System Preservation

Contents

Roadway

Roadway Closures

Measure at a glance	
Category: System Preservation **Subcategory:** Roadway	

Indicator Overview

Description

This indicator measures the amount of public access lost due to closed, washed out roads and reduced load bridges.

Human and Environmental Drivers

Human: Implementing regular maintenance and improvements to roadways reduces the risk of road wash-outs. Building roadways on erosion-prone substances, such as sand or silt, will increase the risk of road wash-outs.

Application

In the Basin

No current in-basin use.

External uses

The **National Park Service** uses "Loss of Public Access Due to Closed or Washed Out Roads" to understand visitor experience (National Park Service 2017).

Literature or Guidance Documents

No literature or guidance documents identified.

Relationship with Goal

System Preservation: This measure relates to the system preservation goal because it deals with the roadway system and maintenance during closures.

Economic Vitality and Quality of Life: This measure relates to visitor experience because the loss of public access is directly related to the quality of the visitor experience.

Safety: This measure relates to safety because agencies must reduce the amount of washed out roads and reduced load bridges to maintain a safe transportation system.

Variations of the Measure / Alternatives to the measures

Loss of public access due to closed or washed out roads.

References

(Aguettant 2016)
(Beth Beard 2015)
(National Park Service 2008)
(National Park Service 2017)

Pavement Condition

Measure at a glance

Category: System Preservation
Subcategory: Roadway

Indicator Overview

Description

"Pavement Condition" measures the quality of pavement on roadways, and informs maintenance needs due to defects and the severity of these defects. Defects include rutting and cracking. This measure applies to the National Highway System and the State Highway System. It allows DOTs to prioritize road maintenance and allocate resources to areas that are heavily used.

Human and Environmental Drivers

Physical: Road usage/ high traffic loads decreases pavement conditions; poor roadway construction reduces pavement condition; low temperatures may cause roadway surface shrinkage which leads to cracking, thus decreasing the pavement condition; oxidation decreases pavement condition; excess bituminous material decreases the pavement condition.

Application

In the Basin

TRPA currently uses "Percent of Pavement in Good Condition" to measure the pavement condition in the region (Tahoe Regional Planning Agency 2014).

External uses

California Rural Counties Task Force use the "Distressed Lane Miles and Pavement Condition Index" measures to understand the condition of rural roads in California (California Rural Counties Task Force 2015).
Nevada Department of Transportation uses the "Pavement Condition Rating" measure to understand system preservation (Nevada Department of Transportation 2016a).
Chicago Metropolitan Agency for Planning uses the "Acceptable Ride Quality" (International Roughness Index) measure to understand system preservation of principal arterials (Chicago Metropolitan Agency for Planning 2016).
Florida Department of Transportation uses the "Pavement Condition Rating" measure to understand transportation system preservation and its maintenance needs in the state (Florida Department of Transportation 2016).
Oregon Department of Transportation uses the "Pavement Condition Rating" measure to understand transportation infrastructure preservation and maintenance in the state (Oregon Department of Transportation 2015).
Tennessee Department of Transportation uses the "Pavement Condition Quality" measure to understand existing system preservation and management needs (Tennessee Department of Transportation 2016).
Metropolitan Transportation Commission uses the "Pavement Condition Index" measure to understand infrastructure maintenance needs (Metropolitan Transportation Commission 2009).
The National Park Service uses the "Pavement Condition Rating" measure to understand the transportation system condition in national parks (National Park Service 2017).

Literature or Guidance Documents

No literature or guidance documents identified.

Relationship with Goal

System Preservation: This measure is related to system preservation because it measures the percent of state and federal highways that are in good condition, set to inform decisions regarding maintenance/repair of these highways to further preserve their quality.

Variations of the Measure / Alternatives to the measures

Percent of Pavement in State of Good Repair, Distressed Roadway Miles, Acceptable Ride Quality (International Roughness Index), and Pavement Condition Index or Pavement Condition Rating. State departments of transportation (DOTs) and the Federal Highway Administration (FHWA) use the "international roughness index (IRI)", which is a variation of "pavement condition".

References

(Association of bay Area Governments & Metropolitan Transportation Commission 2013)
(California Department of Transportation 2015a)
(California Rural Counties Task Force 2015)
(Chicago Metropolitan Agency for Planning 2013)
(Chicago Metropolitan Agency for Planning 2016)
(Florida Department of Transportation 2016)
(Florida Department of Transportation n.d.)
(Metropolitan Transportation Commission 2009)
(Nevada Department of Transportation 2016a)
(Nevada Department of Transportation 2016b)
(Northwest Pavement Management Association n.d.)

(Oregon Department of Transportation 2015)
(Tennessee Department of Transportation 2016)

Bridge Condition

Measure at a glance

Category: System Preservation
Subcategory: Roadway

Indicator Overview

Description

This indicator measures the quality of the bridge and its ability to sustain traffic without causing any potential crashes. This measure communicates the quality of bridges that are in the national bridge inventory that serve the national highway system (NHS) based on the condition ratings of its deck, superstructure, substructure, and culverts. This measure allows DOTs to prioritize bridge maintenance and allocate resources to bridges that need repair/ maintenance most.

