

Transportation Performance Management & Bridges

WSDOT sets TPM bridge performance targets

The Federal Highway Administration published in the Federal Register (82 FR 5886) a final rule establishing performance measures for State Departments of Transportation to use in managing pavement and bridge performance on the National Highway System. The National Performance Management Measures; Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program Final Rule addresses requirements established by Transportation Performance Management (formerly Moving Ahead for Progress in the 21st Century) and reflects passage of the Fixing America’s Surface Transportation Act. The rule was effective May 20, 2017.

Targets established May 20, 2018

WSDOT has been proactive in working with Metropolitan Planning Organizations and local agencies (such as cities and counties) with regard to the implementation of federal pavement performance measures for the NHS. Collaborative efforts to establish targets by May 20, 2018, included meetings with all MPO directors and WSDOT representatives; responsible for helping make policy, process, data and advisory target setting decisions as well as in-depth discussions between subject matter experts; responsible for better understanding final federal rule requirements and their implications.

FHWA has set the upper limit for the percentage of all NHS bridges classified in poor condition at 10%. Based on analysis and past trends, 10% is the recommended target. The FHWA did not set a limit for the percentage of NHS bridges classified as being in good condition; it is recommended to adopt a target of 30% based on a thorough review of current bridge conditions (see chart below).

The condition of individual bridge elements (deck, superstructure, substructure), and culverts (which are measured separately), are rated using a classification method from the National Bridge Inventory and the Highway Bridge Program. This classification method assigns the elements and culverts condition ratings ranging from 0 to 8 where 7 or greater = good; 5-6 = fair; and 4 or less = poor.

For TPM, bridges in good condition have all three elements (deck, superstructure, substructure) rated as 7 or higher; bridges in fair condition meet the minimum threshold of 5 or higher; and poor bridges have any of the elements rated as 4 or lower (see p. 2).

The percentage of the total NHS bridge deck area for each classification (good, fair, poor) is calculated as the ratio of the total deck area of NHS bridges in a classification to the total deck area of NHS bridges in the state. The bridge deck condition of a shoulder on a bridge is included in the overall condition rating; it is not tracked or rated for active transportation use separate from the overall bridge deck condition. Sidewalk elements are defined and condition rated but these data are not reported here.

A separate requirement determined by FHWA is that the percent of NHS bridges in poor condition cannot exceed 10%. This performance criterion is a special requirement mandated by Congress, and is the only bridge performance measure that results in a funding penalty if it is not met. The penalty requires the State to obligate a specified percentage of its National Highway Performance Program funds to correct the NHS bridge conditions until the minimum threshold is met (see p. 4 for more details).

MAP-21 performance measures by program area		Current data	2-year target ¹	4-year target ¹	Penalty if not met
Bridges (PM2)	23 CFR Part 490 ID No. 2125-AF53				
Percent of NHS bridges classified in poor condition (weighted by deck area)		7.0%	<10%	<10%	Yes
Percent of NHS bridges classified in good condition (weighted by deck area)		33.4%	>30%	>30%	No

Notes: Federal rule allows state and MPOs to adjust four-year targets during the mid-performance progress report. ¹ Two-year and four-year target periods for PM2 end October 1, 2020, and October 1, 2022. WSDOT did not adjust its targets during the mid-performance progress report.

How bridge conditions are assessed

TPM rules state that bridge condition be determined based on an assessment of the deck, superstructure and substructure. Culverts are also included and are only rated based on one item.

The method for classification would be the same method currently used under the Highway Bridge Program, as shown in the table below.

National Bridge Inventory condition rating thresholds for National Highway System bridges

	8 - 7 Good	6 - 5 Fair	4 - 3 - 2 - 1 - 0 Poor
Deck	≥ 7	5 or 6	≤ 4
Superstructure	≥ 7	5 or 6	≤ 4
Substructure	≥ 7	5 or 6	≤ 4
Culvert	≥ 7	5 or 6	≤ 4

Data source: Federal Highway Administration.

