Tillamook County Public Works

Road Asset Management Plan

Submitted to:
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Tillamook, OR 97141

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Table of Contents

Chapter 1 Executive Summary

1. Overview

The contribution of Tillamook County Public Works (TCPW) to the quality of life and economy in Tillamook County is critical. Sustainably managing the Tillamook County road network requires knowing the current and future needs of the road network, identifying community priorities and strategies that achieve desired community outcomes. Adequate funding is necessary to achieve these community priorities.

This is the first Asset Management Plan (AMP). It provides information on County road assets, including key inventory, condition and valuation information. It presents the current level of road services, and where possible future funding scenarios that optimize county road investments. Road asset planning assumptions are included and management improvements identified. A three-year Improvement plan is included which addresses business processes, data management, the organization of people, and how county road services are delivered.

Unless otherwise stated, information is current through July 2007.

1.1 County Road Assets

Tillamook County Public Works (TCPW) manages a 378[1] mile county road network for the 25,845 citizens in Tillamook County. The road network provides safe access to services for county residents and movement of goods to and within the county.

[1] There is slight variation in the reported miles of Tillamook County roads. For purposes of this report, 378 miles (281 paved, 97 gravel) is used. This is the mileage reported by in the *Tillamook County Comprehensive Annual Financial Report*, June 30, 2007

County road assets include paved and gravel roads, right of way, bridges, guardrails, levees, culverts, ditches, a traffic signal, street signs and posts, pavement markings, two quarries, the equipment and vehicles used to maintain road assets, and buildings used by TCPW.

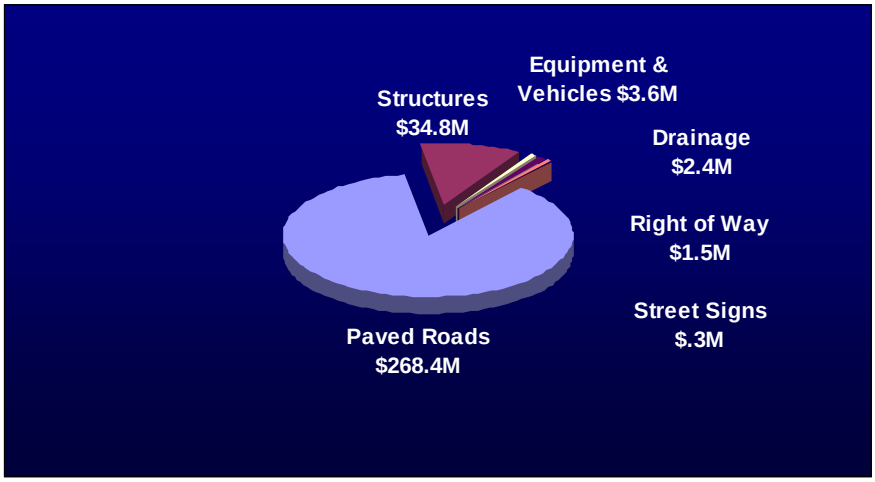


Figure 1 Tillamook County Road Assets Value July 2007 - $311 Million

As of July 2007 County road assets are conservatively valued at $311 million. Eighty-six percent (86%) of the road network's value is in its pavements.

Table 1 Tillamook County Road Network
Inventory, Value, Condition & Unmet Need

FACILITY	GASB34	STATUS	REPLACEMENT VALUE*	CONDITION**						TOTAL UNMET NEED***
				VG	G	F	P	VP	TBD	
PAVEMENT										
Paved	X	287 centerline miles	$268,385,000		29%	17%	25%	29%		$35,800,000
Gravel		91 centerline miles**	N/A						X	N/A
			$268,385,000							$35,800,000
STRUCTURES										
Bridges	X	96	$33,619,088		66%		27%	7%		TBD
Guardrails		10.1 miles	$1,152,385	39%	8%	8%	33%	10%		$495,526
Levees		2	TBD						X	TBD
			$34,771,473							$495,526
DRAINAGE										
Culverts	X	3,210	$2,375,000						X	TBD
Ditches		668 miles	TBD						X	TBD
TRAFFIC SIGNALS		1	TBD						X	TBD
STREET SIGNS										
Signs	X	4,807	$144,210	92%	7%		1%			$1,620
Delineators	X	659	$11,862						X	TBD
Posts	X	5,452	$98,136						X	TBD
			$254,208							
PAVEMENT MARKINGS										
Painted		282 centerline miles	N/A							N/A
Painted Stop Bars		TBD	N/A							N/A
VEHICLES & EQUIPMENT	X	99	$3,604,050						TBD	TBD
BUILDINGS	X	TBD	TBD						X	
RIGHT-OF-WAY****		2,367 acres	$1,475,557							
TOTAL			$310,865,288							$36,297,146

***** Based on 2007 dollars.

**Asset condition categories vary using 3, 4 and 5-level condition assessment categories.

***Unmet need varies by asset class; the level of service is defined specific to the asset class' highest performance for the least cost, or can simply be the elimination of assets in poor condition (e.g., signs).

****Right of Way Value from *Tillamook County Comprehensive Financial Annual Report* , June 30, 2007. ROW width: minor arterials & major collector: 60 feet; minor collector width is 60 feet; locals 45 feet.

Notes: VG = Very Good, G = Good, F = Fair, P = Poor, VP = Very Poor, TBD = To Be Determined, N/A = Not Applicable

1.2 Business Processes

Information and business processes used by TCPW to manage each of these asset classes include the following.

Table 2 Asset Inventories and Tillamook County Road Management Processes

Asset Inventories	Process				
	Inventory?	**Documented Condition?**	**Documented inspection process?**	**Established inspection schedule?**	**If yes, frequency?**
Roads	Yes IRIS-SS	Yes	Yes	Yes	Every 2 years
Bridges	Yes Spreadsheet	Yes	Yes	Yes	Every 2 years
Traffic Signs -reflectivity	Yes IRIS-RI	Partial IRIS-RI	Yes Annual report	Yes	Once per year-night inspection
Traffic Signs -maintenance	-	Yes IRIS-RI	Yes Report	On-going	
Guardrail	Yes IRIS-RI	Yes	No	No[2]	-
Culverts	Yes[3]	Yes (2006)	No	No	-
Ditches	No	No	No	No	-
Pavement Markings	No[4]	No	No	-	-
Levees	No	No	No	No	-
Buildings	No	No	No	No	-
Vehicles	Yes IRIS-EM	No	Yes[5]	Yes	By need
Quarry sites	No	No	No	No	No
Equipment	Yes	Yes	Yes	Yes	Continuous
Vegetation Management	No	No	No	Yes[6]	-

There is high confidence in the information identifying pavement, bridge, sign and guardrail need. There is no maintained inventory or condition assessment on drainage-related assets (culverts, levees and ditches), buildings, or quarries.

[2] Guardrail inspection begun spring 2007.
[3] Nestucca/Neskowin Watersheds: Culvert Prioritization and Action Plan for Fish Passage, August 2006.
[4] Pavement markings are repainted by contractor (Marion County) one time a year with oil-based paint. An Excel spreadsheet notes the materials used and length of line and type to calculate materials.
[5] Equipment Management tracks preventive maintenance performed by vehicle.
[6] Vegetation management is performed routinely and spray reports comply with regulations.

1.3 Strategic Alignment

Management of county road assets relates to adopted County strategic plans and processes, public expectations and legislative mandates.

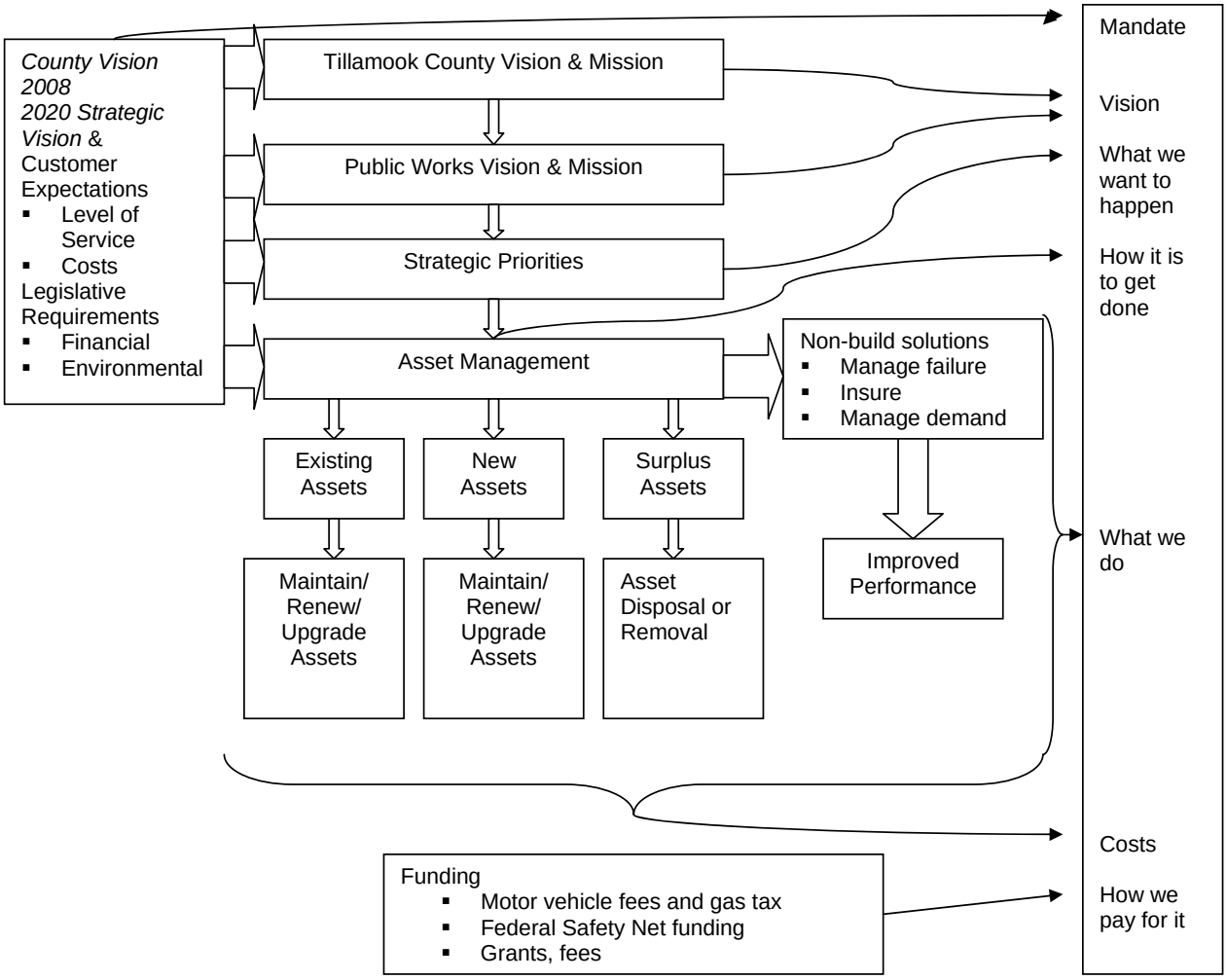


Figure 2 Tillamook County Road Management Framework

1.4 Key Stakeholders

Tillamook County provides road services that meet the needs of the community. What services are provided, and how they are provided depends on the community served.

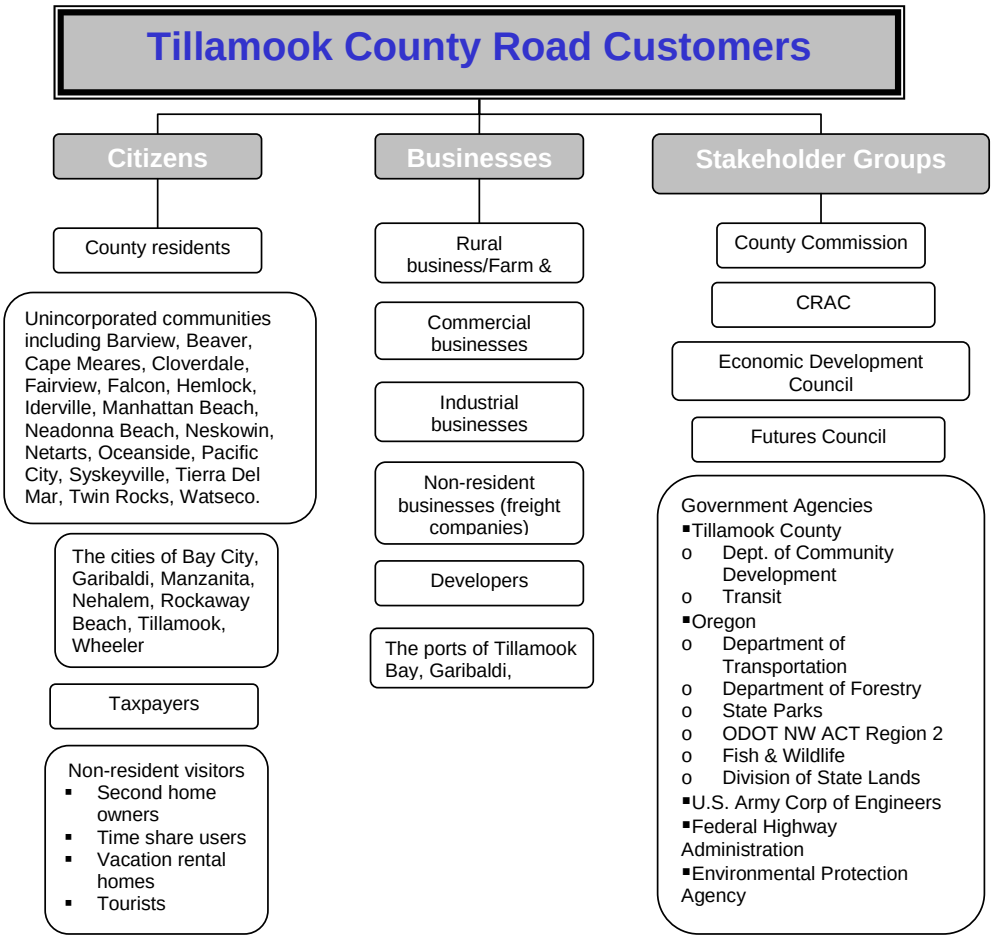


Figure 3 Tillamook County Road Customers

1.5 Management Structure

Tillamook County's road assets are managed by the Public Works. The TCPW reports directly to the County Board. The organizational structure is shown below.

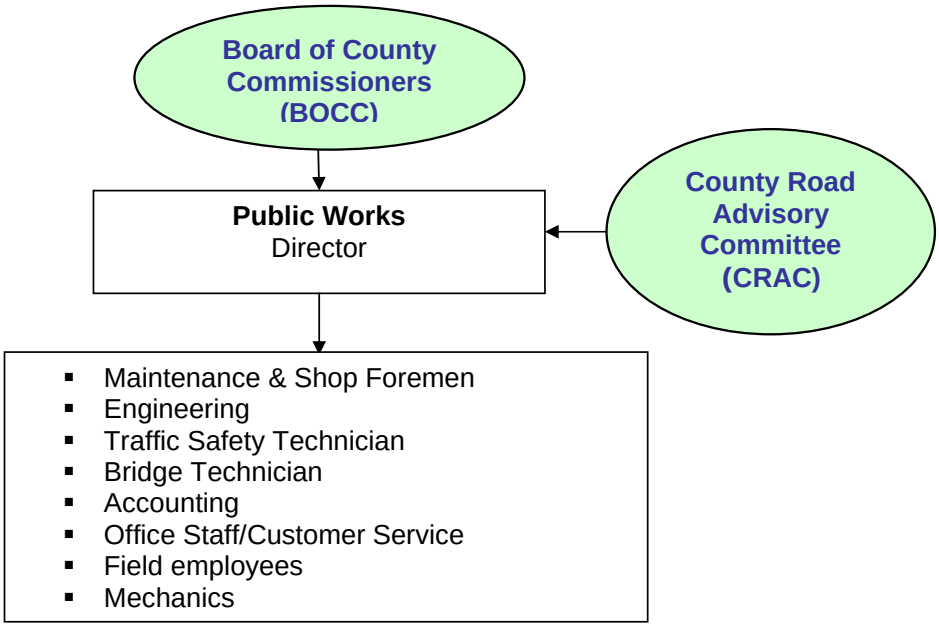


Figure 4 Tillamook County Management Structure

2. Significant Issues

The cost and quality of Tillamook County's road network and supporting services impact county road users. A summary of significant issues facing Tillamook County roads are noted. Financial, operational, technical, legal, social and environmental impacts are assessed.

2.1 County-owned Road Condition Declining

The 2007 replacement value of county paved roads is $268.4 million[7]. County road condition is currently rated the worst of all 36 Oregon counties[8].

Table 3 Pavement Condition in 2007

Condition Category	PCI Range	Percent of Network
Good	70 - 100	29%
Satisfactory	50 - 69	17%
Fair	25 – 49	25%
Poor	< 25	29%

The county road network is subdivided into classifications that function similarly. Arterial and collector roads (53%) carry the majority of trips entering and leaving the county. They provide land access and connect neighborhoods, commercial and industrial areas. Local roads primarily provide access to abutting land and collector and arterial roads.

Table 4 County Road Functional Classifications

Minor Arterial	39 miles	10%
Major Collectors	102 miles	27%
Minor Collectors	62 miles	16%
Local Access-Paved	84 miles	22%
Local Access-Gravel	91 miles	24%

[7] *Tillamook County Public Works Pavement Management Program Budget Options Report*, Engineering Information Services, Inc., June 2007
[8] Letter from Engineering Information Services, October 24, 2007

Since 2001, Tillamook County has experienced a steady decline in road condition; more roads are in Fair or Poor condition than are in Good or Satisfactory condition. County road condition is a community benchmark and Key Performance Indicator for the entire road network.

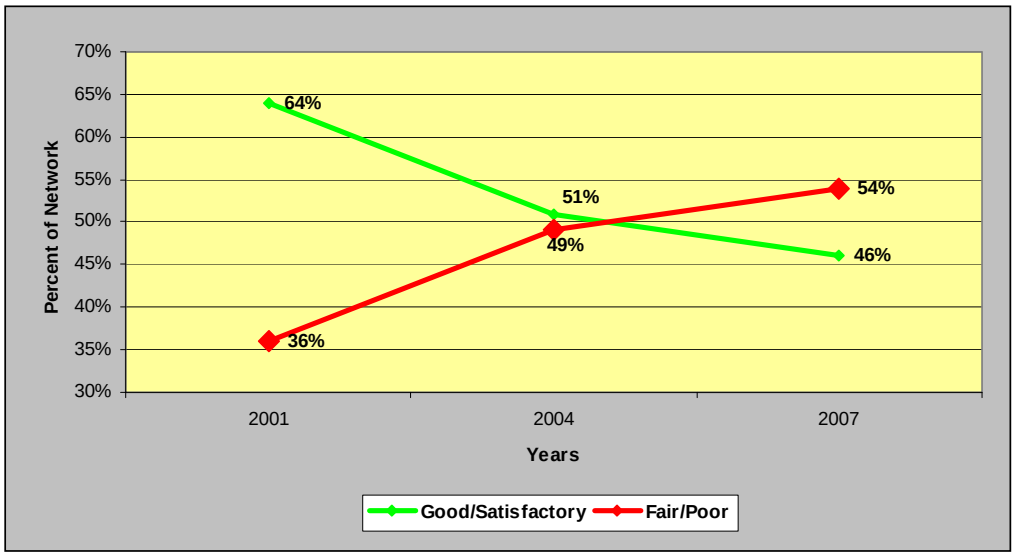


Figure 5 County-Owned Road Condition 2001-2007

Inadequate road funding presents challenges to successfully implement a strategy that seeks to manage road at the least long term cost to taxpayers.

2.2 Road Maintenance & Renewal Needs

Based on the 2007 condition, Tillamook County road require $35 million over the next 10 years to bring county roads to good condition. Without this investment, county roads will decline to poor condition.

Table 5 Road Needs, Resulting Condition by Expenditure Levels

Fiscal Years	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
PCI with Treatment	81	80	84	85	85	85	84	85	86	85
PCI with FY2008 Budget Level	48	45	41	38	35	33	31	29	27	25
Budget Needs	$17,496,811	$2,575,165	$5,440,938	$2,739,909	$1,339,796	$892,609	$432,728	$1,852,680	$2,054,784	$989,598
Preventive Maintenance	$479,284	$82,957	$65,971	$23,001	$29,391	$103,200	$96,112	$1,576,731	$1,903,902	$646,663
Rehabilitation	$17,017,527	$2,492,208	$5,374,967	$2,716,908	$1,310,405	$789,408	$336,616	$275,949	$150,882	$342,935
Deferred Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

The pavement management program's predictive module identifies that $35.8 million is needed over the next ten years. The majority of needs are on County collectors roads. This does not address upgrading county road capacity or substandard roads.

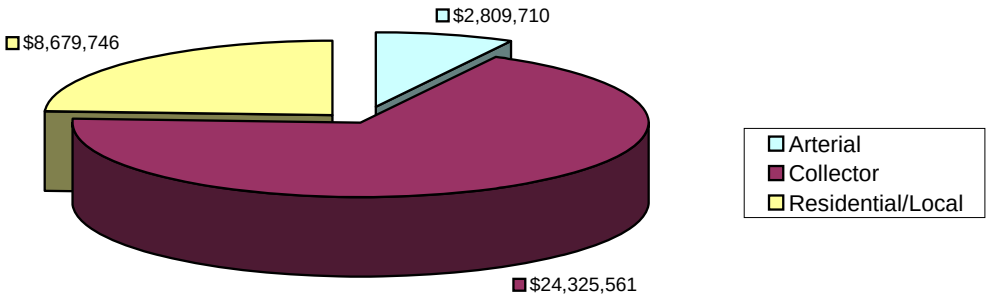


Figure 6 Ten Year Budget Needs by Functional Classification

In 2007, Tillamook County budgeted $12,091 per road mile, significantly less than Clatsop or Lincoln County. Road condition correlates to the per road mile expenditures for the three counties.

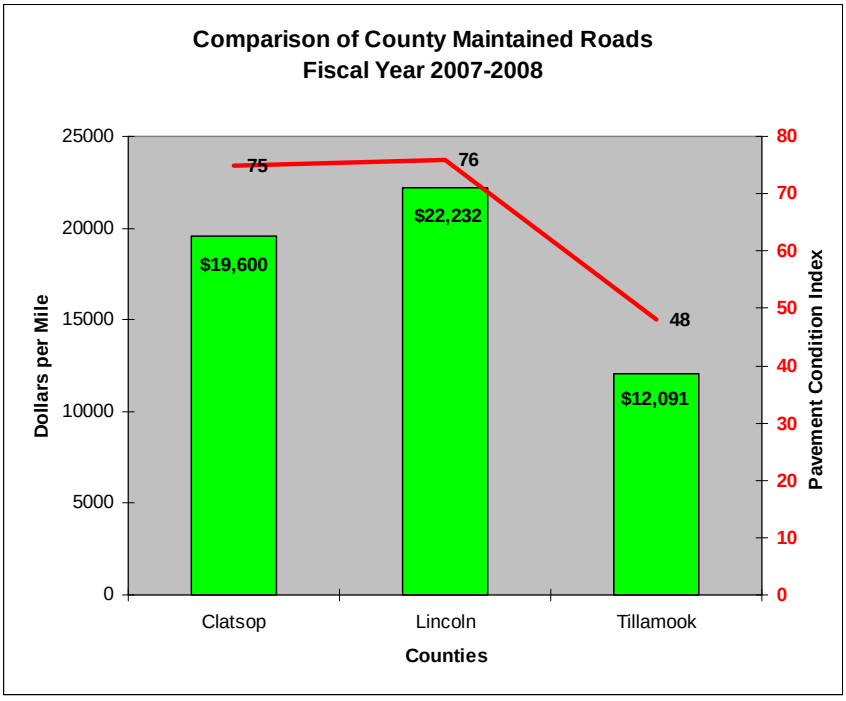


Figure 7 Cost per Mile and Pavement Condition for Northwest Oregon Counties[9]

[9] Local Road and Street Questionnaire for the Fiscal Year Ending June 30, 2007, ODOT

2.3 Road Maintenance and Rehabilitation Activity Costs

The County's road management strategy seeks to minimize road management costs over a road's useful life. The cost of maintaining an individual road varies according to a number of factors, but in general deferring maintenance dramatically increases the cost of maintenance and rehabilitation over time if maintenance is deferred. It is four times more expensive to reconstruct a county road mile than it is to perform timely maintenance by applying a thin overlay.

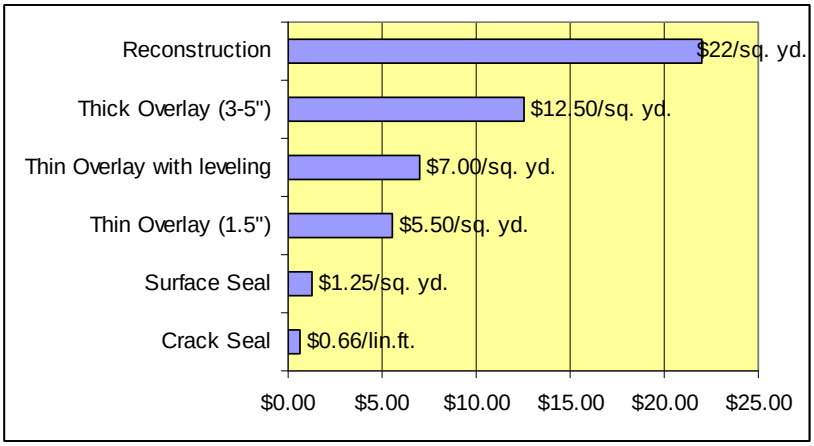


Figure 7 Tillamook County Pavement Treatment Costs - 2007

Table 5 Pavement Management Strategy & 2007 Costs[10]

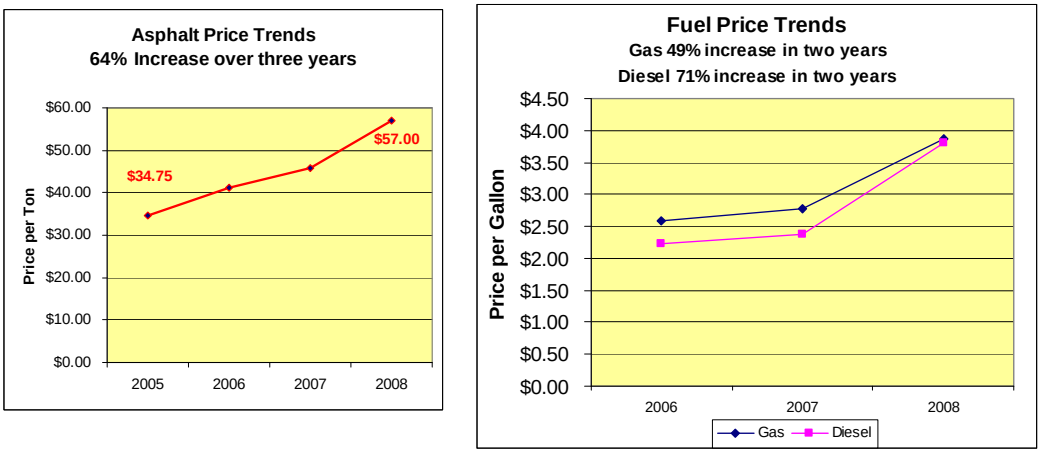
Strategy	Activity	Cost	Unit	Road Condition	
				Category	PCI
Routine Maintenance	Crack Seal	$0.66	lineal foot	Good	90
Routine Maintenance	Surface Seal	$1.25	square yard	Good	90
Preventive Maintenance	Thin Overlay (1.5")	$5.50	square yard	Satisfactory	50-70
Minor Rehabilitation	Thin Overlay with leveling	$7.00	square yard	Fair	25-50
Rehabilitation	Thick Overlay (3-5")	$12.50	square yard	Fair	25-50
Replacement	Reconstruction	$22.00	square yard	Poor	0-25

[10] Tillamook County Pavement Management System, 2007

2.4 Rising Cost of Energy and Road Materials

Significant national and local changes are occurring in the cost of road materials, including asphalt and the fuel used to transport quarry materials (gravel). These shifts affect the quantity of materials which can be purchased and units of work that can be completed.

Following national trends, Tillamook County asphalt and energy (gas and diesel) prices are increasing significantly. Since 2005, asphalt prices per ton increased 64%, from $34.76 to $67.00. Since 2006, gas increased 49% and diesel by 71%. Increases in the cost of road activities reduce what can be accomplished within budget allocations.



Figures 8 & 9 Asphalt and Fuel Price Trends 2005-2007

2.5 Ten-Year Road Funding Unchanged

Road funding averaged approximately $4 million per year over the last ten years.[11]

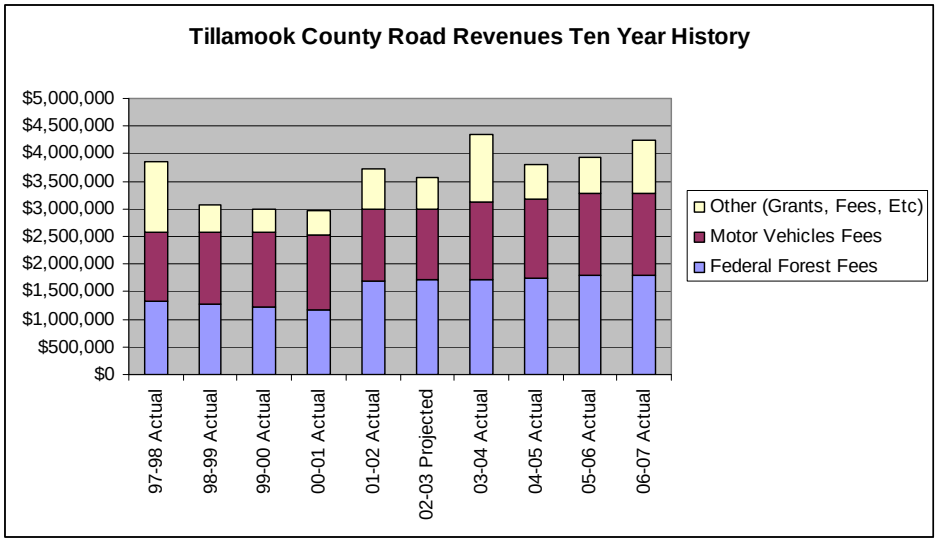


Figure 10 Road Revenues – 1998-2007

2.6 Funding Source – No Local Funding & Federal Source Sunsetting

Federal forest receipts represent the largest source of county road funding (37%), followed by motor vehicle fees (32%) and grants, fees and other sources of funding (31%). Federal forest receipts were extended in 2008 and will sunset in four years. There is no local funding for Tillamook County road services.

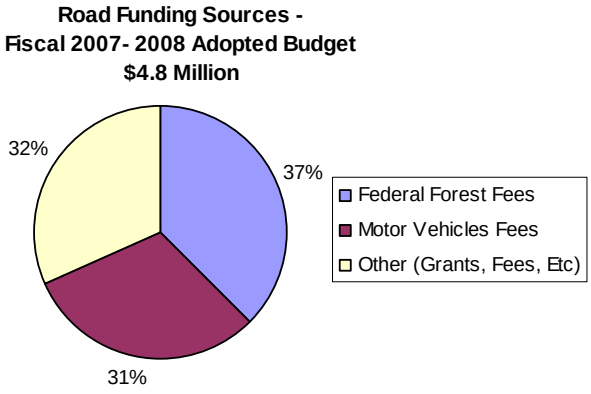


Figure 11 FY 2007-2008 County Adopted Road Budget

[11] *Draft TSP*, 2003 and County Treasurer

2.7 Reduced Resources and Program Elimination

Since 1982, road services have been reduced or eliminated as budgets have not kept pace with the needs.

- TCPW has experienced significant reductions in TCPW employees from a high of 50 employees in 1982, to 30 employees in 2007. The July 2008 loss of federal forest funding resulted in further personnel reductions. Reinstatement of these funds is now leading to additional hiring.
- Over the last 10 years, the county road budget has remained nearly the same, approximately $4 million per year.
- Road surface maintenance remains the focus of available resources. Over the last 10 years, an average of 7 miles has been resurfaced per year. This includes federally funded and county funded road repairs.

Table 6 Ten Year Road TCPW Resources and Workload Accomplishments[12]

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Employees	41	40	39	35	35	35	35	35	30	30
Budget (in millions)	$3.9	$3.1	$3.0	$3.0	$3.7	$3.6	$4.3	$3.8	$3.9	$4.2
Resurfacing (miles)	6.3	2.0	5.4	7.1	3.9	4.8	4.7	18.2	12.3	8.9

- Key programs have been reduced or eliminated over the last 20 years. There no County planned drainage management program; culvert and ditches maintenance occurs on a reactive basis in response to calls for service or flooding. There is no accurate inventory of culverts and no condition assessment of culvert and ditches; the county road ditching program was eliminated in recent years as TCPW staff was reduced.

[12] *Tillamook County Comprehensive Annual Financial Report*, June 30, 2007

2.8 Community Consultation: Perception of Road Condition versus Willingness to Pay

TCPW managers are seeking more effective ways to target available resources so that organizational actions are aligned with community priorities.

The Tillamook County Futures Council surveyed citizen and businesses in 1998 and again in 2007 to understand the perception of the adequacy of road maintenance. Since 1998, a majority of respondents believe better road maintenance was needed, or that the road condition and maintenance are inadequate.

Table 7 Citizen Perception of County Road Condition & Level of Maintenance[13]

Year	Question Asked	Response	Percent
1998	"We need to improve the quality and condition of our roads and highways."	Agree/Strongly Agree	51.2%
2007	"The current condition and level of maintenance of the County roads are adequate."	Disagree/Strongly Disagree	79.5%

The economic cost to sustainably manage the county road network may exceed the community's willingness to pay. A May 2008 ballot measure in support of county road maintenance failed. More focused community consultation is underway to understand what county road services citizens and businesses are willing to pay for. Prioritized service delivery is required to target available resources to the greatest need so that road services can be provided for the least long term cost.

2.9 Increasing Freight Demands on County Roads

Tillamook County is a wet, coastal environment with an average annual rainfall of 90 inches. Since 2006, severe storms have damaged County roads and bridges destroying the Port of Tillamook Bay's Salmonberry Railroad that connected the county to the Willamette Valley. Until this railroad is repaired, there will be increased demands placed on the county roads. Grain shipments for dairy farms, harvested timber and finished mill lumber shipments previously shipped by rail to the Willamette Valley must now use trucks. Traffic congestion is increasing and the deterioration of County roads accelerated as trucks are used to haul this freight pending railroad repair. In 2005, the Port of Tillamook Bay estimated that the Salmonberry railroad carried the equivalent amount of product as 24,000 trucks.[14] The Port

[13] "Comparison of 1998 and 2007 Survey Questions," Community Planning Workshop, July 3, 2007

[14] Application for Connect Oregon 2005-2006, Port of Tillamook Bay, 2005

estimated that one railroad car of finished lumber equals the same as 10 log trucks. [15]

Table 8 Issues by Asset Class

Asset Class	Issue
Pavement	▪ The estimated useful life for county paved roads currently used by the County in financial reporting is 50 years which is considered conservative. A more accurate useful life for the surface of low volume rural roads is 20 years, based on AASHTO guidelines. ▪ Eighty-three percent of the County's road network exceeds even this conservative estimate of useful life, or 50 years. ▪ The method for assessing pavement condition has an optimum confidence, given that 100% of county roads are visually inspected and rated every other year. The visual inspection method pavement management software is used by all Oregon counties, and many west cost cities in the U.S. ▪ In 2007, Tillamook County's roads were rated in Fair condition (PCI 48) the lowest Pavement Condition Index of all Oregon counties. Pavement condition will decline to Very Poor (25 PCI) by 2016 with current funding. ▪ Five levels of pavement service were analyzed in 2007. These are based on the 2007 network condition and projected outcomes given preservation strategies and funding levels. These scenarios' pavement condition, deferred maintenance and pavement condition over 10 years are included in County decision making. ▪ The current funding allocation of $250,000 per year is clearly insufficient to address all of Tillamook County's future road maintenance needs. Local Access Roads receive virtually no road services, beyond responding to emergencies or removal of public safety hazards. ▪ In 2007, Tillamook County's roads were in Fair condition (48 PCI) and the level of deferred maintenance was high ($17.2 million). Without additional funding and preventive maintenance, the backlog will increase over the next 10 years ($47.5 million). ▪ The optimum strategy requires a "Mix of Fixes", or substantial initial investment to rehabilitate county roads and adequate preventive maintenance to ensure those roads in Good condition do not deteriorate. Using this estimate and the MTC program, an unrestricted funding level of $35.8 million over a ten-year period is needed to improve the county's roads to Good condition, a PCI in the low to mid 80's. Of this total, approximately $17.5 million is needed in the first year alone. This initial investment, primarily to repair roads in the "Fair" to "Poor" range, are for

[15] Application for Connect Oregon 2005-2006, Port of Tillamook Bay, 2005

Asset Class	Issue
	those roads with a PCI of 0-49, which is about 54 percent of Tillamook County's total network. The total budget needs amount of $35.8 million exceeds Tillamook County's current funding level by $33.3 million, thus creating a backlog in deferred maintenance. ▪ Little preventive maintenance is occurring on Tillamook County's roads. This investment level should be reexamined to target available resources on those roads most likely to decline below "Satisfactory", or between 45 and 70 PCI. This strategy is seen as necessary pending finding additional funding to address those roads in need of rehabilitation.
Structures	▪ Better information on the condition, performance and value of County levees is needed. ▪ Better knowledge of future bridge and levee renewals and their timing is needed; 25% of the county's bridges have timber in their main span. The useful life of timber bridges is 30 years[16]. ▪ Adequate funding is needed to address known bridge and guardrail maintenance and renewal needs. ▪ The loss of the Salmonberry railroad and subsequent increased truck traffic on county bridges and roads is a current and future risk to the county road network. ▪ The frequency and intensity of weather-related events are considered a risk to county bridges, levees and guardrails condition. ▪ Continued under-funding of bridge, levee and guardrail needs will impact the condition and performance of the county structures.
Traffic Safety	▪ Most sign legends are produced by TCPW Traffic Safety staff. However, the lack of adequate computer and plotter make sign production somewhat difficult. While sign legend manufacturing can be contracted, this adds time and costs to the process. ▪ MUTCD mandates that agencies begin a retroreflectivity program by February 2008. ▪ The 2008 departure of the Traffic Safety technician presents a short term challenge to ongoing sign and marking management.
Drainage	▪ A detailed inventory of county culverts has not been maintained; there is no inventory of county catch basins. ▪ There is currently no comprehensive program to maintain culverts. Their condition is unknown. ▪ There is no inventory of county ditches. Consideration should be given to adding a video log of county ditches to

[16] *Status & Condition Report*, Portland Transportation, July 2006

Asset Class	Issue
	the contract that assesses pavement condition every two years as is done by Clatsop County. ▪ The decline of TCPW employees has resulted in the elimination of a comprehensive ditching program for county roads. Currently, ditching occurs on a reactive basis only. ▪ Drainage asset maintenance (culverts and ditches) is considered an extreme risk given the wet environment, severe weather events in 2006 and 2007 and lack of a comprehensive inventory or condition assessment program.
Vegetation Management	▪ IRIS's vegetation management module is not used to manage this program. ▪ TCPW is implementing a more comprehensive vegetation management program. Standard accomplishments, performance criteria and measurement for each activity as well as annual reporting requirements are needed which monitor TCPW workload, effectiveness and efficiency as well as compare these to other western Oregon counties. Costs per lineal mile are needed which compare methods used (e.g., chemical spray used) to determine opportunities for improving efficiency and effectiveness.
Equipment Management	▪ Nearly ¾ of county vehicles exceeds the County's adopted useful life for vehicles. Equipment replacement set asides did not occur prior to 2007. ▪ Since 2006, TCPW vehicle inventory and maintenance scheduling has been tracked in the IRIS. This is considered a significant improvement to fleet service management. Analysis and reporting of on-going vehicle costs and vehicle performance (miles and hours of use) are needed. Vehicle replacement should be based on optimum use versus cost; careful examination of replacement should be triggered by cost versus useful life so that life cycle costs are minimized. ▪ The Shop Foreman is in the initial stages of implementing policy-based preventive maintenance for each TCPW vehicle and piece of equipment. This is best practice. ▪ TCPW is in the final stages of joining the Portland Metropolitan Area Metropolitan Area (PMAT) cooperative intergovernmental agreement for sharing equipment and services. This is considered best practice.
Buildings	▪ TCPW building maintenance is reactive and under funded. The type, number, quality and location of TCPW buildings are key parameters influencing the efficient and effective management of resources (labor, materials and equipment) used to deliver county road services. ▪ There is no building asset plan. A plan is needed with an inventory and condition assessment of major building elements that assure worker safety and building code

Asset Class	Issue
	compliance. ▪ A strategy is needed to address the most critical TCPW building needs in the most economical timeframe. TCPW buildings were inspected in 2008 for code violations.
Quarries	▪ Local materials should be used in support of road maintenance work wherever possible. This minimizes transportation costs, and maintains the character of materials used within Tillamook County. ▪ The current county-owned quarries provide a great benefit to minimizing hauling costs associated with driving crushed rock to road maintenance sites. These quarries should be managed and maintained to ensure long term use of county owned, local materials appropriate for road maintenance needs. ▪ Evaluating sustainable materials purchasing and utilization practices should continue. The cost and environmental implications of any new contract or practice should be weighed to ensure the best value for county money.

2.11 County Road Management Improvements

Continually improving Tillamook County road services requires adequate policies, people, business processes, data and information, and technology. Following is an assessment of needed improvements. A three-year improvement plan is a part of the Road Asset Plan. It identifies strategic initiatives that begin to implement improvements to Tillamook County's road management practices.

Table 9 Asset Management Recommended Improvements

Asset Management Element	Issue and recommended improvement
Policy	There is no policy which speaks directly to Tillamook County's commitment to manage its roadways. ▪ The County Board should explicitly adopt a road asset management policy clarifies how road services are to be managed and road needs funded. (See draft policy, Appendix D: Asset Management Policy). ▪ The role of the County Boarders and CRAC in setting goals and targeting road service performance needs to be clarified. Adopted goals should guide investment, program and project ranking criteria, and should be specific for each program. ▪ List and communicate established federal, state, local statutes, County policy, governing engineering standards and practices, and agency policies and procedures to the CRAC and TCPW employees.
Performance Management	▪ There is no comprehensive quarterly or annual performance reporting for TCPW services or assets, or adopted performance targets. This is needed to link strategy with operational decisions (response times, service reliability, cost and quality) that deliver services. ▪ TCPW has historically developed its budget requests based on prior budget levels. Resource allocation should be based on adopted service priorities. Expenditure of funds has been based on reactive maintenance; work is organized to respond to service requests, safety hazards or weather events. Reactive maintenance significantly changes daily work priorities. ▪ By assessing road asset needs, setting performance targets then tracking work performed, management can identify needs before they become hazards or require more expensive rehabilitation. Activities can be planned which reduces mobilization costs as staffing and equipment needs can be planned. Unit rates to complete work can be identified for maintenance activities, performance tracked and levels of service used to forecast financial needs that achieve targeted physical asset

Asset Management Element	Issue and recommended improvement
	condition (e.g., signs in very good or good condition) and performance (e.g., sign reflectivity). ▪ The cost of each service and key performance measures should be adopted and reported annually. Service levels and road service budgets should be linked, and shared with the public. Planned, significant changes to services that are provided (e.g., eliminating a service) should be highlighted as a part of the annual budget process. ▪ Targets should be approved by the County Board and appropriate budgets developed so that targets are achievable over defined time periods given available resources. Performance targets should include values that trigger actions. ▪ Roles should be assigned to track the inventory, condition and performance of assets. ▪ Activity accomplishments should be reviewed. Appropriate workload measures should be assigned so that annual work plans can be developed for each service. ▪ Clatsop and Jackson Counties should be contacted to identify improvements to work planning and performance reporting and benchmark the cost of activities and services. This may benefit foremen as they structure how and when activities are performed. ▪ Crews should be trained to identify appropriate maintenance and renewal actions given asset performance and condition. Maintenance standards should be developed which include clear photographs, descriptions and quantitative measures to define the condition of an asset and appropriate maintenance or renewal activities. ▪ The TCPW activities should be reviewed and redefined so that they are aligned with: location, asset class or service (e.g., drainage, structures, vegetation management), and whether an activity is performed to maintain, rehabilitate, install, or decommission an asset. Improving these relationships will enable TCPW to identify whether it is more efficient to continue to maintain or replace an asset based on the lowest life cycle cost.
Accountability	▪ An annual report of all County road assets is needed. This should report the inventory, condition, replacement value and maintenance and renewal needs for each asset. ▪ An inventory and condition assessment is needed for culverts and TCPW buildings. ▪ Documented, regular and repeatable inspection processes based on established standards and frequencies are needed for each asset class.

Asset Management Element	Issue and recommended improvement
	▪ Preventive maintenance activities should be segregated in the cost accounting system so that actions correlate more closely to managing the lifecycle of an asset, and note if an activity is reactive or planned (e.g., pothole patching is reactive while pavement overlays are planned activities). Staff should receive regular training which distinguishes activities that are reactive maintenance (response to service requests) versus proactive or preventive maintenance (usually scheduling work targeted at maintaining an asset's condition or preventing its deterioration). ▪ The TCPW asset management accountabilities and responsibilities should be added to the managers' position statement; foremen position statements should clearly identify their roles and asset management responsibilities, where appropriate. ▪ The role of the TCPW Director and asset management funciton should be adopted and their reporting structure and responsibilities relative to the CRAC and County Board clarified.
Resource Allocation	▪ Implement a risk-based assessment at the network, program and project level. Review the risks identified in this plan to ensure known risks are included, and adopted priorities reflect criteria. The objective is to clearly document the tradeoffs of investing more or less in various services and identifying and selecting projects in a consistent and defensible manner. ▪ Adopted policies should guide service priorities and road resources. ▪ The Local Access Roads (LAR) Board Order should be reviewed given the resources of Tillamook County. Provision of county road maintenance services on private roads is not performed by adjoining Oregon counties. ▪ Service requests purpose should be clearly noted, priorities assigned and response standards adopted and tracked.
Operational Efficiency	▪ New management is beginning to implement innovative ways to reduce operational costs. ▪ TCPW should adopt an explicit policy that as resources are spent on the County's road assets, consideration of innovative techniques for new or major renewal projects will be considered, including performance-based contracting. Bulk materials purchases and equipment sharing should be pursued as a regular practice.

