Summary

Of

Summit County Government's

Road Network Assets

2005

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SUMMARY

The Road and Bridge Department is responsible for the inventory and assessment of Summit County's road network assets. These assets are identified and located using Global Positioning Systems (GPS) equipment. Attribute data of the assets is gathered during the inventory process, then saved in an ArcView Map and a series of Access databases, referred to as the Summit County Asset Management System. The Summit County Asset Management System also serves as the rating system for the various assets, and is used for predicting future maintenance events.

Summit County's road network consists of the following assets: Road Surfaces, Bridges, Culverts, Guardrails, Signs and Curb and Gutters.[1]

A condition assessment of the above referenced assets was completed in 2005, and the results of the assessment are the subject of this report.

Each of the assets were inventoried and rated on a numeric scale called the Overall Condition Index (OCI) to convey the condition of the asset. The OCI is derived from a visual inspection process that considers distresses or other defects.[2] A 100-point scale is used with 0 being a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1) A detailed discussion of each asset is included later in this report.

Table 1 – OCI Ratings

Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

Table 2 - Road Network Asset OCI - 2005

Road Network Asset	Average OCI
Road Surface	74
Bridges	83
Signs	55
Culverts	62
Guardrail	93
TOTAL AVERAGE	73

Once a condition assessment of the asset is completed, the replacement cost and the current value of the asset can be calculated in the following manner:
Replacement Cost = the unit cost of the asset x number of asset units, and
Current value = the Replacement Cost x the OCI Rating (expressed in decimal form) of the asset.

Table 2 represents the average OCI for the each of the road network assets and Table 3 is a summary of the road network assets and their respective costs.

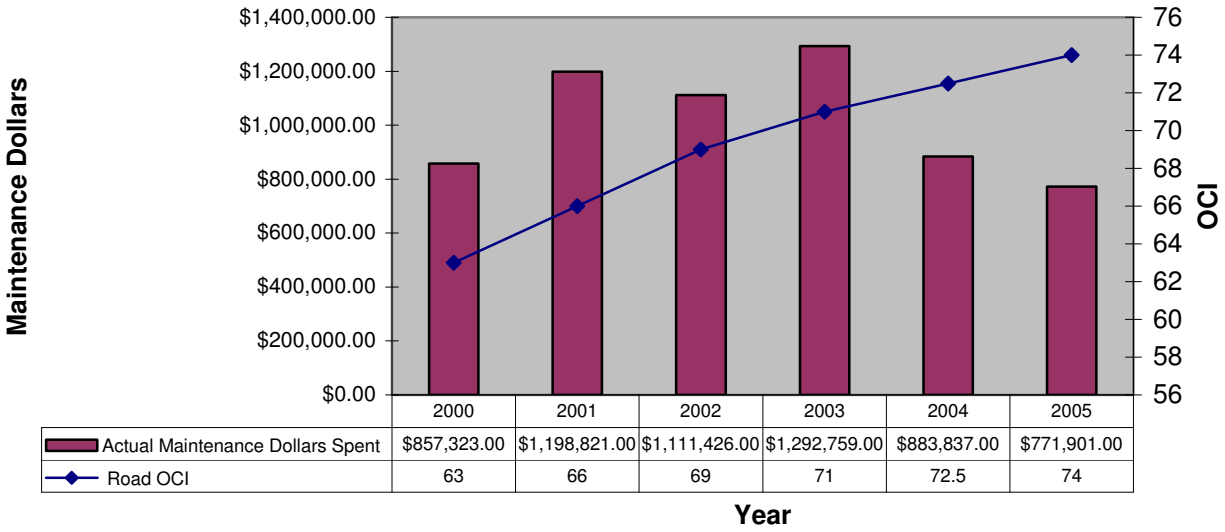
Table 3 - Road Asset Network Summary - 2005

Asset	Count	Units	Historic Cost	Replacement Cost	Current Value
Roads	145.54	Miles	$ 28,512,181.27	$ 29,847,338.23	$ 20,787,531.64
Signs	2138	Each		$ 54,666.20	$ 15,712.15
Culverts	876	Each		$ 3,354,002.35	$ 2,136,982.85
Guardrail	53649.5	Lin-Ft.		$ 1,153,637.26	$ 1,055,790.15
Bridges	7	Each	$ 1,531,232.11	$ 3,582,807.72	$ 681,489.94
		TOTAL	**$ 30,043,413.38**	**$ 37,992,451.76**	**$ 24,677,506.73**

[1] The inventory of this asset is not complete and is not included in this report
[2] Based on industry standards applicable to the asset being rated

In 2000, the BOCC mandated that the average overall condition of the road surfaces would be an OCI of 60 or better, and allocated additional funds for the 2001 budget year to achieve this goal. Also this same year, and after the condition assessment of the roads was completed, the Road and Bridge Department (Department) created a 20-Year Capital Improvement plan for both asphalt and gravel surfaced roads, based on the premise that it is more cost efficient to maintain a road in **Good** condition, rather than to reconstruct a road in **Poor** condition.[3] The Department's current funding strategy serves to maintain this plan. The **Chart 1** below represents a comparison between maintenance dollars spent and the average OCI of the road surface assets.

Chart 1 - Road Maintenance Dollars vs. Overall Condition Index



	2000	2001	2002	2003	2004	2005
Actual Maintenance Dollars Spent	$857,323.00	$1,198,821.00	$1,111,426.00	$1,292,759.00	$883,837.00	$771,901.00
Road OCI	63	66	69	71	72.5	74

As the chart depicts, the additional funds allocated for the road surface assets support the increase of the overall condition of the road surface assets. As the average OCI continues to increase, the Department can reduce the amount of maintenance dollars for the preservation/maintenance of the road surface assets and still maintain the road surface assets in a Good or better condition. The cost savings resulting from the Department's maintenance/preservation strategy can then be used to increase the overall condition of the other road network assets. Although the initial data is encouraging, there are several roads that will require complete restoration in next few years and the full benefit from the Department's maintenance strategy won't be apparent for many years to come.[4]

[3] A more detailed illustration of this premise is included in the Road Surface Asset Summary
[4] More detail is included in the Road Surface Asset Summary

Road Assets

ROAD ASSETS

SUMMARY

Summit County's road network consists of approximately 209 miles of maintained roads.[5] Of these of roads, approximately 146 miles receive year-round, full time maintenance, and are the subject of this report. The remaining 63 miles consists of unimproved roads, which predominately, are on United States Forest Service (USFS) property and receive limited maintenance.

