

PAVEMENT AND BRIDGE CONDITION

Performance-Based Planning and Programming

July 2018



National Capital Region
Transportation Planning Board

PAVEMENT AND BRIDGE CONDITION: PERFORMANCE-BASED PLANNING AND PROGRAMMING

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The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

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PAVEMENT AND BRIDGE CONDITION

This report provides an overview of the performance measures concerning the condition of bridges and pavements within the National Capital Region Transportation Planning area. This information will be useful for determining performance targets and coordinating with the Departments of Transportation of the states of Maryland, Virginia, and the District of Columbia, as required by MAP-21. 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 the Moving Ahead for Progress in the 21st Century Act (MAP-21) and reflects passage of the Fixing America's Surface Transportation (FAST) Act. The rule became effective on May 20, 2017, with one year for implementation.

Overview of Performance-Based Planning and Programming Requirements

Under the Moving Ahead for Progress in the 21st Century Act (MAP-21) and reinforced in the Fixing America's Surface Transportation (FAST) Act, federal surface transportation regulations require the implementation of performance management requirements through which states and MPOs will “transition to a performance-driven, outcome-based program that provides for a greater level of transparency and accountability, improved project decision-making, and more efficient investment of federal transportation funds.”

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) have been gradually issuing a set of rulemakings, initially proposed and subsequently final, for the implementation of this performance-based planning and programming (PBPP) process. Each rulemaking lays out the goals of performance for an area of transportation, establishes the measures for evaluating performance, specifies the data to be used to calculate the measures, and then sets requirements for the setting of targets.

Under the PBPP process, states, MPOs, and providers of public transportation must link investment priorities to the achievement of performance targets in the following areas:

- Highway Safety;
- Highway Assets: Pavement and Bridge Condition;
- System Performance (Interstate and National Highway System, Freight Movement on the Interstate System, and the Congestion Mitigation and Air Quality Improvement Program); and
- Transit Safety and Transit Asset Management.

The final Statewide and Metropolitan Planning Rule, published May 27, 2016, provides direction and guidance on requirements for implementation of PBPP, including specified measures and data sources, forecasting performance, target-setting, documentation in the statewide and metropolitan long-range transportation plans and Transportation Improvement Programs (TIPs), and reporting requirements. The PBPP process requires coordination and agreement on specific responsibilities for each agency in accordance with the planning rule.

Pavement and Bridge Condition Performance Measures

The Pavement and Bridge Condition Performance Measures final rule, published in the Federal Register on January 18, 2017, establishes measures for State DOTs to assess the condition of pavements on the non-Interstate NHS (National Highway System); pavements on the Interstate System (IS); and bridges carrying the NHS, including on- and off-ramps connected to the NHS. Targets must be set for six particular areas; 1) Percent of pavements on the Interstate System in good condition, 2) Percent of pavements on the IS in poor condition, 3) Percent of pavements on the NHS in good condition, 4) Percent of pavements on the NHS in poor condition, 5) Percentage of NHS bridge deck classified in good condition, 6) Percentage of NHS bridge deck classified in poor condition.

Data for these performance measures are available through databases overseen by the Federal Highway Administration, the Highway Performance Monitoring System (HPMS) and the National Bridge Inventory (NBI). State departments of transportation have the responsibility to report data to HPMS and NBI annually.

Table 1: Summary of Pavement and Bridge Performance Measures

| | Performance Measures |
|-----------|--|
| Pavements | Percent of pavements on the IS in good condition |
| | Percent of pavements on the IS in poor condition |
| | Percent of pavements on the NHS in good condition |
| | Percent of pavements on the NHS in poor condition |
| Bridges | Percentage of NHS bridge deck classified in good condition |
| | Percentage of NHS bridge deck classified in poor condition |

In terms of calculating the metrics for this measure (pavement) the HPMS database includes the data for calculating good and poor metrics and the measures. Considerations include the roughness, cracking, and rutting for asphalt pavement and faulting for concrete pavement. The measures are aggregated by lane miles. In addition, HPMS pavement data collection requirements have been revised to require more comprehensive collection of data for the NHS routes.

For the bridge condition performance measures, the measures are calculated based on deck area and a classification of the bridge structure condition. The classification is based on NBI condition ratings for the Deck, Superstructure, Substructure, and Culvert. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as good; if is less than or equal to 4, the classification is poor. (Bridges rated below 7 but above 4 will be classified as fair; there is no related performance measure.) Deck area is computed using NBI criteria of Structure Length, Deck Width or Approach Roadway Width (for some culverts).

STATE DOT AND MPO TARGET SETTING AND REPORTING RESPONSIBILITIES

Pavement

State DOTs must establish targets, regardless of ownership, for the full extent of the Interstate and non-Interstate NHS. These must be statewide two and four-year targets for the non-Interstate NHS and four-year targets for the Interstate by May 20, 2018. Targets must subsequently be reported to FHWA by October 1, 2018. MPOs can either support the relevant state DOTs four-year target or establish their own by 180 days after the state DOT's target are established.

