



Target Service Levels For Transportation Assets



Prepared by:

Department of Land Use and Transportation
Operations and Maintenance Division

Adopted as R&O 15-_____

{DATE}

V.01

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

BACKGROUND 2

PURPOSE 2

PRIORITY MATRIX..... 2

DEFINITIONS..... 3

RISK FACTORS..... 4

FAILURE MODES..... 5

MAINTENANCE PRIORITIES..... 5

TOLERANCES..... 6

CONDITION RATINGS 6

TARGET SERVICE LEVELS 7

BRIDGES 7

CULVERTS 8

PAVED ROADS..... 9

GRAVEL ROADS 10

ROADSIDE DITCHES 11

LANDSCAPED AREAS 12

EXECUTIVE SUMMARY

Washington County's transportation system is comprised is an integrated network of static and dynamic assets working together to deliver a reliable system that allows the safe and efficient movement of freight, commuters, tourists and residents. These assets have varying degrees of maintenance requirements requiring a deliberate and methodical approach to planning the work in order to maximize the effectiveness of any given maintenance treatment.

One of the most important services that any transportation agency can provide is an efficient and well-maintained transportation system that serves the needs of its citizens including residents, businesses, commuters, and tourists. This is a challenging task and civic leaders must often make difficult choices that are sometimes unpopular. Washington County's situation of an aging infrastructure coupled with a reduced revenue stream is not unique. In fact, the difficulties facing the Department of Land Use & Transportation are similar to other transportation agencies throughout the region and across the country.

Washington County's road and bridge maintenance budget is being strained by a number of competing factors. New construction and added programs are being pitted against the preservation and preventive maintenance of existing assets. All the while, gas tax receipts continue to diminish as fuel prices increase, drivers are being encouraged to reduce their vehicular trips and cars are becoming more fuel efficient.

Due to the complexity associated with prioritizing road maintenance work with limited resources, this document is intended to provide staff with formal guidance associated with planning work on the County's road and bridge transportation system. It is intended to be the nexus between the maintenance budget and the annual work program to ensure the goals and priorities of the Board of County Commissioners are being realized. However, it is also important to realize that the service levels identified in this document are merely "targets" and not intended to imply that they are mandates. There are too many variables involved with road and bridge maintenance that are unknown and unpredictable making it feasibly impossible to meet every target service level for every asset at all times.

It is also intended to communicate the goals and priorities with a broader audience including NEED TO FINISH THIS OFF...

BACKGROUND

The maintenance of Washington County's roads and bridges is the responsibility of the Operations & Maintenance Division. The county has a complex and diverse network of 1300 miles of roads, 200 bridges, and 3000 culverts serving the county's 530,000 residents. In addition to performing routine and scheduled maintenance on these assets, the Operations Division also performs minor improvements, occasional reconstructions and round-the-clock coverage for handling emergencies and other incidents requiring a rapid response.

The major assets that represent the foundation of the transportation system include:

1. Bridges	4. Gravel Roads
2. Culverts	5. Roadside Ditches
3. Paved Roads	6. Landscaped Areas

PURPOSE

According to the 2020 Transportation Plan, the maintenance policy of the Department of Land Use and Transportation is to protect public safety and personal property, make effective use of available funds, and preserve the public and private investments in the transportation system. In addition, the department also strives to preserve and protect the natural environment as it relates to the transportation infrastructure. The purpose of this document is to augment the *Road Maintenance Priority Matrix* by establishing target service levels for certain transportation assets managed and maintained by Washington County.

In order to maximize the effectiveness of resources, the following "Target Service Levels" provide guidelines for the Department to use when establishing the annual road maintenance work program, responding to emergencies and service requests, selecting projects, and developing budgets. The target service levels established in this document will supplement the priority matrix to improve the process for selecting maintenance activities that occur on the county's road and bridge system.

The quality of the driving experience is usually a function of the driver's skill and ability. Even during adverse situations, a driver who is prepared can typically negotiate marginal road conditions when they exercise reasonable and prudent judgment.

PRIORITY MATRIX

The primary tool used for selecting road maintenance activities has been the *Road Maintenance Priority Matrix*¹ shown in Table 1. This guideline has been in place since adoption of the 1988 transportation plan but it only focuses on the functional classification of the roadway for the selection process.