The year-round, full time maintenance roads (road assets) are grouped into the following functional classifications:

Arterial roads, which link cities, towns and other traffic generators, such as neighborhoods or resorts, and

Collector roads, which provide a link from local access roads to arterial roads, and allows for the movement of through traffic in neighborhoods, and

Local Access roads, which provide direct access to individual residences, businesses, community facilities and other uses, and

Low Volume roads, which provide direct accesses to individual properties within the agriculture districts, which are subdivided into 20-acre parcels or larger.[6]

In addition, the road assets are classified into two surface types, asphalt and gravel. There are approximately 88 miles of asphalt roads and 58 miles of gravel roads.

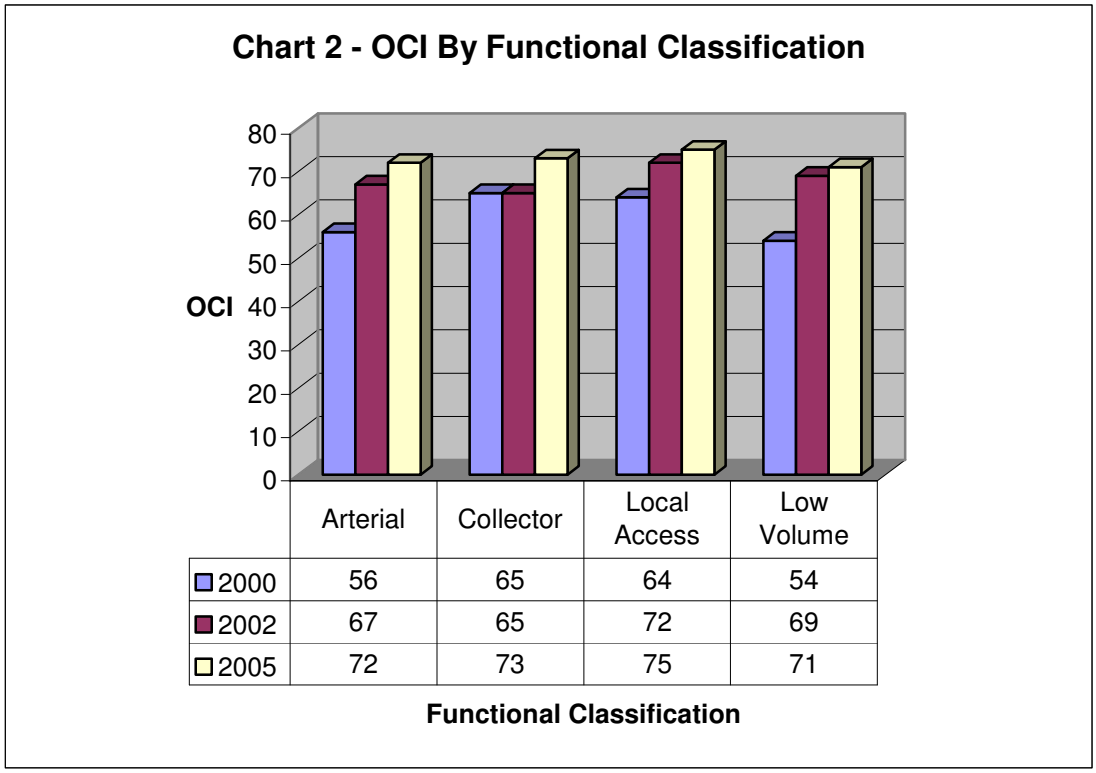
In 2005, a Road Surface Condition Assessment (RSCA) was completed. The road assets were inventoried and rated on a numeric scale called the Overall Condition Index (OCI) to convey the condition of the asset. The OCI is derived from a visual inspection process that considers distresses or other defects.[7] A 100-point scale is used with 0 being a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1)

Table 1 – OCI Ratings

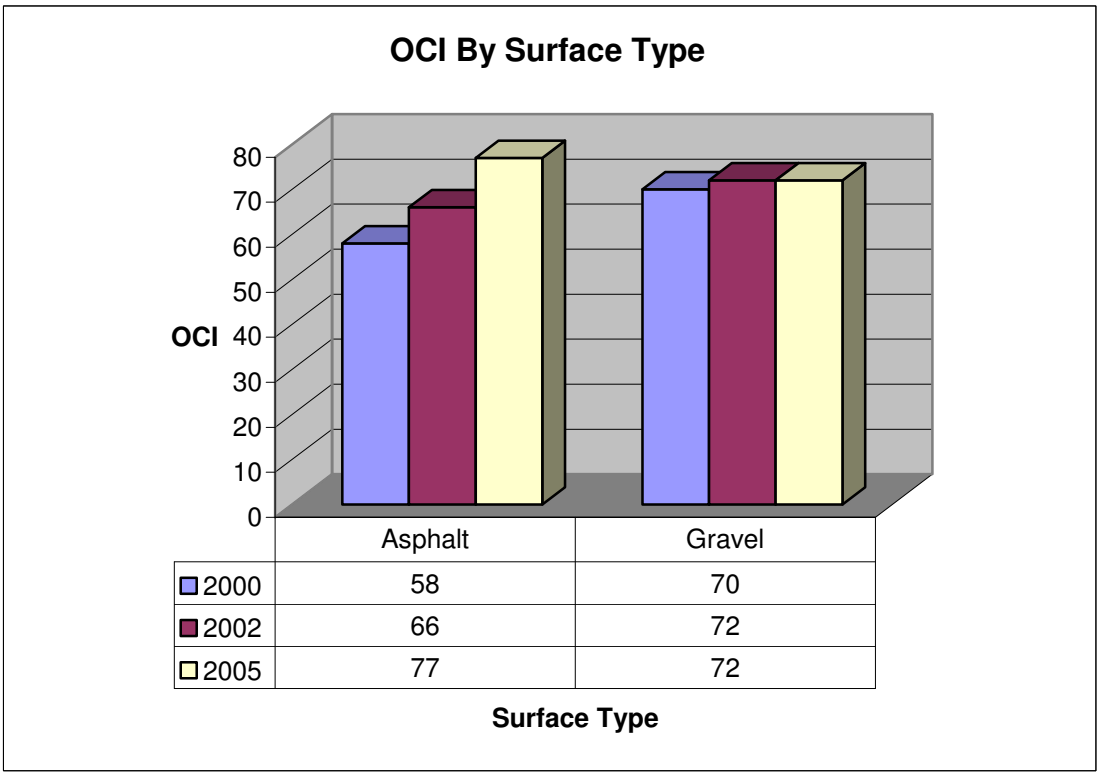
Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