Asset Management Element	Issue and recommended improvement
	▪ Complete intergovernmental agreement (PMAT) which shares resources and services. ▪ List operational efficiencies (e.g., changes in work practice or materials, partnerships with other jurisdictions, disposal of underutilized equipment) in the annual asset status and condition report so that employees, CRAC, the County Board and the public are aware progress. ▪ Examine on-going costs such as equipment maintenance and repair versus equipment replacement, as well as gravel hauling. Identify whether more efficient mobilization can be achieved with fewer work sites.
Data Collection and Organization	▪ Pavement, bridge, sign and guardrail inventory is current and condition known. Equipment management has just begun recently, as has guardrail condition assessment. Inventory and assess condition of culverts, ditches, levees, and buildings. ▪ Enter sign and sign post condition in IRIS. Document methods of condition assessment for each inventory so a repeatable process can achieve similar results when conducted by more than one individual. ▪ Annually report on TCPW assets' inventory, condition, the method of assessing condition and the confidence and frequency of methods used. Document roles, responsibilities and methods for collecting and maintaining inventory information. ▪ Establish regular schedule for assessing asset condition that reflects the risks to the community and County liability. ▪ Train managers responsible for data maintenance and condition assessment on use of IRIS. ▪ Budget development and annual reports to the public and decision makers should include: o An explanation of the current level of service and targeted level of service given a specific timeframe for achieving a road asset condition. The annual budget should seek to link short term budget levels to long term consequence of budgets. o Annual accomplishments (e.g., miles of roads overlayed, signs replaced or maintained, miles of guardrail repaired) o Service requests by type o Public surveys on perception of service priorities and needs
Technology	▪ Explore use of Marion County's GIS (mapping) services. ▪ Discuss whether adding a video log of all county roads to

Asset Management Element	Issue and recommended improvement
	the pavement condition assessment contract would be of benefit. Contact Clatsop County and identify costs and benefits. ▪ Assign clear responsibility for completing high priority asset inventories and condition assessments, i.e., culverts, ditches, levees, buildings. ▪ Document the methods for assessing asset condition, including citing sources of standards and measures used. The objective is to maintain current and accurate data on asset inventory, condition, performance, cost and work accomplishment. ▪ Data roles and responsibilities, and, where appropriate, training on use of these digital tools should be clearly identified. ▪ Protocols for closing service requests should be identified and links to work performed made explicit. ▪ The use of the Maintenance Management Module (MM)[17] should be explored. Jackson County should be contacted for evaluating the effort and benefits of implementing this work planning and scheduling module in IRIS. As this is pursued, coordinate Cost Accounting System (CAS) activities with MMS activities so that planned versus actual reporting can occur. ▪ Review CAS activities so that they relate to location, program and an asset's management over its life cycle.
Financial Planning	▪ Support local funding efforts that explore additional Tillamook County road funding for critical needs of the road network. ▪ Introduce a stronger link between work planning, cost accounting and performance reporting. This should track expenditures based on an asset's life cycle, and track work accomplishments so that performance can be reported. ▪ Establish reporting system that begins to track life cycle cost of work activities; incorporate life cycle cost consideration in capital project selection. ▪ Introduce annual revaluation and inventory, condition rating and unmet need in annual Status & Condition Report for County Transportation Network ▪ Continue risk-rate services which highlight needs based on criticality or risk. Introduce risk-based decision making throughout TCPW decision making (project selection, service priorities, and budget requests). ▪ Move from reporting historic depreciation for County road assets in financial reporting to current valuation. Base

[17] Currently in use by Josephine County.

Asset Management Element	Issue and recommended improvement
	asset value on effective life of assets, current condition and anticipated service demands. ▪ Develop long range capital improvement plan and capital improvement financing to address known rehabilitation, replacement and expansion needs. Integrate with County Transportation System Planning capital project priority setting.

Chapter 2 Introduction

2.1 Purpose of the Asset Management Plan

This asset management plan (AMP) documents Tillamook County Public Work's (TCPW) asset management, financial, maintenance, and engineering practices for the road network. It documents the physical parameters of the road network, assets owned and maintained by the County, asset condition, where known, and the current level of service provided to county residents and businesses.

The overall purpose of asset management planning is to more effectively align organizational actions with community priorities while understanding the long term implications of funding decisions. Providing the desired level of service requires that on-going communication occur with the community about their priorities. This accountability creates trust and understanding within the organization, and between TCPW and elected representatives and the public.

This plan incorporates the Mission, Vision and Values of TCPW, an assessment of current management practices compared to best appropriate practice. A risk assessment is also included. A three year improvement plan prioritizes actions that address business process, information technology, policy and reporting. This will be used to monitor and report road network performance and communicate progress in managing the Tillamook County road network.

2.2 Plan Limitations and Future Management Reporting

This first AMP is based on July 2007 TCPW information and 2008 management practice; strategic and operational performance measures and reporting are cited as key elements in need of improvement. Future plan updates will further develop information that improves the ties between strategy, programs and asset life cycle costs. New information will be incorporated into future AMP updates and progress reported regularly.

2.3 Legislative and Regulatory Requirements

A variety of federal, state and county policies and regulatory requirements impact Tillamook County transportation asset management priorities and reporting requirements.

- The federal Transportation Equity Act for the 21st Century (TEA-21) and implementing regulations (23CFR 450 and 49 CFR 613). In TEA-21's purpose is to "facilitates the efficient, economic movement of people and goods in all areas of the State." The act requires the use of life-cycle costs in the design and engineering of bridges, tunnels, or pavements" and "Investment strategies to improve adjoining State and local roads that support rural economic growth and tourism development…."
- Transportation Planning Rule (OAR 660-12, 1991) requires that local governments with populations greater than 2,500 to prepare and adopt a Transportation System Plan.
- The statewide Transportation Planning Goal 11 requires the county to plan public facilities and services to serve urban and rural development, with transportation identified as one of the five key facilities and services. A key facility is: "base facilities that are primarily planned for by local government but which also may be provided by private enterprise and are essential to the support of more intensive development…." A description of transportation and storm water facilities are included in the County's *Comprehensive Plan,* Goal 11.
- The statewide Transportation Planning Goal 12: Public Facilities is: "To provide and encourage a safe, convenient and economic transportation system." This goal requires periodic analysis and planning for county transportation system needs, and development of goals and policies which implement the Tillamook County Transportation System Plan and Comprehensive Plan Goal 12, Transportation Element. An inventory of the existing system, demand management and policies which describe the function and priority of the road network are found in the Transportation System Plan.
- The Governmental Accounting Standards Board Statement (GASB) No. 34 requires each government to report the number and type of long-lived capital assets the government owns, estimate the useful life of these assets and the current value of these assets given the investments made in these assets over their lives.
- Oregon Revised Statues 368 - County Roads
- The Tillamook County charter
- County board orders, including the "Local Access Road Policy Statement," (Order 92-35)

Many federal, state and county regulations define construction quality and compliance standards which impact the priority and extent of capital investments in the county road infrastructure. These include:

- The American Association of State Highway Transportation Officials (AASHTO) Manual, A Policy on Geometric Design of Highways and Streets
- Manual on Uniform Traffic Control Devices (MUTCD)
- National Bridge Inspection Standards (NBIS)

- Americans with Disabilities Act (ADA)
- Endangered Species Act
- Clean Water Act
- The Tillamook County Road Construction Plan Standards, March 2007

2.4 The Relationship to Other Planning Documents

This asset management plan (AMP) links the County's strategic vision and goals with operational priorities and activities. This ensures that there is a clear understanding of why something is done, what is done and how it is done. By linking Tillamook County's vision and mission, and strategic long term plans to more short term operational plans, performance and accountability can be improved. The following figure shows these relationships.

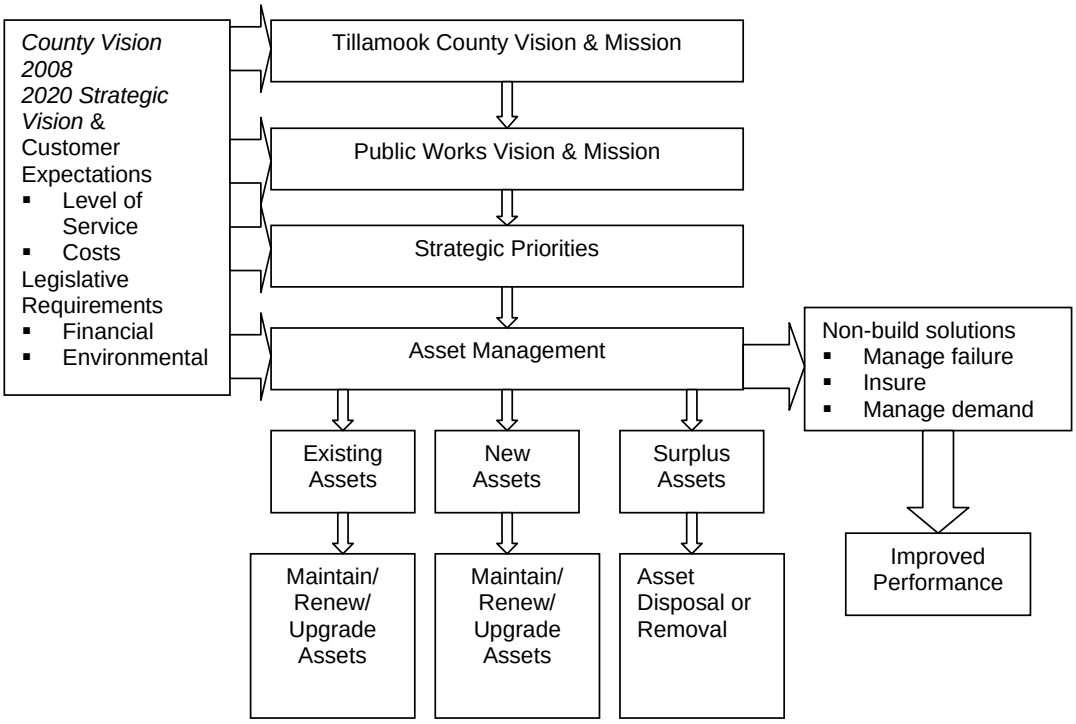


Figure 2.1 Asset Management Links Strategy to Operations

The AMP links specifically to the following strategic documents*:*

- *County Strategic Plan* (2008, pending). This includes the vision and mission for all county services, including the county's key growth and economic trends that will impact transportation services.
- *Tillamook County Futures Council 2020 Strategic Plan* (2008). This document sets a county vision based on statistically valid surveys of county residents and identifies broad outcomes desired by the community for the future of the county, as well as benchmarks for achieving the vision.
- *Tillamook County Comprehensive Plan* (1998). A statement of problems and opportunities existing in the county, anticipated growth, and the resulting needs and desires of county residents that guide future development of the county over the next 20 years. This document includes adopted policy statements that give direction to

county actions and programs. Transportation facilities are addressed in Section 3.3.2 and Section 3.7.2 of Goal 11: Public Facilities, and Goal 12: Transportation Element.

- *Draft Tillamook County Transportation Systems Plan* (2003). The TSP identifies planned transportation facilities and services needed to support planned land uses in unincorporated areas of the county for the next 20 years as required by the Transportation Planning Rule (OAR 660-012) and the Oregon Transportation Plan (OTP).
- *Tillamook County Emergency Operations and Management Plan,* (2005). This identifies the role of Public Works in responding to natural and other civil disasters.

Many federal and state policy and planning documents influence the management of roads within the county. The AMP ensures that the facilities and services needed are cost effectively developed and maintained to achieve strategic outcomes.

2.5 Vision, Goals and Objectives

The County vision is:
"*Enhance the quality of life for its citizens by promoting and preserving public health and safety, maintaining a stable economy, encouraging wise use of resources, and providing services in the most efficient and cost-effective manner possible."* (2007 website)

The *Tillamook County Strategic Plan* and *County Comprehensive Plan, Goal 12: Transportation* identifies key transportation roles the County plays. The Comprehensive Plan cites the need to:

- Protect the function, operation and safety of existing and planned roadways
- Consider land use impacts on existing or planned transportation facilities
- Provide pedestrian and bicycle connectivity in new subdivisions
- Coordinate with other jurisdictions to assure adequate connections to streets and transportation systems between incorporated and unincorporated areas
- Plan for a multi-modal network of transportation facilities and services, including air, water, rail, auto, pedestrian, bicycle and public transit.

The County's *Comprehensive Plan* states that:

- The roadway network is not restricted to jurisdictional boundaries.
- Roadway maintenance and improvement are to be coordinated in cooperation with other jurisdictions.
- Road function, access and "level of service standards" are to be implemented through regulation.
- All modes of transportation for moving goods and people are to be provided and use of public transportation encouraged.

Four strategic goals are identified in the March 2008 *Tillamook County 2020 Strategic Vision* with key areas of emphasis for TCPW in the next three to ten years. The extensive public involvement used to define these issues makes

Comment: Liane: TCPW?

this work an important reflection of Tillamook County citizen and business priorities and concerns.

1. Maintaining a safe road system
    1.1.1 Responding to weather events
    1.1.2 Identifying and repairing hazards
2. Preserving our road system to prevent further deterioration and protect the public's investment.
3. Reconstructing our most critical road system facilities.
4. Bringing road facilities up to standard and building the system to meet current and future needs.

To implement these, Public Works vision is:
"*Tillamook County's high-quality, safe road network supports a thriving economy and a healthy environment. Our professional, well-trained staff works in partnership with our community to ensure that our road network meets the needs of our citizens now and in the future."* (2/2008)

The TCPW mission that achieves its vision is:
"*We take pride in serving the public by providing, maintaining, and preserving a safe and efficient county road network, and quickly responding to weather events and hazards. We protect the public's investment by working with our partners and targeting resources to minimize long term costs while providing the best possible service."* (2/2008)

The link between the Board's vision, expressed community outcomes from the *2020 Strategic Vision* process and key county road objectives are shown below.

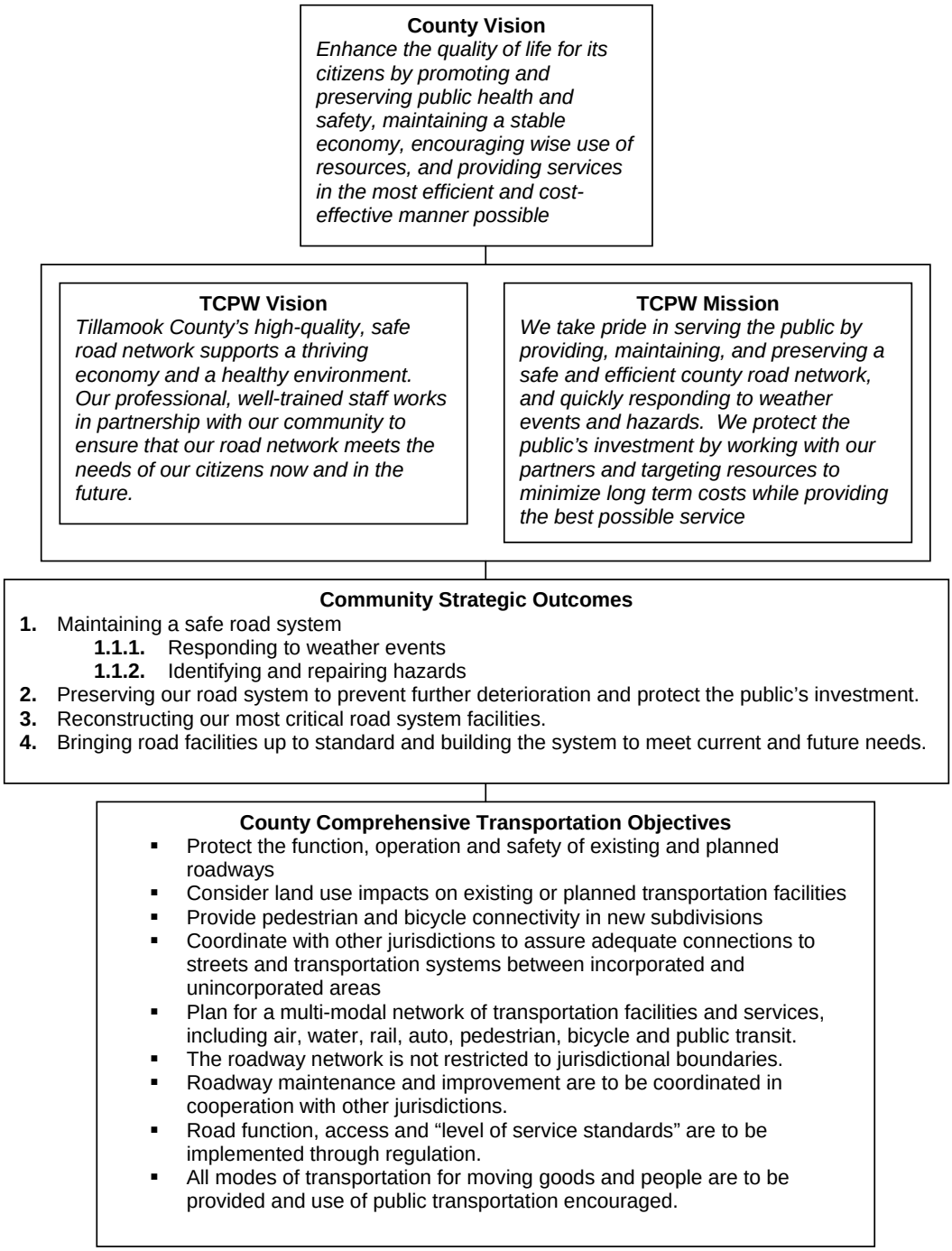


Figure 2.2 Tillamook County Vision and Road Objectives

2.6 Key Stakeholders in the Plan

Many agencies and jurisdictions directly influence the demands and management of roadways within Tillamook County. Key stakeholders include:

- Tillamook County Board of Commissioners
- Tillamook County Road Advisory Committee
- Oregon Department of Transportation
- Oregon Department of Forestry
- Oregon State Parks
- U.S. Army Corp of Engineers
- Economic Development Council of Tillamook County
- Tillamook County Community Development
- County Futures Council
- Unincorporated communities including Barview, Beaver, Cape Meares, Cloverdale, Falcon Cove, Hebo, Idaville, Mohler, Neahkahnie, Neskowin, Oceanside, Netarts, Pacific City/Woods, Syskeyville, Tierra Del Mar, Twin Rocks.
- Tillamook County Transit
- The ports of Tillamook Bay, Garibaldi, Nehalem
- The airports of Tillamook Bay, Nehalem and Pacific City
- The cities of Bay City, Garibaldi, Manzanita, Nehalem, Rockaway Beach, Tillamook, Wheeler

2.7 Management Structure

Tillamook County's road assets are managed by Public Works. TCPW reports directly to the Board of County Commissioners (BOCC). The organizational structure is shown below.

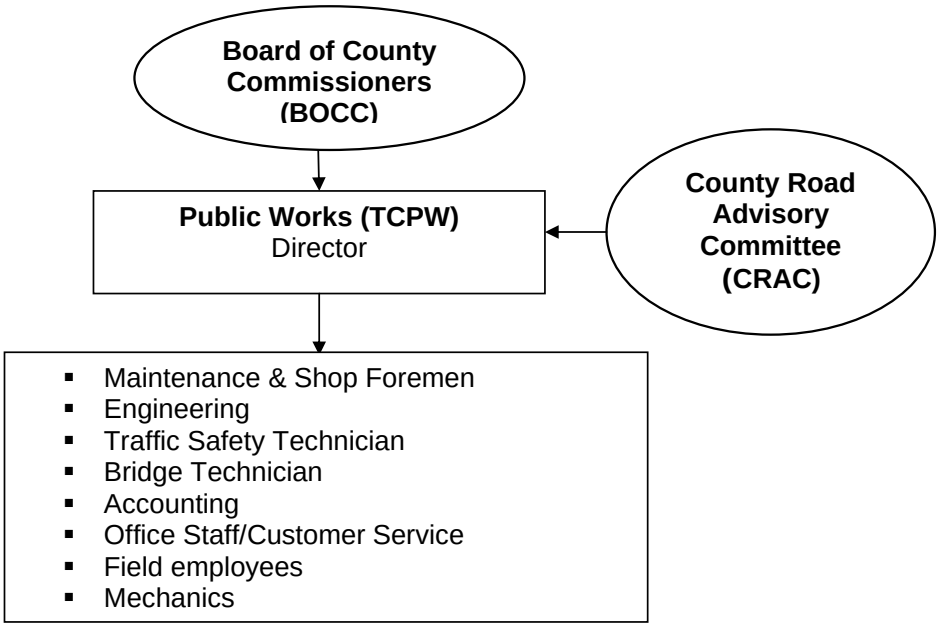


Figure 2.3 Tillamook County Management Structure

Chapter 3

Level of Service

3.1 Introduction

The 378 miles of Tillamook County-owned and maintained road assets interconnect with federally owned roads on public lands, state owned or managed roads, private access roads and city roads. Together, this network of roads serves both urban and rural areas throughout the county's 713,600 acres. This infrastructure backbone serves the community, providing:

- The movement of goods, services and people
- Day to day and emergency access to personal property and businesses
- Connectivity for freight (truck, rail, air, water), cars, public transit and non-vehicular traffic (pedestrians and bicycles)

Defining the level of service for each asset type in the County road network ensures the community understands the quantity, quality, and efficiency of road services paid for, as well as the needs of road assets. Comparing the current status, value and cost of service with the present and future needs of the road network gives the community choice. The cost and consequence of funding a level of service over the life of an asset presents the opportunity to minimize long term costs, increase or decrease levels of service, or discontinue services that are no longer desired or affordable.

By matching the values of the community and desired outcomes with the current and possible future levels of service, tradeoffs can be made between the needs of Tillamook County's road network, other needs of the community and available funding.

Levels of service:

- inform customers of the level of road services offered
- identify life cycle asset management strategies to delivered for these defined these defined levels of service
- measure the performance of strategies
- identify the costs and benefits of road services
- let citizens, businesses and agencies that rely on county roads assess whether road services are desired, affordable and equitable
- are a key input into on-going community consultation about the long term implications of funded county road services

The current level of service is based on:

- The current assessment of community desired outcomes as expressed in the recently updated *Tillamook County 2020 Strategic Vision*[18]. This contains Tillamook County's community vision, goals and strategies developed following contact with 1,000 Tillamook County residents and

[18] *Tillamook County: 2020 Strategic Vision,* Tillamook County Futures Council, March 2008

property owners in 2007. The shared vision and desired conditions for Tillamook County is an update from 1998 and includes community goals, strategies, and benchmarks that measure progress toward goals. Goals address growth and development, natural environment, economy, and society and culture.

- Regulatory and legislative requirements and County ordinances and Board Orders
- Tillamook County Comprehensive Plan and Transportation System Plan

Levels of service are organized into:

- **Customer outcomes**. These are service delivery standards related to how customers perceive successful service, including quality, quantity, safety, appearance, amenity and response.
- **Asset outcomes**. These include technical and operational requirements such as engineering standards, maintenance and replacement needs and capacity requirements.
- **Asset Activities**. These include frequency of repairs and response time to deliver customer and asset outcomes.

Levels of service link community outcomes to the financial requirements.

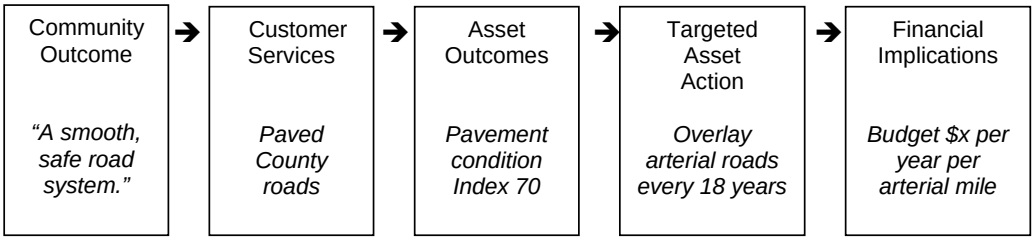


Figure 3.1 Pavement Outcomes and Link to Financial Requirements

This asset management plan is a basic or core asset plan that identifies existing customer survey research, minimum legislative and statutory requirements, and the organization that delivers county road services. Information reflects the current county road network condition and where possible, future outcomes given various funding scenarios.

3.2 Customer Research and Expectations

The following summarizes findings from the 1998 and 2007 County Vision survey administered by the Tillamook County Futures Council. The Futures Council was appointed in December 1997 by County commissioners. Its charge was to develop a vision, goals and strategies to help guide the county in future years. The original vision plan was reviewed and issues updated in 2007. This update included:

- Community workshops and youth forums with over 100 people. The purpose was to identify concerns and interests of residents and property owners.
- A survey sent to 4,000 randomly selected residents and homeowners in the county. Completed surveys from nearly 1,000 residents allowed survey results to be within +/- 3.35% margin of error.

Table 3.2.1 Citizen Perception of County Road Condition & Level of Maintenance[19]

Year	Question Asked	Response	Percent
1998	"We need to improve the quality and condition of our roads and highways."	Agree/Strongly Agree	51.2%
2007	"The current condition and level of maintenance of the County roads are adequate."	Disagree/Strongly Disagree	79.5%

The April 2007 household survey measured satisfaction with overall county road maintenance. This gives a broad understanding of current customer satisfaction, but does not attempt to determine the level of road services desired by county residents or the reasons for the response. It can be used to target broad areas of asset performance.

A survey question asked whether there was agreement with the following statement: "The current condition and level of maintenance of the County roads are adequate." While this 2007 question differs from one asked in 1998, county residents dissatisfaction with the quality and condition of county roads has declined dramatically.

Information from the survey resulted in an updated vision, goals and strategies to achieve the 2020 vision, as well as adopted benchmarks that monitor progress toward achieving the goals. The *Tillamook County 2020 Strategic Vision* was published in February 2008. Four strategic goals relate to TCPW's mission:

1. Maintaining a safe road system

[19] "Comparison of 1998 and 2007 Survey Questions," Community Planning Workshop, July 3, 2007

    1.1.1. Responding to weather events
    1.1.2. Identifying and repairing hazards
2. Preserving our road system to prevent further deterioration and protect the public's investment.
3. Reconstructing our most critical road system facilities.
4. Bringing road facilities up to standard and building the system to meet current and future needs.

Other *Vision* questions submitted to Tillamook County households relate to growth, improved infrastructure and alternative transportation.

3.3 Legislative and Regulatory Requirements

Oregon Revised Statues define county authority over roads. Tillamook County is a General Rule county that operates with an at-large Board of County Commissioners (BOCC) composed of three elected commissioners. The county charter guides the governmental structure and responsibilities and designates the County Commission as the controlling authority for the county's roads responsible for the provision and maintenance of a safe road network. The level of road maintenance services is set by the County Board. In 2007, a County Board Order formed a Tillamook County Road Service District which encompasses all of Tillamook County, excluding incorporated cities within the county. The service district's purpose is "to construct, maintain and operate all County roads within Tillamook County."[20]

The minimum standards for roads accepted into the Tillamook County maintained road system was adopted by ordinance in 1998.[21] County road construction standards reflect the American Association of State Highway Transportation Officials (AASHTO) design guidelines for county roads which have been augmented in 2007 Tillamook County Road Construction Plan Standards.[22] Sign placement on county roads reflects Manual on Uniform Traffic Control Devices (MUTCD) standards and is addressed in the county's construction standards.

Bridge sufficiency ratings are used to indicate a bridge's condition based on structural adequacy and safety, reduction of load capacity, serviceability and functional obsolescence (roadway width, and vertical clearance), essentiality for pubic usage, and special reductions (detour length). A rating of 75 or above is considered good, 50 to 75 is fair and below 50 is poor. It does not indicate the ability of a bridge to carry traffic loads or whether it will collapse but rather which bridges may need repair or replacement. Federal funding is made available for maintenance, rehabilitation or replacement of bridges based on a bridges sufficiency rating. States annually submit required ratings to the Federal Highway Administration (FHWA). Replacement funding

[20] "Formation of the Tillamook County Road Service District, Tillamook County Board Order 07-110, September 26, 2007
[21] Tillamook County Ordinance 16, February 12, 1998.
[22] "Appendix B: Tillamook County Road Construction Plan Standards," updated March 27, 2007.

requires a rating of 50 or below, while rehabilitation funding for bridges with a sufficiency rating of 80 or below.

The Oregon Highway Plan Policy 1E identifies the need "to provide secure lifeline network of streets, highways, and bridges to facilitate emergency services response and to support rapid economic recovery after a disaster." Highways and roads within Tillamook County receive a lifeline route priority designation. Definitions are:

- Priority 1: Routes essential for emergency responses within the first 72 hours after an emergency incident or disaster.
- Priority 2: Routes desirable for emergency responses in the first 72 hours or routes essential for economic recovery.
- Priority 3: Other emergency response routes or routes which serve relatively few people but are still important because they are the only access.

The Oregon Bikeway and Pedestrian Plan (OBPP) defines bicycle facilities. Bikeways in rural or unincorporated Tillamook County are located on both state and county roads. A minimum shoulder width of 4 feet is required to be a "shoulder bikeway." The majority of county roads has paved shoulders less than 3 feet wide, and do not have striped shoulders; they are classified as "shared" facilities. Shared roadways include roads on which cyclists, motorists and pedestrians share the same travel lane.[23]

On low volume traffic roads, roadway shoulders are often used by pedestrians. The OBPP includes roadway shoulders as "transportation facilities built for use by pedestrians." Many county roads do not have sidewalks so pedestrians share a striped shoulder or the roadway itself with motorists and bicyclists. These roads "should be wide enough so that both pedestrians and bicyclists can use them." [24]

3.4 Strategic Priorities

The Tillamook County Comprehensive Plan and its related Transportation System Plan direct the future development of the county and impact county road assets and service priorities. Changing community needs and priorities are reflected in the County goals and objectives. The priority of road services should reflect the community's values, the appropriateness of the service level, given the current and future needs of the system, an understanding of the cost and performance in delivering these services, and the relative importance of these services, given other county services.

[23] *Draft Tillamook County Transportation System Plan*, 2003
[24] *Ibid.*

Table 3.4.1 Strategic Policy Priorities

Reference Code	Strategic Objective[25]	Core Value	Policy
P1	TE 1b	Accessibility Efficiency Safety	Protect the function, operation and safety of existing and planned roadways
P2	TE 1c	Accessibility Efficiency Safety	Consider land use impacts on existing or planned transportation facilities in all land use decisions.
P3	TE 1d	Accessibility Livability	New subdivisions should provide pedestrian & bicycle connectivity.
P4	TE 1e	Accessibility Partnership Reliability	Coordinate TSP with other jurisdictions' planning to ensure adequate connections to streets and transportation systems between incorporated and unincorporated areas.
P5	TE 1f	Accessibility Livability	Plan for multi-modal network of transportation facilities and services including but not limited to air, water, rail, auto, pedestrian, bicycle and public transit.
P6	TE2.1a	Efficiency Partnership	Promote cooperation and coordination with other jurisdictions in roadway maintenance and improvement.
P7	TE2.1b	Safety Accessibility	Provide regulation and control for development along roads in order to maintain the function of major roads.
P8	TE2.1d	Accessibility Efficiency	Provide regulations to implement access management and level of service standards.
P9	TE2.1e	Accessibility Livability	Make provisions for all modes of transportation for moving people and goods and encourage the use of public transportation.
P10	TE2.1f	Accessibility Reliability	Promote development of a continuous interconnected street pattern.
P11	TE 2.2a	Accessibility Liability	The location and classification of county road network should include public transportation, bicycle and pedestrian travel.
P12	TE2.2	Accessibility Efficiency	Functional classification of roads shall be broken into arterial,

[25] TE is Comprehensive Plan Goal 12: Transportation Element

Reference Code	Strategic Objective[25]	Core Value	Policy
		Reliability	collector and local roadways. Arterial roads should form a continuous road network and be given preference over collector and local roads in signing and signalizing of intersections.
P13	TE2.3	Efficiency Safety Accessibility Reliability	Road improvement standards shall be implemented so that roads are safe, durable, convenient, provide adequate drainage, allow flexibility in design and minimize costs, where possible. Planning and design criteria are defined for arterial, collector and local roads.
P14	TE2.4	Safety Accessibility Reliability	Access management (access, road approach and spacing standards) for existing developed and undeveloped major arterial-collector roadways are to be used to enhance traffic operation and safety.
P15	TE2.5	Safety Accessibility Livability	A pedestrian and bicycle system will function as part of the overall transportation system, providing for maximum safety, establishing an equitable priority system for construction of bike paths, and encouraging the use of bicycles and paths for transportation and recreation. State Coast bike routes along county roads will be disapproved until funding is found to improve them to meet safe bike route standards. A bike system will provide connections between and through adjacent development and provide convenient links to community destinations.
P16	TE 2.6	Safety Accessibility	County road improvement standards shall provide for pedestrian safety at schools, playgrounds and parks. Sidewalks should be constructed on both sides near schools, parks and playgrounds. Wherever possible, bike paths connecting activity centers such as parks should be

Reference Code	Strategic Objective[25]	Core Value	Policy
			separated from existing roadways.
P17	TE3	Accessibility Partnership	County supports public transit options, maintenance of intercity bus service and development of park and ride lots, carpooling and vanpooling.
P18	TE 4a	Accessibility Reliability Partnership	Encourage the maintenance and viability of existing rail, water and air transport systems.
P19	TE4i, j	Accessibility Reliability Partnership	Supports provision of rail freight service to north and central Tillamook County and cities of Wheeler, Rockaway, Garibaldi, Bay City and Tillamook. Supports Port of Tillamook Bay to maintain rail freight service to the Port's airport industrial park.
P20	EP[26] FCV	Safety Reliability	The role of Public Works is to respond to natural and other civil disasters. Effectively prepare, respond and recover from natural hazards.
P21	FCV[27]	Efficiency Partnership	Adequate infrastructure for current conditions and future growth.
P22	FCV	Livability Efficiency	Create vibrant towns & maintain rural character.
P23	FCV	Livability	Preserve quality of life.
P24	FCV	Safety Accessibility	Safe and convenient transportation for all.

[26] *Tillamook County Emergency Operations and Management Plan,* 2005
[27] *Tillamook County 2020 Strategic Vision,* February 2008

3.5 Level of Service Statements

The following tables describe the road services Tillamook County provides. A level of service statement identifies the service purpose, how it is measured (as perceived by the customer, and the technical expert), and sets targets of performance. Where possible, the current road service performance and future targets are identified so progress can be measured and reported. Managing performance is a process of continuous improvement.

3.5.1 Road Network Level of Service

TCPW Mission: Provide, maintain, and preserve a safe and efficient county road network, and quickly responding to weather events and hazards. We protect the public's investment by working with our partners and targeting resources to minimize long term costs while providing the best possible service.

Table 3.5.1 Current Service Levels – Road Surface Management

Purpose: Provide, maintain and preserve a safe and efficient county road network.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Responsiveness & Safety-Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	TBD	Routine: -Response 100% in 24 hours -Completion is priority dependent Emergency: -Response 100% in 2 hours for hazard -Completion 100% as is required and resources allow	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin monthly reports in FY 09-10	See Actions

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
TECHNICAL LEVELS OF SERVICE						
Quality Sustainability – Overall Pavement Condition Index	Maintain the condition of assets at minimum lifecycle costs within the available budget	Inspect, rate & report pavement condition every other year; Report pavement condition annually (Very Good to Very Poor)	To Be Established (e.g., Good or better – more than 85%, PCI greater than 75)	2007 PCI: -Arterials: 61 -Collectors: 51 -Locals: 40	Budget for pavement inspection & asset condition reporting;	TCPW director & professional inspection contract
		% of arterial, collector and local paved roads receiving surface maintenance and renewal	TBD	2007: -Arterials: _ miles -Collectors: _ miles -Locals: _ miles	Pave roads to minimize lifecycle costs & repair greatest safety risks ("Mix of Fixes")	District Foremen
	Blade & gravel local roads to minimize lifecycle costs & repair greatest safety risks ("Mix of Fixes")	% of gravel roads receiving maintenance annually	Re-grade every other year	Not currently met	Seek additional revenues and shift from storm repair	District Foremen

Table 3.5.2 Traffic Safety Level of Service Statement

Purpose: Place and maintain road signs and markings so that the traveling public uses the county road network safely and reliably in a manner that state and local laws can be understood and enforced.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Responsiveness & Safety-Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	Same as Current	Routine: -Response Evaluated in 2 days -Completion Prioritized by need. Emergency: -Response 100% in 24 hours for Stops -Completion 100% in 48 hours for Stops	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin annual reports in FY 09-10	See Actions

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
TECHNICAL LEVELS OF SERVICE						
Safety – Sign Condition & Pavement Markings	Maintain a safe road network	Regulatory signs inspected	100% regulatory signs inspected annually; all signs inventoried in IRIS	__% inspected in FY08-09; __% tracked in IRIS	Assign sign inspection responsibility; Assign IRIS data entry & reporting	TBD
		Arterial & collector centerline pavement markings repainted annually	Pavement markings - centerlines annually; Fog lines every other year	Same as target	Assign pavement marking contract to Engineering Project Supervisor	See actions
Accessibility & Efficiency	Assess land use impacts on transportation facilities	Permit activity	100% permit activity reported annually	Same as Target	Establish annual report by FY09-10 with Engineering Project Supervisor	Director, Engineering staff

Table 3.5.3 Structures Level of Service Statements

Purpose: Provide a continuous road network over rivers, streams and uneven terrain supporting the traveling public and safety of all road users.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Responsiveness & Safety-Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	TBD	Routine: -Response 100% in 48 hours -Completion Priority dependent Emergency: -Response 100% in 2 hours for hazard -Completion – Priority dependent	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin annual reports in FY 09-10	See Actions
TECHNCIAL LEVELS OF SERVICE						
Safety Sustainability -Bridge Condition & Posted Weight Limited Bridges	Maintain safe, accessible bridges appropriate for traffic	Publish bridge condition (Good 75-100, Fair 50 to 75, Poor 0-49) annually.	TBD	6 bridges in Poor condition (2007)	Report bridge condition to CRAC & set Target.	Assign inspection contract management and reporting to Engineering Project Supervisor
		Inspect all bridges every other year and after major storms	100%	100%	Manage bridge inspection contract.	Assign inspection contract management to Engineering Project Supervisor

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
		# of weight limited bridges	TBD	3 bridges posted with restricted weight limits (2007)	Post weight limits as appropriate; work with CRAC.	Engineering Project Manager
Safety Sustainability – Guardrail Condition	Safe, appropriate guardrail protection	Inspect guardrail condition every other year using Oregon Standardized Drawings 5-point condition assessment.	TBD	43% in Poor or Very Poor condition (2007)	Post weight limits as appropriate; work with CRAC.	Engineering Project Manager
Safety Sustainability –Levees Condition	Safe, continuous road passage by levee protection	100% levees inspected annually, or after weather event	TBD	100% of levees inspected & emergency needs addressed	Assign levee inspection responsibility to Engineering Project Supvr.;	See Actions'

Table 3.5.4 Emergency Management Level of Service

Purpose: Quickly respond to weather events and hazards to ensure repair and safety of the county road network by working in partnership with federal, state and county emergency responders.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Safety & Responsiveness - Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	TBD	Emergency: -Response 100% as staffing allows -Completion Priority dependent	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin annual reports in FY 09-10	See Actions
TECHNCIAL LEVELS OF SERVICE						
Safety – Storm response hours	Respond to hazards due to weather events and hazards	Hours of storm response (TCPW total);	TBD	TBD	Work with foremen and Office staff to track storm response hours	See Actions
Safety- Hours spent plowing and sanding		Miles of road network sanded and plowed,	TBD	TBD	Work with foremen and Office staff to track hours plowing and sanding	See Actions
Safety - Slides responded to		Number of slides	TBD	TBD	Work with foremen and Office staff to track number of slides	See Actions
Safety – Culverts		Number of culverts	TBD	TBD	Work with foremen and Office staff to track number of blocked culverts	See Actions

Table 3.5.5 Drainage Facilities Level of Service Statements

Purpose: Ensure roads are clear of surface storm water and flooding so that road access, safety and quality are maintained.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Responsiveness - Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	TBD	TBD	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin monthly reports in FY 09-10	See Actions
Safety	Provide stormwater system that is low risk to the community	Number of injuries & Number of properties affected & inundation events	TBD	TBD	Develop tracking system with Engineering staff	Assign to Engineering staff
TECHNCIAL LEVELS OF SERVICE						
Condition Visual Assessment	Periodic visual assessment of ditches & culverts	Visual inspection	TBD	TBD	Establish inventory of ditches & culverts; Adopt inspection method	TBD
Function – Percent of ditches maintained & Lineal feet of culverts repaired or replaced	Ensure stormwater system has appropriate design capacity		TBD	TBD	Develop tracking system with Emergency Manager	TBD

Table 3.5.6 Vegetation Management Level of Service Statement

Purpose: Ensure roadside safety and visibility by removing vegetation blocking sight lines to advisory signs, ditch lines, guardrail and guideposts.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
COMMUNITY LEVELS OF SERVICE						
Safety & Responsiveness - Service Requests (SR)	Response to customer Service Requests in a timely manner & Reduce hazards	Response time to Service Requests responded to within set guidelines	TBD	Routine: -Response __% in 24 hours -Completion _% Emergency: -Response __% in 2 hours for hazard -Completion _%	Assign reporting to Office Staff; Set targets in FY 2008-09; Begin monthly reports in FY 09-10	See Actions
TECHNCIAL LEVELS OF SERVICE						
Condition & Function – Percent of lane miles mowed each year; Percent of lane miles cleared of debris per year; Acres of herbicide applied	Ensure roadway is safe and free of unsafe vegetation	Annual mowing and herbicide program	TBD	TBD	Work with foremen and Office staff to track quantities of vegetation management; Work with Engineering & Office Staff to develop performance tracking and reporting	See Actions

Table 3.5.7 Operational Support Level of Service Statements

Engineering Services
Purpose: Plan, research, coordinate and manage variety right of way activities. Assist in emergency response and recovery.

Equipment Management
Purpose: Support reliable vehicles for TCPW by balancing cost and timely maintenance and repairs with optimum vehicle availability and reliability.

Facilities Management
Purpose: Safely and effective shelter for TCPW employees, equipment and the materials used to provide county road services.

Materials Management & Stockpiling
Purpose: Reliable materials for county road maintenance that meet consistent standards of quality for the least cost in support of safe, serviceable and sustainable county roads.

Administration
Purpose: Plan, budget and manage resources (labor, materials and equipment) in a safe and cost effective manner. Communicate results on performance, efficiency and effectiveness.

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
TECHNCIAL LEVELS OF SERVICE						
Engineering Services: Response, Function	Consistent, reliable and responsive permits, projects and	Annual permit and project tracking	TBD	TBD	Engineer staff establish log to track permits reviewed, projects bid and completed (pavement and bridge)	See Actions

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
Permits reviewed, projects readied, lane miles/bridge projects bid, constructed/ completed annually	ROW managed					
Equipment Management: Safety, Condition & Function – Number of pieces of equipment serviced receiving preventive maintenance service; Number of pieces of equipment DOT certified annually;	Reliable vehicles for TCPW that balance cost and timely maintenance and repairs with optimum vehicle availability and reliability.	Equipment receiving 24 hour service fueling; Equipment serviced every 90 days for preventive maintenance; Fleet DOT certified annually	TBD	TBD	Shop Foreman reports performance by FY 08-09	See Actions
Facilities Safety, Condition and Function	Safely and effectively shelter TCPW employees, equipment and the materials used to provide county road services.	Buildings inspected by fire, OSHA, building inspector	TBD	TBD	Engineering Project Supervisory and Bridge Technician reports performance by FY 08-09	See Actions

Key Service Criteria & Performance Measure	Level of Service	Performance Measure Process	Performance Target	Current Performance	Actions to Meet Target Performance	Resources
Materials Management: Quality, Reliability Supply of aggregate and sign materials	Record on materials, quality, dates and hours of operation and volume by type of material	Transaction records on square yards of gravel and number of signs issued	TBD	TBD	Office Staff and Engineering Project Supervisor: Mmaintain records	See Actions
Administration: Response, Quality Training per employee, performance assessment, retention/turn over annually	Ensure skilled employees, and performance is monitored and reported	Maintain annual report on employee training performance assessments, and turnover (% of budget for training budget; $/employee; hours of training per employee; % turnover	TBD	TBD	Director works with Office staff to develop format for annual report	See Actions

Chapter 4

Future Demand

4.1 Overview

Demand factors along the U.S. Pacific Coast have been well documented.[28] Many of the major trends found in this research effect Tillamook County and impact demand on the county road network. These trends include:

- Natural resources in coastal ecosystems sustain economic vitality.
- Population migration is driven by employment, recreation, tourism, waterborne commerce, energy and mineral production.
- Balancing economic growth and environmental protection leads to many coastal policies; the qualities that make coastal communities so desirable also make them fragile environmentally, including pollution, habitat degradation, over fishing, invasive species and the hazard of coastal sea rising.
- Coastal communities are subject to major population influxes during peak vacation periods.
- The unprecedented number of Americans that will retire in the next decade will place additional pressure on coastal communities as people have more time to enjoy the amenities of the coastal environment.
- Just in time manufacturing and globalization of the world's economy impacts the use of the nation's highways and county roads as freight is increasingly transported on trucks.
- The frequency and severity of weather events.

[28] *Population Trends Along the Coastal U.S. 1980-2008*, U.S Department of Commerce, September 2004.

4.2 Demographic Trends

Tillamook County's population in 2007 was 25,845[29], a 6.5% growth from 2000. This compares to Oregon's 9.5% growth rate over this same time period[30].

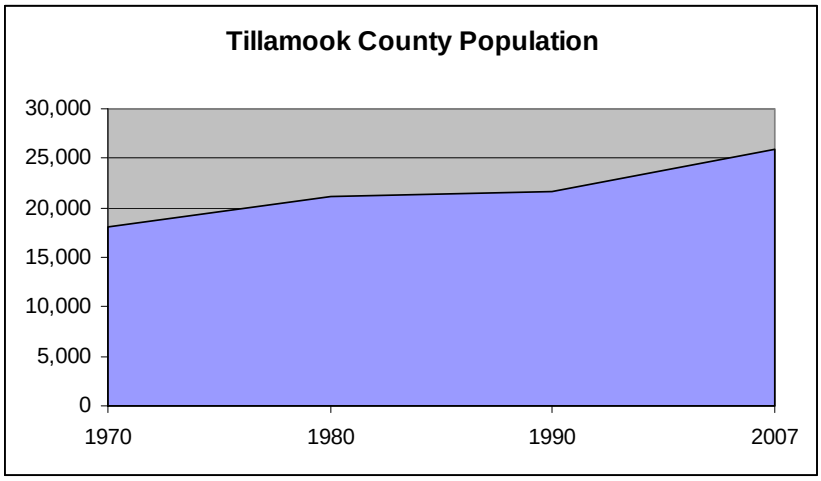


Figure 4.1 County Population 1970-2007

The U.S. Census shows that the age distribution of the county has changed significantly over the last 17 years. Similar to the rest of Oregon, there has been a decline in the 30-39 age groups and increase in those 50-59 due to the shift in age of baby boomers.[31] Tillamook County experiences a lower rate of youth than the statewide average.[32]

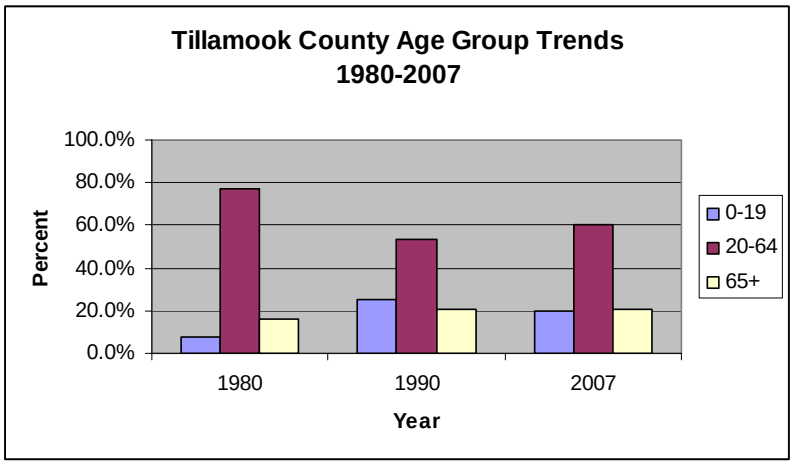


Figure 4.2 Age Group Trends 1980-2007

[29] Portland State University Center for Population Research and Census, November 2007
[30] Other coastal counties' growth rates between 2000 and 20007 are: Clatsop County 5.1%, Columbia County 9.2% and Lincoln County's .3%.
[31] *2007 Survey of Tillamook County*, Community Planning Workshop, University of Oregon, September 2007.
[32] Portland State University Center for Population Research and Census

Between 1990 and 2006, all of Tillamook County's population increase was from in-migration.

