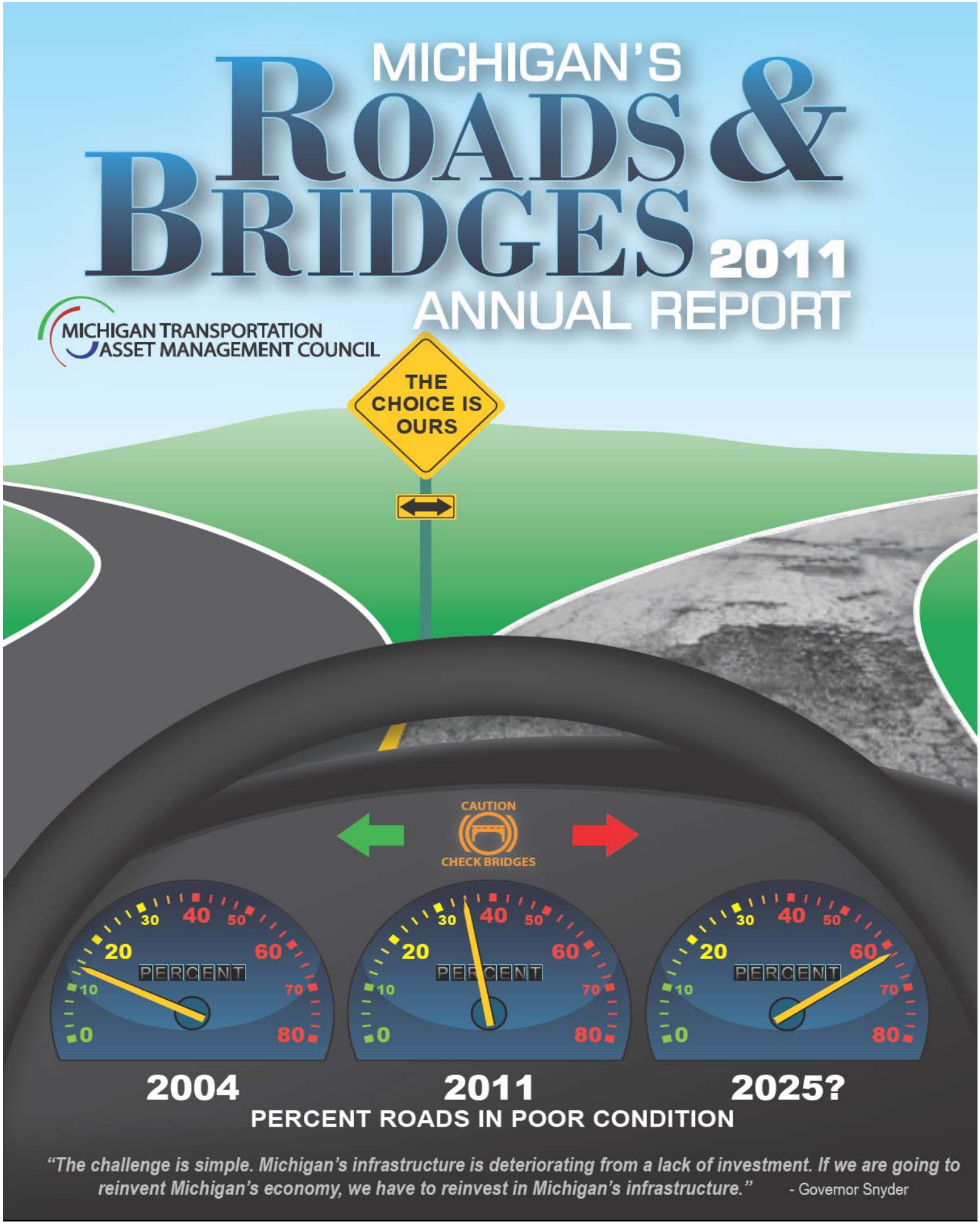
MICHIGAN'S ROADS & BRIDGES 2011 ANNUAL REPORT

MICHIGAN TRANSPORTATION ASSET MANAGEMENT COUNCIL



PERCENT ROADS IN POOR CONDITION

"The challenge is simple. Michigan's infrastructure is deteriorating from a lack of investment. If we are going to reinvent Michigan's economy, we have to reinvest in Michigan's infrastructure." - Governor Snyder

TABLE OF CONTENTS

EXECUTIVE SUMMARY ……..… Pgs. 4-5

TRANSPORTATION ASSET MANAGEMENT IN MICHIGAN …..…. Pgs. 6-8

TRANSPORTATION ASSET MANAGEMENT COUNCIL ……..... Pgs. 9-12

CONDITION OF THE SYSTEM 2011 ……..…….. Pgs. 13-27

Pavement Surface Evaluation System (PASER)
Federal-Aid Roads Condition
National Functional Class (NFC)
Non-Federal-Aid Roads and Streets Condition
Federal-Aid vs. Non-Federal-Aid Roads and Streets
Pavement Condition and Vehicle Miles Traveled (VMT)
Bridge Condition
National Bridge Inventory (NBI)

EIGHT YEAR TREND ANALYSIS …… Pgs. 28-29

Roads – Pavement Cycle of Life 2004-2011
Bridges – Bridges Cycle of Life 2004-2011

FORECASTED SYSTEM CONDITION ……..…… Pgs. 30-31

Road Condition – Forecast of Pavement Condition 2012-2025
Bridge Condition – Bridge Condition Forecast System 2012-2021

INVESTMENTS IN THE SYSTEM …….……..…… Pgs. 32-33

APPENDIX A: MICHIGAN'S ROADS CRISIS REPORT ……..… Pgs. 34-60

APPENDIX B: SPECIAL MESSAGE FROM GOVERNOR SNYDER ….. Pgs. 61-73

APPENDIX C: ACT 51 ……..……..…….. Pgs. 74-76

APPENDIX D: COUNCIL MEMBERS …….…. Pg. 77

APPENDIX E: COMMISSION MEMBERS ……..……. Pg. 78

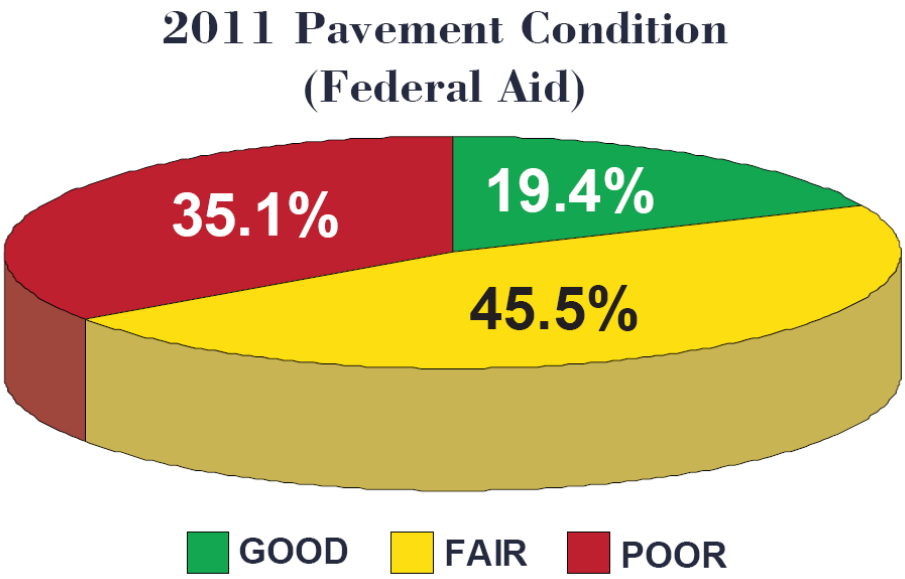
APPENDIX F: DEFINITION OF TERMS ……..…… Pgs. 79-80

APPENDIX G: REDUCTION IN ASSET VALUE 2004-11 …….…….. Pg. 81

EXECUTIVE SUMMARY

The condition of Michigan's roads continued to deteriorate in 2011. This is the conclusion of the Michigan Transportation Asset Management Council after reviewing the 2011 pavement condition data. While the data show a slight 1.4 percent increase in the number of roads rated in "good" condition between 2010/11, one out of every three miles of road on the federal-aid eligible road system remain rated in "poor" condition. This slight increase is likely due to the projects completed as part of the American Recovery & Reinvestment Act (ARRA) of 2009 and rated in 2011. Though welcome news, there is not sufficient evidence to suggest that the trend is reversing itself; in fact, the Council projects that the situation will only get worse in the coming years.

Allowing this trend to continue will have significant financial and economic consequences. For example, the cost of returning a poor road to good condition is four to five times greater than the cost of maintaining a road in fair condition. Allowing more roads to reach poor condition will dramatically increase the future costs of repairing Michigan's road network.



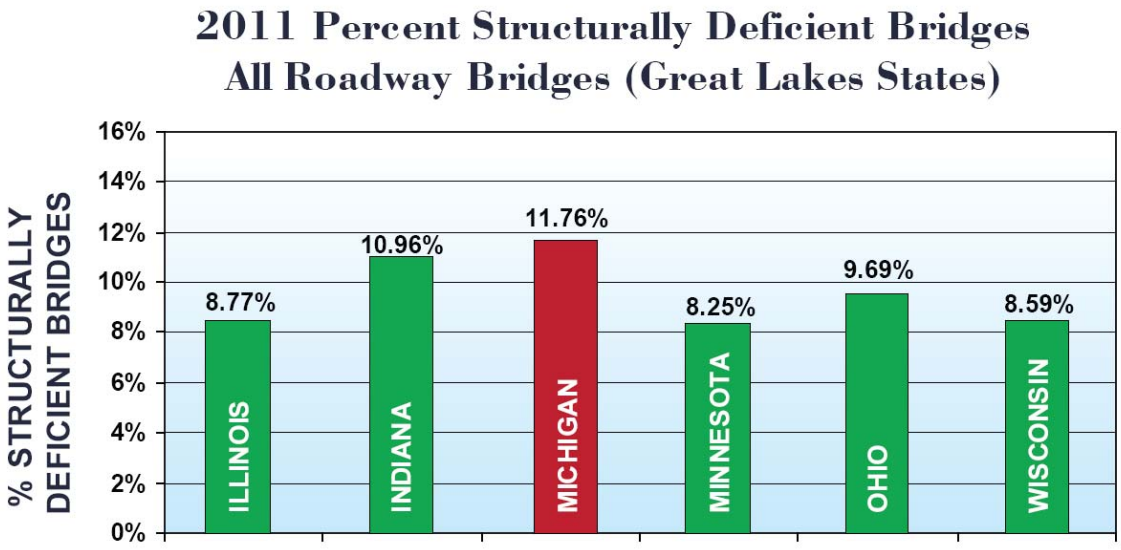
Source: TAMC 2011 PASER Data Collection
Figure 1

Figure 1 above shows the results of the 2011 rating reveal that 35.1 percent (18,781 lane miles) were in poor condition, 45.5 percent (24,345 lane miles) were in fair condition, and 19.4 percent (10,380 lane miles) were in good condition.

With respect to Michigan's bridges, progress has been made in reducing the number of structurally deficient bridges under state jurisdiction, and more local agencies are implementing preventive maintenance "mix of fixes" on local bridges. Through the efforts of the Council, MDOT's Local Agency Program received an allowance from the Federal Highway Administration to use Federal Highway Bridge Program funding to do systematic preventative maintenance of locally owned roadway bridges. Michigan is one of the first states to be granted this option.

Federal guidelines classify bridges as *structurally deficient* if at least one of three key bridge components (deck, superstructure, or substructure) is rated in poor condition. This means that qualified engineers have determined that the bridge requires significant maintenance, rehabilitation or replacement. A structurally deficient bridge may need to have heavy vehicle traffic restricted or eventually be closed until necessary repairs can be completed.

An analysis of bridge conditions in Michigan shows that state and local bridge owners and decision makers are "holding their own" despite rising costs and revenue challenges. Bridge conditions in Michigan have been given even more of a strategic focus with the development of the MiDashboard, Governor Snyder's set of high level performance measures indicating how the state compares with the rest of the nation in key result areas, along with recent trends. The percentage of Michigan's bridges which are rated structurally deficient is one of the 5 measures of the overall strength of Michigan's economy, and this measure can be accessed online at: **www.michigan.gov/midashboard**



Source: MDOT April 2012
Figure 2

However, there remains reason for continued concern regarding Michigan's ability to preserve its strategic bridge assets. Figure 2 indicates that Michigan has a significantly higher percentage of structurally deficient bridges than other Great-Lakes states. In 2011, 5.5 percent of state-owned bridges and 16.1 percent of county and local bridges were structurally deficient, resulting in Michigan having 11.8 percent of all roadway bridges structurally deficient.

At current funding levels, the condition of Michigan's transportation infrastructure will continue to deteriorate. This alarming decline in condition of Michigan's infrastructure affects everyone – from businesses that rely on the transportation network to transport goods and services; from tourists visiting or traveling through our great state to our citizens who expect safe and convenient access to work and school. Reinvesting in our transportation system and maintaining these vital public assets are essential to securing a better future for all of Michigan's citizens.

TRANSPORTATION ASSET MANAGEMENT IN MICHIGAN

"An ongoing process of maintaining, upgrading and operating assets cost-effectively, based on a continuous, physical inventory and condition assessment." [MCL 247.659(a)]

Asset Management involves collecting physical inventory and managing current conditions based on strategic goals and sound investments. It is a continuous, iterative process enabling managers to evaluate various scenarios, determine trade-offs between different actions, and select the best method for achieving specified goals.

In Michigan, there are 618 public agencies (MDOT, Counties, and Cities & Villages) that have jurisdiction over the road and bridge system of the state. As defined by Public Act 51, each of these agencies receives a set amount of state funding to manage the road and bridge system under their jurisdiction. Some local agencies receive additional funding from local sources (millages, assessments, etc.). Traditionally, public sector management of roads and bridges has been tactical in nature, concentrating on the immediate and most severe problems. In response to this practice, the Michigan Legislature created the Transportation Asset Management Council under Public Act 51 (P.A. 499 of 2002; Amended by P.A. 199 of 2007) to provide a coordinated, unified effort by the various roadway agencies within the state to advise the State Transportation Commission on a statewide asset management strategy. Asset management moves from a "worst-first" approach to one that is strategic in nature. Decisions are made with regard to the long-range condition of the entire system rather than individual projects. This requires considering system condition goals and various investment strategies over a period of time.

It is crucial in an asset management process to have the ability to forecast future road and bridge conditions and perform investment analyses based on various funding and fix scenarios. The strategic component of the process focuses on network level analysis. This component takes into consideration:

- Current condition of the transportation system and its future condition if there is no change in current practices;
- Future condition based on alternative strategies;
- The best time to maintain, preserve, or improve to get maximum useful life from a transportation asset;
- Use of preventative fixes or allow an asset to deteriorate to the point of requiring reconstruction;
- Costs and benefits of each decision; and
- Relation to identified goals and objectives.

It is also necessary to focus on effectively and efficiently managing and operating the transportation system rather than merely reconstructing it.

The fundamental elements of an asset management process includes:

- Conduct periodic system condition inventories;
- Identify needs by forecasting system conditions based upon reliable rates of deterioration;
- Establish strategic goals and objectives and performance measures;
- Evaluate investment scenarios based upon forecasted conditions and achievement of goals and objectives;
- Develop and implement a multi-year investment program; and
- Routinely monitor the performance of the system improvements.

What causes a road to deteriorate?

According to the American Association of State Highway and Transportation Officials (AASHTO) "Those who work with pavements know that after a pavement is built, traffic and environmental loadings create unavoidable stress that will eventually reduce the condition of the roads to a point where they will not be usable without maintenance." (Executive Summary Report: Pavement Management Guide, ASSHTO, November 2001, pgs. 1-2)

When a road is designed and constructed/reconstructed, 20 to 25 years of useful service can be expected before major rehabilitation or reconstruction is needed. The life cycle performance of a highway depends upon the type, time of application, and quality of the maintenance it receives. There are three groups of maintenance: routine, capital preventative and reactive maintenance. Routine maintenance consists of the on-going, planned activities such as snow removal, street sweeping, crack sealing, and mowing. Capital preventative maintenance activities protect the pavement and decrease the rate of deterioration of the pavement quality. Reactive maintenance activities are performed to correct a specific pavement problem such as potholes.