National Highway System bridge conditions

Washington's National Highway System includes 2,578 bridges, 91.6 percent (2,361) of which are managed by WSDOT. The remaining 8.4 percent (217 bridges) are owned and managed by local agencies.

As of June 2021, 3.6 million square feet of the deck area of NHS bridges were in poor condition statewide (see table below). WSDOT-owned bridges made up 3.3 million square feet of this while locally-owned bridges comprised 0.4 million. In total, it amounts to 7.0% of the NHS system.

Condition ratings for bridges on the National Highway System

As of June 2021; Deck area in millions of square feet

	Deck area	Number of bridges
WSDOT-owned	47.7	2,361
Amount poor (%)	3.3 (6.8%)	111
Locally-owned	4.1	217
Amount poor (%)	0.4 (8.2%)	16
Total	51.8	2,578
Amount poor (%)	3.6 (7.0%)	127

Data source: WSDOT Bridge & Structures Office.

Notes: For locally-owned bridges, poor also includes load-restricted bridges, even if those bridges are in fair or better condition. Locally-owned refers to bridges owned by cities and counties.

Bridge condition assessments based on minimum values

The FHWA states that for each applicable bridge, the performance measures for determining condition be based on the minimum values for deck, superstructure, substructure and culverts. The FHWA and TPM process

weights this condition by the respective deck area of each bridge and express condition totals as a percentage of the total deck area of bridges in a state. This method for calculating bridge condition is illustrated below.

Calculating NHS bridge condition performance measures

Overall bridge condition rating	Structure Type		Measures
	Bridges	Culverts	
Good	3 metric classification (Deck, Superstructure, Substructure) All metrics rated "good"	1 metric classification (Culverts) Metric rated "good"	Percentage of deck area classified in good condition
Poor	One or more metrics rated "poor"	Metric rated "poor"	Percentage of deck area classified in poor condition
Fair	Minimum rated metric "fair"	Metric rated "fair"	

Data source: Federal Highway Administration.

The percentage of total NHS bridge deck area for each classification (good, fair and poor) would be calculated as the ratio of the total deck area of NHS bridges in a classification to the total deck area of NHS bridges in the state:

$$\% \text{ of NHS bridges in good condition} = 100.0 \times \frac{\text{Total deck area of NHS bridges in good condition}}{\text{Total deck area of NHS bridges in a state}}$$

$$\% \text{ of NHS bridges in poor condition} = 100.0 \times \frac{\text{Total deck area of NHS bridges in poor condition}}{\text{Total deck area of NHS bridges in a state}}$$

Reporting on National Highway System bridge conditions

For the Mid-Performance Period Report, states collected annual condition data of the superstructure, substructure, deck area and culverts for the National Bridge Inventory from 2016-2017. The Full Performance Period Report included NBI data from 2018-2019.

The FHWA requires that state DOTs coordinate with all relevant bridge owners, such as federal agencies that own NHS bridges and other state DOTs that share NHS bridges that cross state borders, in order to meet the requirements and to ensure consistency. This differs from certain established requirements of the National Bridge Inspection Standards (NBIS), such as the NBI data submittal process under which states are not responsible for federally- or tribally-owned bridges.

The FHWA makes minimum condition level determinations annually based on data finalized in the NBI as of June 15. The FHWA requires that state DOTs submit their most current NBI data on highway bridges to FHWA no later than March 15 annually. State DOTs have 90 days after submitting their inventory to the NBI to conduct data checks to ensure quality and completeness. The FHWA then makes its compliance determination and notifies all state DOTs of its findings prior to October 1 of the year in which the determination was made.

Reports are structured by a 4-year reporting cycle, with midpoint (2-year) reports. WSDOT has already submitted its Baseline Performance and its Mid-Performance Period reports to FHWA. In October 2022, WSDOT will submit its Full Performance Period Progress Report, which includes the same content as the Mid Performance Period Progress Report, (conditions and performance, investment strategy effectiveness and discuss progress in achieving targets) but reports on the 4-year targets. If a state has not made significant progress toward achieving the NHPP targets in two consecutive biennial determinations, then the

state DOT must include a description of the actions they will undertake to better achieve the targets in the next performance period.

