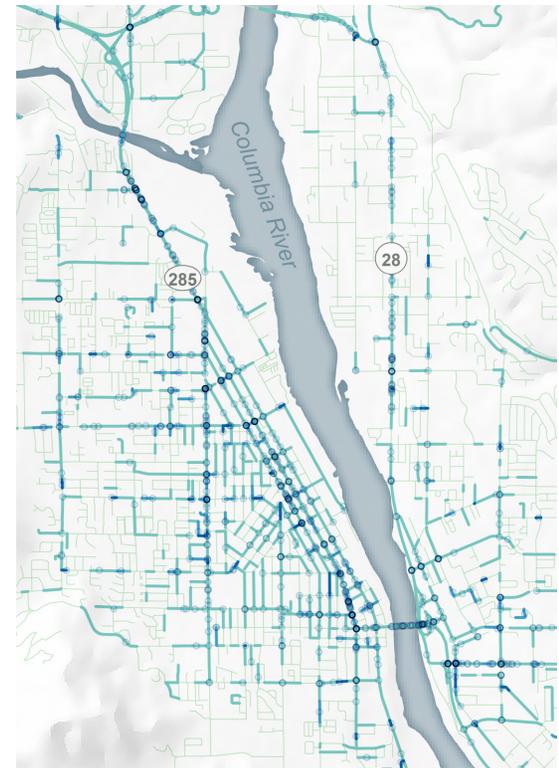


# APPENDIX B: PERFORMANCE- BASED PLANNING PROCESS



Transportation 2040 identifies more than 100 specific transportation projects, all of which are aimed at improving and/or expanding the regional transportation system. These projects were identified through a performance-based planning process that is described in this appendix.

The performance-based planning process follows these basic steps:

1. Forecast Transportation System Performance (congestion, safety, condition, etc.)
2. Identify Performance Deficiencies (using performance measures)
3. Define Improvements to Remedy Performance Deficiencies

## Performance Measures

Section 2 of Transportation 2040 provides a brief overview of the performance measures used to evaluate the current and forecasted future performance of the regional transportation system. A performance measure is effectively a tool for defining how and where the transportation system operates in an acceptable manner, and by the same token, where it

fails to meet a minimum standard of performance. A more detailed description of the seven Transportation 2040 performance measures and how they were used to evaluate the regional transportation system follows.

### Pedestrian Mobility

To evaluate the regional transportation system's non-motorized performance, a pedestrian infrastructure inventory of the functionally classified road network was conducted. The inventory identified more than 125 miles of roadways with deficient pedestrian infrastructure. Two specific performance measures were applied; the following conditions represent a deficiency:

1. Lack of continuous sidewalks or other hard-surfaced pathway on both sides of federal-aid roadways.
2. Lack of a minimum 4 foot buffer between the sidewalk and the edge of the outside vehicle travel lane. This buffer can be satisfied with a striped shoulder, a bicycle lane, parking lane, or a sidewalk that is set back from the curb.

The estimated cost to upgrade these roadways in accordance with these performance measures would be over \$200 million in 2015 dollars, which does not include the many miles of local roadways that also lack sidewalks and other necessary pedestrian facilities.

### Bicycle Mobility

Like pedestrian mobility, bicycle mobility is a key element of the regional non-motorized transportation network. The Greater Wenatchee Bicycle Master Plan (BMP), adopted by CDTC in 2013, provides definition of the Wenatchee urbanized area's bicycle mobility needs, and a framework for evaluating and prioritizing improvements. As a result, the cycling performance measure in Transportation 2040 is applied to define a deficiency as wherever a roadway does not yet have a bicycle facility consistent with the BMP.

### Maintenance and Preservation

The cost of adequate maintenance and preservation of the regional transportation system is substantial. Over 25 years, the total estimated cost of this anticipated in Transportation 2040 is projected to be over \$1 billion. This cost estimate was conducted by evaluating the deterioration



of the regional transportation system's two major components requiring regular preservation: roadways and bridges. The cost estimate for bridge preservation was derived from data gathered from local agencies and WSDOT bridge preservation programs. It was rolled directly into the 25-year Transportation 2040 preservation program in the year-of-expenditure (YOE). Roadway preservation costs were calculated using the Pavement Condition Index (PCI) and expected life cycles of existing pavement surface types. Pavement surface type and PCI data for local routes was collected through a biannual pavement condition survey completed with CDTC resources. State highway PCI data was collected from WSDOT's ongoing pavement management system database. The Transportation 2040 performance measure for roadway condition is applied to define any roadway segment with a measured PCI score less than 40 to be deficient.

