MAP-21 Target-Setting Exercise

Background Resources

Document Overview

This document is designed to support the AASHTO SCOPM MAP-21 Target-Setting exercise. It includes material specific to the Pavement Condition performance area. It presents targeted excerpts from documents that have already been developed through previous Task Force activities. This documents also contains selected information from research conducted through NCHRP 20-24(37) Comparative Performance Measurement series. The appendix contains a brief Pavement Condition Performance Measure Factsheet produced through a previous effort of the SCOPM Task Force.

This document is organized into three sections:

1. **General Target-Setting Recommendations**
   SCOPM Task Force Findings on MAP-21 Performance Measure Target-Setting (3/13)
2. **Pavement Condition Performance Area Recommendations**
   SCOPM Task Force Findings on MAP-21 Performance Measure Target-Setting (3/13)
   SCOPM Task Force Findings on National-Level Performance Measures (11/12)
   SCOPM Task Force Workshop on National Performance Measures Background Paper (9/12)
3. **Appendix**
   Performance Measure Factsheet

Additional information is available at the Target-Setting Exercise website:
http://sites.spypondpartners.com/targetsetting/pavement

1. General Target-Setting Recommendations

1.1. Target-Setting Overview

The findings on of the SCOPM Task Force with regard to MAP-21 target-setting requirements included in this document are based on the following interpretation of the related MAP-21 target-setting requirements:

- A set of standard, consistent national performance measures will be established, but states will have flexibility to establish the target values of those measures. Thus, the term "consistent" applies to the performance measures, data methodologies (collection, processing and analysis), and performance reporting processes. There is no presumption that targets will be consistent across states – rather they will be specific to local conditions and needs and at set at the discretion of DOTs and MPOs.
- States must submit biennial reports on progress toward target achievement for each national measure.
- For the Highway Safety Improvement Program, states that have not made significant progress towards meeting established targets face reductions in funding flexibility and additional reporting requirements.
- For the National Highway Performance Program (NHPP), states that do not make significant progress towards meeting their established targets for asset condition or performance must report actions that they will undertake to achieve the targets.

1.2. Target-Setting Findings and Recommendations

The findings of the SCOPM Task Force with regard to target-setting center around three general findings and eleven recommendations.

1.2.1. General Findings

- **First**, State DOTs request maximum flexibility when setting performance targets. Every state and municipality faces different constraints and opportunities affecting their transportation system. Funding levels and sources vary, as do environmental conditions, population growth trends, and legislative and gubernatorial mandates and priorities. Flexibility in target-setting allows states and municipalities to face the realities of their unique situations. Furthermore, accountability should be based on what states can accomplish with their shares of federal funding.
- **Second**, consistent with the National-Level Guiding Principle #2 (see page 3), *Specificity and Simplicity*, MAP-21 rulemaking should encourage States DOTs to adopt performance targets that are attainable and realistic. These targets should be periodically reevaluated and adjusted

to reflect risks, revenue expectations, and strategic priorities. In addition, the State DOTs agree that consistent data collection and analysis methods are essential to ensure that national-level measures and reporting use comparable data.

- **Third**, in keeping with National-Level Guiding Principle #3 (see page 3), *Possession is 9/10ths of the Law*, the establishment of performance targets can provide a focal point for action and a basis for accountability. However, it is important to recognize that for several of the national-level performance measures, State DOTs have relatively limited control over outcomes. There are many externalities that could affect a State DOT attaining certain performance targets from economic to social forces. For example, the effect of background changes in traffic related to economic conditions can overwhelm any deliberate actions on the part of a state to improve safety or reduce traffic delay. Generally speaking, State DOTs have more control over achieving targets related to asset condition and less control over performance measures associated with safety and system performance.

1.2.2. Specific Recommendations

The following are specific recommendations of the SCOPM Task Force that should be considered in drafting specific rules for implementation of the target-setting provisions of MAP-21:

Provide maximum flexibility

- Regional, local, or other targets are to be established by states or MPOs as appropriate when necessary. Baseline conditions may vary significantly state-to-state and region-to-region.
- Many factors, such as population growth and environmental conditions affect performance outcomes for metrics like congestion and pavement. Therefore, maximum flexibility is required for target-setting.

