City of Traverse City

December 2006

PAVEMENT MANAGEMENT REPORT

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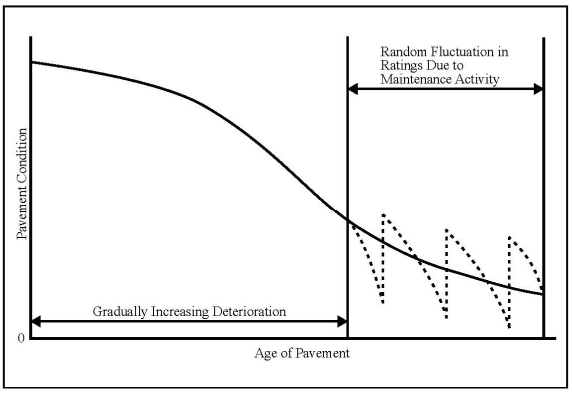
PAVEMENT MANAGEMENT SYSTEM

The Pavement Management System for the City of Traverse City consists of three major components:

1. A system to regularly collect pavement condition data.
2. A database to sort and store the collected data.
3. A process to evaluate, repair or preserve strategies and suggest cost effective projects to maintain acceptable pavement conditions.

Data collection includes performing a field review of all City Streets using a uniform rating system. The data component contains inventory information, including physical cross-section, materials, history, traffic/load data, and condition.

The database and evaluation have been set up using the City Geographic Information System. The analysis part of the pavement management system attempts to predict how long a pavement segment will last with a certain kind of repair under the given traffic loads, climate, and other factors. Overall, the intent of the analysis is to identify the most cost-effective ways to maintain a street system in satisfactory condition.



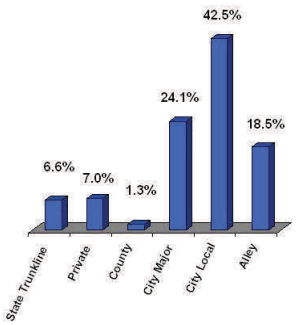
Typical Performance Curve

Pavement Condition Deterioration Prediction Curve

Pavement Condition Deterioration Prediction —Pavements tend to deteriorate very slowly during the first few years after placement and very rapidly when they are aged. Even though pavement designs and materials varied widely, the deterioration of pavements

FUNCTIONAL CLASSIFICATION

Classification Breakdown



Functional classification is the process by which our 117 miles of streets are grouped into classes, or systems, according to the character of service they are intended to provide. For the City of Traverse City the functional classification is shown in Map 1.

Major streets are the principle traffic corridors and comprise over 24% of the street mileage. Local streets serve to provide connectivity between major streets and provide access to and from adjacent properties and comprise over 42% of the street mileage.

Alleys provide access to and from adjacent properties and function to discourage through traffic. Emergency access routes shown in Map 8 are a primary and secondary network of roads designated to best move emergency service vehicles.

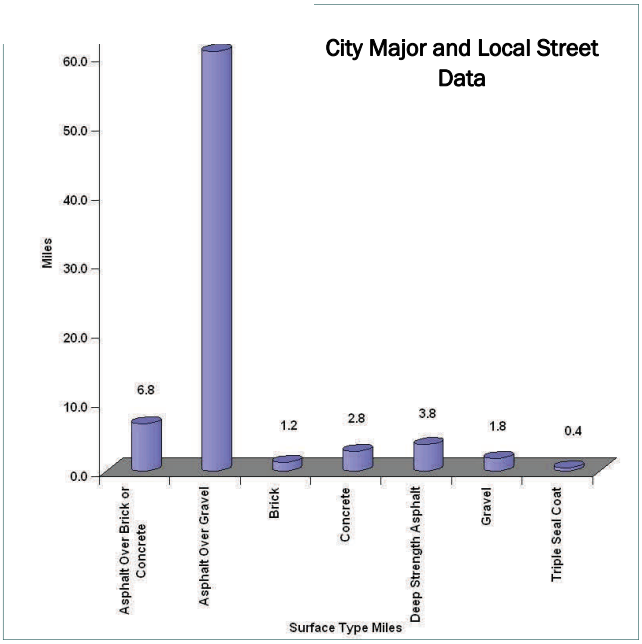
Pavement Surface Type and Street Data

The database for the City's Pavement Management System includes inventory data and construction data. Inventory data is a collection of the physical characteristics of the pavement. The most basic information about City streets is included in Map 2. Other inventory data collected by the City may include:

- Curb and gutter locations,
- Number and width of lanes,
- Thickness of pavement layers, and
- Drainage conditions.