In order to tally the cost of adequate system preservation, segments of deficient roadway condition were assigned a reconstruction cost within the first year of the 25-year program. These costs were calculated using 2015 rates from

the County Road Administration Board. Routes with fair PCI scores (40 to 60) are inflated based on standard expected pavement life cycles, which depend on pavement surface type. It was assumed that, given the high costs associated with maintaining the region's 900 miles of state highways paved with asphalt, many of these roadways will be given a less expensive chip sealed surface treatment in the future. The lower cost chip sealed treatment was applied to 80 percent of these roads with a fair PCI score. In total, this action reduced state highway resurfacing cost by approximately 60 percent over the 25-year planning horizon of Transportation 2040.

**Vehicle Mobility**

In the Wenatchee urbanized area, vehicle mobility performance is evaluated with CDTC's travel demand model. Transportation 2040 applies a suite of performance measures based on analyzing two different aspects of vehicle mobility.

The first is Intersection level-of-service (LOS) during the PM peak hour. For this, the following criteria applies

1. Intersections in rural areas, small cities and on US 2,

2. US 97 and SR 28 that operate below LOS "D" are deficient;
2. Intersections within the Wenatchee urbanized area other than on US 97 and SR 28, and
- 3, outside of the Wenatchee central business district "pedestrian priority zone" (shown in Section 2, Figure 2-3 of Transportation 2040) that operate below LOS "E" are deficient; and
4. Intersections within the Wenatchee central business district "pedestrian priority zone" that operate below LOS "E" are only deficient if the averaged LOS of all signalized intersections within the zone fall below LOS "E."

Additionally, volume to capacity (V/C) ratio of roadway segments during the PM peak hour was used. For this, a threshold V/C ratio of 0.7 was applied to highlight roadway segments where volumes are high enough and gaps between vehicle platoons likely too limited to allow safe



turning movements to and from side streets at unsignalized intersections (this measure was essentially used as a proxy for conducting the Highway Capacity Manual LOS analysis for all unsignalized intersections on the regional transportation system). The results of this analysis are shown in the map presented in Section 2, Figure 2-3 of Transportation 2040.

### **Safety**

The safety of the regional transportation system was evaluated by examining collision data from the previous five years, from 2010 to 2014. Transportation 2040 applies a suite of safety performance measures, as follows:

1. Total crash rate
2. Rate of crashes resulting in fatalities
3. Rate of crashes resulting in serious and disabling injury

While these performance measures are established for the purpose of evaluating safety, Transportation 2040 does not apply these measures in a manner that determines a roadway or intersection to be explicitly defined as “deficient.” The crash data is reported with these perfor-

mance measures in order to provide a method for observing trends over time using a rolling 5 year average time period, and for purposes of identifying opportunities to improve transportation safety in the ongoing development of transportation system improvements.

### **Transit**

Transportation 2040 measures the overall performance of public transit based solely on the total number of passenger trips served year over year. As with some other performance categories, this measure was not used in Transportation 2004 to determine deficiencies or identify specific transit projects. Year over year growth in public transit trips above the rate of population growth is desired and considered to be acceptable performance at a system level.

### **Air Quality**

Transportation 2040 sets a performance target for air quality in the region as a continuous decrease in greenhouse gas emissions. At this time, however, insufficient data exists to measure and track the region's performance in air quality. It is expected that as part of the new federal Map-21 performance reporting

requirements, additional data sources will become available in the near future.



## Project Evaluation Methodologies

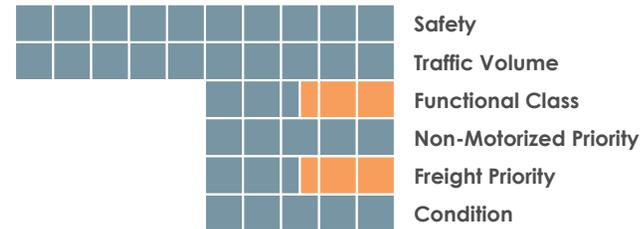
To evaluate individual projects included in Transportation 2040, CDTC developed a scoring system, based around a set of criteria that correspond with previously described performance measures. Figure B-1 summarizes this system. It shows the different metrics used to score projects and their relative weight. The methodology behind the project scoring system is shown in detail in Table B-1.

