Asset Management Plan - Bridges

Revision no.: 3
March 22, 2023

Multnomah County
Contract #4400004108

Multnomah County Department of Community Services Asset Management

Asset Management Plan - Bridges

Client name:	Multnomah County		
Project name:	Multnomah County Department of Community Services Asset Management		
Client reference:	Contract #4400004108	**Project no.:**	W8Y16800
Revision no.:	3	**Project manager:**	Kelsi Pothier
Date:	March 22, 2023	**File name:**	Asset Management Plan Bridges

Document History and Status

Revision	Date	Description	Author	Reviewed
1	10/14/22	Draft	Jacobs	Andy Whittaker
2	1/11/23	Draft	Jacobs	Andy Whittaker
3	3/22/23	Final	Jacobs	Andy Whittaker

Jacobs Engineering Group Inc.

2020 SW Fourth Avenue
3rd Floor
Portland, OR 97201
United States

T +1.503.235.5000
www.jacobs.com

Executive Summary

This document is the first Asset Management Plan (AMP) for Multnomah County's Willamette River Bridges. This AMP is a strategic document that describes how the bridge assets are to be managed over the medium to long term. The plan provides:

- Value and condition information
- Levels of service the County has established and is working to achieve
- Life cycle strategies, activities and resources needed to achieve the levels of service
- Risks and opportunities that could have an effect on levels of service and stakeholder objectives
- Funding needs, sources and potential shortfalls

Asset Inventory and Valuation

There are six Willamette River Bridges, four of which are movable. They have a replacement value of approximately $4,880 million and the overall condition of the bridges is Fair.

Levels of Service

The purpose of the levels of service (LOS) is to measure the actual service delivered to customers, the community and the environment, and to make decisions on the assets based on the service that they provide rather than simply on their condition. This is often called a "serviceability" approach and it aims to put the interests of the customer at the heart of decision-making. Assets exist to deliver service to customers and stakeholders, and it is important to understand and measure current service delivery performance as a baseline for future planning.

The County has developed a preliminary set of LOS measures that align with organizational goals. The LOS measures cover:

- Accessibility
- Reliability
- Quality
- Safety
- Sustainability
- Customer Service

The LOS measures will be finalized in the upcoming months.

Climate change is a factor affecting the County's long-term ability to deliver levels of service. The County has developed a Climate Action Plan in collaboration with the City of Portland. The development of this AMP included a high-level climate change vulnerability assessment. The outcomes of the assessment include threats from the potential of higher temperatures, increased intensity of storm events and increased flooding all of which could affect the ability of the assets to deliver expected levels of service.

Asset Strategies

Growth and Enhancement

Multnomah County has developed and uses its 20-year Capital Improvement Plan (CIP) as the roadmap for enhancements to bridges. The Transportation Division has developed a mission statement and a guiding North Star that covers all aspects of the Transportation Division.

The Transportation Division Mission Statement (2020):

Helping people safety get where they want to go. Serving diverse communities in Multnomah County by looking after the County's transportation system to support social equity and economic well-being, while protecting the environment.

The County has a strong focus on the transportation network being accessible for all. They have drafted a plan to bring all non-compliant ADA pedestrian facilities into compliance and they are upgrading the Active Transportation network making connectivity with the surrounding street network the priority.

Seismic resiliency is a strong driver in County planning. The County is in the process of replacing the Burnside Bridge which is on a lifeline route for emergency response, once completed the bridge will be able to withstand a Cascadia subduction zone earthquake. The County has developed a Seismic Vulnerabilities and Retrofit Report which summarizes each bridges vulnerabilities and proposed retrofits.

Lifecycle Management Activities

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current LOS and ensure optimum use of assets throughout the whole lifecycle. The activities undertaken are as follows:

- Operations and Maintenance, including planned and reactive maintenance.
- Renewal activities, including condition assessment, significant and major rehabilitations, and renewals.
- Disposal activities, including responsible disposal of waste material and rationalization of surplus assets.
- Non-Infrastructure Solutions, such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery.

The County has a robust preventive maintenance program in place with at least 97% of all preventive maintenance activities being consistently completed.

Lifecycle planning has not been a focus for the County, and as a result the frequency and magnitude of reactive work is increasing. There are assets that should have been replaced years ago; however, they continue to run until they become problematic, and replacement is critical. As reactive work is identified, it goes into a work plan. The tasks are prioritized and worked throughout the year, but they are not always completed due to other activities taking priority, insufficient staffing, and budget concerns.

ODOT performs structural inspections on the bridges approximately every two years. Following the inspection, a report is developed that includes a sufficiency rating for the structure and items noted for follow-up by the County. Items noted during the inspection follow one of two paths:

1. Larger renewal items are added as a future capital improvement project.
2. Items for repair/further inspection by the County are added to a spreadsheet, assigned a priority and then worked throughout the year.

The County identifies short-term renewal needs from ODOT inspection findings combined with the operational inspections of the mechanical and electrical components. These two inputs, along with the 20-year CIP, are then used to develop a five-year work plan. The County updates the work plan annually based on available funding and project progress.

Long-Term Renewals are captured in the Bridges 20-year CIP which was last updated in 2015. The County completed an assessment of the bridges to identify several long-term renewals needs for each of the major technical components. These assessments were used to establish representative projects and costs over a 20-year time period.

Infrastructure Gap

An infrastructure gap is a potential shortfall between the budgeted/allocated expenditures and unconstrained needs. The total forecasted renewal needs between 2020 and 2039 is approximately $544 million, when annualized, is the equivalent of $27 million per year in expenditure. The total budgeted/allocated renewal expenditures between 2022 and 2026 are approximately $59 million, equivalent to $11.7 million per year.

The infrastructure gap should not be quantified by simply subtracting one number from another because they do not contain exactly the same sets of asset needs. Additionally, the funding available to the County is volatile and may increase in the future. However, the comparison does indicate that there is a potential infrastructure gap that could develop if future funding remains at existing levels. If this is the case, the County should expect to see decreases in the asset condition and service levels over time.

Contents

Appendices

Tables

Figures

1 Asset Management Plan Introduction

1.1 Asset Management Within the County

The Multnomah County Department of Community Services (DCS) Strategic Plan, the Asset Management Policy, the Strategic Asset Management Plan (SAMP), and other strategic documents guide the County in the application of asset management standards and practices to support effective service delivery.

The County intends for this Asset Management Plan (AMP) to serve as a guiding document across the Transportation Division, which informs County stakeholders involved in the management of transportation assets, members of the County Board, and residents. The AMP should achieve the following, as it relates to asset management, in line with the DCS mission, vision, and values:

1. Normalize asset management concepts
2. Promote understanding
3. Encourage transparency of decision making

1.2 Plan Overview

An AMP is a strategic document with a planning horizon of at least 10 years. Within that timeframe, it sets out the strategies and activities that will be applied to the County's assets to move toward stakeholder expectations, per financial and delivery constraints. AMPs should be service-based and include all the assets required to deliver the service, even though some of the assets may be stewarded in different parts of the organization.

The AMP provides a holistic view of the strategy for a service area and captures all strategic aspects, from growth plans (typically derived from the master plans and other strategic plans that affect asset management planning) to lifecycle management of existing assets. It should bring together these strategic activities into a coherent and integrated forward-looking plan that encompasses the following aspects:

- Outlines the strategic trade-offs between the performance expectations of the service area, the available funding, and the long-term risks
- Identifies, analyzes, and provides recommendations
- Provides a transparent platform to inform senior decision makers and elected officials in decision-making

The preparation of AMPs is generally considered good practice in asset management and is a requirement of ISO 55000.

