Appendix A: Develop Scoring for Measures

Technical Memorandum

Develop Scoring for Measures (Task 7.1)

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To: Multnomah County

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Subject: Roadway Capital Improvement Plan (RCIP) Update

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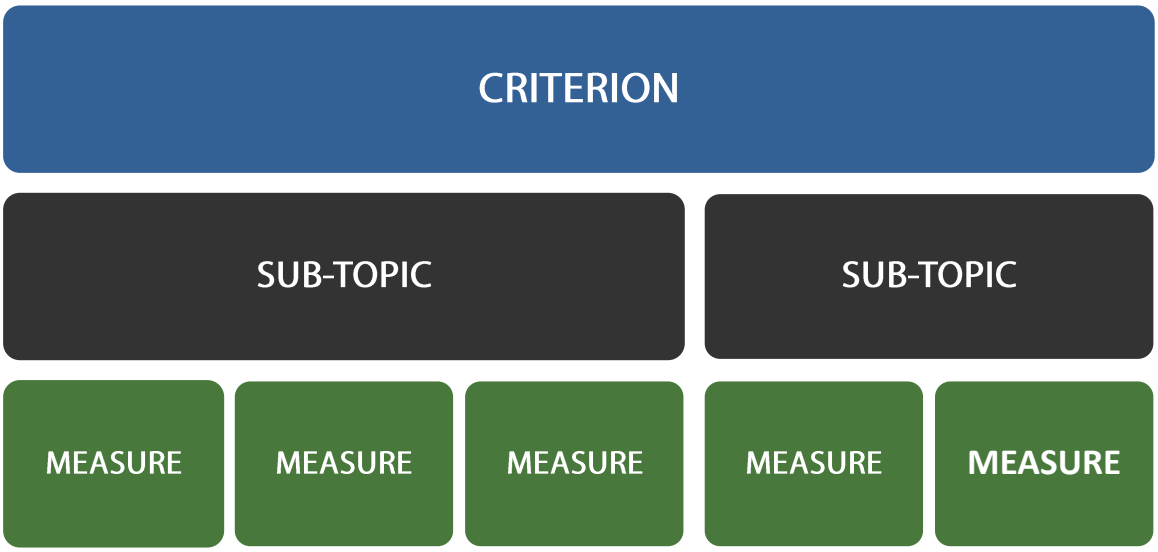
Introduction

Multnomah County is developing a comprehensive scoring evaluation framework for the purpose of ranking and prioritizing transportation projects for its RCIP. Based on a review of adopted plans and documents and national best practices, the County has defined six scoring criteria to evaluate projects across a number of areas: Equity, Safety, Mobility, Asset Management, Resiliency and Emergency Management, and Sustainability. Within each criterion, a number of measures—which are grouped into sub-topics—explain the details associated with evaluating each project. Figure 1 summarizes the hierarchy of these components for this framework. More details associated with the scoring values and GIS methodology can be found in Appendices A-C.

These components are defined below:

- **Criterion** – Broad subject area to structure the evaluation framework.
- **Sub-topics** – Categories within each criterion to define what topics the criterion will address.
- **Measures** – Evaluative questions associated with each criterion that result in qualitative or quantitative answers.

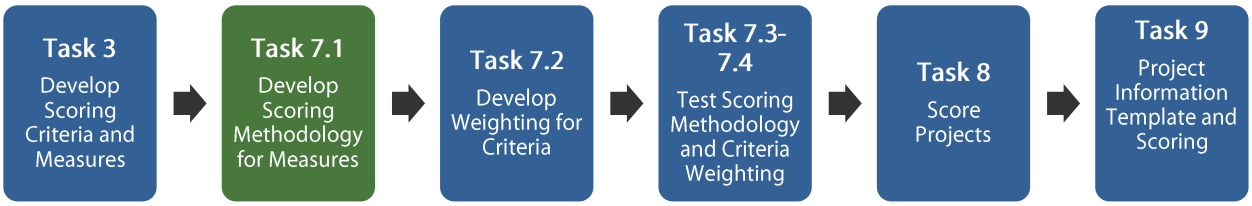
Figure 1: Evaluation Framework



Purpose

The purpose of this memorandum is to summarize the scoring for each measure. Projects are assigned a score ranging from zero to three for every measure. A higher score indicates a higher level of priority, and the project with the most points after final scoring will be the top priority project based on this methodology. County staff will have to make additional decisions about when they actually implement a project based on available funding, coordination with other projects, and political environment. This methodology does not include these considerations. The data sources and methodologies used to arrive at scores for each measure are detailed in later sections of this memorandum. Measure scoring represents a critical, early step in the development of a comprehensive scoring evaluation framework. Figure 2 shows how the work discussed in this memorandum fits into this broader framework.

Figure 2: Project Timeline



Organization of this Tech Memo

The section below, **Scoring Methodologies,** summarizes the data and analysis used to score each measure, organized by criterion. While most of the data comes from the County, additional data was utilized from the EPA and Census Bureau. The detailed tables referenced within the text can be found in Appendix A: Scoring Details by Criterion.

The following section describes the next step of the scoring process, **Calculating aggregated criteria scores,** for each project based on the measures scores for all measures under a given criterion. The criteria scores for each project are the direct inputs for the methodology presented in the accompanying memorandum for Task 7.2.

Finally, the **Alternatives Dismissed After Consideration** section, includes a discussion of criteria and measures considered as part of the analysis, but ultimately not selected for the scoring evaluation framework.

Scoring Methodologies

Equity

Eight measures are divided across two sub-topics: Population Groups and Health Risk Factors. Measures under each of these sub-topics identify the relationship between a given project and (1) the distribution of vulnerable or transportation disadvantaged populations, and (2) occurrence of health risk factors, respectively. Projects in areas with higher concentrations of these population groups or health risk factors score higher. Geographical concentrations of population groups is determined at the US Census block group level.

Sub-topic – Population Groups:

The Population Groups measures is based on data from the Census Bureau. The following measures are included within this sub-topic:

- People of Color
- Limited English Proficiency (LEP)
- Older adults
- Children
- Disability
- Low-income

Sub-topic – Health Risk Factors:

The Health Risk Factors measures is based on data from the EPA (Environmental Toxins) and the County (BMI). The following measures are included within this sub-topic:

- Environmental Toxins
- Body mass index (BMI)

Many projects, such as a major roadway or bikeway corridor project, span multiple block groups. In these cases, each segment of the project is assigned a score for each measure for every block group the project intersects. The project's overall score for a given Equity measure is the average (mean) of all scores for that measure across all applicable block groups.

Table 3 summarizes the methodological approach for scoring for the measures under the Equity criterion.

Safety

Six measures are identified for the Safety criterion, divided among three sub-topics: Existing Crash Information, Potential Crash Information, and Potential Safety Benefits. These measures evaluate projects in the context of safety needs for a transportation facility. Projects achieving the highest scores for the measures in this criterion are those in areas with a history of crashes or greater potential for crashes as well as those that incorporate specific improvements to improve safety for all users.

Sub-topic – Existing Crash Information and Potential Crash Information:

Existing Crash Information and Potential Crash Information data comes from the County. The following measures are included within these sub-topics:

Existing crash information

- Safety priority index system (SPIS) rating
- Severity of crashes
- Pedestrian/bicycle crashes

Potential crash information

- Safety index

Sub-topic – Potential Safety Benefits:

The Potential Safety Benefits is based on details associated with the project description. The following measures are included within this sub-topic:

- Potential safety benefits for non-motorized modes
- Potential safety benefits for motor vehicles

For projects with multiple scores for multiple units of analysis (e.g., a project corridor divided into multiple street segments) for a given Safety measure, the project will score the maximum of all scores.

Table 4 summarizes the methodological approach for scoring for the measures under the Safety criterion.