Human and Environmental Drivers

Environmental/Physical: Age of the bridge decreases its condition; multi-span bridges have greater deterioration rates compared to single span bridges; bridges in marine/ coastal locations have higher deterioration rates due to sea salt; bridges in areas that experience snow and ice during winter have higher deterioration rates due to the increased use of de-icing salts; span length of bridge is correlated with greater deterioration rates; bridges with lower traffic volumes have a lower deterioration rate and are in better condition, however, a few studies have shown that bridges serving primary routes and interstates have a lower deterioration rate in some instances due to higher design and maintenance standards compared to bridges serving secondary routes.

Application

In the Basin

TRPA currently uses "Percent of Bridges in Good Condition" to analyze the bridge condition within the region. (Tahoe Regional Planning Agency 2014)

External uses

Nevada Department of Transportation uses the "Percent of Substandard Bridges" measure to understand the condition of bridges in the state (Nevada Department of Transportation 2016a).
Florida Department of Transportation uses the "Percent of Bridges in State of Good Repair" measure to understand transportation system preservation and its maintenance needs in the state (Florida Department of Transportation 2016).
Oregon Department of Transportation uses the "Percent of State Highway Bridges that are not Distressed" measure to understand transportation infrastructure preservation and maintenance in the state (Oregon Department of Transportation 2015).
Tennessee Department of Transportation uses the "Percent of Bridges in State of Good Repair" measure to understand existing system preservation and management needs (Tennessee Department of Transportation 2016).
Carson Area Metropolitan Planning Organization uses the "Percentage of Structurally Deficient Bridge Decks" measure to understand transportation system maintenance needs (Carson Area Metropolitan Planning Organization 2016).
Chicago Metropolitan Agency for Planning uses the "Percent of Structurally Deficient Bridges" and "Percent of Bridges in Good Repair" measures to understand system preservation of all bridges in the region (Chicago Metropolitan Agency for Planning 2016).
Mid-Ohio Regional Planning Commission uses the "Percent of Structurally Deficient Bridges" and/or "Functionally Obsolete Bridges" measure to understand the life of existing infrastructure in the region (Mid-Ohio Regional Planning Commission 2011).
The National Park Service uses the "Facility Condition Index" measure to understand the transportation system condition in national parks (National Park Service 2017).

Literature or Guidance Documents

No literature or guidance documents identified.

Relationship with Goal

System Preservation: This measure is related to the system preservation goal because it measures the percent of bridges serving the NHS that are in good condition to inform decisions regarding maintenance/repair of these bridges to further preserve their quality.

Variations of the Measure / Alternatives to the measures

Percent of Bridges in State of Good Repair, Percent of Substandard Bridges, Percent of Structurally Deficient Bridges, and Facility Condition Index.

References

(California Department of Transportation 2015b)
(Carson Area Metropolitan Planning Organization 2016)
(Cavalline et al. 2015)

(Chicago Metropolitan Agency for Planning 2010)
(Chicago Metropolitan Agency for Planning 2013)
(Chicago Metropolitan Agency for Planning 2016)
(Florida Department of Transportation 2016)
(Florida Department of Transportation n.d.)
(Metropolitan Transportation Commission n.d.)
(Mid-Ohio Regional Planning Commission 2011)
(Mid-Ohio Regional Planning Commission 2012)
(Mid-Ohio Regional Planning Commission 2016)
(National Park Service 2017)
(Nevada Department of Transportation 2016a)
(Nevada Department of Transportation 2016b)
(Oregon Department of Transportation 2015)
(Tennessee Department of Transportation 2016)
(Transportation for America 2015)

Asset Management

Percentage of Vehicles Met or Exceeded Useful Life Benchmark

Measure at a glance

Category: System Preservation
Subcategory: Asset management - Equipment
Non-revenue support-service and maintenance vehicles as well as Rolling Stock Revenue vehicles by mode

Indicator Overview

Description

This indicator measures the proportion of the total number of transit vehicles in a region's fleet that meet established standards for operation. It also measures "the expected lifecycle of a capital asset for a particular Transit Provider's operating environment, or the acceptable period of use in service for a particular Transit Provider's operating environment".

Human and Environmental Drivers

Environment: Developing the Useful Life Benchmark for a fleet is dependent on the physical environment including topography (inclines and declines) and variation in weather conditions.
Human: Investments in repair and service of the vehicles and roadways can extend the useful life of the fleet. The level of ridership also impacts the life of fleet. Up-to-date monitoring of vehicles, ensuring no risk (physical, economic, or otherwise) increases usage.

Application

In the Basin

No current in-basin use.