Delays in applying maintenance fixes increase the severity of pavement defects and increase the costs to correct those defects. When the defect is finally corrected, the cost is much greater.

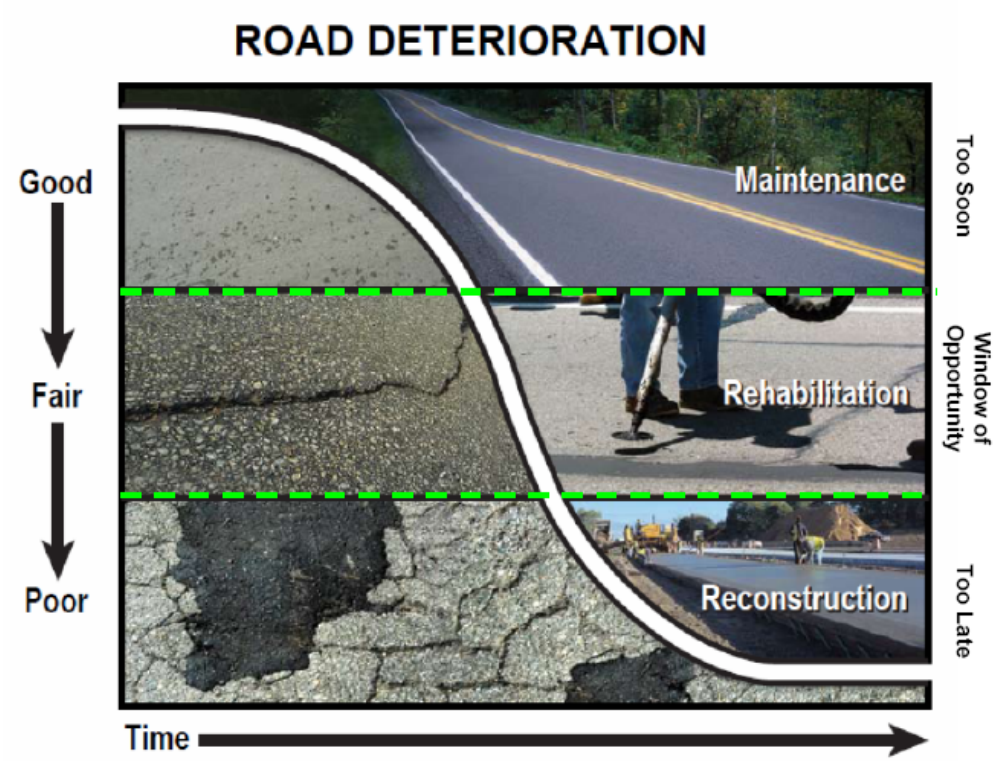
The heart of asset management is a sound capital preventive maintenance program (CPM).

Act 51 defines preventive maintenance as "a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserve assets by retarding deterioration and maintaining functional condition without significantly increasing structural capacity." [MCL 247.660(c)] A sound capital preventative maintenance program minimizes the effects of the elements (sunlight/weather) on road deterioration and ensuring that the 20-25 years of useful service from the road is achieved. CPM is extremely important in an era of tight funding. Studies have shown that for every dollar spent on CPM an agency can delay spending $4 to $6 dollars on reconstruction.

The purpose of a CPM program is to protect the pavement structure, slow the rate of deterioration and correct surface deficiencies. The National Center for Pavement Preservation notes that: "In the past, many CPM practices have not been effective because they were applied reactively to roads in poor condition instead of proactively to roads still in good condition. The correct approach to CPM is to ***'place the right treatment on the right road at the right time.'*** Traditional approaches waited until deficiencies became evident, even to the untrained observer, at which time, the road agency was trapped into the unfavorable choice of either applying major rehabilitation or complete reconstruction. By the time deficiencies became evident to the observer, irreversible underlying structural damage has often already occurred and it is too late to apply preventive treatments." (Pavement Preservation: Applied Asset Management, National Center for Pavement Preservation, Department of Civil and Environmental Engineering, MSU, November 2006, pgs. 1-3)

"Window of Opportunity"

Figure 3 illustrates the concept in which certain types of treatments are more feasible to use than others. The curved line show how a pavement deteriorates over time. There are certain points along the curve where different types of work activities no longer are feasible. These points define the **"window of opportunity."**



Source: TAMC 2012
Figure 3

The portion of Figure 3 outlined in green/dashed-line is the area where CPM activities take place with the most effectiveness. With tight budgets and scarce funds, agencies need to optimize the performance of their existing systems. A CPM program is designed to extend the life of good and fair pavements by applying lower cost treatments. These slow the rate of deterioration.

TRANSPORTATION ASSET MANAGEMENT COUNCIL

Formation and Mission

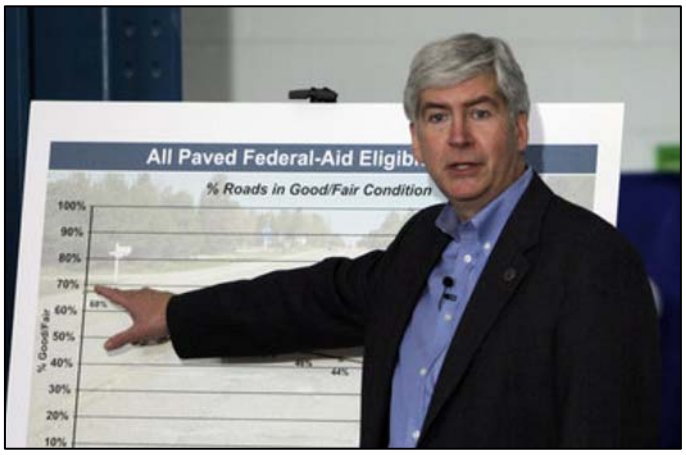
The Transportation Asset Management Council (Council) was formed under Public Act 499 of 2002 (Amended by P.A. 199) to develop a coordinated, unified process by the various roadway agencies within the state to advise the State Transportation Commission on a statewide asset management strategy. For more information on the State Transportation Commission please see Appendix E of this report or visit MDOT's Website: www.michigan.gov/mdot. The Council is comprised of ten (10) voting members from the Michigan Department of Transportation (MDOT), Michigan Municipal League (MML), County Road Association (CRAM), Michigan Association of Counties (MAC), Michigan Township Association (MTA), Michigan Association of Regions (MAR), Michigan Transportation Planning Association (MTPA), and one (1) non-voting member from the Michigan Center for Shared Solutions (MCSS). For more information on Council members please see Appendix D of this report or visit the Council's Website: www.michigan.gov/tamc

Mission: To support excellence in managing Michigan's transportation assets by:

1. Advising the Legislature and State Transportation Commission
2. Promoting Asset Management Principles
3. Providing Tools and Practices for Road Agencies

Governor Snyder's Special Message on Infrastructure:

In October of 2011, Governor Snyder delivered a special message on public infrastructure titled *'Reinventing Michigan's Infrastructure: Better Road Drive Better Jobs'*. In that message, the Governor stated that Michigan's infrastructure is deteriorating from a lack of investment. The Governor laid out a multi- step plan to meet the challenge of improving our infrastructure that included reforms to current practices, revenue enhancement, and public transit improvements.



AP Photo/Carlos Osorio

As part of that message, Governor Snyder recognized that Michigan is a leader in managing our road and bridge assets with a long term vision. This is, in part, due to the efforts of the Transportation Asset Management Council. He urged the continuation and expansion of the practice as part of his vision to improve our underfunded transportation infrastructure. To review this message in its entirety, please see APPENDIX B or visit the Governors Webpage: www.michigan.gov/snyder

Michigan Roads Crisis Report

On September 19, 2011 Representatives Rick Olson and Roy Schmidt published a report of the Work Group on Transportation Funding, of the House of Representatives Transportation Committee titled "Michigan's Roads Crisis: What Will It Cost to Maintain Our Roads and Bridges?" [See APPENDIX A to view the full report]. This report relied on the PASER condition data supplied by the Transportation Asset Management Council and analysis completed by MDOT staff.

Accomplishments & Activities over the Past Year:

Training & Education:

- Two (2) Asset Management Conferences held in Grand Rapids and Escanaba – Attendance: 200
- Five (5) Asset Management Workshops - Attendance: 120
- Twelve (12) Elected & Appointed Officials Workshops – Attendance: 300
- Ten (10) PASER Trainings – Attendance: 400
- Fourteen (14) Investment Reporting Tool Trainings – Attendance: 200

Public Outreach:

- *Website:* The Council continues to revise and update the Transportation Asset Management Council's website to improve ease of use and add content. In 2011, the Council added features to the public interactive map that includes historical and most current PASER condition rating, updated PASER data collection information, and most current NBI (Bridge) condition information.
- *Dashboards:* In late 2011 the Council began work on several Performance Measure Dashboards that show the condition, operation, and investment in Michigan's public road and bridge system. These dashboards will be located on the Council website and accessible to all public agencies and the general public:
    - *Pavement & Pavement Comparison Dashboard* – is based on paved surface ratings for state highways as well as roads under the jurisdiction of Michigan's counties, cities & villages. These dashboards illustrate pavement condition, as well as, provides the user with the ability to compare their performance with up to eight of their piers. Anticipated release: Spring 2012.
    - *Bridge Dashboard* – statewide there are over 10,000 public road bridges. Bridge conditions are based on bi-annual inspections of state, county, city & village owned bridges. Anticipated release: Spring 2012.
    - *Finance Dashboard* – capitol investments are necessary to extend the useful life of any asset including roads and bridges. This dashboard illustrates how investments in the road and bridge system are made. Anticipated release: Spring 2012.
    - *Traffic & Safety Dashboard* – the rate of crashes (fatalities, serious injuries) and traffic volumes is a measure of how effectively the road system is performing. Anticipated release: Fall 2012
    - *Routine Maintenance Dashboard* – is required to keep roads and bridges performing as intended. Anticipated release: Fall 2012.

Publications:

- *Annual Report:* On May 2nd of each year (since 2003), the Council submits an Annual Report to the State Transportation Commission and Michigan Legislature describing the asset management related efforts and condition of the road & bridge system from the year prior.
- *Asset Management Guide / Sample Asset Management Plan*: Working in conjunction with MDOT, in the spring of 2011 the Council adopted an updated Local Agency Guide for Developing an Asset Management Process/Plan and developed a new Sample Asset Management Plan.

  This Guide was designed to lead an agency through the steps of an asset management process with the idea that when applied to 600+ local agencies, one size does NOT fit all. This idea ultimately lead to the creation of a tiered (Basic, Moderate, Advanced Levels) sample asset management plan. Each local agency now has access to both of these documents online.
- *Asset Management Guide for Local Agency Bridges in Michigan/Sample Bridge Asset Management Plan:* The Council has developed an Asset Management Guide for Local Agency Bridges in Michigan. The guide is intended to provide assistance to local agency bridge owners and decision makers in understanding bridge management and preservation. In this regard, the guide provides guidance to decision makers and county bridge or highway engineers in the planning, developing, programming, and implementing of effective and efficient capital programs and maintenance actions to preserve the bridges under their jurisdiction; and information to assist local agencies (1) in understanding their bridge network, (2) in the preparation and implementation of a bridge preservation plan, and (3) to support applications for funding under MDOT's Local Bridge Program.

  As a result of this effort, MDOT's Local Agency Program received an allowance from the Federal Highway Administration to use Federal Highway Bridge Program funding to do systematic preventative maintenance of locally owned highway bridges. Michigan is one of the first states to be granted this option.

All Publications are Available on the Council's Webpage: **www.michigan.gov/tamc**

Reporting:

- *Investment Reporting Tool (IRT) & Act 51 Distribution and Reporting System (ADARS):* In 2011/12, the Council partnered with MDOT's Financial Operations Division to add the annual project reporting requirements within the IRT to the newly developed online ADARS. In effect, this effort combines two separate annual reporting requirements of road owning agencies (Counties, Cities & Villages) into one to provide the State Legislature with a much clearer understanding of how Michigan Transportation Funds (MTF) are applied at the project level.

Recognition:

- *Awards Program:* The Council adopted an awards program to annually single out those individuals and organizations that support and promote asset management practices. The following individuals and organizations were recognized in 2009 – 2011:
  - Individual
    - John Daly III, PHD – 2009
    - Brian Gutowski, Emmet County Road Commission – 2009
    - Lance Malburg, Oceana County Road Commission – 2010
    - Rob VanEffen, Delta County Road Commission – 2010
    - Anamika Laad, EMCOG – 2010
    - Edward G. Hug, SEMCOG – 2011
  - Organization
    - Michigan Department of Transportation – 2009
    - Genesee County Metropolitan Planning – 2009
    - City of Manistee – 2009
    - City of Marquette – 2009
    - Alcona County Road Commission – 2009
    - Kent County Road Commission – 2009
    - Kalamazoo County Road Commission – 2010
    - Roscommon County Road Commission – 2010
    - Genesee County Road Commission – 2010
    - Ottawa County Road Commission – 2011

Pavement Surface Evaluation and Rating System (PASER)

The Council chose the Pavement Surface Evaluation and Rating System (PASER) because the data it uses is easy to collect; it is of sufficient detail for statewide, network-level analysis; and it is the method currently used by most road agencies in Michigan. PASER is a visual survey of the condition of the surface of the road. It rates the condition of various types of pavement distress on a scale of 1-10. It is based on a system of pavement evaluation developed in Wisconsin and is used by many road agencies in the state. This type of survey is one of the easiest to do and is relatively inexpensive compared to other rating methods. This makes it ideal for small agencies.

While PASER is a subjective method, it is based on sound engineering principles. PASER measures "surface distress." It does not measure structural capacity, ride quality or friction. The Council groups the 1-10 rating scale into three categories (Good 8-10, Fair 5-7, Poor 1-4) based upon the type of work that is required for each rating (Routine Maintenance, Capital Preventive Maintenance, Structural Improvement).

