

Washington State’s Infrastructure Health Index  
Background and Methodology Document

**Outcome Measure 3.1 – Reliable Infrastructure:** Based on current funding levels, maintain the percent of Washington infrastructure assets in satisfactory condition at 2013 baseline levels.

**Background:**

Washington State’s Infrastructure Health Index provides an overview of the condition of the infrastructure assets listed under outcome measure 3.1. The index focuses on present day condition of infrastructure assets, and does not account for factors such as capacity, funding gaps, or expected future conditions. The Index is a composite score drawn from existing metrics available for present-day conditions of eight key transportation and non-transportation infrastructure assets. These assets are:

<b>Transportation infrastructure assets:</b>	<b>Non-transportation infrastructure assets:</b>
3.1.a - Bridges <sup>1</sup>	3.1.c - Drinking water systems <sup>2</sup>
3.1.b - Pavement <sup>1</sup>	3.1.c - Wastewater systems <sup>2</sup>
3.1.e - Ferry terminal systems <sup>1</sup>	3.1.c - Broadband <sup>2</sup>
3.1.e - Ferry vessel systems <sup>1</sup>	
3.1.f - Transit fleet <sup>2</sup>	

Data notes: <sup>1</sup>Existing Results Washington measure that has already been approved. <sup>2</sup>Measure has not yet been approved.

The index is based fully on quantitative data. Where possible, comprehensive statewide assessments are used to evaluate the condition of these assets; in other cases, data on a portion of overall systems, or the best available proxies, are used. This is particularly the case for the non-transportation infrastructure assets, which are generally owned by local governments or private entities. For these assets, limited condition data is available at the state level; while some utilities do have detailed asset management plans this data is not collected statewide. In each case, condition data are normalized to show the percentage of the asset considered “satisfactory” versus “needs improvement” as explained further below. An asset is considered “satisfactory” if it meets a minimally accepted condition threshold as determined by the respective specialists.

The Washington State Infrastructure Health Index, to the best of our knowledge, is the first of its kind in the nation, as it includes both transportation and non-transportation assets. The index was developed by a working group comprised of analysts from the Washington State Departments of Transportation, Commerce and Agriculture.

**Calculation methodology:**

The Infrastructure Health Index is reported as the percent of infrastructure asset systems that are in satisfactory condition and, conversely, the percent of infrastructure asset systems that need improvement for a given year. Equal weightings are applied for all of the assets included in the index. Since there are currently eight assets included in the index, each asset has a weighting of 13%. For each asset included in the index, the percent of that asset that is considered in satisfactory condition is multiplied by the weighting factor (13%). After these weighted values are calculated for each of the assets, they are summed to calculate the percent of statewide infrastructure asset systems that are in satisfactory condition. The converse of this percentage is the portion of statewide infrastructure asset systems that need improvement.

The Infrastructure Health Index comprises the following metrics for transportation infrastructure assets:

- **Pavement Condition** – This measure is calculated using the percent of Washington State Annual Vehicle Miles Traveled (AVMT) on National Highway System (NHS) routes in satisfactory condition,

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according to the index values below. For this measure, pavement condition is assessed using only the International Roughness Index (IRI) and has the following thresholds:

- *Satisfactory*: Defined as pavement with an IRI<170 on Interstate NHS, IRI<220 on state and local NHS with speeds >=45 mph, or IRI<300 on state and local NHS with speeds <=40 mph.
- *Needs improvement*: Defined as pavement with an IRI>=170 on Interstate NHS, IRI>=220 on state and local NHS with speeds >=45 mph, and IRI>=300 on state and local NHS with speeds <=40 mph.

For more information, see [Gray Notebook 52, page 9](#).

- **Bridge Condition** – This measure is calculated using the percent of bridges on NHS routes, measured by deck area, in good, fair and poor condition.
  - *Satisfactory*: Defined as a bridge in fair or better condition. A bridge is classified as fair or better if the Level of Service (LOS) for Deck, Sub-Structure and Super Structure are all greater than or equal to 5.
  - *Needs improvement*: Defined as a bridge that is structurally deficient or in poor condition. A bridge is classified in poor condition if it has a Level of Service (LOS) for Deck, Sub-Structure or Super Structure less than or equal to 4.

For more information, see [Gray Notebook 54, page 5](#).

- **Ferry Terminal System Condition** – This measure is calculated using the percent of ferry terminal systems, measured by dollar value, not yet due or due for replacement. The uses an economic asset management model to estimate the percentage of systems that are past due for replacement, and includes factors such as risk, cost of failure, and costs of planned and corrective maintenance.
  - *Satisfactory*: Defined as a ferry terminal system not due for replacement.
  - *Needs improvement*: Defined as a ferry terminal system past due for replacement.

For more information, see [Gray Notebook 55, page 16](#).

- **Ferry Vessel System Condition** – This measure is calculated using the percent of ferry vessel systems, measured by dollar value, not yet due (Condition Rating 1), due within the current or ensuing biennium (Condition Rating 2), or overdue (Condition Rating 3) for replacement.
  - *Satisfactory*: Defined as a ferry vessel system not yet due (Condition Rating 1) or due within the current or ensuing biennium (Condition Rating 2).
  - *Needs improvement*: Defined as ferry vessel systems overdue for replacement (Condition Rating 3).

For more information, see [Gray Notebook 55, page 14](#).

- **Transit Fleet Condition** – This measure is calculated using the percent of the state's transit fleet that exceeds the minimum useful life specified by the Federal Transit Administration.
  - *Satisfactory*: Defined as transit fleet within its useful life.
  - *Needs improvement*: Defined as transit fleet not within its useful life.

The Infrastructure Health Index also includes the following metrics for non-transportation infrastructure assets. The non-transportation infrastructure asset measures are not currently approved and are not currently listed on the Goal 2 Map:

- **Drinking Water Systems Condition** – The percentage of drinking water system inspections completed with no significant deficiencies identified. Large systems are surveyed for sanitary conditions on a rotating basis, every three to five years, so figures for any particular time period are

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based on a subset of systems. A significant deficiency could represent a condition problem in the actual infrastructure, a system management problem, or a combination of such problems. This measure is taken from the Department of Health's performance metrics. Quarterly data are averaged to derive an annual figure.

- *Satisfactory*: The percentage of systems without significant deficiencies noted during inspections conducted over the year.
  - *Needs improvement*: The percentage of systems with significant deficiencies noted during inspections conducted over the year.
- **Wastewater Systems Condition** – This measure is derived from the Department of Ecology's water quality permitting and reporting information system (PARIS). Two categories of facilities are included: municipalities and other public entities that discharge treated domestic wastewater to surface waters ("Municipal NPDES IP") and ground waters ("Municipal to ground SWDP IP"). A facility is considered in satisfactory condition for this measure if it has no more than one effluent or design criteria exceedance violation noted within the year.
    - *Satisfactory*: No more than one effluent or design criteria exceedance violation noted within the year.
    - *Needs improvement*: More than one effluent or design criteria exceedance violation noted within the year.
- **Broadband Availability** – The percentage of Washingtonians to whom broadband internet service with download speeds exceeding 100 mbps is available for purchase at their place of residence, based on data from the Washington State Broadband Office.
    - *Satisfactory*: Broadband internet service with download speeds >100 mbps is available
    - *Needs improvement*: Broadband internet service with download speeds >100 mbps is not available