Mobility

Eight measures are identified for the Mobility criterion, divided into three sub-categories: Infrastructure, Operations, and Capacity. These measures serve to prioritize projects that best address mobility and accessibility needs in the County. Projects that score highest across the measures under the Mobility criterion provide enhanced freedom of mobility as well as improved inter-modal connectivity and accessibility for all users.

Sub-topic - Infrastructure:

Most of the measures within the infrastructure topic are based on data provided by the County (Project Length is the only exception and is based on the project description). The following measures are included within this sub-topic:

- Project length
- Transit connections
- School connections
- ADA compliance

Sub-topic - Operations:

The Operations sub-topic and only measure, Congestion Relief, is based on data from the County, with boundary information from Metro. The following measures are included within this sub-topic:

- Congestion relief

Sub-topic - Capacity:

The three Capacity sub-topics (Vehicle, Bike, and Pedestrian) are based on details associated with the project description. The following measures are included within this sub-topic:

- Vehicle capacity
- Bike capacity
- Pedestrian capacity

For projects with multiple scores for a given Mobility measure, the project will score the maximum of all scores.

Table 5 summarizes the methodological approach for scoring for the measures under the Mobility criterion.

Asset Management

Seven measures are under the Asset Management criterion, divided among three sub-topics: Surface Infrastructure, Structures, and Criticality. These measures evaluate asset condition to prioritize projects

that address insufficient or failing infrastructure or the County's most critical assets. Projects scoring highest for these measures are those that address areas of most urgent need or critical importance.

Sub-topics – Surface Infrastructure, Structures, and Criticality:

All data used within this criterion is from the County. The following measures are included within these sub-topics:

Surface infrastructure

- Pavement condition
- Signalized intersections
- Guardrail
- Shoulder

Structures

- Culverts
- Bridges

Criticality

- Critical roads

For projects with multiple scores for a given Asset Management measure, the project will score the maximum of all scores.

Table 6 summarizes the methodological approach for scoring for the measures under the Asset Management criterion.

Resiliency and Emergency Management

Seven measures identified for the Resiliency and Emergency Management criterion evaluate how projects relate to areas associated with high risk of natural disasters and emergency response operations. The measures are divided among two sub-topics: Known Hazards and Access. The projects that score highest for this criterion are those that are located in areas of high risk hazards and enhance mobility and accessibility for emergency response services.

Sub-topics – Known Hazards and Access:

All data used within this criterion is from the County. Additional data from the Oregon Department of Geology and Mineral Industries (DOGAMI) was integrated into the landslide measure within the Known Hazards sub-topic. The following measures are included within these sub-topics:

Known hazards

- Landslides
- Earthquakes
- Wildfire risk
- Floodplain

Access

- Emergency response proximity
- Emergency transportation routes (ETRs)
- Important Access

For projects with multiple scores for a given Resiliency and Emergency Management measure, the project will score the maximum of all scores.

Table 7 summarizes the methodological approach for scoring for the measures under the Resiliency and Emergency Management criterion.

Sustainability

Four measures are identified under the Sustainability criterion, divided among two sub-topics: Economic Vitality and Environmental Protection. These measures evaluate the relationship between the project location and employment opportunities and high value lands or habitats, respectively. Projects located closer to employment centers and sensitive lands score higher; it is assumed that these projects will contribute positively to increased economic activity and protection of natural resources.

Sub-topics – Economic Vitality:

The Jobs measure is evaluated based on Census Bureau data. The Rural Center and Opportunity Zones uses data from Business Oregon and the County. The following measures are included within this sub-topic:

- Jobs
- Rural centers and opportunity zones

Sub-topics – Environmental Protection:

The Environmental Protection sub-topic measure of High Value Lands is based on data from the Regional Conservation Strategy. The Important Fish Passage Culverts data is from the County. The following measures are included within this sub-topic:

- High value lands
- Important fish passage culverts

For projects with multiple scores for a given Sustainability measure, the project will score the maximum of all scores.

Table 8 summarizes the methodological approach for scoring for the measures under the Sustainability criterion.

Calculating Aggregate Criteria Scores

As noted above within each criterion, projects that receive multiple scores for any one measure will be assigned either the maximum or average of all scores. This occurs on projects that span multiple units of analysis, (Census block groups or street segments). The only criterion where the measure scores are averaged by the mean is the Equity criterion. All other measures are calculated using the maximum of all scores. These calculations will occur when the project location spans across multiple geographies that receive scores. The following examples illustrate these calculations for a project that receives two measure scores (2 and 3):

- Mean measure calculation: 2 + 3 = 5 /2 = 2.5
- Maximum measure calculation: 3 is the maximum value = 3

Once all measure scores have been determined for a given project, aggregate criteria scores are determined by averaging the scores for the measures within each criterion. For example, for a given project, scores for the seven measures under Asset Management are averaged, resulting in an overall Asset Management score for that project. This process yields aggregated criteria scores ranging from zero to three. To make these scores more readily interpretable, aggregated criteria scores are converted to a 100-point scale. Table 1 demonstrates this procedure.

Table 1. Example Calculation of a Project's Aggregate Criteria Score

Asset Management Measure	**Measure Score**
Pavement Condition	1.0
Signalized Intersections	2.0
Guardrail	1.0
Shoulder	1.0
Culverts	0.0
Bridges	0.0
Critical Roads	2.0
AVERAGE	**1.0**
Conversion to 100-pt Scale	**1.0** / 3 * 100 = **33.3**

This procedure is repeated for all six criteria for every project. These aggregate criteria scores are the direct inputs for the next steps in the project scoring framework. These next steps are detailed in the technical memorandum for Task 7.2, which details how to determine a project's total score based its aggregate criteria scores.

Alternatives Dismissed After Consideration

This section provides an overview of a number of alternative criteria and corresponding measures considered by the PMT, but ultimately not selected for testing of the scoring evaluation framework. Table 2 below presents a list of these alternatives and explanation of why they are not included in next steps.

Many measures that consider the project's potential were not included at this level of analysis. Scoring occurred for over 100 projects, with some projects requiring higher level of design than others and we can't adequately compare a project at 0% design to one at 30% design. Where we can measure a project's potential, we have done so at a more general level (e.g. does it add a shoulder or sidewalk, etc.).

Table 2. Alternatives Dismissed After Consideration

Criterion	Measure	Background	Resolution
Equity	E. coli in water bodies	Complete dataset is not available and data would not be integrated into scoring of all projects	Not included in analysis
	Project's potential for improvement (improve air quality, lower obesity/chronic illness, improve access for marginalized communities)	This is a comprehensive analysis of project features that will be developed later as well as assumptions about the project's ability to change behavior, etc. that are difficult to estimate as only a component of the transportation system	Not included in analysis
Safety	ARTS data	Complete dataset is not available and data would not be integrated into scoring of all projects	Not included in analysis and used other safety measures
	Metro high crash corridor	The data used by metro to create high crash corridors incorporates many of the same pieces used in the safety measure(not necessary to use both)	Not included in analysis and used other safety measures
	Near crash	Subjective and not measureable (qualitative interpretation from members of the public and County staff locating areas where "near crash" events occurred)	Developed a safety index that highlights potentially dangerous locations before crashes have occurred
	Safety countermeasures	This is a comprehensive analysis of project features that will be developed later	A potential safety benefits measure was created that addresses more generalized safety improvements
Mobility	ADA Compliance	We considered using the same prioritization methodology that was used to prioritize the ADA ramps through the ADA Transition Plan opposed to the scores the ADA Transition Plan had already developed	We used the scores already developed as part of the ADA Transition Plan