Routine Maintenance is the day-to-day, regularly-scheduled activities to prevent water from seeping into the surface such as street sweeping, drainage clearing, gravel shoulder grading, and sealing cracks. PASER ratings 8, 9, and 10 are included in this category. This category also includes roads that are newly constructed or recently seal coated. They require little or no maintenance. In popular nomenclature ***these roads are considered "good."***

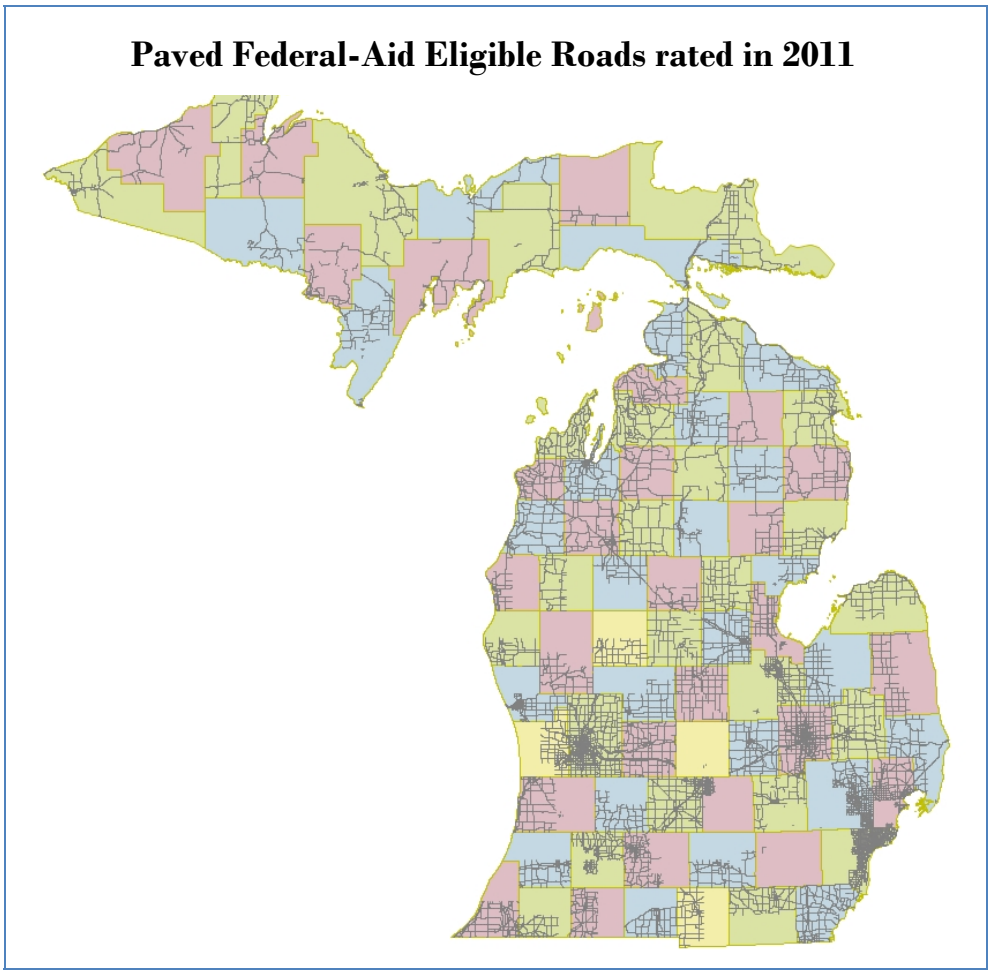
Capitol Preventive Maintenance (CPM) is a planned set of cost effective treatments to an existing roadway that retards further deterioration and maintains or improves the functional condition of the system without significantly increasing the structural capacity. The purpose of CPM fixes is to protect the pavement structure; slow the rate of deterioration; and/or correct pavement surface deficiencies. PASER ratings 5, 6, and 7 are included in this category. Roads in this category still show good structural support but the surface is starting to deteriorate. CPM is intended to address pavement problem ***before*** the structural integrity of the pavement has been severely impacted. ***These roads are considered "fair."***

Structural Improvement is necessary for roads assigned a PASER rating of 1, 2, 3, or 4 which require some type of structural improvement such as resurfacing or major reconstruction. Alligator cracking is evident. Rutting is beginning to take place. Road rutting is evidence that the underlying structure is beginning to fail and it must be either rehabilitated with a fix like a crush and shape or it must be totally reconstructed. ***These roads are considered "poor."***

PAVEMENT CONDITION

Federal-Aid Roads

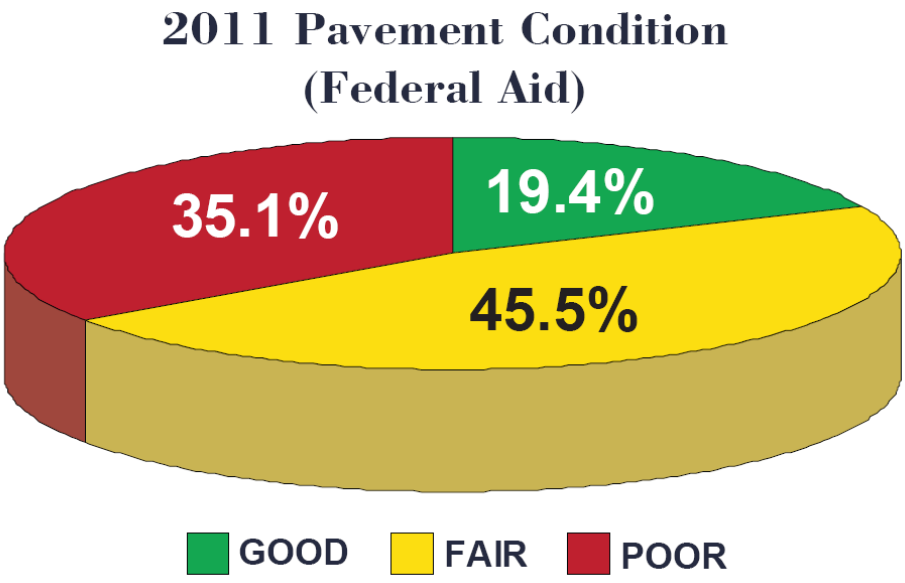
In 2011, the Council required that only 50 percent of the paved federal-aid eligible roads be rated, with the other 50 percent having been rated in 2010.



Source: TAMC 2011 PASER Data Collection - Figure 4

Even though agencies were only required to report 50 percent, approximately 63 percent of these roads were rated and reported in 2011 and 71 percent reported in 2010. Analysis of the data collected indicated that while 63 percent of the system condition was collected, it was statistically representative of the entire system. Over 100 teams of trained raters assessed the condition of 53,506 lane miles of paved federal-aid eligible roads. The collection of roadway condition data by the Council is a cooperative effort involving teams of county, city, state and regional planning staff members. Individuals must attend PASER training each year before being allowed to rate the roads. This effort was coordinated by the 21 regional planning and metropolitan planning organizations.

The data is reported in lane miles. A lane mile is determined by multiplying the number of lanes by the length of the road. For example, if you were surveying five miles of two-lane road, you would be rating ten lane miles. If it were a four-lane road, then you would have twenty lane miles.



Source: TAMC 2011 PASER Data Collection
Figure 1

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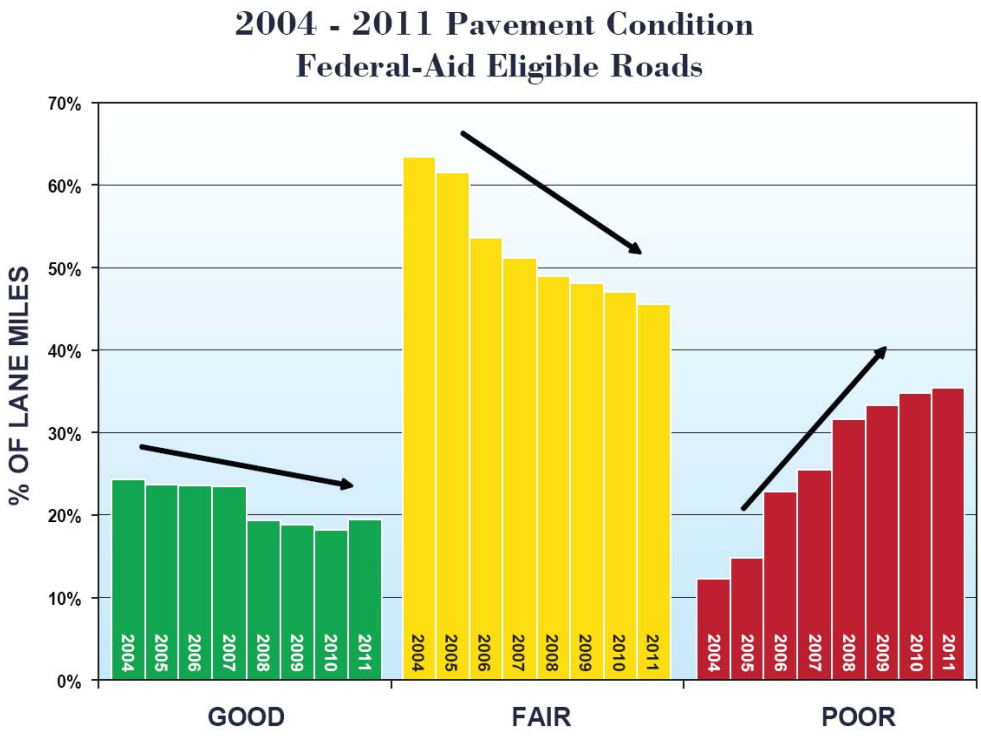
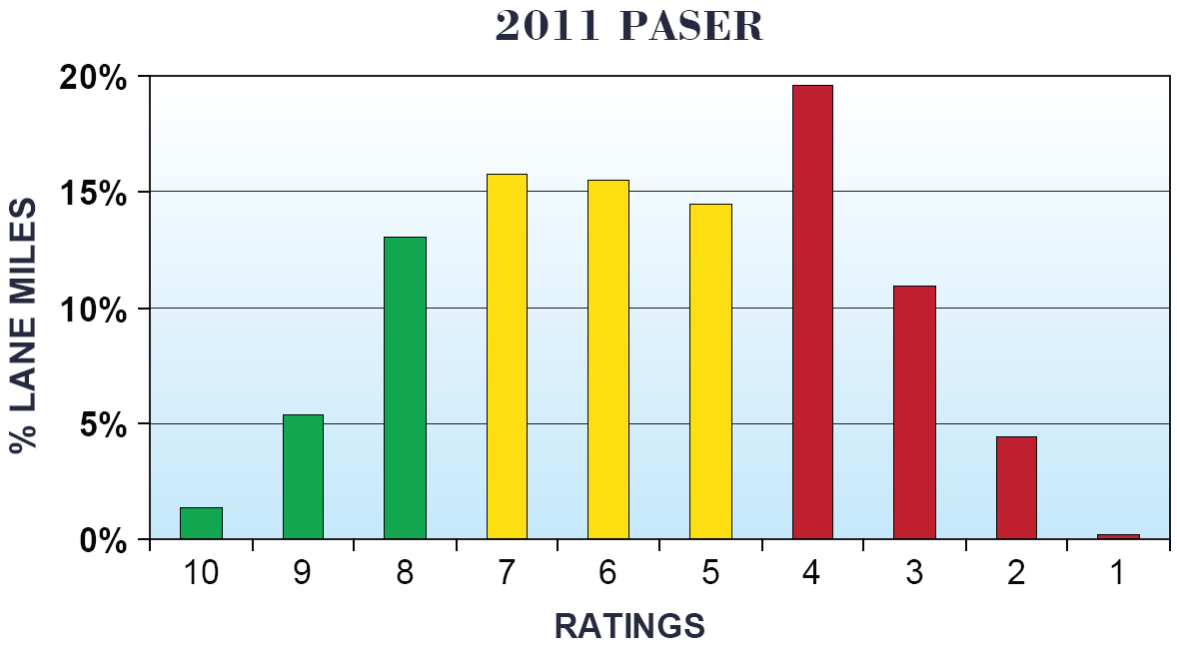


Source: TAMC 2004 – 2011 PASER Data Collection
Figure 5

Figure 5 shows that after eight years of pavement condition ratings, it is clear that Michigan's roads are deteriorating faster than they can be maintained. While the 2011 data shows a slight 1.4 percent increase in the number of roads rated in "good" condition, the number of lane miles in both fair and poor condition continued to decrease. The trend in the data reported over the past eight years continues to show a dramatic increase in the number of lane miles needing structural improvement (rehabilitation and reconstruction). These are roads rated in "poor" condition.

In 2004, 13.6 percent of lane miles were identified as needing structural improvement. By 2011, that number had more than doubled to 35.1 percent. In 2004, nearly 88 percent of the federal-aid system could be considered in good or fair shape. By 2011, that figure fell to 64.9 percent. Clearly, the overall condition of the federal-aid system is getting significantly worse with more miles in poor condition than in good condition. The cost of returning a poor road to good condition is four to five times greater than the cost of returning a fair road to good condition. Allowing more roads to reach poor condition will dramatically increase the costs of repairing Michigan's road network.

The slight increase in roads rated in "good" condition in 2011 is likely due to the projects completed as part of the American Recovery & Reinvestment Act (ARRA) of 2009. Though welcome news, there is not sufficient evidence to suggest that the trend is reversing itself; in fact, the current trend is for more roads to lapse into a poor condition.



Source: TAMC 2011 PASER Data Collection
Figure 6

Figure 6 above shows the breakdown of the 2011 pavement condition by lane miles and individual PASER ratings (Good 8-10, Fair 5-7, Poor 1-4).

National Functional Classification (NFC)

Since its inception, the Council's primary focus has been on how the transportation system functions. National Functional Classification (NFC) is a planning tool which federal, state and local transportation agencies have used since the late 1960's. The Federal Highway Administration (FHWA) developed this system of classifying all streets, roads and highways according to their function. The federal-aid system is subdivided into four major classification groups, Principle Arterials, Freeways, Minor Arterials and Collectors. These groups are determined by the extent to which each provides two essential functions; mobility and accessibility. The analysis below compares the 2011 federal-aid PASER ratings broken down by each of these classification groups.

Principal Arterials are at the top of the NFC hierarchical system. Principal arterials generally carry long distance, through-travel movements. They also provide access to important traffic generators, such as major airports or regional shopping centers.

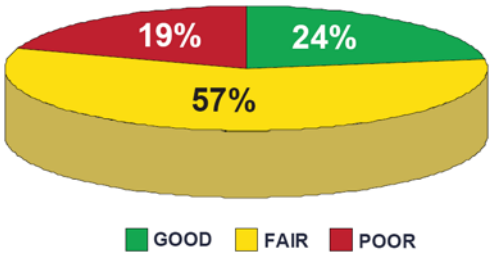


Figure 7

The 2011 rating of the *Principal Arterial* system reveals that 19 percent (1,598 lane miles) were in poor condition, 57 percent (4,828 lane miles) were in fair condition, and 24 percent (1,995 lane miles) were in good condition.

Freeways are a subset of the *Principal Arterial* system that has limited access: no at-grade intersections with other roads, railroads, or trails. Freeways generally carry the highest volume of traffic.

Figure 8

The 2011 rating of the *Freeway* system reveals that 10 percent (574 lane miles) were in poor condition, 50 percent (2,878 lane miles) were in fair condition, and 40 percent (2,270 lane miles) were in good condition.

Minor Arterials are similar in function to principal arterials, except they carry trips of shorter distance and to lesser traffic generators.

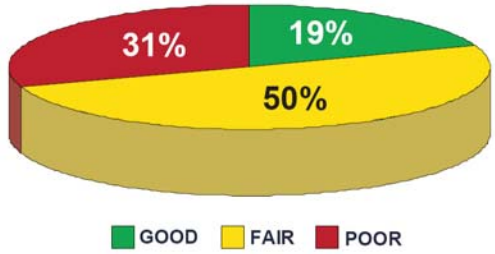


Figure 9

The 2011 rating of the *Minor Arterial* system reveals that 31 percent (4,239 lane miles) were in poor condition, 51 percent (6,916 lane miles) were in fair condition, and 19 percent (2,538 lane miles) were in good condition.

Collectors tend to provide more access to property than do arterials. Collectors also funnel traffic from residential to rural areas to arterials.

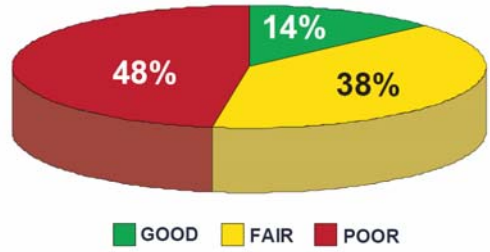


Figure 10

The 2011 rating of the *Collector* system reveals that 48 percent (12,394 lane miles) were in poor condition, 38 percent (9,707 lane miles) were in fair condition, and 14 percent (3,569 lane miles) were in good condition.