Focus on what matters – the right outcome

- Target-setting should not focus on a single target value for a performance measure but on achieving improved performance over time.
- States and MPOs often have to make priority decisions based on customer and stakeholder requirements. Each state and MPO must consider these requirements – which will vary from state to state – within its target-setting process.
- The value of performance management is found in better decision-making, not target achievement. DOTs support the idea of allowing states to establish ranges of acceptable performance outcomes. Use of ranges can provide DOTs with a more nuanced way of discussing performance outcomes across multiple competing objectives.

Align targets with system ownership and funding levels

- Targets set for federal performance measures should be aligned with federal funding levels as state DOTs and local partners may or may not have multiple funding sources in addition to federal funds.
- Diverting state funds to meet federal requirements may not be an option. State funding is typically used to match federal funds and allocated to meet state obligations and priorities set by state government such as non-federal-aid eligible maintenance activities.

Base target-setting on longer term trend data

- Targets cannot be set in isolation of solid baseline and reliable, quality, multi-year trend data.
- The expansion of the NHS in MAP-21 has provided challenges as baseline and multi-year data may not be available for the full NHS system.
- Long term viewpoints and multi-year efforts should be considered in target-setting; one data point should not be used to evaluate a program.

Coordinate target-setting through a continuing, cooperative, and comprehensive process

- The development of state, MPO and transit provider targets should be coordinated through a 3C (continuing, cooperative and comprehensive) planning process. This process should result in MPO targets that are attainable given the level of investment a DOT plans to make in a metropolitan planning area (MPA) over a particular time-horizon. Whenever possible, DOTs and MPOs should use consistent (i.e. equivalent) targets to assess the condition and performance of state highways within an MPA.
- Only hold state DOTs and MPOs accountable for what they manage and control. Those who set targets should be those who manage and fund the system and are held responsible for compliance.
- Agencies should not be penalized for not meeting targets due to circumstances beyond their control.

Tell the story: performance is more than just a number

- Analysis and reporting on achieving targets should be both qualitative and quantitative:
- Target-setting should reflect a good faith effort and provide qualitative and quantitative reasoning, as appropriate, to support the results of failing to meet specific targets. For example, states and MPO should be given the opportunity to explain how available resources and other factors such as population dynamics and environmental factors influenced the failure to meet specific targets.
- State DOTs are under increasing pressure and scrutiny from the public regarding investments of public funds and the quality of services provided. While defining measures, setting targets, and aligning strategies to achieve the targets can all positively affect the performance of the state DOTs, these actions will do little to increase the credibility of DOTs unless there is a

reliable, transparent, and understandable method of reporting the progress in achieving the performance targets.

Avoid unachievable targets or the "one size target fits all approach"

- Funding constraints should be factored into the process for determining what values to use for targets. DOTs and local partners work within resource constraints, and cannot be expected to perform to a uniform level (target value) on all measures.
- Targets should reflect realistic expectation about what can be achieved through transportation investments.

Allow for appropriate timelines for target achievement

- Allow for appropriate timelines for achieving targets as a measurable change or progress toward targets may take many years to be noticeable. These may vary by performance area and measure.
- In addition, time horizon (short vs. long-term) for targets should be allowed to vary depending on the measure and at the discretion of each state. For example, safety measures could use the 5 year projection of the 5-year moving average to set targets; annual reports would demonstrate progress using these projections.
- At each DOT's discretion, targets should be regularly reevaluated and adjusted to reflect evolving risks (e.g. new revenue expectations, changing strategic priorities, etc.)
- At each DOT'S discretion, targets should be reviewed and revised periodically to confirm the selected target is still suitable for achieving the required results.

Guard against unintended consequences

- Consider how targets set for one measure could have unintended consequences for the performance of another measure due to resources shifting to other priorities.
- Targets could drive a "worst first" prioritization approach, risking neglect of long-term system needs. A sustainable, efficient transportation system must place a high priority on system maintenance, preservation, and maximizing asset life while minimizing overall life cycle costs.
- Worst first prioritization can lead to unintended consequences in the system. For example, International Roughness Index (IRI) targets could lead to smooth pavements with deteriorating structural conditions. The IRI target could also prompt states to address the wrong problems, and inadvertently shorten pavement life, instead of lengthening it.