Criterion	Measure	Background	Resolution
	Project's potential for freight improvements	This is a comprehensive analysis of project features that will be developed later	Not included in analysis
	Gap connectivity	Subjective to determine the extent of a distinct road or bike facility	Not included in analysis
	Opportunity to connect multiple modes (e.g. bike facility with transit stop)	Subjective and data not available	Not included in analysis
	Project's potential to improve access to transit and schools	This is a comprehensive analysis of project features that will be developed later as well as assumptions about the project's ability to change behavior, etc. that are difficult to estimate as only a component of the transportation system	Not included in analysis
	Project's potential to improve level of service and improve traffic flow		Not included in analysis
Asset Management	Culvert material	County staff created a rating of culverts based on age (not necessary to use both)	Culvert condition covered in fish culvert dataset
	Street markings	Subjective and not measureable (qualitative interpretation from members of the public and County staff)	Not included in analysis
Resiliency and Emergency Management	Project's potential to improve operations during/after an emergency	This is a comprehensive analysis of project features that will be developed later as well as assumptions about the project's ability to change behavior, etc. that are difficult to estimate as only a component of the transportation system	Not included in analysis
	Project's potential to reduce damage from known hazards		Not included in analysis
	Project's potential to provide continuous access and for how many people after a major hazard event		Not included in analysis
	Project's potential to reduce risk for public		Not included in analysis
	Provides alternative routes	This would require use of Network Analysis and this capability isn't available right now, but it could be something utilized in the future	Not included in analysis and used other measure to assess access
Sustainability	Significant environmental concern	Riparian and upland habitat were identified as the most sensitive environment land use	A more appropriate dataset was used (high value lands)
Cost	Design and construction	This is a comprehensive analysis of project features that will be developed later and the public/management team did not want the project cost to be included as part of the score	Not included in analysis and instead will be part of the decision making process related to implementation
	Ability to fund project		
	Ability to proceed independently with phasing		

Appendix A: Scoring Details by Criterion

Table 3: Equity Measures Scoring Methodology

Sub-topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Population Groups	People of Color	Evaluation of concentration of the minority population (all non-white populations, including the Hispanic/Latino population) in project area	Projects located within higher concentrations of population groups of Census Block Groups will score higher	Existing	Zero population	Lowest third ≤0.1737	Middle third ≤0.3046	Highest third ≤0.7319
	Limited-English Proficiency	Evaluation of concentration of people with Limited-English proficiency in project area			Zero population	Lowest third ≤0.0507	Middle third ≤0.0911	Highest third ≤0.2322
	Older adults	Evaluation of concentration of older adults (ages 65+) in project area			Zero population	Lowest third ≤0.0182	Middle third ≤0.1331	Highest third ≤0.5275
	Children	Evaluation of concentration of children (ages 5-17) in project area			Zero population	Lowest third ≤0.0507	Middle third ≤0.09114	Highest third ≤0.2322
	Disability	Evaluation of concentration of households with one or more persons with a disability in project area			Zero population	Lowest third ≤0.1073	Middle third ≤0.1753	Highest third ≤0.5323
	Low-income	Evaluation of concentration of low-income will be calculated based on the Federal Poverty Limit from the US Department of Health and Human Services in project area			Zero population	Lowest third ≤0.0832	Middle third ≤0.1641	Highest third ≤0.7557
Health Risk Factors	Environmental Toxins	Evaluation of particulate matter 2.5 ppm (fine particulate matter in the air) concentration in project area	Projects located within higher concentrations of environmental factors will score higher		No PM 2.5	Lowest third ≤9.76	Middle third ≤10.06	Highest third ≤10.41
	Health Indicators	Evaluation of Body Mass Index (BMI) in project area			Zero population	Lowest third ≤25.413	Middle third ≤26.708	Highest third ≤28.597

Table 4: Safety Measures Scoring Methodology

Sub-Topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Existing Crash Information	Safety priority index system (SPIS) rating	Evaluation of number of crashes based on the SPIS rating, which includes frequency, rate, and severity in project area	Projects located within higher SPIS rating areas will score higher	Existing	No crashes	N/A	Project is located within a half mile or less of a corridor of the top 10 percentile SPIS rating group	Project is located within a corridor of the top 10 percentile SPIS rating group
	Severity of Crashes	Evaluation of severity of crashes in project area with higher points allocated for locations/areas with fatalities in project area	Projects located within areas containing more severe crashes will score higher	Existing	No crashes	Crashes identified within the project area/location contain property damage only (PDO)	Crashes identified within the project area/location contain at least one non-fatal injury	Crashes identified within the project area/location that have fatal
	Pedestrian/Bicycle Crashes	Evaluation of presence and severity of pedestrian and/or bicycle crashes in project area	Projects located with pedestrian/bicycle crashes will score higher	Existing	No pedestrian **OR** bicycle crashes	Crashes include a pedestrian **OR** bicycle crash **AND** results in property damage only (PDO)	Crashes include a pedestrian **OR** bicycle crash **AND** result in a non-fatal injury	Crashes include a pedestrian **OR** bicycle crash **AND** result in a fatality
Potential Crash Information	Safety Index	Evaluation of factors related to crashes (roughly based on ODOT's priority safety corridor concept) in project area	Projects located with more unsafe conditions will score higher	Existing	Two situations: 1) Posted speed is 25 miles per hour or lower and 2) 30-35 miles per hour **AND** under 12,000 average daily traffic **OR** one or two lanes in one direction	• Posted speed is 40 miles per hour or greater, **OR** • Speed limit 30-35 miles per hour, more than two lanes in one direction, **OR** • 12,000 or greater annual average daily traffic	• Posted speed is 40 miles per hour or greater **AND** one of the following: • More than two lanes in one direction, **OR** • 12,000 or greater annual average daily traffic	• Posted speed is 40 miles per hour or greater **AND** • More than two lanes in one direction **AND** • 12,000 or greater annual average daily traffic
Potential Safety Benefits	Potential Safety Benefits for Non-motorized Modes	Evaluation of project description for pedestrian and bicyclist safety improvement components	Projects involving safety components that also include a pedestrian and/or bicycle component will score higher	Project	Safety not listed in project description	Shoulder creation or enhancement included in project description	Sidewalk or bike lane included in project description	Multi-use path or buffered bike lane included in project description
	Potential Safety Benefits for Motor Vehicles	Evaluation of project description for motor vehicle safety improvement components	Projects involving any safety improvements for motor vehicles will score higher. The project description will be searched for "safety improvement"	Project	No safety improvements listed in project description	Safety improvement listed within project description	N/A	N/A

Table 5: Mobility Measures Scoring Methodology

Sub-topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Infrastructure	Project Length	Evaluation of project length	Projects with longer extents will score higher	Project	Project length is at an intersection	Project length is less than a mile	Project length is 1-2 miles	Project length is 2+ miles
	Transit Connections	Evaluation of connections to transit in project area	Projects located near bus stops will score higher	Existing	No bus stops within a half mile	Project located within half mile of a bus stop	Project located within quarter mile of a bus stop	Project located within 500 feet of a bus stop
	School Connections	Evaluation of connections to schools in project area	Projects located near schools will score higher	Existing	No schools within a half mile	Project located within a half mile of a school	Project located within a quarter mile of a school	Project located within 500 feet of a school
	ADA Compliance	Evaluation of ramp condition and ADA compatibility of curb ramps sharing the same roadway or intersection of the project. Tiers are taken from the ADA Transition Plan that already incorporate prioritization for improvements.	Projects located near ADA deficiencies will score higher	Existing	No ADA ramp located within project extent	Project located at or includes an intersection with ramp score of lowest priority for replacement and repair (scores 1-7 | Tiers 5 and 6)	Project located at or includes an intersection with ramp score of medium priority for replacement and repair (scores 8-15 |Tiers 3 and 4)	Project located at or includes an intersection with ramp score of highest priority for replacement and repair (scores 16-30 | Tiers 1 and 2)
Operations	Congestion Relief	Evaluation of areas of congestion based on Metro congestion information for areas within the Metro jurisdiction and lanes/ADT for areas outside of the Metro jurisdiction in project area	Projects located in area with more congestion will score higher	Existing	N/A	For areas outside the Metro jurisdiction, if PM peak ADT per lane is less than 1,500	For areas outside the Metro jurisdiction, if PM peak ADT per lane is between 1,500-1,700	For areas outside the Metro jurisdiction, if PM peak ADT per lane is between 1,700-1,800
Capacity	Vehicle Capacity	Evaluation of project description for increased vehicle capacity	Project that increases capacity will score higher	Project	Project does not add capacity	Project adds capacity for cars (key words in project description: new lanes, turn lanes, center turn lane)	N/A	N/A
	Bike Capacity	Evaluation of project description for increased bike capacity	Project that increases capacity will score higher	Project	Project does not add capacity	Project adds capacity for bike (key words in project description: shoulder, bike lane, multiuse path)	N/A	N/A
	Pedestrian Capacity	Evaluation of project description for increased pedestrian capacity	Project that increases capacity will score higher	Project	Project does not add capacity	Project adds capacity for ped (key words in project description: sidewalk and multi-use path and for rural projects: shoulders)	N/A	N/A