Table 1: Road Maintenance Priority Matrix

Activity	Arterial	Collector	Rural Resource Route	Neighborhood Route	Local Road
Mandated	1	1	1	1	1
Emergencies	1	1	1	1	1
Hazards	1	1	1	1	1
General Maintenance	2	3	4	5	8
Minor Improvements	6	7	11	13	14
Reconstruction	9	10	12	15	16

¹ Policy 21 of the Washington County 2020 Transportation Plan (Oct 2002)

DEFINITIONS

Performance Indicators

1. **Service Level:** Measurable indicators used to define an asset's actual and targeted operational efficiency.
2. **Condition Rating:** A standardized method for measuring the physical state of an asset.

Asset Types

1. **Bridge:** A structure that typically consists of vertical supports and horizontal members connecting at least two road segments that allows safe and efficient passage of a vehicle or pedestrian over an obstacle such as a body of water, a road, or a railway. In some instances, large culverts are considered bridges.
2. **Culvert:** A structure underneath the roadway used to pass storm water through a roadway fill section.
3. **Pavement:** The hard driving surface of a road that carries the vehicular traffic. The surface can be made of bituminous material (asphalt or chip seal) or Portland cement concrete.
4. **Gravel Road:** A road that has crushed aggregate material as the driving surface.
5. **Roadside Ditch:** An open channel adjacent to the roadway used for the collection and conveyance of storm runoff.
6. **Landscaped Area:** A region in the right-of-way with ornamental trees, shrubs, ground cover intended to provide erosion control, environmental mitigation, traffic calming, and aesthetic value to the extent that it can be managed and maintained to the Board-adopted level of service.

Functional Classifications of Roads

1. **Arterial:** Interconnects and supplements the highway system while providing general mobility throughout the region
2. **Collector:** Provides access and circulation between residential, commercial, industrial and agricultural areas
3. **Neighborhood Route:** Provides connectivity to the collector and arterial systems through residential areas
4. **Rural Resource Route:** Rural local roads serving active commercial operations such as rock quarries, timber harvests, farms and nurseries.
5. **Local:** Provides direct access to residential parcels in both the urban and rural areas. In the rural area, local roads often serve other parcel types related to agricultural, forestry, and quarry operations.

RISK FACTORS

Certain inherent risks are involved when it comes to public transportation infrastructure. The goal of Washington County is to minimize the risk through sound engineering judgment, methodical maintenance strategies, and the use of established industry-standard approaches to managing the road and bridge system.

Washington County and the users of the transportation system are exposed to some level of risk when the public infrastructure is used. The goal of the managing agency is to reduce the exposure of risk both to the end users as well as to the agency. Factors to consider when managing risk include:

Factor	Issues	Stakeholder
Economics	Travel Delay Maintenance	End Users Agency
Legal	Liability due to damage claims Law Suits / Litigation	Agency End Users & Agency
Community	Poor Mobility/Connectivity Quality of Life Nuisances	End Users End Users End Users
Health / Safety	Injury / loss of life Property Damage Vehicle Damage	End Users End Users End Users
Environment	Destruction / Degradation of Habitat Pollution Regulatory Violations	End Users End Users Agency
Reputation	Loss of Trust Loss of Partners / Allies	Agency Agency

The management of these risks includes the following strategies:

- Avoid: Do not own the asset or perform the activity that presents the risk
- Transfer: Shift the risk to a third party either through insurance or through a performance contract.
- Mitigate: Implement design or operating measures that reduce the likelihood or severity of occurrence.
- Accept: Self Insure or otherwise assume the likely consequences of occurrence.

When dealing with risk, it is important to take into consideration the consequences of failure. For each asset class, "failure" can occur in a number of ways with varying degrees of severity. Understanding that failures of assets will occur, the challenge for the agency is to keep those failures to a minimum in order to reduce the likelihood of a catastrophic failure that can injure a person, damage personal property, or harm the environment.