Complement flexibility in target-setting with transparency and accountability

- Setting targets should be accompanied by a rationale for selecting the specific target value.
- When states and MPOs do not meet performance targets, they should describe what they have done to improve performance, how those actions impacted the performance, and why they have not met the target.

Allow flexibility for DOTs and MPOs to use a risk based target-setting approach

- Risk-based targets do not reflect optimal outcomes within a particular investment area; rather, risk-based targets represent strategic objectives within a plan to manage agency risks.
- Risk-based targets are meaningful in that they can be realistically achieved under existing revenue expectations. Unlike aspirational targets, risk-based targets can be managed.
- Risk-based targets are derived from risk assessments and revenue expectations at a point in time; Targets should be continuously reevaluated as risks and revenue expectations evolve.

1.2.3. Determining "Significant Progress"

The following guidelines are offered for approaches to rulemaking with respect to determination of "significant progress" for the HSIP and NHPP program areas.

- **Good Faith Effort:** In determining "significant progress achieved", FHWA should consider the demonstration of a state's or MPO's "Good Faith Effort" towards meeting targets. This information should be documented and provided by states and MPOs to a reasonable level of detail.
- **Programmatic Approach:** The "significant progress" determination should be made based on a programmatic approach rather than based on separate evaluations for individual target areas. This approach would support states and MPOs in making balanced and sound investment decisions rather than trying to meet one target at the expense of another.
- **Defining Significant Progress and Progress Agreements:** Consistent with current practice, states and their local FHWA Division offices should continue to work together and be empowered to consensually develop and determine what constitutes significant program – at the program or performance measure level. Progress determination could be based on mutually agreed on templates and criteria. Periodic meetings during the performance period can be held to review, discuss and adjust progress determinations as needed.
  Progress determination teams could work together to cooperatively understand and document specific circumstances that may impact a state's ability to achieve progress towards the established performance targets. These teams would consider unforeseen circumstances that may require adjusting and or resetting performance targets while considering progress.
- **Negative Trends**: Even though the value of a performance measure is not moving towards its target, this doesn't necessarily mean that "Significant Progress" is not being made. For example, if pavement is deteriorating at a slower rate than before implementing MAP-21; or if congestion is increasing at a slower rate than population growth, progress is still being made. These are examples of how a negative or deteriorating trend direction could still meet the "significant progress' definition.
- **Self-evaluation**: States and MPOs should be allowed to self-evaluate in determining whether 'significant progress" has been made. This assessment should be based on quantitative and, if

needed, qualitative data. In addition, determination of "significant progress" should be supported by narrative information if specific performance targets are not achieved. In this case, states and MPOs should provide narrative information and data to document the circumstances and assessment determination.

- **Significant Progress prior to MAP-21**: States that have already made significant progress in recent years (prior to MAP-21) should not be penalized if they do not continue to make significant progress at the rate of other states that are starting with a poor/fair level of performance. In other words, states that have already made significant progress over past (pre MAP-21) years, based on trend data, should be given credit for these improvements. In these circumstances, the failure to meet targets, especially if aggressive targets are pursued (i.e Target Zero), should not be considered a lack of progress.
- **Significant Progress Time Frame Constraints**: States and MPOs generally have 4 to 6 year STIP/TIPs. These are viewed as commitments to constituents. Even if resources are available and policy priorities can be shifted, "significant progress" may not be realized until the 4th or 6th year of a program since it may take time to redirect funds to a different priority.
- **Allow for Target Range Considerations:** When setting targets, states and MPOs may consider setting a target range (opposed to a single number). When making "significant progress" determinations during self–assessment (or FHWA assessment), states and MPOs can consider the full range of the performances measure target area.

2. Pavement Condition — Performance Area Recommendations

2.1. Measures

- **Interstate Pavement in Good, Fair and Poor Condition based on the International Roughness Index (IRI)**—Percentage of 0.1 mile segments of Interstate pavement mileage in good, fair and poor condition based on the following criteria: good if IRI<95, fair if IRI is between 95 and 170, and poor if IRI is greater than 170.
- **Non-Interstate NHS Pavement in Good, Fair and Poor Condition based on the International Roughness Index (IRI)**—Percentage of .1 mile segments of non- Interstate NHS pavement mileage in good, fair and poor condition based on the following criteria: good if IRI<95, fair if IRI is between 95 and 170, and poor if IRI is greater than 170.
- **Pavement Structural Health Index—**Percentage of pavement which meet minimum criteria for pavement faulting, rutting and cracking.