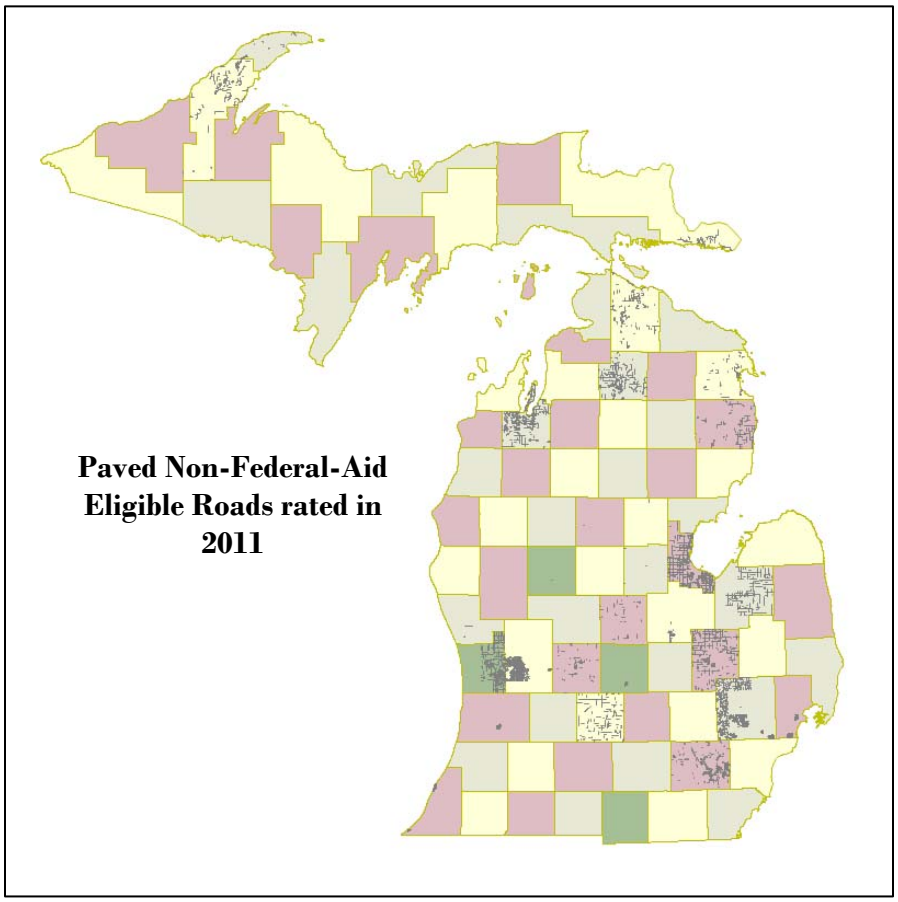
The analyses of the 2011 federal-aid PASER condition data by National Functional Classification (NFC) reveals that the highest level system of Principal Arterials (inclusive of Interstate, other Freeways, and other Principal Arterials) is in the best condition of the three NFC systems. This Principal Arterial system is critical to all multi-state, multi-regional, and much intra-regional travel throughout Michigan and typically carries the highest traffic volumes and the longest trips. The PASER condition data shows a larger percentage of poor pavements in the "middle" NFC system of Minor Arterials. The Minor Arterial system is especially important to support inter- and intra- regional travel, and serves relatively high traffic volumes. Finally, this analysis reveals that the lowest level of federal-aid roads (Collectors) are also in the poorest condition of the three federal aid systems. Collector roads tend to have lower traffic volumes and serve shorter distance trips and/or the beginning or ending legs for longer distance trips, since they provide more accessibility to homes, businesses, and other attractions. This analysis is evidence that Michigan's road agencies are strategically investing their limited transportation funds in the portion of

the system that provides the greatest long-distance mobility and highest traffic volumes. However, most trips utilize some of each of the three systems, so in order to have the safest, most efficient federal-aid system possible, funding must be strategically allocated to all three of these NFC systems.

[Source: 2011 Asset Management Council Pavement Assessment Date: March 2012]

Non-Federal-Aid Roads and Streets

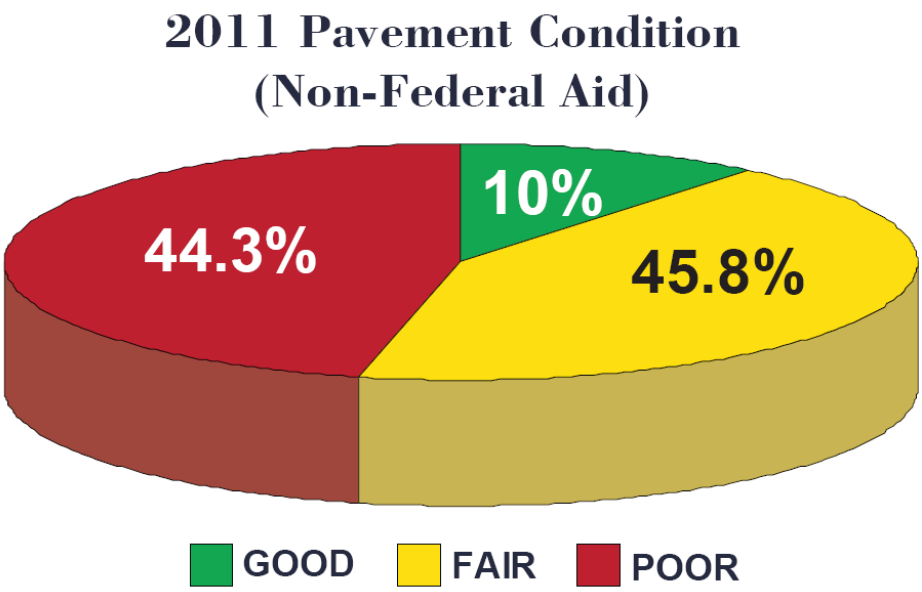
Not all roads in Michigan are eligible for federal aid. Whether a road is eligible for aid or not depends upon its national functional classification. In general, non-federal-aid eligible roads are residential streets and lightly traveled county roads. Roughly half of these roads are unpaved.



Source: TAMC 2011 PASER Data Collection
Figure 11

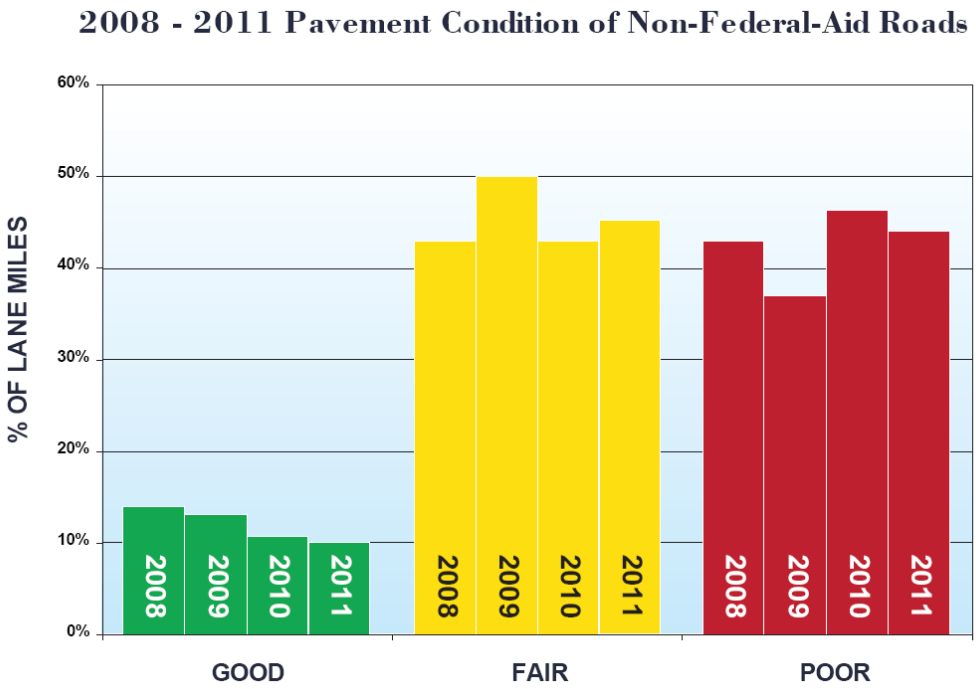
Since its inception, the Council has focused its attention on the condition of the 39,700 miles of federal aid eligible roads in the state as required by Act 51. In 2008, the Council expanded its focus to include a major portion of the paved non-federal-aid eligible roads.

There are 80,000 miles of non-federal aid eligible roads in the state. Approximately one half of this mileage (about 40,000 miles) is paved. Just over 9,766 miles of these roads were observed and assigned PASER ratings in 2011; 4,296 miles in 2010, 5,647 miles in 2009; and 11,557 miles in 2008.



Source: TAMC 2011 PASER Data Collection
Figure 12

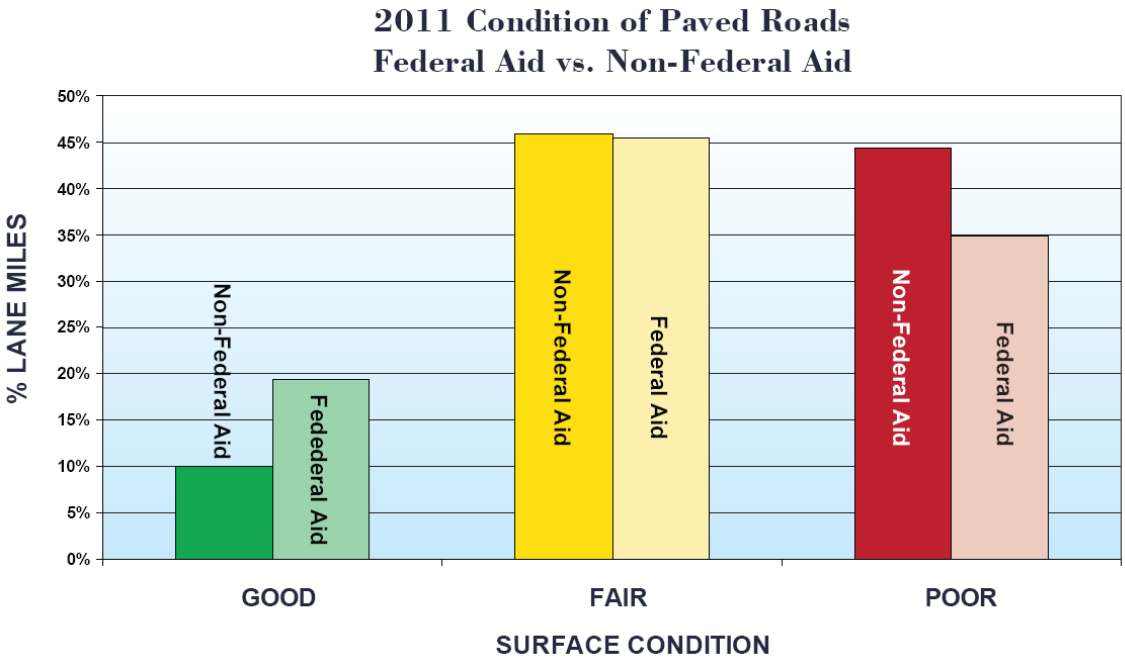
Similar to the pavement ratings for federal-aid roads, the ratings for non-federal-aid roads are reported in lane miles. Figure 12 above indicates that 9,766 miles of non-federal-aid roads were rated in 2011, comprising 9,766 lane miles. The 2011 ratings reveal that 44.2 percent (4,317 lane miles) are in poor condition, 45.8 percent (4,473 lane miles) are in fair condition, and 10 percent (977 lane miles) are in good condition.



Source: TAMC 2008-11 PASER Data Collection
Figure 13

Figure 13 above shows the results of the three-year data collection cycle (2008-11) sponsored by the Council.

Federal-Aid vs. Non-Federal-Aid Roads and Streets

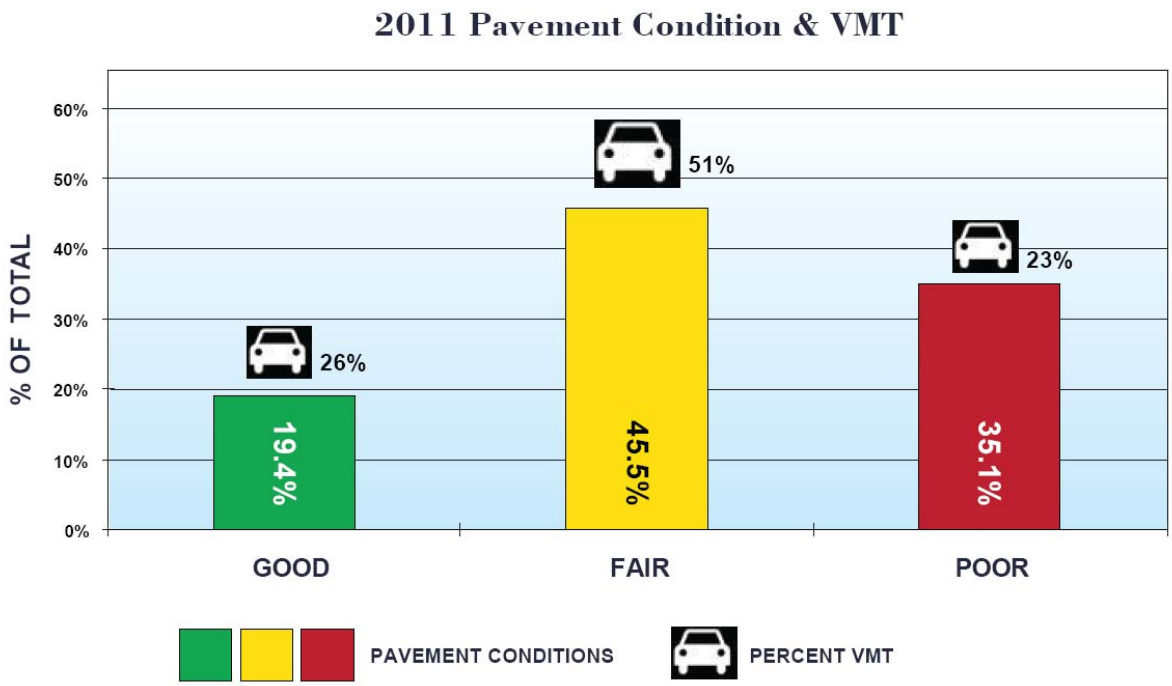


Source: TAMC 2011 PASER Data Collection
Figure 14

The data shown in Figure 14 above indicate that the condition of the paved non-federal-aid system is significantly worse than that of the paved-federal-aid system. One reason for this is the fact that more funding is available for federal-aid roads.

Pavement Condition and Vehicle Miles Traveled (VMT)

Vehicle Miles Traveled (VMT) is the total number of miles driven by all vehicles in Michigan during any given year.



Source: TAMC 2011 PASER Data Collection

Figure 15

The data shown in Figure 15 above indicate that the majority of traffic (77 percent of VMT) travels on the part of the system (65 percent) that has been rated as good and fair condition. While roads in poor condition make up 35 percent of the federal-aid system, they carry only 23 percent of all vehicle miles traveled. This difference is largely attributed to the efforts of road agencies to maintain higher volume roads in better condition than lower volume roads. This suggests that road agencies are spending their limited transportation funds on the parts of the system that carry the majority of traffic.

BRIDGE CONDITION

National Bridge Inventory (NBI)

Bridges have their own federal rating system. Bridges can be classified as "structurally deficient" or "functionally obsolete." These classifications are determined by the National Bridge Inventory (NBI) database. Federal law requires that bridges be inspected at least once every two years. Condition ratings are based on a 0-9 scale and assigned for each culvert or the superstructure, the substructure, and the deck of each bridge. A condition of 4 or less classifies the bridge as being in "poor" condition.

Structurally Deficient: Generally, a bridge is structurally deficient if any major component is in "poor" condition. If any one or more of the following are true, then the bridge is structurally deficient.

- Deck Rating is less than 5
- Superstructure Rating is less than 5
- Substructure Rating is less than 5
- Culvert Rating is less than 5
- Structural Evaluation is less than 3

Functionally Obsolete: Generally, a bridge is functionally obsolete if it is NOT structurally deficient AND its clearances are significantly below current design standards for the volume of traffic being carried on or under the bridge. More specifically, if the bridge is NOT structurally deficient AND any one or more of the following are true, then the bridge is functionally obsolete.

- Structural Evaluation = 3
- Deck Geometry is less than 4
- Underclearance is less than 4 and there is another highway under the bridge
- Waterway Adequacy = 3
- Approach Roadway Alignment is less than 4
- Waterway Adequacy is less than 3

A bridge cannot be classified as both structurally deficient and functionally obsolete. If a bridge qualifies for both, then it is reported as structurally deficient. While functionally obsolete bridges represent needed improvements if the overall system is to achieve maximum operating efficiency, the bridges rated as structurally deficient require more immediate attention.

