

USE OF POCKET GUIDES AND SMART PHONE APPLICATIONS IN BRIDGE PRESERVATION CONSTRUCTION

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INTRODUCTION

In this world of fast moving and accelerated construction, quality can suffer if those delegated with bridge construction inspection are not properly trained. Sometimes this training needs to happen quickly, possibly the same day construction takes place. Greenman-Pedersen, Inc. (GPI) was contracted by the Federal Highway Administration (FHWA) to develop a series of Pocket Guides on construction specific to bridge preservation. Guides developed to date include installation of Thin Polymer Overlays on bridge decks, removal and replacement of bridge coatings, installation of bridge expansion joints and bridge cleaning. The guides were developed as part of the FHWA Bridge Preservation Expert Task Group (BPETG) that features members from state department of transportation's, academia, industry and private consultants. The target audience for the pocket guides are construction inspectors, industry representatives, and resident engineers. A typical scenario would be where an inexperienced construction inspector is assigned a duty such as oversight of a thin overlay on a deck without prior expertise in that area. The pocket guide offers quick checklists and the "what is important" aspects of the installation. To further help the process, the guides were developed into a smart phone application whereby the inspector can access the checklists electronically, select those items completely by the contractor and email the report to their supervisory. This presentation/paper will illustrate the guides and how they can be effective tools in the field.

The history for the pocket guides can be traced back to the strategic plan for the BPETG. Funded by the FHWA, a major objective of the group is to inform bridge owners of best practices for preservation activities. One impediment to extending the service life of bridges through preventive maintenance activities is proper training of field and oversight personnel involved with the application, installation or construction of a preservation task. One example is the use of thin polymer overlays to extend the service life of a bridge deck. It is generally agreed that such an application can have significant effect on the life of a bridge deck if properly applied. Application can be performed by either in-house maintenance forces or a contractor. It is customary to have a service representative come up and provide on-the-job training to a crew, but there is not constant reinforcement and sometimes the "why" things are done are not properly reinforced. Bottom line is that training is needed in all shapes, forms and sizes in order to maintain the quality of the preservation activity.

AVAILABLE TRAINING

Training in Bridge Preservation construction activities does exist but is sometimes not well known or advertised. The National Highway Institute (NHI), the training arm of the FHWA, developed a bridge maintenance course 15 years ago and updated it in 2014 to include the most common bridge preservation activities. The update also included adult learning techniques instead of straight lecture which was a great improvement. As an example, participants as part of the four-day course develop a case study whereby a bridge must be investigated for the best repairs, rehabilitation and preservation strategies. This course is instructor led and is hosted by a bridge agency/owner with participants numbering from 20 to 30 in the classroom.

Many times, it is difficult for participants to attend an instructor led course, so web-based training has become popular. NHI has developed several web-based (WBT) courses that have direct application to bridge preservation. There is a 3-part course specifically focused on bridge preservation, specialty WBTs on preservation of movable bridges, masonry bridges, timber bridges and specialty repairs like the use of FRP in concrete bridge rehabilitation. Recently an AASHTO training group TC3 took Pocket Guides

developed by the BPETG and transformed them into WBTs. The 1-hour courses walk participants through the guides and provides more visuals like photos and complete narration.

WHY POCKET GUIDES

With all this training available why then pocket guides? The development thinking was that sometimes you might have to become knowledgeable in a short amount of time regarding a preservation subject or need a quick review. A potential scenario is an inexperienced construction inspector who is requested that day to inspect the installation of a bridge preservation action. The “pocket” refers to the size of the guide that can be printed out and fit into the pocket of the inspector. The guides were deliberately kept short and focused on best practices and avoiding construction mistakes that can doom the project from the start. The average length of the guides are 20 pages with multiple checklists with the hopes that within an hour out in the field the inspector can gain some limited but valuable knowledge. Each pocket guide contains links to other references so if needed more detailed information can be obtained.

Three pocket guides have currently been developed and posted on the AASHTO TSP2 website.
<https://www.tsp2.org/>

1. Thin-Polymer Bridge Deck Overlay Systems
2. Bridge Cleaning
3. Removal and Replacement of Bridge Coatings

Three additional pocket guides are currently under development

1. Bridge Deck Patching
2. Bridge Spot and Zone Painting
3. Bridge Concrete Substructure Repair

The initial pocket guide produced was one for application of thin-polymer bridge deck overlay systems. These systems are currently being used by many bridge agencies with good long-term results. However, the application of the overlay needs to have proper preparation. If the deck is not clean and dry the application will not bond with the existing concrete. The deck needs to be cleaned by sand or shot blasting to prepare the surface, but care must be taken not to disturb that initial layer of paste on the deck surface too much. Another critical aspect of the application is to have the deck in a state of saturated surface dry condition. Finally, use of too much or too little epoxy and/or aggregate can affect bond and slip resistance.

The bridge cleaning pocket guide provides practical tips on application of water or cleaning without the use of water. Although not covered in depth environmental controls are listed with links to other documentation. The pocket guide covering removal and replacement of bridge coatings was initially a comprehensive guide covering all aspects of bridge maintenance painting but was determined to be too long for the stated intention of a quick read. Two separate but complementary documents were therefore prepared. Bridge painting removal and replacement can be one of the costliest preservation measures applied to a bridge. As an example of the limited scope of the guides selection of paint type was not covered. It is assumed that decisions like that would be made long before the guide would be needed.

SMART PHONE APPLICATIONS

So why develop smart phone applications from the pocket guides? The answer lies with the BPETG and leader of the pocket guide group that theorized “Wouldn’t it be cool if the guides could be transformed into checklists that could be completed in the field and a report on the quality could be emailed directly from the field”. That idea took hold amongst the experts and development began thereafter. Since most inspectors use their phone for other documentation such as photos it made sense to be able to use one tool. The entire PDF of the Pocket Guides are contained in the app, but then the app transforms the guide into a series of subjects separated by work tasks. Users of the app can edit the checklists and add

notes to customize the tool for their specific project. At the user's discretion they can select the "email report" tab and send the report like a normally initiated new email.

SUMMARY

The BPETG Pocket Guides and Smart Phone Applications offer a valuable tool to those out in the field that are involved with the construction or installation of bridge preservation actions. If you have questions or would like more information, please contact Mr. Thorkildsen.