1.3 Support for County Goals

The purpose of the AMP is to deliver on the County's goals that are defined in the Transportation Division Mission Statement, the DCS Strategic Plan, and the Transportation System Plan. In doing so the AMP should follow the commitments laid out in the Asset Management Policy:

- *Do not focus on perfection, but instead foster an organizational culture where everyone has a meaningful role to play in Asset Management through:*
    - *Coordination and collaboration*
    - *Customer service focused on making connections, conversations that focus on understanding, not simply responding, and creating choices and options*
    - *Ongoing learning through workforce development and training*
    - *Innovation*
    - *Flexibility*
    - *Continuous improvement*
- *Collaborate with our internal and external partners and stakeholders in the interest of the public good. Work together when our interests align and find creative solutions when they do not.*
- *Follow legislative and regulatory requirements of local, regional, state, and federal governments, and take action to change these requirements when they conflict with our values and are a barrier to providing valued services to our community.*
- *Maintain a balanced and flexible five-year budget plan with transparent investment policies that align with our values.*
- *Use Whole Life Cost methods to plan for the purchase, operation, maintenance, repair, replacement, and retirement of our Assets.*
- *Prioritize and budget for Planned Maintenance strategies including Periodic, Predictive, and Preventive approaches.*
- *Clearly define and actively listen to our community in order to document their needs and expectations through our Service Levels.*
- *Use our values, Risk Management, Asset Lifecycle Costs, and regulatory requirements to inform our Service Levels.*
- *Make decisions holistically by using a Triple Bottom Line approach:*
    - *Equitable outcomes and impacts, social equity, and an anti-racist lens to achieve racial justice*
    - *Environmental health and sustainability*
    - *Fiscal responsibility and economic mobility*
- *Practice Risk Management that prioritizes community safety and identify, quantify, and assess systemic and asset-based risks in order to integrate costs and benefits in our decision-making. We pledge to consider:*
    - *Equity and the social context*
    - *Community safety*
    - *Natural environment*
    - *Financial impacts*
- *Actively and strategically manage department Data as an Asset to ensure it is trusted, understood, accurate, readily available, and used to support evidence-based decision-making and informed action.*

1.4 Linkages to Other Strategic Documents

The County has a number of strategic, long-term planning documents that complement each other and work together to direct the County's future.

1. DCS Strategic Plan: Communicates the department's vision, outlines strategies, and provides a five-year direction.
2. DCS Asset Management Policy: Guides the management of infrastructure decisions.
3. City of Portland 2035 Transportation System Plan (TSP): and associated Central Portland plans.
4. Rural Transportation System Plan (TSP): Sauvie Island Bridge is in unincorporated Multnomah County.
5. Road and Stormwater AMPs: Complementary AMPs that provide guidance for the respective asset types.

1.5 Plan Scope

This AMP addresses the following asset category, which is owned by the County and maintained by the Transportation Division – Bridge Section: Willamette River Bridges.

The AMP does not address the following asset categories and types, which will be covered either by a separate AMP or included in the next version of the AMP:

1. Roads that are not connected to a Willamette River Bridge
2. Small Bridges
3. Road Sidewalks and Pathways
4. Road Structures, including Poles, Streetlights, Traffic Signs
5. Road Guardrails
6. Road Traffic Service Assets such as Detectors and Signals
7. Road Stormwater
8. Road Catch Basins
9. Culverts

1.6 Timeframes

This AMP covers a planning period of 10 years, meaning that the forecasts presented in the Asset Strategies Chapter (Chapter 4) and Financing Strategies Chapter (Chapter 5) represent 10-year timeframes. A full re-evaluation and update of the AMP should be conducted at least every five years, and may be warranted more frequently (for example, on a three-year cycle) should business circumstances change. In addition, an annual progress review toward the actions identified for improvement in the AMP (Chapter 6) should be conducted to track the County's overall progress.

1.7 Development Methodology

The content included in each chapter of this AMP and the methodology used to develop the content are briefly summarized in Table 1-1.

Table 1-1: Description of AMP Chapters

Chapter	Name	Content
2	State of Local Infrastructure	Provides an overview of the asset portfolio, including the inventory, valuation, age, and condition of the asset categories and types and the approach to condition assessment. *The chapter was developed by analyzing the County's available data, and it includes commentary on the data sources and data quality in terms of its reliability and accuracy.*
3	Levels of Service	Provides the current Levels of Service (LOS) for the service area and LOS information that the County deems to be important. *The chapter was developed through consultation with the County in workshop settings to identify the set of existing LOS statements and metrics that currently best represent the service area.*
4	Asset Management Strategy	Documents the existing asset management strategies in practice at the County, to operate, maintain, and renew the assets in the scope of this AMP, and to document how demands related to growth and enhancement are currently met. Provides renewal funding forecasts over a five-year horizon that identify the order of magnitude of costs required to renew the assets such that they maintain the current LOS they provide. *The chapter was developed through consultation with the various County stakeholders in workshop settings to document asset management practices and to understand any key issues to be raised in the AMP.*
5	Financial Strategy	Provides an overview of both historical (previous five years) and future budgeted/allocated (next five years) capital expenditures and historical operational expenditures to provide an overview of the spending on the asset base. Estimates the magnitude of the "infrastructure gap," which is the difference between the funding requirement to deliver the asset strategies identified in the Asset Management Strategy chapter to maintain the existing LOS, and the funding that has been budgeted/allocated for the next five years. Flags key considerations for the County and comments on any qualifiers associated with the funding gap estimation. This chapter also explores the alternative approaches both financial and other non-financial strategies for closing the infrastructure gap.
6	Improvement and Monitoring Plan	Provides high-level improvement actions to the AMP, such as changes to lifecycle management activities, changes to data collection, or other actions that will improve the overall performance of the service area. Focuses on improvement actions and tasks that can be completed in the intervening period between this AMP publish date and the subsequent update required in 2027, to support the requirements of the next update.

2 State of Infrastructure (SOI)

Multnomah County maintains a network of transportation assets, which includes six bridges that cross the Willamette River and Multnomah Channel. They are major structures, and four of the bridges are movable, which means they open and close for the passage of river traffic. The four bridges that are movable are Broadway, Burnside, Hawthorne, and Morrison. In addition to being a movable bridge, Burnside is a primary regional emergency transportation route.

Table 2-1 shows the summary of bridge assets. The asset data for these bridges is held primarily in Geographic Information System (GIS) and Cartegraph Operations Management System (OMS), the County's asset management software, which are supplemented with a small amount of information in spreadsheets.

Table 2-1: Asset Summary

Title	Willamette River Bridges
Inventory	6
Replacement Costs	$4,880 million
Overall Condition	

2.1 Asset Inventory and Valuation

Table 2-2 summarizes the asset inventory and replacement valuation for each Willamette River Bridge. The values for Broadway, Hawthorne, and Morrison bridges are estimates provided by County staff. Burnside Bridge is scheduled for replacement in 2025, and the valuation listed is the current value for the replacement of this bridge. Sauvie Island and Sellwood were replaced in the last 15 years, and the value provided is the construction cost of the bridge adjusted for inflation.

Table 2-2: Asset Inventory and Replacement Valuation

Asset Category	Asset Type	Length	Valuation ($M)	Total Valuation of Asset Category ($M)
Willamette River Bridges	Broadway	1,613 ft	$1,000	$4,880
	Burnside	2,241 ft	$895	
	Hawthorne	3,552 ft	$1,000	
	Morrison	3,700 ft	$1,650	
	Sauvie Island	1,185 ft	$51	
	Sellwood	1,976 ft	$284	

The County maintains four bridges that are moveable, Broadway, Burnside, Hawthorne, and Morrison, and thus have assets that support the bridge opening. The County does not currently document each asset on each bridge, rather they have consolidated multiple assets into one record within their hierarchy. Due to upcoming FHWA requirements, the County is working on regular reporting of individual assets with a consultant and plans to update the condition of these elements every two years. Table 2-3 provides a count of these assets in GIS.

Table 2-3: Assets that Support Bridge Opening (Count)

Asset Type	Broadway	Burnside	Hawthorne	Morrison
Low Voltage	6	8	6	8
Motor Drives	4	2	2	2
Motor Room	2	2	1	2
Sheaves			19	
Span Locks	2	2	4	2
Tower	2	2	2	2
Trunnion	12	12	16	8
Wire Ropes			74	

There is an opportunity to develop more accurate valuations for the Willamette River Bridges. The valuation for three of the bridges is based on replacement costs, either from a recent or upcoming replacement. The valuation of the other three bridges is based on estimates by County staff. Table 2-4 summarizes the methods and sources for valuating these assets.