FAILURE MODES

There are two failure modes for any given transportation asset. A **Functional** failure is when the asset continues to operate but stops performing the way it was designed or intended. This failure can be short-lived with the asset being restored to full capacity with the use of limited resources. For example, a roadside ditch may be full of sediment and debris which in turn reduces its capacity during a heavy rain event. Water may overtop the ditch temporarily closing the road. This type of failure can create minor disruptions to the flow of traffic or increase the need for additional maintenance costs to repair damages to the system. A **Catastrophic** failure is when an asset is destroyed creating a “life-safety” gap in the transportation system. An example of this would be a bridge or culvert washout that completely removes access across an entire section of roadway. The typical solution to a catastrophic failure is constructing a new asset altogether or performing a major rehabilitation on the existing feature.

Failure Examples

	Functional	Catastrophic
Bridges	Rot, deterioration, or damage to one or more structural components substantially limiting its ability to carry its intended load.	Bridge collapse or structural failure resulting in the closure of the bridge.
Culverts	Water is flowing over, or undermining, the roadway due to the culvert being blocked, plugged, or exceeding its intended capacity. Rust, collapse are also functional deficiencies.	Culvert collapse, excessive “piping”, or the pipe washing out resulting in the closure of the road.
Paved Roads	Severe deterioration of the surface such as major depressions, deflection, ruts, cracking, and delamination that require corrective measures beyond routine maintenance.	A sinkhole or other base failure requiring the closure of a travel lane or the entire roadway.
Gravel Roads	Excessive washboarding, potholes, ruts, erosion or segregated aggregate that require corrective measures beyond routine grading.	A sinkhole or other base failure requiring the closure of a travel lane or the entire roadway.
Roadside Ditches	Erosion and scour occurs diverting the intended flow caused by a point blockage. Point blockages may include plugged pipes, natural or manmade debris (i.e. downed tree limbs, garbage, topsoil, surface rock, etc) in the channel, overgrown vegetation, or sedimentation.	Excessive sedimentation or some other blockage that forces water out of the ditch and into the roadway or over an embankment.
Landscaped Areas	Vegetation is untrimmed, dead, diseased, or damaged. Landscaped areas are littered with debris and trash diminishing the aesthetic value.	Excessive growth that causes sight distance or other visibility issues to the point of causing a safety hazard.

MAINTENANCE PRIORITIES

There are four different types of priorities associated with roadway maintenance:

- 1) **Emergencies:** Work related to abating or managing an immediate threat to public safety, private property, or environmental resources
- 2) **Mandated:** Work related to regulatory or legislative requirements that require the agency to perform certain activities
- 3) **Essential:** Work that maximizes the efficiency of the transportation system but is not required, by law, to be performed
- 4) **Non-Essential:** Work that is typically for aesthetic or non-functional enhancements as it relates to the movement of vehicles and pedestrians.

Asset	Emergency	Mandated	Essential	Non-Essential
Bridges	✓	✓		
Culverts	✓	✓		
Paved Road	✓		✓	
Gravel Roads	✓		✓	
Roadside Ditches	✓	✓		
Landscaped Areas	✓			✓

TOLERANCES

The goal of the department is to have at least 90% of the assets meet the target service level for the given functional classification of the road where the asset is located. When an asset's service level is less than the target, it is the goal of the department to have asset rated no less than one service level below the target.

CONDITION RATINGS

Of the seven assets, four of them are inspected using nationally adopted methods and techniques while two of the asset classes use techniques that have been developed by the Operations & Maintenance Division. The County-developed techniques are based on the best management and industry standard principles found in the other methods. The following table illustrates the asset class, inspection method and frequency.

Asset	Inspection Method	Agency	Inspection Cycle²
Bridges	<i>National Bridge Inspection Standards</i>	FHWA ³	2 years
Culverts	<i>Culvert Inspection Manual</i>	FHWA	6 years (untreated metal or cracked concrete)
			12 years (coated metal or concrete)
Paved Road	<i>Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys – Modified Standard #D6433</i>	ASTM International ⁴	2 years (Arterials & Collectors)
			4 years (Neighborhood Routes & Locals)
Gravel Roads	<i>Pavement Surface Evaluation and Rating for Gravel Roads</i>	Transportation Information Center – University of Wisconsin-Madison	Annually
Roadside Ditches	<i>Roadside Ditch Evaluation and Rating System</i>	Washington County, Oregon	4 years
Landscaped Areas	<i>Landscaped Area Evaluation and Rating System</i>	Washington County, Oregon	2 years
Water Quality Drainage Structures	<i>Manufacturer's Recommendations</i>	Various	Annually

² "Inspection Cycle" is generalized for assets meeting target service levels. Enhanced, accelerated, or more frequent inspections may be needed for certain, specific assets that require additional attention and/or monitoring.