2.2. Targets

- AASHTO supports state flexibility in the setting of targets; as provided in MAP-21. Because IRI testing is not appropriate at low traffic speeds and may be adversely impacted by utilities, we do not recommend establishing targets for urban environments without further study.
- We recommend that a state set targets to increase the % of rural road segments rated good and limit % of rural road segments rated poor. For example, a state may set a goal to increase the % good by 1%, while not allowing the % poor for rural roadways to exceed 20%. If a state has a very low percentage of road sections rated as poor, then a target maintaining current IRI should be acceptable.
- Progress towards meeting state-established targets should be assessed based on analysis of HPMS or state-reported data for the target year.
- Given that MAP-21 requires establishment of a national minimum condition level for Interstates, we recommend that this level be established only for rural interstate segments given the above referenced issues with urban IRI measurement. We recommend that a minimum condition level for rural interstate segments be set at less than or equal to 20% of segments rated poor based on IRI. Based on current HPMS reports, only three reporting agencies will struggle with the percentage poor requirement: Washington, DC, Puerto Rico, and New Jersey. When urban roadways are removed, New Jersey should fall under the 20% poor threshold. Many state agencies have less than 10% of segments rated poor.

2.3. Methodology

2.3.1. Data Source

A state can choose to submit their HPMS data or data from their state database. If the state database is used, the data should also include the functional class (also available in HPMS) to identify and perhaps modify the good/fair/poor breakpoints for urban versus rural roadway segments.

2.3.2. Spatial Segregation

IRI testing is not appropriate at low traffic speeds and in urban environments. IRI may be adversely impacted by utilities. Data from urban sections should be submitted, but will be used to set reasonable urban ride quality goals in the future.

2.3.3. Standards and Procedures

Generally require HPMS protocols, deleting any segment that is less than 0.1 mile long. Portions of roadways that are under construction should be "skipped" in the current year of data collection and reporting.

- We recommend that states adhere to the most current version of AASHTO M328, R 56, R57, and R43.
- To improve consistency of IRI data between states, it is recommended that IRI data be processed using PROVAL, which is available at no cost. In addition, agencies should select a local site where a weekly data check is performed, and develop a control chart. No IRI determination should vary more than 5% from the control.

We recommend that FHWA consider the following additional actions to improve future data consistency and incorporate a future measures on pavement structural health:

- Develop regional calibration sites, similar to those for FWD calibration.
- Consider use of regional or national data collection contractors to reduce variability and achieve consistency in test equipment, training, quality assurance.
- Undertake a national study to determine the sensor type and the spacing of data collection intervals necessary to allow repeatable consistent measurement of faulting so that rutting for flexible pavements and faulting for rigid pavements could be considered for use in performance measurement, at a future date.

2.4. MAP-21 Performance Measurement Requirements

- Secretary to Establish State Performance Measures to Assess Pavement Condition on the Interstate and non-Interstate NHS, Secretary to Establish Minimum Interstate Condition Level [§1203; 23 USC 150(c)(3)] The Secretary will establish performance measures and standards

for States to assess pavement condition, and will establish minimum condition levels for the Interstate System – which can vary by region.

- States to Set Performance Targets [§1203; 23 USC 150(d)] States have 12 months from final rulemaking to set targets reflecting the established measures, with the option of setting different targets for rural and urbanized areas.
- States to Submit Biennial Performance Reports [§1203; 23 USC 150(e)] States have four years from the enactment of MAP–21 to submit a first biennial performance report addressing progress in achieving performance targets.
- Consequences of Not Meeting Minimum Interstate Pavement Condition Level [§1106; 23 USC 119(f)] If minimum condition standards for Interstate pavements are not met, funding flexibility is reduced.

3. Appendix

MAP-21 National-Level Performance Measure Factsheet
Pavement

AASHTO
SCOPM Communications Workshop

Why It's Important

- Pavement smoothness is directly experienced by the traveling public. Smoother roads provide a safer and more comfortable driving experience. Rougher roads increase vehicle fuel consumption and operating cost.
- Pavement smoothness standards are commonly used by state DOTs as part of the construction payment process.
- More comprehensive pavement structural condition metrics currently under development provide information critical to long-term least life cycle cost management strategies.