Table 2-4: Methods and Sources Used for Asset Valuation

Asset Category	Asset Type	Method	Source
Willamette River Bridges	Structural Bridges: Burnside, Sauvie Island, and Sellwood	Replacement Costs	Construction Value
	Structural Bridges: Broadway, Hawthorne, and Morrison	Replacement Costs	County Staff
Mechanical & Electrical Assets	All	N/A	N/A

2.1.1 Average Age and Typical Useful Life

The County has a record of year constructed for each of the six Willamette River Bridges (see Table 2-5), however mechanical and electrical assets on the bridges do not have data to calculate age. Therefore, typical useful life values have not been fully developed.

Table 2-5: Age of Bridges

Asset Category	Asset Type	Year Constructed	Age (as of 2022)	Year Renewed
Willamette River Bridges	Broadway	1912	110	N/A
	Burnside	1926	96	N/A
	Hawthorne	1910	112	N/A
	Morrison	1958	64	2011
	Sauvie Island	2008	14	N/A
	Sellwood	2015	7	N/A

2.2 Condition of Assets

Condition data is extensive and available for the bridge structures (see Table 2-6), but it is not currently captured for the mechanical and electrical assets on the bridges.

Table 2-6: Condition Grading for Bridge Structures

Rating	Rating Description	Sufficiency Rating
Very Good	Fit for future, well maintained, good condition, new or recently rehabilitated	85 to 100
Good	Adequate for now, acceptable, generally in mid-stage of expected service life	70 to 85
Fair	Requires attention, signs of deterioration, some elements exhibit deficiencies	50 to 70
Poor	Increasing potential of affecting service, approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20 to 50
Very Poor	Unfit for sustained service, near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0 to 20

The Oregon Department of Transportation (ODOT) inspects bridges every two years in compliance with the ODOT Bridge Inspection Manual to ensure the safety of the bridges. The sufficiency rating from the last inspection is summarized in Table 2-7. These ratings include structural components only.

Table 2-7: Bridges Condition Summary

Asset Category	Asset Name	Sufficiency Rating						Condition Rating
		Main Bridge	Sub-Bridge 1	Sub-Bridge 2	Sub-Bridge 3	Sub-Bridge 4	Average	
Willamette River Bridges	Broadway	42.1	70.7	52.1	-	-	55.0	Fair
	Burnside	47.5	39.5	33.0	-	-	40.0	Poor
	Hawthorne	45.5	48.6	56.6	63.8	64.4	55.8	Fair
	Morrison	44.2	50.7	74.0	27.6	55.9	50.48	Fair
	Sauvie Island	70.1	-	-	-	-	70.1	Good
	Sellwood	81	92.2	92.2	-	-	88.5	Very Good

2.3 Data Sources, Reliability, and Accuracy

2.3.1 Data Sources

Cartegraph OMS and GIS were the main sources of data used to develop this AMP. The County provided other studies and narratives with additional information and context for asset data. Table 2-8 shows a summary of the data sources identified in the data collection process.

Table 2-8: Data Sources Summary

Asset Category	Asset Type	Inventory	Condition	Replacement Costs
Bridges	All	Cartegraph OMS/GIS	Cartegraph OMS /NBI Inspections	Estimates from County staff, construction costs adjusted for inflation

2.3.2 Data Reliability and Accuracy

During the data gathering step of preparing this AMP, it was identified that there are significant gaps for transportation assets. Over the last few years, the Transportation Division has made substantial progress in improving its asset inventory data, which is a fundamental building block of asset management. However, there are still many gaps, such as valuation data. Table 2-9 outlines the criteria for data reliability/accuracy, and Table 2-10 shows the data confidence of the bridges.

Table 2-9: Definitions for Data Reliability and Accuracy Assessments

Measure	Description	High	Moderate	Low
Reliability	Consistency of procedures/processes used to obtain data	Based on sound records, procedures, or analyses that have been acceptably documented and are recognized as the best method of assessment	Based upon known reasonable procedures or analyses that have been acceptably documented	Based upon expert verbal opinion or cursory inspections/ observations
Accuracy	Correctness of data value in comparison with its true value	+/- 1%	+/- 10%	+/- 50%

Table 2-10: Structural Bridges Data Confidence

Data Type	Data Reliability	Data Accuracy
Inventory	Moderate to High	Moderate to High
Condition	High	High
Valuation	Medium	Medium

3 Levels of Service

To achieve a common understanding with customers and stakeholders on expected levels of service (LOS) and associated costs, it is important for organizations to define a suite of measures that can be used to monitor performance, assist in data-driven decision-making, and manage costs. This approach is called a "serviceability approach" and refers to the use of LOS in decision-making and risk management.

These measures are often part of a hierarchical structure, illustrated in Figure 3-1. At the top are a few qualitative statements that typically represent the organizational goals, which are referred to as corporate LOS. In the middle, are the customer LOS, which are intended to quantify what performance the customers and stakeholders receive. Supporting the LOS measures are many more detailed asset LOS used to monitor the performance of assets and the various activities around them.

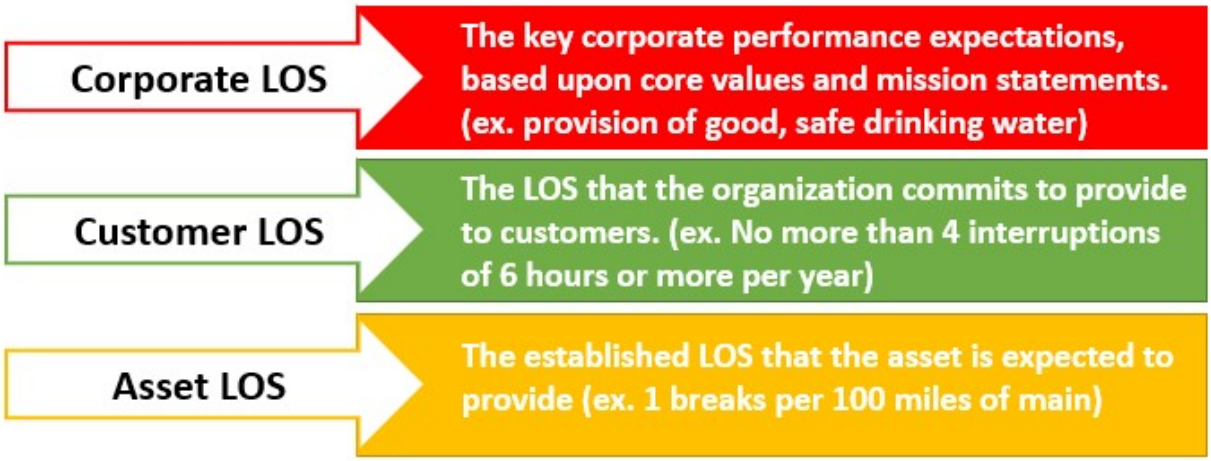


Figure 3-1: Levels of Service

Defining the measures follows two basic principles: (1) the organization of customers and stakeholders so that their expectations and needs are reflected in a holistic set of measures; (2) alignment that should be created to connect organizational goals through the LOS down to detailed measures of the assets and the activities around them.

3.1 Current Levels of Service

The County has defined LOS as well as measures to track progress. Table 3-1 identifies the current levels of service, including the service outcome statement, the candidate measure, and the results for 2020 and 2021.

Table 3-1: Current Levels of Service

Attribute	Service Outcome Statement	Candidate Measure	2020 (Actual Results)	2021 (Actual Results)
Accessibility	Ensure any bridge weight limits do not affect emergency vehicles, school, and public transit buses. On local, regional, and state lifeline routes, ensure that our bridges are not weight limited to any legal loads, excluding special haul vehicles.	Percent of bridges on lifeline and emergency routes that are not weight limited	-	33%
	Provide continuous sidewalks and pathways on arterials and collectors in the urban east	Gaps in the active transportation network (linear feet)	-	-
	Compliance with internal policies on removing barriers (including Americans with Disabilities Act Title II Regulations)	Future measure	Future measure	
Reliability	Respond as soon as possible to emergency situations on roads and bridges that block traffic or pose an urgent safety concern for users	Percent compliance with emergency response on roads and bridges as per our Community Charter	33%	62%
Quality	Ensure the ride quality on roads and bridges will be in a Fair to Good condition	The ride quality on Willamette River Bridge sidewalks, multi-use paths, and driving surfaces are maintained to a Good condition	Data needs to be collected	
	Provide an intuitive road and bridge system that is easy to navigate and safe to use	Future measure	Future measure	
	Keep roads, bridge sidewalks, multi-use paths, and bridge driving surfaces safe and clean for everyone to comfortably travel	Percent compliance with completing stair and sidewalk cleaning on schedule (on schedule is <30 days from date entered in Cartegraph OMS)	99%	93%
		Percent compliance with removing graffiti as per our Community Charter	100%	100%
		Percent compliance with responding to cleaning and debris removal as per our Community Charter	100%	80%
Safety	To be developed	Future measure	Future measure	
Sustainability	To be developed	Future measure	Future measure	
Customer Service	Be easily accessible, approachable, and respond to service requests from all members of the community	Under development	Future measure	

3.1.1 Accessibility

The County is planning to take steps to go beyond the minimum requirement in the Americans with Disabilities Act (ADA) Title II Regulations, including developing policies on removing barriers.