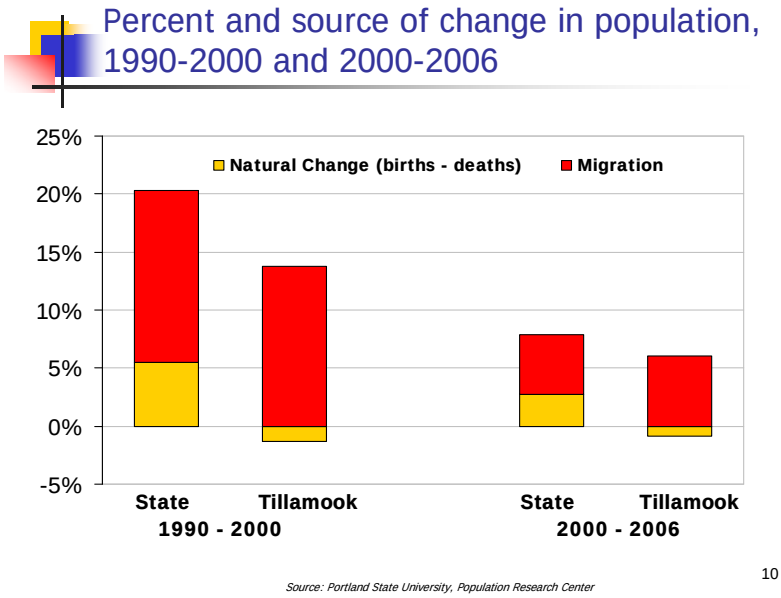
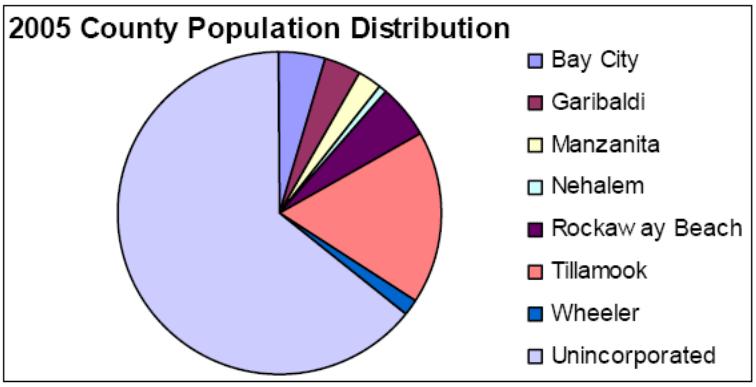


Figure 4.3 Percent & Source of County Population Change[33]

According to the 2006 *Futures Council Report*, approximately 64% of Tillamook County's population lives in the unincorporated areas.



Source: Portland State University Population Research Center

Figure 4.4 Distribution of Tillamook County Population[34]

[33] Oregon Progress Board, Population Research Center, Portland State University
[34] *Measuring Progress: 2006 Tillamook County Benchmarks*, Tillamook County Futures, June 2006

4.3 Residential Building & County Income Trends

The construction of second homes in north and south Tillamook County reflect the increasing desirability of building or owning a second home at the Oregon coast. This creates major population influxes during peak vacation periods adding to the volume of vehicle traffic on state and county roads.

Significant trends include:

- The County's population increases 50% during the summer season.[35]
- In 2005, 399 residential building permits were filed and in 2006, 427 permits[36].
- The assessed value of Tillamook County property increased 59% between 1998 and 2007.[37]
- The 2004 median household income in Tillamook County was $36,451 compared to a median income in Oregon of $42,568.
- The 2004 median value of owner-occupied home in Tillamook County was $143,900, compared to a median value of owner-occupied home in Oregon of $152,100.[38]

4.4 Economic Trends

Tillamook County experiences a high volume of truck traffic primarily due to logging and dairy farms.[39] Recreation and tourism, farm workers, retail salespeople and housekeepers are the driving force of Tillamook County employment.[40]

Significant trends include:

- Tillamook County is the largest resource of harvestable timber in the state. A 2001 traffic count estimated between 2-5% of all county traffic is freight related.
- The loss of the Port of Tillamook Bay's Salmonberry railroad in the December 2008 storm will significantly increase the amount of truck traffic in the county. Grain shipments for dairy farms and timber products previously shipped by rail to the Willamette Valley must now use trucks.
- In 2005, the Port of Tillamook Bay estimated that the Salmonberry railroad carried the equivalent amount of product as 24,000 trucks.[41] The Port estimates that one railroad car of finished lumber equals the same as 10 log trucks. [42]
- The greatest percentage increase in future employment growth will occur within the Other Services (32%), Professional & Business Services (31.3%), Educational & Health Services (28%) and Construction (19.4%) categories, according to the Tillamook County Industry Employment Forecast, 2004-2014.

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[35] *Tillamook County Comprehensive Annual Financial Report for Year ending June 30, 2007*
[36] U.S. Census Bureau, 2005 and 2006.
[37] *Tillamook County Comprehensive Annual Financial Report for Year ending June 30, 2007* Tillamook County Office of the Treasurer.
[38] U.S. Census Bureau Tillamook County Quick Facts
[39] *Draft Transportation System Plan, 2003*
[40] *City of Manzanita-Revised Draft Economic Opportunities Analysis*, Cogan/Owen/Cogen, Revised June 15, 2007.
[41] Application for Connect Oregon 2005-2006, Port of Tillamook Bay, 2005
[42] Application for Connect Oregon 2005-2006, Port of Tillamook Bay, 2005

- The greatest increases in actual number of jobs is anticipated in Educational & Health Services, Trade, Transportation and Utilities, Leisure and Hospitality, and Manufacturing
- The June 2007 unemployment rate in Tillamook County was 4.8%, a decrease from 5.1% in 2006. This compares to a 2007 Oregon unemployment rate of 5.1%.[43]

4.5 Weather Patterns and Impacts on Road Infrastructure

Tillamook County has experienced significant wind, rain and flooding weather events including in 1996, 1998, 2005, 2006, 2007 and 2008. These events have had catastrophic impact on county road infrastructure leading to more federally declared disasters than any other west coast U.S. jurisdiction. The frequency and severity of these events is expected to continue for the foreseeable future, according to Tillamook County contract climatologists.

Climate scientists have evaluated the impact of significant Pacific Northwest climate changes on U.S. transportation.[44] The primary changes are warmer temperatures, rising sea levels, and increased winter precipitation. These have potential impacts on infrastructure, including:

- Increased winter precipitation could lead to more flooding and landslides, which could damage transportation infrastructure and underlying utilities and hamper the mobility and safety of travel
- More flooding, that overwhelms the existing storm water drainage system, causing soil saturation and surface erosion
- Increased erosion of soil around roads, bridge footings, and retaining walls
- Adverse affect on bridge operations and maintenance due to greater thermal expansion at bridge expansion joints
- Sea level rise which could exacerbate erosion around bridge footings, and affect bridge clearances
- Roadway deterioration and shortened road lives due to increased precipitation
- Increased road flooding and strained drainage systems

Seattle, Washington, and Alaska consider these effects in the scope of project designs, the replacement cycles for all transportation infrastructure and as a criterion for evaluating rehabilitation and replacement projects.

[43] *Tillamook County Comprehensive Annual Financial Report for Year ending June 30, 2007.* Tillamook County Office of the Treasurer.
[44] *Potential Impacts of Climate Change on U.S. Transportation*, Transportation Research Board, 2008.

Chapter 5

Risk

5.1 Overview[45]

A team of Tillamook County leaders, managers, and advisors developed a core risk management plan as a supporting document to this asset management plan.[46] The purpose of a risk management plan is to document the results and recommendations resulting from periodic identification, assessment and treatment of risks associated with providing road services to Tillamook County. Risk management:

- Identifies how Tillamook County will manage risk associated with its road assets in a consistent manner by applying systematic policies, procedures and management practices
- Identifies operational and organizational risks
- Assigns management of risk to improve accountability
- Prioritizes risk so that the highest risk are addressed
- Monitors and communicates risk

By identifying the probability and likelihood of risks, a range of options can be examined which reduce the adverse impacts on services, minimize losses and increase the County's ability to meet community needs.

Risks may be caused by threats, failure of an asset due to natural events, external impacts, physical failure or operational failure. Identifying and realizing risks that come from opportunities are also considered, such as infrastructure that is given to the county which will then requires maintenance over its life.

Analyzing Tillamook County's risk relative to managing road assets uses the following process:

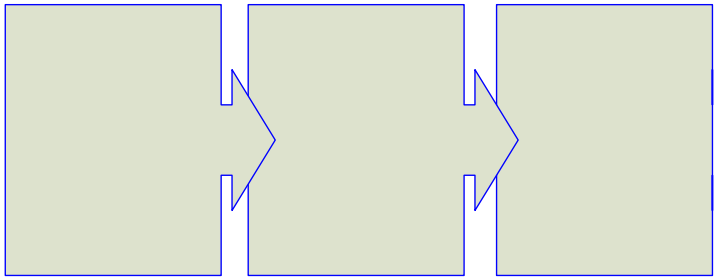


Figure 5.1 Risk Management Process[47]

5.2 Risk Identification

Potential risks associated with providing services from infrastructure were

[45] The risk approach uses international best practice, including *City of Portland* Asset Status & Condition Report, December 2007, and NAMS.PLUS, Institute of Public Works Engineers Australia, 2007

[46] *Core Infrastructure Risk Management Plan*, Tillamook County Public Works, September 2008

[47] Adapted from AS/NZS 4360:2004, Fig 3.1 p 13, used with permission NAMS.PLUS

identified by Tillamook County Public Works (TCPW) and then refined by Risk Workshop attendees. This June 2008 workshop was attended by County Board, the County Road Advisory Committee (CRAC), TCPW director, engineer, foremen, cost accounting and customer service managers, County directors from human resources, community development, treasurer and coastal resource planner. Asset-related services were risk rated so that an anticipated 40% budget cut could be targeted to address highest risk services.

Workshop attendees reviewed a refined list of TCPW asset-related programs and activities and were asked: "What failure can happen, where and when?" for the various county road services. They were then asked to identify "Why would this failure occur and how can it happen?" so that the reasonableness of potential events could be checked.

Failure of county owned and maintained roads and related assets can occur due to:

- Natural events: Events the timing and extent of which the county has little or no control, such as floods, windstorms or earthquakes. For example, the loss of the Salmonberry Bridge due to the December 2007 storm.
- External impacts: Impacts outside Tillamook County's control, such as loss of on time good or service or failure of their assets. Examples include loss of federal forest revenues, loss of Port of Tillamook Bay's railroad which will increase truck traffic on county roads.
- Physical failure: Failed condition or performance of an asset due to age. Bridge or levees failure due to naturally deteriorate based on their age.
- Operation risk: Management of the asset which impacts asset condition or integrity. The deteriorating road conditions due to lack of adequate funding and timely preventive maintenance is an example.
- Opportunity risk: Negative consequences which result from otherwise positive opportunities. For example, transportation funding partners may pay for add new facilities (for example, a bridge) to the County road network which then adds to the long term maintenance and operational requirements of the County.

5.3 Risk Analysis

Credible risks are analyzed by the “likelihood” and the “consequences” of the event occurring. The objective of the analysis is to separate the minor acceptable risks from the major risks and to provide data to assist in the assessment and management of risks.

The risk analysis process determines levels of risk. The process acts as a filter by applying a reasoned and consistent process. Minor risks can be eliminated from further consideration and dealt with within standard operating procedures. The remaining risks are sufficiently significant so that risk treatment options and plans will be identified.

The risk analysis method relies on expert knowledge of the transportation network based on experience, documented history along with information on asset inventory, condition and known demands on transportation network assets and services. Road programs and risks are listed including a list of how assets or services fail. A score from 1 to 5, or Very Unlikely to Almost Certain, is assigned as risks are considered. This score assesses the likelihood or probability of an event. Then a score is given considering if the risk event were to occur, what would the consequence or impact be? A variety of economic, social and environmental criteria are used to estimate the severity of consequences and a 1 to 5 score assigned, from Insignificant to Catastrophic. Placed on the same matrix the two scores derive a relative risk rating, from Low to Extreme. See Tables 5.1,5.2, and 5.3 below.

5.3.1 Likelihood

Likelihood is a qualitative description of probability of an event occurring. The process of determining likelihood involves combining information about estimated or calculated probability with history or experience. Where possible it is based on past records, relevant experience, industry practice and experience, published literature or expert judgement.

Table 5.1 Rating the Likelihood of Failure

Likelihood	Probability	Frequency	Description	Rating
Almost Certain	90%	9 out of every 10 years	The threat can be expected to occur Or A very poor state of knowledge has been established on the threat.	5
Likely	70%	7 out of every 10 years	The threat will quite commonly occur Or A poor state of knowledge has been established on the threat.	4
Moderate	50%	Every 5 out of every 10 years	The threat may occur occasionally Or A moderate state of knowledge has been established on the threat.	3
Unlikely	20-30%	Once per 2-3 out of 10 years	The threat could infrequently occur Or A good state of knowledge has been established on the threat.	2
Rare	10%	Once per 10 years +	The threat may occur in exceptional circumstances Or A very good state of knowledge has been established on the threat.	1

5.3.2 Consequences

Consequences are a qualitative description of the effect of the event. The process of determining consequences involved combining information about estimated or calculated effects, history and experience. The following categories have been reviewed and refined by Tillamook County Public Works management.

Table 5.2 Risk Consequences Ratings[48]

	Score				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Factor	**1**	**2**	**3**	**4**	**5**
Economic (damages to community, losses, additional expenditures)	Less than $5,000	$5,000-$50,000	$50,000 - $100,000	$100,000 - $500,000	Greater than $500,000 (or 25% of budget).
Legal compliance	County fully complies and is on course with regulators to anticipate mandates	County agrees to compliance schedule, and avoids lawsuits and fines.	County warned of compliance issues and adopts corrective action	County sued or fined for missing mandates. Expects to comply in 1 year.	County sued or fined for missing mandates. No viable plan to comply.
Community impact	Community complaints	Unplanned disruption to multiple households, firms or community services/structures	Simultaneous unplanned disruption to multiple households, firms, or community services/structures	Unplanned disruption to large number of households	Unplanned disruption to essential service (e.g., lifeline route)
Human health and safety	No injuries	Minor injuries	Serious injuries	Single fatality or multiple serious injuries	Multiple fatalities
Reputation	No adverse media (all week)	Local media criticize county for 1 week	Regional media criticizes County for 2 days	National media criticizes County for 2 days	National media criticizes County for 1 week
Environment	Short-term damage	Limited but medium-term negative effect	Major but recoverable ecological damage	Heavy ecological damage, costly restoration	Permanent, widespread ecological damage
Human Resources	Permanent staff turnover 0% to 10% per year	Permanent staff turnover 10% to 15% per year	Permanent staff turnover 15% to 20% per year	Permanent staff turnover 20% to 30% per year	Permanent staff turnover exceeds 30% per year

[48] Categories should be reviewed and modified over time to reflect changing economic, community and environmental conditions.

The rating of consequence and likelihood identifies the combined relative risk the community faces.

Risk = Consequence of failure x Likelihood of failure

This relative risk rating directs the Tillamook County Public Works risk management strategies and service priorities.

Table 5.3 Relative Risk Rating

Likelihood	Consequence				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
5 Almost Certain	M	H	H	E	E
4 Likely	M	M	H	H	E
3 Moderate	L	M	H	H	H
2 Unlikely	L	L	M	M	H
1 Rare	L	L	M	M	H

5.3.3 Indicator of Risk Treatment

The risk rating is used to determine risk treatments. Risk treatments can range from immediate corrective action (such as stop work or prevent use of the asset) for "Extreme" risks to managing "Low" risks using routine procedures.

An event with a "High Risk" rating will require Management attention. This may include actions such as reducing the likelihood of the event occurring by physical methods (limiting usage to within the asset's capacity, increasing monitoring and maintenance practices, etc), reducing consequences (limiting speed of use, preparing response plans, etc) and/or sharing the risk with others (insuring the organization against the risk).

Table 5.4 Risk

Risk Rating		Action Required
E	Extreme Risk	Immediate action required to reduce risk
H	High Risk	Management attention required to manage risk
M	Medium Risk	Management responsibilities specified and risk controls reviewed
L	Low Risk	Manage by routine procedures

5.5 Risk Treatments

Once risks are assessed and rated, treatment strategies or controls for significant risks are identified. A risk register identifies risks, records current controls, prioritized the risks and provides an action plan of proposed controls and monitoring schedule for each. The effectiveness of these controls is also noted.

Establishing a standard for the effectiveness of risk controls helps clarify how well a risk management strategy will address the relative risks of the County.

Table 5.5 Risk Control Effectiveness

Quality		Definition
Excellent	**1**	Controls are strong and operating properly, providing a high level of assurance that objectives will be achieved.
Very Good	**2**	Controls are operating properly, providing a reasonable level of assurance that objectives are being achieved.
Good	**3**	Controls operate, providing some assurance that objectives are being achieved.
Unsatisfactory	**4**	Controls are weak and do not provide reasonable assurance that objectives will be achieved.
Poor	**5**	There are little or no controls in evidence.

5.6 Risk Register

Lifeline routes have been identified by the state of Oregon as a part of the Tillamook County emergency evacuation plan. Lifeline routes cover disasters and event-based risks that may impact the transportation network which may occur due to flooding, wind events or earthquakes. This is an important source of identifying critical road assets for emergency response. The director of Tillamook County Public Works works closely with other emergency response agencies to identify and program specific risk-reduction infrastructure projects.

Once risks are identified, capital and maintenance projects can be identified which strengthen or replace key road infrastructure. These risk-based priorities are reflected in TCPW programs and help define project priorities.

Asset-based and event based risks have been rated for risk. Risk mitigation and response will be included in the improvement plan for TCPW. The risk register is used for day to day management across TCPW as risk management business practices are improved. Review of risks must occur on a regular basis and risks added or removed over time to ensure that the level of risk exposure is reduced in Tillamook County's road network.

It should be noted that while TCPW has begun identifying and managing known risks the remainder of Tillamook County and their strategic partners have not participated in risk rating all services. This may impact the ability and effectiveness of TCPW as they seek to manage or mitigate road network risks.

5.7 Monitoring and Review

Monitoring, communicating and updating risks are essential, especially “High” and “Extreme” risks. Evaluating the Risk Register periodically is needed to determine its effectiveness in reducing the level of risk exposure.

The plan will be monitored and reviewed as follows.

Table 5.6 Risk Monitoring Process

Activity	Review Process
Review of new risks and changes to existing risks	Annual review by team with stakeholders and report to council
Review of Risk Management Plan	3 yearly review and re-write by team and report to council
Performance review of Risk Treatment Plan	Action plan tasks incorporated in council staff performance criteria with 6 monthly performance review. Action plan tasks for other organizations reviewed at annual team review meeting

Table 5.7 Risk Register

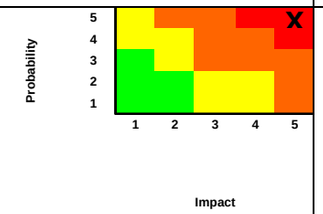
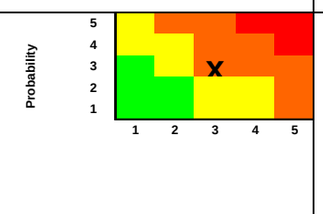
	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
14	**Risk Management Plan for Tillamook County Public Works Department**																				
15	**Risk Identification**								**Qualitative Risk Assessment**							**Management Plan**					
16	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
17–23	1	Roads	Paved roads	Lack of timely maintenance Insufficient funding Poor design Wet climate/storm damage Poor drainage Utility work Traffic loads Lack of enforcement Lack of staff	Pot holes, shoulder deterioration, poor public image, base deterioration, overgrown vegetation, detracting from property value, increase maintenance cost, increased congestion, increase property damage, hurts industrial development tourism	Threat	5	5								Mitigate	Fill pot holes and pave what we can on high volume streets (collectors & arterials)	Risk remains.	1.1 Report to board on risk and funding need. 1.2 Implement increased program if funds approved. 1.3 Develop Pavement Management Strategies	TCPW Director	1.1 TCPW Director 1.2 TCPWDirector & foremen & contract inspection
24–30	2	Roads	Gravel roads-county maintained	Lack of county maintenance Poor design Wet climate Poor drainage	Pot holes, shoulder deterioration, poor public image, base deterioration, overgrown vegetation, detracting from property value, increase maintenance cost, increased congestion, increase property damage, hurts industrial development tourism	Threat	3	3								Mitigate	Grade gravel roads Focus on higher volume roads with more residents	Risk remains.	2.1 Define gravel road priority based on connectivity and emergency routing. 2.2 Identify roads to transfer to other jurisdictions based on above. 2.3 Review/approve Board to transfer to partner based on above. 2.4 Proceed as possible based on available resources.	TCPW Director	2.1 TCPW Director 2.2 TCPWDirector & foremen & contract inspection

Table 5.7 Risk Register

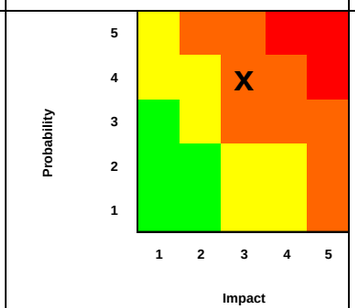
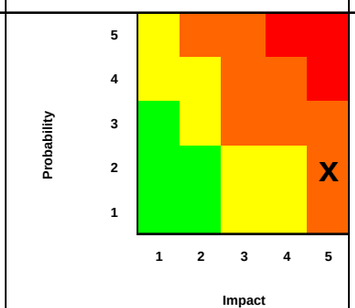
	A	B	C	D	E	F	H	I	J	V	W	X	Y	Z	AA
162	**Risk Management Plan for Tillamook County Public Works Department**														
163	**Risk Identification**					**Qualitative Risk Assessment**				**Management Plan**					
164	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**	**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
165–171	3	Roads	Local Access Roads	Lack of private maintenance lack of county communication	Citizen complaints, higher maintenance, drainage issues, vegetation, past practice expectation, no mail service, no school bus service, emergency vehicles?	Threat	4	3		**Transfer**	Clarify County and private responsibility County: fix signs, fix landslides, abandon routine maintenance, maintain bridges Private: routine road maintenance	Risk remains for citizens; reduced work on private roads	3.1 Draft notice for local paper re: County road responsibilities vs. private. 3.2 Continue to answer citizen calls and answer acknowledge with letters.	TCPW Director and Board	3.1 TCPW Director & Board member 3.2 Staff & Director
172–178	4	Structures	Bridges	Condition deteriorates to point of asset failure under normal traffic loading Lifeline failure during natural disaster event or restricted use Restrictions on load/dimensions of use	loss of life, isolation of people, liability, emergency response, maintenance costs, economic impact, lack of accessibility, detours,	Threat	2	5		**Mitigate**	Pursue federal and state money for bridges in poor condition Inspect and post weight limits. Manage life line routes.	Risk remains if funding not found to address bridges in poor condition or load limit signs are ignored or another major storm causes	4.1 Conduct every other year inspection 4.2 Post weight limited bridges 4.3 Notify industry of routes with posted bridges	Bridge Technician, consulting services and Director	4.1 Bridge testing consultant 4.2 Train staff 4.3 TCPWD Direcotr

Table 5.7 Risk Register

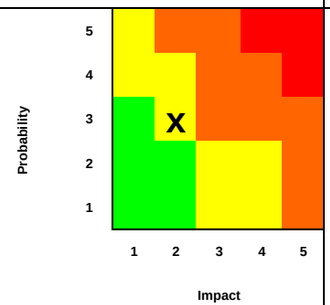
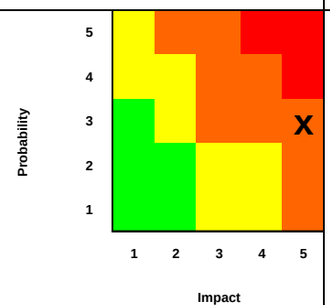
	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
179	**Risk Management Plan for Tillamook County Public Works Department**																				
180	**Risk Identification**							**Qualitative Risk Assessment**								**Management Plan**					
181	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
182	5	Structures	Guardrails	Condition deteriorates to point of asset failure Asset fails during natural disaster Asset fails due to failure of roadside slope Guardrail failure caused by poor design, landslide and vehicle impact, storm damage	guard rails sunk below road, more serious injuries, fatalities, negative image	Threat	3	2								**Accept**	Remove dangerous guardrails	Risk remains.	5.1 Identify guardrail in poor condition and remove. 5.2 Notify public in newspaper article of actions	Bridge technician	5.1 Bridge technician 5.2 Bridge technician drafts notice & TCPWD Director reviews & submits to board for approval prior to publishing
189	6	Structures	Levees	Natural disaster (wind/rain, flooding, erosion) causes erosion and embankment failure and flooding	major flooding, economic impacts, fatalities, property damage, road closure	Threat	3	5								**Mitigate**	Inspect levees, repair within budget capabilites Look for hazard mitigation funds Access past inspection reports and develop annual inspection program Develop funding partnerships, and seek disaster	Low when action plan done.	6.1 Develop inspection methodology and program 6.2 Institute practice of inspecting prior to and following storm events. 6.3 Report to board on progam needs.	TCPW Engineering staff and foremen	6.1 Engineering staff 6.2 Foremen 6.3 TCPW Director

Table 5.7 Risk Register

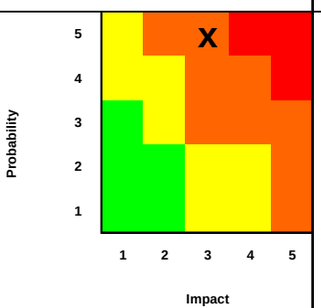
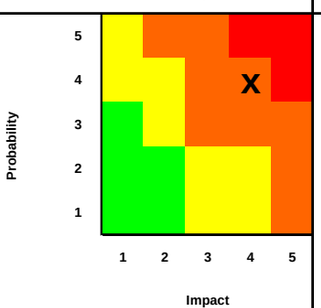
	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
196	**Risk Management Plan for Tillamook County Public Works Department**																				
197	**Risk Identification**					**Qualitative Risk Assessment**										**Management Plan**					
198	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
199	7	Drainage	Culverts	Outdated inventory & condition assessment Lack of mapped culverts Low lying roads inundated by plugged or deteriorated culverts Inappropriately sized outfalls beavers, undersized culverts, storm water	road washouts, flood property, road closures, traffic delays, property damage, emergency response issues, ecological impacts, negetive impact on road integrity	Threat	5	3								**Mitigate**	Scope plan for storm water managemenbnt program: inventory and map assets, inspect, rate condition. Develop preventive maintenance program	Reduced when plan done.	7.1 Develop inventory & planned inspection and cleaning program 7.2 Reduce failed culverts as budget allows 7.3 Report to board on program costs & needs.	TCPW Director & foremen	7.1 Director and consulting services & foremen 7.2 Director
206	8	Drainage	Ditches and Shoulders	No inventory or condition assessment Eliminated program over 20 years ago, vegetation up to road	road washouts, flood property, road closures, traffic delays, property damage, emergency response issues, ecological impacts, negetive impact on road integrity, premature road deterioration, shoulder buildup of debris	Threat	4	4								**Mitigate**	Develop inventory and map ditches; inspect, rate condition	Reduced when plan done.	8.1 Develop inventory & planned inspection and cleaning program as budget allows 8.2 Report to board on program costs & needs.	TCPW Director & foremen	8.1 Director and consulting services & foremen 8.2 Director

Table 5.7 Risk Register

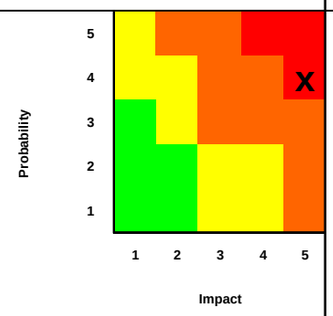
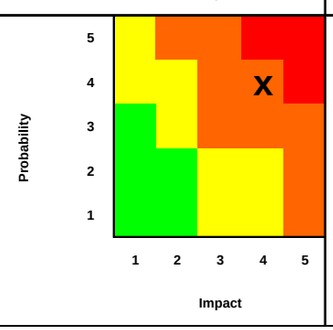
	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
214	**Risk Identification**						**Qualitative Risk Assessment**									**Management Plan**					
215	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
216	9	Veg.Mgmt	Spraying & Mowing	Lack of sight distance Obstructs traffic signs	builds shoulders, accidents, loss of sight distance, road deterioration, property damage, user costs, black ice, complaint volume increase	Threat & Opportunity	4	5								**Mitigate & Transfer**	Communicate change in policy on LARs to public Request public help maintaining private roads/LARs	Short term increased risk until public notified	9.1 Spray vegetation and report in accordance with DOA. 9.2 Mow vegetation as budget allows. 9.3 Provide public notice in local paper of changed policy 9.2 Board rescinds LAR Board Order	Staff and Dirctor; Board approval required	9.1 Jeanette drafts for Director's approval; review with Board & send to local paper 9.2 Director & Board
223	10	Traffic Safety	Signs-Regulatory (stop signs) red/white	Loss of sign in key locations Condition (reflectivity) falls below threshold Vandalism or graffiti Posts knocked over from storm age deterioration	incrased fatalities, accidents, complaints, speeding, etc. and overtime costs due to reactive maintenance	Threat	4	4								**Avoid**	Continue regulatory sign maintenance	Low risk when plan executed/	10.1 Continue sign maintenance program on regulatory signs only 10.2 Report sign need based on inspection	Foremen & Bridge technician	10.1 Foremen 10.2 Bridge technician

Table 5.7 Risk Register

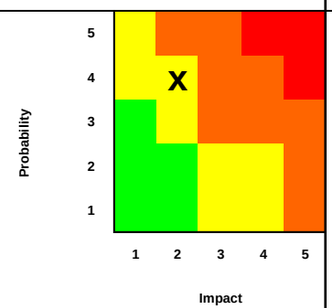
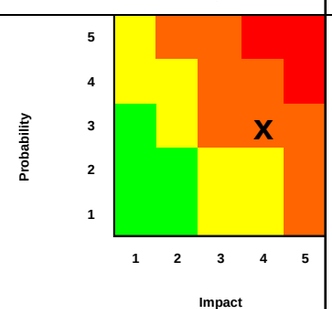
	A	B	C	D	E	F	H	I	J	V	W	X	Y	Z	AA
230	**Risk Management Plan for Tillamook County Public Works Department**														
231	**Risk Identification**					**Qualitative Risk Assessment**				**Management Plan**					
232	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**	**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
233–239	11	Traffic Safety	Signs-Other	Loss or lack of sign in key locations Condition falls below threshold Vandalism or graffiti Posts knocked over from storm	increased emergency response to down and vandalized signs, increased citizen complaints, increased overtime costs due to reactive maintenance	Threat	4	2		**Accept**	No overtime response for requests to replace non-regulatory signs down	Risk remains	11.1 Communicate decision to defer non-regulatory sign maintenance & overtime	Director & foremen	11.1 Director & foremen
240–246	12	Traffic Safety	Pavement markings	Markings not replaced annually Poor or no visible markings	accidents		3	4		**Mitigate**	Reduce pavement marking service by providing fog lines on high traffic roads only	Risk remains	12.1 Communicate decision to staff managing painting contract 12.2 Include clarificationon reduced pavement marking service so public is aware of change	Bridge technician & Director	12.1 Bridge technician 12.2 Director

Table 5.7 Risk Register

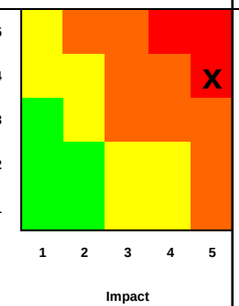
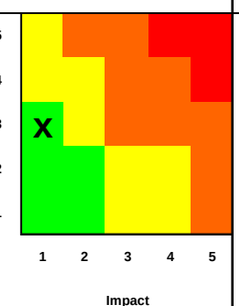
	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
247	**Risk Management Plan for Tillamook County Public Works Department**																				
248	**Risk Identification**						**Qualitative Risk Assessment**									**Management Plan**					
249	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
250	13	Equipment	Fleet & Equipment	Inadequate preventive maintenance Vehicles exceed useful life/ performance Vehicles outdated or unsafe for job	accidents, time loss at work		4	5								**Mitigate**	Support set aside for vehicle replacement fund	Reduced over long term when action plan followed.	13.1 Continue annual equipment replacement fund set aside 13.2 Continue tracking time and hours of performance & maintenance cost per vehicle 13.3 Report on need	TCPW Director & Equipment Supervisor	13.1 Director 13.2 Equipment Supervisor
257	14	Facilities	TCPWD Buildings	Buildings not to code Buildings functionally inadequate Buildings in poor condition	Worker safety Poor employee Costly reactive maintenance	threat	3	1								**Mitigate**	Annual inspection program Pursue consultative inspection Provide minimal maintenance	Risk remains	14.1 Conduct annual inspeciton of buildings 14.2 Provide reactive building maintenance 14.3 Report on need	County staff & TCPWD Director	14.1 County building inspectors 14.2 TCPW staff 14.3 TCPW Director

Table 5.7 Risk Register

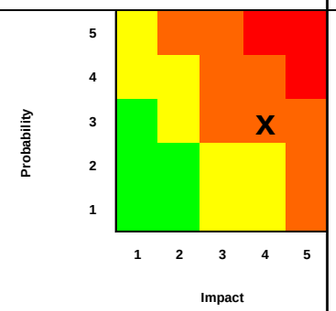
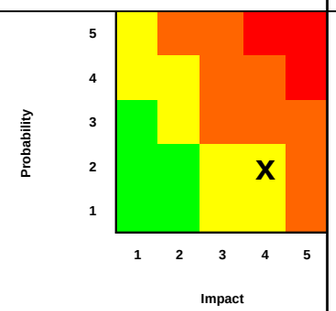
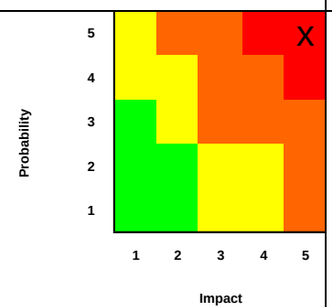
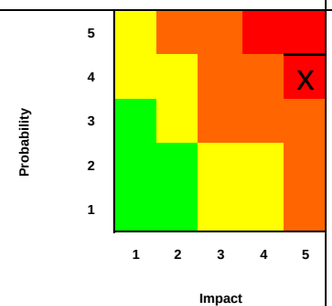
	A	B	C	D	E	F	H	I	J	V	W	X	Y	Z	AA
264	**Risk Management Plan for Tillamook County Public Works Department**														
265	**Risk Identification**					**Qualitative Risk Assessment**				**Management Plan**					
266	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**	**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
267–273	15	Materials Mgmt.	Quarries	Inadequate crushed rock Threat of selling quarries	Buy more costly materials that don't meet job needs Slower delivery of materials	threat	4	3		**Mitigate**	Do not sell County quarries Continue to get rock from County quarries	Low risk when plan executed/quarries retained.	15.1 Review decision with Board to elevate understanding of risk & strategy	TCPW Director	15.1 TCPW Director & Board
274–280	16	Engineering	Engineering Staff	Staff inadquate for volume of permits Qualified staff resigns or retires	Slow permit review Threat that mandated review cycle not met Higher costs to developers, utilities and citizens	threat	2	4		**Mitigate**	Increase permit fees, review fees	Risk remains until fees increased and additional staff hired	16.1 Review current permit fees and compare to adjoining counties 16.2 Report to Board and identify if increase fees	Staff and Dirctor	16.1 Engineering staff 16.2 TCPW Director

Table 5.7 Risk Register

	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	V	W	X	Y	Z	AA
281	**Risk Management Plan for Tillamook County Public Works Department**																				
282	**Risk Identification**					**Qualitative Risk Assessment**										**Management Plan**					
283	**#**	**Program**	**Risk Category**	**Failure Cause**	**Effect**	**Threat or Opportunity**	**Probability**	**Impact**	**Risk Matrix**							**Response**	**Risk Contingency Response Plan**	**Residual Risk**	Actions	Responsibility	Resources
284	17	Admin. Services	Department Employees	Inadquate staffing Inadequate compensation Inadquate technical training Insufficient funding to hire, train employees	Poor employee morale Poor public image Slower response to public requests for service Accelerated employee turnover & loss of corporate knowledge	threat	5	5								**Accept & Mitigate**	Provide information for citizens revenue initiative, as requested Implement layoffs October 2008 Implement reduced services focused on Extreme and High risk services (see above)	Risk remains	17.1 Provide information to citizen revenue initiative 17.2 Implement layoffs in October 2008 17.3 Continue performance reviews & ensure market rate compensation for staff 17.4 Communicate	TCPW Director & County Board	17.1-3 TCPW Director 17.4 County Board 17.5 TCPW Director and Board
291	18	Emrgcy. Mgmt.	Roads Bridges Culverts Ditches Signs Levees Department Employees	Natural disasters Extreme weather events Failed roads, bridges, drainage systems and levees	Closed routes for emergency services Increased demands and risk to private property and life Flooding due to failed levees or culverts or flooded roads	threat	4	5								**Mitigate**	Provide information for citizens revenue initiative, as requested Implement layoffs October 2008 Implement reduced services focused on Extreme and High risk services (see above)	Risk remains	18.1 Participate in emergency drills 18.2 Buy emergency generators 18.3 Check and mitigate known high risk assets (culverts) at hot spots before events 18.4 Ensure TCPWD staff have	TCPW Director	18.1 Director and staff 18.2 Shop Supervisor 18.3 TCPWD staff 18.4 Director and staff

Chapter 6 Lifecycle Management Plans

6.1 Overview[49]

This section describes the life cycle management tactics for the following key asset classes:

- Roads (paved and gravel)
- Structures (bridges, levees and guardrails)
- Drainage (culverts and ditches)
- Traffic Safety (road signs, road markings, traffic signals)
- Equipment management
- Facilities (buildings) management
- Quarries
- Operational programs that support the above (Vegetation Management, Emergency Management, Engineering and Administrative Services, Materials and Stockpiling)

Each section on asset classes includes:

- The purpose for each asset class
- Background information:
  - Physical inventory and value
  - Capacity and performance and lifecycle management decisions
  - Condition
  - Historic expenditures
- Management tactics to achieve the level of service are organized into main types of work performed:
  - Operations and maintenance
  - Rehabilitation/renewal
  - New assets

This first Asset Management Plan is based on the current management practice and structure of programs, activities and cost accounting. Future asset plan updates will track the life cycle management of county road assets and their renewal needs over a 10-year period. Where possible, renewal needs over the assets' useful life are included.

[49] This asset plan incorporates the approach and definitions found in the *City of Portland Asset Status & Condition Report*, City of Portland, December 2007; *International Infrastructure Management Manual*, 2006, the *Transport Asset Management Plan*, North Shore City, New Zealand 2005, unless otherwise specified.

County activities occur as follows:

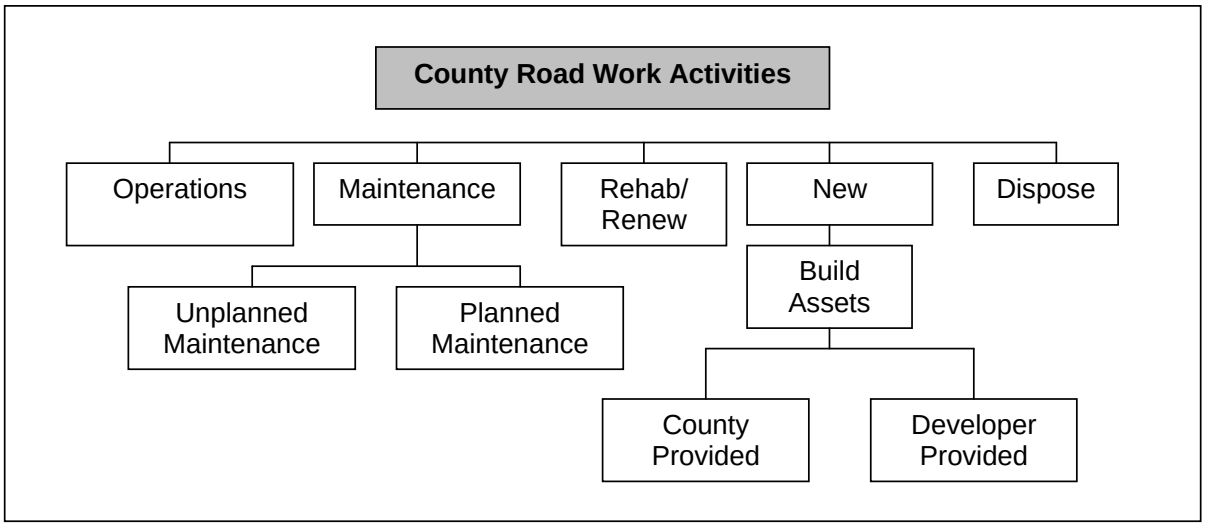


Figure 6.1 Tillamook County Road Activities

6.1.2 Work Category Definitions[50]

Definitions are as follows.

Operations – Ongoing activities that allow for the use of an asset for its intended purpose but have no effect on asset condition. Operational costs are budgeted with maintenance activities in the County budget.

Operational activities include:

- Engineering Support
- Customer service/response
- Software support costs for asset management systems (IRIS)
- Graffiti removal
- Utility coordination
- Vegetation control
- Emergency management
- Overhead costs
- Inspection of assets
- Energy costs to light the county's traffic signal
- Material management/Stockpiling

Routine Maintenance – Daily activities that keep an asset operating as designed or prevent it from deteriorating prematurely, excluding rehabilitation or renewal which may extend asset life. Maintenance can be planned or unplanned: Planned maintenance includes preventive, regularly scheduled maintenance; condition-based maintenance, which is triggered from tests, measurements or observations; or deferred maintenance. Deferred maintenance is the shortfall which occurs when maintenance is postponed. Typically this strategy results in higher costs when repairs are made or premature failure of the asset.

Maintenance and operations activities should address:

- Procedures, standards and desired results
- Compliance with legislation
- Response times by activity type
- Inspection and reporting requirements
- Approved work programs and schedules
- Reporting on activities costs; labor, materials and equipment used; changes to asset inventories and inspections.

Current TCPW maintenance programs include:

- Surface road maintenance
- Structure (bridges, levees, guardrails)
- Traffic Safety (traffic signs, road markings, traffic signal)
- Drainage (culverts and ditches)
- Vegetative or roadside maintenance

[50] Includes definitions from *Asset Status and Conditions Report*, City of Portland, Oregon, December 2007

- Emergency Management
- Equipment Management
- Bicycle/Pedestrian

Rehabilitation/renewal – Maintenance performed on an asset to restore it to its original level of service or capacity and achieve its useful life, which may result in an extension of the asset's service life.

New Assets (Capital Expansion) - Projects or facilities that create new assets, increase the capacity of existing assets beyond their original design capacity or service potential, or increase the size and service capability of a current service area, including service to new annexed, undeveloped, or under-served areas. Adding new assets generally increases the total maintenance requirements because it is increasing the total asset base.

Asset Disposal – Costs associated with the removal or disposal of decommissioned road assets.

6.1.3 Optimized Decision Making

Evaluating the economic impact of different capital project and renewal or rehabilitation options supports the strategy to minimize the total expenditures of an asset over its life. This consideration of options and tradeoffs is closely linked to achieving community outcomes, risks, and service priorities as expressed in the *Tillamook County Transportation System Plan*. It can be used at the network level or project selection level and is based on considering multiple criteria, and tradeoffs between options.

Deciding whether to renew or replace an asset involves several factors including the asset's condition, performance, physical capacity and whether an asset is functionally obsolete. Assessing these failure criteria identifies the level of service the asset is providing, and the economic implications if the asset were to fail, options to maintain the asset, the impact on the community, the environment and the costs of failure. Then impacts on the organization are assessed, as well as clarifying if there are make or break reasons (legal liability, e.g.) whether an activity or project can proceed. Each viable option should have a complete financial analysis.

Maintenance Planning. Maintenance and operation planning also need to be optimized for the county road activities. The right blend of planned and reactive or unplanned maintenance helps minimize the cost of road services. Quarterly reporting and analysis of work activities and costs increase the efficiency and effectiveness of county road activities and road services.

Rehabilitation/Renewal Planning. Planning future asset renewal has different levels of sophistication, including:

- Historic costs

- Specific renewal strategies
- Valuation based on historic capital investment and depreciation
- Predictive deterioration modeling based on asset lives and historic rates of condition deterioration
- Assessment of asset criticality, failure modes, failure criteria and risk exposure levels, analysis of alternative options, impact of options and optimum solution
- Predictive condition and performance deterioration modeling, as is done for the county pavement assets using the Street Save software.

