The "Bump at the End of the Bridge": Findings of Scan 19-01

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The objective of Scan 19-01 was to gather agencies' experiences with distresses observed on approaches to jointless bridges—the "bump at the end of the bridge." This article presents highlights of the scan and a few of the findings of the final report, *Leading Practices for Detailing Bridge Ends and Approach Pavements to Limit Distress and Deterioration*.[1]

What Is a Scan?

The Domestic Scan Program considers items of common interest to transportation agencies and facilitates the sharing of innovative practices. The program is funded through National Cooperative Highway Research Program (NCHRP) Project 20-68D. A scan team typically consists of eight to 12 members from the American Association of State Highway and Transportation Officials (AASHTO) member agencies and may include representatives from academia, the Federal Highway Administration (FHWA), industry, and other public organizations involved in the specific topic. The time allotted to carry out a scan is relatively short, about 12 to 15 months.

Scan 19-01

For Scan 19-01 the team consisted of representatives from five state departments of transportation (DOTs), one representative from FHWA, and a subject matter expert from academia. The team met in August 2019 to select the participating agencies and finalize the amplifying questions to pose to them. The participating DOTs were selected to include states with severe climates, active relevant research programs, unique design or retrofit procedures, a long history of integral pier use, and other criteria. **Figure 1** shows the states with members on the scan team and the participating DOTs.

The scan team studied the specific bridge components shown in **Fig. 2**. To collect and capture information on jointless bridges, amplifying questions were posed to the participating DOTs. The following is a sampling of the amplifying questions:

- How do you track system performance of jointless bridges?
- What details do you no longer use and why?
- Do you impose limits on span lengths or total bridge lengths for integral abutments?
- What is the approximate distribution (percentage) of your superstructures: steel, cast-in-place concrete, or precast concrete?
- What is your expansion joint detail on your approach slab-to-roadway pavement interface?
- Does your state design manual provide jointless bridge design guidance?
- Have you evaluated cost equivalency (for example, joint maintenance compared with a jointless bridge)?