Where the County infrastructure intersects with infrastructure from the cities, such as the Willamette River Bridges, the County is collaborating with the cities to incorporate changes to the roadways to allow for more active transportation modes. Data is currently being gathered to support measuring the LOS.

3.1.2 Reliability

The County has a responsibility to operate the drawbridges on the Willamette River in compliance with federal and state laws for navigable water.[1] The specific requirements for operation of individual bridges is established under Sub-Part B of the regulation.[2] The requirements provide specific times during the week that drawbridges must be opened and the minimum notice that a vessel is required to provide the County. Since 2012 the County has had successful lifts at least 97% of the time, this includes lifts for vessels, as well as maintenance and training lifts. The County can apply for amendments to the regulations as needed to conduct maintenance activities for the bridges, as was most recently done for the Morrison Bridge.

The County has developed a draft Community Charter that sets out target response times to a range of common incidents and service requests. It is planning to formally adopt the Community Charter and develop a measurement system to monitor compliance with target response time, which will enable the County to track performance and identify any opportunities for changes.

3.1.3 Quality

Ride quality has been used as a general term to represent the customer experience. Better road conditions will lead to a better ride quality and reduce the cost to vehicles. The County is collecting data in order to measure ride quality. It has plans to establish condition targets for road surfaces based on traffic level. Road surfaces with higher levels of traffic will be prioritized and kept in a better overall condition.

3.1.4 Safety

The County has not yet formally documented a safety strategy, but there are plans to develop one in the near future.

[1] Title 33 Chapter 1 Subchapter J Part 117 – Drawbridge Operations Regulations - https://www.ecfr.gov/current/title-33/chapter-I/subchapter-J/part-117

[2] Title 33 Chapter 1 Subchapter J Part 117 -Subpart B – Oregon – 117.897 https://www.ecfr.gov/current/title-33/chapter-I/subchapter-J/part-117/subpart-B/subject-group-ECFR9c5f9599e04fdfc/section-117.897#p-117.897(c)(3)(iv)

3.1.5 Sustainability

The County does not have specific sustainability goals for the transportation network. The aim is to align with regulatory agencies and community groups to design the system for sustainable outcomes for fish, wildlife, and road users.

3.1.6 Customer Service

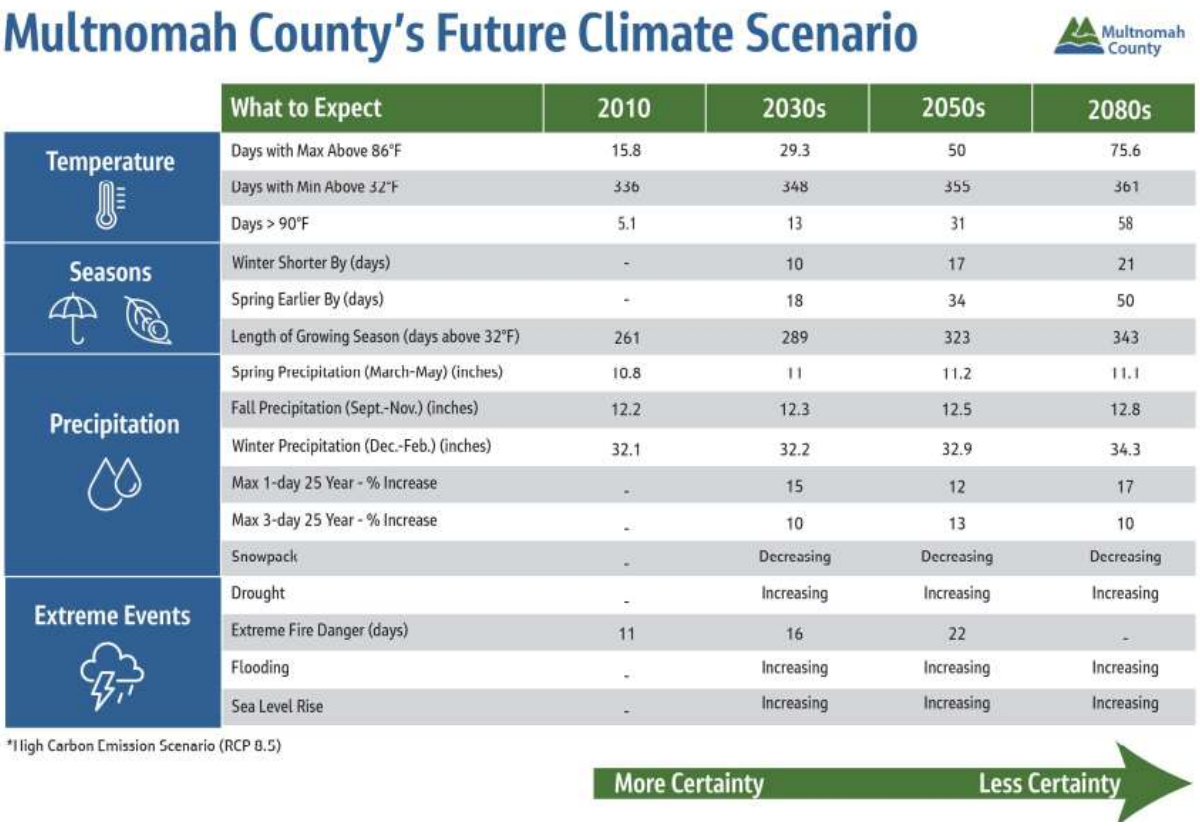
The County has plans to develop tools to track its interactions with customers and provide an indication of overall satisfaction with the transportation services provided.

3.2 Factors Affecting Future Levels of Service

3.2.1 Climate Change

The County has developed a Climate Action Plan (Multnomah, 2015) in collaboration with the City of Portland.[3] Further steps have been taken as part of this AMP to understand the effects of climate change to LOS by completing a high-level climate change vulnerability assessment under the highest emission scenario (RCP 8.5) for the years 2050 and 2080 (see Figure 3-2). The assessment involved the identification of relevant climate parameters, such as temperature, analysis of the interaction between the climate parameter and the LOS, and description of the adaptive capacity/strategy of the organization to reduce the effects. The outcomes from the assessments provide the County with a preliminary outlook of potential vulnerabilities that may be used to set priorities and identify specific actions, timelines, and resources.

[3] https://multco-web7-psh-files-usw2.s3-us-west-2.amazonaws.com/s3fs-public/CAP2015_june2015_web.pdf



Multnomah County's Future Climate Scenario

	What to Expect	2010	2030s	2050s	2080s
Temperature	Days with Max Above 86°F	15.8	29.3	50	75.6
	Days with Min Above 32°F	336	348	355	361
	Days > 90°F	5.1	13	31	58
Seasons	Winter Shorter By (days)	-	10	17	21
	Spring Earlier By (days)	-	18	34	50
	Length of Growing Season (days above 32°F)	261	289	323	343
Precipitation	Spring Precipitation (March-May) (inches)	10.8	11	11.2	11.1
	Fall Precipitation (Sept.-Nov.) (inches)	12.2	12.3	12.5	12.8
	Winter Precipitation (Dec.-Feb.) (inches)	32.1	32.2	32.9	34.3
	Max 1-day 25 Year - % Increase	-	15	12	17
	Max 3-day 25 Year - % Increase	-	10	13	10
	Snowpack	-	Decreasing	Decreasing	Decreasing
Extreme Events	Drought	-	Increasing	Increasing	Increasing
	Extreme Fire Danger (days)	11	16	22	-
	Flooding	-	Increasing	Increasing	Increasing
	Sea Level Rise	-	Increasing	Increasing	Increasing

*High Carbon Emission Scenario (RCP 8.5)

Figure 3-2: Future Climate Change Scenario

Temperature

The increase in the number of days above 90°F could potentially lead to increased deterioration or acute failures of certain components of bridges and lead to restrictions. Currently, the Hawthorne bridge malfunctions when opening at temperatures in the high 90's and above, due to expansion issues; this is likely to be exacerbated with more days above 90°F. While the most bridge structures have long lives that would extend beyond the 2050 and 2080 timelines, the County may need to assess materials and components with the following criteria to determine if they are suitable for the expected higher temperatures:

1. Materials and components with a life expectancy of 30 to 50 years that have been used in the last 10 years; OR
2. Materials and components with a life expectancy of 30 to 50 years that will be used in the next 20 years.

