Modern Inspection Practices for Culverts & Storm Drain Systems

REAL-WORLD NEED
When it was published in 1986, FHWA's Culvert Inspection Manual was the most comprehensive guide to inspecting and rating culverts, and it remains influential and valuable today. But in the three decades since the manual's publication, new practices and technologies have emerged, such as laser profilometry and plastic and fiberglass-reinforced culvert pipes. While many states have developed their own guidance incorporating these advances, there was a need to update the FHWA manual and create a central resource that captures the most up-to-date information on culvert and storm drain system inspection.

RESEARCH SOLUTION
NCHRP Project 14-26 developed the Culvert and Storm Drain System Inspection Manual, which updates practices described in the 1986 manual, introduces new practices and technologies, and includes a more precise condition rating system. The manual assists DOTs in incorporating culverts into modern asset management systems—a move that allows agencies to improve the way they prioritize rehabilitation activities and more clearly demonstrate the need for repair funding. The manual will also help agencies reduce costs and improve safety by addressing issues early, before they become severe.
About the Research

RESEARCH STRATEGY
Researchers first conducted a literature review to determine the state of the practice in culvert and storm drain system inspection. They identified topics that weren’t addressed in the 1986 manual, as well as practices that had changed significantly since the manual’s publication. They also collected more than 3,500 photographs illustrating specific culvert and storm drain system distress conditions, using cases from many state highway agencies and several foreign agencies. Researchers selected some of these photographs for inclusion in a comprehensive catalog that inspectors can use as they are assigning condition ratings to culverts and storm drains.

WHAT WE LEARNED
The 1986 FHWA manual established a 10-point condition rating system for culverts. This system was subjective, leading to inconsistencies in ratings between inspectors and inspections. The new manual establishes a 5-point rating system. Where the previous manual used imprecise descriptors, such as “mild” or “severe,” the new manual improves consistency by quantifying and illustrating ratings. The new manual also recommends inspection frequencies based on the culvert’s size and condition, qualifications for members of the inspection team, and procedures for the quality control and quality assurance of reported data.

WHY IT MATTERS
The new manual introduces element-level condition reporting, with inspection and rating procedures for 14 culvert or storm drain components. This new system will be more detailed and specific than the previous system, which assigned only an overall rating to a culvert. For example, the previous method might have assigned the same rating to a culvert with structural issues as to one with soil in its barrel, even though the two issues are unequal in severity and require different remedial actions. The AASHTO Subcommittee on Bridges and Structures (Technical Committee T13 on Culverts) is currently reviewing the new manual for publication as an AASHTO guide.

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The updated manual provides inspection procedures for a variety of technologies, including laser profilometry.