³ Federal Highway Administration

⁴ American Society for Testing and Materials

TARGET SERVICE LEVELSBRIDGESRoutine Service Levels

Service Level A: No problems of any consequence noted with the structural bridge components. Bridge capacity is significantly above legal loads. No maintenance on structural items is required.

Bridge Structural Index: 8.5 - 10.0 (Very Good)

Service Level B: There maybe some deterioration or other minor defects in structural components. The capacity of the bridge is not impacted by deterioration or maintenance needs. Bridge capacity is greater than 1.5 times legal loads.

Bridge Structural Index: 7.0 – 8.5 (Good)

Service Level C: All primary structural elements are sound but may have minor defects. Bridge may have a capacity less then 1.5 times legal loads, but is not posted for less than legal loads.

Bridge Structural Index: 5.5 - 7.0 (Fair)

Service level D: Bridge may be showing advanced deterioration in one or more structural component. Bridge likely has a capacity less than 1.5 times legal load and is possibly weight limited. All parts of the structure require some level of maintenance.

Bridge Structural Index: 4.0 – 5.5 (Poor)

Service Level E: Deterioration has seriously affected primary structural components. Local failures are possible. Bridge should be closely monitored until repairs can be made. Bridge likely cannot carry legal loads.

Bridge Structural Index: 0.0 - 4.0 (Very Poor)

Target Service Levels

Functional Class	Target Service Level
Arterial	
Collector	
Rural Resource	
Neighborhood Route (URMD)	
Neighborhood Route	
Local (URMD)	
Local	

CULVERTS

Routine Service Levels

Service Level A: Culvert is structurally sound and flows freely with no accumulated debris or sedimentation. Channel slopes are stable and well protected. Water does not breach the embankment and cross the roadway. No noticeable or noteworthy structural deficiencies.

Culvert Rating: 8 - 9

Service Level B: Culvert is structurally sound and has only minor localized deficiencies. Silt and debris build-up is minimal. Banks may show some signs of instability. Water does not breach the embankment and cross the roadway.

Culvert Rating: 6 - 7

Service Level C: Culvert has moderate silt and debris build-up that requires occasional maintenance. Moderate to major deterioration is occurring in localized areas and culvert may be misaligned. Erosion is occurring in the channel and banks may be unstable. Culvert is able to handle most heavy flows but may build up head water.

Culvert Rating: 4 - 5

Service level D: Culvert has significant silt and debris build-up impacting capacity. Bank protection has failed and water may be piping around the culvert. The culvert had deteriorated to the point where settlement is likely occurring in the roadway. Partial culvert collapse is imminent if corrective action is not taken. Roadway may overtop during high flows or causes flooding to adjacent properties. Culvert has settled or is misaligned.

Culvert Rating: 2 - 3

Service Level E: Culvert has lost all structural capacity and has failed beyond the point of repair. Flow may be piping through the embankment. Portions of the culvert have collapsed or are completely undermined. Roadway has settled in shallow culvert installations.

Culvert Rating: 1

Target Service Levels

Functional Class	Target Service Level
Arterial	
Collector	
Rural Resource	
Neighborhood Route (URMD)	
Neighborhood Route	
Local (URMD)	
Local	

Culverts that are less than 36" diameter are the responsibility of Clean Water Services inside their district boundary.

PAVED ROADS

Routine Service Levels:

Service Level A: Few or no unrepaired potholes, ruts, or unsealed cracks. The shoulder is generally clean and free of debris.

Pavement Condition Index: 85 – 100 (Very Good)

Service Level B: Minor amount of unrepaired potholes, ruts, or unsealed cracks. The paved shoulder contains a small amount of debris build-up at the edge.

Pavement Condition Index: 70 – 84 (Good)

Service Level C: Moderate amount of unrepaired potholes, ruts, or unsealed cracks. The paved shoulder contains a noticeable debris build-up that may be unsightly.

Pavement Condition Index: 55 – 69 (Fair)

Service Level D: Significant amount of unrepaired potholes, ruts or unsealed cracks. The paved shoulder contains significant debris that would restrict bicycle or pedestrian use, and be unsightly.