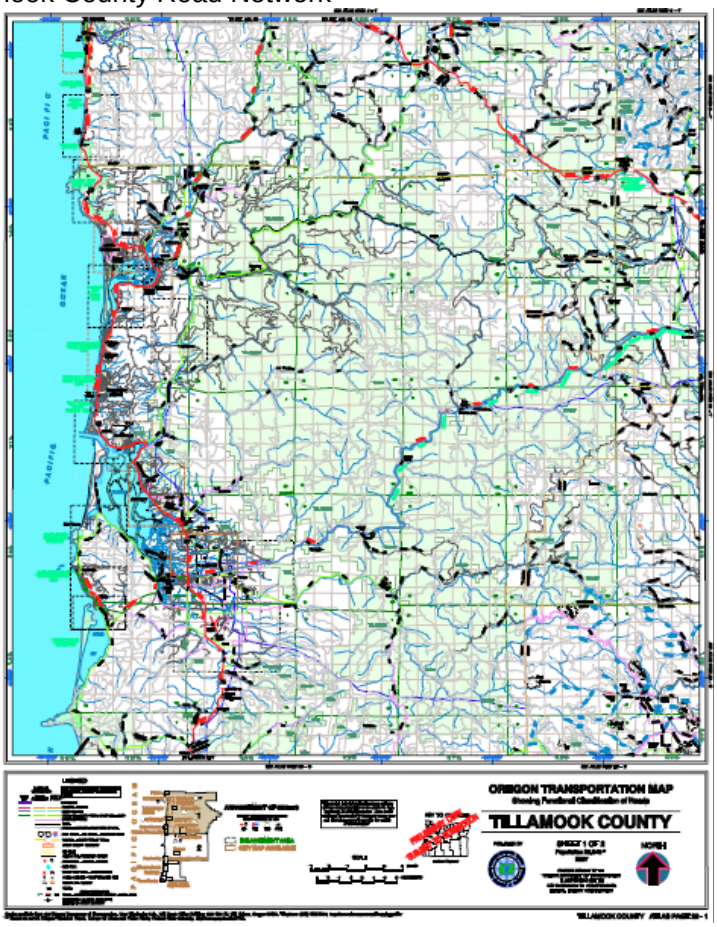
The improvement plan includes actions which will improve the accuracy of rehabilitation and renewal forecasts for existing county road assets. Once implemented, the confidence of financial planning will improve based on cost accounting which integrates asset-based programs with the lifecycle expenditures made to manage county road assets' lifecycle.

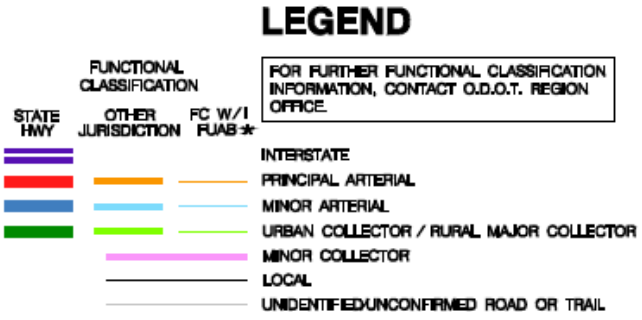
New Assets. New assets built by the County are identified in the County Transportation System Plan and its implementing program, the Transportation Improvement Program (STIP). The majority of new assets are built through private development.

6.1.4 County Road Network

The roads within Tillamook County are shown below.[51]

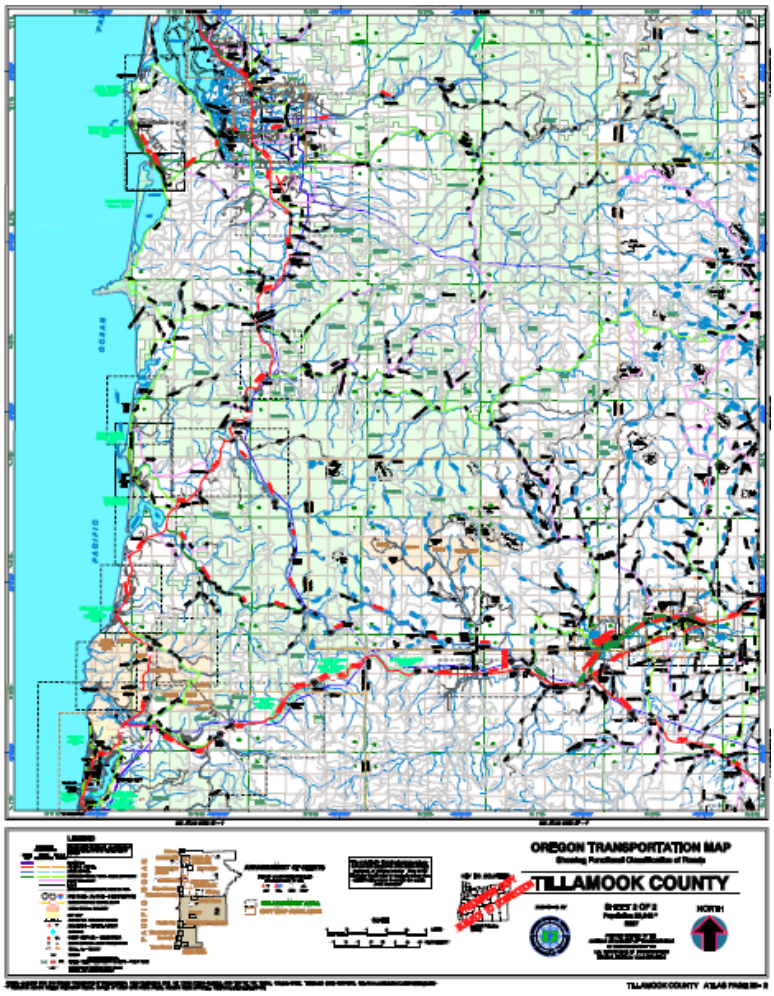
North Tillamook County Road Network





[51] From http://egov.oregon.gov/ODOT/TD/TDATA/gis/docs/countymaps/till2.pdf

South Tillamook County Road Network



LEGEND

FUNCTIONAL CLASSIFICATION

STATE HWY	OTHER JURISDICTION	FC W/I FUAB ★	
			INTERSTATE
			PRINCIPAL ARTERIAL
			MINOR ARTERIAL
			URBAN COLLECTOR / RURAL MAJOR COLLECTOR
			MINOR COLLECTOR
			LOCAL
			UNIDENTIFIED/UNCONFIRMED ROAD OR TRAIL

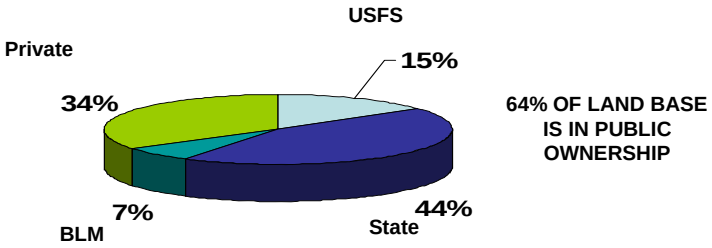
FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT O.D.O.T. REGION OFFICE.

6.1.5 Boundary and Coordination Issues

Many government agencies own roadways serving Tillamook County, including federal agencies, and the Oregon Department of Transportation. Sixty-four percent of Tillamook County is public lands.[52]

Table 6.1.5.1 Tillamook County Land Ownership

Tillamook Land Ownership (Acres)	
Private	**237,000**
BLM	**50,000**
USFS	**103,000**
State	**306,000**
Other	**4,000**
Total	**700,000**



Three ports (Tillamook Bay, Garibaldi and Nehalem) place demands on county roadways and influence road needs. The Port of Tillamook Bay owns a 90-mile long railroad which connects Tillamook County with the Willamette Valley. There are seven incorporated cities within Tillamook County have adopted comprehensive plans (Bay City, Garibaldi, Manzanita, Nehalem, Rockaway Beach, Tillamook and Wheeler), and twelve unincorporated community within the county (Barview-Watseco, Beaver, Cloverdale, Hebo, Idaville, Mohler, Neahkanie, Neskowin, Netarts, Oceanside, Pacific City, and Siskeyville). The Tillamook County Transportation District (TCTD) provides transit services in Tillamook County.

[52] Tim Josi, County Commissioner, January 2008 & *CAFR.*

6.2 Pavement Lifecycle Management Plan

This section of the road asset management plan assesses the condition and useful life of arterial, collector and local county-owned and maintained roads.

6.2.1 Road Management Issues

The conclusions of the condition assessment and estimation of remaining life and useful life are.

1. The estimated useful life for county paved roads currently used by the County in financial reporting is 50 years which is considered conservative. A more accurate useful life for the surface of low volume rural roads is 20 years, based on AASHTO guidelines,.
2. Eighty-three percent of the County's road network exceeds even this conservative estimate of useful life, or 50 years.
3. The method for assessing pavement condition has an optimum confidence, given that 100% of county roads are visually inspected and rated every other year. The visual inspection method pavement management software is used by all Oregon counties, and many west cost cities in the U.S.
4. Tillamook County's roads are in Fair condition (PCI 48) the lowest Pavement Condition Index of all Oregon counties. Pavement condition will decline to Very Poor (25 PCI) by 2016 with current funding
5. Five levels of service were analyzed in 2007. These are based on the current network condition and projected outcomes given remaining service life and maintenance strategies and funding levels. These scenarios' pavement condition, deferred maintenance and pavement condition over 10 years are included in County decision making.
6. The current funding allocation of $250,000 per year is clearly insufficient to address all of Tillamook County's future road maintenance needs. Local Access Roads receive virtually no road services, beyond responding to emergencies or removal of public safety hazards.
7. Although Tillamook County's roads are in Fair condition (48 PCI), the current deferred maintenance is high ($17.2 million). Without additional funding and preventive maintenance, the backlog will increase over the next 10 years ($47.5 million). This will place additional financial burden and funding requirements to maintain the road system in future years.
8. The optimum strategy requires a "Mix of Fixes", or substantial initial investment to rehabilitate county roads and adequate preventive maintenance to ensure those roads in Good condition do not deteriorate. Using this estimate and the MTC program, an unrestricted funding level of $35.8 million over the next ten-year period is needed to improve the county's roads to Good condition, a PCI in the low to mid 80's. Of this total, approximately $17.5 million is needed in the first year alone. This initial investment, primarily to repair roads in the 'fair' to 'poor' range, are for those roads with a PCI of 0-49, which is about 54 percent of Tillamook County's total network. The total budget needs amount of $35.8 million

exceeds Tillamook County's current funding level by $33.3 million, thus creating a backlog in deferred maintenance.

9. Little preventive maintenance is occurring on Tillamook County's roads. This investment level should be reexamined to target available resources on those roads most likely to decline below Satisfactory, or between 45 and 70 PCI. This strategy is seen as necessary pending finding additional funding to address those roads in need of rehabilitation.

6.2.2 Road Classification

The County's *Transportation Element (Goal 12)* of the *Transportation System Plan* defines the county road functions and priority as follows:

- *Arterial Roads* – Arterial roads connect principal state highways and areas of principal traffic generation within the County…. Arterial roads should form a "continuous road network," and these routes should be given preferential treatment over collector and local roads in the signing and signalizing of intersections.
- *Collector Roads* – Collector roads carry internal traffic within areas having predominant land use…and join arterial roads and minor traffic generators such as schools and shopping centers.
- *Local roads* – Local roads constitute all rural roads not classified as principal arterials, minor arterials or collectors.

The pavement management system used by Tillamook County defines county road functions and terms used to determine the impacts of different maintenance and rehabilitation programs and investment strategies on future pavement conditions.[53]

- *Urban arterial* roads carry the major portion of trips entering and leaving the urban are, as well as the majority of through movements desiring to bypass the central County. In addition, significant intra-area travel such as between central business districts and outlying residential areas.
- *Urban collector* roads provide land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. They differ from the arterial system in that facilities on a collector system may penetrate residential neighborhoods.
- *Urban local* roads comprise those roads that are not one of the higher road functions. They serve primarily to provide direct access to abutting land and access to the roads carrying higher volumes of traffic.
- *Network* is the complete inventory of roads and other pavement facilities in which the County owns and maintains.
- *Deferred maintenance*, often referred to as *backlog*, is timely maintenance and rehabilitation work that preserves pavement at the least cost that has been postponed due to insufficient funding.
- *Reactive Maintenance* (pothole patching), also *Stop Gap* repairs applied to maintain the pavement in a serviceable condition. These are temporary

[53] Definitions from *Tillamook County Pavement Management Program Budget Options Report,* Engineering Information Services, Inc., June 2007

repairs to respond to complaints and do not extend the pavement life. Reactive maintenance is proportionate to the amount of deferred maintenance and must compete with preventive maintenance budget allocations.

6.2.3 Road Classification

Tillamook County's road network is comprised of 378 road miles[54]:

Minor Arterial	39 miles	10%
Major Collectors	102 miles	27%
Minor Collectors	62 miles	16%
Local - Paved	84 miles	22%
Local - Gravel	91 miles	24%

County financial statements report the road infrastructure value as of June 30, 2007.

Current replacement cost	$268.4 million[55]
Accumulated depreciation	$ 5.7 million
Written Down Value	$ 14.2 million

The depreciation expense for the period ending June 30, 2007 is $198,000. The road network was recognized in County accounts and re-valued as at June 30, 2007. County accounting policy requires revaluation of infrastructure assets annually. Capital assets are defined by the County as assets with an initial, individual cost of more than $5,000 and an estimated useful life of at least one year. Such assets are recorded at historical cost or estimated historical cost if purchased or constructed. Major outlays for capital assets and improvements are capitalized as projects are constructed. Infrastructure is depreciated using the straight-line method over estimated useful lives.

It is worth noting that this accounting based method of reporting on pavement assets does not indicate a management strategy; it is a report of the on-going reinvestment in county road assets over time and resulting increased or depreciated value of an asset based on its life and on-going investment in the asset. This on-going investment/disinvestment impacts whether the asset's estimated life is achieved and is used as an indicator of whether the community is maintaining the value of a community asset, or whether its value is decreasing.

6.2.4 Current Useful Life

The useful life assessment provides data on the remaining life of the asset class for revaluation in accordance with County accounting policy. Useful life is the estimated life an asset is able to provide the required service and economic benefit to the community before it needs to be replaced or disposed of.

[54] Based on TCPW spreadsheet used to track pavement value, *Tillamook County CAFR* 2007.
[55] Replacement cost includes only the paved roadway (consisting of all labor and materials associated with construction) from curb to curb.

Tillamook County uses the following useful life estimates for valuing paved county roads when it estimates the network value.

Paved roads - 50 years

It is not clear the source of this useful life assumption. The “Guideline for Geometric Design of Very Low-Volume Local Roads”, American Association of State Highway and Transportation Officials, 2001 indicates the design life for well designed pavement is 20 years at which point it requires an asphalt overlay. Failure usually occurs through fatigue or weathering. However, the actual life depends on original construction, drainage, soil conditions, amount and type of traffic, age and timeliness of previous maintenance activities and weather. The sub-base of the road can last 30-100 years, depending on the above factors.

Eighty-three percent of the County’s road network exceeds even this conservative estimate of useful life, or 50 years. The average rainfall in Tillamook County is 90 inches per year.

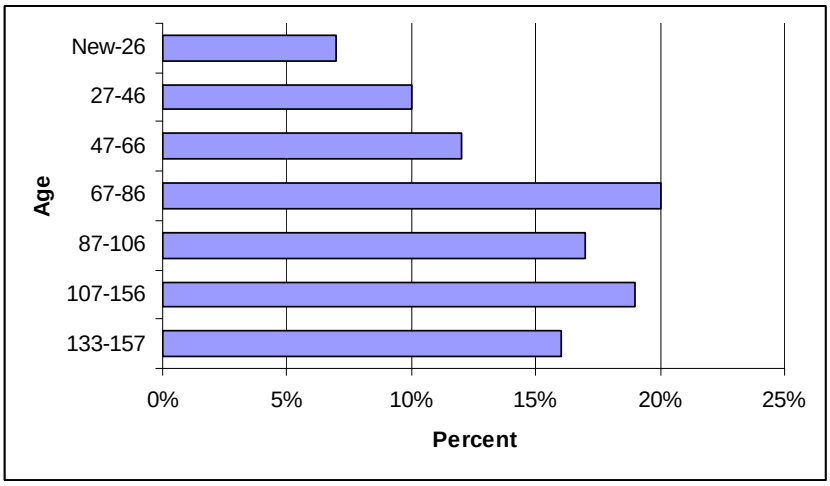


Figure 6.2.1 83% of County Roads Exceed Useful Life of 50 Years

6.2.5 Road Management and Decision Making

County road needs are determined at the network level using the pavement management system. Tactics used to implement County strategic policy and road priorities relies upon the expert knowledge of pavement engineers. Final project selection from a list of candidate projects occurs after a cost benefit analysis, structural review and coordination with utilities. This process is shown in the following figure. Recommended annual work plans are reviewed and approved by the County Commissioners.

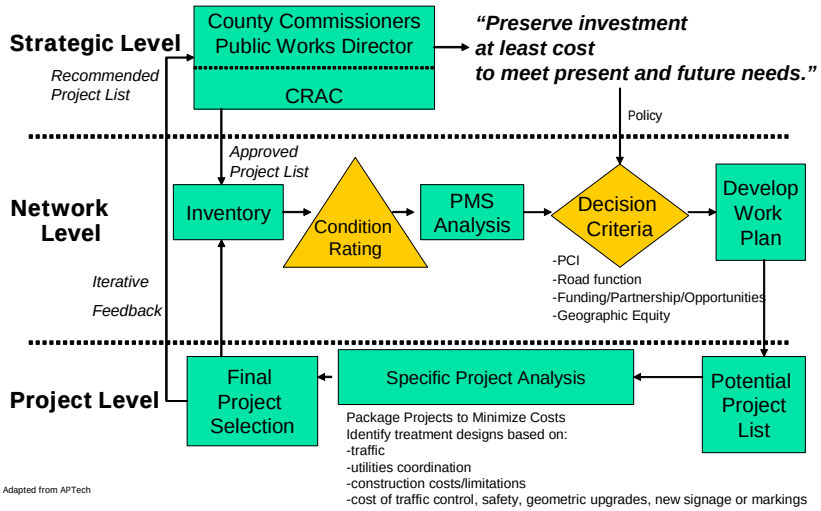


Figure 6.2.2 Tillamook County Road Management Decision Process[56]

[56] Adapted from *City of Portland Pavement Management System Software Replacement Business Practices Analysis,* Applied Pavement Technology, May 2007

Pavement condition is also a key performance benchmark selected by the Tillamook County Futures Council to evaluate whether the County's vision is being implemented. The condition of County roads has declined. Those roads classified as Good to Satisfactory decreased 28% from 2001 to 2007. Fair to poor conditions increased by 50% from 2001 to 2007.

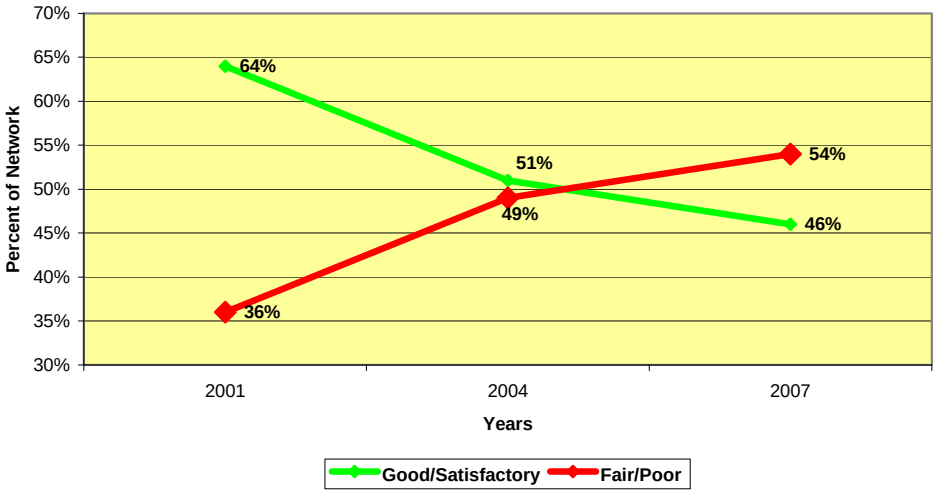


Figure 6.2.3 Condition of County-Owned Roads Declined

The state has a goal of maintaining a statewide 78 percent of state roads in fair or better condition.[57] Pavement condition is rated every two years in Tillamook County. An average pavement condition index (PCI) is assessed for every segment of the county roads with a PCI of 0 to 45 considered poor condition.

There are insufficient funds to address the community's perception of road need. The continued decline of county road condition, a key community benchmark, reflects the lack of resources to implement an adequate asset action plan. While there is high confidence in the strategy to address this need, there is a missing link in funding to implement the adopted strategy and achieve the benchmark.

Efforts to raise local road revenues failed. There are current efforts in 2008 to ask the community what level of service is desired and affordable to address this documented need.

[57] "Pavement Condition Report," ODOT 2001, and the *Oregon Highway Plan*, 2001

Pavement condition is rated every two years in Tillamook County by an expert pavement engineering contractor. Each road segment is assigned an average pavement condition index (PCI), a composite of observable surface defects, such as cracking, rutting, raveling, utility cuts, spalling or distortions. This is a measure of the serviceability of a pavement, with 100 PCI representing the score for a new road and a PCI of 0 to 25 considered poor condition.

The 2007 inspection places Tillamook County road condition at 48 PCI, or the high end of Poor.

Table 6.2.2 Pavement Condition in 2007

Condition Category	PCI Range	Percent of Network
Good	**70 - 100**	**29%**
Satisfactory	**50 - 69**	**17%**
Fair	**25 – 49**	**25%**
Poor	**< 25**	**29%**

In 2007, the county's arterial and collector roads are in better condition than local roads.

Table 6.2.3
2007 County Road Condition by Road Function

Weighted Average PCI	
Arterial	66
Collectors	51
Residential/Other	40

The County's road management strategy seeks to minimize road management costs over a road's life. This strategic policy recognizes that the cost of maintaining an individual road varies according to a number of factors, but in general deferring maintenance dramatically increases over time if maintenance is deferred.

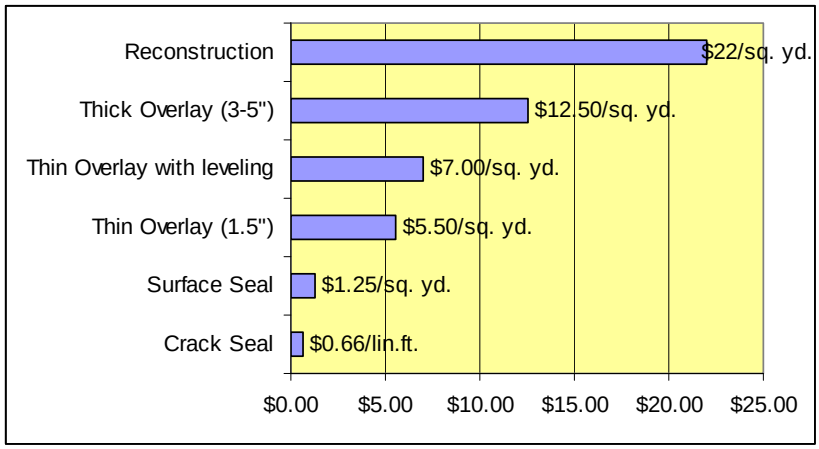


Figure 6.2.4 Tillamook County Pavement Treatment Costs - 2007

Table 6.2.3 Pavement Management Strategy & Costs[58]

				Road Condition	
Strategy	**Activity**	**Cost**	**Unit**	**Category**	**PCI**
Routine Maintenance	Crack Seal	$0.66	lineal foot	Good	90
Routine Maintenance	Surface Seal	$1.25	square yard	Good	90
Preventive Maintenance	Thin Overlay (1.5")	$5.50	square yard	Satisfactory	50-70
Minor Rehabilitation	Thin Overlay with leveling	$7.00	square yard	Fair	25-50
Rehabilitation	Thick Overlay (3-5")	$12.50	square yard	Fair	25-50
Replacement	Reconstruction	$22.00	square yard	Poor	0-25

Significant national and local changes are occurring in the cost of road materials, including asphalt and the fuel used to transport quarry materials (gravel). These shifts affect the quantity of materials which can be purchased and units of work that can be completed.

[58] Tillamook County Pavement Management System, 2007

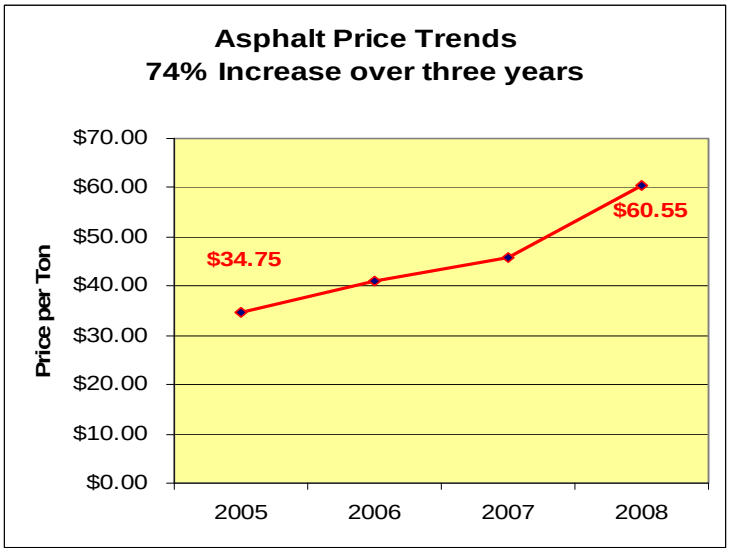


Figure 6.2.5 Three Year Asphalt Price Trend

The 2008 cost for asphalt is $60.55 per ton,[59] an increase of 74% since 2005.

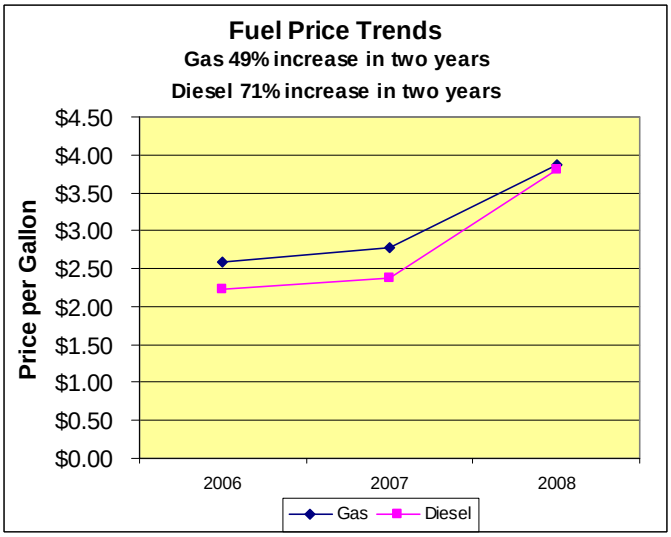


Figure 6.2.6 Two Year Fuel Price Trends

Fuel prices have increased 49% (gas) and 71% (diesel) over the last two years. The cost paid to re-stripe a mile of county road in 2007 was $1,700, a 22% increase from 2006. Hauling gravel from quarries located in Cloverdale and

[59] Bid price for Tillamook County Preservation Program, March 2008

Nehalem to respective work locations within Tillamook County cost $45,600 in 2007. The unit price for shoulder gravel is $18 per ton. The road network covers 378 miles within this 70-mile long county.

6.2.6 Pavement Management Activities[60]

Road maintenance activities include all routine, corrective (reactive), preventive and catastrophic maintenance functions which primarily restore the serviceability of a road once deterioration or failure has occurred.

County roadway maintenance includes pothole patching and repair, surface blading, new base/sub-base, new oil mat (gravel), oil seal coat (pavement), paving (including blade patching) less than 2 inches, paving 2 inches or more, and inspecting road condition.

Routine maintenance consists of work that is planned and performed on a routine basis to maintain and preserve the condition of the county road network or to respond to specific conditions and events that restore the county roads to an adequate level of service. Maintenance activities are often "in-house" or TCPW performed.

Preventive maintenance is a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without significantly increasing the structural capacity. Preventive maintenance treatments include new oil mat for gravel roads, surface oil seals, and thin overlays (less than 2 inches).

Corrective maintenance activities are performed in response to the development of a deficiency or deficiencies that negatively impact the safe, efficient operations of the facility and future integrity of the pavement section. Corrective maintenance activities are generally reactive, not proactive, and performed to restore a pavement to an acceptable level of service due to unforeseen conditions. Pothole patching and base repair are examples of county corrective maintenance activity.

Catastrophic maintenance describes work activities generally necessary to return a roadway facility back to a minimum level of service while a permanent restoration is being designed, for example, emergency road repairs following a storm.

Resurfacing is one of the most common methods of rehabilitating an existing pavement which restores an existing asset to its original capacity or required condition. The objective in rehabilitating and renewing an asset is to apply the correct treatment at the optimum time so that the required level of service is delivered while minimizing total life cycle costs. Overlays are the most typically renewal treatment. Chipsealing is also a common resurfacing technique which

[60] Applied Pavement Technology; AASHTO Subcommittee on Maintenance, AASHTO Standing Committee on Highways, 1997

combines waterproofing seal and a stone chip spread on top as a wearing surface; Tillamook County does not currently use this technique.

Minor pavement rehabilitation consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develop in flexible pavements due to environmental exposure. Because of the non-structural nature of minor rehabilitation techniques, these types of rehabilitation techniques are placed in the category of pavement preservation.

Major pavement rehabilitation consists of structural enhancements that both extend the service life of an existing pavement and/or improve its load-carrying capability. Structural overlays (greater than 2 inches) are major rehabilitation.

Pavement reconstruction is the replacement of the entire existing pavement structure by the placement of the equivalent or increased pavement structure. Reconstruction is required when a pavement has either failed or has become functionally obsolete.

Pavement condition correlates to the following strategies and road appearance.

6.2.7 Historic Expenditures

Road maintenance and renewal expenditures for fiscal years 2005-2007 are shown below.

Table 6.2.4 Road Maintenance Expenditures[61]

	2005	2006	2007
1101 - Chuckhole Repair	$389,088.31	$324,181.06	$216,295.22
1102 - Surface Blading	$56,543.72	$79,373.67	$68,813.14
1104 - Shoulder Maintenance	$230,107.25	$176,255.62	$183,983.17
1105 - Brooming	$8,188.82	$10,185.33	$11,145.66
1150 - New Base/Sub Base	$50,870.12	$101,351.90	$112,304.56
1151 - New Oil Mat (Gravel)	$186.65	$5,200.00	$9,805.00
1152 - Oil Seal Coat (Pavement)	$631.49	$1,171.52	$0
1153 - Paving (less than 2 inches)	$45,464.58	$258,637.83	$50,253.13
1154 - Paving (2 inches or more)	$368,892.51	$658,795.46	$864,802.82
1181 - Road Conditions	$0	$20,787.96	$24,082.26
Totals	**$1,149,973.45**	**$1,635,940.35**	**$1,541,484.96**

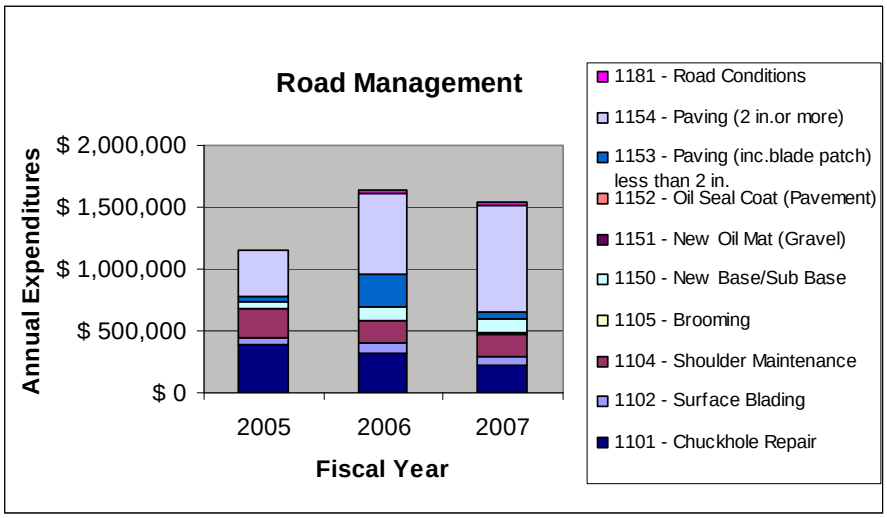


Figure 6.2.5 Road Management Program Expenditures 2005-2007

[61] Tillamook County Integrated Road Information System, Cost Accounting Module, 2008

Individual activity expenditures are shown in the following chart. As pavement condition declines, the costs associated with major pavement rehabilitation increase.

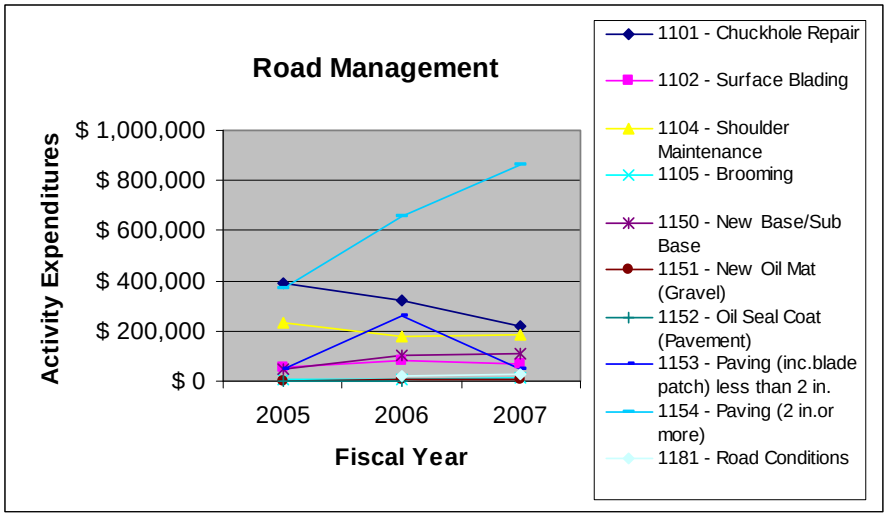


Figure 6.2.6 Road Management Expenditures by Activity 2005-2007

Tillamook County road activities are assigned to lifecycle categories.

Table 6.2.5 Road Management Activities by Lifecycle

Activity	Routine Maintenance	Reactive Maintenance	Preventive Maintenance	Rehabilitation	Reconstruction
1101 - Chuckhole Repair		✓			
1102 - Surface Blading	✓				
1104 – Shoulder Maintenance	✓				
1105 - Brooming	✓				
1150 - New Base/Sub Base				✓	
1151 - New Oil Mat (Gravel)			✓		
1152 - Oil Seal Coat (Pavement)			✓		
1153 - Paving (includes blade patch) less than 2 in.			✓		
1154 - Paving (2 inches or more)				✓	
1181 - Road Conditions	✓				

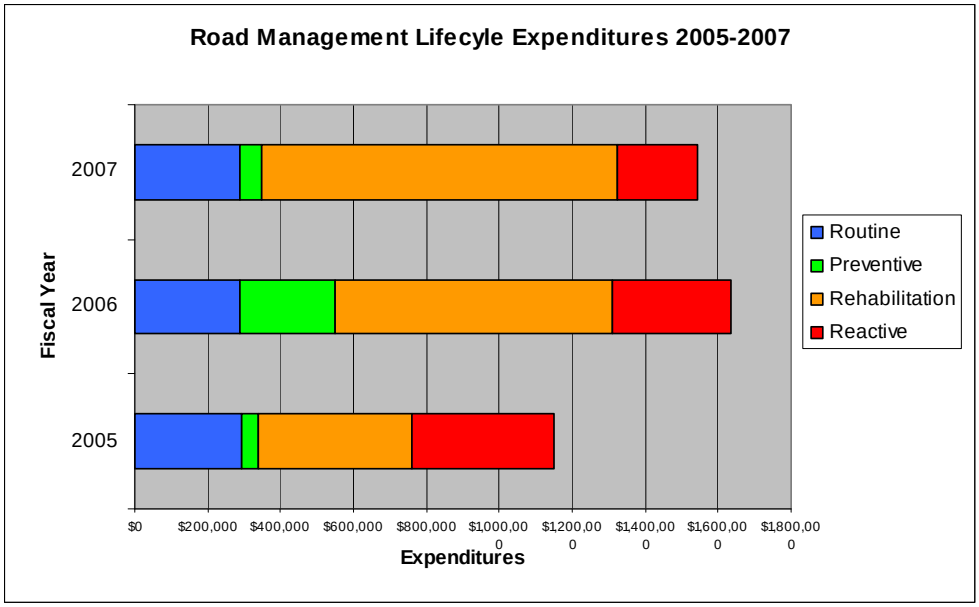


Figure 6.2.7 Road Lifecycle Management 2005-2007

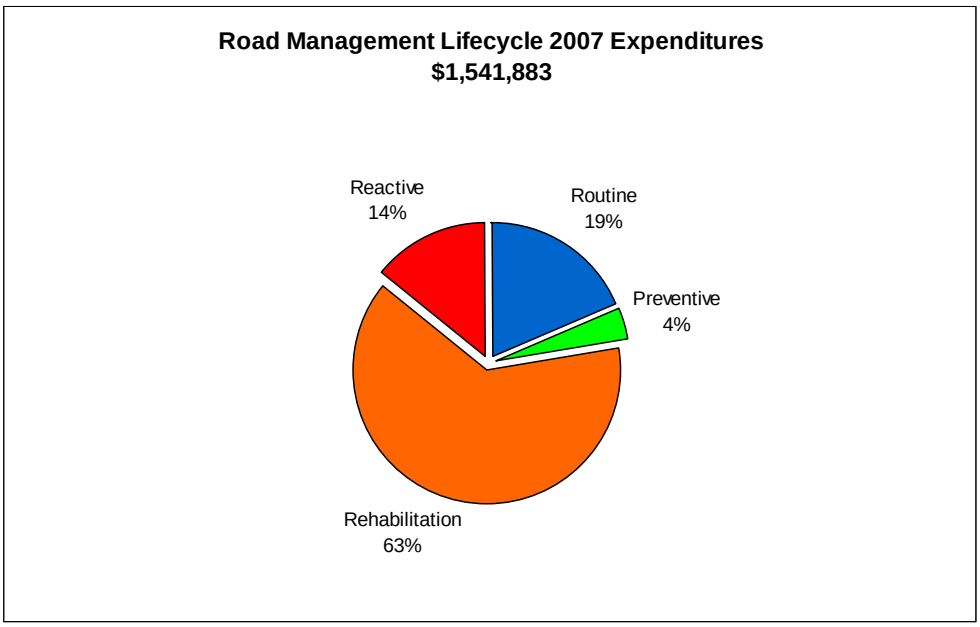


Figure 6.2.8 Road Lifecycle Expenditures

In 2007, $1.5 million was expended on the road management program. Expenditures reflect the decline in the condition of the county road network; three-fourths of the road surface budget was spent on road rehabilitation. The current level of service cannot address all roads in need of reconstruction.

- 63% of expenditures were rehabilitation (greater than 2 inch overlays)
- 19% was spent on routine maintenance
- 4% was spent on preventive maintenance
- 14% was spent on reactive maintenance, less than the previous 2 years
- none was spent on reconstruction
- Based on lack of resources, two paved roads in poor condition, McKinster and Chance, were turned into gravel roads

6.2.8 New County Roads

This section of the asset plan describes the strategy used to create new county roads which upgrade or improve an existing road beyond its original capacity or performance to respond to changing traffic needs, safety considerations, mandates or customer expectations. These projects can result from road improvements or road widening, neighborhood improvements and new roads to serve development subdivisions and commercial development.

New roads must meet applicable regulations, policies, standards and guidelines set out in the "Tillamook County Road Construction Plan Standards (see Appendix C). These standards augment AASHTO's "A Policy on Geometric Design of Highways and Streets."

In 2003, the *Draft Transportation System Plan (TSP)* assessed the short and long term needs in Tillamook County. Roadway, pedestrian, and bicycle needs were identified by analyzing existing, future, forecast and no-build conditions using plans, policies and committee input.

A review of existing widths of county collector and arterial roadways was conducted using data provided by Tillamook County. Most county facilities consist of rural paved roadways with two travel lanes and no shoulders. The addition of shoulders on rural major collector and arterial roads was considered to address safety deficiencies and accommodate freight and bike traffic. These can be found in the County TSP.

Recommendations were made in the TSP to widen some county roads in and within the vicinity of urban areas, including the potential for sidewalks and bike lanes to address safety deficiencies and accommodate freight, bike, and pedestrian traffic.

While the TSP identifies the need for these capacity improvements, new road improvements are prioritized by Tillamook County and submitted for funding consideration to the Northwest Oregon Area Commission on Transportation (NWACT). Design and construction, environmental assessment and public outreach associated with these projects rely on state funding allocations.

Projects identified for the Statewide Transportation Improvement Program (STIP) must compete regionally for funding. $20 million is available for 9 counties in Oregon's Region 2 In 2010-2013 STIP process.

6.2.9 Future Road Investment Scenarios

Following best practice, the County's pavement management system produces several scenarios which indicate the future condition of the county road network given various funding levels. Many factors are used in this optimization software, including the surface type, traffic loading, and visual inspection rating. The condition and cost over the future 10 years is shown for 5 scenarios:

1. Unconstrained (PCI 85)
2. Current investment (PCI 31)
3. Increase budget level to achieve Satisfactory road condition (PCI 65)
4. Increase budget to Good road condition (PCI 70)
5. Zero funding (PCI 25)

The costs and results of each strategy are shown in the following tables.

Table 6.2.6
Scenario 1 — Unconstrained
Improve Road Condition and Zero Deferred Maintenance
PCI 85 by 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$17,496,811	$2,575,165	$5,440,938	$2,739,909	$1,339,796	$892,609	$432,728	$1,852,680	$2,054,784	$989,598	$35,815,018
Rehabilitation	$17,017,527	$2,492,208	$5,374,967	$2,716,908	$1,310,405	$789,408	$336,616	$275,949	$150,882	$342,935	$30,807,806
Preventive Maintenance	$479,284	$82,957	$65,971	$23,001	$29,391	$103,200	$96,112	$1,576,731	$1,903,902	$646,663	$5,007,212
Stop Gap	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	---
Deferred Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	---
PCI	81	80	84	85	85	85	84	85	86	85	---

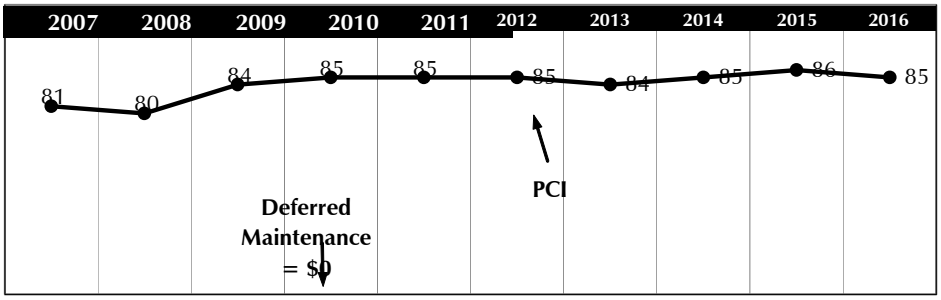


Figure 6.2.8
Scenario 1 – Unconstrained
Road Condition and Resulting Backlog 2007-2016

This scenario shows that with a budget of $17.5 million in 2007, road condition would improve to 81. Sufficient funds would then be spend to keep roads in the low to mid 80s, or Good condition. This scenario costs $35.8 million over the 10-year period shown.