Bridges

State DOTs must establish targets for all bridges carrying the NHS, which includes on- and off-ramps connected to the NHS within a State, and bridges carrying the NHS that cross a State border, regardless of ownership. These must be statewide two and four-year targets by May 20, 2018, with subsequent reporting to FHWA by October 1, 2018. As with the pavement performance measures, MPOs can either support the relevant state DOT(s) four-year target or establish their own by 180 days after the State DOT's target are established.

Penalties

If FHWA determines that a state DOT's Interstate pavement condition falls below the minimum level for the most recent year, the state DOT must obligate a portion of National Highway Performance Program (NHPP) and transfer a portion of Surface Transportation Program (STP) funds to address Interstate pavement condition. If for three consecutive years more than 10.0% of a state DOT's NHS bridges' total deck area is classified as Structurally Deficient, the state DOT must obligate and set aside National Highway Performance Program (NHPP) funds for eligible projects on bridges on the NHS.

DISTRICT OF COLUMBIA

Tables 2 and 3 below are the established performance measures for both pavement and bridge conditions in the District of Columbia. Targets were established by use of historical data, future programmed projects, and future budgets appropriated to maintain pavement in a state of good repair. It should be noted that for the District of Columbia, it has a number of bridges that are not maintained by DDOT, but rather by the National Park Services (NPS). Regardless of this, those NPS bridges, i.e. The Memorial Bridge, are calculated into the overall bridge condition in the District Columbia.

Table 2: District of Columbia Summary of Pavement Condition Performance Measure Targets

| Interstate | CY 2018 – 2020 Two Year Target | CY 2018 – 2022 Four Year Target |
|----------------------|-----------------------------------|------------------------------------|
| Percent Good | 10% | 5% |
| Percent Poor | 5% | 5% |
| NHS (Non-Interstate) | CY 2018 – 2020 Two Year Target | CY 2018 – 2022 Four Year Target |
| Percent Good | 67% | 54% |
| Percent Poor | 7.1% | 14.1% |

Table 3: District of Columbia Summary of Bridge Condition Performance Measure Targets

| Bridges | CY 2018 – 2020 Two Year Target | CY 2018 – 2022 Four Year Target |
|----------------|-----------------------------------|------------------------------------|
| Deck Area Good | 15.8% | 24.9% |
| Deck Area Poor | 8.6% | 4.1% |

MARYLAND

Tables 4 and 5 below are the established performance measures for both pavement and bridge conditions in the portion of Interstate and Non-Interstate roadways within the TPB planning area for the state of Maryland. Targets were established by use of historical data, future programmed projects, and future budgets appropriated to maintain pavement in a state of good repair.

Table 4: Maryland Summary of Pavement Condition Performance Measure Targets

| Interstate | CY 2016 – 2018 Two Year Target | CY 2016 – 2020 Four Year Target |
|----------------------|-----------------------------------|------------------------------------|
| Percent Good | Not Required | 62.8% |
| Percent Poor | Not Required | 0.3% |
| NHS (Non-Interstate) | CY 2016 – 2018 Two Year Target | CY 2016 – 2020 Four Year Target |
| Percent Good | 32.4% | 31.6% |
| Percent Poor | 6.5% | 7.2% |

Table 5: Maryland Summary of Bridge Condition Performance Measure Targets

| Bridges | CY 2018 – 2019 Two Year Target | CY 2018 – 2021 Four Year Target |
|----------------|-----------------------------------|------------------------------------|
| Deck Area Good | 29.5% | 27% |
| Deck Area Poor | 2% | 5% |

VIRGINIA

Tables 6 and 7 below are the established performance measures for both pavement and bridge conditions for the state of Virginia. It was determined through coordination between TPB staff and Virginia DOT staff that determining a regional forecasted target, similar to the case in Maryland, was not feasible. Statewide targets were established by use of historical data, future programmed projects, and future budgets appropriated to maintain pavement in a state of good repair.