This includes deck surfaces that under high temperatures may start to deform, reducing ride quality. Increased temperatures will also influence users of active transportation; thus, it is important that appropriate shade corridors are implemented along the active transportation elements to offer protection from direct sun exposure.

Precipitation

Although the projected total annual precipitation increase is minimal, the intensity of storm events will increase and may overwhelm current drainage capacity. High precipitation could increase river flooding and lead to overtopping of the bridge or damages caused by debris, ultimately leading to prolonged bridge closures or restrictions. Existing intergovernmental collaboration agreements may need to be reviewed and updated to help identify potential alternative routes and prioritize investments to increase resilience on priority routes. During high water events on the Willamette River, operators are required to staff the bridges 24 hours a day, 7 days a week. Extended periods of high water severely stress staff and take resources away from preventative maintenance.

Extremes

Increased river and overland flooding caused by fast snow melts and heavy precipitation may cause accelerated deterioration or even acute failure of bridge components such as piers and foundations, leading to prolonged closures or restrictions.

Higher wind speeds and increased river flows may disrupt the County's ability to reliably operate the Willamette Bridges. Although the County is permitted to restrict its operation during high-wind events, this could require it to deploy additional resources.

The County is replacing one of its seismically vulnerable bridges and structures. Although it is anticipated that these upgrades will also provide additional resistance to potential flooding events, expanded condition monitoring of mechanical and electrical components may also be needed.

3.2.2 Available Funding/Resources

The County is facing a shortage of staff resources, causing a backlog of work that cannot be completed. The backlog includes reactive maintenance activities and inspection actions resulting from ODOT bridge inspections. This may cause existing assets to deteriorate to the point where they need to be replaced.

The County has a bridge fund through the State Transportation Improvement Plan. Funds are allocated every three years, and the County has typically received $20-25 million each time. This funding requires a 10% match by the County. These funds can be used on the bridges for any renewals or improvements the County determines is the best use of the money. The County will seek out additional funding sources when these allocations do not meet renewal needs.

3.2.3 Aging Infrastructure

The oldest Willamette River Bridge was built in 1910. As infrastructure ages, maintenance and rehabilitation activities may be performed more often and become more costly. With the current deficit in staff resources, this increase in required maintenance and rehabilitation becomes more difficult to perform. It is important that this issue be recognized, and appropriate interventions are performed to not only continue providing uninterrupted service to customers but also at the targeted LOS.

3.2.4 Stakeholder Expectations

The County is organizing a community stakeholder committee. This committee may be used as a forum to understand community expectations, align LOS to customer expectations, and define priorities.

The cities within the County also have expectations that need to be managed. These entities work with the County on a regular basis and a forum exists where communication can happen around LOS and expectations.

3.2.5 Regulation Changes

Regulation changes may drive infrastructure renewal needs. These include regulations related to growth, climate change, development of asset management strategies, and more.

4 Asset Strategies

4.1 Growth and Enhancement

Multnomah County has developed and uses its 20-year Capital Improvement Plan (CIP) as the roadmap for enhancements to bridges. Bridges do not have a master plan that is equivalent to the Transportation System Plan developed for roads.

Multnomah County has a mission statement and a guiding North Star, and these are applicable across all aspects of the Transportation Division.

> *The Transportation Division Mission Statement (2020):*
>
> *Helping people safely get where they want to go. Serving diverse communities in Multnomah County by looking after the County's transportation system to support social equity and economic well-being, while protecting the environment.*

The Transportation Division North Star:

Manage a transportation system that elevates Health and Safety, Environmental Stewardship, Resiliency, and Asset Management through equitable engagement and data-driven practices.

Equitable Engagement

- *Equity is foundational to how we do the work – we seek out and listen to the voices that transportation has historically overlooked*
- *Community input guides our plans to ensure the health, safety, and access of all who use the system*
- *Clearly communicate information and decisions in plain language*

Data-Driven Practices

- *Use data to inform decisions and ensure successful project delivery*
- *Plan maintenance and capital improvements to maximize the life of each asset at an acceptable level of risk*
- *Clearly define our service levels based on community needs and expectations*

Culture Change

- *Everyone understands transportation's purpose and how their work connects to it*
- *Staff feels valued in a culture of shared responsibility and support across all workgroups*

4.1.1 ADA Program

The County has drafted a plan to implement all the necessary ADA improvements to bring all non-compliant pedestrian facilities up to the County's right-of-way compliance. The County desires to create and maintain a transportation system that does not discriminate against individuals and minimizes barriers to make it as easy as possible for all to use.

The plan looked at curb ramps on bridges to determine if they meet or exceed the ADA requirements. Figure 4-1 shows these findings.

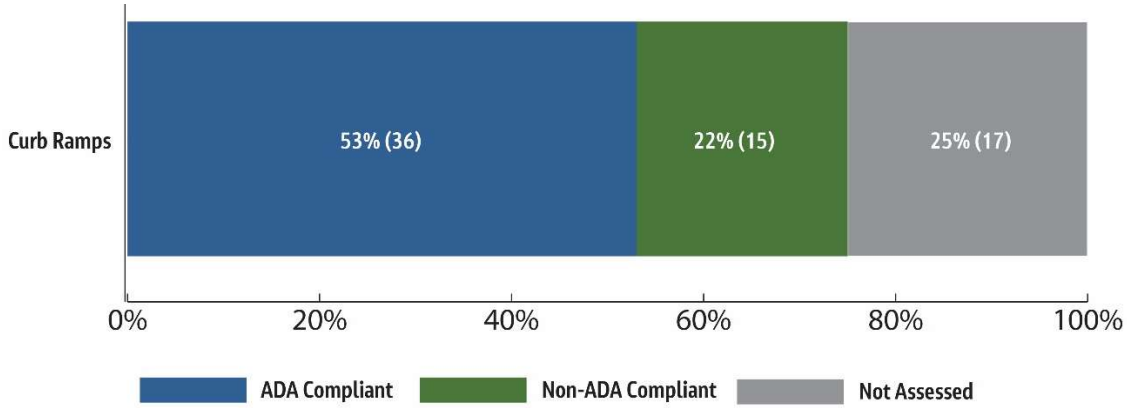


Figure 4-1: ADA Compliance Findings

The Bridge CIP identified five projects that included ADA improvements. Three projects were strictly ADA improvements at Broadway, Hawthorne, and Morrison bridges totaling $8.28 million. Two other projects at Hawthorne and Morrison included ADA improvements; however, the ADA improvements were not broken out separately.

4.1.2 Seismic Resiliency

The County developed a Seismic Vulnerabilities and Retrofit Report, following an assessment of the seismic vulnerabilities on each movable bridge. The report summarizes each bridge's vulnerabilities and proposed retrofits.

The County has taken action to improve seismic resiliency with the replacement of the Burnside Bridge, since the bridge is on a lifeline route for emergency response. The new bridge, which is scheduled to be completed by 2030, will be able to withstand a Cascadia subduction zone earthquake.

4.1.3 Other Enhancements

One third of the projects identified in the CIP include upgrades to the Active Transportation (AT) network. These projects focus on safety and accessibility for pedestrians and bicyclists. Connectivity with the surrounding street network is the priority.

4.1.4 Enhancement CIP Summary

The CIP defines capital projects to be completed over the 20-year period from 2020 to 2039. Table 4-1 summarizes the investment forecast for enhancements by primary work category. The County maintains a five-year work plan, which is developed using the highest ranked projects from the CIP for which funding is available. The forecasted enhancements are primarily driven by replacement of the existing Burnside Bridge

with a seismically resilient bridge. The construction of the bridge is now anticipated to be completed in 2030 at a revised total cost of $895 million.