Table 6.2.7
Scenario 2 - Current Service Level
Decreased Road Condition
PCI 31 by 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$2,500,000
Rehabilitation	$246,887	$247,458	$247,154	$247,395	$246,317	$247,243	$247,455	$247,190	$247,459	$247,225	$2,471,783
Preventive Maintenance	$3,082	$2,479	$2,808	$2,603	$3,393	$2,293	$2,545	$2,644	$2,216	$2,775	$26,836
Stop Gap	$787,791	$101,942	$182,827	$102,729	$54,811	$1,074,345	$197,145	$395,333	$202,883	$102,910	---
Deferred Maintenance	17,246,841	18,670,024	23,263,836	26,667,531	30,362,980	33,305,659	36,081,844	40,491,255	43,461,327	47,474,852	---
Surplus PM	$30	$63	$39	$2	$290	$465	$0	$166	$325	$0	---
PCI	49	46	43	40	38	36	35	33	32	31	

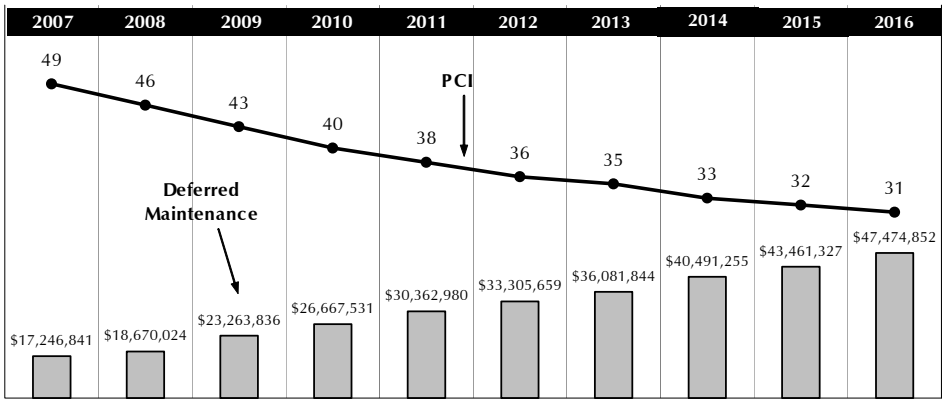


Figure 6.2.9
Scenario 2 - Current Service Level
Road Condition and Backlog

Table 6.2.8
Scenario 3 - Increase Service Level
Achieve Satisfactory Road Condition
PCI 65 by 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$2,100,000	$21,000,000
Rehabilitation	$2,078,929	$2,076,275	$2,078,781	$2,072,781	$2,068,953	$2,066,635	$2,053,469	$2,075,971	$2,064,557	$2,049,602	$20,685,953
Preventive Maintenance	$0	$0	$0	$0	$18,132	$0	$0	$0	$0	$50,385	$68,517
Stop Gap	$623,797	$67,183	$149,470	$69,650	$12,896	$540,041	$73,974	$131,248	$63,417	$0	---
Deferred Maintenance	15,417,882	15,082,629	17,862,269	19,481,269	21,502,495	23,086,521	23,572,072	24,097,384	24,191,551	24,038,959	---
Surplus PM	$0	$0	$0	$0	$20	$0	$0	$0	$0	$13	---
PCI	55	59	60	60	60	60	61	63	63	65	

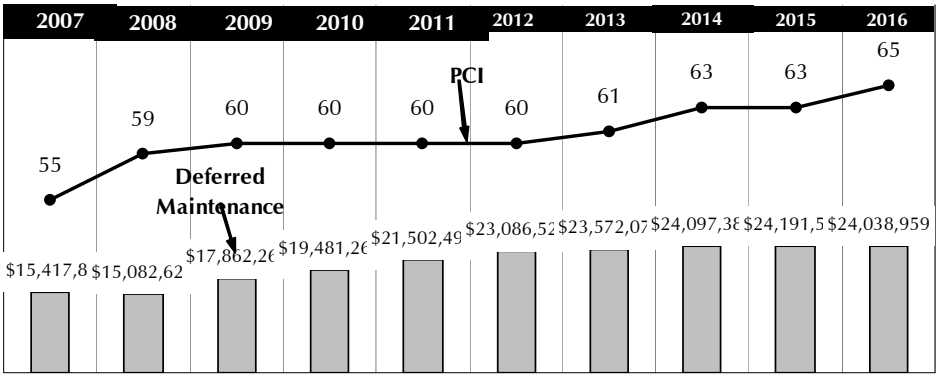


Figure 6.2.10
Scenario 3 - Increase Service Level
Road Condition and Resulting Backlog

Table 6.2.9
Scenario 4 – Increase Service Level
Achieve Good Road Condition
PCI 70 by 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$2,600,000	$26,000,000
Rehabilitation	$2,572,949	$2,565,687	$2,571,888	$2,552,019	$2,545,961	$2,572,579	$2,548,153	$2,551,580	$2,558,812	$2,566,583	$25,606,211
Preventive Maintenance	$0	$0	$0	$0	$49,073	$0	$0	$0	$6,862	$33,175	$89,110
Stop Gap	$568,749	$52,659	$132,290	$58,095	$4,882	$482,038	$53,425	$101,661	$34,324	$0	---
Deferred Maintenance	14,923,862	14,074,496	16,597,519	17,674,519	19,097,860	20,019,313	19,613,116	19,450,535	18,767,400	18,073,256	---
Surplus PM	$0	$0	$0	$0	$84	$0	$0	$0	$1	$243	---
PCI	57	61	62	62	63	64	65	67	68	70	

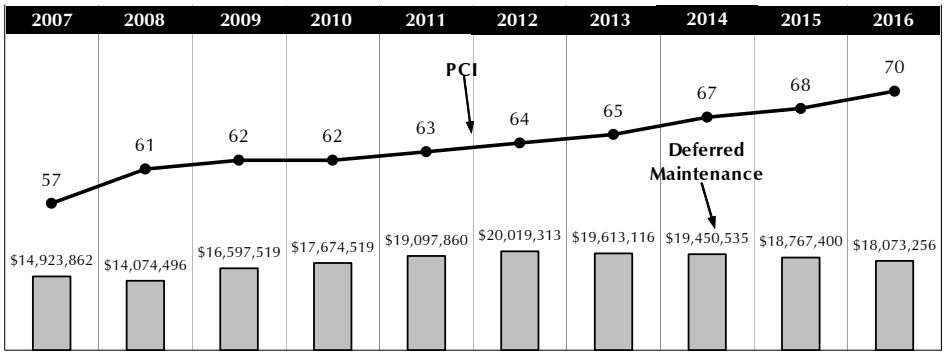


Figure 6.2.11
Scenario 4 – Increase Service Level
Road Condition and Resulting Backlog

Table 6.2.10
Scenario 5 —Zero Funding / Do Nothing
Decrease Road Condition to Poor
PCI 25 by 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Rehabilitation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Preventive Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stop Gap	$796,767	$110,349	$186,915	$109,092	$66,271	$1,104,538	$216,544	$408,202	$233,546	$140,370	---
Deferred Maintenance	17,496,811	19,070,949	23,745,753	27,247,362	31,431,890	35,281,000	38,496,977	42,829,302	45,390,725	50,374,883	---
Surplus PM	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	---
PCI	48	45	41	38	35	33	31	29	27	25	

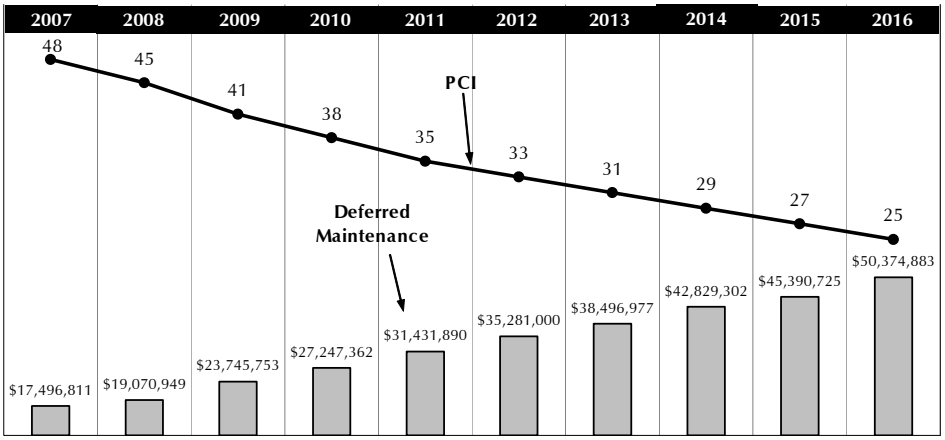


Figure 6.2.12
Scenario 5 —Zero Funding / Do Nothing
Decrease Road Condition to Poor
PCI 25 by 2016

6.2.10 Summary of Future Costs for Road Management

The five scenarios show pavement condition in 2016 given funding levels. Without new funding, by 2016, Tillamook's road network will decline to a pavement condition of 25 PCI or Very Poor condition.

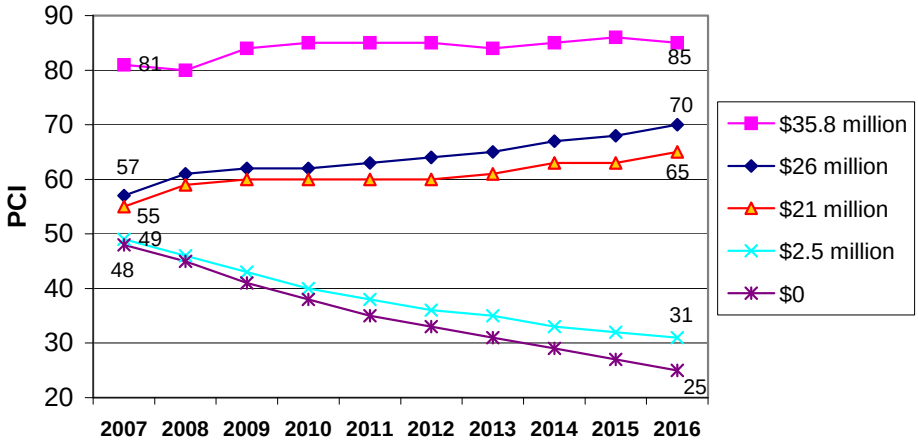


Figure 6.2.13 Pavement Condition and Expenditures Over Ten Years

Table 6.2.11 shows the next 10 years of county road network needs assuming an improvement of road condition to optimal condition, or 80 PCI. In this unconstrained scenario, there is no deferred maintenance; the road program would focus on preventive maintenance after investment in roads that need rehabilitation and reconstruction. Costs are based on the assumed 2007 road condition and the Pavement Management System modeling.

Table 6.2.11 Ten Year Road Needs – Unconstrained

Fiscal Years	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
PCI with Treatment	81	80	84	85	85	85	84	85	86	85
PCI no Treatment	48	45	41	38	35	33	31	29	27	25
Budget Needs	$17,496,811	$2,575,165	$5,440,938	$2,739,909	$1,339,796	$892,609	$432,728	$1,852,680	$2,054,784	$989,598
Preventive Maintenance	$479,284	$82,957	$65,971	$23,001	$29,391	$103,200	$96,112	$1,576,731	$1,903,902	$646,663
Rehabilitation	$17,017,527	$2,492,208	$5,374,967	$2,716,908	$1,310,405	$789,408	$336,616	$275,949	$150,882	$342,935
Deferred Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

The following figure adds routine maintenance to this scenario.

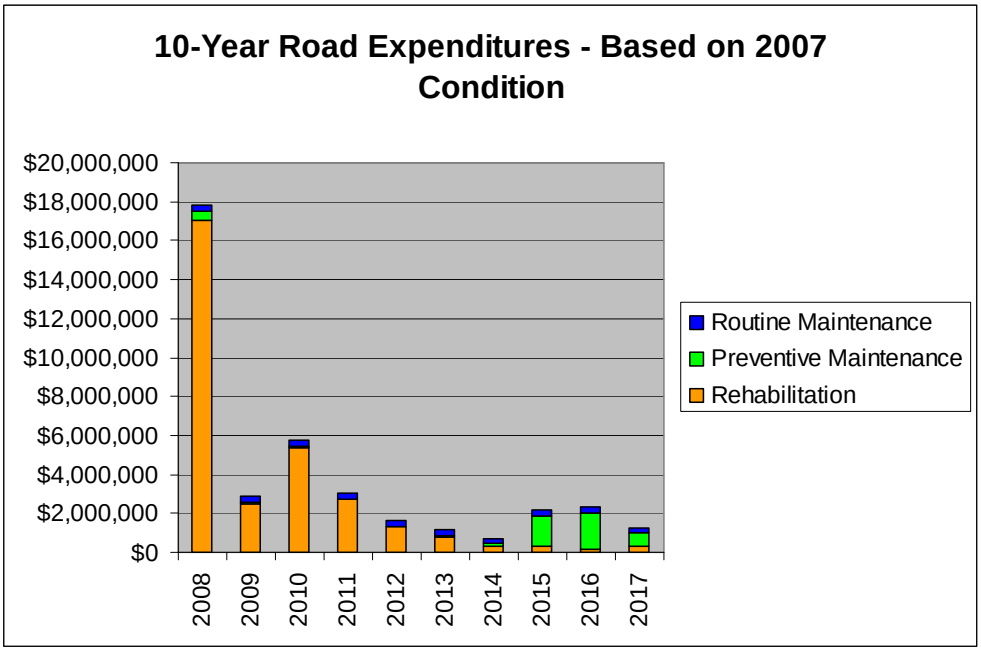


Figure 6.2.14 Future Costs to Achieve Optimal Road Condition by 2017

The pavement management program's predictive module identifies that $35.8 million is needed over the next ten years. The majority of needs are on County collectors roads.

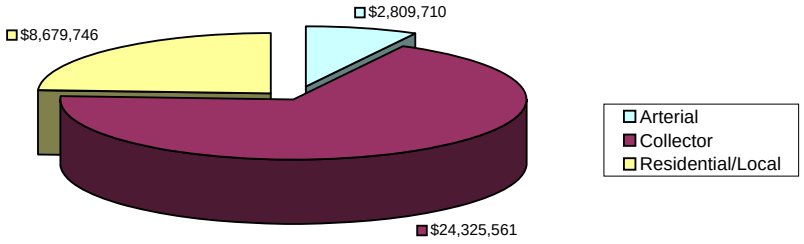


Figure 6.2.14 Ten Year Budget Needs by Functional Classification

6.3 Structures Lifecycle Plan

6.3.1 Goal and Objectives

County road structures ensure safe and continuous use of the road network.

6.3.2 Background Information

a) Issues

Key County structure issues include:

- The need to better understand the condition, performance and value of County levees.
- Better knowledge of future bridge and levee renewals and their timing; 25% of the county's bridges have timber in their main span. The useful life of timber bridges is 30 years[62].
- Finding adequate funding to address known bridge and guardrail maintenance and renewal needs.
- The loss of the Salmonberry railroad and subsequent increased truck traffic on county bridges and roads is a current and future risk to county bridges.
- The frequency and intensity of weather-related events and continued under-funding of road network needs are considered a risk to county bridges, levees and guardrails.
- Continued under-funding of bridge, levee and guardrail needs will impact the condition and performance of the county structures.

b) Asset Description

Tillamook County is responsible for managing the bridges, levees and guardrails associated with county owned and maintained roads. The value of County's 96 bridges was $34 million in 2007. There are just over 10 miles of guardrail valued at $1.2 million. Two levees (McDonald Dike and McKinster Road Dike) support county roadways. Their value is unknown.

Table 6.3.1 County Structures Inventory & Value - 2007

Structure Type	Number	Replacement Value
Bridges	96	$33,619,008
Guardrail	10 miles	$ 1,152,385
Levees	2	Unknown

c) Data Management

There are three sources of information on county structures. Bridge and guardrail inventory and condition information is maintained in IRIS. In addition, detailed bridge inspection reports are submitted by a contractor to TCPW. An Excel spreadsheet tracks bridge inventory and condition information. No information on levees is entered in IRIS, or other structures database.

[62] *Status & Condition Report*, Portland Transportation, July 2006

e) Age
Bridge age is graphed below.

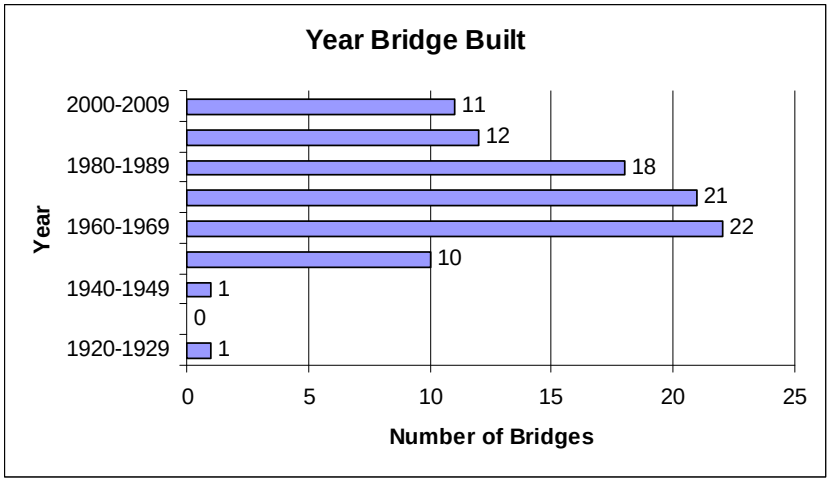


Figure 6.3.1 Bridge Age

Eighty-eight percent of county bridges are over 45 years old. Eleven percent of bridges have been replaced since 2000; 6 bridge renewal and replacement projects have been funded with OTIA III state funds since 2003.

There is no age related information on county guardrails or levees.

While Tillamook County has not estimated the useful life of county road assets, assumptions for scheduling renewal could utilize assumptions used by other Pacific Northwest local agencies. Following are useful life assumptions used by the City of Portland.

Table 6.3.2 Structure Asset Useful Life[63]

Asset Group	Useful Life
Bridges	
Timber bridges, treated	30 years
Steel bridges	65 years
Reinforced concrete bridges	80 years
Pre-stressed concrete bridges	100 years
Guardrail	40 years

In 2006, 66 percent of county bridges are in good condition, nearly one-third (27%) are in fair and 7 percent are in poor condition.

[63] *Status & Condition Report*, Portland Transportation, July 2006

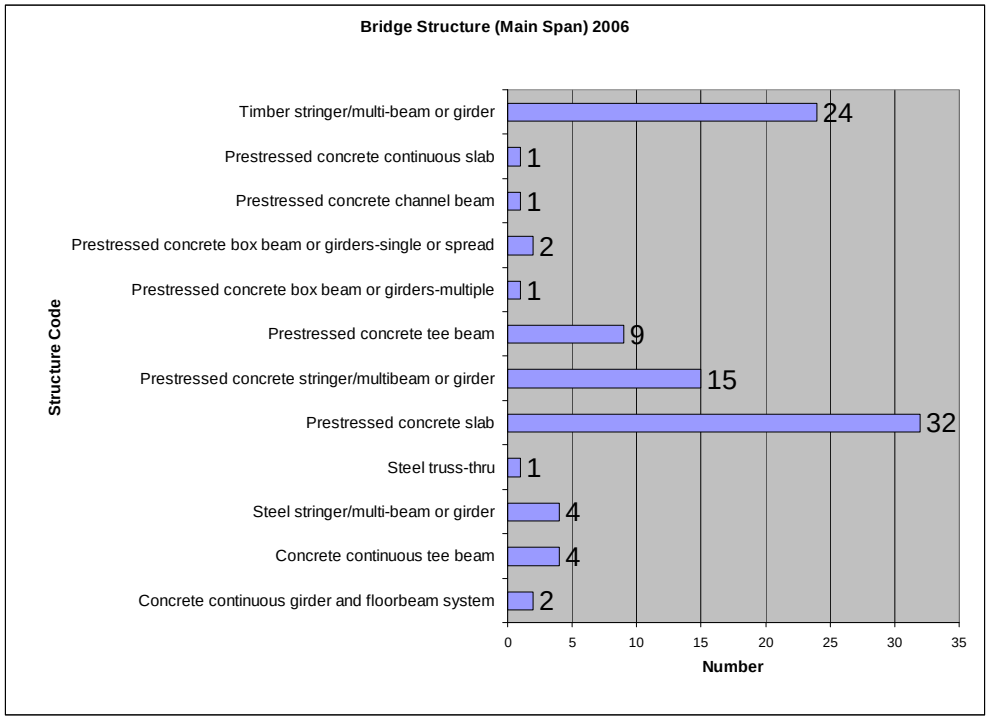


Figure 6.3.2 Bridges by Type - 2006

The majority of county bridges have concrete main spans. There are 24 (25%) bridges with timber in their main spans.

f) Bridge Condition & Performance

Bridge sufficiency ratings are used to indicate a bridge's condition based on structural adequacy and safety, reduction of load capacity, serviceability and functional obsolescence (roadway width, and vertical clearance), essentiality for pubic usage, and special reductions (detour length).

A rating of 75 or above is considered good, 50 to 75 is fair and below 50 is poor. It does not indicate the ability of a bridge to carry traffic loads or whether it will collapse but rather which bridges may need repair or replacement. Federal funding is made available for maintenance, rehabilitation or replacement of bridges based on a bridges sufficiency rating. States annually submit required ratings to the Federal Highway Administration (FHWA). Replacement funding requires a rating of 50 or less, while rehabilitation funding for bridges is allocated based on a sufficiency rating of 80 or less.

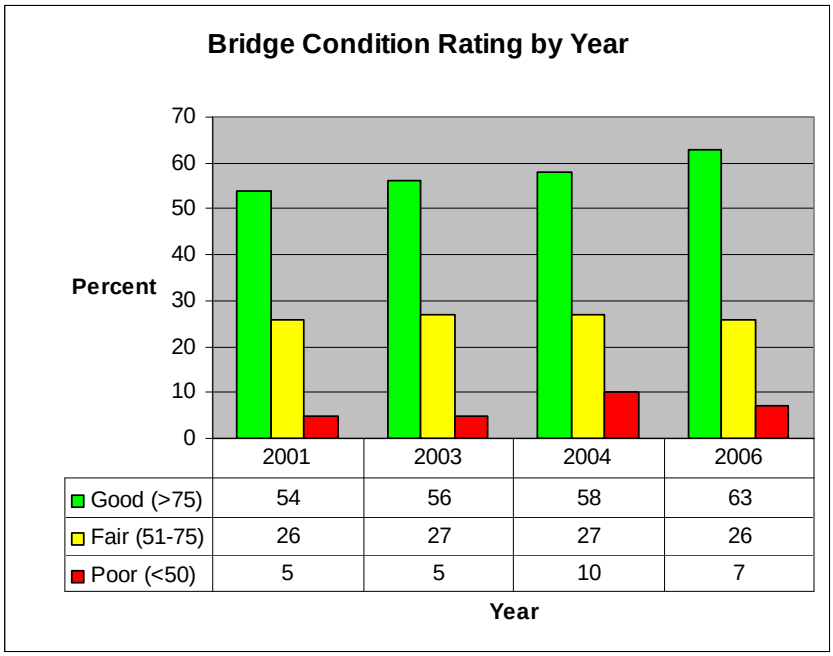


Figure 6.3.3 Bridge Condition 2001-2006

There are approximately 10 miles of guardrail protecting the roadway in Tillamook County. Guardrail condition was assessed in 2007. The Oregon Standardized Drawings were the basis of the five-point condition assessment.

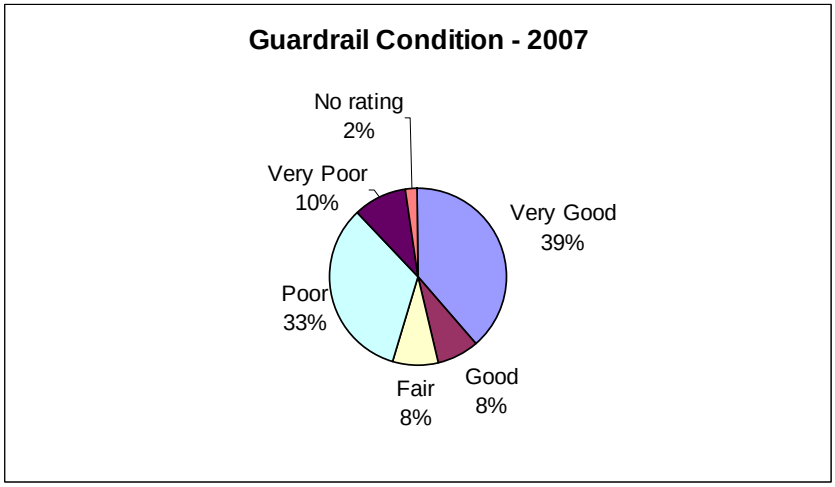


Figure 6.3.4 Guardrail Condition - 2007

Forty-three (43) percent, or approximately 4.3 miles of the County's 10.1 miles of guardrails are in Very Poor or Poor condition.

g) Historic Expenditures

Based on information in the IRIS Cost Accounting system, the majority of expenditures over the previous three years have been in bridge repair and replacement. Bridge maintenance and repair expenses are difficult to predict and usually expensive when needed.

Table 6.3.3 Structures Expenditures - 2005-2007

	2005	2006	2007
1130 - Guard Rail	$4,975.01	$5,050.74	$7,890.95
1131 - Fencing	$53.23	$590.72	$257.64
1201 - Brushing	$3,199.04	$8,433.76	$2,029.74
1202 - Debris Removal	$229.72	$5,924.92	$557.64
1204 - Cleaning	$1,727.48	$11,020.82	$8,233.33
1205 - Approach Guardrail Repair	$9,879.63	$2,676.81	$2,595.82
1206 - Inspections	$6,394.75	$2,047.32	$11,528.99
1207 - Approach Repair	$11,125.27	$357.41	$470.25
1210 - Repair Structure - Wood	$486.89	$0.00	$299.30
1211 - Repair Structure - Concrete	$522.55	$0.00	$418,415.20
1220 - Replace Structure - All Types	$414.76	$2,101,102.78	$1,344,880.50
Total	**$39,008.33**	**$2,137,205.28**	**$1,797,159.36**

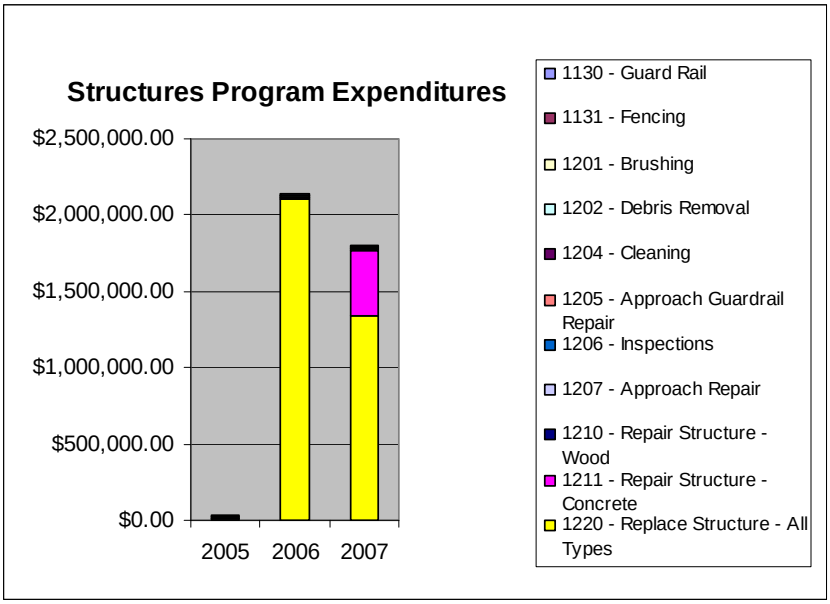


Figure 6.3.5 Structures Program Expenditures 2005-2007

The majority of structures program expenditures focus on county bridge repair and replacement. Damage to structures, including levees, is usually weather or storm related. The most recent storms in 2006 and 2007 have dramatically affected the county bridges, levees and guardrail needs.

6.3.3 Lifecycle Management Tactics

a) Inspection Method & Data Confidence

Bridge condition is assessed every other year. Guardrail condition was assessed in 2007. There is a high confidence in bridge and guardrail inventory and condition data. The County's two levees were inspected following the December 2007 hurricane. On-going inspection cycles are not established for guardrail and levees.

b) Maintenance and Renewal Decision Making

Efforts to assess the best way to manage the County's risks associated with its bridges, levees and guardrail structures management are in the beginning stages of development. Following is an initial assessment of failures modes, how important or critical each asset class is to the traveling public, and what criteria are being used to judge the current risk. [64]

Table 6.3.3 Structures Priority Risk Assessment

Asset Type	Risks	Criticality	Failure Modes				Failure Criteria		Current Risk
			Condition	Capacity	Performance	Obsolescence	Level of Service	Economic	
Bridges	B-1	H	Yes				Condition deteriorates to point of asset failure under normal traffic loading	Maintenance costs exceed renewal costs. Road user costs.	M
	B-2	H	Yes		Yes		Lifeline failure during natural disaster event or restricted use	Risk exposure costs exceed mitigation costs. Road user costs.	H
	B-3	M		Yes	Yes		Restrictions on load/ dimensional attributes	Road user costs	M
Guardrails	G-1	M	Yes				Condition deteriorates to point of asset failure.	Maintenance costs exceed renewal costs. Road user costs.	L
Levees	L-1	H			Yes		Land erosion and embankment. Safety risk		M

[64] Optimized criteria and process from North Shore City *Transport Asset Management Plan*, 2005

Based on the above assessment, the following strategies are proposed to manage these risks. Intervention strategies should be included in a Tillamook County risk register, a listing of risks and strategies to manage them. Progress on managing identified risk and the resources required should be presented in on-going reports to CRAC and the County Board and budget requests.

Table 6.3.4 Structures Risk Impact on Community and Mitigation Actions

Risk	Community Impacts Economic (Ec) Social (S) Environmental (Env)	Current Risk	Future Risk	Action
B-1-Bridge Condition	Ec, S, Env	M	M	Inspect bridges Apply for grant funding for structural repair & replacement Inform community of risk
B-2 Bridge lifeline failure due to natural disaster	Ec. S, Env	H	H	Monitor structures on lifeline route
B-3 Weight limited bridges	Ec, S	L	M	Inspect bridges every other year Post weight limits where needed
G-1 Guardrail condition	Ec, S	L	M	Identify critical guardrail needs Identify grant funding to replace to standard
L-1 Levee performance	Ec, S, Env	M	M	Inspect levees annually and after storm events

Criticality & Risk
L = Low
M = Medium
H = High

c) Maintenance and Renewal Strategy

As described above, bridge condition is rated every other year. A bridge's sufficiency rating affects its eligibility for federal funding for maintenance, rehabilitation, or replacement activities. Bridge inspection reports note bridge maintenance needs.

As stated in the *Draft Transportation System Plan*, bridge improvement projects on county bridges should be considered including bridges with:

- sufficiency ratings are less than 50
- weight-restricted limits
- weight-restricted bridges should be considered for Improvement projects
- Phase 1 and Phase 2 seismic retrofit projects for bridges in Tillamook County are recommended in the *Prioritization of Oregon Bridges for Seismic Retrofit Report completed in 1997.*
- Documented maintenance needs from bridge inspection reports
- As funding is found, those bridge projects are listed in corridor plans and STIP project lists

In 2006, the most recent year for bridge inspections, there were 7 bridges in poor condition; the Wyss Bridge was scheduled for repair in 2007. By Board Order, Hushbeck, Prince (Blum Lane) and Foley Creek bridges have posted signs limiting weight loads.

Table 6.3.5 Bridges in Poor Condition in 2006 (less than 50 sufficiency rating)

BRIDGE NAME (less than 50 sufficiency rating)	SUFFICIENCY RATE 2006
WYSS	35.0
LOMMEN OVERPASS	44.2
TRASK RIVER, SO. FK.	45.0
JOHNSON (TRASK)	45.9
HUSHBECK	46.1
FAGAN	48.5
PRINCE (BLUM LANE)	49.8

The 2001 Oregon legislature approved a statewide bond measure, the Oregon Transportation Investment Act (OTIA), which provides funding for state, county and city bridge replacement. Tillamook bridges repaired or replaced using these funds are:

- Johnson Bridge
- East Creek Bridge on Moon Creek Road
- Sorenson Bridge
- Bewley Creek Bridge on Bewley Creek Road
- Josi Bridge on Kansan Creek Road
- Killam Creek Bridge on South Prairie Road

d) New Assets
The county relies on external funding (grants and developers) to provide new assets. There is no capital plan to add new county structures (bridges, levees or guardrails). As new subdivisions occur within the county, it is assumed new structure assets will be required, and will be built according to the "Tillamook County Road Construction Plan Standards[65]

6.3.4 Summary of Future Costs
Future bridge, levee and guardrail renewal expenditures are difficult to predict. The availability of state funds for county road needs (i.e., OTIA III-funded projects) is unusual.

If guardrails in Poor/Very Poor condition were replaced, this would require $495,526.

Levees have not received prior budget allocations. However, based on the risk to the economy, the community and the environmental impact were either levee to fail, and given the recent severity of the 2006 and 2007 weather events, there is acknowledgement that county levee maintenance and renewal is needed.

[65] See Appendix C.

6.4 Traffic Safety

6.4.1 Goal and Objectives

The purpose of the traffic safety activities is to protect the motoring public by providing quality traffic control devices (signs & delineation) and striping. This is accomplished by providing the public with signage and striping that meet at least the minimum standard required by federal, state and county regulations. Signs and delineators serve a variety of functions, including:

- Providing the motoring public with regulatory instructions which they are required to obey
- Warning travelers of temporary or permanent hazards
- Providing street name, and guide signs which identify where the traveler is or where sites are located

6.4.2 Background Information

a) Issues

- Most sign legends are produced by TCPW Traffic Safety staff. However, the lack of adequate computer and plotter make sign production somewhat difficult. While sign legend manufacturing can be contracted, this adds time and costs to the process.
- MUTCD mandates that agencies begin a retroreflectivity program by February 2008.
- The recent departure of the Traffic Safety technician presents a short term challenge to ongoing sign and marking management.

b) Asset Description

Tillamook County manages sign inventory with a 2007 replacement value of $254,208.

Table 6.4.1 Traffic Safety Inventory and Value - 2007

Asset	Units	Unit Cost	Replacement Value
Signs	4,807	$30	$144,210
Delineators	659	$18	$11,862
Posts	5,452	$18	$98,136
Total Replacement Value			**$254,208**

The number of posts exceeds signs because at times more than one post is needed to support a sign.

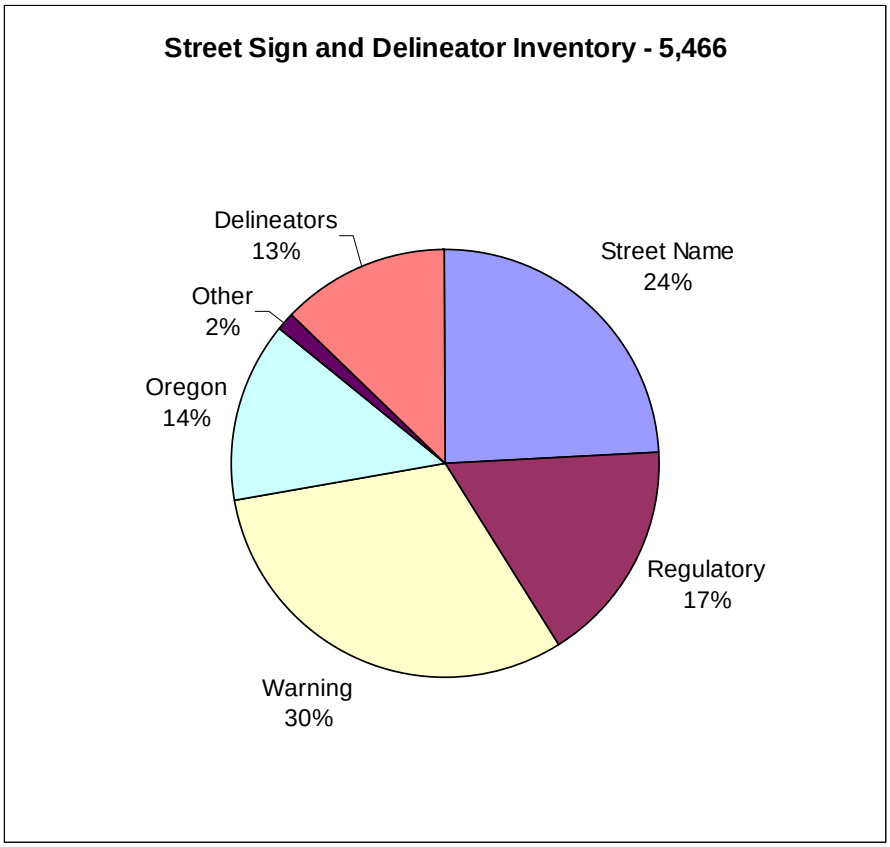


Figure 6.4.1 Sign Inventory by Type

Regulatory signs (including stop and parking signs) make up 17% of all signs, while street name or destination signs represent 24% of the county sign inventory. There is one County owned and maintained signal located in Pacific City.

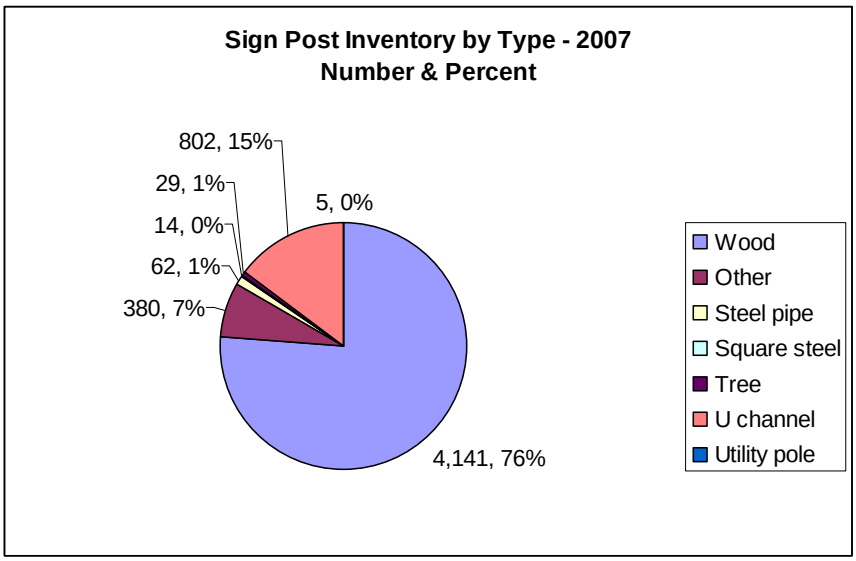


Figure 6.4.2 Sign Posts by Type 2007

Three-fourths of the 5,452 sign posts are wooden.

c) Data Management

A signs and delineators database is maintained by Tillamook County in the Integrated Road Information System (IRIS). The TCPW Traffic Safety manager and administrative staff update information. The database includes:

- sign location (milepost)
- MUTCD legend
- Orientation
- placement on the road,
- sign height
- width
- legend color
- post type
- length
- the sign height on post
- material type
- number of posts
- sign condition
- sign performance - reflectivity condition

d) Age

The exact age of each sign is unknown. The assumed useful life of a sign is 7 years. The manufacturer identifies a 20 year service life for roadside delineators. The assumed useful life of sign mounts is 10-30 years and varies by material.[66]

Table 6.4.2 Traffic Safety Asset Useful Life

Asset	Useful Life
Signs	7 years
Signs-delineators	20 years
Posts	10-30 years
Painted pavement markings	6 months – 1 year

d) Condition & Performance

Table 6.4.3 Sign Condition & Performance

Category	Condition		Reflectivity	
Very Good (1)	4,399	92%	484	87%
Good (2)	355	7%	18	3%
Fair (3)	44	1%	5	1%
Poor (4)	9	0%	50	9%
Subtotal	**4,807**	**100%**	**557**	**100%**
No information	668		110	

[66] *International Infrastructure Management Manual,* New Zealand 2006; City of Portland assumes a 20 year useful life for sign mounts.

Reflectivity thresholds are judged using nighttime visual inspection and use the same four-point scale. No technical reflectivity measure is used. Only 10% of the sign inventory in IRIS has a documented reflectivity rating. Of the 557 signs with a reflectivity condition rating, 73% are Very Good.

The majority of signs are in good physical condition. For the 4,807 signs with condition ratings in IRIS, 92% are in Very Good condition.

e) Historical Expenditures

The County spent $232,000 on the Traffic Safety program in 2007. Over half of the program's expenditures (58%) were used to re-stripe County roads and anther 6% on other pavement markings (stop bars, e.g.). Nearly one-third (27%) was expended maintaining County signs. The County spent $16,000 in 2007 responding to vandalism.

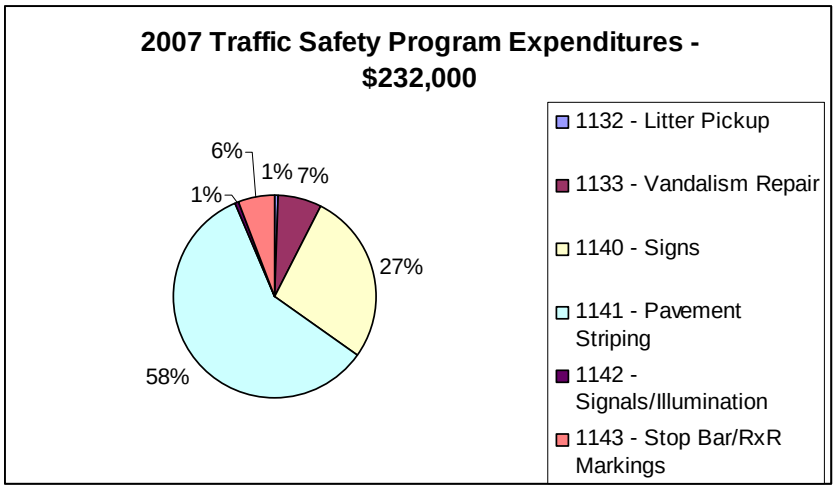


Figure 6.4.3 Traffic Safety Program Expenditures - 2007

Table 6.4.4 Traffic Safety Expenditures 2005-2007

	2005	2006	2007
1132 - Litter Pickup	$1,779.39	$2,873.60	$1,160.48
1133 - Vandalism Repair	$10,257.54	$17,070.65	$15,990.08
1140 - Signs	$64,532.52	$67,060.62	$63,548.99
1141 - Pavement Striping	$111,240.97	$116,852.58	$136,180.03
1142 - Signals/Illumination	$1,154.04	$1,368.10	$1,267.23
1143 - Stop Bar/RxR Markings	$11,800.23	$25,264.51	$13,847.96
Total	**$200,764.69**	**$230,490.06**	**$231,994.77**

Between 2005 and 2007, Traffic Safety program expenditures increased 15%, from $201,000 to $232,000.

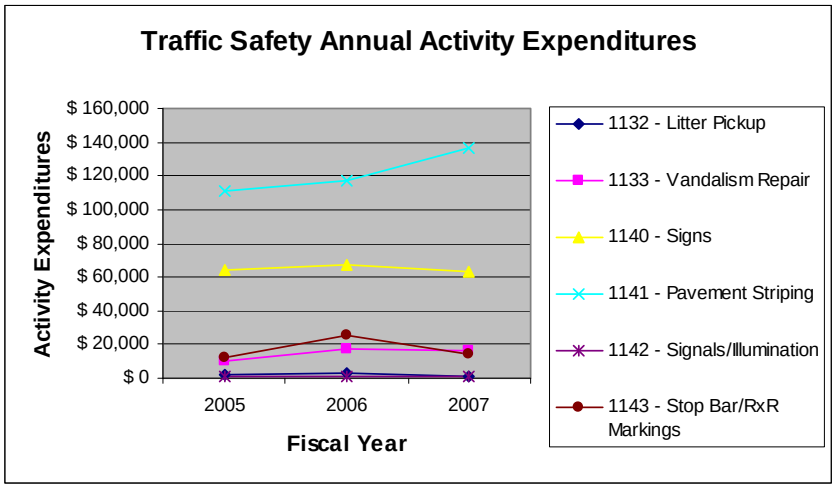


Figure 6.4.4 Traffic Safety Program Expenditures 2005-2007

The most significant increase in Traffic Safety activity expenses between 2005 and 2007 were pavement re-striping contract expenses. Pavement striping costs increased 22% over this three year period.

6.4.4 Management Tactics

a) Inspection and Renewal Cycle

Signs, delineators and pavement markings are designed to meet the federal Manual on Uniform Traffic Control Devices (MUTCD), the "Sign Policy and Guidelines for the Oregon State Highway System", and Tillamook County's "Road Construction Plan Standards", updated March 2007.

Sign inspection occurs on an on-going basis. Routes are driven throughout the county and maintenance needs noted. Repair occurs as a product of driving County roads, making a list of needed maintenance and repairs, or in response to service requests. Sign retroreflectivity is inspected at night once per year. This activity takes approximately 1 to 1 ½ weeks. North facing signs are washed once every other year.

Response times for sign service requests are:

- Stop signs/hazards – immediately
- Other regulatory signs (e.g., sharp turn) – next duty day
- Graffiti – immediately

Striping is contracted out. Oil-based paint is used to re-stripe each county paved road annually. Marion County acts as contractor and spends approximately 15 days per year in July re-striping Tillamook County's roads. There is no pavement marking inventory within IRIS; the Traffic Safety manager has developed a map for re-striping.

Stop bars are maintained by the county. These are re-painted annually using water-based paint. This activity takes one month each year to complete.

b) Maintenance and Renewal Decision Making

Sign and road markings management considers maintenance, renewal and new assets needs. How a sign fails and how critical a sign is to protect the traveling public are part of the decision process.

Currently, sign condition and reflectivity is assessed and the risks associated with signs incorporated into response timing, as noted above.

Two failure modes are judged:

- sign condition (condition falls below threshold level where continued maintenance costs exceed renewal or replacement costs) and
- sign performance (visibility or reflectivity sufficient to ensure the traveling public's safety).

Information on sign condition and reflectivity are recorded in IRIS. Condition thresholds are judged through visual inspection and a four-point scale assigned to each sign. The risk associated with sign type, or criticality, is reflected in how quickly sign needs are addressed, as described above in the service response standards.

c) New Traffic Safety Assets

New signs and markings are installed as a part of on-going assessment of traffic safety needs. These costs are currently not segregated from on-going maintenance and renewal of the existing inventory. As new development permits are issued requirements are made to comply with the Tillamook County "Road Construction Plan Standards."

6.4.5 Future Costs

A 10-year financial forecast of sign maintenance and renewal needs assumes:

- A seven year replacement cycle for street signs
- A 20-year replacement cycle for delineators
- A 20 year useful life for posts[67]
- One traffic safety technician to maintain and replace signs

Future costs are shown below.

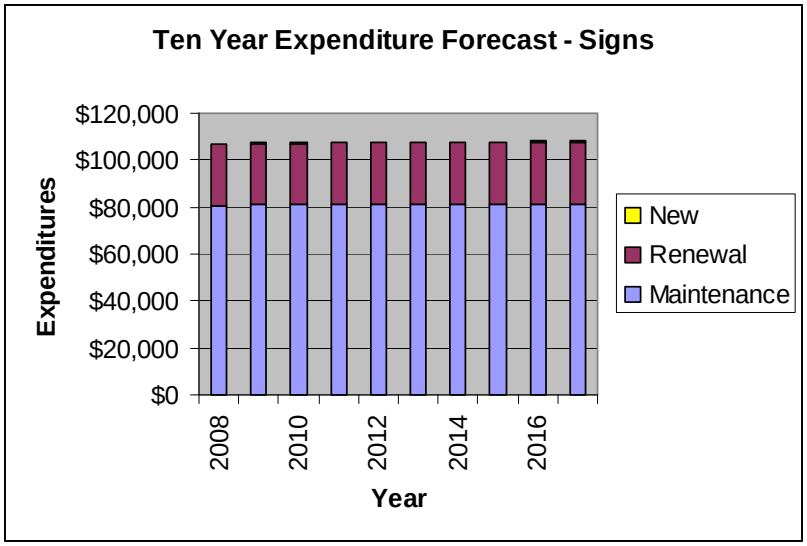


Figure 6.4.5 Ten Year Financial Forecast - Signs

Approximately $108,000 is needed each year to maintain and replace Tillamook County signs on a schedule that supports industry standards. This assumes a 1% growth rate in the number of signs and maintenance needed to care for them and does not include inflation.

The forecast for pavement marking maintenance and renewal expenditures are based on the recent historical 3-year cost trends 2005-2007.

[67] *International Infrastructure Management Manual,* NAMS, New Zealand, 2006

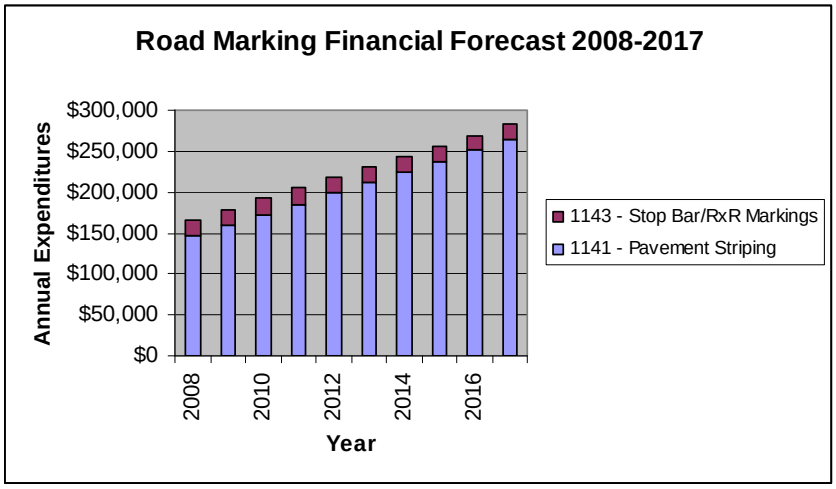


Figure 6.4.6 Ten Year Expenditure Forecast – Road Markings

Based on the most recent three-year expenditures for annually re-painting the county's road markings, expenditures will increase from $150,000 to $282,000 annually over the next ten years.

6.5 Drainage Management

6.5.1 Goal and Objectives

The purpose of the drainage management is

- to provide and maintain adequate road drainage in order to prevent water damage to the roadway structure,
- to maximize the use of the county road network,
- and to protect the rights of adjoining property, and
- to provide fish passage where mandated.

This is accomplished by providing vegetated ditches that serve as drainage and water quality facilities, culverts in the condition necessary to handle their design capacity, and where culverts carry streams, in a condition to provide fish passage.