Table 6: Virginia Summary of Pavement Condition Performance Measure Targets

| Interstate | CY 2018 – 2019 Two Year Target | CY 2018 – 2021 Four Year Target |
|----------------------|-----------------------------------|------------------------------------|
| Percent Good | 45% | 45% |
| Percent Poor | <3% | <3% |
| NHS (Non-Interstate) | CY 2018 – 2019 Two Year Target | CY 2018 – 2021 Four Year Target |
| Percent Good | 25% | 25% |
| Percent Poor | <5% | <5% |

Table 7: Virginia Summary of Bridge Condition Performance Measure Targets

| Bridges | CY 2018 – 2019 Two Year Target | CY 2018 – 2021 Four Year Target |
|----------------|-----------------------------------|------------------------------------|
| Deck Area Good | 33.5% | 33% |
| Deck Area Poor | 3.5% | 3% |

TPB Regional Pavement and Bridge Targets

Concerning the Pavement and Bridge Performance Measures, MPOs have two options. The first being to support the statewide targets established by the state DOTs. The second option is for the MPO to establish their own quantifiable four-year targets for both measures. In this case the TPB chose the latter option. The coordination for the establishment of these targets was highly dependent on the information provided by the states as well as information obtained from the Highway Performance Monitoring System (HPMS) and the National Bridge Inventory (NBI).

PAVEMENT

In deciding a forecasted four-year target for pavement condition for the TPB planning area, initially data was obtained and analyzed for the HPMS database using the field manual inventory, which contains metrics for rutting, faulting, cracking, and international roughness index (IRI). Next, TPB staff were able to calculate the number of lane miles within the planning area for the District of Columbia, Maryland, and Virginia. Table 8 gives the lane mileage for each state or part of the state, as well as the regional total number of lane miles in the TPB region. Finally, the statewide targets, for the District of Columbia and Virginia were applied to their respective lane miles within the TPB region. For the state of Maryland, forecasted targets for the portion of the state in the TPB planning area were provided and applied to the lane miles. Table 9 gives the regional pavement condition four-year target calculated by adding up the respective result for each state.

Table 8: Summary of Regional Lane Miles for Interstate and Non-Interstate Roadways

| | Interstate Lane Miles | Non-Interstate Lane Miles |
|---------------|-----------------------|---------------------------|
| DC | 55.2 | 464.4 |
| MD* | 853.6 | 2272.4 |
| VA* | 767.2 | 1897.4 |
| Region | 1676.0 | 4634.2 |

*Sub-Region

Table 9: Regional Performance Measure Targets for Pavement Condition

| Interstate | CY 2018 – 2021 Four Year Target |
|---|---------------------------------|
| (1) Percentage of pavements on the Interstate System in Good condition | 52.7% |
| (2) Percentage of pavements on the Interstate System in Poor condition | 1.7% |
| NHS (Non-Interstate) | CY 2018 – 2021 Four Year Target |
| (3) Percentage of pavements on the NHS (excl. Interstate) in Good condition | 31.1% |
| (4) Percentage of pavements on the NHS (excl. Interstate) in Poor condition | 7.0% |

Graphical summaries of recent pavement condition performance and the four-year targets are provided in Figure 1 for the Interstate and in Figure 2 for the non-Interstate NHS.