Table 4-1: CIP Enhancements (thousands)

Primary Work Category	2020-2024	2025-2029	2030-2034	2035-2039
Accessibility	$1,443	$16,320	$16,324	$8,787
Seismic	$684,942	$0	$103,672	$0
Total	**$686,385**	**$16,320**	**$119,996**	**$8,787**
Annual Average	**$137,277**	**$3,264**	**$23,999**	**$1,757**
Notes: This table contains the original CIP cost estimates, and some cost estimates have been subsequently revised. These are costs at target construction time.				

4.2 Lifecycle Management Activities

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current LOS and ensure optimum use of assets throughout the whole lifecycle. The activities undertaken are as follows:

- **Operations and Maintenance,** including planned and reactive maintenance.
- **Renewal activities,** including condition assessment, significant and major rehabilitations, and renewals.
- **Disposal activities,** including responsible disposal of waste material and rationalization of surplus assets.
- **Non-Infrastructure Solutions,** such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery.

4.2.1 Maintenance and Operations

The County has a well built out preventive maintenance schedule in Cartegraph OMS that details the maintenance activities to be performed. The program is effective; since 2018 at least 97% of all preventive maintenance activities have consistently been completed. The preventive maintenance activities and the frequency they are performed are listed in Table 4-2.

Table 4-2: Preventive Maintenance Activities

Frequency	Activity	
Bi-Weekly	• Adjust Span Guides	
Monthly	• Clean Sidewalk and Stairs • Clean Stairways and Catwalks Inside	• Lubricate Mechanical Components
2 Months	• Clean Under Ramp • Grease Open Gears	• Replenish First-Aid Kits • Service Machinery Bushings
3 Months	• Check Brake Linings • Clean and Flush Drains	• Drain and Flush Vault • Pump Septic Tanks
6 Months	• Centerlock Gate and Compressor Service • Replace Tarp • Test Emergency Drive • Clean and Inspect Machine Roof • Clean Oil and Grease Machinery Room • Flush and Clean Steel Grating	• Lubricate Centerlock • Lubricate Counterweight Guides • Major Barrier Gate Service • Minor Gate Centerlock Service • Minor Traffic Gate Service • Trim Brush
8 Months	• Clean Structural Steel	
Annual	• Annual Structural Inspection • Change Oil Speed Reducers • Charge Water System • Clean and Paint Operator and Machine House • Clean and Paint Operator House • Clean Gear Grease • Clean Pits • Drain Water System • Gate and Centerlock Speed Reducer Service • Grease Tarps • Clean Gutters	• Inspect Counterweight • Inspect Fall Arrest System • Minor Barrier Gate Service • Clean and Paint Guardrail • Clean and Paint Machinery Areas • Clean and Paint Operator House • Prepare for Rose Festival • Seal Deck Cracks • Service Operating Ropes • Test Lift w/Generator • Tighten Diaphragm Bolts
2 Years	• Clean Caps Seats and Expansion Rollers	
10 Years	• Paint Illumination Poles	

Employees train with an operations manual and recertify annually. A process is in place to report malfunctions, which involves the operator logging the issue in a spreadsheet and engineering evaluating the response time required for that issue. Engineering will then determine a corrective plan, decide if any training is required, and adjust preventive maintenance schedules as needed.

Historically, lifecycle planning has not been a focus for the County, and as a result the frequency and magnitude of reactive work is increasing. There are assets that should have been replaced years ago; however, they continue to run until they become problematic, and replacement is critical. As reactive work is identified, it goes into a work plan. The tasks are prioritized and worked throughout the year, but they are not always completed due to other activities taking priority, insufficient staffing, and budget concerns.

ODOT Inspections

ODOT performs structural inspections on the bridges approximately every two years. Following the inspection, a report is developed that includes a sufficiency rating for the structure and items noted for follow-up by the County. Items noted during the inspection follow one of two paths:

1. Larger renewal items are added as a future capital improvement project.
2. Items for repair/further inspection by the County are added to a spreadsheet and assigned a priority.

These items are then worked throughout the year with the focus being on "critical" or "high priority" items. Items that are prioritized as "low" or "monitor" get little attention and may show up on ODOT inspection reports over multiple years.

Due to upcoming Federal Highway Administration (FHWA) requirements, the County is working on regular reporting of individual assets with a consultant and plans to update the condition of these elements every 2 years. Electrical and mechanical components are not included in the ODOT inspections, and at this time a County-led inspection program is not in place. County staff does perform informal maintenance inspections, and these are typically done when staff is aware of a potential problem and is inspecting it to monitor the condition.

4.2.1.2 Operations and Maintenance Review

There is a project in 2023 to review the preventive maintenance programs in place and delivery capabilities. The outputs of this project will be discussed in the next version of the AMP.

4.2.2 Short-Term Renewals

The County identifies short-term renewal needs from ODOT inspection findings combined with the operational inspections of the mechanical and electrical components. These two inputs, along with the 20-year CIP, are then used to develop a five-year work plan. The CIP has ranked the projects in order of importance, and the five-year work plan contains the highest ranked projects that can be completed with projected funding. The County updates the work plan annually based on available funding and project progress. Multnomah County faces challenges with project planning, as a significant portion of its funding comes from grants. The county does not know what grants will be approved or how much money will be received.

4.2.3 Disposal

When materials or assets are ready for disposal, it is done in an environmentally friendly way. Materials are often sold to get salvage value. Where possible, materials are recycled, either through a recycling facility or into other structures.

4.2.4 Non-Infrastructure Solutions

Operations currently logs malfunction issues into a spreadsheet. The spreadsheet does not allow for items to be flagged or repeat issues to be easily identified. Using Cartegraph OMS as a log would provide a systematic way to flag issues and provide prompts to look at repeat issues.

A formal inspection program run by the County is not currently in place. There is a desire to create one to bring structure to the program, inspect all assets on a regular basis, and review them systematically. The County could use information gathered from a formal inspection program to better inform decisions and lifecycle planning.

4.2.5 Long-Term Renewals Needs

As part of the development of Willamette River Bridges 20-year CIP in 2015, the County completed an assessment of the bridges to identify several long-term renewals needs for each of the major technical components, including Mechanical and Electrical, Roadways, Structures, and Multi-Modal elements. Although the County updated some financial projections of the Bridge CIP in 2020, the CIP has been updated every 20 years, which is a very long interval between updates. These assessments were used to establish representative projects and costs over a 20-year time period. Table 4-3 provides a summary of the Willamette River Bridge renewals by primary work category between 2020 and 2039. This forecast should be considered alongside the forecasted seismic enhancements from Table 4-1, which can include the renewal of a significant amount of bridge components, as is the case for the Burnside Bridge Replacement.

Table 4-3: Willamette Bridge Capital Long-Term Renewals (thousands)

Primary Work Category	2020-2024	2025-2029	2030-2034	2035-2039	20-year Total
Driving Surface	$4,985	$34,264	$0	$0	$39,249
Electrical Lightning	$0	$9,434	$0	$13,775	$23,209
Mechanical	$4,266	$23,308	$0	$2,301	$29,874
Paint	$65,119	$26,326	$80,693	$136,763	$308,900
Structural	$25,118	$50,117	$66,737	$864	$142,837
Total	**$99,487**	**$143,450**	**$147,430**	**$153,703**	**$544,070**
Annual Average	**$19,897**	**$28,690**	**$29,485**	**$30,740**	

4.3 Risks

There are risks to the delivery of this AMP, a workshop was held with County staff to identify potential risks as well as ways that these risks could be mitigated.

