

Changing Bridge Terminology of the Federal-aid Highway Program



by Dr. Joseph L. Hartmann

The collapse of a span of the Interstate 5 Skagit River Bridge after being struck by an overheight load on May 23, 2013, resulted in a National Transportation Safety Board (NTSB) highway accident investigation. On site the next day, I helped the NTSB chairman prepare for a press conference on the incident and found myself once again explaining the language of the Federal-aid Highway Program, what the language meant, and, just as important, what it did not mean.

If you are a bridge engineer, you are likely to be familiar with the language of the program and, hopefully, understand its purpose and how to use it. To help the chairman prepare for the unavoidable questions that are always

asked after a bridge incident, I skipped the formal definitions and associated each of the bridge-specific terms with a characteristic of the bridge or program.

- *Structurally Deficient* (SD) refers to the condition of the bridge.
- *Functionally Obsolete* (FO) refers to the roadway geometry on the bridge.
- *Sufficiency Rating* (SR) refers to funding the bridge is eligible for.
- *Fracture Critical* (FC) refers to how a bridge is inspected.

After explaining each association with the chairman, I was very deliberate and careful to include a qualifier. This term (SD, FO, SR, or FC) does not mean a bridge is unsafe:

open bridges are safe, and unsafe bridges are closed. That last part might seem like an oversimplification to detail-oriented engineers, who would rather hear something like, “Open bridges are safe for all legal and unrestricted loads as long as vehicle operators self-enforce any bridge load-posting limits or similar operating restrictions,” but that statement just does not roll off the tongue as easily. Once the chairman was prepared, I left, thinking once again that a change in language was long past due.

In late 2013, I interviewed for the position I currently hold at the Federal Highway Administration (FHWA) as director of the Office of Bridges and Structures. During those interviews, I spoke of the need to change or eliminate federally instituted but sometimes confusing, unclear, misleading, and even alarming terms from the language of bridge engineers. Although this language has served the bridge community well for decades, I recognized that the common usage of these terms differ significantly from the technical definitions, and therefore they do not translate well outside the discipline. In early 2014, I was fortunate to be selected to serve as director and be given the authority to change the terminology.

Revising the language would not have been possible without the enactment of the Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012. MAP-21 reduced the number of core programs that fund the Federal-aid Highway Program from 17 to 4. In doing so, the need to determine the status of a bridge (SD, FO, or not deficient) or its SR to establish funding eligibility ended. Soon after MAP-21 became law, I started speaking within the FHWA about the possibility of making changes, and, in 2014, I raised the topic externally at the meeting of American Association of State Highway and Transportation Officials’ (AASHTO’s) Committee on Bridges and Structures (CBS), formerly known as SCOBs (Subcommittee on Bridges and Structures).

What was a SD bridge?

Before MAP-21, a highway bridge could have one of three status classifications: not deficient, FO, or SD. Bridges and bridge-sized



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culverts were classified SD if the condition was poor or worse (a condition rating of 4 or less for any component of the structure), or if they had an appraisal rating of 2 or less for structural evaluation or waterway adequacy, which are used to evaluate the level of service provided by a bridge compared to a bridge built to modern standards. Under the performance-based funding programs established by MAP-21 and its associated regulations, SD has been redefined, using the same criteria mentioned above, as **Poor** in a Good/Fair/Poor condition classification system, and, as a result, the SD term is no longer needed within the Federal-aid Highway Program.

What was an FO bridge?

An FO bridge or bridge-sized culvert was one that primarily did not meet current geometric design standards, such as lane width or number of lanes, relative to the current traffic volume carried by the bridge. An FO determination indicated an appraisal rating of 3 or less for deck geometry, underclearances, or approach roadway alignment, or an appraisal rating of 3 for structural evaluation or waterway adequacy of a bridge. Although the measure was well intentioned, the industry constructs FO bridges every year. These structures are typically built in urban settings where the lane and deck geometries must match what is on the servicing highway and both the highway and bridge are laterally or vertically constrained by other assets or natural features. In those situations, only the bridge, and not the highway, was classified as FO. Because the programmatic need to determine a FO classification is now obsolete and the classification serves no other constructive purpose, FO is no longer needed within the Federal-aid Highway Program.

What was the SR?

A bridge's SR (on a scale from 0 to 100) was determined by evaluating three components that relied on a total of 19 inventory and inspection items reported to the National Bridge Inventory:

- structural adequacy and safety;
- serviceability and functional obsolescence; and
- essentiality for public use.

Bridges with a SD or FO status and a SR of 80.0 or less but 50.0 or more were eligible for replacement or rehabilitation with federal funding, whereas those with a SR of 80.0 or less but more than 50.0 were eligible for rehabilitation with federal funding. As noted, because the programs that relied on a SR to determine eligibility have been eliminated, SR is now a legacy term that is no longer needed

within the Federal-aid Highway Program.

What is an FC bridge?

An FC bridge contains at least one fracture-critical member (a steel member in tension, or with a tension element whose failure would probably cause a portion of or the entire bridge to collapse). Once constructed, FC bridges are subject to more rigorous inspection procedures than non-FC bridges. This term will be with us a little while longer. However, FHWA is pursuing an update to the National Bridge Inspection Standards (NBIS) regulation and intends to replace this term with language that is more illustrative of the notion, yet less alarming to the public.

In short, SD, FO, and SR are no longer used within the Federal-aid Highway Program, and FC is likely to be phased out during the ongoing update to the NBIS. Overall bridge

condition is now classified using a scale of Good, Fair, or Poor. This is a transformational change, and FHWA recognizes that state departments of transportation (DOTs), AASHTO, and others still use the former terminology. Although it may take years to retire the outmoded terminology, FHWA has taken the lead to initiate that transition.

To reiterate, the terms SD, FO, SR, and FC do not directly reflect the safety of a bridge. Decades of success have proven that the National Bridge Inspection Program, as implemented by state DOTs through appropriate inspection and load rating and, where necessary, posting or restriction, is effective at ensuring that open bridges are safe and unsafe bridges are closed. I encourage you to join FHWA in embracing this change of language and helping institutionalize it throughout our bridge community. 