The program includes:

- Culvert and catch basin cleaning, culvert replacement and ditching.
- Erosion control using best management practices with regards to steep slopes, drainage ways and permitted activities.

6.5.2 Background Information

a) Issues

- A detailed inventory of county culverts has not been maintained; there is no inventory of county catch basins.
- There is currently no comprehensive program to maintain culverts. Their condition is unknown.
- There is no inventory of county ditches. Consideration should be given to adding a video log of county ditches to the contract that assesses pavement condition every two years as is done by Clatsop County.
- The decline of TCPW employees has resulted in the elimination of a comprehensive ditching program for county roads. Currently, ditching occurs on a reactive basis only.
- Drainage asset maintenance (culverts and ditches) is considered an extreme risk given the wet environment, severe weather events in 2006 and 2007 and lack of a comprehensive inventory or condition assessment program.

b) Asset Description

Culverts can be constructed of metal, concrete, or corrugated polyethylene; their purpose is to carry water under a roadway or roadway approach. There are an estimated 3,210 culverts in the county with a combined length of 124,577 feet, or almost 24 miles of culverts associated with draining Tillamook County roads and their approaches. [68] Of these, 1,860 are classified as cross culverts which act as conduits that move water under the roadway. Based on a review of information in IRIS, the average length of a county culvert is 39 feet; 291 culverts (9%) have no information on length. The confidence in culvert inventory has not been established but is considered low.

[68] Integrated Road Information System (IRIS)

New culverts installed as a part of new development must comply with the Tillamook County "Road Construction Plan Standards."[69] These specify that culverts crossing under roadways be at least 18" diameter. Culverts under road approaches must be at least 12" diameter and between 20-30 feet long. Larger diameters may be required if large run-off flows are anticipated. Public Works may require adequate calculations to show that a new or replacement culvert size/design will adequately carry surface drainage flow through the culvert based on a minimum 100 year flood event.

It is estimated that 90% of county roads have ditches on either side.[70] Using this assumption, there are 668 miles of ditches along county roads. The county's ditch standard[71] requires a ditch depth of 3:1 width, with a width of 5 feet required.

Table 6.5.1 Drainage Asset Inventory

Culverts	3,290
Ditches	668 miles

c) Data Management

A culvert inventory exists in the Integrated Road Information System (IRIS). The inventory of culverts is considered incomplete. The location and length of 91% of culverts are noted in IRIS. IRIS has catch basin and ditches inventory and maintenance data management modules; however there is no information for these county assets in IRIS.

Previous efforts to prioritize culvert repair and replacement in 2003 are not considered accurate given changes that have occurred to culvert condition and performance since this assessment. Tillamook County has a wet climate (an average of 90 inches per year), and has experienced dramatic weather events in 2006 and 2007. These wet conditions and severe weather events would dramatically impact the condition of county road culverts and ditches.

There is no inventory of catch basis or ditches in IRIS.

d) Age

[69] See Appendix C.
[70] TCPW Director, May 29, 2008
[71] "Standard Roadway Section," which reflects standards of the American Association of State Highways and Transportation Officials (AASHTO) Manual

The estimated useful life of culverts is 50-100 years.[72] While there is no information on the age of culverts, it can be assumed that they were built at the same time as the roadway. Eighty-three percent of county roads are older than 50 years.

e) Culvert Condition Assessment

There is no current condition assessment of the county's culverts. IRIS contains a Culvert Maintenance module which tracks:

- Location
- Material
- Placement (side of road)
- San/Width
- Length
- Maintenance action
- Culvert condition
- Inlet and outlet condition and flow
- Inlet and outlet basin

Clatsop County's culvert maintenance report also notes whether the culvert is designated for Oregon Department of Fish and Wildlife (ODFW) fish passage.

Culverts in Tillamook County's three service districts were inspected and prioritized in 2003. [73] TCPW staff used a 3-point priority system (1-high, 2-medium, 3-low) to identify culvert replacement needs. Culverts classified as high priority were looked at first for replacement, medium culvert priorities were to be replaced when possible, and low priority culverts were to be replaced in 2-3 years. Priority 2 and 3 culvert projects were to seek fish passage grant funds.

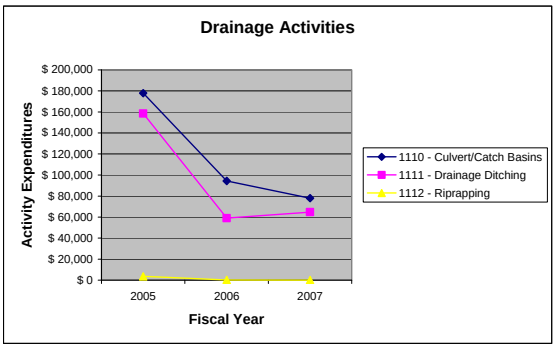
TCPW engineering staff participated in a 2002-2004 compilation and prioritization of existing data on culverts located in the Nestucca Watershed. The purpose was to identify high and medium priority fish passage barriers and replacement strategies. The Bureau of Land Management compiled existing information on culverts in the Nestucca Watershed and inspected stream crossings. Data was merged with an existing U.S. Forest Service database resulting in 582 culverts for the Nestucca Watershed. This process cannot be considered a complete assessment of the County's culverts or their current condition.

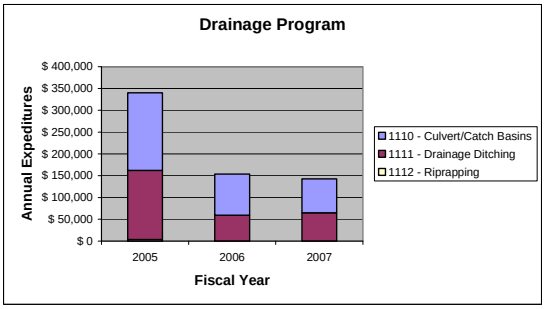
Roadside ditches are only maintained on a reactive basis. There is no condition assessment of ditches.

[72] *International Infrastructure Management Manual*, 2006
[73] CRAC meeting minutes from October 3, 2003.

f) Drainage Historic Expenditures

Activities	Drainage Program Expenditures by Fiscal Year 2005	2006	2007
1110 - Culvert/Catch Basins	$177,899.12	$94,421.18	$77,921.83
1111 - Drainage Ditching	$158,528.17	$58,913.08	$64,678.11
1112 - Riprapping	$3,606.77	$155.38	$0.00
Total	**$340,034.06**	**$153,489.64**	**$142,599.94**





Drainage management expenditures decreased 58% between 2005 and 2007, from $340,000 to $143,000 annually.

6.5.3 Management Tactics

a) Optimized Decision Making

This process considers the best management decisions for maintenance, renewal and new drainage assets considering the tradeoffs between costs, risks and benefits to the community. Efforts are underway to improve the way the County assesses risks associated with its culverts, catch basins and ditches. Following is an initial assessment of failures modes, how critical each asset class is to the traveling public, and criteria used to judge the current risk. [74] This process can be used for targeting program resources and communicating the road drainage needs and priorities.

Table 6.5.1 Drainage Priority Risk Assessment

Asset Type	Risks	Criticality	Failure Modes				Failure Criteria		Current Risk
			Condition	Capacity	Performance	Obsolescence	Level of Service	Economic	
Culverts/ Ditches	C-1	H	Yes				Condition falls below acceptable level	Maintenance costs exceed renewal costs.	M
	C-2	H		Yes	Yes		Flooding delays traffic and impacts adjoining property.	Impact on public and road erosion exceeds culvert renewal costs and ditch maintenance.	H

Criticality & Risk

L = Low
M = Medium
H = High

[74] Modified from criteria and process from North Shore City *Transport Asset Management Plan*, 2005

Based on the above assessment, the following strategies are proposed to manage these risks. Intervention strategies should be included in a Tillamook County risk register, a listing of known risks and strategies to manage them. Progress on managing identified risk and the resources required should be presented in on-going reports to CRAC and the County Board and budget requests.

Table 6.5.2 Drainage Risk Impact on Community and Mitigation Actions

Risk	Community Impacts Economic (Ec) Social (S) Environmental (Env)	Current Risk	Future Risk	Action
C-1-Culvert Condition	Ec, S, Env	M	M	Inventory and mark culverts. Inspect culverts. Apply for grant funding for culvert repair & replacement Inform community of risk.
C-2 Culvert and ditch flooding due to weather events	Ec. S, Env	H	H	Inspect "hotspot" culverts prior to and after heavy rains. Conduct ditching annually in dry season.

Criticality & Risk
L = Low
M = Medium
H = High

b) Inspection, Maintenance and Renewal
There is currently no comprehensive culvert inspection program; the condition of culverts is unknown. Culverts at low-lying areas are inspected following heavy rains or weather events and in response to request. There is no established cycle for rehabilitating or replacing county culverts. Culvert replacement occurs as a part of road improvement projects, as needed.

Ideally, a planned culvert inspection program occurs prior to heavy fall rains, usually in September or October. Minimal manual culvert cleaning is done while more extensive culvert repairs or flushing for plugged culverts is noted. This

activity is done during and after rainy periods so that inlets and outlets are clear from debris and water can flow. Ditch lines can be walked so that culverts can be inspected and debris cleared within 3 feet of the culvert inlet or outlet. The number of culverts inspected and cleaned is noted so that performance and accomplishments can be noted.

Optimally, county roadway ditches should be cleaned annually. Ditches are graded generally during the dry summer months so that the vegetation can be removed, the original flow line defined and adequate roadway and ditch drainage can occur. Currently, Tillamook County ditches are cleaned on a reactive basis.

c) New Assets
Most road drainage work is included in road projects or as a requirement of new development. Culvert repair and replacement can be coordinated with grading activities or pavement improvement project and requires locating existing utilities and planned work.

6.5.4 Future Costs
Current drainage asset age and condition are unknown; and therefore future renewal costs are unknown. A comprehensive culvert inventory and condition assessment is needed to identify their performance. Projection of future costs to maintain and replace county culverts is a future work item.

6.6 Vegetation Management

6.6.1 Goal and Objectives

TCPW performs regularly maintains roadside vegetation, including routine cutting and disposing of trees, brush, berry, and other vines that may become a traffic hazard. This maintenance also provides sight distance safety, drainage and prevents further damage to road surfaces and shoulders.

6.6.2 Background Information

a) Issues

- IRIS's vegetation management module is not used to manage this program.
- TCPW is implementing a more comprehensive vegetation management program. Standard accomplishments, performance criteria and measurement for each activity as well as annual reporting requirements are needed which monitor TCPW workload, effectiveness and efficiency as well as compare these to other western Oregon counties. Costs per lineal mile are needed which compare methods used (e.g., chemical spray used) to determine opportunities for improving efficiency and effectiveness.

b) Asset Description

Vegetation management protects the edge of pavement and water flow in ditches.

c) Data Management

IRIS's Vegetation Management module is not currently used to track this program. A paper-based spreadsheet is currently used and costs tracked in IRIS's Cost Accounting module.

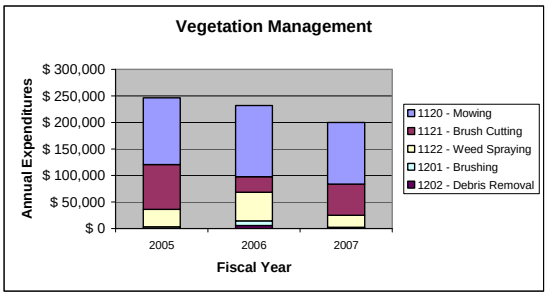
d) Roadside Condition Assessment

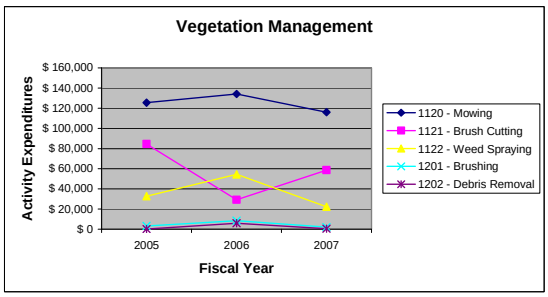
There is currently no assessment of the condition of vegetation at the edge of county roads (e.g., obstructions/hazards, noxious weed inventory, presence of litter, appearance). Levels of service can be established which note the distance of vegetation from the edge of pavement, whether vegetation impedes sight distance, and obstructions in the clear zone to distinguish the level of service and need. Service Requests are not reported by type of complaint at this time.

e) Vegetation Management Historic Expenditures

Vegetation Management Activities

	2005	2006	2007
1120 - Mowing	$125,597.06	$134,118.83	$116,153.60
1121 - Brush Cutting	$84,551.33	$29,188.20	$58,703.45
1122 - Weed Spraying	$32,733.50	$54,417.84	$22,364.24
1201 - Brushing	$3,199.04	$8,433.76	$2,029.74
1202 - Debris Remova	$229.72	$5,924.92	$557.64
Total	**$246,310.65**	**$232,083.55**	**$199,808.67**





Vegetation management expenditures decreased 19%, from approximately $246,000 to approximately $200,000, between 2005 and 2007.

6.6.3 Management Tactics

a) Optimized Decision Making

This process considers the best management decisions for maintenance, renewal and managing county vegetation considering the tradeoffs between costs, risks and benefits to the community. Efforts are underway to improve the way the County managing its roadside vegetation program. Following is an initial assessment of failures modes, how critical each activity is to the traveling public, and criteria used to judge the current risk. [75] This process can be used for targeting program resources and communicating vegetation management needs and priorities.

Table 6.6.1 Vegetation Priority Risk Assessment

Asset Type	Risks	Criticality	Failure Modes			Failure Criteria		Current Risk
			Condition	Capacity	Performance	Level of Service	Economic	
Roadside Vegetation Management	VM-1	L	Yes		Yes	Condition falls below acceptable level	Maintenance costs exceed renewal costs.	L
	VM-2	L			Yes	Visually unattractive-citizens complain		L

Criticality & Risk

L = Low
M = Medium
H = High

[75] Modified from criteria and process from North Shore City *Transport Asset Management Plan*, 2005

Based on the above assessment, the following strategies are proposed to manage these risks. Intervention strategies should be included in a Tillamook County risk register, a listing of known risks and strategies to manage them. Progress on managing identified risk and the resources required should be presented in on-going reports to CRAC and the County Board and budget requests.

Table 6.6.2 Vegetation Management
Risk to Community and Mitigation Actions

Risk	Community Impacts Economic (Ec) Social (S) Environmental (Env)	Current Risk	Future Risk	Action
VM-1- Excessive Roadside Vegetation	Ec, S, Env	L	L	Implement vegetation program including performance reporting for litter pick up, noxious weed control, presence of nuisance vegetation, and presence of vegetation obstructions (hazards). Implement benchmarking with other counties.
VM-2 Vegetation Appearance, Visual Obstructions and Hazards	Ec. S, Env	L	L	Conduct annual vegetation control program in dry season. Establish service request tracking system which reports citizen complaints on obstructions and litter.

Criticality & Risk
L = Low
M = Medium
H = High

b) Operation, Maintenance and Renewal
Vegetation management is a program that helps eliminate visual hazards from the roadside, protects the edge of pavement and supports adequate drainage of the roadway. Activities include:

- Grading of shoulders
- Flail mowing of brush, cattails and grasses
- Mechanical ditching
- Manual brushing
- Chemical controls used to control the growth of problem vegetation

TCPW applies herbicide to the road right-of-way between May and September during dry weather. All products are approved for use near aquatic areas.

Tillamook County does not spray in dense residential areas or any area where the property owner agrees to maintain the vegetation to the satisfaction of the Public Works.

c) New Assets
Most vegetation management work supports road and drainage effectiveness. These assets are described in separate sections of this report.

6.5.4 Future Costs
Until a desirable level of service is adopted by TCPW based on identified risks, priorities and performance per activity, the future costs for the vegetation management service cannot be defined.

6.6 Equipment Management

6.6.1 Goal and Objectives

Equipment used to maintain the roads, bridges, signs and other county road assets, and respond to hazards and emergencies depends on reliable vehicles for road asset maintenance and renewal. The equipment management program provides vehicle services to TCPW, from acquisition through disposal, maintenance & fabrication services of TCPW vehicles and equipment. The fleet employees are responsible for coordinating information, resources, and activities that support reliable vehicles for TCPW; using employees to test and diagnose equipment, regularly service and repair vehicles seeking to balance cost and timeliness of repairs and maintenance with optimum vehicle availability and reliability.

6.6.2 Background Information

a) Issues

- Nearly 75 percent of county vehicles exceeds the County's adopted useful life for vehicles. There is no set aside for equipment replacement.
- The 2006 incorporation of TCPW vehicle information into IRIS is considered a significant improvement to fleet service management. Analysis and reporting of on-going vehicle costs and vehicle performance (miles and hours of use) are needed. Vehicle replacement should be based on optimum use versus cost; careful examination of replacement should be triggered by cost versus useful life so that life cycle costs are minimized.
- The Shop Foreman is in the initial stages of implementing policy-based preventive maintenance for each TCPW vehicle and piece of equipment. This is best practice.
- TCPW is in the final stages of joining the Portland Metropolitan Area Metropolitan Area (PMAT) cooperative intergovernmental agreement for sharing equipment and services. This is considered best practice.

b) Asset Description

TCPW fleet inventory includes 99 vehicles and rolling stock.[76] The total historic purchase price of the County's fleet is $3.6 million based on the *Tillamook County Comprehensive Annual Financial Report,* June 2007; this is not the true replacement value. The county's road fleet includes 14 dump trucks, 9 1-2 ton trucks, 15 passenger vehicles, 3 backhoes, 2 vactors, 4 loaders, 2 cranes, 1 excavator, 1 spray truck, 2 pavers and a variety of other rolling stock and trailers that support County Public Works activities.

c) Data Management

IRIS contains the equipment inventory (date purchased, amount of purchase, useful life, hours/miles used), policies on when preventive maintenance is to be performed on each vehicle in the inventory, and maintenance history.

[76] Integrated Road Information System (IRIS)

c) Age

The estimated useful live for County motor vehicles is 5 to 10 years.[77] Nearly three-fourths of the TCPW's equipment and fleet exceeds this replacement criterion.

Table 6.6.1 Vehicles Exceeding Financial Useful Life

Vehicles Exceeding Useful Life:	
>10 years	73%
>20 years	43%
>30 years	11%

For purposes of this first asset plan, useful life is used as a proxy or partial indicator TCPW's fleet replacement needs. Based on information in IRIS, the useful life of County vehicles and equipment varies from 10 to 50 years. A cursory review of the fleet inventory in IRIS and their purchase year indicates that many vehicles exceed those useful life assumptions.

Table 6.6.2 Vehicles Exceeding Industry Useful Life[78]

Vehicle Type	Number	Useful Life	Exceeds Useful Life
10 Yard Dump Truck	10	20 years	20%
5 Yard Dump Truck	5	30 years	100%
Graders	3	20-23 years	100%

e) Fleet Condition and Performance

There is currently no reporting on equipment reliability and performance. However, beginning in 2006, information on maintenance performed on the county's fleet is being tracked in Equipment Management module of IRIS.

[77] *Tillamook County Comprehensive Annual Financial Report*, June 30, 2007

[78] Useful life assumptions from IRIS. Best vehicle management practice is based on tracking miles and/or hours of use. In general, as a vehicle's hours and miles of use increase, the maintenance required increases dramatically. Timely preventive maintenance is based on these Key Performance Indicators. Maintenance expenses for each vehicle can then be compared to industry expectations for a vehicle's average useful life. Decisions optimize total life cycle (purchase, maintain, repair, operate, disposal) costs over a vehicles life. This helps minimize life cycle cost per vehicle.

f) Historic Expenditures

An annual average of almost $400,000 was spent inspecting, maintaining, and repairing TCPW vehicles and equipment from 2005 – 2007.

Table 6.6.3 Equipment Management Activities

	2005	2006	2007
1601 - Safety Inspections (shop)	$206.32	$616.67	$0.00
1602 - Fuel/Oil/Lube	$90,712.12	$139,239.65	$146,049.94
1603 - Tires	$10,872.42	$15,861.05	$27,319.63
1604 - Communications Equipment	$2,401.99	$3,641.66	$777.31
1610 - Other Repairs (shop crew)	$228,120.71	$248,083.95	$203,743.83
1620 - Operator Maintenance and Repairs	$17,282.06	$16,170.02	$13,526.25
1621 - Accident Repairs	$0.00	$220.68	$0.00
1622 - Non-County Equipment/Oper. Rental	$173.00	$2,795.13	$518.52
1630 - Fabrication	$636.65	$329.70	$46.58
1640 - Chasing Parts	$2,797.29	$5,035.74	$2,480.00
Total	**$353,202.56**	**$431,994.25**	**$394,462.06**

The majority of these expenses (52%) of 2007 expenditures were spent repairing vehicles.

Equipment Management Activities	Operate	Preventive Maintenance	Repair
1601 - Safety Inspections (shop)	✓		
1602 - Fuel/Oil/Lube	✓		
1603 - Tires	✓		
1604 - Communications Equipment	✓		
1610 - Other Repairs (shop crew)			✓
1620 - Operator Maintenance and Repairs		✓	
1621 - Accident Repairs			✓
1622 - Non-County Equipment/Oper. Rental	✓		
1630 - Fabrication			✓
1640 - Chasing Parts		✓	

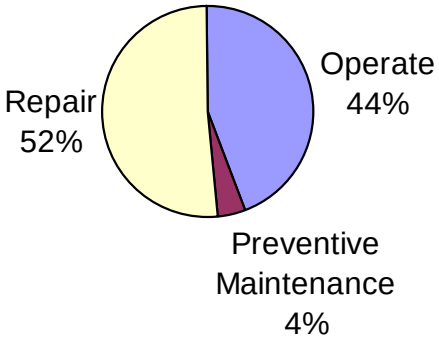


Figure 6.6.1 2007 Equipment Management Expenditures

6.6.3 Management Tactics

a) Inspection and Renewal Cycle

Preventive inspection and maintenance standards are identified for each county vehicle based either on hours of use or miles driven. These follow industry best practice.

Industry based assumptions on useful life have been identified for each vehicle or piece of equipment. A schedule for replacing individual vehicles at the optimum time based on useful life and the maintenance and repair expenditures is needed. This supports the TCPW mission to ensure efficient, safe TCPW vehicles and equipment at the lowest life cycle cost.

b) Acquisition, Maintenance, Repairs, Replacement and Disposal Decision Making

As TCPW equipment maintenance costs are tracked, these should be used to determine the optimum maintenance, renewal, replacement and disposal of each piece of equipment.

Decisions should be based on a per vehicle assessment. Reporting is needed which includes key equipment performance indicators including:

- Maintenance expenditures per vehicle
- Percent of work orders completed compared to those scheduled
- Number of vehicles per full time management FTE in the Shop area
- Average expenditures per vehicle
- Compare total maintenance per vehicle with preventive maintenance per vehicle

6.6.4 Future Costs

A schedule is needed which plans maintenance, repair, disposal and acquisition costs for the county's fleet based on an individual assessment of vehicle maintenance history and useful life. Given that the county's fleet is significantly over age, a short payback period can be anticipated for replacing over age vehicles with high maintenance and repair costs.

6.7 Buildings

6.7.1 Goal and Objectives

The purpose of TCPW buildings is to safely and effectively shelter employees, equipment and the materials used to provide county road services.

6.7.2 Background Information

a) Issues

- TCPW building maintenance is reactive and under funded. The type, number, quality and location of TCPW buildings are key parameters influencing the efficiency and effectiveness of managing resources (labor, materials and equipment) used to deliver county road services.
- There is no building asset plan. A plan is needed with an inventory and condition assessment of major building elements that assure worker safety and building code compliance.
- A strategy is needed to address the most critical TCPW building needs in the most economical timeframe. At a minimum, TCPW buildings should be inspected for code violations to ensure worker safety.

b) Asset Description

TCPW buildings are located in three locations: the North, Central and South County maintenance yards. No complete inventory or condition assessment is maintained on these facilities. The County's *Comprehensive Annual Financial Report* does not report TCPW building value separately from the total value of County buildings.

c) Data Management

There is currently no inventory or condition data on TCPW buildings or subcomponents.

d) Age

The estimated useful live used for County buildings is 45 to 50 years.[79] It is unclear when the TCPW buildings were built.

g) Building Condition

There is currently no reporting on the adequacy of TCPW buildings.

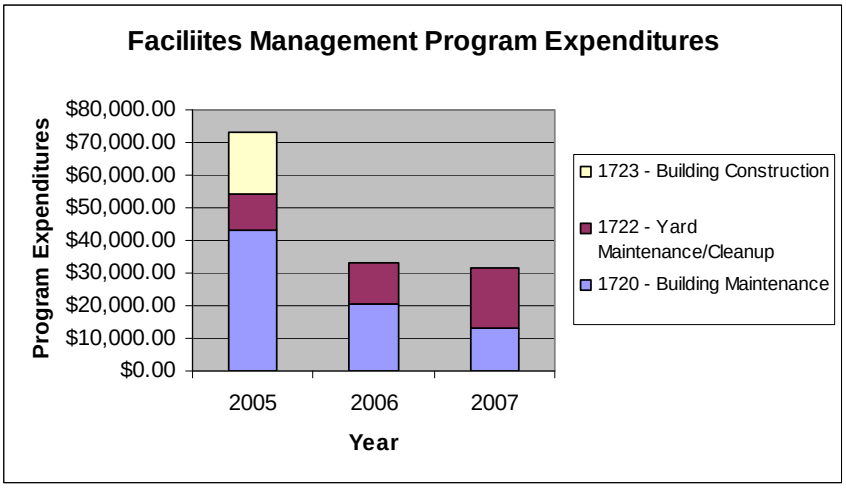
[79] *Tillamook County Comprehensive Annual Financial Report*, June 30, 2007

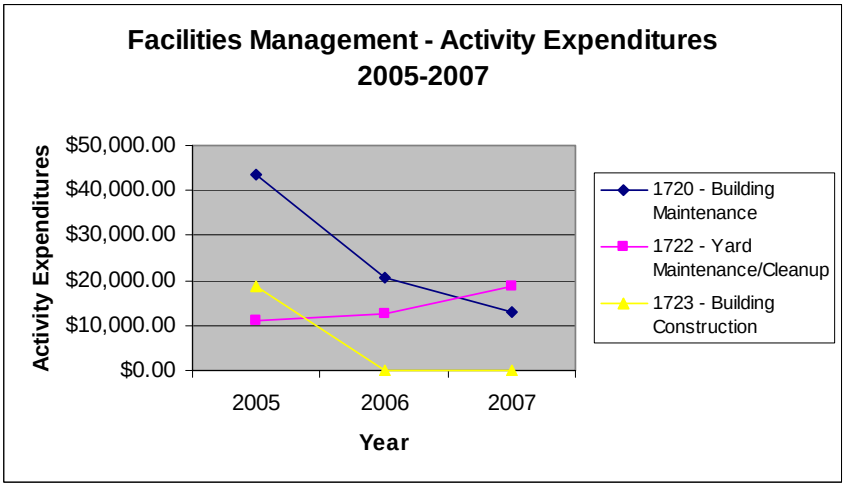
g) Historic Expenditures

Building maintenance expenditures on TCPW buildings have been negligible. An average of $46,000 per year has been spent maintaining and repairing TCPW buildings. No building repair or replacement has occurred.

Table 6.7.2 Facilities Management Expenditures by Activity

	2005	2006	2007
1720 - Building Maintenance	$43,344.04	$20,581.22	$12,967.46
1722 - Yard Maintenance/Cleanup	$10,921.89	$12,640.78	$18,566.78
1723 - Building Construction	$18,635.23	$0.00	$115.17
Total	**$72,901.16**	**$33,222.00**	**$31,649.41**





6.7.3 Management Tactics

TCPW building maintenance is reactive and under funded. There is no building asset plan. A plan is needed with an inventory and condition assessment of major building elements including:

1. Total number of each building asset type.
2. Major building subcomponents[80] include:
   - FOUNDATIONS & STRUCTURAL (Foundations, Vertical Structural Elements
     Horizontal Structural Elements, Roofing)
   - ARCHITECTURAL (Windows & Exterior Doors, Exterior Walls, Insulation, Interior Walls, Floors, Ceilings, Door Trim)
   - SPECIALTIES
   - HVAC (Air Handlers, Exhaust Fan/Ventilators, HVAC Controls, Ductwork & Accessories)
   - ELECTRICAL (Interior Wiring & Circuit Breakers, Interior/Exterior Lighting, Energy, Management Controls, and Generators)
   - PLUMBING (Water & Sanitary Sewer Piping, Regulators & Valves, Fixtures, Water Heaters)
   - MECHANICAL
   - FIRE DETECTION/SUPPRESSION (Sprinklers, Fire Alarm Panels, Detectors, Pull Stations)
3. Building condition assessment scale addresses:
   - Condition 1: No defects - as new condition
   - Condition 2: Some defects - minor maintenance repairs required
   - Condition 3: Significant defects - major maintenance/repairs required
   - Condition 4: Major defects - refurbishment/rehabilitation required
   - Condition 5: Replace - beyond repair/refurbishment or no longer economical to invest in
4. Desired level of service, standard and performance measures set by their building asset management plan for each type or group of building assets identified in the building asset management plan.
5. Physical building condition assessment rating system used in their building asset management plan.
6. Life of individual building components, building elements and/or the whole building asset adopted in their building asset management plan.
7. Asset hierarchy, weighting or ranking of individual building components, building elements and/or the whole building asset if used in their building asset management plan.
8. Adopted frequency of condition monitoring of building components, building elements and/or the whole building asset in their building asset management plan.
9. Intervention levels set by their building asset management plan.

[80] Institute of Public Works Engineers Australia (IPWEA)

a) Inspection and Renewal Cycle
Preventive inspection and maintenance standards are needed for each county building. These should follow industry best practice.

Industry based assumptions on useful life have been identified for county buildings. A schedule for replacing individual buildings at the optimum time based on useful life and the maintenance and repair expenditures is needed. This supports the TCPW mission to ensure efficient, safe TCPW road-related assets at the lowest life cycle cost.

b) Acquisition, Maintenance, Repairs, Replacement and Disposal Decision Making
As TCPW building maintenance costs are tracked, these should be used to determine the optimum maintenance, renewal, replacement and disposal of each building.

6.7.4 Future Costs

A schedule is needed which plans maintenance, repair, disposal and acquisition costs for the county's buildings based on an individual assessment of building maintenance history and useful life.

6.8 Quarries and Materials Management

6.8.1 Goal and Objectives

To provide reliable materials for county road maintenance that meet consistent standards of quality for the least cost in support of safe, serviceable and sustainable county roads.

Where possible, it is best practice to provide local materials for county road maintenance treatments. While it is important to comply with construction standards, some specifications may be too high, or increase costs due to the cost to transport crushed rock longer distances and may preclude the use of locally sourced material. Using local materials has the added benefit of keeping the character of materials consistent with Tillamook County's rural character, a strategic county goal.

6.8.2 Background Information

a) Issues

- Local materials should be used in support of road maintenance work wherever possible. This minimizes transportation costs, and maintains the character of materials used within Tillamook County.
- The current county-owned quarries provide a great benefit to minimizing hauling costs associated with driving crushed rock to road maintenance sites. These quarries should be managed and maintained to ensure long term use of county owned, local materials appropriate for road maintenance needs.
- The pursuit of sustainable materials purchasing and utilization practices should continue to be considered. The cost and environmental implications of any new contract or practice should be weighed to ensure the best value for county money.

b) Asset Description

There are two county quarries. The county quarries are located south of Cloverdale (near Clear Creek) and north of Nehalem.

c) Data Management

There is currently no inventory or condition data on TCPW-owned quarries. Costs associated with materials management are tracked in IRIS's cost accounting system.

d) Age

The age of the county's quarries is unknown.

h) Quarry Condition

There is currently no reporting on the capacity or condition of TCPW quarries.

g) Historic Expenditures
The three year average expenditures for materials that support road and traffic safety (sign) maintenance average $72,000 annually.

Table 8.1 Materials Management/Stockpiles

	2005	2006	2007
1502 - Operation	$1,133.55	$1,168.47	$4,817.57
1505 - Tack Oil	$7,995.13	$1,611.44	$2,106.49
1507 - Signs	$283.38	$8,195.15	$8,960.24
1510 - Pit/Stockpile Dev./Maint.	$37,275.85	$7,617.18	$2,767.01
1511 - Hauling to Stockpile	$25,711.74	$61,690.80	$45,575.59
1521 - Material Purchase		$349.47	
Totals	**$72,399.65**	**$80,632.51**	**$64,226.90**

On average, sixty-one percent (61%) of TCPW materials management costs are associated with driving crushed rock to job sites. Another fifth (22%) of stockpile management expenditures are required to crush and manage quarry rock supplies.

In 2005, a private contractor mined, crushed and stockpiled rock at County quarries for road maintenance. The contract provided 15,000 cubic yards of 1" crushed rock and 5,000 cubic yards of 2" rock. Rock was crushed at each of the two quarries. This material provided crushed rock for County road maintenance needs in 2005-2008. Additional rock crushing is anticipated at the two quarries in Fiscal Year 2008-2009. Given the rising cost of fuel, the benefits of county-owned quarries will continue to minimize materials management costs.

6.8.3 Management Tactics
TCPW quarry maintenance is not established. An inventory of quarry equipment and built improvements should be conducted to determine their current adequacy and needed improvements. Management strategies that address inspection, renewal, replacement and disposal can then be developed. Strategies to partner with other public agencies should be a part of ongoing consideration.

6.8.4 Future Costs
A schedule is needed which plans materials and equipment acquisition costs, and quarry maintenance, repair, disposal and potential relocation cost.

6.9 Emergency Management

Emergency management is a significant aspect of county road network management both financially and in importance to county residents and businesses. Average rainfall in Tillamook County is 90 inches per year. Rain and wind events are regular and frequent occurrences. Flooding and high winds affect the condition of the county road network. It affects the procurement and operational management of other county road services. This section should therefore be read as a companion to other sections in this document.

6.9.1 Goal and Objectives

Emergency management contributes significantly to each of the county road objectives. TCPW, working in partnership with other federal, state and county emergency responders:

- Protects the function, operation and safety of existing roadways
- Coordinates with other jurisdictions to assure a reliable street network exists between incorporated and unincorporated areas across jurisdictional boundaries
- Coordinates post emergency roadway maintenance and improvements with other jurisdictions to ensure repair of the county road network for all modes of travel that move goods and people

6.9.2 Issues

- Flooding and wind-related debris can cause serious damage to road surfaces and drainage. It is a significant contributor to increasing life cycle costs of road assets.
- In conjunction with county road partners, consultation with stakeholders and road users (businesses and citizens), and based on risk assessment operational policies and lifeline routes should support a priority for responding to weather emergencies. These priorities should be communicated to the public along with advice on safe use of the network.
- Given the regular experience responding to natural disasters in the county, TCPW is considered expert in their understanding of emergency response. This should be communicated to road service users given that emergency services receive the highest priority and require substantial County road funding.
- There is little information on the primary assets that control county road drainage: culverts, ditches and levees. This represents a high risk to the county as weather events will increase the failure of these assets and emergency response costs will increase as reactive maintenance is needed during and after weather events. Strategies should be evaluated that address implementing a culvert and ditch maintenance program and whether emergency management costs could be reduced.

6.9.3 Historical Expenditures

Emergency management activities represent 6% of the 2007 expenditures.

Table 6.9.1 Emergency Management

	2005	2006	2007
1160 - Snow Plow/Sanding	$19,284.89	$18,377.38	$37,469.10
1161 - Flood/Wind/Slide	$83,780.82	$275,726.14	$300,934.93
Total	**$103,065.71**	**$294,103.52**	**$338,404.03**

The three year average spent on emergency response is $245,000.

These activity costs should be considered with information about drainage-related assets in the Drainage Management section of this report.

6.10 Capital Investment to Meet Capacity and Safety Needs – Road Network Creation, Acquisition and Improvement

6.10.1 Goal and Objectives

TCPW is responsible for managing and approving the design, construction, acquisition or improvement to the county road network. As defined in the Tillamook County Road Construction Plan Standards, TCPW is responsible for managing the construction plan review process to enforce the county road standards. A significant number of changes occur in Tillamook County's road right of way which must be managed through permit issuance, review and approval.

Many agencies and jurisdictions directly influence the number of permitted activities in the right of way. Key stakeholders include:

- Oregon Department of Transportation
- Oregon Department of Forestry
- Oregon State Parks
- U.S. Army Corp of Engineers
- Unincorporated communities including Barview, Beaver, Cape Meares, Cloverdale, Falcon Cove, Hebo, Idaville, Mohler, Neahkahnie, Neskowin, Oceanside, Netarts, Pacific City/Woods, Syskeyville, Tierra Del Mar, Twin Rocks.
- Tillamook County Transit
- The ports of Tillamook Bay, Garibaldi, Nehalem
- The airports of Tillamook Bay, Nehalem and Pacific City
- The cities of Bay City, Garibaldi, Manzanita, Nehalem, Rockaway Beach, Tillamook, Wheeler
- Service districts and public utility districts

6.10.2 Background Information

a) Issues

Tillamook County has a Transportation System Plan (TSP) consistent with state strategies. Currently, Tillamook County Public Works does not have a capital improvement plan. The current level of TCPW road funding is based on historic, declining funding levels and is considered inadequate. Loss of qualified staff represents a high risk, high priority for managing changes to TCPW roads.

Significant economic, demographic and weather trends result within the county right of way require permits. These are placing significant pressure on County Public Works engineering staff. The 2007 number of professional engineers and technicians required to provide engineering services is considered inadequate. Appropriate contracting for project design, inspection and management services is being pursued but does not remove the need for professionally qualified County engineering staff. The County is still responsible for adequate contract oversight. This need is recognized by Public Works management.

Balancing economic growth and environmental protection leads to many coastal policies; the qualities that make coastal communities so desirable also make them fragile environmentally.

b) Activity Description
County Engineering Services performs a variety of functions ensuring the safety and reliability of the road network. County policy is reviewed by engineering staff to ensure consistent road management. Ordinances and policy updates are written by engineering. Technical questions from stakeholders must be responded to in a timely manner. Right of way is acquired, roadways surveyed and contracts managed.

Changes to the roadway require permits. Engineering Services issues or reviews permits for:

- Construction related to land use approvals such as private or public roads created in subdivisions or major partitions, or other land use actions with off-site public road construction involved
- Construction activity in public right of ways (with existing roadway, less than full standard roadways or non-existing roadways
- Fish passage replacement
- Subdivision or major partition tentative plat approvals

Permits may require:

- geotechnical reports,
- erosion control plans,
- additional requirements based on environmental, land use or other permit conditions
- traffic control plans
- road approaches

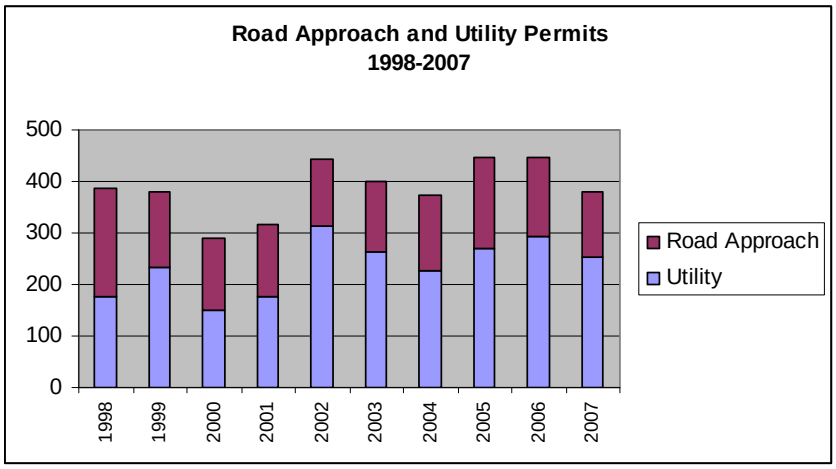
Construction inspection may be involved. Review of detailed standard drawings and construction plans involves a county professional engineer, or similarly qualified agent working for the county, ensuring that the design is adequately stamped and sealed, includes specifications, road sections and designs for cuts and fills consistent with AASHTO standards. Road projects must be reviewed for design speed based on topography and potential traffic volume. If there is any compliance issue, the county engineering staff may dig up test spots to check compaction and material sufficiency.

Some permits are in floodplains, wetlands and the permittee required submitting additional environmental requirements. Permits manage:

- Complying with natural resource regulations for management of coastal ecosystems that sustain economic vitality, including mitigation of known pollution, fish habitat degradation and management, invasive species management

- Mitigating flooding (culverts, levee)
- Development permits serving the county's residential home market, tourism, industry and commercial sectors
- Utility placement in the right of way
- FEMA and federally funded projects that manage the impacts of coastal flooding and wind storms.

The demand for quick turn around by developers and other stakeholders makes the permit review process a high priority. Turn around time varies by the type and complexity of permits.



Over the last 10 years, the number of road approach and utility permits has averaged 410 annually. In 2007, 293 oversize vehicle permits were reviewed by Engineering Services.

Beyond simple permit issuance or review, Engineering Services perform the following functions:

- Subdivisions and Major Partitions (e.g., design review, on-site inspections, letters, coordination with cities in urban growth boundary)
- Planning Coordination for land use, condition use, zone changes
- General Road Issues (e.g., Road improvements, jurisdiction transfers, railroad crossing safety improvements, encroachments, vacations, fill sites)

c) Data Management

In all cases, project management records are kept and permits tracked from design through final inspection and approval. In some cases, this can take years. There is no automated system for project filing or as-built drawings.

Asset inventories and contracts to inspect, maintain, repair or replace them are managed by the engineering staff. These include:

- Striping – manage intergovernmental agreements (Marion County)
- Signs- review changes, speed zones, business sing guide, curve riders, no parking signs
- Vegetation Spraying – seasonal coordination
- Bridge inspection/coordination
- Pavements, guardrail inspection, culverts, inventories

d) Operational Support

Planning and research, coordination, and response to a variety of activities that affect the right of way are performed by engineering staff. Examples of these are:

- Utility location coordination (Call B4Udig)
- ROW issues Design, culvert, etc
- History of roads/assets
- Survey
- Permits (ODOT, fill, development)
- Project planning
- Cost estimating
- Research & implement environmental best management practices

A key role is played by Engineering Services during weather events and emergencies. Participating in Incident Command at 911, field support during storms, documentation and environmental permits following the storm are all Engineering Services duties.

e) Solid Waste and Partner Coordination

General direction and supervision is provided for the County's Solid Waste program. Program oversight includes:

- Recycling & waste
  - Franchise Management overseeing three transfer stations and five garbage haulers
  - Closed landfill management
  - Legislative and policy awareness
  - Solid Waste Advisory Committee (SWAC)
  - Budget development
  - DEQ relationships
  - Household hazardous waste
  - Education and outreach
  - Solid waste complaint response and code enforcement

A variety of services must be coordinated with other County, state and environmental agencies including the TEP, watershed councils, County parks, and ODFW. (Recent example projects include God's Valley Culverts, East Beaver Creek culvert, Wildcat Creek culvert, Clear Creek boat ramp, Fraser culvert and tidegate.)

f) Historic Expenditures

Engineering Activities

	2005	2006	2007
1401 - Design	$817,821.08	$564,129.21	$108,189.69
1402 - Permit Acquisition	$1,423.97	$13,908.70	$5,515.59
1403 - R/W Acquisition	$66,293.04	$74,976.76	$176,471.31
1404 - Contract Inspections	$2,413.98	$13,908.70	$524.60
1405 - Contract Management	$7,680.62	$257,625.83	$132,429.78
1406 - Misc. Survey Work	$5,986.90	$1,430.70	$4,871.56
1410 - Misc. Issues Within R/W	$27,311.09	$38,018.76	$38,421.26
1411 - Road Approach Permits	$70,696.02	$63,604.16	$64,973.79
1412 - Utility Permits	$55,778.99	$70,750.60	$70,963.16
1413 - Business Guide Signs	$226.22	$91.56	$704.96
1414 - Road Construction Permits	$1,065.07	$1,377.72	$262.64
1415 - Adopt-A-Road Program	$27.83	$3,715.07	
1420 - Road Vacations	$1,480.91	$1,767.07	$1,357.27
1421 - BOC Orders and Related	$337.51	$867.46	$289.74
1422 - Road Status (except vacations)	$1,347.75	$863.58	$1,458.47
1423 - Traffic Control	$1,334.71	$143.60	$544.06
1424 - L.I.D. Documents	$530.18		
1430 - Inventory/Records (other)	$4,629.06	$2,159.64	$2,960.99
1431 - Road Status Records	$3,628.90	$2,780.55	$12,170.81
1432 - Signs	$7,739.90	$5,637.18	$5,697.30
1433 - Bridges	$1,860.96	$611.07	$742.84
1434 - Pavement Conditions	$43,455.43	$3,321.09	$3,043.63
1435 - Misc. Road Conditions	$25,109.49	$24,022.59	$11,281.55
1436 - Traffic Counts	$3,372.41		$550.13
1438 - Public Infomation	$16,013.41	$16,578.91	$20,753.71
1439 - Capital Imprv. Project Planning	$277.37	$417.15	$2,222.84
1440 - Litigation	$1,201.73	$2,482.36	$71.58
1450 - Policy Research/Develop (general)	$2,003.69	$1,803.90	$4,784.85
1451 - Acquiring Funding	$2,167.95	$1,915.94	$1,123.29
1453 - County Policy Development	$4,319.86	$5,612.75	$4,730.39
1454 - Policy/Ordinance Writing	$12,661.21	$13,816.65	$251.02
1455 - ODOT Planning	$1,358.12	$208.96	$1,441.88
1456 - Statewide Policy Development	$3,520.66	$3,028.52	$950.39
1458 - Public Transportation	$3,074.85	$3,676.08	$189.88
1460 - Land Use Planning (general)	$13,167.03	$15,341.66	$15,489.04
1461 - Conditional Use Permits	$2,085.88	$1,075.69	$1,561.34
1462 - Zone Changes	$297.00	$479.89	$53.18
1463 - Variances	$356.92	$261.08	$689.92
1464 - Partitions	$1,115.50	$2,269.78	$3,151.94
1465 - Subdivisions	$12,563.91	$7,551.69	$6,539.13
1466 - Planning Grants	$506.30	$222.23	
Total	**$1,228,243.41**	**$1,222,454.84**	**$707,429.51**

An average of $1.1 million has been spent annually between 2005 – 2007 on engineering services. 2007 expenditures declined by 42% due to a loss of engineering staff and completion of projects.

Note: review of cost accounting will shift some of these costs into more appropriate categories in future years.