Risk Classification	Risk Description	Potential Mitigations
Service	There is an operational maintenance program for the E&M equipment on moveable bridges but there has never been a capital renewals program leading to higher reactive maintenance and the potential for impact on service.	Inspections are starting this year and now have capital programs for replacements on 3 bridges.
Service	There can be a lack of visibility of the City of Portland roads plans that affect the bridges. This is in part due to the City initiating projects at short notice. This can lead to significant re-allocation of resources by the County and impact to other programs.	There are good relationships at staff level and a degree of information sharing. Both parties recognize the need to work more collaboratively, and more formal meetings are developing.
Resources	Experienced staff are approaching retirement which leads to a significant loss of institutional knowledge. Now using contractors to do the bigger operational projects, this is a new practice and a higher cost.	Could partner with roads staff or ODOT but they also have staffing issues.
Financial	Funding is more stable for bridges and it is indexed but below inflation and so there is insufficient funding.	TBD
Financial	In the past CIP projects in the range $1m to $20m have been chosen and these are realistically 'fundable'. Upcoming projects can be $50m projects and not clear how this will be funded.	TBD

5 Financial Strategies

5.1 Current Financial Strategy

5.1.1 Historical Operational Expenditures (OPEX)

The historical expenditures for the core activities on the Willamette River Bridges are provided in Table 5-1. Expenditures have increased approximately 40% between 2017 and 2021.

Table 5-1: Historical OPEX (thousands)

OPEX (000)	2017	2018	2019	2020	2021
Expenditures	$ 4,673	$ 5,188	$ 6,392	$ 6,752	$ 6,454

These expenditures fund the operations and maintenance activities described in Section 4.2.1, including inspections, cleaning, clearing debris from the deck surface and walkways, electrical and mechanical maintenance, painting, and drainage maintenance.

5.1.2 Historical Capital Expenditures (CAPEX)

The historical capital expenditures for renewals and enhancements are provided in Table 5-2. The capital expenditures for renewals tend to fluctuate based on available funding and project progress. The annual average expenditure is approximately $5 million. Most of the renewal expenditures consist of painting, overlays, and electrical and mechanical component replacements.

The enhancement projects consist of the major seismic upgrades and replacement of the Sellwood Bridge, which was opened in 2016, and seismic upgrades to the Burnside Bridge, which is planned for construction between 2026 and 2030. Although these projects have been classified as enhancements, they contain a large proportion of renewals as well because they are providing a new bridge in the same location as the existing bridge. The project will upgrade seismic and safety standards, along with improved active transportation elements.

Table 5-2: Historical CAPEX (thousands)

CAPEX (000)	2017	2018	2019	2020	2021
Renewals	$8,267	$10,543	$2,135	$2,194	$1,310
Enhancements	$17,660	$7,147	$7,916	$11,725	$7,351
Total	$25,927	$17,690	$10,051	$13,941	$8,762

5.2 Future Financial Strategy

5.2.1 Future OPEX

The projected operating expenditures is expected to increase approximately 35% in the next five years (see Table 5-3).

Table 5-3: Future OPEX (thousands)

OPEX (000)	2022	2023	2024	2025	2026
Expenditures	$6,454	$6,109	$8,183	$7,240	$8,735
Notes: Expenditures exclude debt payments.					

5.2.2 Future CAPEX

The allocated/budgeted capital expenditures for 2022-2026 are shown in Table 5-4 and Figure 5-1. It is anticipated that expenditures will increase significantly in the next five years compared to the last three years. Although most of the increase is driven by the replacement of the Burnside Bridge, a number of renewal projects have also been identified, which are shown in Table 5-5.

Table 5-4: Budgeted/Allocated CAPEX (thousands)

CAPEX (000)	2022	2023	2024	2025	2026	5-Year Total
Renewals	$9,603	$19,207	$19,084	$9,576	$1,112	$58,581
Enhancements	$11,237	$12,716	$62,518	$43,834	$86,391	$216,726
Total	**$20,840**	**$31,923**	**$81,602**	**$53,410**	**$87,503**	**$275,307**
Notes: The forecasted expenditures shown in this table may not match the allocated budget in any particular year. Enhancements are primarily seismic enhancements on Burnside Bridge						

Table 5-5: 2023 Allocated Capital Budget (Thousands)

Project	Expenditure Type	2023 Budget	Total Capital Cost	Completion Date
Morrison Paint Project	Renewal	$15,129	$24,000	2023
Broadway Lift Span	Renewal	$3,936	$21,000	2025
Hawthorne Overlay	Renewal	$1,030	$9,550	2024
Morrison Strengthening	Renewal	$872	$9,000	2025
Hawthorne PLC	Renewal	$150	$150	2023
Miscellaneous Overlays/Bridge Repairs	Renewal	$500	$500	2023
Burnside Bridge	Enhancement	$51,085	$895,000	2030
Total		**$72,702**	**$959,200**	

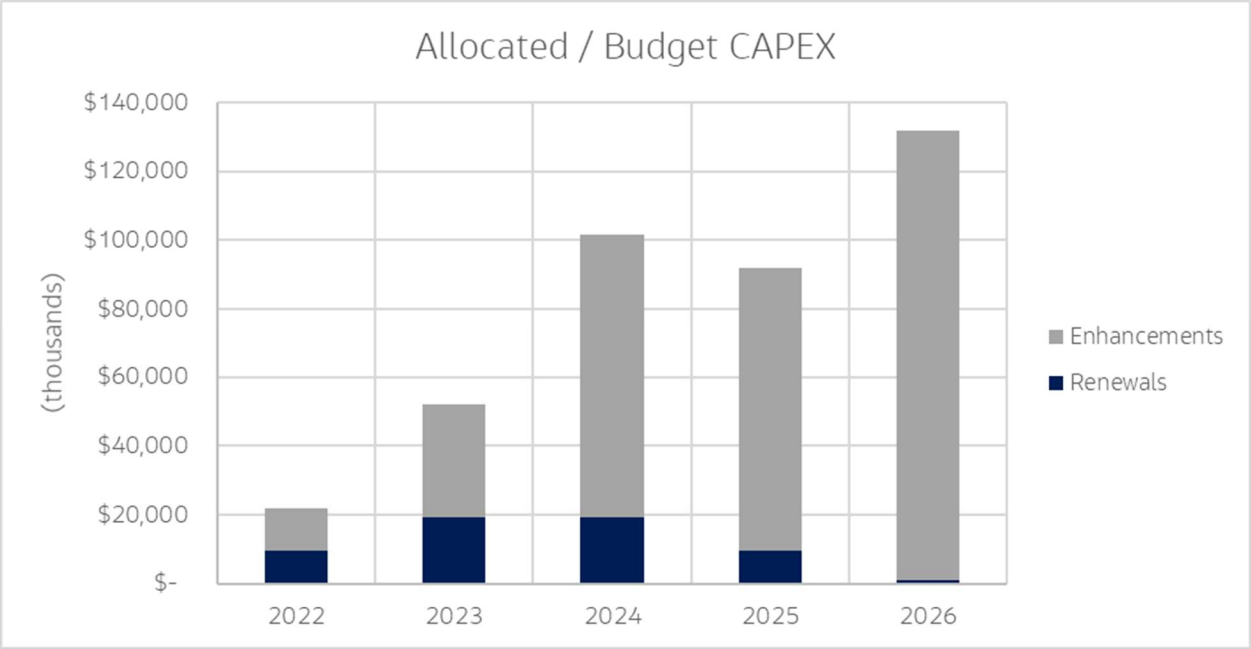


Figure 5-1: Allocated/Budgeted CAPEX

5.3 Revenue Sources

The Bridge Fund is primarily funded by the state vehicle registration tax, which is a dedicated fund for use only on the Willamette River Bridges. Revenue collected through the vehicle registration tax is not adequate for funding most of the capital investments, so the County relies on additional state and federal grants. A summary of the revenue sources for both roads and bridges for 2022 is provided in Figure 5-2. This distribution of revenue is what a typical year looks like. The County has an annual pass through of approximately $30 million to cities and, as a result, revenues will not match expenditures.

The County's state grants are allocated by the Local Agency Bridge Selection Committee. The committee distributes funds every three years to the County, who must provide a 10% match in funding.

The Sellwood and Burnside Bridge replacement projects have been financed through a combination of federal and state grants, as well as bond sales. Individual funds have been established for each project to manage the expenditures for these projects separate from the Bridge Fund.