Table 6: Asset Management Measures Scoring Methodology

Sub-topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Surface Infrastructure	Pavement Condition	Evaluation of pavement condition index in project area	Project located at poor pavement condition locations will score higher	Existing	Project extent is located on a roadway with 100 PCI	Project extent is located on a roadway with 70-99 PCI	Project extent is located on a roadway with 51-69 PCI	Project extent is located on a roadway with less than 50 PCI
	Signalized Intersections	Evaluation of condition of signalized intersections in project area	Project located at signalized intersections of a worse condition score higher	Existing	Project does not include signalized intersections	Project extent includes a signal in Good condition (scored a 1 by County staff)	Project extent includes a signal in Fair condition, defined as installed before 1995 (scored a 2 by County staff)	Project extent includes a signal in Poor condition, defined as a failed signal (scored a 3 by County staff)
	Guardrail	Evaluation of condition of current guardrail or slope hazard location without guardrail in project area	Project located at failed guardrail locations or that should have guardrail will score higher	Existing	Project extent is not located within slope hazard area	Project extent includes guardrail with "pass" rating in slope hazard area	N/A	Project extent includes guardrail with "fail" or "unknown" rating **OR** no guardrail in slope hazard area
	Shoulder	Evaluation of shoulder width in project area	Project located where no shoulder exists will score higher	Existing	Project extent includes a shoulder > 6 feet	Project extent includes a shoulder >4 but <6 feet	Project extent includes shoulder is >2 but <4 feet	Project extent includes no shoulder
Structures	Culverts	Evaluation of culvert condition and installation date in project area	Project located near culverts in worse condition will score higher	Existing	Project extent includes a culvert that is in Good condition, and/or has been installed recently	Project extent includes a culvert in Fair condition, and/or has been installed at least 10 years prior to current year	Project extent includes a culvert in Poor condition and/or has been installed at least 35 years prior to current year	Project extend includes a culvert in Critical condition and/or has been installed at least 50 years prior to current year
	Bridges	Evaluation of ODOT bridge sufficiency rating and structure condition in project area	Project extent that includes a bridge with lower sufficiency score will score higher	Existing	Sufficiency rating is 91-100, structure and elements are in very good condition, or project extent does not include a bridge	Project extent includes bridge with a sufficiency rating within 81-90 or minor to moderate work is recommended	Project extent includes bridge with a sufficiency rating 51-80 or major work is recommended	Project extent includes bridge with a sufficiency rating within 0-50 or replacement is recommended
Criticality	Critical Roads	Evaluation of functional class and snow plowing priority in project area	Project extent that includes a road segment that has plowing priority and higher functional class will score higher	Existing	Project is on a second tier snow route and is local/gravel	Project is on a first or second tier snow route and is local	Project is on a first tier or second tier snow route and is a Collector or Arterial	Project is on a first tier snow route and is an Arterial

Table 7: Resiliency and Emergency Management Measures Scoring Methodology

Sub-topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Known Hazards	Landslides	Evaluation of landslide susceptibility in project area	Projects located within higher risk areas of known hazards will score higher	Existing	Project not located within an area susceptible to landslides	N/A	N/A	Project located within an area susceptible to landslides
	Earthquakes	Evaluation of potential damage from earthquakes in project area		Existing	Project not located within an area susceptible to high damage area	N/A	N/A	Project located within heavy damage potential area
	Wildfire Risk	Evaluation of wildfire risk in project area		Existing	Not within area for wildfire risk	N/A	N/A	Project located within area for wildfire risk
	Floodplain	Evaluation of proximity to the 100 year floodplain in project area		Existing	Project not located within the floodplain	N/A	N/A	Project located within the floodplain
Access	Emergency Response Proximity	Evaluation of access to emergency shelters, law enforcement, medical facilities, and urgent care centers in project area	Projects located closer to emergency services will score higher	Existing	Project not located adjacent to any emergency service locations within a mile	Project located up to one emergency service locations within a mile	Project located up to three emergency service locations within a mile	Project located at least four emergency service locations within a mile
	ETRs	Evaluation of emergency transportation routes (ETR) in project area	Projects located along ETRs will score higher	Existing	Project not located along an ETR	N/A	N/A	Project located along an ETR
	Important Access	Evaluation of important access in project area	Access to state facility, across a pinch point (bridge) or only way in/out of a tourist destination will score higher.	Project	Project not located within any polygons	Polygon covers a low ADT road	Polygon covers a mid ADT road	Polygon covers a high ADT road

Table 8: Sustainability Measures Scoring Methodology

Sub-topic	Measure	Description of Evaluation	Assumption	Type of Analysis	SCORE			
					0 (no points)	1 (low)	2 (medium)	3 (high)
Economic Vitality	Jobs	Evaluation of primary jobs located within a quarter mile of project area	Project located within higher concentrations of jobs will score higher	Existing	Project not located near any jobs	Project located within lowest third of jobs within unincorporated Multnomah County	Project located within middle third of jobs within unincorporated Multnomah County	Project located within highest third of jobs within unincorporated Multnomah County
	Rural Centers and Opportunity Zones	Evaluation of rural areas and opportunity zones in project area	Project located in rural centers and opportunity zones will score higher	Existing	Project not located in any rural center or opportunity zone	N/A	N/A	Project located in rural center or opportunity zone
Environmental Protection	High Value Lands	Evaluation of sensitive fish and wildlife habitats in project area	Project located within high value lands areas will rank higher because it is implied that they will have to improve the area if they construct a project	Existing	Project not located within high value habitat lands area	N/A	N/A	Project located within high value habitat lands area
	Important Fish Passage Culverts	Evaluation of streams in project area. This is a stream quality proxy because we do not have data for all streams.	Project extent that includes high ranking fish passage culvert projects from the 2015 CIP will score higher. This assumes that projects on/near a fish passage culvert should score higher because it is more critical.	Existing	Neither regional nor local and not 5 year priority	Regional or local but not 5 year priority	Local and 5 year priority	Regional and 5 year priority

Appendix B: GIS Methodology

This document describes the methodology completed within GIS to complete the scoring for all measures. The descriptions of measures are the same as the measures table above but include additional information related to data as necessary. File paths and internal DEA references have been included to expedite any clarification questions the county has for DEA.

1. Equity

Population Groups

People of Color

Evaluation of concentration of the minority population (all non-white populations, including the Hispanic/Latino population) in project area. Total minority population (B03002) divided by total population at block group level.

Limited-English Proficiency

Evaluation of concentration of people with Limited-English (LEP) proficiency in project area. LEP population (B16004) divided by total population at block group level.