Related to inventory data, construction data contain information about the history of the pavement. This information is important because roads can only be rehabilitated a limited number of times before a full-scale reconstruction of the road is necessary. The type of construction data collected includes:

- Year built, design service life,
- Date and type of rehabilitation and maintenance projects, and
- Materials used in construction activities.



PASER Rating System

PASER is an acronym for Pavement Surface Evaluation and Rating System and is used by the City and various other agencies including the MDOT to evaluate the surface condition of streets. Major Streets of the City are evaluated annually. Local Streets are evaluated less frequently at nearly 5 year intervals. The streets are rated on a scale of 1 to 10 with 10 being the best condition and 1 being the worst condition.

PASER Rating	Pavement Quality
1	Poor
2	
3	
4	
5	
6	
7	
8	
9	
10	Excellent

Excellent (10): Pavements are most likely newly constructed or resurfaced and have few or no distresses.

Very good (9): Pavements require mostly preventative maintenance and have only low levels of distress such as minor cracks or surface flaking.

Good (7-8): pavements exhibit some low-severity distresses but still have satisfactory ride quality. Pavements at the low end of the "Good" range have significant levels of distress and may require a combination of rehabilitation and preventative maintenance to keep them from deteriorating rapidly.

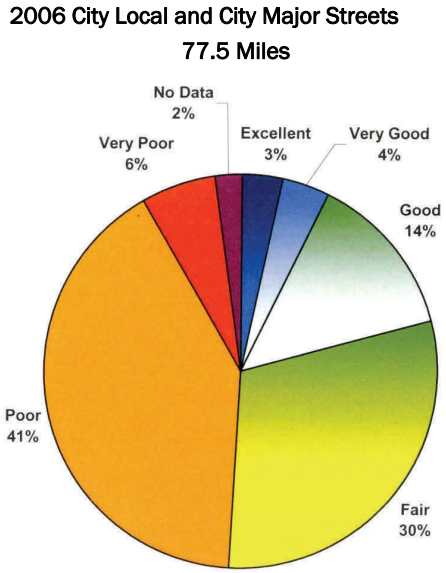
Fair (5-6): Pavements are deteriorated and require immediate attention, including rehabilitative work; ride quality is significantly inferior to the better pavement categories above.

Poor (3-4): Pavements have extensive amounts of major distresses and require rehabilitation or reconstruction. Pavements in this condition significantly affect the speed and flow of traffic.

Very poor (1-2): Pavements need reconstruction and are difficult to drive on.

Map 3 shows the 2006 PASER street rating for City streets.

The Chart below shows the PASER rating breakdown for City Streets. The ratings show that the majority of street conditions are in the very poor to fair ratings. Only 21% of our streets are rated good to excellent.



Street Condition Breakdown

What Will It All Cost?