[5] As reported in the 2005 HUTF report submitted this year
[6] Sa defined in Chapter 5, The Road and Bridge Standards, of the Summit County Land Use and Development Code
[7] Based on industry standards applicable to the asset being rated

The following tables and charts represent the current OCI rating of the road assets and include previous ratings from the years 2000 and 2002:



	Arterial	Collector	Local Access	Low Volume
2000	56	65	64	54
2002	67	65	72	69
2005	72	73	75	71



	Asphalt	Gravel
2000	58	70
2002	66	72
2005	77	72

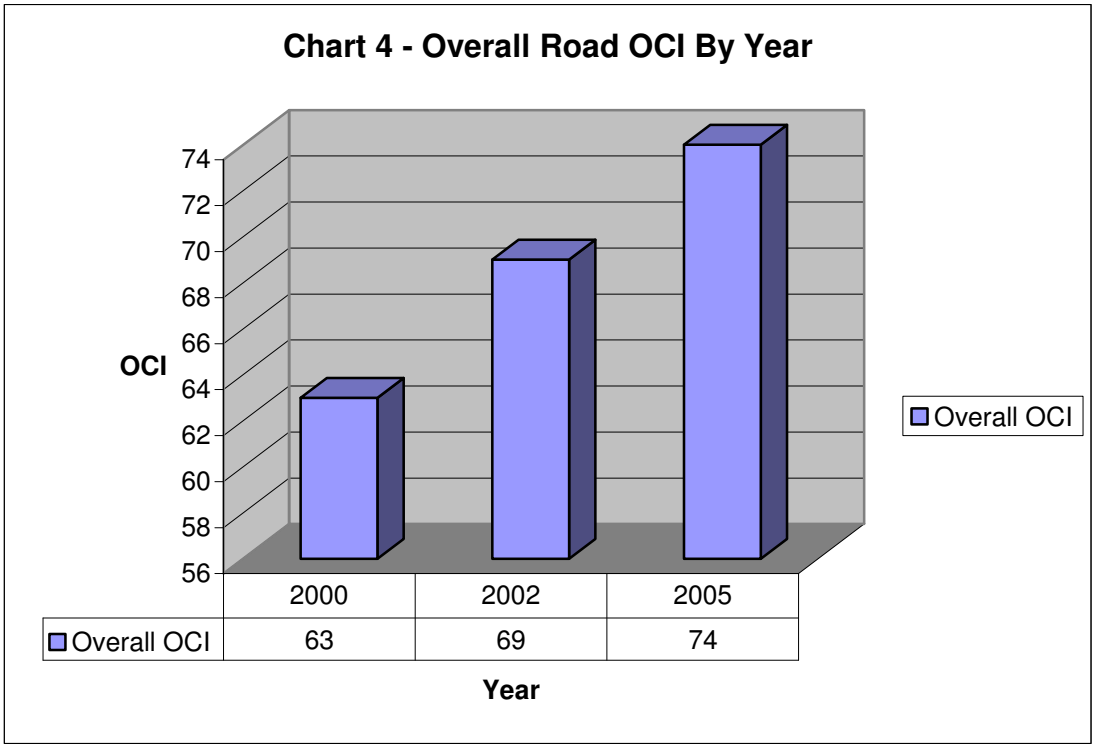
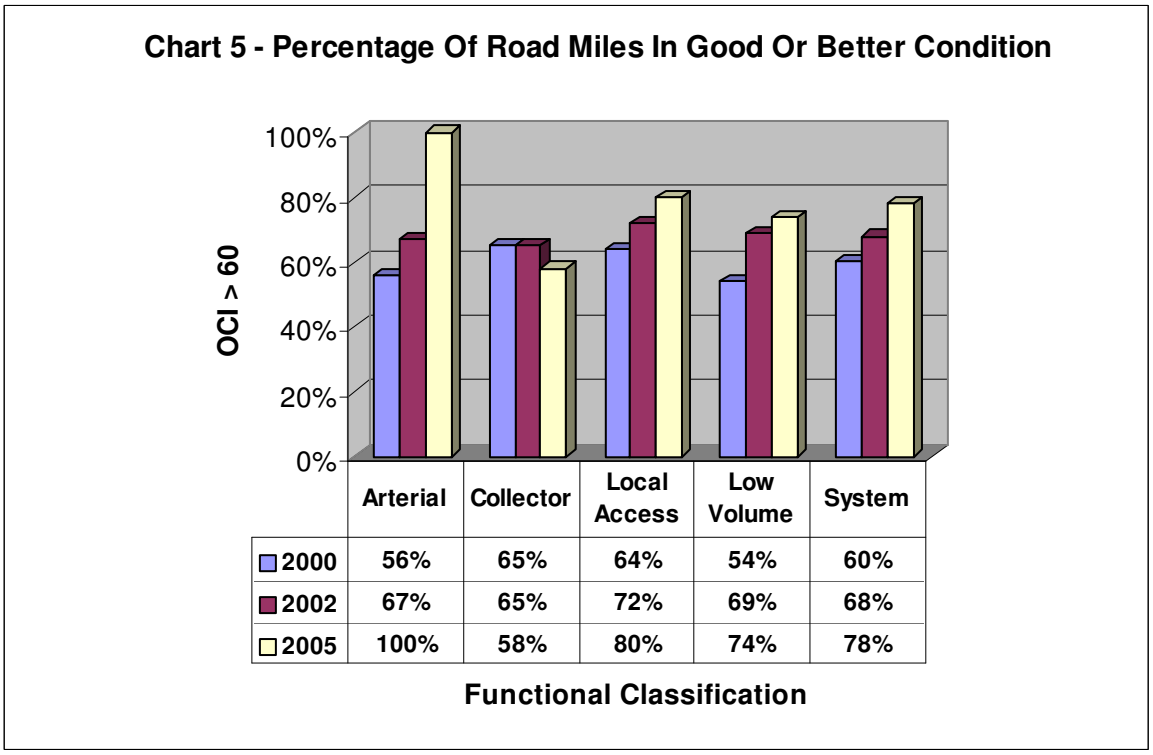