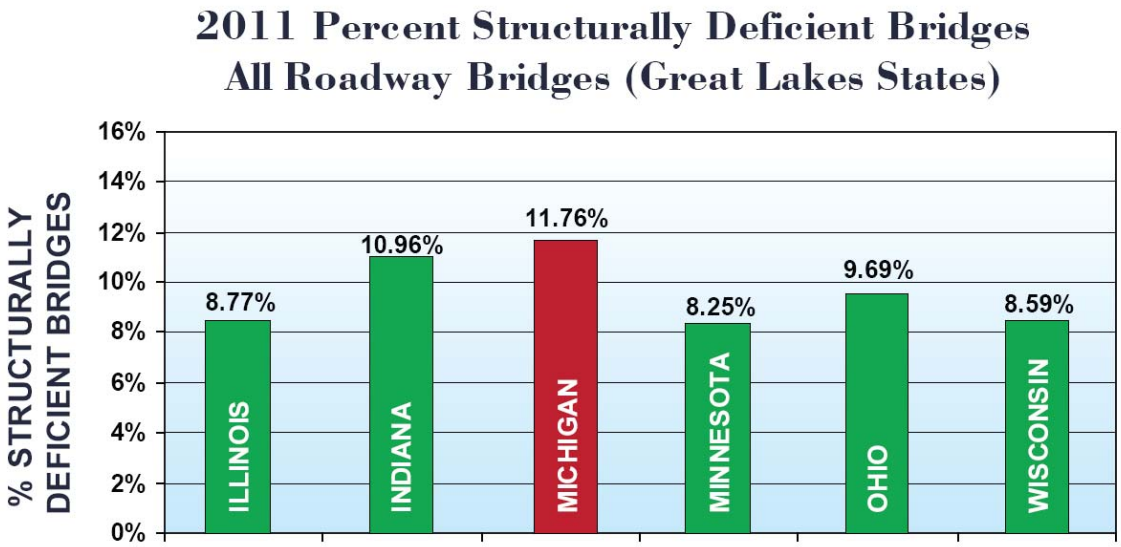
Bridges

An analysis of bridge conditions in Michigan shows that state and local bridge owners and decision makers are continuing to "hold their own" despite rising costs and revenue challenges. From 2004 to 2010, the overall network of bridges in the state saw a slight but steady improvement in overall condition. This can be attributed to:

1. Progress being made in reducing the number of structurally deficient bridges under state jurisdiction.
2. More local agencies are implementing preventive maintenance "mix of fixes" strategies on local bridge systems.

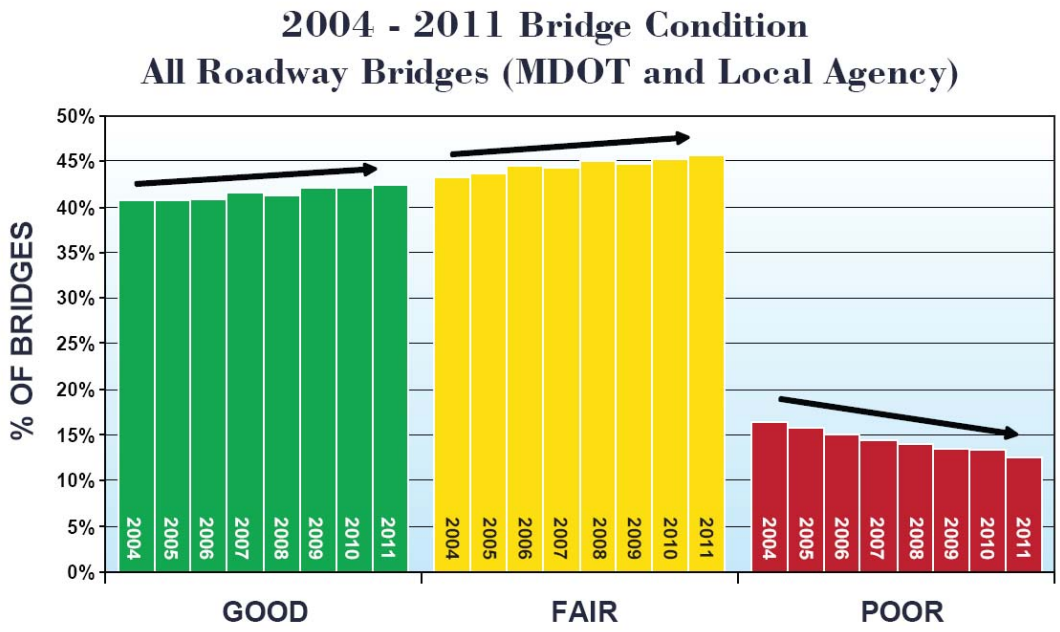
Federal guidelines classify bridges as *structurally deficient* if at least one of three key bridge components (deck, superstructure, or substructure) is rated in poor condition. This means that qualified engineers have determined that the bridge requires significant maintenance, rehabilitation or replacement. A structurally deficient bridge may need to have heavy vehicle traffic restricted or eventually be closed until necessary repairs can be completed.

Bridge conditions in Michigan have been given even more of a strategic focus with the development of the MiDashboard, Governor Snyder's set of high level performance measures indicating how the state compares with the rest of the nation in key result areas, along with recent trends. The percentage of Michigan's bridges which are rated structurally deficient is one of the 5 measures of the overall strength of Michigan's economy, and this measure can be accessed here: www.michigan.gov/midashboard



Source: MDOT April 2012
Figure 2

However, there remains reason for continued concern regarding Michigan's ability to preserve its strategic bridge assets. The figure 2 above indicates that Michigan has a significantly higher percentage of structurally deficient bridges than other Great-Lakes states. An analysis of the 2011 NBI submittal shows that 5.5 percent of state-owned bridges and 16.1 percent of county and local bridges were structurally deficient, resulting in Michigan having 11.8 percent of all roadway bridges structurally deficient.



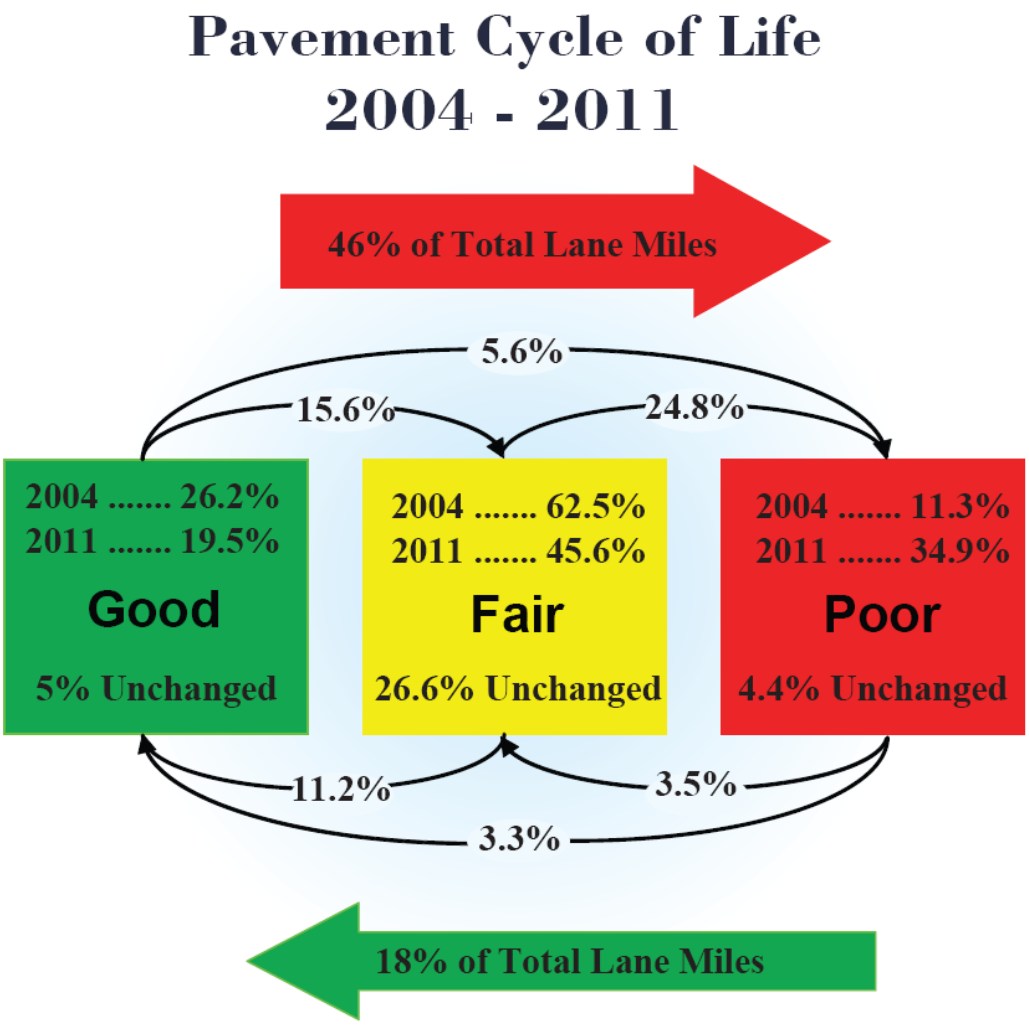
Source: MDOT March 2012
Figure 16

Figure 16 compares the percentage of Michigan bridges in good, fair, and poor condition for the years 2004-2011. Michigan state and local bridge owners and decision makers have reduced the percentage of bridges in poor condition while increasing the number of bridges in good and fair condition. Although the trend-line for the good and fair categories is increasing, without implementing an effective preventative maintenance strategy those bridges located on the fair to poor border-line are in danger of dropping into the poor category.

EIGHT YEAR TREND ANALYSIS

Roads

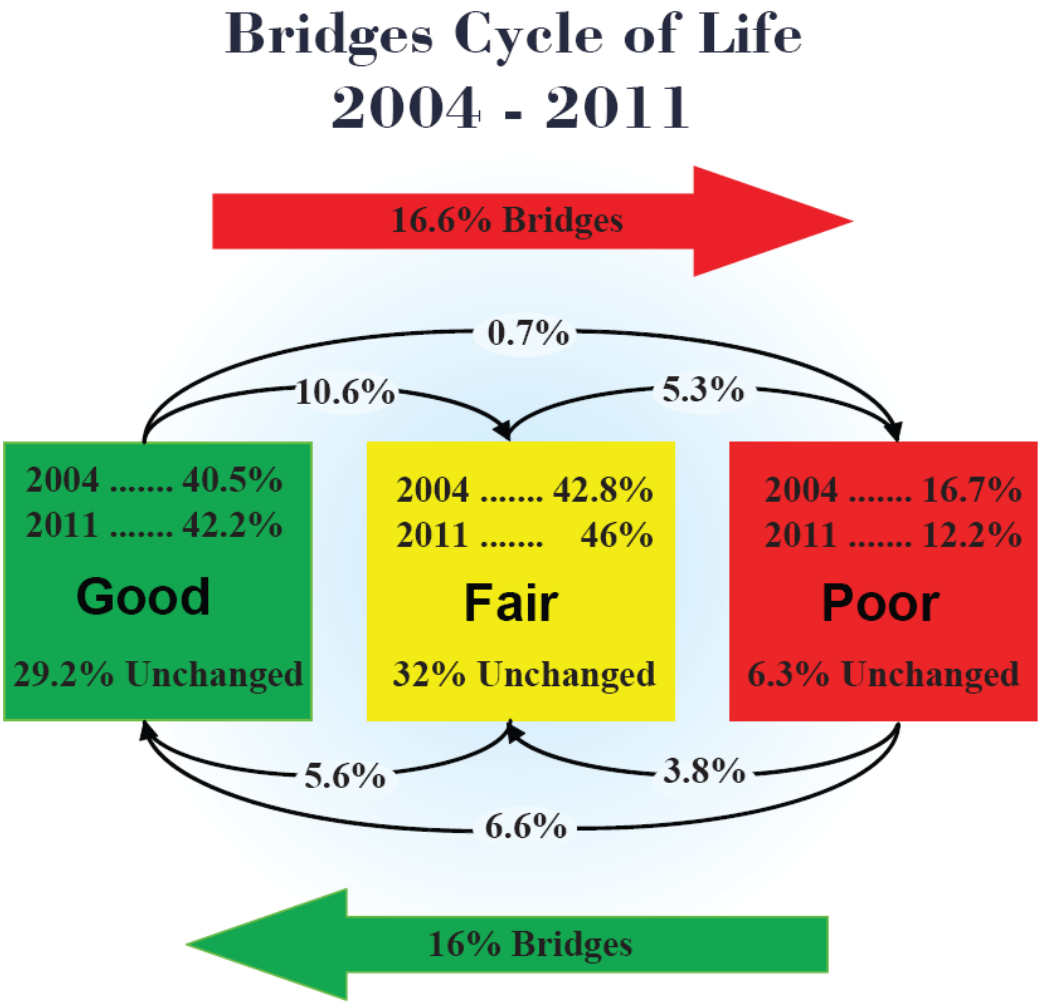
Figure 16 below shows that 46 percent of Michigan's roads have deteriorated over the last eight years (2004 – 2011). During that period, 18 percent of the roads went from good to fair, 24.8 percent went from fair to poor, and 5.6 percent slid all the way from good to poor. In that same eight year period, only 18 percent of the roads were improved; 11.2 percent went from fair to good, 3.5 percent went from poor to fair and 3.3 percent went from poor to good.



Source: TAMC 2004 - 2011 PASER Data Collection
Figure 17

Bridges

Figure 17 below shows the percentage of bridges that have improved/deteriorated into each of the major condition categories over the last eight years (2004 – 2011). Michigan's overall goal is to reduce the number of poor bridges. Over this time span, 16.6 percent of Michigan's bridges have deteriorated; 10.6 percent of the bridges went from good to fair, 5.3 percent went from fair to poor, and 0.7 percent slid all the way from good to poor. In that same eight year period, 16 percent of the bridges were improved; 5.6 percent went from fair to good, 3.8 percent went from poor to fair and 6.6 percent went from poor to good.



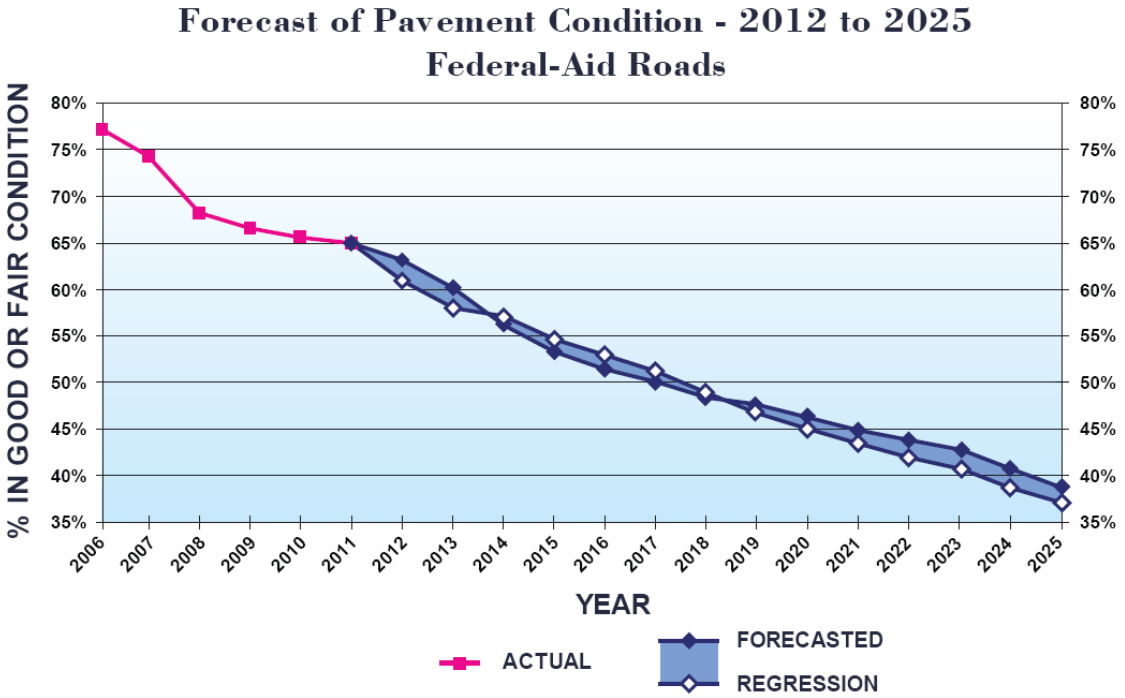
Source: Michigan Bridge Database (March 2012) All Michigan Highway Bridges

Figure 18

FORECASTED SYSTEM CONDITION

Road Condition

Forecasts for statewide road condition, assuming current funding trends, indicate a continuation of the trend reported for the past eight years. Given current funding levels, the percentage of roads rated in good or fair condition will probably decrease dramatically over the next fourteen years.