Projects score were used in conjunction with revenue forecasts and limitations, and the judgement of CDTC staff and Technical Advisory Committee members, to prioritize the fiscally constrained portion of the Plan. The table and maps at the end of Section 3 of Transportation 2040 show these results.

Individual projects in the plan are categorized as system upgrades and rebuilds, traffic operation improvements and system expansions. In addition to these defined projects, the regional transportation system requires investment in routine maintenance, preservation and non-motorized improvements; all of which are

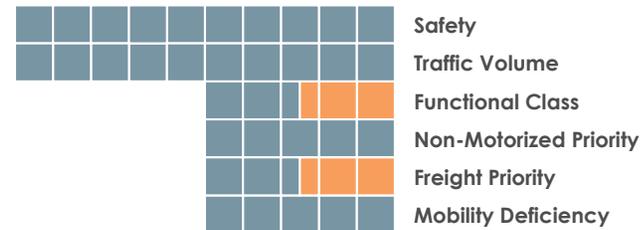
### Upgrade/Rebuild Projects 0-40 Scale

Factors & Their Relative Weight



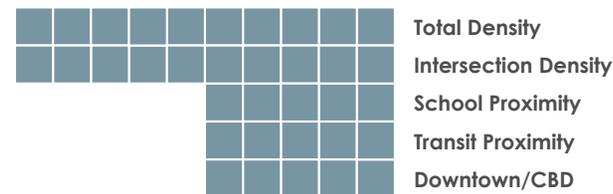
### Traffic Operation and Expansion Projects 0-40 Scale

Factors & Their Relative Weight



### Pedestrian Demand Index 0-35 Scale

Factors & Their Relative Weight



### Transit Projects

Defer to LINK Transit

Figure B-1: Project Prioritization Criteria



**Table B-1: Metrics Used for Transportation 2040 Project Prioritization Factors and Corresponding Methodologies**

FACTOR	METHODOLOGY	APPLICABLE PROJECT TYPES
<b>TRANSPORTATION PROJECT EVALUATION SCORE FACTORS</b>		
<b>Safety</b>	Severity index, which is calculated as: $[\# \text{ of collisions} + (\# \text{ of injuries resulting from collisions} \times 5) + (\# \text{ of fatalities resulting from collisions} \times 10)] / \text{road segment length}$ .	Upgrade/rebuilds, traffic operations, expansions
<b>Traffic Volume</b>	PM peak hour traffic volumes, from CDTC traffic model in the Wenatchee urbanized area and WSDOT in other locations.	Upgrade/rebuilds, traffic operations, expansions
<b>Functional Class</b>	5 points for arterials, 2.5 points for collectors	Upgrade/rebuilds, traffic operations, expansions
<b>Non-Motorized Priority</b>	Project meets an identified non-motorized transportation need	Upgrade/rebuilds, traffic operations, expansions
<b>Freight Priority</b>	In Wenatchee urbanized area: 5 points for priority freight route, 2.5 points for supporting freight route. In small city urban growth areas: 5 points for arterials, 2.5 points for major collectors. In rural areas: 5 points for arterials and major collectors, 2.5 points for minor collectors. 5 points given to projects specifically identified in Freight Master Plan. Points only given to projects with an identifiable freight benefit.	Upgrade/rebuilds, traffic operations, expansions
<b>Condition</b>	Project addresses a known roadway condition deficiency, or a structurally deficient bridge. Condition deficiencies are defined as roadways with a Pavement Condition Index (PCI) score of 40 or below.	Upgrade/rebuilds
<b>Mobility Deficiency</b>	Project addresses vehicle mobility issues, identified by CDTC traffic model.	Traffic operations and expansions
<b>PEDESTRIAN DEMAND INDEX FACTORS</b>		
<b>Total Density</b>	Population density + employment density	All active transportation projects
<b>Intersection Density</b>	Intersection density, based on analyses contained in the Environmental Protection Agency's (EPA) Smart Location Database	All active transportation projects
<b>School Proximity</b>	Project is located within 1,000 feet of a school	All active transportation projects
<b>Transit Proximity</b>	Project is located within 500 feet of a transit stop	All active transportation projects
<b>Downtown/CBD</b>	Project is located inside the central business district (CBD) of a city or town	All active transportation projects



allocated substantial funding in Transportation 2040. However, rather than identify specific projects, Transportation 2040 addresses these categories programmatically, at the entire system level. Any projects in these categories that address an need identified in Transportation 2040 are automatically deemed to be regionally significant and consistent with Transportation 2040. This aligns with citizen preferences in the region, which favor investment in these areas.