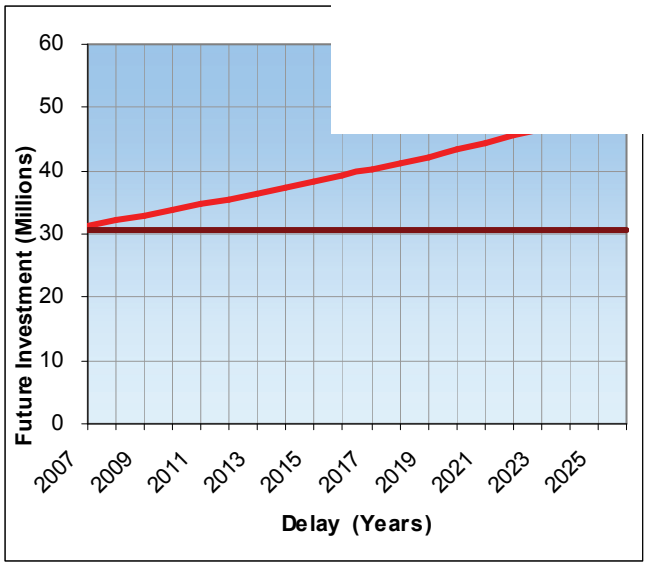
Poor Sidewalk and Street Conditions

New Bike Paths and Trails

Before and After Construction photographs for Woodmere Avenue

The table shown below sums up the over $ 30 million Future Investments needed to fix and repair our existing streets, sidewalks, bridges and culverts, implement a stormwater quality improvement plan and to construct new sidewalks and bike paths. The photos on the left show the conditions which exist and some of the recent investments which have improved the City's quality of life.

Rating	Required Future Investment*		
	Streets	Sidewalks	Total
Very Poor (0-2)	2.54	0.18	2.72
Poor (3-4)	11.41	1.35	12.76
Fair (5-6)	5.94	0.50	6.44
Good (7-8)	1.98	0.16	2.14
Very good (9)	1.14	0.20	1.34
Excellent (10)	0.30	0.04	0.33
Total Streets and Sidewalks	23.31	2.41	25.73
Stormwater Quality Improvements			2.50
Fix and Repair Bridges and Culverts			1.60
New Sidewalks and Bikepaths			2.43
Total Future Investments			32.26
*2006 Dollars in millions (not adjusted for inflation)			



"Do Nothing" is the Most Expensive Option

Streets, alleys, bridges, sidewalks, bike paths, storm systems and traffic control devices account for more than 57% of the over $63.7 million Capital Assets of the City. The majority of these assets have been fully depreciated, having reached the end of their expected useful life. We have been fortunate that many of these assets have far exceeded their expected useful life. This is reflected in the street and sidewalk condition ratings with nearly 80% of our assets in very poor to fair condition. Deferring a significant investment into these assets will only escalate the Future Investment required. The chart, on the left, shows the effects of 2.5% inflation over a 20 year period escalating the present day cost to over $50 million from the current estimated cost of over $30 million.