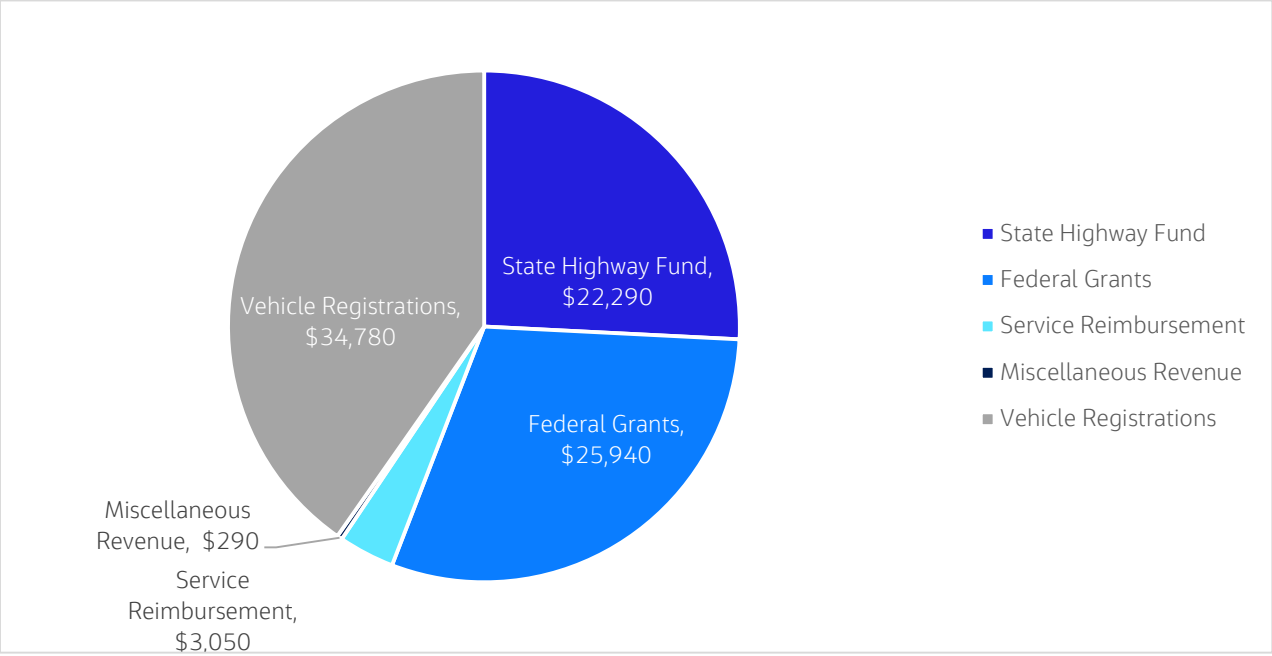


Figure 5-2: Transportation Revenues by Source in 2022

5.4 Infrastructure Gap

This section provides a high-level comparison of the budgeted/allocated expenditures for the renewal of the assets discussed in Section 5.2 with unconstrained forecasted needs from Section 4.2.5. Where there is potential shortfall between the budgeted/allocated expenditures and unconstrained needs, this is termed an infrastructure gap.

The total forecasted renewal needs between 2020 and 2039 is approximately $544 million (see Table 4-3), which, if annualized, is the equivalent of $27 million per year in expenditure. This forecast is based around several assumptions, including the design life of the bridge elements and analysis of the trends in deterioration. Therefore, the forecast could change over time as information is updated and further assessments are completed.

The total budgeted/allocated renewal expenditures between 2022 and 2026 are approximately $59 million, (see Table 5-4), which is equivalent to $11.7 million per year. It is not reasonable to try to quantify the infrastructure gap by simply subtracting one number from another because they do not contain exactly the same sets of asset needs. Additionally, the funding available to the County is volatile and may increase in the future. However, the comparison does indicate that there is potential infrastructure gap that could develop if future funding remains at existing levels. If this is the case, the County should expect to see decreases in the asset condition and service levels over time.

The funding shortfall presents a significant challenge for the County, and a number of financial and non-financial strategies will need to be explored to determine how best to close the infrastructure gap.

It is also important to consider the effects of climate change, as discussed in Section 3.2.1, which could further accelerate deterioration of the asset base and require increased levels of renewal expenditures. A fully costed climate change adaptation plan has not yet been established, which when incorporated into the future version of the AMP, may increase the infrastructure gap.

6 Improvement Plan

This is a first-generation AMP for the Transportation Division. The items outlined in Table 6-1 will improve the quality of subsequent AMPs. The actions that are considered short-term will provide the most benefit toward the next version of the AMP.

Table 6-1: AMP Improvement Plan

Chapter	Improvement	Details	Short-Term	Longer Term
State of Infrastructure	Value of the Bridges	Three of the bridges have estimated valuations. It would be useful to have an assessment completed on the bridges to develop an estimated replacement cost.		X
	Electrical and Mechanical Assets	The inventory for electrical and mechanical assets currently bundles assets. The County should develop more granular inventory and valuation data and develop an asset hierarchy in Cartegraph OMS.	X	
Levels of Service	Document the Strategy	Document the strategy to remove or reduce weight restrictions on the bridges. This should be included in the master plan (see the Asset Strategies chapter below).		X
	Formalize the Community Charter	The County has a Community Charter that is currently in draft format, this should be formalized and adopted. Develop a strategy to gradually improve performance to meet charter targets.	X	
	Collect Data to Measure LOS	To measure the LOS for ride quality, sidewalks, and pathways, there is data that needs to be collected.	X	
	Develop Future Measures	The County does not currently have measures for safety and sustainability and should develop these measures.	X	
	Refine Climate Change Scenario	The climate change scenario used for this generation of the AMP was developed without much input from the County. This scenario should be refined to meet the County expectations.		X
	Climate Change Study	The County should conduct follow-up climate change studies to better develop adaptation plans. Bridge flooding and shade corridors are likely to be the priorities.		X
Asset Strategies	A Bridges Master Plan (or equivalent)	The County currently has several strategic plans, a mission statement, and a North Star. A master plan would pull these enhancement plans and initiatives together into a single document. The master plan should be a simple, concise summary document and should not require a major study.		X

Chapter	Improvement	Details	Short-Term	Longer Term
	Develop Clear Outputs of Projects	The County has initiatives to improve ADA compliance and the AT network. As part of the next CIP or a master plan, the County should provide clarity on the outputs of the projects. As an example, if all the projects in the CIP are completed, then the output would show what proportion of the AT network would be complete.		X
	Develop a Condition Assessment Program on Electrical and Mechanical Assets	A condition assessment program could start as a visual inspection where the outcomes are documented in Cartegraph OMS and then lead to renewal planning. As lifecycle strategies are developed, the County can define tasks and budgets for both operational maintenance and renewals.	X	
	Better Configure and Use Cartegraph OMS	Cartegraph OMS can be better configured in two ways: • Assign maintenance tasks to assets: After developing a more granular inventory of electrical and mechanical assets (above), then assign maintenance tasks to the more granular inventory items. • Record reactive work: Move away from tracking reactive work in spreadsheets and track in Cartegraph OMS.	X	
	Move to a More Frequent CIP Cycle	Current planning practices include developing the CIP at a 20-year interval. The CIP should be updated at least every 10 years.		X
Finance	Budgeting and Tracking	In future planning the County should clearly budget and track expenditure on renewals and enhancements. This will allow the County to better track how they are spending funds on renewals and help to identify any shortfalls as an early warning of potential service delivery impacts on the community. Within the broader categories of renewal and enhancements, the County may also want to develop sub-categories. As an example, sub-categories of enhancements could include seismic, ADA, and AT network.	X	
	Better Capital Project Referencing	As part of this AMP, individual projects appeared in the CIP, funding document, five-year budget, and five-year workplan with similar but not identical project names. A project referencing system would allow the County to better track the status of proposed projects from their initial conception in the CIP through to their final delivery in the five-year workplan.		X
	Develop Clear Outputs of Workplans	When the available funding is known, define the outputs that can be delivered. Update this every three to five years in line with updates to the AMP or major changes in funding allocation (see Develop Clear Outputs of Projects above).		X

Acronyms and Abbreviations

Term	Definition
ADA	Americans with Disabilities Act
AMP	Asset Management Plan
AT	Active Transportation
CAPEX	Capital Expenditures
CIP	Capital Improvement Plan
DCS	Department of Community Services
FHWA	Federal Highway Administration
GIS	Geographic Information System
LOS	Levels of Service
ODOT	Oregon Department of Transportation
OMS	Operations Management System
OPEX	Operating Expenditures
SAMP	Strategic Asset Management Plan
SOI	State of Infrastructure
TSP	Transportation System Plan