As Figure B-2 shows, the public places high priority on investment in system preservation and non-motorized improvements. Revenue allocated to maintenance and preservation matches these preferences. However, non-motorized revenue allocations do not. This indicates a need to explore opportunities for increasing revenues available for non-motorized facilities. One way to achieve this would be to implement a regional funding initiative, as discussed in Appendix A, aimed at addressing non-motorized needs.

While non-motorized improvements are not specifically identified and scored as projects, a pedestrian demand index was created in to assist local agencies

in planning and project development for sidewalks and related improvements. The index encourages local agencies to prioritize certain areas within the region for investment in pedestrian and other non-motorized investments. It was not

used to score individual projects. The criteria used for this index are shown in Table B-1. Maps of the index are presented in Section 2 of Transportation 2040, in Figures 2-4, 2-5 and 2-6.

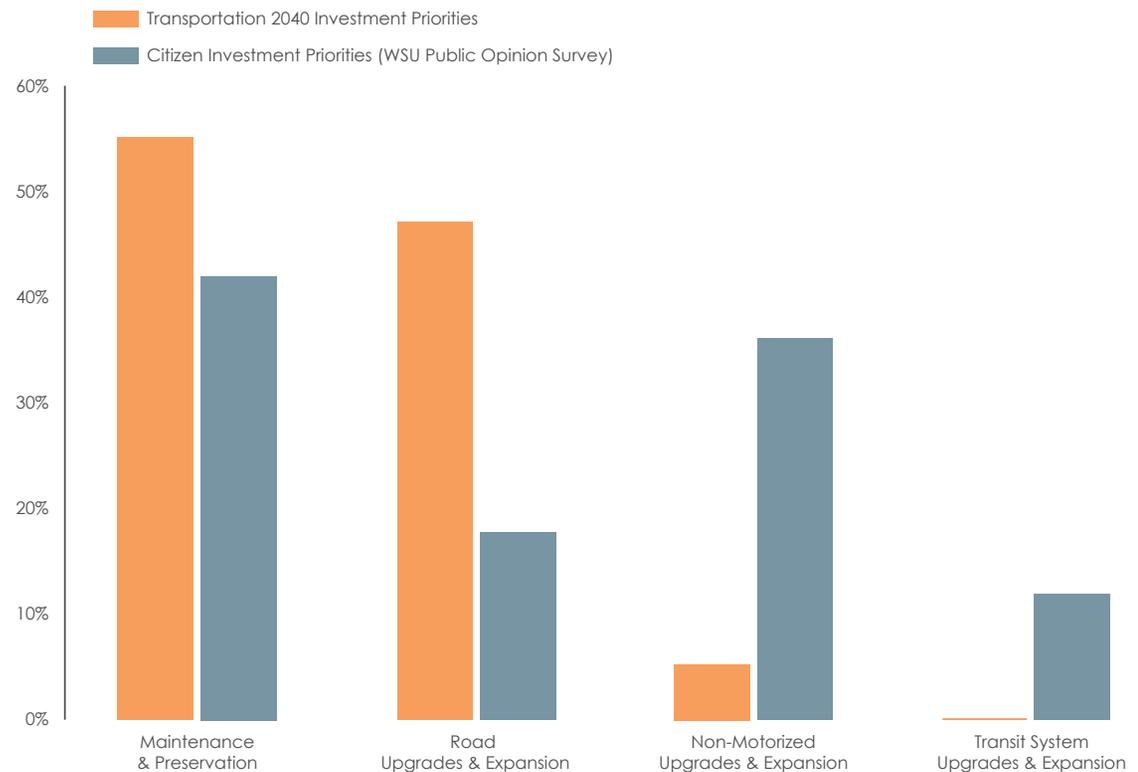


Figure B-2: The Difference Between Transportation 2040 and Citizen Investment Priorities