Older Adults

Evaluation of concentration of older adults (ages 65+) in project area. Population 65 and older (B01001) divided by total population at block group level.

Children

Evaluation of concentration of children (ages 5-17) in project area. Population ages 10-17 (B01001) divided by total population at block group level.

Disability

Evaluation of concentration of households with one or more persons with a disability in project area. C2007 divided by total population at block group level.

Low-income

Evaluation of concentration of low-income will be calculated based on the Federal Poverty Limit from the US Department of Health and Human Services in project area. Federal Poverty Limit multiplied by two at block group level.

Health Risk Factors

Environmental Toxins (Particulate matter)

Evaluation of particulate matter 2.5 ppm (fine particulate matter in the air) concentration in project area. Particulate Matter 2.5 at block group level. Data downloaded from: https://www.epa.gov/ejscreen.

Health indicators (BMI)

Evaluation of Body Mass Index (BMI) in project area. Average BMI at block group level.

Table 9: GIS Equity Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Equity	**Population Groups**	People of Color	**No** population	Lowest third ≤0.1737	Middle third ≤0.3046	Highest third ≤0.7319	E_Minority	PCT_MINORI	Equity_Blockgroups	Average score for block groups intersected by project extent for non-white persons divided by population	ACS, 5-year estimates	2016
		LEP		Lowest third ≤0.0507	Middle third ≤0.0911	Highest third ≤0.2322	E_LEP	TOTAL_PCT_	Equity_Blockgroups	Average score for block groups intersected by project extent for LEP persons divided by population	ACS, 5-year estimates	2016
		Older adults		Lowest third ≤0.0182	Middle third ≤0.1331	Highest third ≤0.5275	E_Older_Adults	PCT_65_PLU	Equity_Blockgroups	Average score for block groups intersected by project extent for persons aged 65+ divided by population	ACS, 5-year estimates	2016
		Children		Lowest third ≤0.0507	Middle third ≤0.09114	Highest third ≤0.2322	E_Children	PCT_10_17	Equity_Blockgroups	Average score for block groups intersected by project extent for persons aged 10-17 divided by population	ACS, 5-year estimates	2016
		Disability		Lowest third ≤0.1073	Middle third ≤0.1753	Highest third ≤0.5323	E_Disability	PCT_DISABI	Equity_Blockgroups	Average score for block groups intersected by project extent for persons with disability divided by population	ACS, 5-year estimates	2016
		Low-income		Lowest third ≤0.0832	Middle third ≤0.1641	Highest third ≤0.7557	E_Low_Income	PCT_200_FP	Equity_Blockgroups	Average score for block groups intersected by project extent for households (HH) earning less than 200% FPG by total HHs	ACS, 5-year estimates	2016
	Health Risk Factors	Environmental Toxins	**No** PM 2.5	Lowest third ≤9.76	Middle third ≤10.06	Highest third ≤10.41	E_Env_Toxins	PCT_Partic	Equity_Blockgroups	Average score for block groups intersected by project extent for PM 2.5 concentration	EPA	2017
		BMI	**No** population	Lowest third ≤25.413	Middle third ≤26.708	Highest third ≤28.597	E_Health_Indicators	meanBMI_AA	Equity_Blockgroups	Average score for block groups intersected by project extent for BMI	County	2016

2. Safety

Existing Crash Information

Safety Priority Index System (SPIS) Rating

Evaluation of number of crashes based on the SPIS rating, which includes frequency, rate, and severity, in project area.

Severity of Crashes

Evaluation of severity of crashes with higher points allocated for locations/areas with fatalities in project area.

Pedestrian/Bicycle Crashes

Evaluation of presence and severity of pedestrian and/or bicycle crashes in project area.

Potential Crash Information

Safety Index

Evaluation of factors related to crashes (roughly based on ODOT's priority safety corridor concept) in project area.

Potential Safety Benefits

Potential Safety Benefits for Non-motorized Modes

Evaluation of project description for pedestrian and bicyclist safety improvement components.[1]

Potential Safety Benefits for Motor Vehicles

Evaluation of project description for motor vehicle safety improvement components.[2]

Table 10: GIS Safety Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Safety	**Existing Crash Information**	(SPIS) rating	**No** crashes	N/A	Project is located within a half mile or less of a corridor of the top 10 percentile SPIS rating group	Project is located within a corridor of the top 10 percentile SPIS rating group	S_SPIS	IN_OUT	Safety_SPIS	Location of project in relation to a SPIS location or half mile buffer around SPIS locations	ODOT	2015-2017
		Severity of Crashes		Crashes identified within the project area/location contain property damage only (PDO)	Crashes identified within the project area/location contain at least one non-fatal injury	Crashes identified within the project area/location that have fatal	S_Severity_Crashes	Crash_Severity_MV_Bike_Ped	Safety_Crashes	Extraction of highest score in project area	County	2008-2018
		Pedestrian/ Bicycle Crashes		Crashes include a pedestrian **OR** bicycle crash **AND** results in property damage only (PDO)	Crashes include a pedestrian **OR** bicycle crash **AND** result in a non-fatal injury	Crashes include a pedestrian **OR** bicycle crash **AND** result in a fatality	S_Ped_Bike_Crashes	Crash_Severity_MV_Bike_Ped	Safety_Crashes	Extraction of highest score in project area	County County	2008-2018
	Potential Crash Information	Safety Index	Two situations: 1) Posted speed is 25 miles per hour or lower and 2) 30-35 miles per hour **AND** under 12,000 average daily traffic **OR** one or two lanes	• Posted speed is 40 miles per hour or greater, OR • Speed limit 30-35 miles per hour, more than two lanes, OR • 12,000 or greater annual average daily traffic.	• Posted speed is 40 miles per hour or greater AND one of the following: • More than two lanes, OR • 12,000 or greater annual average daily traffic	• Posted speed is 40 miles per hour or greater AND • More than two lanes AND • 12,000 or greater annual average daily traffic	S_Safety_Index	SPEED	CIP19_Final_Scoring	Extraction of high risk roads that have higher potential to have crashes in the project area	County	2010-2018
								Lanes	CIP19_Final_Scoring		County	2018
								ADT_2018	CIP19_Final_Scoring		County	2018
	Potential Safety Benefits	Potential Safety for Non-motorized	"Shoulder", "Sidewalk", "Multi-use path" **not** in project description	"Shoulder" in project description	"Sidewalk" in project description	"Multi-use path" in project description	S_NonMotor_Benefits	Project_Description	CIP19_Final_Scoring	Search by keyword of project description	Project Description	2019
		Potential Safety for Motor Vehicles	"Safety" **not** in the project description	"Safety" in project description	N/A	N/A	S_Motor_Benefits	Project_Description	CIP19_Final_Scoring	Search by keyword of project description and manual review	Project Description	2019

[1] To identify pedestrian and bicyclist safety improvements, the project descriptions provided by Multnomah County are searched for the keywords: shoulder, sidewalk, multi-use path, bike lane, and buffered bike lane. Common misspellings, style differences, and synonyms for these keywords are also incorporated into the search (e.g., for “multi-use path”, “multiuse path”, “multi use path”, “shared path”, etc. are also searched)

[2] To identify motor vehicle safety improvements, the project descriptions provided by Multnomah County are searched for the keywords: safety, improve, and reduce. Common misspellings, style differences, and synonyms for these keywords are also incorporated into the search. Project descriptions containing one or more of these keywords were flagged for manual review to confirm that project involved a motor vehicle safety improvement.

3. Mobility

Infrastructure

Project Length

Evaluation of project length.

Transit Connections

Evaluation of connections to transit in project area.