6.10.3 Management Tactics

There is no capital plan for TCPW. However, capital project coordination with other agencies and grant-funded projects impact, adds, replaces and repairs significant county road assets. Coordination with ODOT requires capital project prioritization and identification on the Northwest Oregon Area Commission on Transportation (NWACT), statewide transportation improvement plan (STIP), and the Transportation System Plan (TSP). Recent projects are: Highway 6/WRL, Latimer Road, Mills Bridge, Highway 101 Manzanita, Nedonna Beach, Aspen Pacific City, bridge painting, Long Prairie Rd/101, and adding a passing lane at Hebo. Recent contract management for major repair and replacement projects (e.g., Johnson Bridge, Fawcett Creek replace culvert with bridge, repair Salmonberry bridge, Long Prairie/Highway 101) are also managed by engineering staff.

6.10.4 Future Costs

Tillamook County is subject to major population influxes during peak vacation periods. The unprecedented numbers of Americans that will retire in the next decade are expected to place additional development pressure on Tillamook County and its roads. Projected weather trends are expected to continue to cause damage to the road network; some weather-related construction and repair projects will require permits. Management of these expected changes will increase the demand for TCPW engineering knowledge and skills.

Chapter 7 Financial Summary

7.1 Overview

This section contains the financial requirements resulting from all the information presented in the previous sections of this asset management plan. The financial projections will be improved as further information becomes available on desired levels of service and current and projected future asset performance.

A 10-year financial forecast follows for pavement and sign assets, Fiscal Years 2008 to 20017. The forecast of each asset or service is described above in Chapter 6. Except for road surface cost projections, inflation is excluded.

Expenditures are categorized into:

- Operations
- Maintenance
- Renewal
- New assets

Future maintenance, renewal and new asset needs have not been identified for:

- Structures (bridges, guardrails, levees)
- Drainage (culverts, ditches)
- Equipment & vehicles
- Buildings
- Quarries
- Services (engineering, emergency management)

Further work is needed to collect inventories, assess condition and understand the remaining service life for these assets. A long range financing plan is needed which ensures road services and the assets that provide them are adequately maintained.

7.2 Confidence Levels in Data & Information

The accuracy and reliability to forecast road asset needs is based on available information. The quality of forecasts varies by asset class. The expression of accuracy and reliability in the areas of information (source and reliability), process (ad hoc or repeatable) and documentation (documented or not documented).

The following table provides definitions for each confidence level:

Table 7.2.1 Confidence Level & Definitions[81]

	Confidence Level	Inventory Completeness	Condition Assessment Method and Frequency	Process and Documentation
1	No confidence	No inventory	No assessment method	No process
2	Low confidence	Partially	Estimates used to assess condition	Process not well documented
3	Moderate confidence	Inventory complete	Subjective process to estimate condition	Some documentation in place
4	High confidence	Inventory complete	Condition surveys conducted on a regular schedule by well-trained personnel	Well documented process followed
5	Optimal confidence	Inventory complete	Condition survey on a regular schedule	Objective process followed; Accuracy of data verified and well documented

The following defines confidence levels[82] in asset information presented in this report.

Table 7.2.2 Confidence Levels by Asset Class - 2007

Asset Information	Confidence
Pavement	Optimal for the first 3 years and Moderate in years 4-10.
Bridge	Optimal in the near term and Moderate for years 4-10.
Culverts	Low; inventory estimated and condition unknown.
Guardrails	Moderate; inventory and condition assessment as of 2007; no documentation or inspection cycle established.
Signs	Moderate; inventory and condition managed by trained staff through 2008; condition not entered in IRIS
Equipment	Optimal
Remaining assets (Levees, buildings, quarries, ditches)	Low; better inventory and condition information, and inspection processes needed
Pavement Markings	Not applicable; repainted each year based on inventory

[81] *City of Portland Asset Status & Condition Report*, December 2007
[82] *City of Portland Asset Status & Condition Report*, 2007

7.3 Existing County Funding Sources

The primary sources of the fiscal year 2007-2008 Tillamook County road funds are the state gas tax (31%) and federal funding available from the U.S. Forest Service (37%). [83]

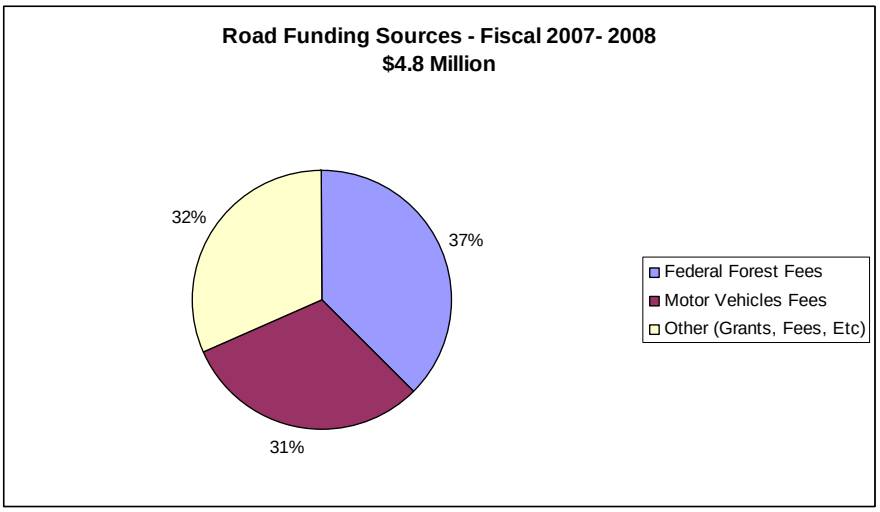


Figure 7.3.1 Road Funding Sources – Fiscal Year 2007- 2008

Road funding averaged approximately $4 million per year over the last ten years.[84]

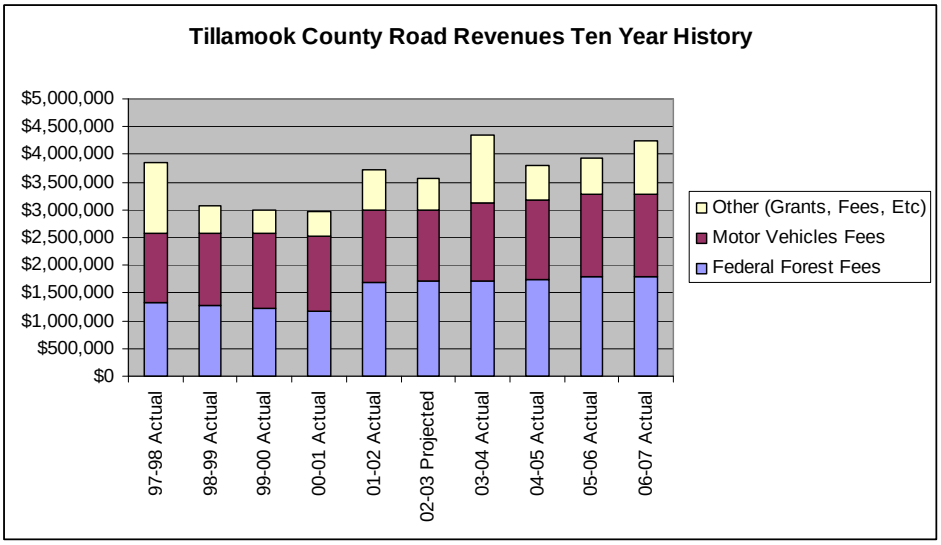


Figure 7.3.2 Road Revenues – 1998-2007

[83] *Tillamook County Comprehensive Annual Financial Report*, June 30, 2007
[84] *Draft TSP*, 2003 and County Treasurer

7.4 Future Expenditures

7.4.1 Road

Projected needs for routine road surface maintenance and renewal expenditures for the next 10 years assumes the 2007 road condition as a start point, elimination of deferred maintenance and achieving an adequacy of road condition so that subsequent years (year 11 and beyond) could focus on preventive maintenance. No funding strategy has been developed to support this scenario.

Table 7.4.1
Improve Road Condition (85 PCI) &
Zero Deferred Maintenance
2007 - 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Budget	$17,496,811	$2,575,165	$5,440,938	$2,739,909	$1,339,796	$892,609	$432,728	$1,852,680	$2,054,784	$989,598	$35,815,018
Rehabilitation	$17,017,527	$2,492,208	$5,374,967	$2,716,908	$1,310,405	$789,408	$336,616	$275,949	$150,882	$342,935	$30,807,806
Preventive Maintenance	$479,284	$82,957	$65,971	$23,001	$29,391	$103,200	$96,112	$1,576,731	$1,903,902	$646,663	$5,007,212
Stop Gap	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	---
Deferred Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	---
PCI	81	80	84	85	85	85	84	85	86	85	---

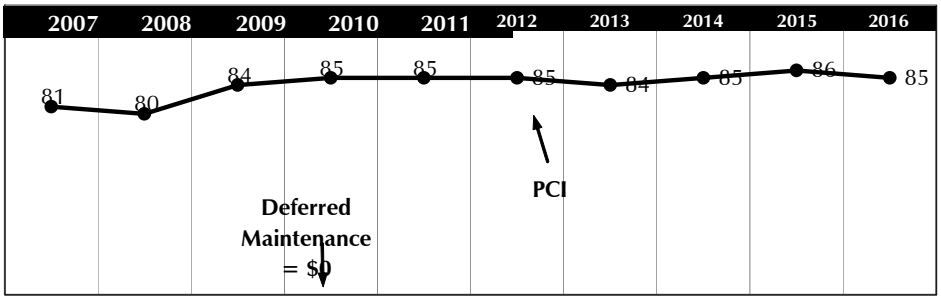


Figure 7.4.1 Improve Road Condition (85 PCI) &
Zero Deferred Maintenance 2007 – 2016

7.4.2 Traffic Safety Needs

Approximately $108,000 is needed each year to maintain and replace Tillamook County signs on a schedule that supports industry standards. This assumes a 1% growth rate in the number of signs and maintenance needed to care for them and does not include inflation.

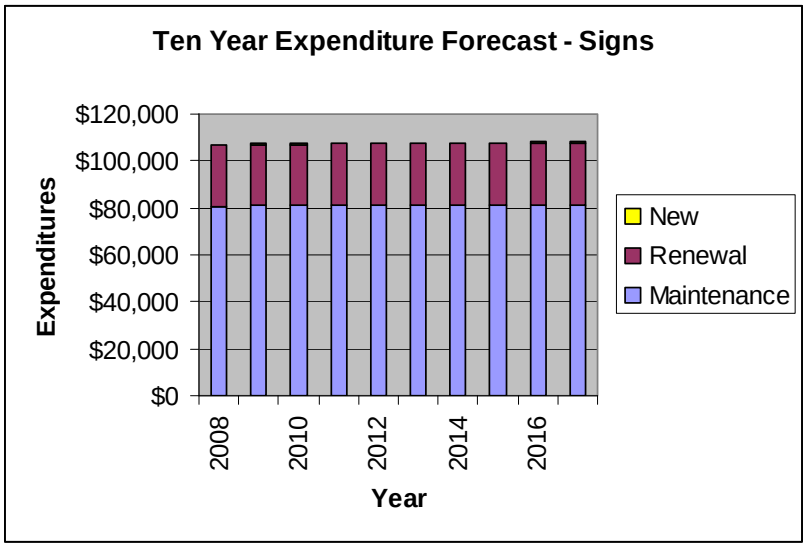


Figure 7.4.2.1 Ten Year Financial Forecast - Signs

The forecast for pavement marking maintenance and renewal expenditures are based on the recent historical 3-year cost trends 2005-2007, between $150,000 and $275,000 annually.

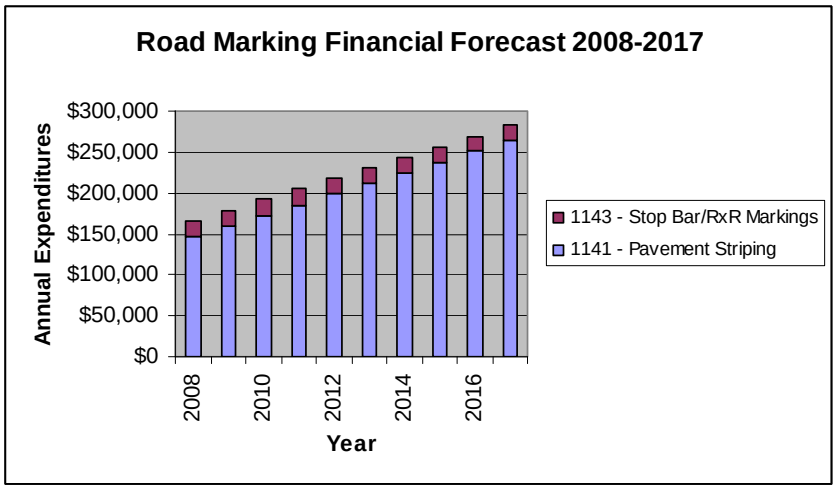


Figure 7.4.2.2 Ten Year Needs – Pavement Markings

7.5 Sustainable Financing Strategy

The purpose of this road asset management plan is to identify the current level of road services, and what the community needs to provide these services in a sustainable manner. The County must continue to address what road services stakeholders desire and can afford. Then a long term financial plan can be developed to fund the strategy.

Providing services in a sustainable manner requires matching renewal and maintenance of assets with planned new capital works projects to meet targeted performance or service levels. These must be funded with available revenue.

A sustainable financial plan is needed to address Tillamook County road needs. Current funding is insufficient to meet current or future needs of road network assets over their life. The County financial plan should incorporate cash flows identified in this asset plan in long term financial plans and budgeting.

A gap between projected asset renewals, planned asset renewals and funding exists. This indicates that further work is required to manage required service levels within available funds. A decline in current asset condition will occur without additional funds.

The County can manage the gap to some degree by using this asset management plan to guide future service levels and existing resources to provide high priority road services while eliminating others. Work programs, budgets, County strategic plans and organizational structures can begin to address global trends presented by this asset plan. However, without additional resources the trends presented will continue and Tillamook County road asset condition and services will decline.

Chapter 8 Asset Management Practices

8.1 Overview

The ability to strategically target available resources for the least cost with an understanding of the long term implications is known as asset management.

The *International Infrastructure Management Manual*[85] describes two levels of asset management practice, basic and advanced. A continuum of improving public works management and managing infrastructure typically evolves within an agency from a basic knowledge of network needs to more specific, documented processes and information based on performance targets and explicitly adopted management strategies.

Basic asset management practice addresses minimum legal and organizational requirements for financial planning and reporting. From this, the current level of service is developed for an annual budget process, and usually a five year capital plan for new or replaced assets. Basic or foundational asset management may include:

- Inventory of major asset classes (for example, miles of pavement by functional classification, bridges, miles of guardrail, ditches, culverts, number of signs)
- An understanding of assets that are most critical to the community (for example, regulatory signs, arterial pavements, levees)
- Asset condition and performance for critical assets (pavement and bridge inspections based on established criteria) but reliance on the judgment of knowledgeable maintenance or engineering staff for non-critical asset classes' condition
- Simple cost/benefit discussions for key projects prior to requesting or assigning resources, versus more rigorous and documented options analysis for capital investment options

As asset management practice evolves, investment strategies are based on the desired community outcomes, are supported by technical information gathered in the field as to where work was performed on which asset, and targets expenditures that better manage preservation of an asset so that the useful life of an asset can be achieved with the least cost. These actions support explicitly agreed to service standards. Continuously improving the link between what the community has explicitly stated it is willing to pay, with where and what activity is performed, improves accountability and an understanding of why work is performed.

[85] *International Infrastructure Management Manual*, INGENIUM, New Zealand, 2006

Advanced asset management practice key elements include:

- Corporate strategic plan is explicitly linked to a commitment or chartered asset management strategy. Links exist between service outcomes, programs, an asset management plan and performance.
- Options that include consideration of the lowest cost for managing an asset, or lifecycle costs, including knowledge of the costs to design, build, operate, maintain, renew/repair, replace and decommission an asset[86]. Explicit considering of these costs, the risks and benefits to the community and capacity of the organization to deliver the service occur at this point..
- Operational objectives are aligned with performance measures.
- Information systems are integrated, understood and used.
- Skills and training are aligned to explicit roles and responsibilities and knowledge is shared, as appropriate
- Investment strategies are based on risk assessment, projection of future costs and consequences and a commitment to continuous improvement.

Criteria for determining where an agency is in its evolving practice, from basic infrastructure management to growing application of asset management, and finally state-of-the-art asset management, have been recently documented by the National Cooperative Highway Research Program.[87] Elements include:

- Overall description of agency practice
- Policy guidance
- Asset life-cycle focus
- Asset performance and costs
- Impacts of asset performance
- Resource allocation, budgeting and project selection
- Organization
- Performance measurement
- Information technology and data collection and processing

Key elements of the current road network management practices were reviewed within TCPW including:

- Processes & practices (inventory, condition, replacement value, cost accounting, strategic planning, internal communication and the consistency of management practices and standards)
- Information systems
- Data & knowledge of assets including knowing what happens if they fail, the likelihood of failure, their historic and projected cost, given their age and performance
- Service delivery mechanisms (in-house or contracted)
- Organization and people

86 Up to 80% decisions about an asset's lifecycle costs are determined at the design/build point of its life

87 NCHRP Synthesis 371, *Managing Selected Transportation Assets: Signals, Lighting, Signs, Pavement Markings, Culverts, nd Sidewalks*, Washington, D.C. 2007

- Performance linked to a financial plan based on options for levels of service and what happens to system condition over time given these alternative scenarios, their costs and benefits

8.2 TCPW Asset Management Readiness Assessment

Following is an initial assessment of how Tillamook County Public Works (TCPW) compares to best asset management practices.

Beginning in January 2008, the following approach was used to complete this task.

- Review existing documentation
  - policy, asset inventory, condition & performance, business processes, resource allocation, budgeting & project selection, organization, performance reporting, information technology and data collection and processes
- Understand current practice, priority setting & issues[88]
  - Interview TCPW Director & management staff
  - Conduct a Self Assessment Survey[89] of TCPW management
  - Interview County Commissioner, planning, emergency response, decision makers in community
- Compare to best practice
  - Summarize results
  - Review preliminary results with Director
- Finalize readiness assessment

[88] See Appendix A: List of Interviewees
[89] See Appendix B: Self Assessment Survey

Table 8.1 Self Assessment
Best Asset Management Practice and. Current Practice

Asset Management Element	Assessment of Current Practice
Organization & People	
Best Practice Description Continuous improvement and AM principles and practices are integrated into the organization: ▪ Articulated vision & top support ▪ Roles and responsibilities are well defined ▪ Dynamic agency communication includes collaboration across functions (engineering, operations, finance) ▪ Consistent and well documented practices with accessible information that support s decisions and tracks accountability ▪ Agency consults customers and integrates requests for service into decision making ▪ Staff understands & supports vision, is well trained and has access to information.	**TCPW Strength** TCPW's leadership is engaged in defining vision that supports AM. Recently, the culture has shifted to a decision model based on collaboration across functions and shared decision making. Information is shared and options examined. Communication as a team is frequent. This, along with the knowledge of many long term employees, makes the agency well positioned to integrate AM. Many roles have been reassigned recently. Documentation of roles & responsibilities occurred in 2007. **Needs Improvement** Clarify asset inventory, condition and data maintenance roles and responsibilities. Access to information is limited as many data sets require knowledge of where the information is, and training on software used to access it. Training on e-mail, and IRIS software is needed .
Policy & Strategies	
Best Practice Description Clear strategies and measurable performance against targets exist that lead to sustainable infrastructure management. ▪ Strategic plans exist. ▪ Operating, capital and financial plans are linked and	**TCPW Strengths** TCPW has an on-going commitment to respond to community requests for service. Recent Futures Council survey and strategies track perception of service and strategies to implement a County-wide vision. Risk-based decision making has been required to address significant weather events

Asset Management Element	Assessment of Current Practice
funding strategies tied to long range needs. ▪ Master facility plans are tied to capital improvement plans. ▪ Asset plans define alternative levels of service, including current level of service, that address the ability to reach useful life of assets ▪ Performance targets are adopted and compared to objective descriptions of desired and actual conditions of features. These form the basis of maintenance and operations manuals. ▪ Community desired outcomes are linked to services provided and regular feedback with stakeholders occurs. ▪ Risk management identifies critical assets and guides resource allocation. ▪ Maintenance costs are reported and used to evaluate against long term asset needs.	in 2006 and 2007. Excellent cost accounting tracks the cost of maintenance services. **Needs Improvements** County strategic vision and goals need to be integrated with TCPW vision and strategies. Explicit performance targets are needed and an asset plan developed that reflects alternative levels of service, including the cost and consequence of the current level of service, and the long term needs of the road network and its assets. This should reflect the desired level of service as expressed by the community. Project selection and services should reflect strategic priorities.
Information Systems, Data and Knowledge	
Best Practice Description Accurate records are maintained on all assets and information integrated across the agency. ▪ Inventory, condition and value are known for each asset class. Work accomplishments are tracked.	**TCPW Strengths** TCPW uses IRIS to track costs and service requests. IRIS modules optimize pavement management strategies and inventories and condition are known for pavement, bridges, signs, and guardrails. Inspection cycles are every other year for pavement and bridges. Vehicles are inventoried in the EM module

Asset Management Element	Assessment of Current Practice
▪ Risk-based priority is established including consequence and likelihood for all asset classes. ▪ Explicit confidence is stated as a part of asset reporting. ▪ Information is gathered to understand the lifecycle of assets. ▪ Databases are integrated and information accessible to all who need it. ▪ An appropriate mix of data collection technology is used to support high quality of data and minimize data maintenance. ▪ Inspection occurs on defined schedules and sampling techniques are used. ▪ Information on public perception is updated regularly through surveys and complaint tracking.	and preventive maintenance cycles established. The service request module of IRIS tracks citizen requests. Recent storms have lead to risk management approach to work priorities. **Needs Improvement** A 2006 culvert inventory is not maintained. Continuously maintained culvert and levee inventory and condition assessment are needed. There is no condition assessment for buildings, or quarry sites. Multiple software is used to track bridge condition (Excel and inspection reports), and equipment management (IRIS and Truck Management). There is no comprehensive report stating the TCPW asset inventory, condition, replacement value or confidence in data. No laptops or GPS are used; the GIS module of IRIS is not supported by AOC. Inspection standards, measures and frequency should be documented for all asset classes and QA/QC methods adopted that assure data accuracy and repeatability. Regular performance reports should include service request volumes and community survey results on perception of service. A response standard for SR is needed. Comprehensive risk assessment should identify and plan for risk that protects the public safety, services and minimizes future costs. The results should be included in an asset plan.

8.3 Inventory Condition Assessment & Documentation

TCPW is responsible for managing Tillamook County's road network, including roads (paved and gravel), bridges, traffic signs, pavement markings, guardrails, levees, and county facilities, including TCPW buildings and quarry sites. Vehicles and equipment used to maintain these facilities are also TCPW assets. Following summarizes information on each of these asset classes.

Table 8.2 Asset Inventories and Tillamook County Road Management Processes

Asset Inventories	Process				
	Inventory?	**Documented Condition?**	**Documented inspection process?**	**Established inspection schedule?**	**If yes, frequency?**
Roads	Yes IRIS-SS	Yes	Yes	Yes	Every 2 years
Bridges	Yes Spreadsheet	Yes	Yes	Yes	Every 2 years
Traffic Signs -reflectivity	Yes IRIS-RI	Partial IRIS-RI	Yes Annual report	Yes	Once per year-night inspection
Traffic Signs -maintenance	-	Yes IRIS-RI	Yes Report	On-going	
Guardrail	Yes IRIS-RI	Yes	No	No[90]	-
Culverts	Yes[91]	Yes (2006)	No	No	-
Ditches	No	No	No	No	-
Pavement Markings	No[92]	No	No	-	-
Levees	No	No	No	No	-
Buildings	No	No	No	No	-
Vehicles	Yes IRIS-EM	No	Yes[93]	Yes	By need
Quarry sites	No	No	No	No	No

[90] Guardrail inspection begun spring 2007.
[91] Nestucca/Neskowin Watersheds: Culvert Prioritization and Action Plan for Fish Passage, August 2006.
[92] Pavement markings are repainted by contractor (Marion County) one time a year with oil-based paint. An Excel spreadsheet notes the materials used and length of line and type to calculate materials.
[93] Equipment Management tracks preventive maintenance performed by vehicle.

8.4 Asset Management Practice Gap Analysis[94]

Asset management practice addresses the processes, analysis and evaluation techniques needed for life cycle asset management; information systems that support business processes, including asset data storage and analysis capabilities; and data available for analysis and asset management support. An assessment of current asset management practice against best appropriate practice should be conducted every 3-4 years. This analysis, called a "gap analysis" identifies the most strategically important areas of improvement in managing the county's road network.

Specific asset management activities which are evaluated include:

- Asset Knowledge (Data and Processes)
- Strategic Planning Processes
- Asset Capital Processes
- Operations and Maintenance Processes
- Asset Information Systems
- Asset Management Plans
- Organizational and Contract Delivery Methods

Scoring Tillamook County's current capabilities compared to best appropriate practice reveals the gaps in current practice. The level of importance placed on each asset management activity is weighted. This weighted gap score identifies what is critical and sets priority to efforts that improve asset management practices.

TCPW director rated the county's road network stewardship, asset management planning and financial planning.[95] Current asset management practice was compared to desired practice. The importance Tillamook placed on each category was noted. The gap between current and desired asset management was then calculated.

[94] Asset management elements from North Shore City *Transport Asset Management Plan*, 2005

[95] This gap analysis process, templates and graphs are used with the permission of the Institute of Public Works Engineers' (IPWEA) NAMS.PLUS.

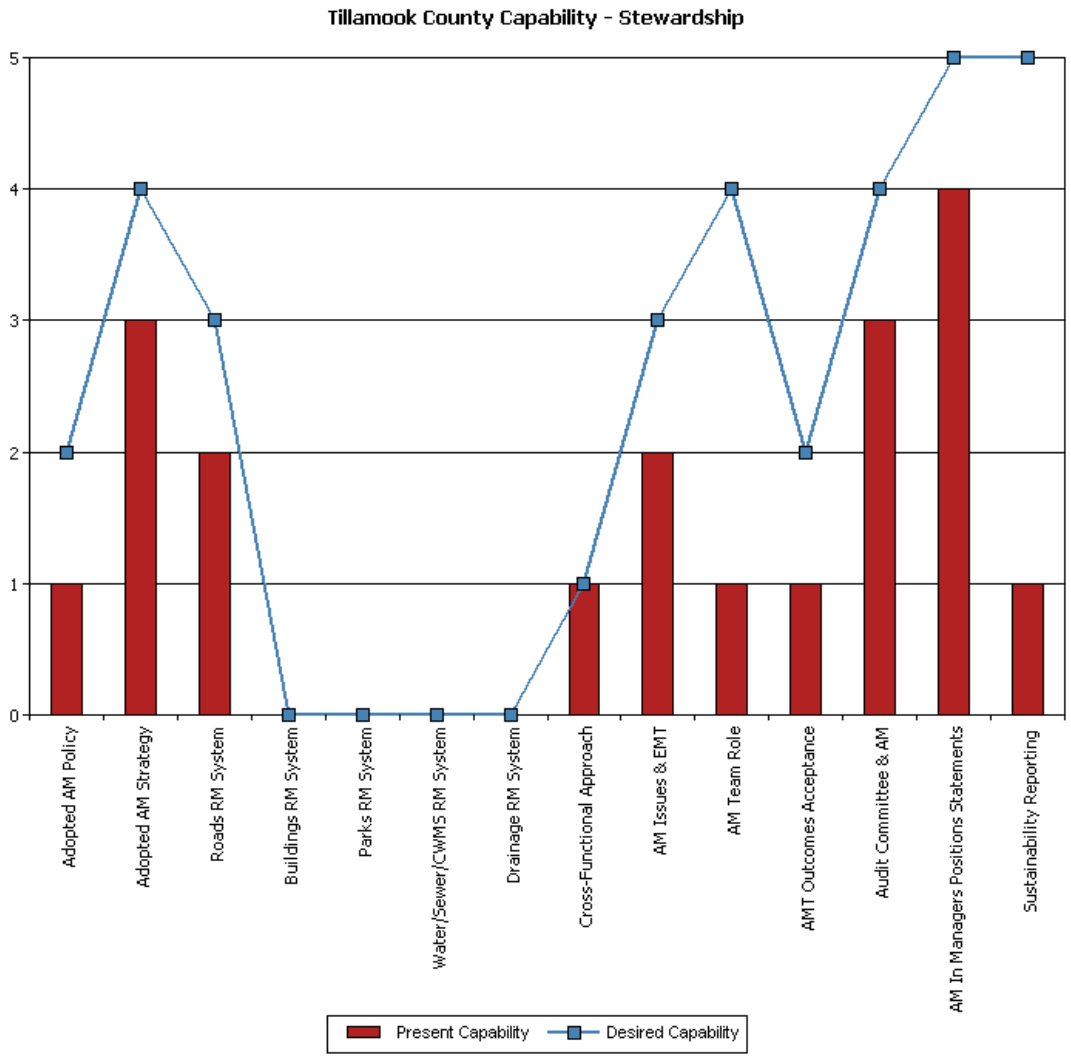


Figure 8.1 Asset Management Stewardship - Current Practice & Gap

Table 8.3 Asset Management Stewardship
Practice Areas and Capabilities

Practice Area	Capability
AM Policy	Adopted AM Policy
AM Strategy	Adopted AM Strategy
Risk Management Process	Roads RM System
Risk Management Process	Buildings RM System
Risk Management Process	Parks RM System
Risk Management Process	Water/Sewer/CWMS RM System
Risk Management Process	Drainage RM System
AM Accountability & Responsibility	Cross-Functional Approach
AM Accountability & Responsibility	AM Issues & EMT
AM Accountability & Responsibility	AM Team Role
AM Accountability & Responsibility	AMT Outcomes Acceptance
AM Accountability & Responsibility	Audit Committee & AM
AM Accountability & Responsibility	AM In Managers Positions Statements
Sustainability Reporting	Sustainability Reporting

c) Evaluation

No asset management policy has been adopted; plans are in place to present a draft policy to Tillamook County Board over the next 12 months for consideration. This would direct responsibility for implementing sustainable road management strategies and practices to the TCPW director with periodic review of progress by County Commissioners.

The adoption of an explicit strategy that manages county road assets is being addressed as a part of the risk assessment process and asset management plan adoption. A cross-functional team, composed of County Commissioners, human resource and community development and emergency management managers along with the County Road Advisory Committee (CRAC) and TCPW management are reviewing the current status and condition of road assets, and ranking priorities based on the desire to implement sustainable financing and a sustainable management strategy. This strategy is based on preserving existing assets as the primary focus while ensuring the safety of the traveling public.

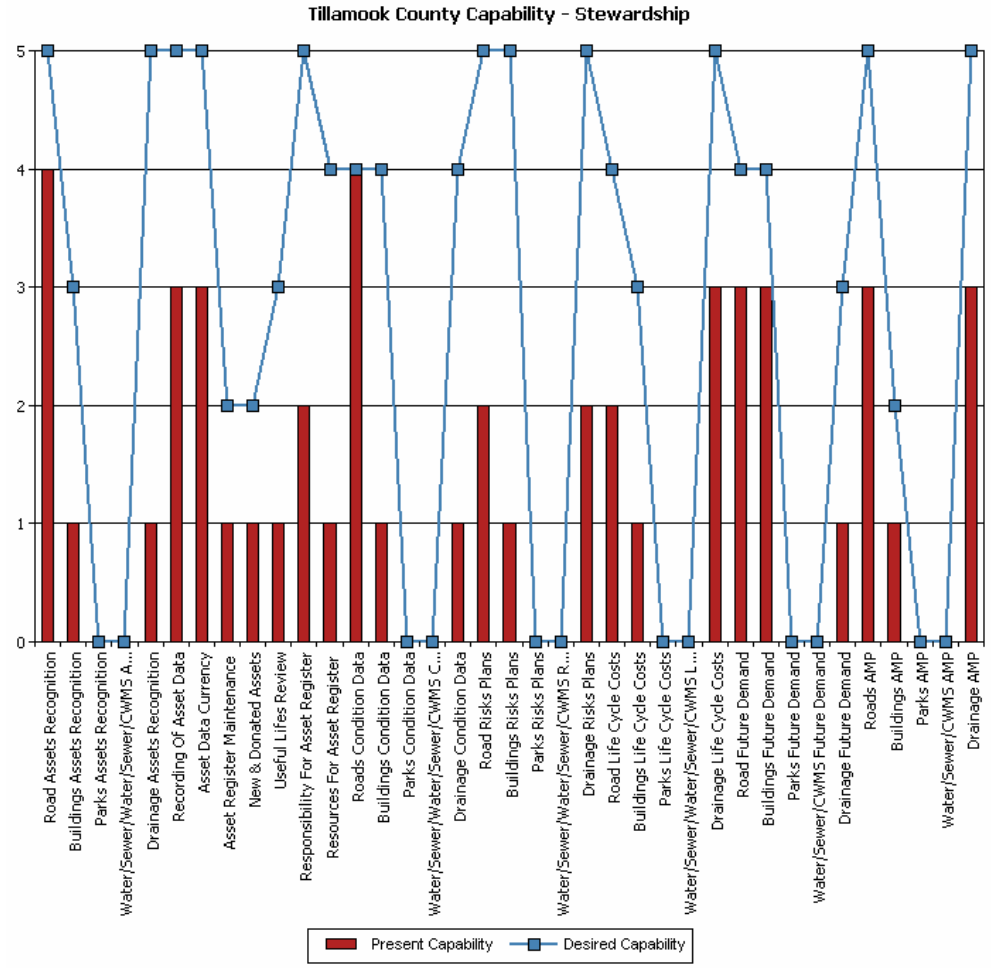


Figure 8.2 Asset Management Planning - Current Practice & Gap

Table 8.4 Asset Management Planning
Practice Areas & Capabilities

Practice Area	Capability
Asset Identification & Recording	Road Assets Recognition
Asset Identification & Recording	Buildings Assets Recognition
Asset Identification & Recording	Drainage Assets Recognition
Asset Identification & Recording	Recording Of Asset Data
Asset Data Maintenance	Asset Data Currency
Asset Data Maintenance	Asset Register Maintenance
Asset Data Maintenance	New & Donated Assets
Asset Data Maintenance	Useful Lives Review
Asset Data Maintenance	Responsibility For Asset Register
Asset Data Maintenance	Resources For Asset Register
Asset Condition Data	Roads Condition Data
Asset Condition Data	Buildings Condition Data
Asset Condition Data	Drainage Condition Data
Risk Management	Road Risks Plans
Risk Management	Buildings Risks Plans
Risk Management	Drainage Risks Plans
Service Levels & Delivery Costs	Road Life Cycle Costs
Service Levels & Delivery Costs	Buildings Life Cycle Costs
Service Levels & Delivery Costs	Drainage Life Cycle Costs
Future Demand Impacts	Road Future Demand
Future Demand Impacts	Buildings Future Demand
Future Demand Impacts	Drainage Future Demand
Asset Management Plans	Roads AMP
Asset Management Plans	Buildings AMP
Asset Management Plans	Drainage AMP

Evaluation

Data collection and ability to target future funding and condition from alternative scenarios is currently possible for pavement management. While bridge, sign and guardrail data is good, implementing risk based decision making at the network and project level is just beginning. Clear definition of the current service level and its cost are being included as a part of the first asset plan. Information is based on current practice; the three year improvement plan identifies the need to inventory and assess the condition of culverts and ditches.

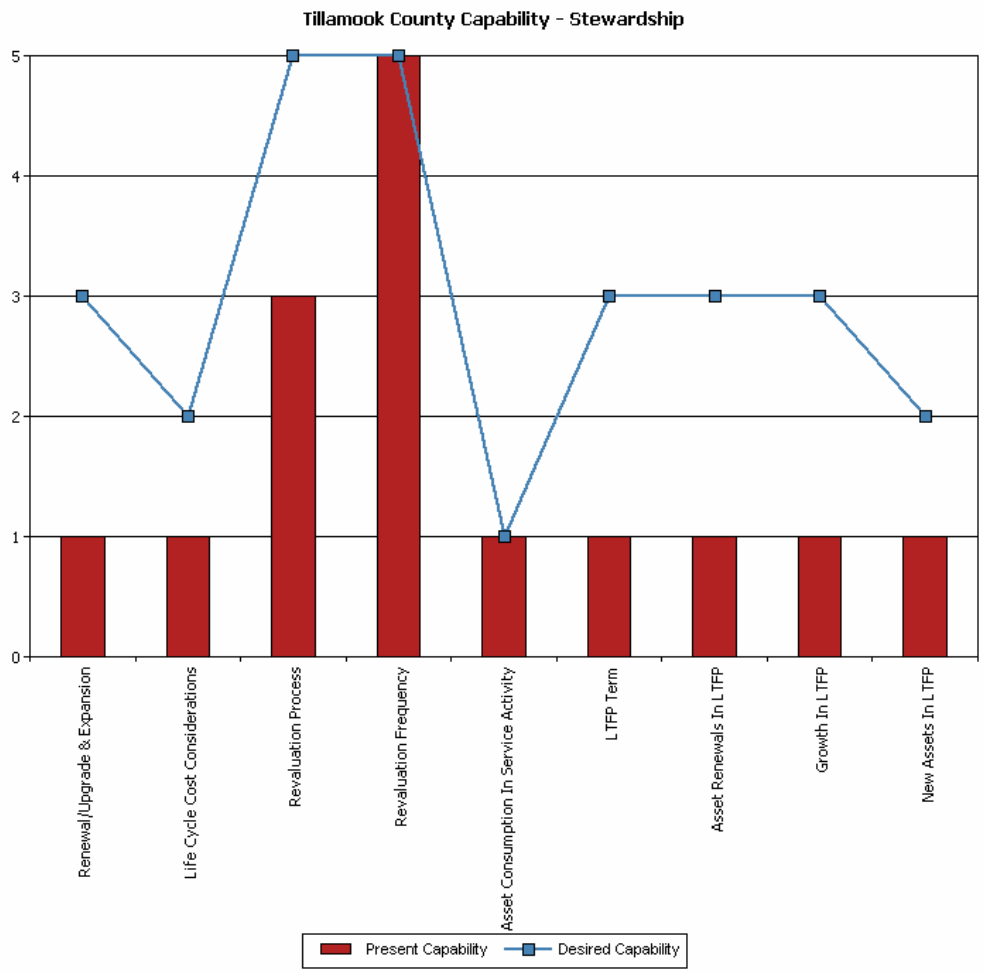


Figure 8.3 Financial Planning - Current Practice & Gap

Table 8.5 Financial Planning Practice Areas and Capabilities Assessed

Practice Area	Capability
Life Cycle Costs & Investment Decisions	Renewal/Upgrade & Expansion
Life Cycle Costs & Investment Decisions	Life Cycle Cost Considerations
Revaluation Process	Revaluation Process
Revaluation Process	Revaluation Frequency
Reporting Asset Consumption	Asset Consumption In Service Activity
Long Term Financial Plan	LTFP Term
Long Term Financial Plan	Asset Renewals In LTFP
Long Term Financial Plan	Growth In LTFP
Long Term Financial Plan	New Assets In LTFP

Evaluation

Current road funding is insufficient to address Tillamook County road maintenance and renewal. Funds are limited and dedicated to road maintenance and preservation (federal forest receipts and State Highway Trust Fund). However, local funding options are being explored which augment Tillamook County road funding and begin to address the critical needs of the road network.

TCPW has begun efforts to improve the link between work planning, cost accounting and performance reporting. This will improve the ability to track expenditures based on an asset's life cycle, and track work accomplishments so that performance can be reported. Life cycle costs are not currently tracked or considered in project selection; however introduction of risk-based decision making begins to introduce this into the decision making of TCPW.

County financial reporting is currently based on the historic depreciation of county physical road assets, a federal financial reporting requirement (GASB). However, financial reporting is needed that helps track expenditures during the year, and enables management to project long term financial needs based on current condition, anticipated demands and financing. TCPW currently does not have a capital improvement plan or financing to address known rehabilitation, replacement or expansion needs.

Chapter 9 Improvement Plan

9.1 Purpose and Objectives

Recommended improvements move TCPW to a more sustainable management of road assets. The following three-year improvement plan recognizes that management of Tillamook County road assets is a continual and ongoing process. Implemented on an annual basis, improvement projects are essential for continuous improvement of asset management practice.

The highest priority is given to those actions which:

- Ensure the right level of funding is allocated to maintain asset capacity, function and condition so that current and future service can be provided at the least cost
- Implement predictive modeling so that alternative long term cost scenarios are understood prior to and as a part of decision making
- Regularly consult with customers (internal and external) to ensure they have input into selecting the best scenario

The three-year improvement plan is a key outcome of the 2008 asset management status review discussed in Section 8, Asset Management Practices. It summarizes the major improvement tasks needed for asset management purposes. The Risk Register, Section 5, is used day to day as a management tool across TCPW to manage risk and improve risk management practice.

9.2 Monitoring & Review

Progress will be reviewed by the Director and reported annually to the CRAC and the Board of County Commissioners. This ensures issues are understood, improvements remain a priority and risks are managed.

This asset management plan will be reviewed during annual budget preparation and amended to recognize any changes in service levels and/or resources available to provide those services as a result of the budget decision process.

9.3 Improvement Plan Tasks

Policy

There is no policy which speaks directly to Tillamook County's commitment to manage its roadways.

1. The Tillamook County Board of Commissioners (BOCC) should explicitly adopt a road asset management policy clarifies how road services are to be managed and road needs funded. (See draft policy, Appendix D: Asset Management Policy).
2. The role of the BOCC and CRAC in setting goals and targeting road service performance needs to be clarified. Adopted goals should guide investment, program and project ranking criteria, and should be specific for each program.
3. List and communicate established federal, state, local statutes, County policy, governing engineering standards and practices, and agency policies and procedures to the CRAC and TCPW employees.

Performance Measures

There is no comprehensive annual performance reporting for TCPW programs or assets. There are no adopted targets for asset condition which makes it difficult to allocate resources based on adopted service priorities.

TCPW has historically developed its budget requests based on prior budget levels. Expenditure of funds has been based on reactive maintenance; work is organized to respond to service requests, safety hazards or weather events. Reactive maintenance significantly changes daily work priorities.

By assessing road asset needs, setting performance targets then tracking work performed, management can identify needs before they become hazards or require more expensive rehabilitation. Activities can be planned which reduce mobilization costs as staffing and equipment needs are planned. Unit rates to complete work can be identified for maintenance activities, performance tracked and levels of service used to forecast financial needs that achieve targeted physical asset condition (e.g., signs in very good or good condition) and performance (e.g., sign reflectivity).

1. The cost of each service and key performance measures should be adopted and reported annually. Service levels and road service budgets should be linked, and shared with the public. Planned, significant changes to services that are provided (e.g., eliminating a service) should be highlighted as a part of the annual budget process.
2. Targets should be approved by the County Board and appropriate budgets developed so that targets are achievable over defined time periods given available resources.
3. Roles should be assigned to track the inventory, condition and performance of assets.

4. Activity accomplishments should be reviewed. Appropriate workload measures should be assigned so that annual work plans can be developed for each service.
5. Clatsop and Jackson Counties should be contacted to identify improvements to work planning and performance reporting and benchmark the cost of activities and services. This may benefit foremen as they structure how and when activities are performed.
6. Crews should be trained to identify appropriate maintenance and renewal actions given asset performance and condition. Maintenance standards should be developed which include clear photographs, descriptions and quantitative measures to define the condition of an asset and appropriate maintenance or renewal activities.
7. The TCPW activities should be reviewed and redefined so that they are aligned with: location, asset class or service (e.g., drainage, structures, vegetation management), and whether an activity is performed to maintain, rehabilitate, install, or decommission an asset. Improving these relationships will enable TCPW to identify whether it is more efficient to continue to maintain or replace an asset based on the lowest life cycle cost.

Accountability

1. An annual report of all County road assets is needed. This should report the inventory, condition, replacement value and maintenance and renewal needs for each asset.
2. An inventory and condition assessment is needed for culverts and TCPW buildings.
3. Documented, regular and repeatable inspection processes based on established standards and frequencies are needed for each asset class.
4. Preventive maintenance activities should be segregated in the cost accounting system so that actions correlate more closely to managing the lifecycle of an asset, and note if an activity is reactive or planned (e.g., pothole patching is reactive while pavement overlays are planned activities). Staff should receive regular training which distinguishes activities that are reactive maintenance (response to service requests) versus proactive, or preventive maintenance (usually scheduling work targeted at maintaining an asset's condition or preventing its deterioration).
5. The TCPW asset management accountabilities and responsibilities should be added to the managers' position statement; foremen position statements should clearly identify their roles and asset management responsibilities, where appropriate.
6. The director TCPW and asset management responsibilities and roles should be adopted and the frequency of reporting to the CRAC and County Commissioners defined. The TCPW director and AM team will a) adopt strategy and assign implementation roles based on needs assessment and strategic initiatives to improve road services; b) plan implementation for data collection, review of service delivery, and information technology implementation (e.g., service requests, inventory and mapping services); and

c) plan ongoing operations and planning (e.g., evaluate and monitor accomplishments) and ongoing plan review).

Resource Allocation

1. Implement a risk-based assessment at the network, program and project level. Review the risks identified in this plan to ensure known risks are included, adopted priorities are reflected in criteria. The objective is to clearly document the tradeoffs of investing more or less in various services and identifying and selecting projects in a consistent and defensible manner.
2. Adopted policies should guide service priorities and road resources.
3. The Local Access Roads (LAR) Board Order should be reviewed given the resources of Tillamook County. Provision of county road maintenance services on private roads is not performed by adjoining Oregon counties.
4. Service requests purpose should be clearly noted, priorities assigned and response standards adopted and tracked.
5. "Our agency has established trigger values of performance measures resulting in various actions."

Operational Efficiency

Management is beginning to implement innovative ways to reduce operational costs.

1. TCPW should adopt an explicit policy that as resources are spent on the County's road assets, consideration of innovative techniques for new or major renewal projects will be considered, including performance-based contracting. Bulk materials purchases and equipment sharing should be pursued as a regular practice.
2. Complete intergovernmental agreement (PMAT) which shares resources and services.
3. List operational efficiencies (e.g., changes in work practice or materials, partnerships with other jurisdictions, disposal of underutilized equipment) in the annual asset status and condition report so that employees, CRAC, the County Board and the public are aware progress.
4. Examine on-going costs such as equipment maintenance and repair versus equipment replacement, as well as gravel hauling. Identify whether more efficient mobilization can be achieved with fewer work sites.

Data Collection and Organization

1. Pavement, bridge, sign and guardrail inventory is current and condition known. Equipment management has just begun recently, as has guardrail condition assessment. Inventory and assess condition of culverts, ditches, levees, and buildings.
2. Enter sign and sign post condition in IRIS. Document methods of condition assessment for each inventory so a repeatable process can achieve similar results when conducted by more than one individual.
3. Annually report on TCPW assets' inventory, condition, the method of assessing condition and the confidence and frequency of methods used.

Document roles, responsibilities and methods for collecting and maintaining inventory information.