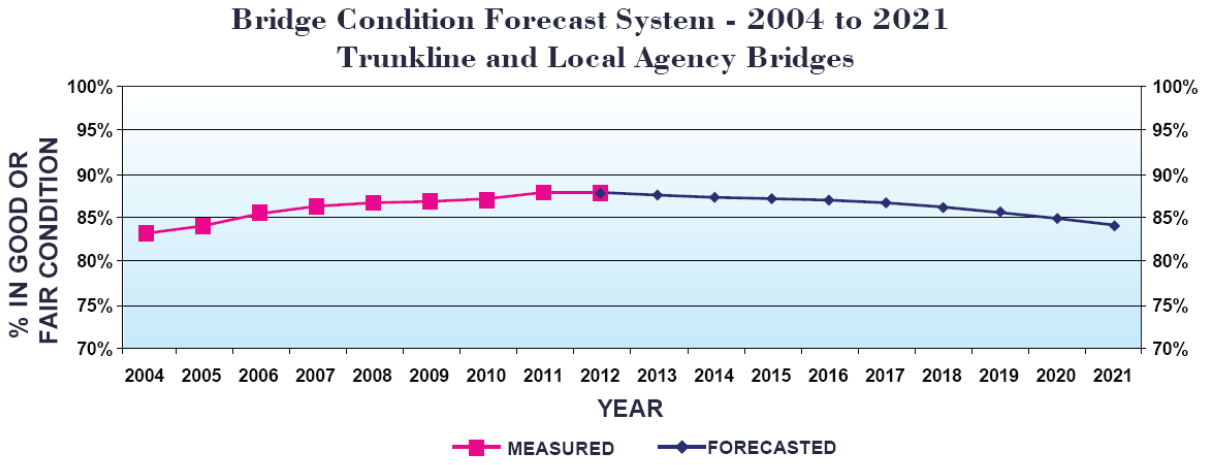


Source: MDOT March 2012
Figure 19

Figure 18 above is a graph of past, present, and future pavement condition. It shows the probable condition of paved federal-aid roads for the next fourteen years if current trends continue. Each point on the graph represents the percentage of roads in good or fair condition. The first six points on the graph show the actual pavement condition for the years 2006 to 2011; the remaining data points show the forecasted pavement condition. Each forecast year is represented by two points. The points represented by a white circle were derived from a trend-line analysis based on pavement conditions in 2006 to 2011. The points represented by a red diamond were derived from a Markovian model that uses multiple variables, such as historical pavement data, pavement management strategies, and revenues available for construction and maintenance. The results of the two models are remarkably similar: they show a continuous trend of worsening pavement conditions over the next fourteen years.

Bridge Condition

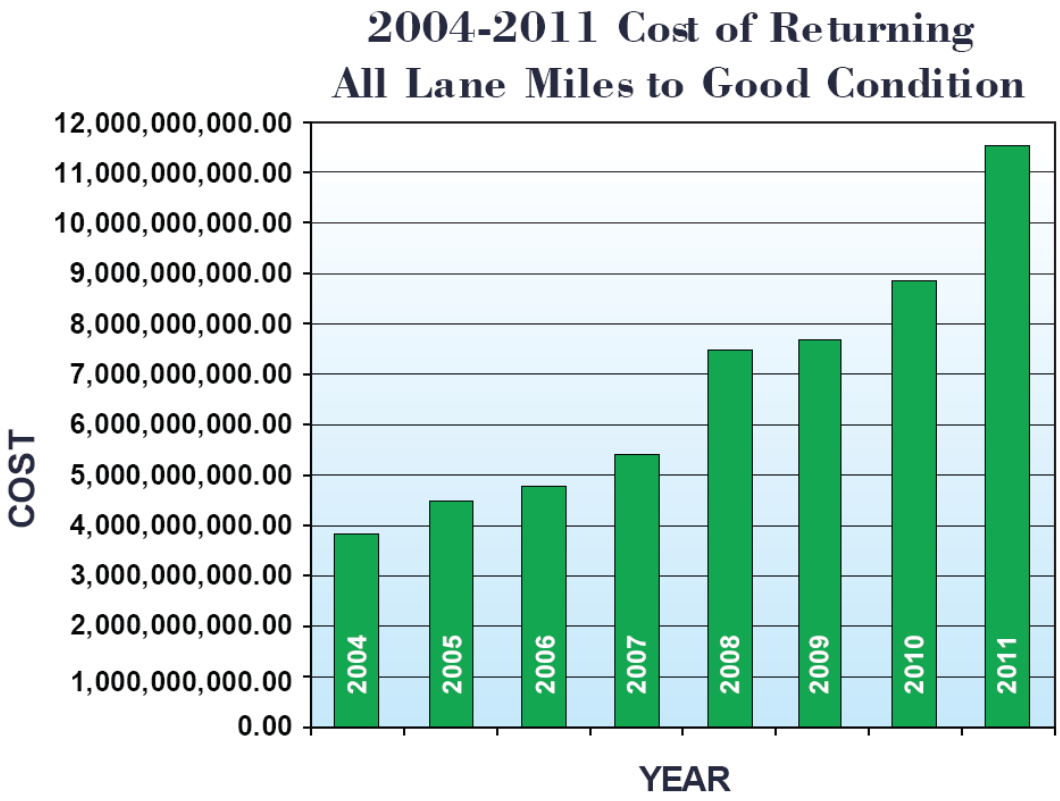
Working from current bridge condition information (National Bridge Inventory Data), bridge deterioration rate, project costs, expected inflation, and fix strategies, the Bridge Condition Forecasting System (BCFS) estimates future condition of MDOT and local bridges.



Source: MDOT Date: March 2012

Figure 20

Figure 20 indicates the combined overall bridge condition of all the state's bridges (Trunkline and local agency) is expected to decline after 2012 unless additional funding is identified for both state and local bridge programs. In addition, the condition and forecast data shows the local bridge program could materially benefit from applying capital preventative maintenance strategies.



Source: TAMC Date: March 2012
Figure 21

Cost of Deterioration

The costs of this continued deterioration are significant. Figure 21 above shoat that in 2004 the Council projected it would have cost approximately $3.7 billion to bring all federal-aid roads rated poor and fair up to a good rating. In 2011, the Council projects it would have cost $11.5 billion, more than triple what it would have cost in 2004. This represents $7.8 billion in lost value of our road assets. The adoption of good pavement and asset management practices by all road agencies can help check this deterioration and the resulting loss of value, but without adequate funding these practices by themselves will be insufficient to fix this situation. [See APPENDIX for the Reduction in Asset Value 2004-11 Spreadsheet]

Michigan Roads Crisis Report

On September 19, 2011 Representatives Rick Olson and Roy Schmidt published a report of the Work Group on Transportation Funding, of the House of Representatives Transportation Committee titled "Michigan's Roads Crisis: What Will It Cost to Maintain Our Roads and Bridges?" [See APPENDIX A to view the full report]. The task assigned to Rep. Olson and Schmidt was to review previous studies, consult with various stakeholders, and make recommendations for the future funding needs of transportation. Their objective was to recommend funding levels needed to minimize the long term cost of maintaining the State's roads and bridges.

Additional Investment Needed (in millions)

Year	Total Funds Needed to meet Goals (Current plus Additional)	Total Additional Funding Above Current Investment Needed to Meet and Sustain Goals
2012	$2,703.13	$1,377.13
2013	$2,687.68	$1,361.68
2014	$2,691.92	$1,365.92
2015	$2,688.46	$1,362.46
2016	$2,834.30	$1,508.25
2017	$3,059.50	$1,733.10
2018	$3,202.86	$1,876.84
2019	$3,344.49	$2,018.61
2020	$3,503.72	$2,177.80
2021	$3,558.88	$2,231.77
2022	$3,707.19	$2,381.76
2023	$3,896.18	$2,569.40
Total	$37,878.31	$21,964.72

Source: Michigan's Roads Crisis Report Date: September 2011
Figure 22

Figure 22 above concludes that an increase in road and bridge funding of approximately $1.4 billion dollars is necessary to maintain the system at the following levels:

- ✓ State trunkline freeway: 95% good or fair according to Remaining Service Life (RSL) ratings;
- ✓ Remainder of state trunkline highways: 85% according to RSL ratings;
- ✓ Remainder of federal-aid roads: 85% according to PASER ratings;
- ✓ Non-federal aid roads that are paved: 85% according to PASER ratings.
- ✓ Freeway Bridges: 95% according to National Bridge Inventory (NBI) ratings;
- ✓ Non-Freeway Bridges: 85% according to NBI ratings;
- ✓ Non-Trunkline Bridges: 84% according to NBI ratings.

To view the latest report updates from Rep. Olson, please visit this Website:
http://www.gophouse.com/welcome.asp?District=55

APPENDIX A:

Michigan's Roads Crisis: What Will It Cost to Maintain Our Roads and Bridges?

(A Report of the Work Group on Transportation Funding, of the House of Representatives Transportation Committee)
September 19, 2011 Final Revised Draft

Rick Olson, State Representative, District 55
989 House Office Bldg., Lansing, MI 48909
(517) 373-1792, rickolson@house.mi.gov

Roy Schmidt, State Representative, District 76
1095 House Office Bldg., Lansing, MI 48909
(517) 373-0822, royschmidt@house.mi.gov

Executive Summary.

Many of Michigan's roads and bridges are in bad shape, with crumbling bridges and potholed roads all too familiar to most Michigan's motorists. Unless additional funding is available to maintain our roads, they are projected to get much worse. Part of the problem is that transportation revenues have been declining due to the heavy reliance on the gas tax. The Transportation Funding Task Force (TF2) reported in 2008 that Michigan needed $3 billion more revenue per year to achieve a "good" condition. This report contains the results of a rigorous attempt to disprove or verify the TF2 report's findings regarding the maintenance of the state's roads and bridges, i.e., pavement preservation. This report does not include any new or widened roads to improve capacity, relieve congestion or to improve safety, all of which were included in the TF2 recommendation. The report also does not consider any transit issues.

Of the key questions developed by a work group appointed from among the House Transportation Committee members, this report focuses only on the question of "How much money do we need?"

A technical analysis team tackled the question using computerized models, made possible by road condition data recently gathered by the Asset Management Council. The models used an asset management strategy of applying the right fix at the right place at the right time (among the choices of capital preventive maintenance, rehabilitation or reconstruction) which minimizes the cost of maintaining the asset value of the road system by performing the lower cost preventive maintenance rather than allowing the roads to deteriorate to the point of needing a higher cost fix.

We divided the state's paved roads into four categories and set the following quality goals:

- State trunkline freeways: 95% good or fair
- Remainder of the state trunkline highways: 85%
- Remainder of the federal-aid roads: 85%
- Non-federal aid roads that are paved: 85%

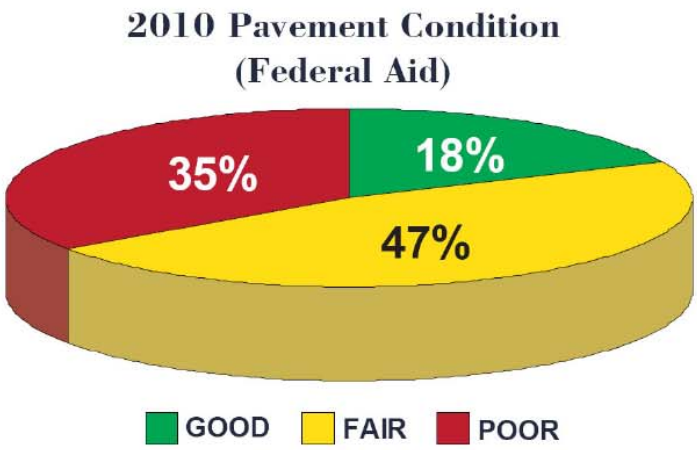
The amount of work that the model assumed could be done in some road segments and in some years was limited by the maximum percentage of roads that could be worked on without causing excessive congestion caused by road construction.

The model projected that almost $1.4 billion dollars more revenue per year would be needed in 2012-2015 and rising to almost $2.6 billion per year by 2023 to achieve the goals set. This result is consistent with the TF2 findings regarding pavement preservation. The graphs included in the report show that this would not result in a "gold plated" road system, as many of the roads in fair condition would be just that - fair- and not good.

The conclusion reached was that if the investments projected by these models are not done, either the deferred costs of maintaining our roads will be much higher OR we choose to accept lower quality roads. From a business perspective, the set of investments recommended is the lowest long-term costs of maintaining our roads.

Setting the Stage.

Many of Michigan's roads and bridges are in bad shape, and unless additional funding is available to maintain our roads, they are projected to get much worse.

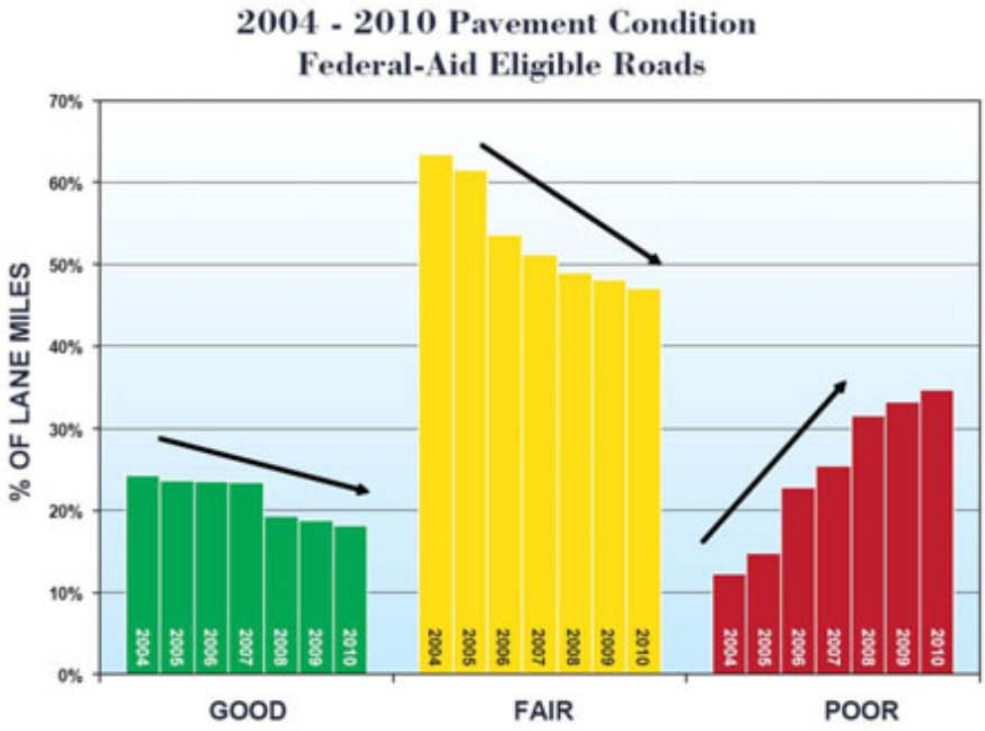


Source: TAMC 2010 PASER Data Collection
Figure 1

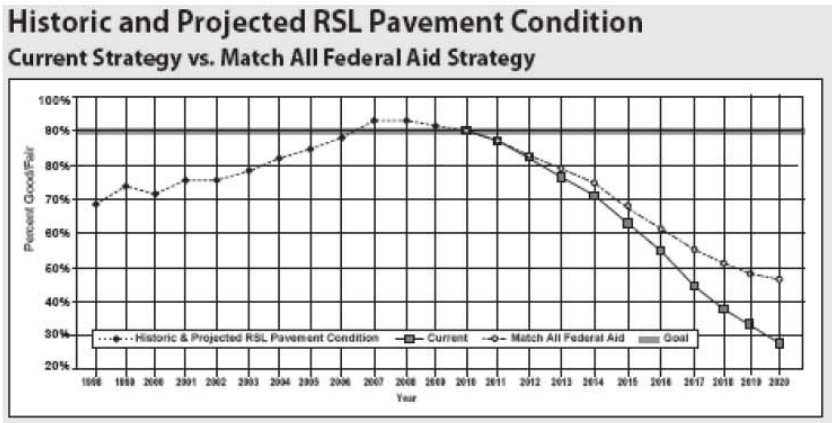
"Figure 1 above shows the results of the 2010 rating reveal that 35 percent (20,810.17 lane miles) were in poor condition, 47 percent (28,081.42 lane miles) were in fair condition, and 18 percent (10,926.99 lane miles) were in good condition." Michigan's Roads and Bridges 2010 Annual Report, Michigan Transportation Asset Management Council, http://tamc.mcgi.state.mi.us/MITRP/Council/Default_Council.aspx

Note that the data reported is in "lane miles". A lane mile is determined by multiplying the number of lanes by the length of the road, as contrasted to "centerline miles" which simply measures the length of the road. Further, PASER ratings of 8-10 are "good", 5-7 are "Fair" and 1-4 are "poor".