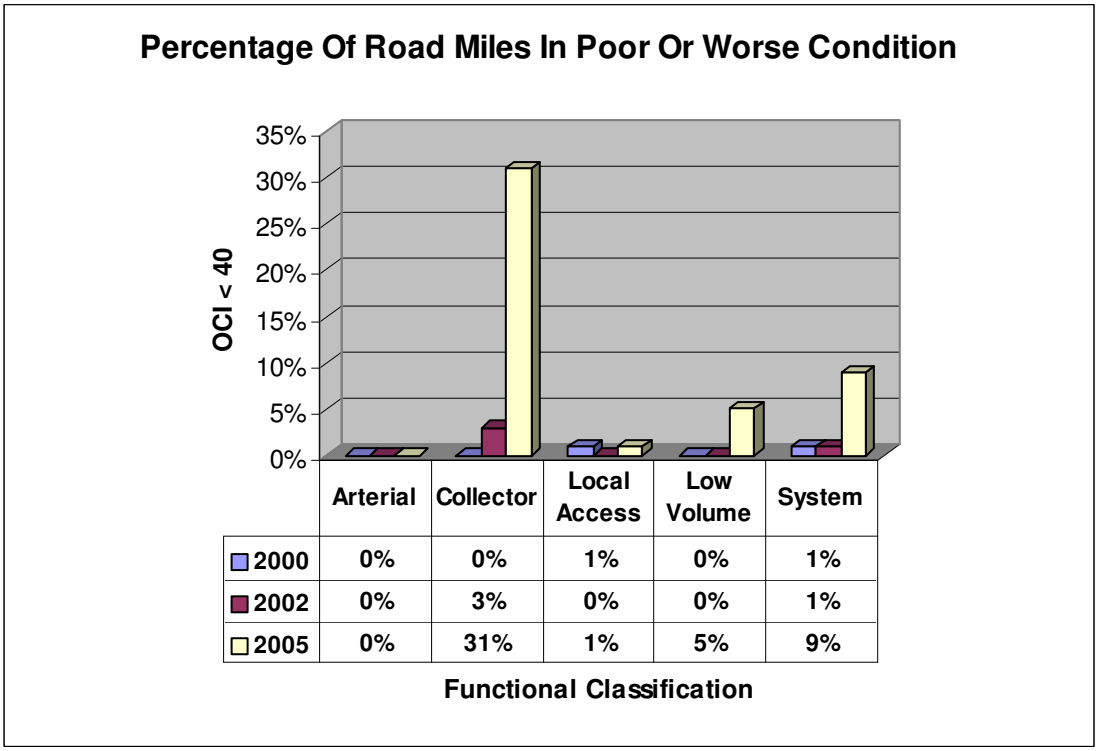


Chart 4 shows the average OCI for road assets has increased from 69 in 2002, to 74 in 2005. **Chart 5** shows the percentage of road assets that are rated in **Good** or better condition has increased from 68% in 2002 to 78% in 2005.



However, due to the rapid deterioration of several roads such as Heeney Road, the percentage of road assets that are rated in **Poor** or worse condition has increased from 1 % in 2002 to 9% in 2005, as shown on **Chart 6.**



The current value of the road assets is approximately $20,787,532 dollars, and the replacement cost is approximately $29,847,338 dollars.[8]