Key Concepts

International Roughness Index (IRI) is a measure of pavement condition. It is based on the total vertical motion of a vehicle's axle as it drives. IRI is calculated in inches of vertical displacement per mile of road traveled.

- Smoother pavement produces fewer, smaller bumps and vibrations and results in lower IRI; rougher pavement results in higher IRI. IRI can be summarized into categories: Good (IRI<95), Fair (IRI between 95 and 170), and Poor (IRI>170).

Measure: Pavement Condition (specified in MAP-21)

What FHWA May Measure

Interstate Pavement Condition

Simply Put: Percentage of your state's Interstate pavement in Good, Fair and Poor Condition, based on the smoothness of the pavement surface.
Technically Speaking: Percentage of 0.1 mile segments of Interstate pavement mileage in each of the following categories: good if IRI is less than 95, fair if IRI is between 95 and 170, and poor if IRI is greater than 170.

Non-Interstate NHS Pavement Condition

Simply Put: Percentage of your state's (non-Interstate) National Highway System pavement in Good, Fair and Poor Condition, based on the smoothness of the pavement surface.
Technically Speaking: Percentage of 0.1 mile segments of Non-Interstate National Highway System (NHS) pavement mileage in each of the following categories: good if IRI is less than 95, fair if IRI is between 95 and 170, and poor if IRI is greater than 170.

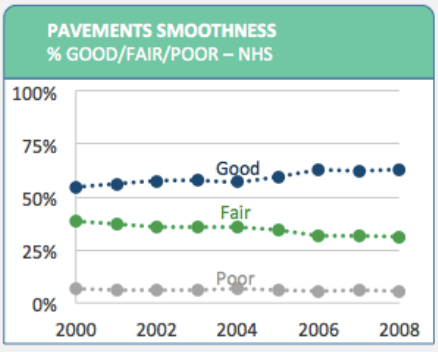
Language of the Measure

These measures can be expressed in plain language, as an overall percentage exceeding a threshold condition value:

- "84% of our state's Interstate pavement is in fair or better condition"
- "82% of our state's National Highway System pavement is in fair or better condition"

When expressed in these terms, the measure is readily understood by the general public, but care must be taken in defining categories like 'good' and 'fair.'

Visualizing it



National Reporting Issues

- **Applicability.** IRI does not accurately reflect pavement condition when measured at low speed and in urban areas.
- **Accuracy.** There is currently much variation in IRI measurement and reporting practices from state to state. This makes state-to-state comparisons difficult.
- **Asset Management.** Pavement smoothness only tells us about the pavement surface. It does not provide insight into the pavement's underlying structural health. As such, pavement smoothness cannot be used to fully capture the results of long-term least life cycle cost management strategies and support investment decision making.
- **Minimum Condition Level.** MAP-21 also requires a national minimum condition level be set for Interstates. This presents challenges for assessing pavement condition in urban areas.

Measure: Pavement Structural Health

What FHWA May Measure

Pavement Structural Health

Simply Put: Percentage of pavement in good condition based on a measure of cracks, faults, ruts, and other visible signs of structural distress.

Technically Speaking: Percentage of pavement which meets minimum criteria for pavement faulting, rutting and cracking.

Unlike the measures of pavement condition based on IRI, a measure of pavement structural health requires further development and is not suitable for implementation or technical definition at this time. While measures of structural adequacy would better support preventive action, they would require major new testing program for most states. This measure is introduced to address the limitations of the IRI-based measures for supporting investment decision making.

Pavement Performance Communication Issues

Communicating Condition

- A measure of pavement condition based on smoothness is a *lagging* indicator of performance. It does not provide immediate feedback on the results of recent investments or disinvestments, and must be employed carefully to avoid driving a worst-first asset management approach.

Apples to Apples

- Because pavement condition is affected by weather conditions and climate, states seeking a true “apples to apples” comparison of pavement condition with their peers will look within their geographic region for states with similar climatic characteristics.
- Other factors that can help define peer states are ratio of urban and rural road miles, ratio of asphalt and concrete pavements, and of course the amount of traffic.