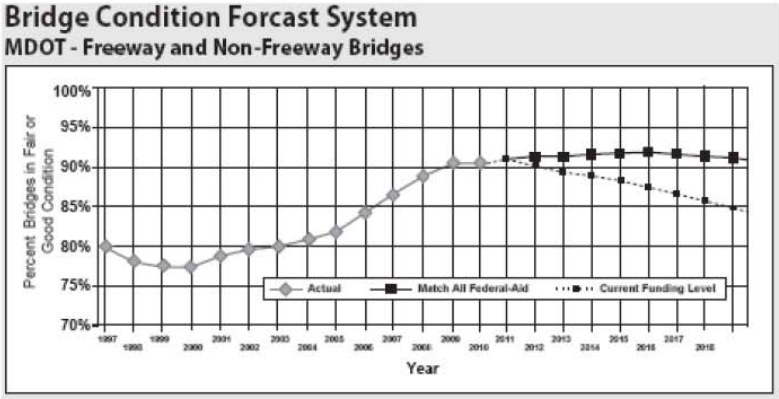
Roads eligible for federal aid have seen a significant increase since 2004 in the percentage that are rated "poor".



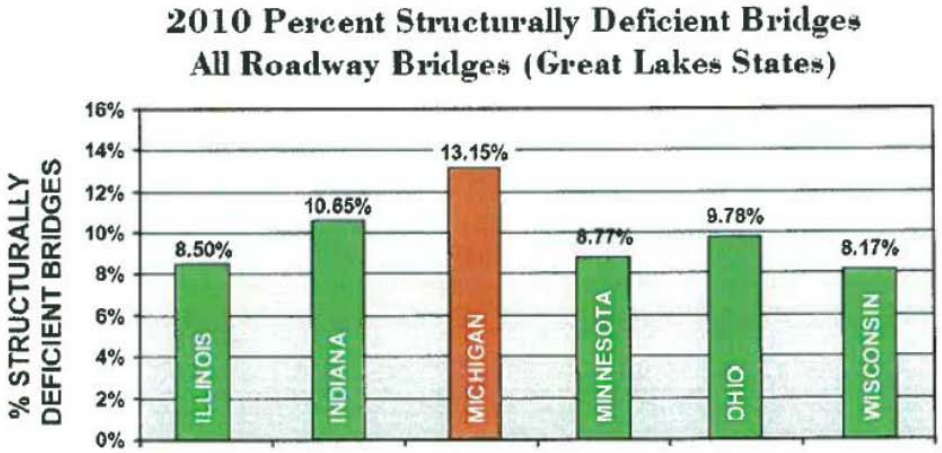
The bad news is that even with all federal gas tax matched so that we don't lose any, the condition of the roads is projected to significantly decline.



The prospects for bridge condition are much more favorable, despite the challenges of a number of bridges that need attention.



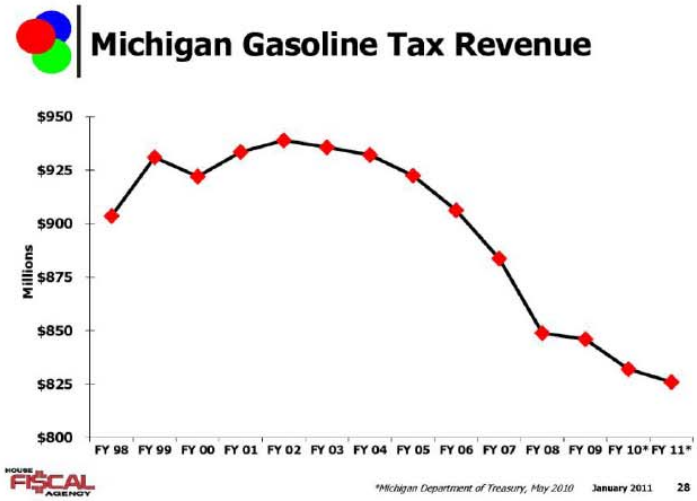
Source: MDOT 2011-2015 Five Year Transportation Program, http://www.michigan.gov/documents/mdot/MDOT_5_Year_Program_216970_7.pdf

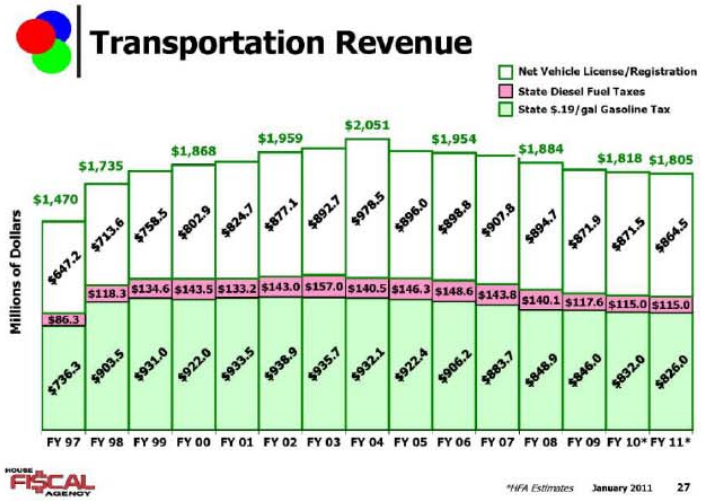


Source: MDOT April 2011
Figure 2

This funding problem stems from the declining amount of revenues collected from the gas tax, due in part to the sagging Michigan economy which has affected the number of miles driven, but also because of increased fuel efficiency in the vehicles we drive.

The other major state source of funds deposited into the Michigan Transportation Fund, the vehicle registration fees, has also declined due to the poor economy, resulting in declining total transportation revenue.





Background Information on Road Condition Rating and Prescribing Appropriate Fixes.

"The [Asset Management] Council has adopted the Pavement Surface Evaluation and Rating (PASER) system for measuring statewide pavement condition. PASER is a visual survey method used to evaluate the condition of roads. The method was developed by the University of Wisconsin Transportation Information Center to provide a simple, efficient, and consistent method for evaluating road condition. . . . PASER uses 10 separate ratings to evaluate the surface distress of the pavement. Ratings are assigned based on the pavement

material (asphalt, concrete, sealcoat, gravel, etc.) and the types of deterioration that are present. . . .

The Council groups the 10 ratings into three categories based upon the type of work that is required for each rating – routine maintenance, capital preventive maintenance, and structural improvement.4

Routine Maintenance
Routine maintenance is the day-to-day, regularly scheduled activities to prevent water from seeping into the surface such as street sweeping, drainage clearing, gravel shoulder grading, and sealing of tight cracks. PASER ratings 8, 9, and 10 are included in this category. This category includes roads that are newly constructed or rehabilitated, have received a structural overlay, or were recently seal coated. They require little or no maintenance.

Capital Preventive Maintenance
Capital preventive maintenance (CPM) is at the heart of asset management. It is the planned set of cost-effective treatments applied to an existing roadway that retards further deterioration and maintains or improves the functional condition of the system without significantly increasing the structural capacity. The purpose of CPM is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface distress. PASER ratings 5, 6, and 7 are included in this category. Roads in this category still show good structural support, but the surface is starting to deteriorate. Asphalt pavements with these ratings will exhibit distress such as: longitudinal and transverse cracks greater than ¼", crack raveling, transverse cracks 10' to 40' apart, first signs of block cracking, etc. CPM is intended to address pavement problems before the structural integrity of the pavement has been severely impacted.

Structural Improvement

Structural improvement is the category of roads requiring some type of repair to improve the structural integrity of the pavement. PASER ratings 1, 2, 3, and 4 are included in this category. Asphalt pavements with these ratings will exhibit distress such as: rutting greater than ½" deep, cracking in the wheel path, severe block cracking, alligator cracking, and longitudinal and transverse cracks with severe erosion. Typical structural improvement activities include major rehabilitation or reconstruction."

Asset Management Guide for Local Agencies in Michigan, Michigan Transportation Asset Management Council, December, 2007
http://tamc.mcgi.state.mi.us/MITRP/Council/AssetManagementPlans.aspx

For more information on the PASER rating system, see Appendix A. This is an excerpt from the Asphalt Rating Training Manual. Comparable rating systems for other road surfaces are available at http://tic.engr.wisc.edu/Publications.lasso

The Federal Highway Administration (FHWA) developed a National Functional Classification (NFC) system of classifying all streets, roads and highways in the 1960's according to the predominant type of traffic and the traffic volume a road carries.

- The federal-aid system is subdivided into four major classification groups, Freeways, Principle Arterials, Minor Arterials and Collectors. Of the 39,700 miles of federal-aid roads in Michigan, 9,695 miles (8 percent of all roads) are under the jurisdiction of the Michigan Department of Transportation and are the state trunkline highways, comprised of freeway and non-freeway.

- Not all roads in Michigan are eligible for federal aid, based upon its national functional classification. In general, non-federal-aid eligible roads are residential streets and lightly traveled county roads. There are 76,435 miles of non-federal aid eligible roads in the state. Approximately one half of this mileage (about 40,000 miles) is paved.

Another way of looking at our roads in the state is by jurisdiction, as follows:

Route Mileage and Vehicle Miles Traveled by Legal System

Legal System	Route Miles	Percent of State Total	Annual Vehicle-miles Traveled (AVMT) in millions	Percent of State Total
State Trunklines	**9,725**	**8%**	**49,986**	**55%**
County Primary Roads	26,363	22%	22,748	25%
County Local Roads	62,811	53%	3,458	4%
County Subtotal	**89,174**	**75%**	**26,206**	**29%**
City & Village Major Streets	5,923	5%	12,690	14%
City & Village Local Streets	14,577	12%	2,733	3%
City & Village Subtotal	**20,500**	**17%**	**15,423**	**17%**
State Total	**119,399**	**100%**	**91,616**	**100%**

Sources: Highway Performance Monitoring System data for June, 1999 and 1999 MDOT Sufficiency Report

Since its inception, the Asset Management Council has focused its attention on the condition of the federal aid eligible roads in the state. In 2008, the Council expanded its focus to include a major portion of the paved non-federal-aid eligible roads. Just over 4,296 miles of these roads were observed and assigned PASER ratings in 2010; 5,647 miles in 2009; and 11,557 miles in 2008. The condition of these observed and rated roads has been assumed to be representative of the remainder of the unobserved roads in this study. This data is important, because the estimating of the costs of maintaining our non-federal aid roads would not be possible without it, and has not been possible in past.

Transportation Funding Work Group.

With full recognition of the challenges of funding road and bridge maintenance, together with the previous failed attempts to solve the issues, House Transportation Committee Chairman Representative Paul Opsommer created a Transportation Funding Work Group early in 2011. He appointed Roy Schmidt (D) – District 76, Kent County, and Rick Olson (R) – District 55, S. of Ann Arbor. The Task assigned was: Review previous studies, consult with various stakeholders, and make recommendations for the future funding needs of transportation. Their objective was to: Recommend funding levels needed to minimize the long term cost of maintaining our roads and bridges.

Key Questions

The key questions developed were:

- How much money do we need?
- How do we raise the money?
- How do we get the money to roads and bridges?
- How do we deal with townships with minimal ability to have match money?
- How do we create the reality and perception that taxpayers are getting value for money
- How (or do we) deal with the sales tax question?

Thus far, attention has been focused on the first question, how much money do we need, and this report focuses solely on that question.

The most significant previous effort to address the funding problems was the Transportation Funding Task Force (TF2) created in response to Public Act 221 in Dec. 2007. The TF2 issued its final report to the Legislature, Governor and State Transportation Commission on Nov. 10, 2008. In short, its "good" recommendation said that the state should double its investment in maintaining its roads and bridges, or add $3 Billion/Year. The TF2 report is available online at www.michigan.gov/tf2. Not wanting to accept a round number that was not based on current conditions, the work group has taken a fresh look at the question, and built the answer from scratch.

Technical Analysis Team

The technical analysis team that has worked on the question of how much money do we need has been comprised of:

- Gilbert Earle Chesbro, MDOT Transportation Planning Specialist
- Jim Ashman, MDOT Transportation Planner
- Craig Newell, MDOT Manager, Statewide Systems Management Section
- Denise Jackson, MDOT Administrator, Statewide Transportation Planning Division
- Bill Tansil, MDOT Administrator, Asset Management Division
- Kelly Bartlett, MDOT Legislative Liaison
- Carmine Palombo, MI Transportation Asset Management Council
- Steve Warren, Michigan Transportation Asset Management Council
- Bob Morris, Southeast Michigan Council of Governments (SEMCOG)
- Frank Raha, Michigan Transportation Commission

Scope of Work.

As important as what this work is, it is important to be clear what this is not. I.e., this does not account for all needs that merit or could merit consideration. For example, this analysis does not include:

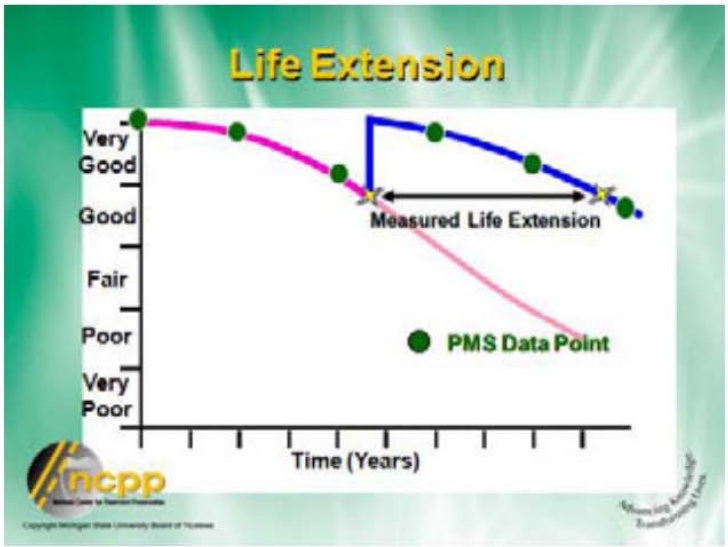
- Strategies to relieve congestion
- Reactions to address safety needs based on accident analysis
- Additions to paved roads or increased attention to gravel roads
- Local & State road agency equipment needs
- Transit: light rail, bus systems

These items may need to be evaluated to add to any "new" money that needs to be raised or alternative means for addressing these needs might be derived.

Study Methodology.

Incorporated in this study is the concept of "asset management", i.e.. a pavement preservation program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations. The program adopts the idea of the right fix (from the "mix of fixes") at the right place at the right time to optimize pavement life.

It employs the concept that if you apply fix X on a road with a Y rating, you extend the service life of the road by Z years. (Slides courtesy of Larry Galehouse, PE, PS, Director, National Center for Pavement Preservation, Michigan State University, from presentation given at the Best Management Practices Conference in Lansing, Michigan, July 26, 2011.)