Future Investment Years 1-5

Street Name	From	To	Model Type	Length	Street Cost	Sidewalk Cost	Total Cost
BOON ST	Garfield	Santo	S	2430	$ 105,301	$ -	$ 105,301
LEEWARD TRL	Western	Ex. Pave	U	390	$ 16,541	$ -	$ 16,541
CYPRESS ST	Division	Cedar	U	530	$ 22,863	$ -	$ 22,863
WESTERN ST	Birchwood	East Bay Blvd	U	400	$ 17,171	$ -	$ 17,171
BATES ST	Boyd	8th	U	580	$ 24,848	$ -	$ 24,848
GROVE ST	Rose	Grant	U	930	$ 40,077	$ -	$ 40,077
BOYD ST	Rose	Bates	U	500	$ 21,376	$ -	$ 21,376
W GRIFFIN ST	Pine	Locust	U	370	$ 16,007	$ -	$ 16,007
KELLEY ST	Bates	Barlow	U	860	$ 37,152	$ -	$ 37,152
SHEFFER ST	Centre	Carver	U	1430	$ 61,772	$ -	$ 61,772
SANTO ST	Baldwin	Alley	U	460	$ 19,464	$ -	$ 19,464
PLAINVIEW ST	Hastings	End	U	670	$ 28,648	$ -	$ 28,648
LAKE RIDGE DR	16th	14th	U	1030	$ 44,525	$ -	$ 44,525
XAVIER CT	Cedar	Cypress	U	360	$ 15,274	$ -	$ 15,274
AERO PARK DR	Parsons	West Aero Park	S	1590	$ 75,423	$ -	$ 75,423
AIRPORT ACCESS RD	Munson	Westminster	S	780	$ 36,996	$ -	$ 36,996
BARLOW ST	Carver	Centre	S	1360	$ 63,924	$ -	$ 63,924
BIRCHWOOD AVE	Eastern	East Bay Blvd	S	1970	$ 93,364	$ -	$ 93,364
BOUGHEY ST	Veterans	High	Q-1	540	$ 42,002	$ -	$ 42,002
E EIGHTH ST	Munson	East Bay Blvd	S	900	$ 42,069	$ -	$ 42,069
E EIGHTH ST	Rose	Garfield	H	1350	$ 175,407	$ 19,950	$ 195,357
E EIGHTH ST	Boardman	Wellington	A	620	$ 88,049	$ 6,900	$ 94,949
STATE ST	Railroad	Wellington	Q	980	$ 104,041	$ 11,550	$ 115,591
E STATE ST	Garfield	Barlow	O	2610	$ 228,273	$ 19,650	$ 247,923
E TWELFTH ST	Union	Cass	H-1	730	$ 81,614	$ 5,400	$ 87,014
EAST TIMBERLANE DR	Nakoma	Kaukana	S	2420	$ 114,599	$ -	$ 114,599
GARLAND ST	Hall	Grandview Pkwy	A-1	850	$ 60,931	$ -	$ 60,931
HANNAH AVE	Garfield	Hastings	S	680	$ 32,185	$ -	$ 32,185
HIGHLAND PARK DR	Eastern	Cherry Lane	S	560	$ 26,460	$ -	$ 26,460
HILL ST	Monroe	End	L	850	$ 98,307	$ 3,150	$ 101,457
HURON HILLS DR	Quail Ridge	Arrowhead	S	240	$ 11,130	$ -	$ 11,130
INCOCHEE RD	Wayne	City Limits	S	210	$ 9,827	$ -	$ 9,827
INDIAN TRAIL BLVD	Airport Access	Westminster	S	1350	$ 63,182	$ -	$ 63,182
JEFFERSON RD	Madison	Hillcrest	Q	370	$ 39,288	$ -	$ 39,288
LAKE AVE	Union	8th	A	640	$ 91,448	$ 9,510	$ 100,958
MANOR AVE	Eastwood	E. Orchard	S	330	$ 15,609	$ -	$ 15,609
N ELMWOOD AVE	E. Front	Bay	H	2870	$ 375,000	$ 17,550	$ 392,550
PARSONS RD	Airport Access	City Limits	S	1870	$ 88,648	$ -	$ 88,648
PINE ST	State	Front	A	460	$ 65,539	$ 3,450	$ 68,989
QUAIL RIDGE DR	Eastern	Huron Hills	S	2210	$ 104,500	$ -	$ 104,500
RAILROAD AVE	8th	Front	S	1900	$ 89,107	$ 7,170	$ 96,277
RANDOLPH ST	Monroe	Fulton	L	320	$ 36,559	$ 3,510	$ 40,069
RANDOLPH ST	Division	Spruce	Q	1180	$ 126,543	$ 19,740	$ 146,283
ROSE ST	Hannah	Boon	O	2760	$ 238,517	$ 22,830	$ 261,347
S EAST BAY BLVD	8th	Shawnee	S	1710	$ 79,787	$ -	$ 79,787
S MAPLE ST	14th	13th	O	640	$ 56,139	$ 4,950	$ 61,089
S OAK ST	14th	13th	O	650	$ 56,111	$ 6,255	$ 62,366
S OAK ST	Front	7th	L	1300	$ 152,329	$ 19,470	$ 171,799
S UNION ST	14th	Boughey	N	2040	$ 197,801	$ 22,380	$ 220,181
SEVENTH ST	Union	Pine	Q	610	$ 64,431	$ 8,850	$ 73,281
SEVENTH ST	Cedar	Spruce	Q-1	400	$ 30,802	$ 3,000	$ 33,802
SHERIDAN RD	N. Orchard	Eastern	S	1750	$ 82,331	$ -	$ 82,331
THIRD ST	Division	Spruce	S	890	$ 41,545	$ 7,185	$ 48,730
W EIGHTH ST	Division	Union	K-1	2870	$ 871,085	$ 21,450	$ 892,535
W ELEVENTH ST	Pine	Elmwood	G-1 & S	3620	$ 451,842	$ 40,410	$ 492,252
W FRONT ST	Division	Maple	A	430	$ 61,297	$ 6,300	$ 67,597
W NINTH ST	Wadsworth	Division	H	1670	$ 218,999	$ 49,680	$ 268,679
W STATE ST	Pine	Union	A	540	$ 76,307	$ 15,840	$ 92,147
WADSWORTH ST	7th	9th	L & Q	870	$ 97,381	$ 11,175	$ 108,556
WASHINGTON ST	Garfield	Prospect	N	900	$ 86,371.9	$ 9,900.0	$ 96,271.9
WAYNE ST	Cedar	Incochee Crest	Q-1 & S	4110	$ 260,551	$ 5,625	$ 266,176
WENONAH ST	8th	Iroquois	S	1330	$ 62,627	$ -	$ 62,627
WEST ORCHARD DR	Sheridan	E. Orchard	S	770	$ 28,082	$ -	$ 28,082
				Total	$ 6,172,556	$ 384,450	$ 6,557,006