GIS Methodology:

Original Layer: N:\GIS\rlis_latest\TRANSIT\busstops.shp

1. Clip 'busstops.shp' to 'MultCo_halfmileBuffer' = 'MC_Busstops'
2. Buffer 'MC_busstops' 500 feet = 'MC_busstops_500ft'
3. Buffer 'MC_busstops' ¼ mile = 'MC_busstops_quartermile'
4. Buffer 'MC_busstops' ½ mile = 'MC_busstops_half mile'
5. Append 'MC_busstops_500ft' to 'MC_busstops_quartermile'
6. Append 'MC_busstops_quartermile' to 'MC_busstops_halfmile'
7. Delete unnecessary fields, but keep "KEYITEM" (unique ID)
8. Dissolve 'MC_busstops_halfmile' by field: "BUFF_DIST"

School Connections

Evaluation of connections to schools in project area.

GIS Methodology:

Original Layer: P:\M\MULT00000109\0600INFO\GS\Data\Shapes\Data from Metro\schools.shp

1. Buffer schools.shp 500 feet = 'Schools_500feet'
2. Buffer schools.shp ¼ mile = 'Schools_QuartMile'
3. Buffer schools.shp ½ mile = 'Schools_HalfMile_Buf'
4. Append 'Schools_500feet' to 'Schools_QuartMile'
5. Append 'Schools_QuartMile' to 'Schools_HalfMile_Buf'
6. Buffer Multnomah County polygon half mile = 'MultCo_halfmileBuffer'
7. Clip 'METRO_schools_buffers' to 'MultCo_halfmileBuffer'
8. Dissolve 'MultCo_Schools_Buffers' by field: "BUFF_DIST"

ADA Compliance

Evaluation of ramp condition and ADA compatibility of curb ramps sharing the same roadway or intersection of the project. Tiers are taken from the ADA Transition Plan that already incorporate prioritization for improvements.

GIS Methodology:

1. Buffer 'MultCo_ROW_Master2' by 50 feet = 'MC_ROW_50ftBuf'
2. Clip 'ADA_Ramps' to 'MC_ROW_50ftBuf' = 'MC_ROW_50ftBuf_ADA_clip'
3. Clip 'RLIS_Intersection_MultCoSub' to 'MC_ROW_50ftBuf_inter_clip'
4. Add *Sequential Number* Field (starting at 100) called "Intersection_ID" to 'MC_ROW_50ftBuf_inter_clip'
5. 'MC_ROW_50ftBuf_ADA_clip' NEAR 'MC_ROW_50ftBuf_inter_clip' By 65 feet
6. JOIN 'MC_ROW_50ftBuf_inter_clip' "OBJECTID" to 'MC_ROW_50ftBuf_ADA_clip' "NEAR_FID"
7. Export features to: P:\M\MULT00000109\0600INFO\GS\Maps\Task 7\Mobility\ADA_Compliance\Mob_ADAcompliance.gdb\MultCo_ADAramps_IntersectionID
8. Select By Attributes: "Location_ID" Begins With 'D' or 'M'; Delete Rows (midway and driveway ADA ramps)
9. Clean up table of any <NULL> values, match intersections to ADA ramps
10. Add two new fields: "Tier" and "M_ADA_Score"; Select by Attributes and Calculate fields based on Scoring above.

Operations

Congestion Relief

Evaluation of areas of congestion based on Metro congestion information for areas within the Metro jurisdiction and lanes/ADT for areas outside of the Metro jurisdiction in project area.

GIS Methodology:

[ADT_2018] * 0.1 / [Travel_Lanes] = [PM peak per Lane]

Capacity

Vehicle Capacity

Evaluation of project description for increased vehicle capacity.[3]

Bike Capacity

Evaluation of project description for increased bike capacity.[4]

Pedestrian Capacity

Evaluation of project description for increased pedestrian capacity.[5]

[3] To identify increased vehicle capacity, the project descriptions provided by Multnomah County are searched for the keywords: lane and widen. Common misspellings, style differences, and synonyms for these keywords are also incorporated into the search. Project descriptions containing one or more of these keywords were flagged for manual review to confirm that project involved increased vehicle capacity (e.g. a new turn lane rather than a new bike lane).

[4] To identify increased bicycle capacity, the project descriptions provided by Multnomah County are searched for the keywords: multi-use path, bike lane, buffered bike lane, and shoulder. Common misspellings, style differences, and synonyms for these keywords are also incorporated into the search.

[5] To identify increased pedestrian capacity, the project descriptions provided by Multnomah County are searched for the keywords: multi-use path, sidewalk, and shoulder (for projects in rural areas). Common misspellings, style differences, and synonyms for these keywords are also incorporated into the search.

Table 11: GIS Mobility Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Mobility	**Infrastructure**	Project Length	Located at intersection	Less than a mile	1-2 miles	2+ miles	M_Project_Length	Shape_Length	CIP19_Final_Scoring	ESRI Shape_Length dissolved and summed by project number	Project Description	2019
		Transit Connections	**No** bus stops within a half mile	Within 0.5 mile of bus stop	Within 0.25 mile of bus stop	Within 500 feet of bus stop	M_Transit_Connections	Distance_Busstop	Mobility_Connections_Transit_Schools	Location of project in relation to bus stops	County	2018
		School Connections	**No** schools within a half mile	Within 0.5 mile of school	Within 0.25 mile of school	Within 500 feet of school	M_School_Connections	Distance_Schools	Mobility_Connections_Transit_Schools	Location of project in relation to schools	County	2018
		ADA Compliance	**No** ADA deficiencies	Ramp score of 1-7 (Tiers 5 and 6)	Ramp score of 8-15 (Tiers 3 and 4)	Ramp score of 16-30 (Tiers 1 and 2)	M_ADA_Compliance	ADA_Ramp_1	Mobility_ADA_Compliance	Extraction of highest score in project area	County	2018
	Congestion Relief	Congestion Relief	N/A	PM peak ADT per lane is less than 1,500	PM peak ADT per lane is between 1,500-1,700	PM peak ADT per lane is between 1,700-1,800	M_Congestion_Relief	PM_Peak	CIP19_Final_Scoring	Extraction of high congested roads in project area	County (Metro for boundary)	2018
	Capacity	Vehicle Capacity	"Lane" **not** in project description	"Lane" in project description and verified for vehicles	N/A	N/A	M_Vehicle_Capacity	Project_Description	CIP19_Final_Scoring	Search by keyword of project description and manual review	Project Description	2019
		Bike Capacity	"Shoulder," "Bike lane", "Multi-use path" **not** in project description	"Shoulder," "Bike lane", "Multi-use path" in project description)	N/A	N/A	M_Bicycle_Capacity	Project_Description	CIP19_Final_Scoring	Search by keyword of project description	Project Description	2019
		Pedestrian Capacity	"Sidewalk, "Multi-use path" **not** in project description and "Shoulders" **not** in project description for rural projects	"Sidewalk, "Multi-use path" in project description and "Shoulders" in project description for rural projects	N/A	N/A	M_Pedestrian_Capacity	Project_Description	CIP19_Final_Scoring	Search by keyword of project description	Project Description	2019

4. Asset Management

Surface Infrastructure

Pavement Condition

Evaluation of pavement condition index in project area.

Signalized Intersections

Evaluation of condition of signalized intersections in project area.

Guardrail

Evaluation of condition of current guardrail or slope hazard location without guardrail in project area.

Shoulder

Evaluation of shoulder width in project area. Shoulder widths is calculated using the shoulder feature class from Task 4.05, Feature Extraction. For point features; i.e. culverts, intersections, and roadway issues, a 40 foot tolerance is set for locating shoulders nearby.

GIS Methodology:

1. Query "Shoulders": Surface_Type = 'Paved'
2. Buffer Paved_Shoulders 40 feet
3. Intersect with CIP_Projects

Structures

Culverts

Evaluation of culvert condition and installation date of culverts in project area.