4. Establish regular schedule for assessing asset condition that reflects the risks to the community and County liability.
5. Train managers responsible for data maintenance and condition assessment on use of IRIS.
6. Budget development and annual reports to the public and decision makers should include:
   - An explanation of the current level of service and targeted level of service given a specific timeframe for achieving a road asset condition. The annual budget should seek to link short term budget levels to long term consequence of budgets.
   - Annual accomplishments (e.g., miles of roads overlayed, signs replaced or maintained, miles of guardrail repaired)
   - Service requests by type
   - Public surveys on perception of service priorities and needs

Technology

1. Explore use of Marion County's GIS (mapping) services.
2. Discuss whether adding a video log of all county roads to the pavement condition assessment contract would be of benefit. Contact Clatsop County and identify costs and benefits.
3. Assign clear responsibility for completing high priority asset inventories and condition assessments, i.e., culverts, ditches, levees, buildings.
4. Document the methods for assessing asset condition, including citing sources of standards and measures used. The objective is to maintain current and accurate data on asset inventory, condition, performance, cost and work accomplishment.
5. Data roles and responsibilities, and, where appropriate, training on use of these digital tools should be clearly identified.
6. Protocols for closing service requests should be identified and links to work performed made explicit.
7. The use of the Maintenance Management Module (MM)[96] should be explored. Jackson County should be contacted for evaluating the effort and benefits of implementing this work planning and scheduling module in IRIS. As this is pursued, coordinate Cost Accounting System (CAS) activities with MMS activities so that planned versus actual reporting can occur.
8. Review CAS activities so that they relate to location, program and an asset's management over its life cycle.

Financial Planning

1. Support local funding efforts that explore additional Tillamook County road funding for critical needs of the road network.
2. Introduce a stronger link between work planning, cost accounting and performance reporting. This should track expenditures based on an asset's

[96] Currently in use by Josephine County.

life cycle, and track work accomplishments so that performance can be reported.

3. Establish reporting system that begins to track life cycle cost of work activities; incorporate life cycle cost consideration in capital project selection.
4. Introduce annual revaluation and inventory, condition rating and unmet need in annual Status & Condition Report for County Transportation Network
5. Continue risk-rate services which highlight needs based on criticality or risk. Introduce risk-based decision making throughout TCPW decision making (project selection, service priorities, and budget requests).
6. Move from reporting historic depreciation for County road assets in financial reporting to current valuation. Base asset value on effective life of assets, current condition and anticipated service demands.
7. Develop long range capital improvement plan and capital improvement financing to address known rehabilitation, replacement and expansion needs. Integrate with County Transportation System Planning capital project priority setting.

9.3 Improvement Plan Projects, Resources and Costs

Improvemement Plan Schedule FY 2009-2011													
		FY2008-2009				FY2009-2010				FY 2010-2011			
No.	Task	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
	Policy												
1	Adopt explicit Board road asset management policy that clarifies how road services are to be managed and road needs funded. (See draft policy, Appendix D: Asset Management Policy).												
2	The role of the BOCC and CRAC in setting goals and targeting road service performance needs to be clarified. Adopted goals should guide investment, program and project ranking criteria, and should be specific for each program.												
3	Distribute Asset Plan: Communicate established federal, state, local statutes, County policy, governing engineering standards and practices, and agency policies and procedures to the CRAC and TCPWD employees.	**In Progress**											
	Performance Management												
4	The cost of each service and key performance measures should be adopted and reported annually. Service levels and road service budgets should be linked, and shared with the public. Planned, significant changes to services that are provided (e.g., eliminating a service) should be highlighted as a part of the annual budget process.												
5	Targets should be approved by the County Commission and appropriate budgets developed so that targets are achievable over defined time periods given available resources.												
6	Roles should be assigned to track the inventory, condition and performance of assets.												
7	Activity accomplishments should be reviewed. Appropriate workload measures should be assigned so that annual work plans can be developed for each service.												
8	Clatsop and Jackson Counties should be contacted to identify improvements to work planning and performance reporting and benchmark the cost of activities and services. This may benefit foremen as they structure how and when activities are performed.												
9	Crews should be trained to identify appropriate maintenance and renewal actions given asset performance and condition. Maintenance standards should be developed which include clear photographs, descriptions and quantitative measures to define the condition of an asset and appropriate maintenance or renewal activities.												
10	The TCPWD activities should be reviewed and redefined so that they are aligned with: location, asset class or service (e.g., drainage, structures, vegetation management), and whether an activity is performed to maintain, rehabilitate, install, or decommission an asset. Improving these relationships will enable TCPWD to identify whether it is more efficient to continue to maintain or replace an asset based on the lowest life cycle cost.												
	Accountability												
11	An annual report of all County road assets is needed. This should report the inventory, condition, replacement value and maintenance and renewal needs for each asset.												
12	An inventory and condition assessment is needed for culverts and TCPWD buildings.												
13	Documented, regular and repeatable inspection processes based on established standards and frequencies are needed for each asset class.												
14	Preventive maintenance activities should be segregated in the cost accounting system so that actions correlate more closely to managing the lifecycle of an asset, and note if an activity is reactive or planned (e.g., pothole patching is reactive while pavement overlays are planned activities). Staff should receive regular training which distinguishes activities that are reactive maintenance (response to service requests) versus proactive, or preventive maintenance (usually scheduling work targeted at maintaining an asset's condition or preventing its deterioration).												
15	The TCPWD asset management accountabilities and responsibilities should be added to the managers' position statement; foremen position statements should clearly identify their roles and asset management responsibilities, where appropriate.												
16	The director TCPW and asset management responsibilities and roles should be adopted and the frequency of reporting to the CRAC and County Commissioners defined. The TCPW director and AM team will a) adopt strategy and assign implementation roles based on needs assessment and strategic initiatives to improve road services; b) plan implementation for data collection, review of service delivery, and information technology implementation (e.g., service requests, inventory and mapping services); and c) plan ongoing operations and planning (e.g., evaluate and monitor accomplishments) and ongoing plan review).												
	Resource Allocation												
17	Implement a risk-based assessment at the network, program and project level. Review the risks identified in this plan to ensure known risks are included, adopted priorities are reflected in criteria. The objective is to clearly document the tradeoffs of investing more or less in various services and identifying and selecting projects in a consistent and defensible manner.	**Done**											
18	Adopted policies should guide service priorities and road resources.												
19	The Local Access Roads (LAR) Board Order should be reviewed given the resources of Tillamook County. Provision of county road maintenance services on private roads is not performed by adjoining Oregon counties.	**Done**											
20	Service requests purpose should be clearly noted, priorities assigned and response standards adopted and tracked.												

Improvemement Plan Schedule FY 2009-2011														
No.	Task	FY2008-2009				FY2009-2010				FY 2010-2011				
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
	Operational Efficiency													
21	Adopt an explicit policy that as resources are spent on the County's road assets, consideration of innovative techniques for new or major renewal projects will be considered, including performance-based contracting. Bulk materials purchases and equipment sharing should be pursued as a regular practice.	**Done**												
22	Complete intergovernmental agreement (PMAT) which shares resources and services.	**Done**												
23	List operational efficiencies (e.g., changes in work practice or materials, partnerships with other jurisdictions, disposal of underutilized equipment) in the annual asset status and condition report so that employees, CRAC, the County Board and the public are aware progress.	**In Progress**												
24	Examine on-going costs such as equipment maintenance and repair versus equipment replacement, as well as gravel hauling. Identify whether more efficient mobilization can be achieved with fewer work sites.													
	Data Collection and Organization													
25	Pavement, bridge, sign, ditches and guardrail inventory is current and condition known. Equipment management has just begun recently, as has guardrail condition assessment. Initiate inventory and assess condition of culverts, levees, and buildings.													
26	Enter sign and sign post condition in IRIS. Document methods of condition assessment for each inventory so a repeatable process can achieve similar results when conducted by more than one individual.													
27	Annually report on TCPWD assets' inventory, condition, the method of assessing condition and the confidence and frequency of methods used. Document roles, responsibilities and methods for collecting and maintaining inventory information.													
28	Establish regular schedule for assessing asset condition that reflects the risks to the community and County liability.	**In Progress**												
29	Train managers responsible for data maintenance and condition assessment on use of IRIS.													
30	Budget development and annual reports to the public and decision makers should include:	**In Progress**												
30a)	a) An explanation of the current level of service and targeted level of service given a specific timeframe for achieving a road asset condition. The annual budget should seek to link short term budget levels to long term consequence of budgets.	**In Progress**												
30b)	b) Annual accomplishments (e.g., miles of roads overlayed, signs replaced or maintained, miles of guardrail repaired)	**In Progress**												
30c)	c) Service requests by type	**In Progress**												
30d)	d) Public surveys on perception of service priorities and needs	**As exists in other sources**												
	Financial Planning													
31	Support local funding efforts that explore additional Tillamook County road funding for critical needs of the road network.	**In Progress**												
32	Introduce a stronger link between work planning, cost accounting and performance reporting. This should track expenditures based on an asset's life cycle, and track work accomplishments so that performance can be reported.													
33	Establish reporting system that begins to track life cycle cost of work activities; incorporate life cycle cost consideration in capital project selection.													
34	Introduce annual revaluation and inventory, condition rating and unmet need in annual Status & Condition Report for County Transportation Network	**In Progress**												
35	Continue risk-rate services which highlight needs based on criticality or risk. Introduce risk-based decision making throughout TCPW decision making (project selection, service priorities, and budget requests).	**In Progress**												
36	Move from reporting historic depreciation for County road assets in financial reporting to current valuation. Base asset value on effective life of assets, current condition and anticipated service demands.	**In Progress**												
37	Develop long range capital improvement plan and capital improvement financing to address known rehabilitation, replacement and expansion needs. Integrate with County Transportation System Planning capital project priority setting.													

9.4 Improvement Program Monitoring

TCPW is committed to continuously improving the way it provides and reports on road services in Tillamook County. The Tillamook County Road Advisory Committee (CRAC) serves as the Asset Management Steering Committee. The TCPW Director reports to the CRAC monthly and ultimately to the County Commissioners. The County Board approves Public Works priorities and asset management progress.

Management and performance reporting occurs as follows:

Table 9.4 TCPW Asset Management & Improvement Plan Monitoring

Report & Monitoring Method	Frequency	Responsible	Approves	Conferred with	Informed
Asset Management Plan	Every 3 years	TCPW Director	BOCC	CRAC	TCPW Mgmt. & Employees Community & Partners
Three-Year Improvement Plan & Progress	Annual	TCPW Director	BOCC	CRAC	TCPW Mgmt. & Employees Community & Partners

Appendices

Appendix A
Tillamook County Vision, Mission & Values

The TCPW vision is:
"*Tillamook County's high-quality, safe road network supports a thriving economy and a healthy environment. Our professional, well-trained staff works in partnership with our community to ensure that our road network meets the needs of our citizens now and in the future."* (draft 2/2008)

The TCPW mission that achieves its vision is:
"*We take pride in serving the public by providing, maintaining, and preserving a safe and efficient county road network, and quickly responding to weather events and hazards. We protect the public's investment by working with our partners and targeting resources to minimize long term costs while providing the best possible service."* (draft 2/2008)

Values that guide TCPW and how the mission is accomplished are:

- *Teamwork – We work together as a team, dedicated to exploring all options while supporting each other in performing high quality work.*
- *Communication – We keep the lines of communication open with our employees, our partners and our customers.*
- *Professionalism – We strive for professional excellence by supporting employee training focused on improved service delivery.*
- *Change – We anticipate and prepare for change to meet the needs of today and the future.*
- *Accountability - We deliver on our promises, and we maximize the use of public funds to deliver the best possible results.*
- *Success – We provide successful solutions to the meet the needs of the public, and we celebrate our successes.*
- *Safety – We perform our work safely to protect our employees, our customers and our environment.*

Appendix B
Local Access Road Policy Statement

Road and bridges with route codes beginning in “a”, “B” or “C” are “County Roads” (examples: A506, B732 or C951-0253).

Roads and bridges with route codes without a letter at the beginning are “local Access Roads” (examples: 3081, 3203-0253).

TCPW is authorized to do whatever work is necessary for the maintenance and repairs of “County Roads” without prior authorization from the Board of Commissioners.

However, TCPW may only do work on “Local Access Roads” specifically authorized by the Board of Commissioners.

The Board of Commissioners established, by Board Order, the work that can be done on local access roads without prior approval of the Board of Commissioners:

1. Installing and maintaining street “name” signs.
2. Mowing and brush cutting to improve visibility for safety.
3. Performing small projects necessary to reopen roads blocked by storm activity.
4. Maintenance grading of gravel roads, including the adding of fresh crushed aggregate, as needed.
5. Maintenance of existing paving, including thin overlays when needed.
6. Inspecting bridges and posting appropriate signs warning of dangerous bridge conditions.
7. Maintaining and repairing the following bridges:
    - Coho Bridge (#128) – (Foley Estates)
    - Ridgeview Bridge (#129) – (Foley Estates)
    - Curl Bridge (#151) – Curl Road
    - Schriber Bridge (#170) – Schriber Road
    - Prince Bridge (#172) – Kiger Road
    - Cascade Trace (#273) – Silver Valley Ranch)

8. Keeping Bay Ocean Dike Road in a passable condition from the gate at the parking lot to the south Tillamook Jetty.

Any work on “Local Access Roads” other than the above, must be by written order from the Board of Commissioners.

Appendix C
Tillamook County Road Construction Plan Standards[97]

This appendix augments, but is also designed to be used independent of the larger Road Improvement Policy.

The purpose of this appendix is to simplify the construction plan review process. Below are outlined various topics found in preliminary construction plan submissions to Public Works (a.k.a. Road Department) that often require further updating. To prevent unnecessary work by a developer, his representatives and Public Works, many of Public Works general policies on these topics are outlined below. This appendix is a working document and is not all inclusive. Advance review and incorporation into anticipated construction plans as appropriate may be a time saver for all involved.

These standards are applicable to most road construction plans submitted to the Road Department for review (including those related to major partitions and subdivisions [public or private roads] being created through the County Land Division Ordinance).

The below list augments standards in A Policy on Geometric Design of Highways and Streets (Current Edition) (AASHTO manual).

While the below outlines basic construction plans standards, a development or project may be subject to additional conditions of approval from other jurisdictions or sources including:

- Land Division Ordinance (for subdivisions or major partitions), or
- Land Use Ordinance, or
- Regulatory agencies such as Oregon Division of State Lands or U.S. Army Corps of Engineers (for activities such as wetlands, fill or other environmental concerns).

Lack of specific reference in Road Department plan reviews to above requirements does not eliminate those conditions, if applicable.

If you have any questions or recommendations on how to explain any topic more clearly, please contact the Public Works Engineering Project Supervisor with your input.

1. Construction plan review/approval are generally required for all construction activities in public right of ways including, but not limited, to the following activities:
   - Construction related to land use approvals where Public Works is the designated authority for reviewing **This note added 11/05** construction plans/activities (such as private or public roads created in subdivisions or major partitions, or other land use actions with off-site public road construction involved).
   - Construction activity in public right of ways (with existing roadway, less than full standard roadways or non-existing roadways). Applicable regulatory ordinances may include the Road Approach Ordinance,

[97] Updated 3/27/2007

Regulations for Utilities in Tillamook County Public Road Rights-Of-Way (a.k.a. “Utilities Ordinance”), Road Improvement Ordinance.

- Other construction activity not tied to above documents such as fish passage culvert replacements.
- Subdivision or major partition tentative plat approvals may include public and/or private roads. The County Land Division Ordinance requires Public Works to provide input on and review road construction proposals for these developments.

2. Typical construction plans reviewed by Public Works should include the following:

a. Cover page including the following information:

Project Title

Contact information for: Engineer, Surveyor and Owner/Applicant (as appropriate)

Professional Engineer (PE) seal/signature. With a bound document such as Specifications or a report, PE stamp on the cover is adequate. On plans sheets, we require each sheet to have a PE stamp. (Paragraph 4 below)

Vicinity map for the project work

Notes as appropriate (Paragraph 27 below)

Index of sheets in the full set of plans

b. Each plan sheet shall be dated to include latest revision date

c. Road plan view(s) including required sign placement and pavement markings (Paragraphs 16 and 17 below)

d. Road profile(s) (Paragraph 7 below)

e. Road section(s) (Paragraph 5 below)

f. Construction plans shall reflect existing conditions and proposed construction including:

• Topographic information (contours) may be required to facilitate review of respective plans details

• Right of way and/or property lines as appropriate

• Utility lines (underground and overhead) (Paragraph 12 below)

• Drainage details shall adequately outline how drainage runoff is handled within the development, out of the development until it reaches a natural or previously constructed drainage destination. If a project incorporates detention pond(s), the engineer will be expected to provide appropriate analysis (calculations) indicating adequacy of the detention ponds size, etc. (See also Paragraph 10 below). Applicants should be aware of possible environmental permit conditions that relate to drainage that may impact drainage plan development.

• Road approaches (Paragraph 13 below)

• Fill/cut slopes including catch points

• For a disturbed existing roadway, restoration to original conditions at project completion is a minimum requirement. The Erosion Control Plan shall outline intermediate restoration or mitigation requirements during progress of work.

g. Geotechnical Report as appropriate (if required by another agency or jurisdiction or this Department) (Paragraph 9 below)

h. Erosion Control Plan (ECP). Tillamook County Public Works does not have a specified ECP standard other than it should address reasonably expected erosion issues on-site and off-site. Additional requirements may come out of environmental, land use or other permit conditions of approval. The ECP will be reviewed to verify it addresses the project area and any specified details brought to the attention of the Department by other organizations.

i. Traffic Control Plan as appropriate (Paragraph 25 below)

j. Standard Details, as appropriate, to allow a construction contractor to complete needed work with appropriate construction engineering inspection.

k. Submission of Plans: An applicant/engineer shall submit 2 sets of construction plans for needed review. If needed, one of the plan sets will be redlined and returned to the applicant/engineer for updating.

3. **Scale**.

Unless otherwise indicated, all drawings shall be to scale with that scale shown on the sheet. Actual scale utilized is dependent on end product hard copy size.

4. **Engineered Plans**.

According to OSBEELS (Oregon State Board of Examiners for Engineering and Land Surveying), all roads used by the public, visitors, contractors or employees need to be designed and stamped/sealed by a professional engineer. This includes specifications, road sections and design(s) for cuts/fill. For any significant changes in the roadway configuration, engineered details shall be consistent with AASHTO. A professional surveyor seal is adequate for mapping. Road approach permit plans/drawings often do not require PE certification.

If a proposed road improvement for a land use action (subdivision or major partition) is 30 feet in length or less, the requirement for PE stamped plans may be waived provided there are no other outstanding design issues requiring significant design effort (i.e. steep topography, retaining walls, geo-technical mitigation, etc.)

5. **Typical Road Section.** Construction plans shall include typical road sections(s) for roads in the proposed construction. The governing ordinance outlines the standards for the typical road section. If a road construction proposal is within the city limits of or Urban Growth Boundary

of an incorporated city, the city's road section requirements will prevail and be incorporated in the plans.

Short of specifics in a respective ordinance, Enclosures 1 & 2 to this Appendix (located at the end of this appendix) show the County typical sections. The Notes with each typical section provide respective additional information. The widths

This note added 3/07

are defined by AASHTO or (when appropriate with local services roads) minimum standards of the local fire department. As noted on the Road Sections, the designing engineer may determine that a different higher standard road section should apply to a specific proposal. That road section may, for example includes curb for a private roadway in a subdivision tentative plat application. Any road sections that deviate from the outlined typical standard sections will be reviewed case by case based on unique circumstances and in accordance with the basic standards of AASHTO and APWA.

6. **Materials Specifications.**
These Specifications are specifically stated in the County Road Acceptance Ordinance and the Public Road Improvement Ordinance. They are repeated below for clarification. A higher materials specification may be specified by the engineer.

a. **AGGREGATE BASE**. All roads must be constructed with an aggregate base according to the following details: Rock base may be fractured pit run or crushed aggregate. Maximum rock size shall be 4". No more than 10% shall be less than 1". Compaction of the aggregate base shall be done with either a vibratory roller or a static steel wheel roller with a minimum gross weight of 8 tons. The aggregate sub-base shall be laid in accordance with the Standard Roadway Section. See Enclosure 1 or 2 as
appropriate.

b. **AGGREGATE LEVELING COURSE**. All roads must be constructed with an aggregate leveling course according to the following details: Leveling course shall be 3/4"-0 Base Aggregate and shall conform to the requirements of subsection 2630.10 of the Standard Specifications [*2002 Oregon Standard Specifications For Construction*]. Compaction of the aggregate base shall be done with either a vibratory roller or a static steel wheel roller with a minimum gross weight of 8 tons. The aggregate leveling course shall be laid in accordance with the Standard See Enclosure 1 or 2 as appropriate.
Roadway Section.

c. **ASPHALT PAVEMENT**. All roads to be accepted as county roads must be paved with asphalt pavement. Asphalt paving shall be in accordance with the following details:

1. The Asphalt Concrete (AC) Mixture for this project shall be "Light Duty AC", Class 'C' Mix. The mix formulation and placement methods shall conform to Section 00745 of the Standard Specifications, except as follows: The Asphalt Cement shall be PBA-5 grade asphalt and shall conform to the requirements of Section 02710 of the Standard Specifications.

2. The final lift shall consist of not less than three (3) inches compacted of Class 'C' Asphalt Concrete sloped to maintain a 2% crown from the road centerline. This lift shall be placed using an asphalt concrete paving machine and rolled to achieve optimum density.

3. The asphalt pavement shall also conform to the drawing entitled Standard Roadway Section. See Enclosure 1 or 2 as appropriate.

Where State or Federal funds are utilized, a higher standard for materials may apply. Class 'B' Mix asphalt may be directed if conditions warrant (such as with higher traffic counts on the road or other factors).

7. **Design Speed.**

Design speed for all roads will be reviewed (including vertical and horizontal curves) in accordance with the AASHTO Manual. Generally the County minimum design speed requirement is 25 mph for local roads. There are cases in the AASHTO Manual where a lesser design speed is warranted based on topography and potential traffic volume. Road profiles should reflect appropriate information to evaluate the above information.

8. **Backfill Policy.**

If the engineer desires sand backfill in trenches, it may be approved under the following circumstances:

a. Approved as part of the construction plan

s. b. Sand backfill occurs in like native soil **only**.

c. No sand backfill in a road grade greater than 2%.

d. No sand backfill below or at a water table.

e. Uniform fill unless exceptions requested/approved (i.e. compacted rock at pipe bed with compacted sand over).

f. Sand backfill is engineer certified (i.e. field inspected) for proper compaction.

If there is doubt of compliance to the submitted/approved construction plans, the County reserves the right to dig up test spots to check compliance. If the construction plans were followed, the County will pay for

restoring pavement, etc. If not, the developer will be responsible for restoring the pavement, etc. along with the trench backfill corrective action.

It is in the County's and your best interest to insure the proper fill method is utilized. Notifying Public Works of testing times on-site may be one method for sharing information.

9. **Geotechnical Report**.
If not already required by another jurisdiction, Public Works may require a geotechnical analysis to be performed if conditions warrant. Examples where a geotechnical report may be required include conditions where a report is required according to the County Land Use Ordinance, evidence of instability of the ground or poor or suspect soil conditions.

10. **Culverts.**
Culverts crossing under roadways shall be at least 18" diameter. Culverts under a road approaches shall be at least 12" diameter. Larger diameters may be required if large run-off flows are anticipated. Public Works may require adequate calculations to show that a new or replacement culvert size/design will adequately carry surface drainage flow through the culvert based on a minimum 100 year flood event.

11. **Environmental or Other Requirements**.
There may be further application/permitting requirements by other agencies or jurisdictions related to wetlands, floodplain, fill, erosion control, revegetation or other environmental concerns. Lack of reference by the Road Department to other jurisdiction requirements does not eliminate those requirements, if applicable. For any construction plans that include above details, the Road Department may will forward same to that agency/jurisdiction for respective review.

12. Utilities

a. **Utility Permits.** The County ordinance dealing with utilities is titled, Regulations for Utilities in the Tillamook County Public Road Rights-Of-Way (a.k.a. “Utilities Ordinance”). The placement of utilities in an existing public right of way requires a utility permit application signed by the respective utility and approved by Public Works. Most local utilities are aware of this permitting process. If interested, you can obtain a copy of the Tillamook County Utilities Regulations at Public Works.

Approved construction plans including utility details in a public right of way are **not** authorization to place those utilities in an existing public right of way. The approved construction plans indicate that proposed utilities in the plan have been reviewed for consistency with standards

of applicable ordinances and that conflicts between multiple utilities are sorted out. An approved utility permit is the only authorization to install the utilities.

During development of the construction plans, the applicant should coordinate with respective utilities for incorporation of their requirements. Also of interest to the applicant might be the time frame that utilities need to acquire materials for respective improvements. After final construction plan approval, respective utilities company will initiate utility work applications. If their applications are consistent with the approved construction plans, the utility permits are relatively straight forward to approve by Public Works. Lack of prior utility coordination has been one of the major sticking points and reasons for slowdowns in past projects. The Permit Staff at Public Works is the point of contact for specific questions not addressed in the Regulations.

Stubs for utility service connections to underground improvements shall be placed so as to avoid the need to disturb a newly paved surface when service connections are made later. Any underground service stub-outs shall be marked for later access (to avoid excavation searches).

Underground Conduits. Underground utility conduits shall clear right of way ditch bottoms and culverts by at least 30". With justification, 24" clearance may be approved. See Utilities Ordinance for further details.

13. **Road Approaches**.

a. Road approaches onto the public right of way. All road approaches onto public roads under County jurisdiction require road approach permits.

b. Standards and requirements for the Road Approach Permits are found in the County Road Approach Ordinance. Approaches off public right of ways into proposed developed shall not be utilized until properly constructed. This serves to protect the existing edge of the road travel way among other purposes.

c. The procedure for incorporating proposed road approaches into road construction plans of an existing public right of way is outlined in the Standards Section of the Road Improvement Ordinance.

d. If the logging and clearing of the right of way occur as part of the road construction, the temporary road approach conditions will be included as part of the construction plans approval.

e. Any temporary road approaches constructed to conduct activities such as logging that are not specifically part of the road construction plans will be handled through a temporary road approach permit. Temporary road approaches accessing the public right of way shall be applied for with a road approach application in accordance with the Road Approach Ordinance.

f. Road approach permit applications made prior to completion of a proposed public road improvement. Road approach permits will not be approved unless either the public road is constructed to appropriate standards or the proposed approach is previously incorporated into approved construction plans.

14. **Road Islands, Cul-de-sac Islands, Single Lane Roads and Road Gates.**
Road islands, cul-de-sac islands, single lane roads and road gates are not allowed on public right of ways. If roadway plans are developed for future private roadways as part of a land use action/approval, this Department highly encourages construction of islands and gates after the final plat and independent of the Road Department. See Enclosure 3 to Appendix B.

15. **Curbs.**
If curbs are to be considered as part of the project proposal, the following are basic design requirements:

a. From the curbs outward in the right of way there will be a 2% slope of the ground for at least four feet.

b. From that point out, fill slopes at 2:1 or cut slopes at 1.5:1 shall daylight to existing ground. Sand cut slopes are to be 2:1.

16. **Signs.**
Construction plans shall reflect placement of appropriate traffic signs and street fingerboard signs. See Enclosure C to this Appendix (See Road Sign Guidelines below).

17. **Striping.**
Construction plans shall show road striping as appropriate and shall be in accordance with the Manual on Uniform Traffic Control Devices.

18. **Retaining walls or rockery walls.**
Use of either scenario requires some excavation and/or material placement beyond the vertical face of the proposed wall. The extent of this work should be indicated on the plans along with final contours of the completed work. Use of pile driving in a sandy hill environment or a retaining wall that supports the roadway may require additional review. Retaining wall or rockery wall proposed plans shall be certified by a professional civil engineer.

19. **Bridge Designs.**
Any bridge to be constructed shall meet specifications as designated by the Director of Public Works and the current edition of AASHTO Standard Specifications for Highway Bridges. The plans for the bridge shall be stamped/signed by a licensed structural professional engineer.

20. **Required Actions During Project Construction**

a. County's expectation is that the applicant's engineer will provide track construction progress and provided needed direction/support to the contractor.

b. Improvements will be inspected and reviewed for conformance to standards of Public Works. Public Works shall be notified in advance to inspect subgrade, base, pavement (if proposed or required) and final work. These inspection requirements shall be stated on the plans.

c. Public Works may require changes in road typical sections or details if unusual conditions arising during construction warrant such changes.

d. All improvements placed beneath streets by the developer shall be constructed and inspected prior to street surfacing.

e. Public Works may require engineer certification of construction. Examples requiring engineering certification include, but are not limited to, retaining walls and compaction testing.

21. **Public right of way or easement dedications.**

Based on topography or input from an agency (such as the fire department), final approval of proposed construction plans may require acceptance of a public right of way dedication to augment the existing right of way. Fill or cut easements could be required. Any dedications or easements to the public will be made by the respective property owners and notarized. Prior to the County Board of Commissioners consideration any such acceptance, documents will be approved as to form by County Counsel. Submission to County Counsel for review is executed through Public Works.

22. **Road vacations.**

If the project proposal involves a public road vacation, applicant should review related requirements in a copy of the Tillamook County Road Vacation information letter. This document can be obtained at Public Works.

23. **Construction Activity Prior to Approval of Respective Plans/Permit**.

For projects under the purview of the County Road Department, construction activity prior to approval of construction plans is discouraged. Excepts including that brushing/clearing required for survey work or soils exploration.

It should be emphasized that any construction work initiated prior to plan or permit approval will not be considered as justification for requesting a lesser construction standard.

24. **Private Property Access**.
Appropriate property owners permissions are required for cut/fill or other activity outside of the public right of way. The Road Department can not give permission for construction activity on private property.

25. **Traffic Control Plan.**
Construction plans will include traffic plan details. Roads with no alternate access can be closed up to 20 minute intervals coordinated in advance.

Other County requirements such as public/911 notice apply. Notice requirements can be obtained from the Road Dept office. It should be noted that closure of the road as indicated above is not a given and may need further coordination to resolve related concerns.

26. **Do not block property accesses**.
Construction activities should not block existing accesses to adjacent properties without permission or coordination with the respective owners.

27. **Construction Plans Notes.**
As a minimum, submitted plans shall include the following as part of the Notes:

a. **Inspection Advance Notice**.
Public Works requires at least 72 hours notice for inspections (subgrade, base, pavement and final). The time frame that Public Works will be able to respond to an inspection request may be affected by current staff workload and location of the project. The 72 the construction plans.
hours notice shall be stated on

b. **Contractor License/Insurance.** Contractors working in public right of was shall be licensed for their work and maintain liability insurance requirements consistent with the Utilities Ordinance. Evidence of insurance shall be provide to the Road Department.

c. **See above Required Action During Project Construction**
(Paragraph 20)**.**

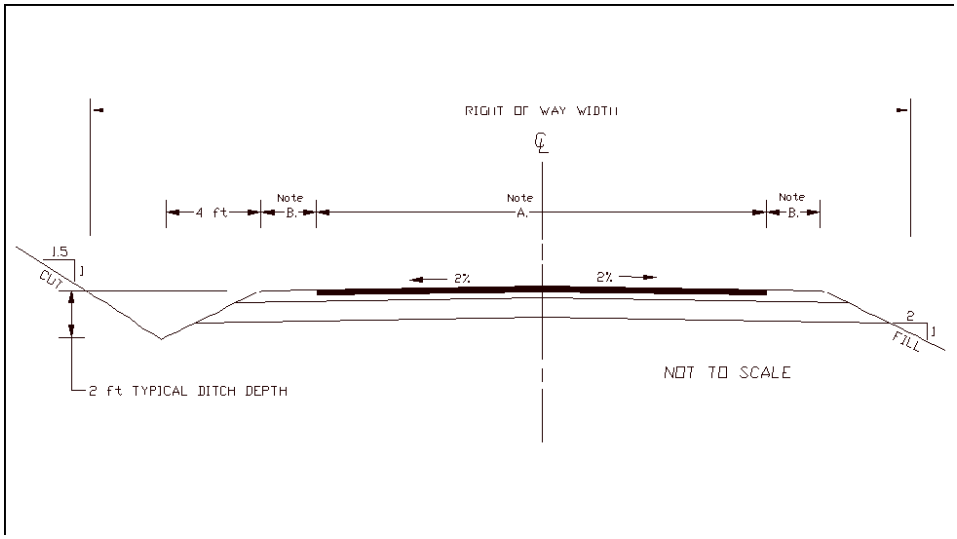
28. **Approval of Construction Plans**.
The Road Department shall review plans deemed as complete. Approval of plans will be in the form of a hard copy letter from the Department. That approval letter shall be considered as part of the approved plans.

29. **Modifications to Final plans.**
Any modification to construction plans after final construction plan approval requires submission in writing of the proposal and justification for

the change. Ultimately any approved changes need to be reflected in the final construction plans.

Based upon unique conditions encountered or proposed, additional requirements may apply.

ENCLOSURE 1 to APPENDIX C:



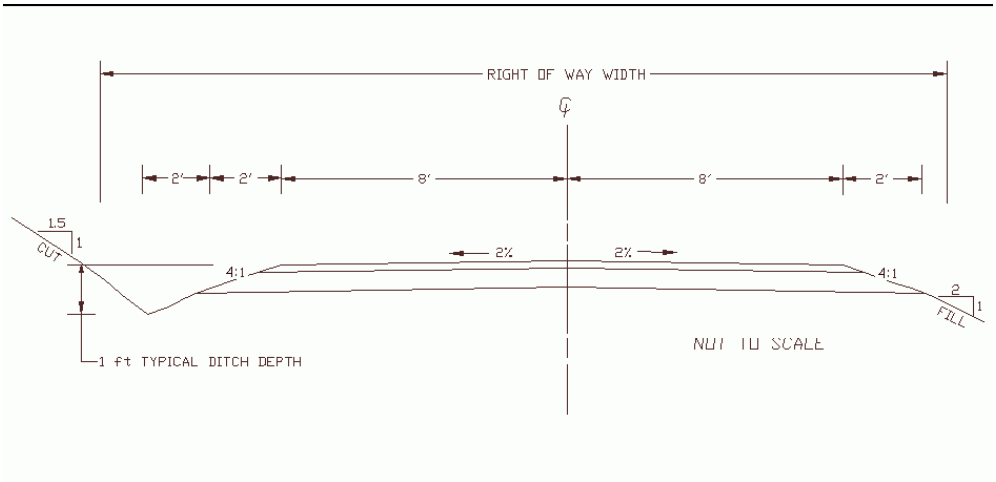
STANDARD ROADWAY SECTION

Minimum 3" Class 'C' A.C. Pavement (compacted)
Minimum 3" Aggregate Leveling Course (compacted)
Minimum 9" Aggregate Base (compacted)

Notes:

A. Width of traveled way in accordance with AASHTO Manual centered in the right of way.
B. Width of shoulders in accordance with AASHTO Manual.
C. Build up shoulders to match pavement level & slope using aggregate leveling course.
D. Aggregate and asphalt specifications in accordance with Materials Specifications as outlined in Appendix B.
E. The County Engineer may require a higher standard.
F. Left Turn Pockets and Right Turn Tapers may be required based on traffic warrants.

ENCLOSURE 2 to APPENDIX C:



MINIMUM ROADWAY SECTION

Minimum 3" Aggregate Leveling Course (compacted)
Minimum 9" Aggregate Base (compacted)

Notes:

A. This minimum roadway section is the minimum roadway improvement width standard authorized by local fire departments. Where sections of the AASHTO Manual have widths less than this, the above standard shall apply.

B. Width of traveled way centered in the right of way.

C. Aggregate and asphalt specifications in accordance with Materials Specifications as outlined in Appendix

ENCLOSURE 3 TO APPENDIX C

Policy on Use of Single Lane Roads, Road Islands

The following outlines current Public Works policy relating to use of single lane roads and islands in roads and cul-de-sacs. All of these features will be considered only as part of private road systems. Use of any of the below features will require approval of a Variance as per the Tillamook County Land Division Ordinance (LDO).

The ultimate goal in establishing standards for these road features is making safe, maintainable roadways that are accessible for emergency services. The following guidelines may be flexible when considered with appropriate variance requirements of the LDO, mitigating proposals, input from the local fire department, design within the standards allowed by AASHTO (American Association of State Highway and Transportation Officials) as outlined in A Policy

on Geometric Design of Highways and Streets, 1990 and ultimately the approval by the Director of Public Works.
A proposal for curbs requires an approved variance from LDO standards and is considered independent of variance(s) for item(s) addressed in this policy.
1. Single lane roads:
a. Single lane roads will be considered as part of a larger two way traffic flow.
b. Traveled road surface width shall be a minimum of 16 feet with 2 foot shoulders. This roadway width reflects a 20 foot wide clearance required by local fire departments. Ditch sections of the Tillamook County typical road section will apply.
c. If input from the local fire department reflects a higher standard, that standard shall apply.
2. Road islands:
a. Standards for single lane roads of the above paragraph apply to the roadway on each side of the island.
b. The height of structures and vegetation in road islands will be considered in conjunction with local fire department input, site distance, use of curbs (as approved by a Variance), and other road design features. Any approved structures will be placed outside of the road shoulders thus keeping the 20 foot wide emergency access clearance.
c. Construction plans of the road island will reflect surface drainage runoff not traveling over the road surface. Additionally, the plans will show road shoulders and a vertical view.
3. Cul-de-sac islands:
a. Standards for single lane roads of the above paragraph apply to the circular roadway around the island.
b. Additional lane width may be needed depending on the radius of the circular roadway.
c. Final construction plans of the cul-de-sac island will reflect surface drainage runoff not traveling over the road surface.
Use of gates on private roads will be considered as part of tentative plats being reviewed by County Staff. My staff is being instructed to deny gate proposals after tentative plat approval (i.e. during construction plan review).

ENCLOSURE 4 TO APPENDIX C

February 6, 2004

TILLAMOOK COUNTY ROAD SIGN GUIDELINES

The below are guidelines to use when planning for and installing signs on public roadways within Tillamook County and under the jurisdiction of the County. These guidelines are minimum standards as set forth in the Manual of Uniform Traffic Control Devices (MUTCD) and Oregon Sign Policy & Guidelines. **ALL** signs in public right of ways under Tillamook County jurisdiction are subject to approval by Tillamook County Public Works.

1. PLACEMENT/LOCATION: Standardization of position cannot always be attained in practice. However, the general rule is to locate signs on the right-hand side of the roadway, where the driver is looking for them. Signs should be located so that they do not obscure sight distance for drivers or block the viewing of other signs along the roadway. Street name signs (fingerboards) should be mounted approximately at right angles to the direction of, and facing, the traffic that they are intended to serve. They should be a minimum distance of 2 feet from the left edge of the sign to the edge of the traveled portion of the roadway and no more than 12 feet. Ideally 4 to 6 feet is preferred.

2. POSTS AND MOUNTINGS: Sign posts, their foundations and sign mountings shall be so constructed as to hold signs in a proper and permanent position, to resist swaying in the wind or displacement by vandalism. In most cases a 4" X 4", pressure treated post will be sufficient for meeting this standard. If larger wood posts or steel posts are used, they must be of suitable breakaway or yielding design. A larger wood post must have a one inch holes drilled through the post at right angles at 4 and 18 inches from ground level to meet the breakaway requirement. Concrete bases for sign supports, when used, should be flush with the ground level. Sign posts should be of sufficient height to allow the bottom portion of the lowest mounted sign to be no less than 7 feet from the road surface. This allows most vehicles and bicyclists/pedestrians passage underneath without striking the sign.

3. SIGN MATERIALS: A variety of materials can be used effectively. However, it is recognized that technological progress may develop new and satisfactory or superior materials for highway signs, particularly in the fields of illumination and reflectorization. Nothing in the guideline should be interpreted to exclude any new material that meets the standard requirements for color and legibility, both by day and by night.

a. Street Name signs: Our basic concern is that all street name signs be green in color and reflectorized. That the lettering be white or silver in color and also reflectorized. Lettering should be a minimum of 4 inches tall and sufficiently spaced that the letters don't appear to be ran together at a reasonable distance. Street name signs are either 6”X30” or 6”X36”. If the road name has few letters we use the 30" sign blank. New state standard

is moving toward 6 inch lettering with a larger sign face. Materials such as wood, plastic, polyplate or aluminum are suitable. However, when making your selection of backing material, remember that Tillamook County experiences frequent high winds and heavy rains that can tax the strength of sign materials. Most of our street name signs are made of 1/8 inch thick aluminum. If your sign is longer than 36 inches, you should use a thicker grade of stock.

b. Stop signs: Only a licensed engineer is qualified to make the judgement as to the need for a stop sign at an intersection. You should consult with our office if you believe a stop sign is needed, and we will make the final judgement. If approved, the standard 30 or 36 inch stop sign is used. We do not use the 24 inch sign in Tillamook County. Backing materials used can be the same as those used for street name signs. All stop signs must be reflectorized and red & white in color.

4. MATERIAL SOURCES: There are many sources you can use to obtain your sign materials. Look in the yellow pages under SIGNS. The Tillamook County sign shop uses the large industrial providers such as Zumar Industries, Inc, (1-800-426-7967), Traffic Safety Supply Co, (1-800-547-8518) and Newman Signs (1-800-439-9770). These providers can either make your signs or provide you with the needed materials. The listing of the above sign manufacturers is not an endorsement by the County, but rather provided for your information.

WARNING: Any party digging deeper than 1 foot in a pubic right of way has the responsibility of identifying exact line locations in accordance with the Oregon Utility Notification Center (OUNC). Oregon Laws 1995 Chapter 691 requires you to follow rules adopted by the OUNC. Those rules are set forth in the Oregon Administrative Rules (OAR) Chapter 952, Division 1, Sections 0010 thru 0090. You may obtain copies of the rules by calling the OUNC. The telephone number is (503) 232-1987; the FAX number is (503) 293-0826. Virtually all County signs posts are installed deeper than 12".

Other sign related topics:

Creating the name of a new or previously unnamed road: Contact Tillamook County Department of Community Development, 842-3408.

Information regarding business signs in the right of way can be found in the Business Guide Sign Ordinance: Contact Tillamook County Public Works.

For private signs on private property and not affecting sight distance or visibility in the right of way, contact Tillamook County Department of Community Development, 842-3408.

Tillamook County Public Works is located at 503 Marolf Loop, Tillamook, OR 97141. Phone: (503) 842-3419

Appendix D Draft Asset Management Policy

TILLAMOOK COUNTY BOARD OF COMMISSIONERS	POLICY NAME[98] **ASSET MANAGEMENT**	DOC NO	
		VERSION 1	DATE JANUARY 27, 2009
PUBLIC WORKS DIRECTOR:	**APPROVED BY:**	**REVIEW DATE**	
LIANE WELCH	**COMMISSIONERS JOSI, HURLIMAN, LABHART MARCH 2009**	**MARCH 2012**	

1.0 Purpose

To set guidelines for implementing consistent asset management processes throughout Tillamook County Public Works.

2.0 Objective

To ensure adequate provision is made for the long-term replacement of major road assets by:

- Ensuring that County services and infrastructure are provided in a sustainable manner, with the appropriate levels of service to residents, visitors and the environment.
- Safeguarding County road assets including physical assets and employees by implementing appropriate asset management strategies and appropriate financial resources for those assets.
- Creating an environment where all County employees take an integral part in overall management of County road assets by creating and sustaining an asset management awareness throughout the County.
- Meeting legislative requirements for asset management and financial reporting.
- Ensuring resources and operational capabilities are identified and responsibility for asset management is allocated.
- Demonstrating transparent and responsible asset management processes that align with demonstrated best practice.

3.0 Scope

This policy applies to all County public works activities.

4.0 Policy

4.1 Background

4.1.1 The County Board is committed to implementing a systematic asset management methodology in order to apply appropriate asset management best practices across all road management areas of the County. This includes ensuring that assets are planned, created, operated, maintained, renewed and disposed of in

[98]

accordance with Board priorities for service delivery.

4.1.2 The County owns and uses approximately $311 million road assets to support its core business of delivering road service to the community.

4.1.3 Asset management practices impact directly on the core business of the county and appropriate asset management is required to achieve our strategic service delivery objectives.

4.1.4 Asset management relates directly to the Tillamook County Transportation Strategic Plan goals and strategies:

- Protect the function, operation and safety of existing and planned roadways
- Consider land use impacts on existing or planned transportation facilities
- Provide pedestrian and bicycle connectivity in new subdivisions
- Coordinate with other jurisdictions to assure adequate connections to streets and transportation systems between incorporated and unincorporated areas
- Plan for a multi-modal network of transportation facilities and services, including air, water, rail, auto, pedestrian, bicycle and public transit.
- The roadway network is not restricted to jurisdictional boundaries.
- Roadway maintenance and improvement are to be coordinated in cooperation with other jurisdictions.
- Road function, access and “level of service standards” are to be implemented through regulation.
- All modes of transportation for moving goods and people are to be provided and use of public transportation encouraged.

4.1.5 A strategic approach to asset management will ensure that the County Board delivers the highest appropriate level of service through its assets. This will provide positive impact on:

- Members of the public and staff;
- County Board’s financial position;
- The ability of the County to deliver the expected level of service and infrastructure;
- The political environment in which the County Board operates; and
- The legal liabilities of the County.

4.2 Principles

4.2.1 A consistent Asset Management Strategy must exist for implementing systematic asset management and appropriate asset management best-practice throughout all departments of the County; however it is recognized that initial focus will be on the County's road department.

4.2.2 All relevant legislative requirements together with political, social and economic environments are to be taken into account in asset management.

4.2.3 Asset management principles will be integrated within existing planning and operational processes.

4.2.4 An inspection regime will be used as part of asset management to ensure agreed service levels are maintained and to identify asset renewal priorities.

4.2.5 Asset renewals required to meet agreed service levels and identified in infrastructure and asset management plans and long term financial plans should be fully funded in the annual budget estimates.

4.2.6 Service levels agreed through the budget process and defined in Infrastructure and Asset Management Plans will be fully funded in the annual budget estimates.

4.2.7 Asset renewal plans will be prioritized and implemented progressively based on agreed service levels and the effectiveness of the current assets to provide that level of service.

4.2.8 Systematic and cyclic reviews will be applied to all asset classes and are to ensure that the assets are managed, valued and depreciated in accordance with appropriate best practice and applicable standards.

4.2.9 Future life cycle costs will be reported and considered in all decisions relating to new services and assets and upgrading of existing services and assets.

4.2.10 Future service levels will be determined in consultation with the community.

5.0 Standard Government Accounting Standards Board (GASB) Statement 34

6.0 Related Documents Road Asset Management Strategy and Asset Management Plan.

Responsibility **County Board of Commissioners** are responsible for adopting the policy and ensuring that sufficient resources are applied to manage the assets.

The **Public Works Director** has overall responsibility for developing an asset management strategy, plans and procedures and reporting on the status and effectiveness of asset management within the County road network.

Review Date	This policy has a life of 4 years. It will be reviewed in March 2012.
Meeting Reference	
Board of Commissioners Meeting Date	