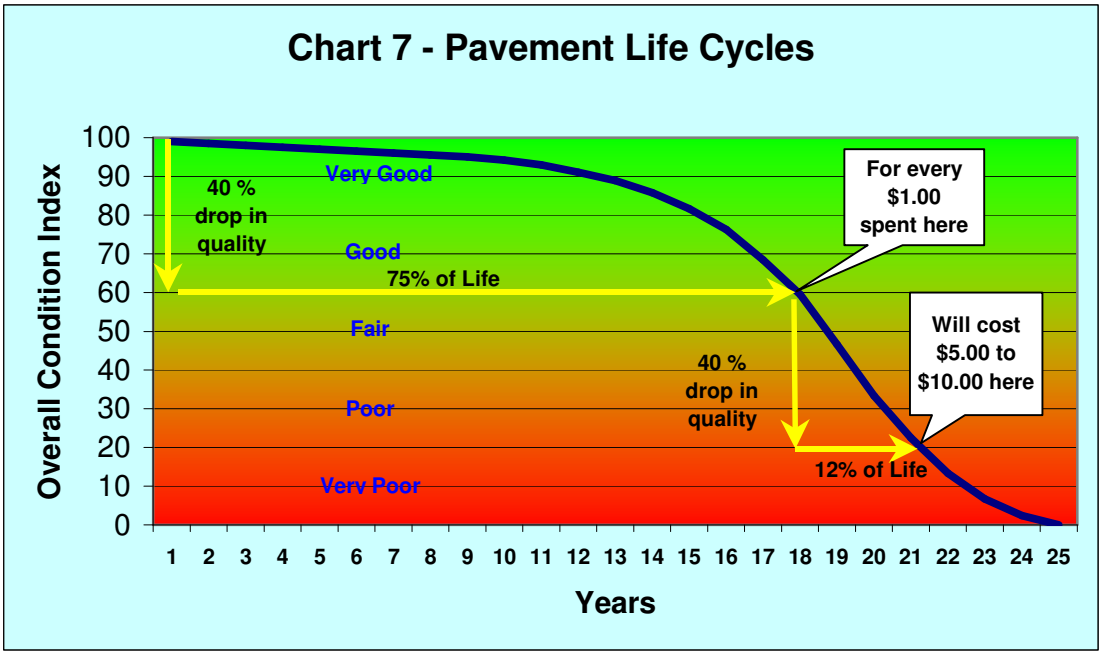
Table 3 - Road Asset Network Summary - 2005

Asset	Count	Units	Historic Cost	Replacement Cost	Current Value
Roads	145.54	Miles	$ 28,512,181.27	$ 29,847,338.23	$ 20,787,531.64
Signs	2138	Each		$ 54,666.20	$ 15,712.15
Culverts	876	Each		$ 3,354,002.35	$ 2,136,982.85
Guardrail	53649.5	Lin-Ft.		$ 1,153,637.26	$ 1,055,790.15
Bridges	7	Each	$ 1,531,232.11	$ 3,582,807.72	$ 681,489.94
		TOTAL	$ 30,043,413.38	$ 37,992,451.76	$ 24,677,506.73

[8] The replacement cost is calculated using construction costs for the reporting year, as seen on County projects or unit costs taken from the latest edition of the CDOT Cost Data Book. The road asset current value is calculated using the replacement cost times a decimal expression of the OCI.

RECOMMENDED FUTURE MAINTENANCE

The Department's maintenance strategy for the preservation of the road assets is based on the



premise that maintenance dollars are more efficiently spent maintaining roads in a **Good** or better condition, rather than reconstructing roads when they are in a **Poor** or worse condition. As **Chart 7** illustrates, it is 4 to 5 times more expensive to reconstruct.

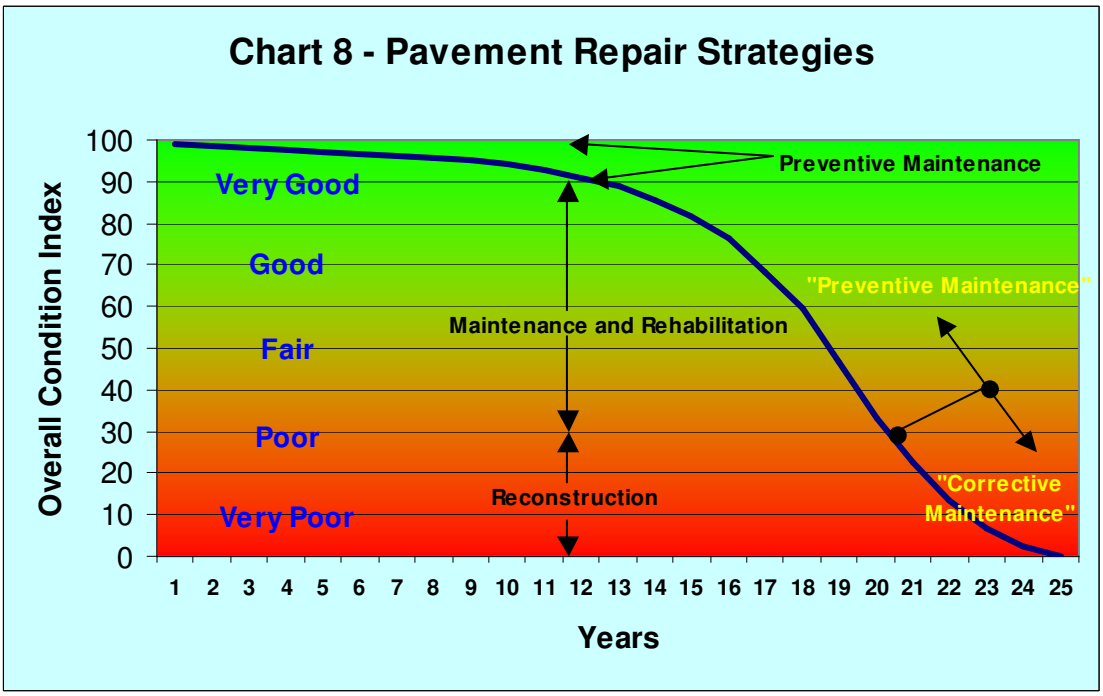


Chart 8 illustrates the pavement repair strategies. Maintenance/preservation of road assets can be categorized as either **Preventive Maintenance** or **Corrective Maintenance**.

The **Preventive Maintenance** category can further be broken down to include:

- Preventive maintenance projects that include crack filling, fog seals and minor drainage work such as ditch grading, and
- Maintenance and Rehabilitation projects that include chip seals, overlays and the application of dust palliative for gravel roads.

The **Corrective Maintenance** category includes reconstruction projects

The Department recommends the following:

- For asphalt surfaces, continue with the current maintenance strategy with emphasis on **Preventative Maintenance Projects** such as crack filling and **Maintenance and Rehabilitation Projects** such as chip seals and patching.