Bridges

Evaluation of ODOT bridge sufficiency rating and structure condition of bridges in project area.

Criticality

Evaluation of functional class and snow plowing priority in project area.

Table 12: GIS Asset Management Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Asset Management	Surface Infrastructure	Pavement Condition	Project extent is located on a roadway with 100 PCI	Project extent is located on a roadway with 70-99 PCI	Project extent is located on a roadway with 51-69 PCI	Project extent is located on a roadway with less than 50 PCI	A_Pavement_Condition	PCI	CIP19_Final_Scoring	Extraction of highest score in project area	County	2018
		Signalized Intersections	Project does not include signalized intersections	Project extent includes a signal scored a 1 by County staff	Project extent includes a signal installed before 1995 (scored a 2 by County staff)	Project extent includes a failed signal (scored a 3 by County staff)	A_Signalized_Intersections	CIPscore	Asset_Management_Signalized_Intersections	Extraction of highest score in project area	County	2018
		Guardrail	Project extent is not located within slope hazard area	Project extent includes guardrail with "pass" rating in slope hazard area	N/A	Project extent includes guardrail with "fail" or "unknown" rating OR no guardrail in slope hazard area	A_Guardrails	Pass	Asset_Management_Guardrail	Identification of guardrail improvements and pass/fail scores for slope hazard areas	County	2018
								SlopeHazar	Asset_Management_Guardrail		County/DOGAMI	2018
		Shoulder	Project extent includes a shoulder > 6 feet	Project extent includes a shoulder >4 but <6 feet	Project extent includes shoulder is >2 but <4 feet	Project extent includes no shoulder	A_Shoulders	WIDTH	Asset_Management_Shoulder	Identification of paved shoulder width within a project extent	DEA	2018
								Surface_Type	Asset_Management_Shoulder		DEA	2018
	Structures	Culverts	Project extent includes a culvert that is in Good condition, and/or has been installed recently	Project extent includes a culvert in Fair condition, and/or has been installed at least 10 years prior to current year	Project extent includes a culvert in Poor condition and/or has been installed at least 35 years prior to current year	Project extend includes a culvert in Critical condition and/or has been installed at least 50 years prior to current year	A_Culverts	CIPRating	Asset_Management_Culverts	Extraction of highest score in project area	County	2018
		Bridges	Sufficiency rating is 91-100, structure and elements are in very good condition, or project extent does not include a bridge	Project extent includes bridge with a sufficiency rating within 81-90 or minor to moderate work is recommended	Project extent includes bridge with a sufficiency rating 51-80 or major work is recommended	Project extent includes bridge with a sufficiency rating within 0-50 or replacement is recommended	A_Bridges	Sufficienc	Asset_Management_Bridges	Extraction of highest score in project area	County	2016

	Criticality	Critical Roads	Project is on a second tier snow route and is local/gravel	Project is on a first or second tier snow route and is local	Project is on a first tier or second tier snow route and is a Collector or Arterial	Project is on a first tier snow route and is an Arterial	A_Critical_Roads	CIPscore	Asset_Management_Critical_Roads	Evaluation of critical roads for emergency or hazardous situations	County	2019

5. Resiliency and Emergency Management

Known Hazards

Landslide

Evaluation of landslide susceptible areas in project area.

Earthquakes

Evaluation of potential damage from earthquakes in project area. Based on Multnomah County gridcode index ranges damage potential is defined as: less than or equal to 160 (light); 161 to less than or equal to 310 (moderate); and 311 to 478 (heavy).

Wildfire Risk

Evaluation of proximity to wildfire risk in project area.

Floodplain

Evaluation of the 100 Year floodplain in project area.

Access

Proximity to Emergency Services

Evaluation of access to emergency shelters, law enforcement, medical facilities, and urgent care centers in project area.

GIS Methodology:

1. Join Law_Enforcement, Urgent_Care_facilities, and Hospitals
2. Buffer 1 mile

ETRs

Evaluation of projects in proximity to emergency transportation routes in project area.

Important Access

Evaluation of important access in project area. Polygons have been created to represent the measure. Polygons are scored based on the volumes of the road.

Table 13: GIS Resiliency and Emergency Management Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Emergency Management	**Known Hazards**	Landslides	Project not located within an area susceptible to landslides	N/A	N/A	Project located within an area susceptible to landslides	EM_Landslides	gridcode	Emergency_Management_Floodplains	Location of projects in relation to landslide susceptible areas	DOGAMI for supplemental	2018
		Earthquakes	Project not located within an area susceptible to high damage area	N/A	N/A	Project located within heavy damage potential area	EM_Earthquakes	gridcode	Emergency_Management_Floodplains	Location of projects in relation to high damage potential area from earthquakes	County	2016
		Wildfire Risk	Not within area for wildfire risk	N/A	N/A	Project located within area for wildfire risk	EM_Wildfire_Risk	COMM_NAME	Emergency_Management_Wildfire	Location of projects in relation to wildfire risk	County	2016
		Floodplain	Project not located within the floodplain	N/A	N/A	Project located within the floodplain	EM_Floodplains	CATEGORY_1	Emergency_Management_Floodplains	Location of project in relation to FEMA 100-year floodplain	County	2018

	Access	Emergecy Response Proximity	Project not located adjacent to any emergency service locations within a mile	Project located up to one emergency service locations within a mile	Project located up to three emergency service locations within a mile	Project located at least four emergency service locations within a mile	EM_Emergency_Response	Num_Eswithin_1mile	Emergency_Management_Response_Proximity	Location of project in relation to emergency service locations	County	2016-2018
		ETRs	Project not located along an ETR	N/A	N/A	Project located along an ETR	EM_ETRs	ETR_Road	Emergency_Management_ETRs	Location of a project in relation to an emergency transportation route	County	2018
		Important Access	Project not located within any polygons	Polygon covers a low ADT road	Polygon covers a mid ADT road	Polygon covers a high ADT road	EM_Important_Access	Score	Emergency_Management_Access	Location of a project in relation to important access roads	County	2019

6. Sustainability

Economic Vitality

Jobs

Evaluation of primary jobs located within a quarter mile of project area.

GIS Methodology:

1. Buffer 'jobs' ¼ mile
2. Join to CIP_Projects_Cntrline
3. Dissolve by Project_Number, Statistic field: c000, Sum

Rural Centers and Opportunity Zones

Evaluation of urban and rural centers in project area. Data downloaded from:
https://www.oregon4biz.com/Opportunity-Zones/

Opportunity Zones

GIS Methodology:

1. Query: Tract = "11.01" , "21" , "23.03" , "51" , "56" , "73" , "81" , "82.01" , "100.01" , "106" , "96.03" , "96.04" , "98.01" , "97.01" , "101" , "103.04" , "57"

Rural Centers

GIS Methodology:

1. Query: ZONE="RC" , "BRC" , "PHRC" , "SRC" , "OR" , "OCI" , "GGRC" , "C3" , "UF20" , "LM"

(RC)Rural Center

(BRC)Burlington Rural Center

(PH-RC)Pleasant Home Rural Center

(SRC)Springdale Rural Center

(OR)Orient Rural Center Residential

(OCI)Orient Commercial – Residential

(RC)Corbett Rural Center

(C-3)Retail Commercial (172nd and Foster)

(UF-20)Urban Future

(LM)Urban Light Manufacturing

Environmental Protection

High Value Lands

Evaluation of sensitive fish and wildlife habitats in project area. Data downloaded from:
http://www.regionalconservationstrategy.org/page/datadownloads

Important Fish Passage Culverts

Evaluation of streams in project area. This is a stream quality proxy because we do not have data for all streams.

