation is to always have two inspectors per team. One entering the result on the tablet and the other one inspecting the element.
- The learning curve is a question often asked: The inspection interface for the inspector has been made as simple and efficient as possible. Consequently, after a day in the office, and a couple of hours on-site, inspectors are fully competent with the software.
- Even considering the setup associated with initial inspection, it was recognized by the inspection team that time saving was made especially during the report generation.

6. Conclusion

The Ravenel Bridge inspection proved to be a perfect project to use the ScanPrint software. The visual inspection of multiple similar elements makes the data even more relevant to compare to each other. Beside the time saved during the report generation, full value of the computerized inspection will be unveiled during the second inspection, and so on. More and more data will be entered, and therefore can be compared and analyzed; each cycle is adding more value to the database.