Pavement Condition Index: 25 – 54 (Poor)

Service Level E: Extensive amount of unrepaired potholes, ruts, or unsealed cracks. The paved shoulder contains debris build-up that would prevent bicycle and pedestrian use, be a hazard to vehicles, and be unsightly.

Pavement Condition Index: 0 – 24 (Very Poor)

Target Service Levels

Functional Class	Target Service Level
Arterial	
Collector	
Rural Resource	
Neighborhood Route (URMD)	
Neighborhood Route	
Local (URMD)	
Local	

GRAVEL ROADS

Routine Service Levels

Service Level A: Travel at or above normal speeds (25 mph+) is reasonable. The road usually has an excellent crown, with good drainage and uniform surface layer of gravel. The road exhibits little or no distress most of the time.

Gravel Road Condition Index: 5

Service Level B: Travel at normal speeds (25 mph) is probable. There road usually has a good crown, drainage and surface layer of gravel.

Gravel Road Condition Index: 4

Service Level C: Travel at moderate speeds (20 mph) is likely. There is usually adequate drainage and crown on more than 50% of roadway. Occasionally there is distress limited to traffic effects such as moderate dust, loose aggregate and slight washboarding.

Gravel Road Condition Index: 3

Service Level D: Travel at slow speeds (15 mph) may be necessary. Additional gravel layer needed to carry traffic. Little or no crown. Ditching is inadequate on more than 50% of roadway.

Gravel Road Condition Index: 2

Service Level E: Needs complete rebuilding. Travel is difficult; road may be closed at times.

Gravel Road Condition Index: 1

Target Service Levels

Functional Class	Target Service Level
Collector	
Rural Resource	
Local (URMD)	
Local	

Note: Due to weather conditions and seasonal requirements to grade roads only during wet weather conditions, the service levels may not be able to be met during the dry months.

ROADSIDE DITCHES

Routine Service Levels

Service Level A: Ditches flow freely. Storm drains are free of blockages. Side slopes are non-eroding and stable. No standing water on pavement or in the ditch line.

Ditch Condition Index: 100-91

Service Level B: Ditches have minor silt and debris build-up. Storm drains have minor blockages. Minor puddling may occur during normal storm events. Slight erosion along side slopes.

Ditch Condition Index:-90 -76

Service Level C: Ditches have moderate silt and debris build-up. Storm drains have moderate blockages and slopes have moderate erosion or slides. There may be some standing water on shoulder and in ditches during major storm events. minor erosion along side slopes

Ditch Condition Index: 75-51

Service Level D: Ditches have significant silt and debris build-up. Storm drains have significant blockages. Erosion or slides may encroach or threaten the roadway. Standing water in traveled lane during normal storm event. Significant erosion along side slopes

Ditch Condition Index: 50-26

Service Level E: Ditches have extensive silt and debris build-up. Drains are blocked. Erosion and slides threaten roadway. Water will be over the roadway during normal storm events. Extensive erosion along side slopes

Ditch Condition Index: 25-0

Target Service Levels

Functional Class	Target Service Level
Arterial	
Collector	
Rural Resource	
Neighborhood Route (URMD)	
Neighborhood Route	
Local (URMD)	
Local	

LANDSCAPED AREAS

Routine Service Levels

Service Level A: Landscaped area vegetation is neatly trimmed and beds are clear of all litter, organic debris, and weeds.

Landscape Condition Index: 100-91

Service Level B: Landscaped area vegetation is trimmed, beds are clear of litter but some organic debris, and weeds are evident.

Landscape Condition Index: 90 -76

Service Level C: Landscaped area vegetation needs minor trimming, beds have minor amount of litter, organic debris, and weeds.

Landscape Condition Index: 75-51

Service level D: Landscaped area vegetation needs moderate trimming, beds have a moderate amount of litter, organic debris, and weeds.

Landscape Condition Index: 50-26

Service Level E: Landscaped area vegetation needs major trimming, beds have an excessive amount of litter, organic debris, and weeds.

Landscape Condition Index: 25-0

Target Service Levels

Functional Class	Target Service Level
Arterial	
Collector	
Neighborhood Route (URMD)	
Neighborhood Route	
Local (URMD)	
Local	