- For gravel roads, continue with the scheduled resurfacing and dust abatement projects.

- Moving forward in the 20-Year Plan, Heeney Rd, Little Beaver Trl, and segments of Boreas Pass Rd, Blue Ridge Rd, Moonstone Rd, Shortcut Rd. and Johnson Rd.[9], (which have deteriorated rapidly since the last RSCA in 2002), for proposed reconstruction beginning in 2007.[10]

- To address safety concerns on the Dillon Dam Rd. and Heeney Rd, continue to schedule rock-scaling projects.

[9] Cove Blvd. Is also in a Very Poor condition however since it is scheduled for rehabilitation the year, it was omitted from this list.

[10] It is anticipated that costs for this work will be in the range of $350,000 to $500,000/ mile. In addition, it will not be feasible to design several of these projects in house, and it will be necessary to hire a consultant for the design work. A cost analysis outlining repair options will be provided in the future.

Sign Assets

SIGN ASSETS

SUMMARY

Currently, the Department is maintaining approximately 2138 roadway traffic signs. These signs include Regulatory signs, Warning signs, Street/Road signs and Guidance signs.

The Department has grouped the signs into the following functional categories outlined in Table 4 below:

Table 4 – Functional Categories of Road Traffic Signs

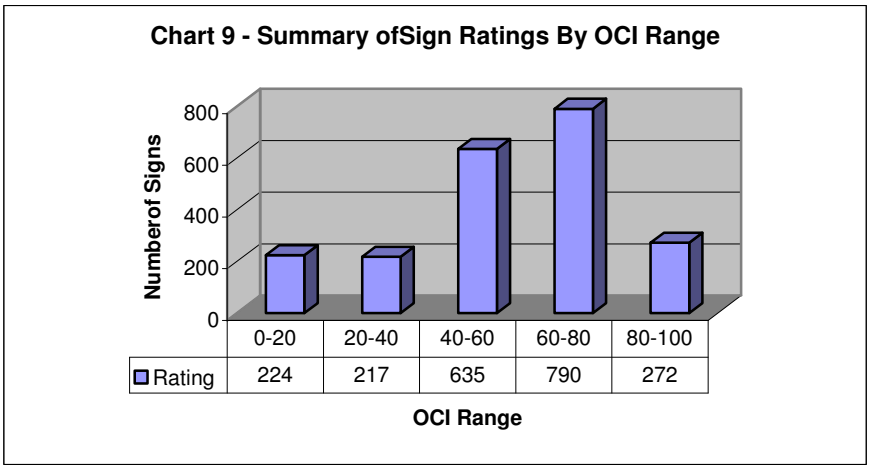
Functional Category	Value	Signs
Immediate	6	STOP, YIELD, DO NOT ENTER, DO NOT PASS, WRONG WAY, KEEP RIGHT, KEEP LEFT, ONE WAY, Railroad Crossing, Turn signs, Reverse Turn, Reverse Curve, Winding Road, Large Arrow (chevron) Railroad Advance Warning
School	5	Regulatory, Warning, or School classified signs that control traffic around schools
Regulatory	4	MUTCD classified "Regulatory" signs not included in a higher category
Warning	3	MUTCD classified "Warning" signs not included in a higher category
Street	2	Street identification signs
Guide	1	MUTCD classified "Guide" signs

In 2005, a Sign Condition Assessment (SCA) was completed. The sign assets were inventoried and rated on a numeric scale called the Overall Condition Index (OCI) to convey the condition of the asset. The OCI is derived from a visual inspection process that considers defects of the sign sheeting such as fading, cracking and vandalism, and the sign backing, such as bullet holes and deformations. A 100-point scale is used with 0 being a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1)

Table 1 – OCI Ratings

Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

Based on the SCA, sign assets are summarized in Chart 9 below:



The current value of the sign assets is approximately $15,712 dollars, and the replacement cost is approximately $54,666 dollars.[11]

Table 3 - Road Asset Network Summary - 2005

Asset	Count	Units	Historic Cost	Replacement Cost	Current Value
Roads	145.54	Miles	$ 28,512,181.27	$ 29,847,338.23	$ 20,787,531.64
Signs	2138	Each		$ 54,666.20	$ 15,712.15
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Guardrail	53649.5	Lin-Ft.		$ 1,153,637.26	$ 1,055,790.15
Bridges	7	Each	$ 1,531,232.11	$ 3,582,807.72	$ 681,489.94
		TOTAL	**$ 30,043,413.38**	**$ 37,992,451.76**	**$ 24,677,506.73**

RECOMMENDED FUTURE MAINTENANCE

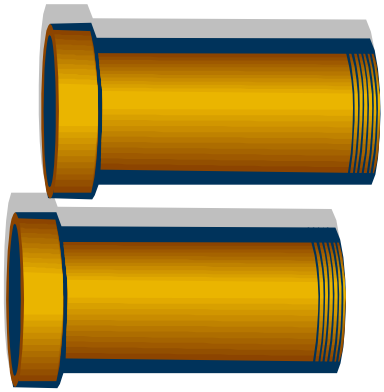
The Department recommends the following:

- Immediately replacing all signs with an OCI of 30 or less. The cost to replace these signs is approximately $13,500 and does not include equipment or labor costs. When replacing these signs, the Department will use a higher grade of retroreflective sign sheeting which increases the life expectancy of the sign and is more visible.

- Initiating a maintenance/inspection program to replace and maintain sign assets by the most cost-efficient method possible. This program will require additional staff time and may require the purchase of a retroreflectometer to verify the retroreflectivity of sign assets.

- Research the possible reduction of the number of speed limit signs currently installed in subdivisions such as Silver Shekel and Peak 7, by installing a sign at the entrance of subdivisions with the message, “SPEED LIMIT 30 MPH UNLESS OTHERWISE POSTED”.[12]

[11] The replacement cost is calculated using construction costs for the reporting year, as seen on County projects or unit costs taken from the latest edition of the CDOT Cost Data Book. The sign asset current value is calculated using the replacement cost times a decimal expression of the OCI.
[12] A cost analysis of this proposed change will provided in the future.