Table 14: GIS Sustainability Measures

	Sub-Topic	Measure	0	1	2	3	Score Field	Data Field	Data File Name	GIS Analysis	Data Source	Data Date
Sustainability	**Economic Vitality**	Jobs	Project not located near any jobs	Project located within lowest third of jobs within unincorporated Multnomah County	Project located within middle third of jobs within unincorporated Multnomah County	Project located within highest third of jobs within unincorporated Multnomah County	Sus_Jobs	c000	Sustainability_Jobs	Location of the number of jobs a quartermile from a project extent	Census Bureau	2015
		Rural Centers and Opportunity Zones	Project not located in any rural center or opportunity zone	N/A	N/A	Project located in rural center or opportunity zone	Sus_Oppurtunity_Zone	Opportunity Zone_InOut	Sustainability_Oppurtunity_Zones	Location of a project in relation to higher economic opportunity in urban areas	Business Oregon	2018
								Rural Center_In_Out	Sustainability_Rural_Centers	Location of a project in relation to higher economic opportunity in rural areas	County	2018
	Environ-mental Protection	High Value Lands	Project not located within high value	N/A	N/A	Project located within high value habitat lands area	Sus_High_Value_Lands	Value	Sustainability_High_Value_Lands	Location of a project in relation to high value fish	Regional Conservation Strategy	2010-2018

			habitat lands area							and wildlife habitats		
		Important Fish Passage Culverts	Neither regional nor local and not 5 year priority	Regional or local but not 5 year priority	Local and 5 year priority	Regional and 5 year priority	Sus_Fish_Passage_Culverts	SustainabilityRank	Asset_Management_Culverts	Location of a project in relation to fish passage culverts	County	2018

Appendix C: Scoring Details Summary

	Measure	0	1	2	3
Equity	People of Color	**No** population	Lowest third ≤0.1737	Middle third ≤0.3046	Highest third ≤0.7319
	LEP		Lowest third ≤0.0507	Middle third ≤0.0911	Highest third ≤0.2322
	Older adults		Lowest third ≤0.0182	Middle third ≤0.1331	Highest third ≤0.5275
	Children		Lowest third ≤0.0507	Middle third ≤0.09114	Highest third ≤0.2322
	Disability		Lowest third ≤0.1073	Middle third ≤0.1753	Highest third ≤0.5323
	Low-income		Lowest third ≤0.0832	Middle third ≤0.1641	Highest third ≤0.7557
	Environmental Toxins	**No** PM 2.5	Lowest third ≤9.76	Middle third ≤10.06	Highest third ≤10.41
	BMI	**No** population	Lowest third ≤25.413	Middle third ≤26.708	Highest third ≤28.597
Safety	(SPIS) rating	**No** crashes	N/A	Within 0.5 mile or less of corridor of top 10 percentile SPIS rating group	Within corridor of top 10 percentile SPIS rating group
	Severity of Crashes		PDO crashes	Non-fatal injury crash	Fatal crash
	Pedestrian/Bicycle Crashes		Pedestrian **OR** bicycle crash **AND** includes PDO	Pedestrian **OR** bicycle crash **AND** result in a non-fatal injury	Pedestrian **OR** bicycle crash **AND** result in a fatality
	Safety Index	Two situations: 1) Posted speed is 25 miles per hour or lower and 2) 30-35 miles per hour **AND** under 12,000 average daily traffic **OR** one or two lanes	40 mph+, **OR** Speed limit 30-35 mph, more than two lanes, **OR** 12,000+ ADT	40 mph+ **AND** one of the following: More than two lanes, **OR** 12,000+ ADT	40 mph+ **AND** More than two lanes **AND** 12,000+ ADT
	Potential Safety for Non-motorized	"Shoulder", "Sidewalk", "Multi-use path" **not** in project description	"Shoulder" in project description	"Sidewalk" or "bike lane" in project description	"Multi-use path" or "buffered bike lane" in project description
	Potential Safety for Motor Vehicles	"Safety" **not** in the project description	"Safety" in project description	N/A	N/A
Mobility	Project Length	Located at intersection	Less than a mile	1-2 miles	2+ miles
	Transit Connections	**No** bus stops within a half mile	Within 0.5 mile of bus stop	Within 0.25 mile of bus stop	Within 500 feet of bus stop
	School Connections	**No** schools within a half mile	Within 0.5 mile of school	Within 0.25 mile of school	Within 500 feet of school
	ADA Compliance	**No** ADA deficiencies	Ramp score of 1-7 (Tiers 5 and 6)	Ramp score of 8-15 (Tiers 3 and 4)	Ramp score of 16-30 (Tiers 1 and 2)
	Congestion Relief	N/A	PM peak ADT per lane is less than 1,500	PM peak ADT per lane is between 1,500-1,700	PM peak ADT per lane is between 1,700-1,800
	Vehicle Capacity	"Lane" **not** in project description	"Lane" in project description and verified for vehicles	N/A	N/A
	Bike Capacity	"Shoulder," "Bike lane", "Multi-use path" **not** in project description	"Shoulder," "Bike lane", "Multi-use path" in project description)	N/A	N/A
	Pedestrian Capacity	"Sidewalk, "Multi-use path" **not** in project description and "Shoulders" **not** in project description for rural projects	"Sidewalk, "Multi-use path" in project description and "Shoulders" in project description for rural projects	N/A	N/A

	Measure	0	1	2	3
Asset Management	Pavement Condition	100 PCI	70-99 PCI	51-69 PCI	<50 PCI
	Signalized Intersections	**No** signalized intersections	Good (County scored as 1)	Fair/Installed before 1995 (County scored as 2)	Poor/Failed signal (County scored as 3)
	Guardrail	**No** slope hazard OR guardrail in hazard area	Pass rating	N/A	Fail or unknown rating OR no guardrail in slope hazard area
	Shoulder	Shoulder > 6 feet	>4 but < 6 feet	>2 but <4 feet	No shoulder
	Culverts	Good condition, and/or has been installed recently	Fair/Installed 10+ years ago	Poor/Installed 35+ years ago	Critical/Installed 50+ years ago
	Bridges	Sufficiency rating 91-100, structure and elements in very good condition, or does not include bridge	Sufficiency rating 81-90 or minor to moderate work is recommended	Sufficiency rating 51-80 or major work is recommended	Sufficiency rating 0-50 or replacement is recommended
	Critical Roads	2nd tier snow route and local/gravel	1st/2nd tier snow route & local	1st/2nd tier snow route & collector or arterial	1st tier snow route & arterial
EM and Resiliency	Landslides	**Not** susceptible to landslides	N/A	N/A	Susceptible to landslides (gridcode 9 and 10)
	Earthquakes	**Not** susceptible to high damage area	N/A	N/A	Heavy damage potential (gridcode 311-478)
	Wildfire Risk	**Not** within wildfire risk area	N/A	N/A	Within wildfire risk area
	Floodplain	**Not** within floodplain	N/A	N/A	Within floodplain
	Emergency Response Proximity	**No** emergency services within a mile	1 emergency service within a mile	2-3 emergency services within a mile	4+ emergency services within a mile
	Emergency Transportation Routes (ETRs)	**Not** within ETR	N/A	N/A	Within ETR
	Important Access	**Not** within polygons identified by County	Within polygon with low ADT road	Within polygon with mid ADT road	Within polygon with high ADT road
Sustainability	Jobs	**No** jobs	Lowest third (1-4 jobs)	Middle third (5-16 jobs)	Highest third (17+ jobs)
	Rural Centers and Opportunity Zones	**Not** within rural center or opportunity zone	N/A	N/A	Within rural center or opportunity zone
	High Value Lands	**Not** within high value habitat lands	N/A	N/A	Within high value habitat lands
	Important Fish Passage Culverts	**Not** regional or local AND **not** 5 year priority	Regional or local but not 5 year priority	Local and 5 year priority	Regional and 5 year priority