As part of the Full Performance Period Progress Report, MPOs will report targets and progress toward the achievement of targets. They will report their established targets, performance, progress, and achievement of the targets to their respective state DOT in a manner that is agreed upon by both parties and documented in the Metropolitan Planning Agreement

Minimum condition level requirements

As a minimum condition level, TPM establishes a threshold of no more than 10 percent of NHS bridges measured by deck area being classified as being in poor condition. A bridge in poor condition is deteriorated structurally, as indicated by a superstructure, deck, and/or substructure rating of four or less, or when the appraisal ratings for structural evaluation or waterway adequacy are two or less, on a scale of zero to eight. Except for structural evaluation or waterway adequacy, WSDOT's poor condition category uses the same data, criteria, and rating scale as that required for TPM (see *Gray Notebook* 84). The minimum condition level is applicable to bridges on the NHS, to bridges on ramps connecting to the NHS within a state, and to bridges on the NHS that cross a state border.

TPM's legislation requires the FHWA's National Bridge Inventory (NBI) be the source of data for classifying a bridge as being in poor condition. Currently, the NBI is the primary source for national bridge information and has been used for many years to classify bridges in poor condition, determine eligibility for the Highway Bridge Program, and apportioned federal-aid funds.



The Stillaguamish Bridge in Snohomish County shown before and after steel painting work was completed in 2021.

Bridge data collection for MAP-21

WSDOT is required to report data to FHWA annually on the condition, functional adequacy and essentiality for the public for all bridges statewide. The bridge data determines sufficiency ratings and if a bridge is in poor condition and/or functionally obsolete. Functionally obsolete bridges are older structures that do not meet the current standards (e.g. lane widths).

The good, fair, and poor classification of bridges on the NHS utilizes data elements from the NBI database. State DOTs measure and classify a number of standard features for bridges (such as condition and geometric information) in their jurisdiction, which they are required to report to FHWA on an annual basis. These requirements include bridges' on-ramps connecting to the NHS.

Penalties

In order to avoid a penalty, states must meet this minimum condition level: National Highway System (NHS) bridges not to exceed 10 percent structurally deficient, by deck area.

If a state does not meet the minimum condition for three consecutive years, a funding penalty will apply during the following fiscal year and each year thereafter until it is in compliance. The state must obligate and set aside an amount to 50 percent of the apportionment for the Highway Bridge Program in fiscal year 2009, from the NHPP apportionment, only for projects on NHS bridges.

Available Data

- Bridge condition assessment per the National Bridge Inventory rating system of bridge deck, superstructure, substructure, and/or culverts for all federally reportable state and local bridges. Data is available for county and city levels and can be provided by the MPO boundaries.

Purpose of reporting requirements

In July 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) became law. Included in the law was a Declaration of Policy: "Performance management will transform the Federal-aid highway program and provide a means to the most efficient investment of Federal transportation funds . . ."

The primary objectives of MAP-21 are to increase the transparency and accountability of states for their investment of federal taxpayer dollars into transportation infrastructure and services nationwide, and to ensure that states invest money in transportation projects that collectively make progress toward the achievement of national goals. The new rules will require reporting performance on the following areas: Safety; Pavement and Bridge; System Performance/Congestion; Freight, and Congestion Mitigation and Air Quality (CMAQ).

Prior to MAP-21, there were no explicit requirements to demonstrate how transportation programs supported national performance outcomes. But many state DOTs, like WSDOT, have engaged in voluntary accountability and reporting efforts.

For more information

State bridge condition information: Sonia Lowry, WSDOT Bridge Engineer, at LowryS@wsdot.wa.gov.

Local bridge condition information: Evan Grimm, WSDOT Bridge Preservation Engineer, at GrimmE@wsdot.wa.gov.

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