External uses

Federal Transit Administration: This measure is required by the MAP-21 federal rule to understand the asset performance of non-revenue support-service and maintenance vehicles (Federal Transit Administration 2017a). Analysis of vehicles established for means of maintenance and support as deemed by the equipment asset.

Literature or Guidance Documents

No current literature or guidance documents identified.

Relationship with Goal

Operations: This measure relates to the operations goal because it manages operative vehicles and their usefulness.
System Preservation: This measure relates to the system preservation goal because it analyzes potential for sustaining utility.
Transit: This measure relates to the transit goal because it assesses the useful life benchmark of different transit vehicles in a fleet.
Safety: This measure relates to the safety goal because it monitors the operability within a certain threshold of physical risk.

Variations of the Measure / Alternatives to the measures

References

(Federal Highway Administration 2012)
(Federal Transit Administration 2016)
(Federal Transit Administration 2017a)
(National Rural Transit Assistance Program 2017)

Percentage of Assets in a State of Good Repair

Measure at a glance

Category: System Preservation
Subcategory: Asset management - Infrastructure
Only rail fixed-guideway, track, signals and systems

Indicator Overview

Description

The indicator measures the condition of transportation infrastructure such as roads, and transit stops, the amount of transit and road infrastructure that is functional and in a "State of Good Repair". State of Good Repair thresholds are determined based on three factors: 1. Desired function - is the asset able to perform the designed function? 2. Safety - Does the asset pose an unacceptable safety risk? 3. Lifecycle investments – Have expected lifecycle investments been met?

Human and Environmental Drivers

Human: Asset condition is broadly the function of two factors, 1) utilization and environmental factors that cause degradation, and 2) investment in maintenance. The relationship between asset condition and utilization can be complex and influenced by a feedback between several drivers. Higher utilization increases wear and results in lower asset condition. However, declining asset condition can reduce usage and improved asset condition can increase utilization. Higher benchmarks for asset condition decrease the proportion of the assets that meet the desired benchmarks. Implementation of regular monitoring of asset condition by qualified individuals can increases reliability of infrastructure accurately meeting the threshold.

Application

In the Basin

No current in basin use.

External uses

Federal Transit Administration: This measure is required by the MAP-21 federal rule to understand the performance of the nation's public transportation assets (Federal Transit Administration 2017a).

Literature or Guidance Documents

No literature or guidance documents identified.

Relationship with Goal

System Preservation: This measure is a direct measure of the proportion of assets that are at or above a desired condition which is a direct functional.
System Connectivity: This measure relates to system connectivity because if assets degrade below the desired condition it may create rerouting and our less service that then reduces connectivity.

Variations of the Measure / Alternatives to the measures

No variations identified.

References

(American Public Transportation Association 2017)
(Federal Highway Administration 2013)
(Federal Transit Administration 2017a)

Percentage of Assets with a Condition Rating Below 3.0 on the FTA TERM scale

Measure at a glance	
Category: System Preservation **Subcategory:** Asset management - Facilities Maintenance and administrative facilities; and passenger stations (buildings) and parking facilities	

Indicator Overview

Description

This indicator measures the percentage of assets with a Condition Rating Below 3.0 on the FTA TERM scale". It measures the amount of facilities compliant with the FTA TERM scale and looks for means of improvement for those facilities not in compliance. TERM stands for Transit Economic Requirements Model and is rated on a scale from 1 (meaning an asset is in immediate need for repair) to 5 (meaning an asset is new and there are no visible defects).

Human and Environmental Drivers

Environmental: Analyze the physical appearance and operation of a facility under an agency's financial jurisdiction. By analyzing substructure, shell, interior, conveyance, plumbing, HVAC, Fire Protection, Electrical, (Fare Collection) Equipment, and the Site of both maintenance and administrative buildings as well as parking and passenger facilities, a score is drawn and must be at least a 3 (moderately deteriorated or defective, but has not exceeded useful life).

Economic: Cost of repairs is calculated and determined by what it will take for a facility's structure to remain at or above "useful". The score is then calculated (sometimes against the cost of repairs) to take those with in adequate scores compared against the conglomeration of facilities to take a percentage based performance measure (the lower the percentage the better).

Human: Assets with a higher score overall are less likely to run harmful risks and are thus more beneficial to the community.

Application

In the Basin

No current in basin use.

External uses

Federal Transit Administration: This measure is required by the MAP-21 federal rule to understand the condition of transit maintenance and administrative facilities, passenger stations, and parking facilities in the nation (Federal Transit Administration 2017a).

Literature or Guidance Documents

No literature or guidance documents identified.

Relationship with Goal

Operations: This measure relates to the operations goal because it establishes the format in which facility infrastructure is assessed.

System Preservation: This measure relates to the system preservation goal because it defines ways of maintaining current facilities to maximize capacity.

Variations of the Measure / Alternatives to the measures

No variations identified.

References

(Federal Transit Administration 2017a)

(Federal Transit Administration 2017b)

(Federal Transit Administration 2017c)

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