Basis of Cost

Street and sidewalk reconstruction or rehabilitation costs for Investment Years 1-5 are shown in the table on left. Costs were determined using pricing for 2006 and do not include provisions for inflation. The costs include construction, engineering, and a 5% contingency. Costs for other utilities including watermains and sanitary sewer are not included as they are funded through separate utility funds.

Stormwater Management

The City Engineering Department recently completed an inventory of the 97 stormwater system entry points into Grand Traverse Bay and contributing waters (i.e. Boardman River and Lake, Kids Creek, etc.) within the City limits. The inventory was combined with our GIS data, and tributary areas for each of the systems were determined. Map 9 shows these stormwater tributary boundaries. Stormwater flow was calculated for various storm events and tabulated for each Stormwater system. Using this data, we are compiling a Stormwater Master Plan to define a system of Best Management Practices (BMPs) for improving water quality through implementing Stormwater system improvements. The Stormwater Master Plan will identify Stormwater systems which impact water quality the most and offer a strategy to mitigate existing impairments.

Stormwater System Entry Point into Boardman River

In conjunction with our water quality partner, The Watershed Center Grand Traverse Bay, the City is implementing several demonstration projects using various Stormwater quality improvement techniques to identify and monitor the effects and cost of different BMP strategies. The information will help determine recommendations for future improvements to be implemented over a period of years. Using the cost figures from the demonstration projects, we estimate a future investment of $2.5 to 3.5 million will be needed to implement water quality projects.

The City is also working to update existing Stormwater ordinances to allow for the use of innovative BMP's and

Recent Investments

Funding for operating and maintaining City streets is determined annually. Funding improvements from the general fund is limited to the investments identified in the Public Improvement Plan. The City has committed $100,000 annually for the improvement of major City streets. This has improved and rehabilitated only 23 miles of City major streets in the last 20 years. Additionally, the City receives an allocation from MDOT through the Small Urban Task Force. Allocations from 2003 and 2006 paid the majority of the cost for the Woodmere Avenue Improvements. Pine and State Streets from Front Street to Union Street are programmed to receive funding for construction in 2008. Other streets in the PIP include Railroad Avenue, Wayne Street, Boardman Lake Avenue, Franke Road-Silver Drive and Park Street.

Local street investments since 1990 have been limited to those included in a Special Improvements District (SID). These improvements are citizen initiated with a contribution from the adjacent property owners and the City. Map 5 shows the recent investments for the years 2001 to 2006.

Sidewalks and Bike Paths

The extent of existing public sidewalks and bike paths in the City are shown on Map 4. The map shows the 72 miles of sidewalks and 4.6 miles of bike paths in the City. Total or partial sidewalk replacement will be made in conjunction with adjacent street improvements. Total replacement was used for streets with more than 75% of the total sidewalk area requiring repair. The areas are shown on Map 4-A. The current estimated cost for repairing existing sidewalks is $2.4 million.

The Map also shows locations where nearly 10 miles of new sidewalk and 2 miles of recreation trails - bike paths are recommended. Locations for new sidewalks were selected if they were:

- Within walking distance to schools
- Connected existing sidewalks
- Along major corridors

Recreation trails and bike paths are shown along West Bay and Boardman Lake includes acquisition of a $500,000 grant to implement a project in 2007/2008. The future investment for new sidewalks and recreation trails - bike paths is estimated at over $2.5 million.