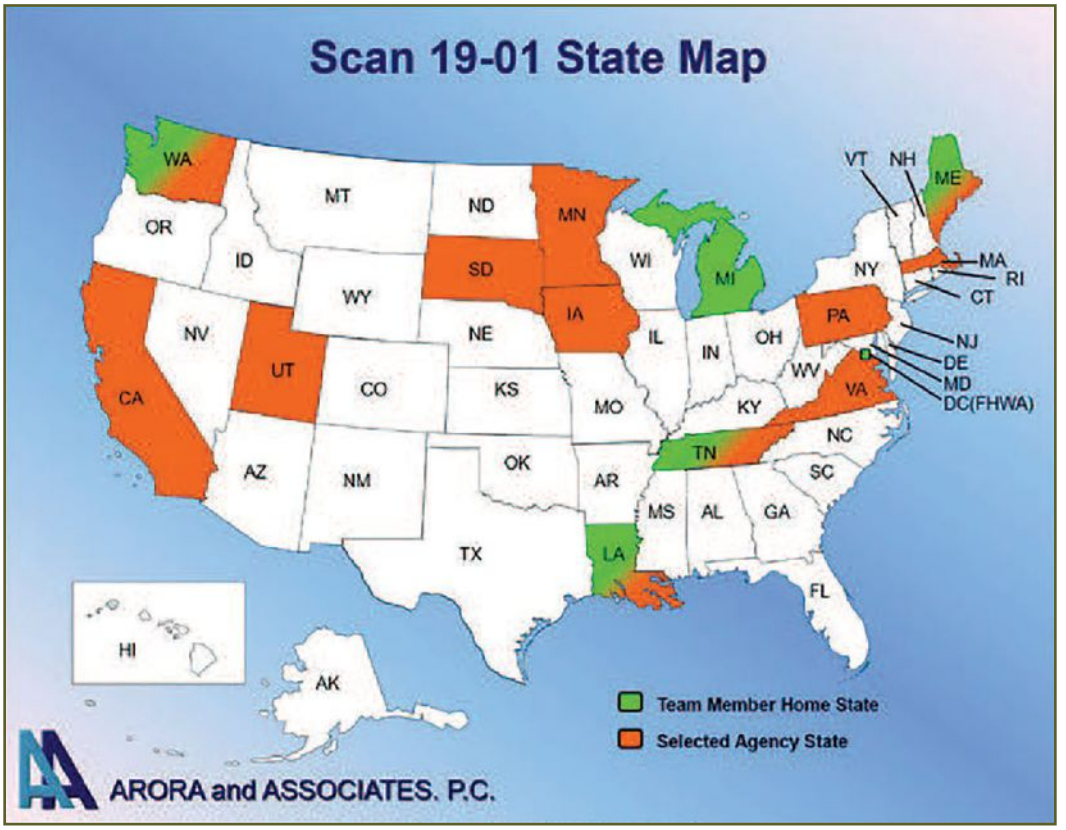

Figure 1. Map showing states with members on the scan team and states selected to participate in Scan 19-01. Source: DeRuyver et al., 2020.

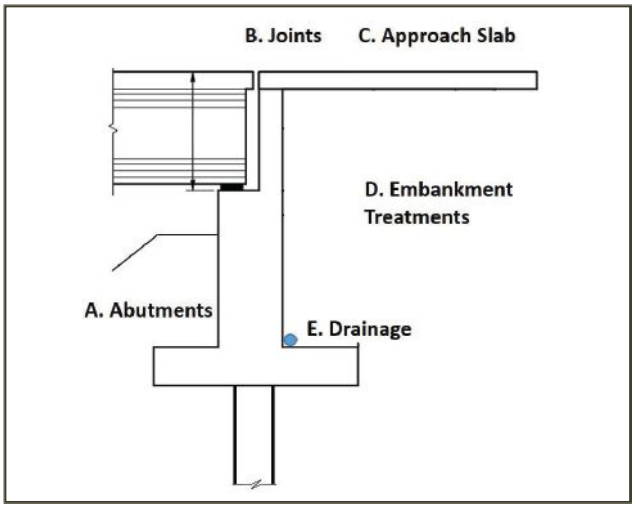

Figure 2. Fourteen departments of transportation shared practices and details related to five bridge components (labeled A–E in the diagram) in hopes of finding a solution to the "bump at the end of the bridge." Although no single remedy was found, *Leading Practices for Detailing Bridge Ends and Approach Pavements to Limit Distress and Deterioration*[1] provides notable findings, including lessons learned.

As can be seen from the questions, the scan addresses more than design details and practices. Construction, repair, inspection, and maintenance are also considered. The complete list of questions is located in an appendix of the report, and the responses are incorporated into the report.

In November 2019, the scan team and representatives from 12 of the 14 state agencies met to share details and lessons learned in bridge end design. Their primary aim was to share what has worked, what has not worked, and why. Each state was given two hours to present details used in their state and answer questions.

Following the presentations, the scan team concluded that given the varying conditions in each state, there is no one-size-fits-all solution to resolving the "bump at the end of the bridge." However, most of the participating states agreed that eliminating joints from the bridge deck and controlling and designing for effective drainage are crucial strategies for structure longevity. From the presentations and the abundance of information gathered, the scan team assembled findings, termed "notable practices of interest." The following are examples of these practices:

- Flowcharts or other tools for selecting appropriate abutment types
- Sample calculations for design of integral or semi-integral abutments
- Design and support of approach slabs
- Compaction methods and requirements for embankments

The scan also included sharing of state-sponsored research, information on cost equivalency analysis, and sustainability practices.

Summary

The Scan 19-01 report[1] is an impressive document that presents various states' practices and details used at the ends of bridges to achieve a jointless structure while minimizing structural distress, reducing maintenance and repair costs, and improving performance. The report is organized and well documented with state-specific details, practices, and lessons learned.

An important aspect of any scan is to disseminate the information collected. Jason DeRuyver, chair of the scan team, gave a presentation on the findings of Scan 19-01 at the AASHTO TSP2 Western/Midwest Bridge Preservation Partnership meeting in Phoenix, Ariz., in December 2021. It can be found on YouTube (https://www.youtube.com/watch?v=KaQl3GOdZno).

Reference

1. DeRuyver, J., D. Eaton, R. Garcia, B. Khaleghi, T. A. Kniazewycz, A. Lancaster, and J. Walsh. 2020. *Leading Practices for Detailing Bridge Ends and Approach Pavements to Limit Distress and Deterioration.* National Cooperative Highway Research Program Project 20-68D, Scan 19-01. Washington, DC: Transportation Research Board. https://onlinepubs.trb.org/Onlinepubs/nchrp/docs/SCAN19-01rev3.pdf.