Culvert Assets

CULVERT ASSETS

SUMMARY

The Department is currently maintaining approximately 876 pipe and box culverts.[13] These culverts come in various diameters, lengths and type of materials.

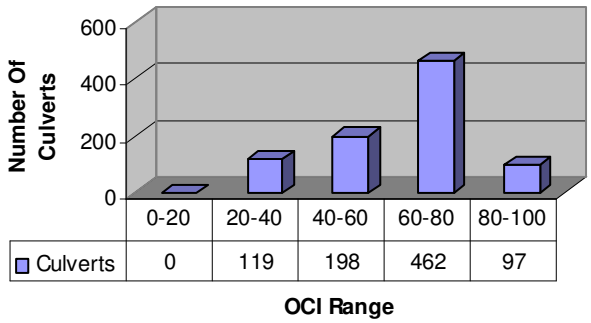
In 2005, a Culvert Condition Assessment (CCA) was completed. The culvert assets were inventoried and rated on a numeric scale called the Overall Condition Index (OCI) to convey the condition of the asset. The OCI is derived from a visual inspection process that considers defects of the culvert such as damaged annular ends, or flared end sections and clogging. A 100-point scale is used with 0 being a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1)

Table 1 – OCI Ratings

Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

The results of the CCA indicate the culvert assets have an average OCI of 62, or are in **Good** condition. A summary of culvert OCI ratings is show on Chart 10 below.

Chart 10 - Summary Of Culvert Ratings By OCI Range



The current value of the culvert assets is approximately $2,136,983 dollars, and the replacement cost is approximately $3,354,002 dollars.[14]

Table 3 - Road Asset Network Summary - 2005

Asset	Count	Units	Historic Cost	Replacement Cost	Current Value
Roads	145.54	Miles	$ 28,512,181.27	$ 29,847,338.23	$ 20,787,531.64
Signs	2138	Each		$ 54,666.20	$ 15,712.15
Culverts	**876**	**Each**		**$ 3,354,002.35**	**$ 2,136,982.85**
Guardrail	53649.5	Lin-Ft.		$ 1,153,637.26	$ 1,055,790.15
Bridges	7	Each	$ 1,531,232.11	$ 3,582,807.72	$ 681,489.94
		TOTAL	**$ 30,043,413.38**	**$ 37,992,451.76**	**$ 24,677,506.73**

[13] Does not include driveway culverts

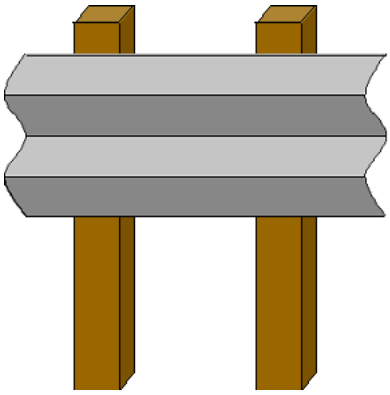
[14] The replacement cost is calculated using construction costs for the reporting year, as seen on County projects or unit costs taken from the latest edition of the CDOT Cost Data Book. The culvert asset current value is calculated using the replacement cost times a decimal expression of the OCI.

RECOMMENDED FUTURE MAINTENANCE

Many of the culverts inventoried, were installed in the 60's and 70's. Typically, only the ends of the culverts are damaged, or they are clogged. Therefore, replacement of the culverts with these types of defects won't be required.

The Department recommends the following:

- Replacing the culvert ends or removing accumulated debris as needed, and will consult with the maintenance crews to prioritize which culverts require immediate attention.



Guardrail Assets

GUARDRAIL ASSETS

SUMMARY

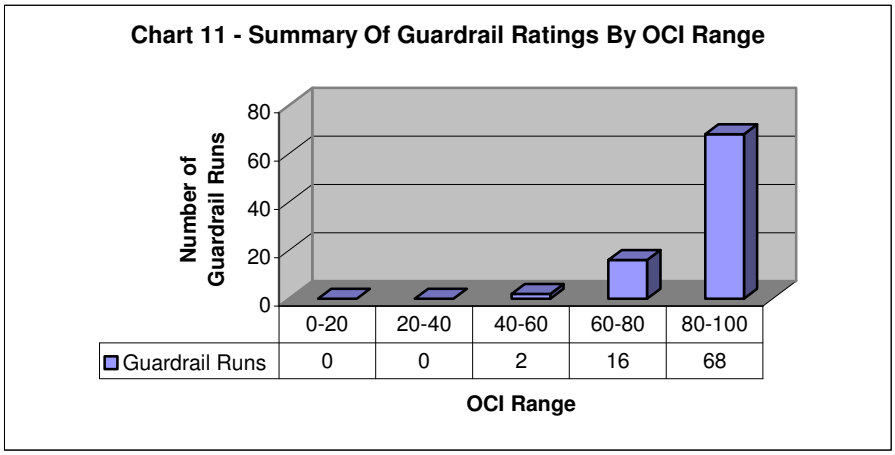
The Department is currently maintaining approximately 53650 linear feet of w-beam and cable guardrail.