***Quick Facts*:**

- There are 117 miles of streets in the City.
- There are 72 miles of sidewalks and 4.6 miles of bike paths in the City.
- 3752 crew-hours, 224 days were spent patching potholes in 2006.
- 552 crew hours were spent crack sealing.
- 944 crew hours were spent repairing sidewalks, both concrete and brick.
- $100,000 is spent annually on major street improvements.
- 21 stop lights are operated by the City, many of which have been upgraded to use low energy LED

City of Traverse City
Engineering Department

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Traverse City, Michigan 49684

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What's Next:

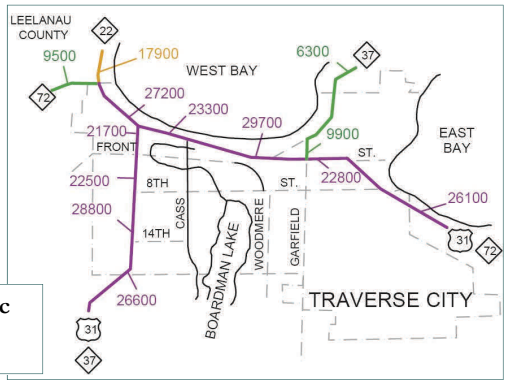
- Review information with stakeholders. Keep the stakeholders informed of current information.
- Develop Investment Options.
- Determine Investment Priorities. Is "fix the worst first" the best priority option?
- Develop investment strategy, combining the Investment Priorities and Investment Options.
- Implement strategy to improve and preserve City streets.

Traffic Count Information

The lifespan of a road is dependent on the amount of traffic that uses it. Traffic count data are useful for calculating the remaining service life of a pavement. Estimating traffic type is also important. Heavy loads, such as those generated by trucks, break down pavement quicker than passenger cars. Knowing traffic volumes and type will be useful for future planning and Pavement Management Systems.

The City collects traffic counts for selected locations annually. The data that is collected provides a reasonable representation of the conditions encountered during the collection timeframe. Counts are taken during the mid-week. Conditions such as the weather, the day of the week, the time of the year and limitations of the data collection device can affect the results.

Traffic count data for selected locations on major streets is collected annually. For local streets, the Engineering Department is collecting traffic count data at five-year intervals. Traffic data for alleys are being collected at ten-year intervals. The most current traffic count data collected is shown in Map 6. Historical and current traffic count data is available on the City's web site and from sources such as the County and MDOT.



MDOT Traffic Count Data

Future Investment

Based on the current condition rating a Future Investment Strategy can be considered. Cost estimates were developed using a "fix the worst first" strategy and following the improvement recommendations listed on page 2, for the various condition ratings, and a 20 year timeline. The improvements are shown on Map 7 and summarized in the table below.

The estimated $23.3 million figure is a beginning point to discuss an investment strategy. This cost estimate varies from the $17.5 million estimate provided in 2005 due to a 25% increase in the cost of materials and the change from 27% to 21% of our streets rated good to excellent. Also, the future investment $2.4 million cost estimate for replacing existing sidewalks in poor condition are shown in the table below. Priorities of improvements will be debated and revised as needed. Funding options including local state and federal sources and other potential funding sources such as a street and sidewalk millage will be explored.

Investment Year	Required Future Investment		
	Streets	Sidewalks	Total
1 to 5	6.2	0.4	6.6
6 to 10	6.3	0.9	7.2
11 to 15	5.0	0.6	5.6
16 to 20	5.9	0.5	6.4
Total	23.3	2.4	25.7

* 2006 Dollars in Millions (not adjusted for inflation)

The City will continue performing maintenance and rehabilitation with City work crews to extend the life of the existing pavement. For example, the City's crack sealing program is designed to prevent moisture from penetrating the surface of relatively new asphalt (starting in the surface's second year) and causing potholes. We use a liquid, hot-poured rubber product manufactured by Deere (not the John Deere Corporation). The observed results have been excellent in the three years that we have been using this maintenance technique.