Figure 1: Regional Interstate Performance Targets

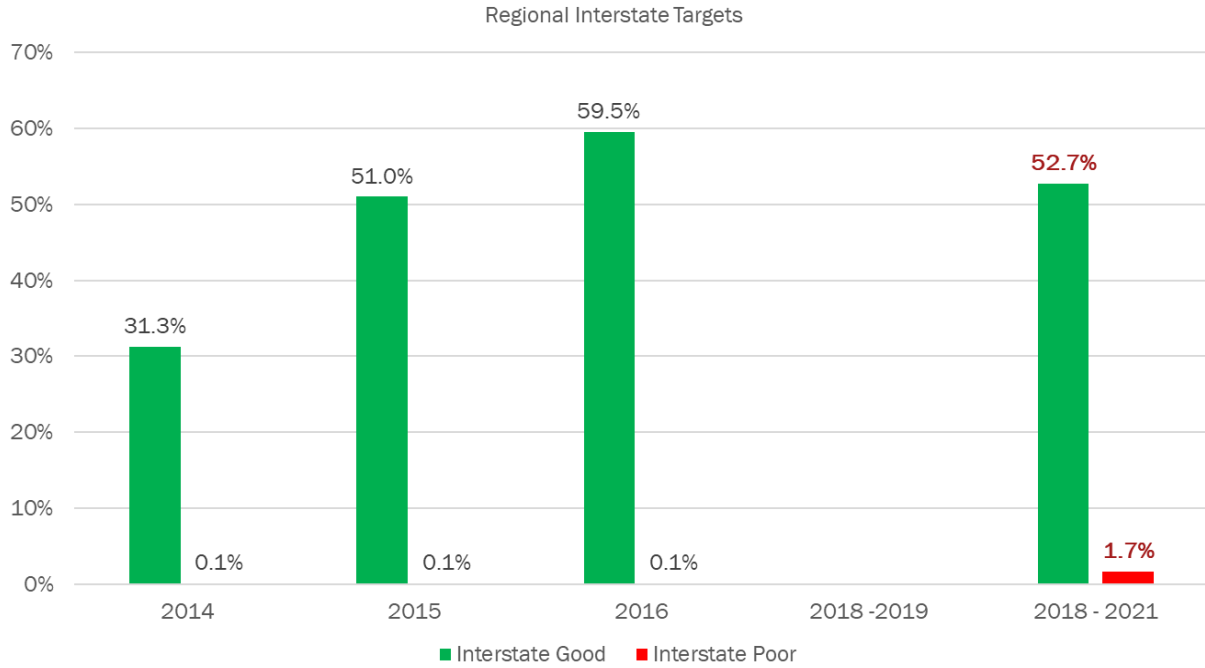
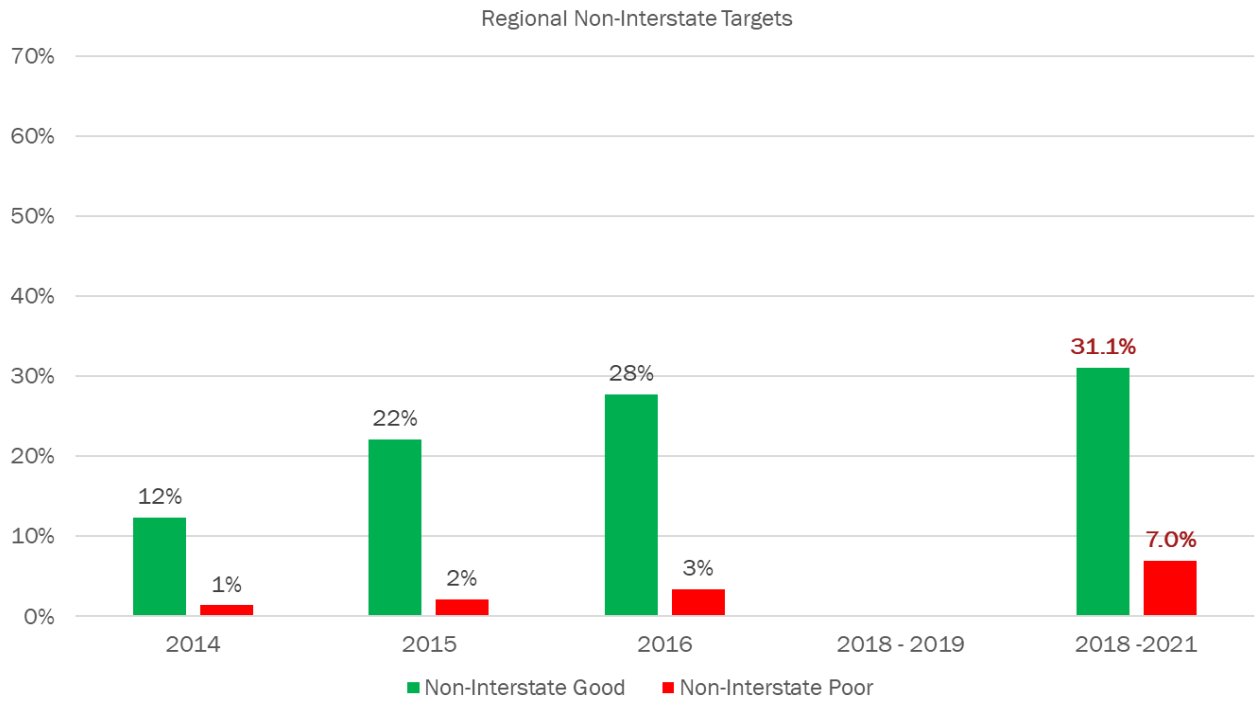


Figure 2: Regional Non-Interstate Performance Targets



BRIDGES

In terms of forecasting the four-year performance measure for the bridge condition within the TPB region, a similar methodology, to that of pavement, was also used. TPB staff collected data from the NBI, analyzing the condition of the surface area as the applicable metric. Next, the deck areas of bridges within the District of Columbia and the portions of Maryland and Virginia that are within the TPB planning area was calculated. Table 12 provides a breakdown of the surface areas of bridges within the TPB planning area. Finally, the statewide targets were applied to the respective deck areas and the four-year target for the region was calculated. The resulting targets are shown below in Table 13.

Table 12: Summary of Regional Deck Area for Bridges

| State | Deck Area (square feet) |
|--------|-------------------------|
| DC | 4,931,177 |
| MD* | 9,846,949 |
| VA* | 12,691,104 |
| Region | 27,469,229 |

Table 13: Regional Performance Measure Targets for Bridge Condition

| Bridges | CY 2018 – 2021 Four-Year Target |
|---|------------------------------------|
| (5) Percentage of NHS Bridges Classified as in Good Condition | 29.4% |
| (6) Percentage of NHS Bridges Classified as in Poor Condition | 3.9% |

A graphical summary of recent performance and the four-year targets is provided in Figure 3.

Figure 3: Regional Bridge Performance Targets