In 2005, a Guardrail Condition Assessment (GCA) was completed. The guardrail assets were inventoried and rated on a numeric scale called the Overall Condition Index (OCI) to convey the condition of the asset. The OCI is derived from a visual inspection process that considers defects of the w-beam, guardrail posts and each of the attached end sections. A 100-point scale is used with 0 being a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1)

Table 1 – OCI Ratings

Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

The results of the GCA indicate the guardrail assets have an average OCI of 93, or are in **Very Good** condition. A summary of guardrail OCI ratings is show on Chart 11 below



The current value of the guardrail assets is approximately $1,055,790 dollars, and the replacement cost is approximately $1,153,637 dollars.[15]

Table 3 - Road Asset Network Summary - 2005

Asset	Count	Units	Historic Cost	Replacement Cost	Current Value
Roads	145.54	Miles	$ 28,512,181.27	$ 29,847,338.23	$ 20,787,531.64
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Bridges	7	Each	$ 1,531,232.11	$ 3,582,807.72	$ 681,489.94
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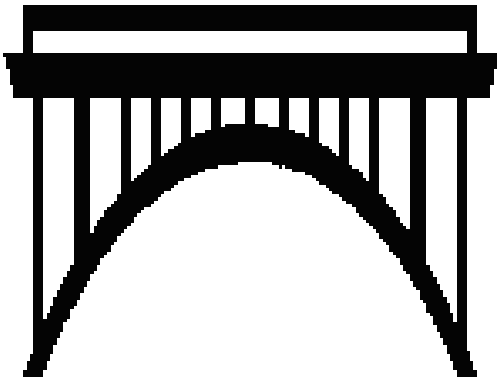
[15] The replacement cost is calculated using construction costs for the reporting year, as seen on County projects or unit costs taken from the latest edition of the CDOT Cost Data Book. The guardrail asset current value is calculated using the replacement cost times a decimal expression of the OCI.

RECOMMENDED FUTURE MAINTENANCE

As shown on Chart 11, the overall condition of the guardrail assets is very good. However, there are a few segments and end sections within the guardrail runs that will require repair.

The Department recommends the following:

- Immediately repairing the end sections and rail segments that have an OCI of 40 or less.



Bridge Assets

BRIDGE ASSETS

SUMMARY

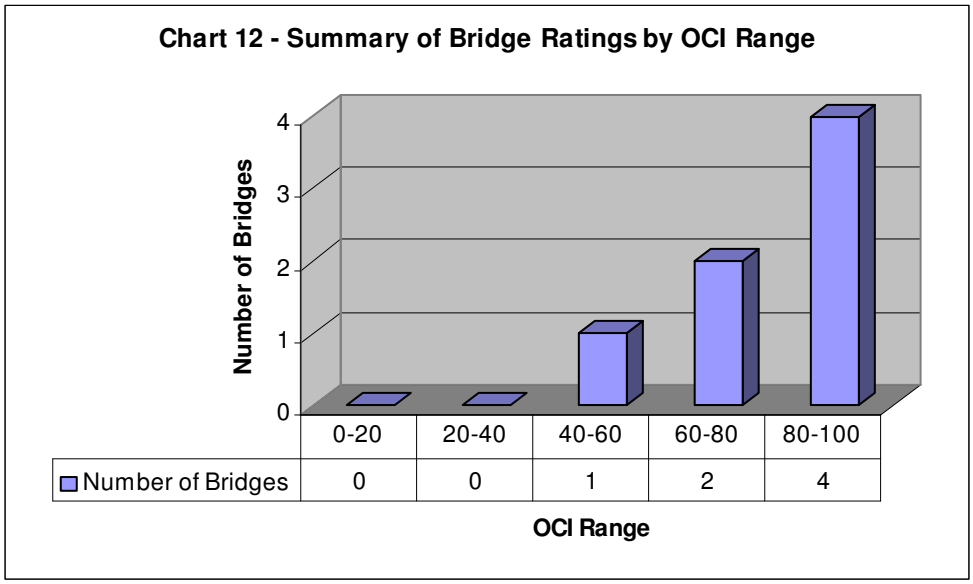
The Department is currently maintaining 7 bridges throughout the County. The types of bridges vary, and consist of simple one span structures to the multi-barreled box culvert on the Blue river at Swan Mt. Rd.

In 2003 and 2005, a Bridge Evaluation (BA) was performed by LONCO, Inc, for CDOT. The bridge assets were evaluated and rated utilizing a software system referred to as PONTIS that considers the various attributes of the structure. Once all data is entered into the program, PONTIS generates a Sufficiency Rating for the structure. The Sufficiency Rating is also a 100-point scale, and correlates with the Departments rating method, where 0 is a **Very Poor** Condition and 100 being a **Very Good** condition. (See Table 1)

Table 1 – OCI Ratings

Legend	
81 to 100	Very Good
61 to 80	Good
41 to 60	Fair
21 to 40	Poor
0 to 20	Very Poor

The results of the BA indicate the bridge assets have an average OCI (or Sufficiency Rating) of 83, or are in **Very Good** condition. A summary of bridge OCI ratings is show on Chart 12 below



The current value of the bridge assets is approximately $681,490 dollars, and the replacement cost is approximately $3,582,808 dollars.[16]

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		TOTAL	**$ 30,043,413.38**	**$ 37,992,451.76**	**$ 24,677,506.73**

RECOMMENDED FUTURE MAINTENANCE

LONCO, Inc has made recommendations for repairs of the bridges and are summarized as follows:

Repair Type	Estimated Cost
Urgent Repairs	$0
Programmed Repairs[17]	$43,450
Safety Improvements[18]	$141,000

The Department recommends the following:

- The Department concurs with LONCO, Inc.'s recommendations, and will commence safety improvement work beginning in 2007. Such work will be included in the capital improvements line item of the budget.

- Adding a line item in the 2007 budget for bridge maintenance and allocating $25,000/yr for programmed repairs.

[16] As calculated by LONCO, Inc. under the direction of the Road and Bridge Department. The replacement cost is calculated using related construction costs for the reporting year. The bridge asset current value is calculated using the replacement cost minus a depreciated value based on the remaining service life of the structure. For example, the Slate Creek Bridge has exceeded its service life; therefore its current value is $0. This explains why the Current Value of the bridge assets is so low.

[17] Includes such items as spall repair, sand/gravel removal, painting, riprap replacement, etc.

[18] Includes such items as installing delineation panels, repair or re-installation of bridge railing, transitions, approach rails and end sections per AASHTO standards.