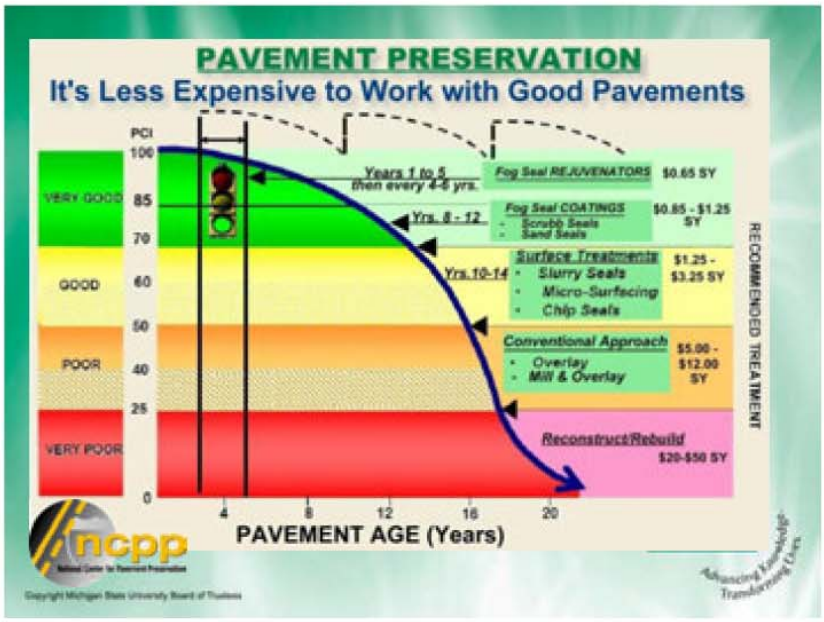


Typical Life Extensions
(Years)

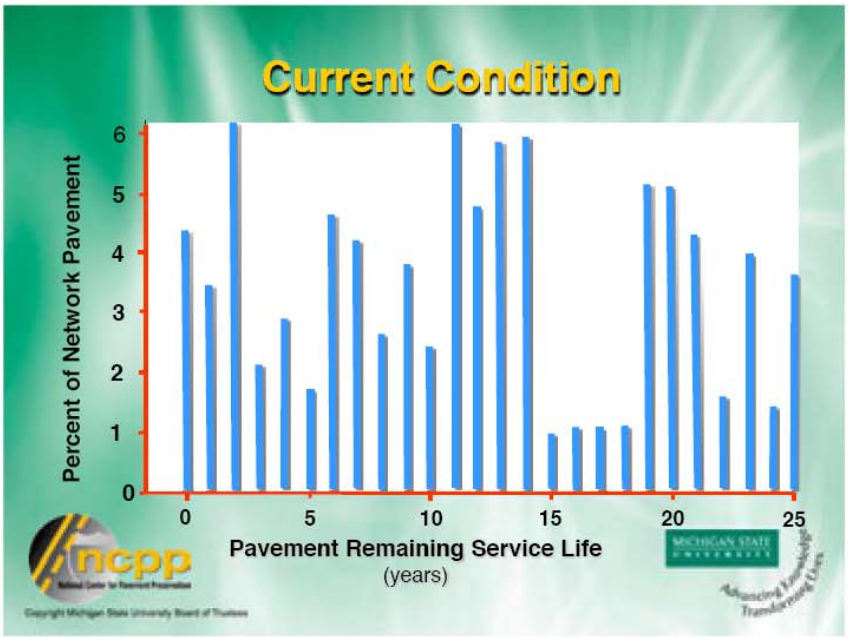
Treatment	Good Condition (PCI=80)	Fair Condition (PCI=60)	Poor Condition (PCI=40)
Crack Fill	1 - 3	0 - 2	0
Crack Seal	1 - 5	0 - 3	0
Fog Seal	1 - 3	0 - 1	0
Chip Seal	4 - 10	3 - 5	0 - 3
Micro-Surfacing	4 – 8	3 - 5	1 - 4
Thin HMA	4 - 10	3 - 7	2 - 4

The typical service life extensions for some typical "fixes" are shown in the slide above.

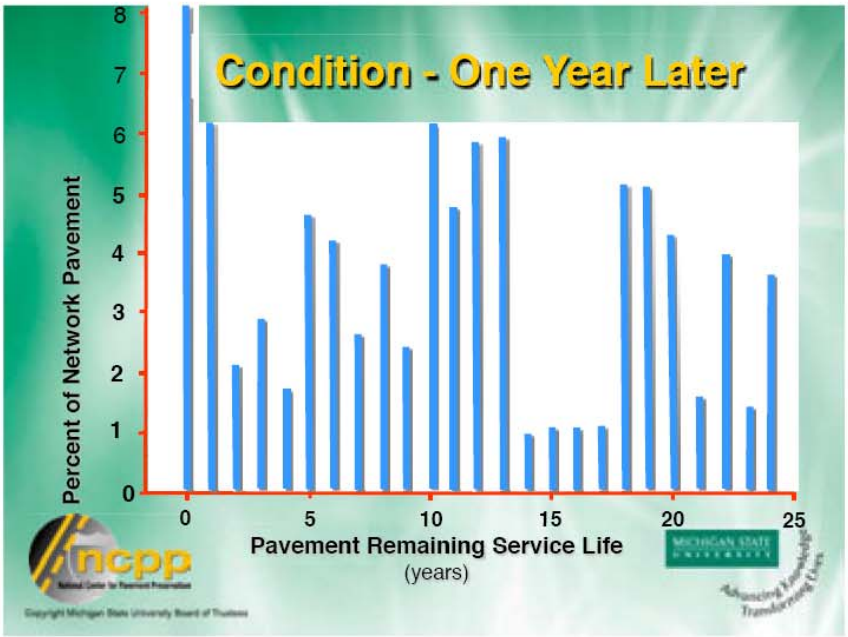
The asset management concept emphasizes that it is less expensive to maintain good pavements over the long-term than allow the pavements to deteriorate to the point of requiring more expensive "fixes", including reconstruction.



To illustrate the method, Larry Galehouse shows an example of an agency highway network with 4,356 lane miles with this set of roads and pavement life:



If no work is done, this is what the network would look like a year later, i.e., each road or lane mile would have one less year of service life (i.e., the bars would move one space left on the graph, with the one year life added to the previous year's zero life remaining. The network would lose 4,256 "lane mile years".



Without going through his full example, suffice it to say that with a limited budget, taking a "worst-first" strategy of reconstructing the roads with zero remaining service lives would use the entire budget and yet not fix all of the worst roads. Meanwhile, the remainder of the roads would

deteriorate, each mile losing a year lane mile, and requiring a more expensive fix than the year before. The system would be in even worse shape each year.

In contrast using the asset management approach, the potential projects would be evaluated on the cost of the project, divided by the lanes treated by the fix, divided by the additional years of service life obtained to calculate the cost per lane mile year. The total service life of all of the roads in the system will be maximized by selecting the combination of projects which have the lowest costs per lane mile year, meaning that much of the work will be capital preventive maintenance pavement preservation treatments applied to prevent the roads from falling into poor categories.

The downside of this strategy is that when there are insufficient funds, the roads in "poor" condition get in even worse shape. Of course, this strategy practically cannot be applied perfectly, as there will be some roads in awful condition that simply need to be addressed, due to traffic loads, safety issues or simply public pressure. The concept, however, is the best management practice that will minimize the cost of maintaining the asset value of our roads, i.e., the lowest cost method of maintaining satisfactory roads in Michigan. The cost estimating models we used utilize this method.

Another downside of using the asset management approach is a lack of understanding among the public. Many find it hard to understand why a road agency is applying an appropriately timed chip seal to a road that looks great to them, in contrast to a "terrible road" in need of reconstruction that is not being improved, when insufficient funds exist to do both. A significant public education effort will be necessary to achieve greater public acceptance of the asset management practice.

Bottom line: if the investments projected by these models are not done, either the deferred costs of maintaining our roads will be much higher OR we choose to accept lower quality roads. From a business perspective, the set of investments recommended is the lowest long-term costs of maintaining our roads.

Key Assumptions in the Models.

The team used models from:

- MDOT RQFS (Road Quality Forecasting System)
- Michigan Transportation Asset Management Council (PASER data)
- A comparable model for bridges

These models work at the 50,000' level, and are not project specific like RoadSoft). That is, it contains data such as there are X number of lane miles of concrete highway at PASER rating 5, Y lane miles at condition 6, etc. The database contains the condition ratings of 100% of the Federal Aid roads and 40% of the non-Federal Aid roads (and the assumption is that this 40% is representative of the remaining 60%).

The formulas in the model predict the deterioration rates of RSL or PASER conditions of each of the categories of roads year by year. The model also assumes improvement in RSL or PASER road conditions for each selected "fix" from X to Y additional road life for each "fix".

We have divided the paved roads in the state into four categories:

- State trunkline freeways
- Remainder of the state trunkline highways
- Remainder of the federal-aid roads
- Non-federal aid roads that are paved

For the purposes of determining the cost to maintain our roads, the maintenance and construction categories used are Capital Preventive Maintenance, Rehabilitation and Reconstruction.

Embedded in the model are costs assumptions per lane mile of "fix". For example, the costs per lane mile through 2015 assumed in the models are:

Cost of Improvements Assumptions (per lane mile)			
	Reconstruction	Rehabilitation	Capital Preventive Maintenance
Freeway	1,456,000	643,000	66,600
Federal Aid, Trunkline	1,250,000	366,000	54,800
Federal Aid, Non-Trunkline	562,000	165,000	26,000
Non-Federal Aid	365,000	105,000	20,000

The data supporting the cost assumptions for the State Trunkline highways are detailed in Appendix B.

Here is the data collected by Steve Warren, Kent County Road Commission Deputy Director and member of the MI Transportation Asset Management Council, for the non-state trunkline roads, to compile a "representative average" from the range of costs in various areas across the state:

Non-State Trunkline Improvement Cost Detail					
Federal-Aid Highways					
	Per 2 Lanes	PE/CE	Total	Per Lane Mile	
				Calculated	Used
Reconstruction	$1,000,000	12.4%	$1,124,000	$562,000	$562,000
Rehabilitation	Average		$329,514	$164,757	$165,000
Crush and Shape	$275,916	10.8%	$305,715	$152,857	
Mill and Fill	$318,875	10.8%	$353,314	$176,657	
Cap. Preven. Maint.	Average		$51,700	$25,850	$26,000
Seal Coat (chip seal)	$43,700		$43,700	$21,850	
Microsurfacing	$59,700		$59,700	$29,850	
Non- Federal-Aid Paved Roads					
	Per 2 Lanes	PE/CE	Total	Per Lane Mile	
				Calculated	Used
Reconstruction	$660,000	10.1%	$726,660	$363,330	$365,000
Rehabilitation	Average		$209,880	$104,940	$105,000
Crush and Shape	$246,000	6.0%	$260,760	$130,380	
Mill and Fill	$150,000	6.0%	$159,000	$79,500	
Cap. Preven. Maint.	Average		$38,800	$19,400	$20,000
Seal Coat (chip seal)	$40,300		$40,300	$20,150	
Microsurfacing	$37,300		$37,300	$18,650	

PE/CE means Preconstruction engineering and construction engineering.

Note that the simplification of the multiple choices in potential "mix of fixes" into the three categories is a limitation of this study, but the estimated costs are deemed representative of the averages across the state that would be experienced.

An assumption of 5% for inflation after 2015 is included. This represents the trend in costs of construction based on MDOT data. The cost of asphalt, an oil based product, is one of the big cost drivers.

Road Quality Goals.

To begin the process of working the models, we had to set road condition goals. We selected the same goals as set by the TF2, i.e.:

- State trunkline freeways: 95% good or fair according to RSL (remaining service life) ratings
- Remainder of the state trunkline highways: 85% according to RSL ratings
- Remainder of the federal-aid roads: 85% according to PASER ratings
- Non-federal aid roads that are paved: 85% according to PASER ratings

Note that the ratings of 8-10 are considered "good", 5-7 are "fair" and 1-4 are "poor". This differs slightly from the rating system in the University of Wisconsin PASER training manuals (see Appendix A) in which only ratings 1-3 are considered "poor" but follows the practice of the Asset Management Council in its reporting system. This may be based on the fact that even roads with a rating 4 require structural improvement, rather than capital preventive maintenance.

Note also that when we achieve these goals, the roads will not be perfect. The reader is advised to study the photos in Appendix A for the different ratings to familiarize yourself with what the ratings mean. The goal is not to have perfect looking roads, but to maintain satisfactory ride quality while minimizing the long-term cost by preserving the pavement and extending the pavement life by applying the right fix at the right place at the right time. In effect, we minimize the cost per lane mile life while achieving decent roads.

Optimal Combination of Fixes and Timing.

The models we used are not cost optimization models that automatically come up with the lowest cost combination of fixes. The analysts needed to run multiple "what ifs?" Their objective was to select the combination and timing of fixes from the "mix of fixes" that costs the least long-term to maintain our asset value of our highway system – a business approach.

Each "what if" required the analysts to assume different percentages of the three types of road fixes, which varied by year and by road type. For example, for the state trunkline highways, both freeway and non-freeway, here are the lowest cost combination found that best achieved the quality goals set for the two segments of 95% and 85% good or fair, respectively.

	Freeway		Non-Freeway	
2012-2016	**Percentage**	**Lane Miles**	**Percentage**	**Lane Miles**
Reconstruction	1.13%	113	0.98%	190
Rehabilitation	4.34%	435	3.09%	600
Preventive Maintenance	5.50%	551	7.89%	1,533
2017-2023				
Reconstruction	1.13%	113	0.96%	187
Rehabilitation	4.51%	452	3.09%	600
Preventive Maintenance	4.91%	492	7.03%	1,366
		2024		
Reconstruction			0.99%	192
Rehabilitation			3.10%	602
Preventive Maintenance			6.14%	1,193
2024-2028		**2025-2028**		
Reconstruction	1.51%	151	0.99%	192
Rehabilitation	4.06%	407	2.91%	565
Preventive Maintenance	5.27%	528	6.14%	1,193
Total Lane Miles in Segment		**10,024**		**19,432**

The remaining two segments of roads are assumed to be improved as follows:

	Non-Trunkline Federal-Aid		Non-Federal-Aid Roads	
2012-2023	**Percentage**	**Lane Miles**	**Percentage**	**Lane Miles**
Reconstruction	0.94%	512	0.98%	779
Rehabilitation	3.65%	1,987	3.09%	2,456
Preventive Maintenance	14.48%	7,885	7.89%	6,271
Total Lane Miles Improved		**10,384**		**9,506**
Total Lane Miles in Segment		**54,452**		**79,482**

Funds Needed to Achieve Condition Goals for 2012-2023: Current Paved Roads and Bridges

Here is an overall summary of the funds needed to achieve our goals with the derived lowest cost combination:

Funds Needed to Achieve Condition Goal for 2012-2023						
		Goal	Funds Needed	Current Budget	Shortfall	Average Annual Lane Miles Improved
	Paved Lane Miles	(Percentage in Good/Fair Condition)	. . . . Annual Average in Millions			
Freeway	10,024	95%	$614	$148	$466	10.7%
Federal Aid, Trunkline	19,432	85%	$696	$317	$379	11.4%
Federal Aid, Non-Trunkline	54,396	85%	$958	$378	$580	19.1%
Non-Federal Aid	79,482	85%	$561	$254	$307	16.9%
Road Subtotal	**163,334**	**86%**	**$2,829**	**$1,097**	**$1,732**	**16.6%**
	Bridges					
Freeway	3,260	95%	$208	$148	$60	
Non-Freeway Trunkline	1,209	85%	$43	$37	$6	
Non-Trunkline Bridges	6,446	84%	$75	$44	$31	
Bridge Subtotal	**10,915**	**87%**	**$326**	**$229**	**$97**	
		Grand Total	**$3,155**	**$1,326**	**$1,829**	

Of note in this chart are the percentages of lane miles improved per year. Experience indicates that improving more than 11% of the major roads in a year ties up traffic excessively, while a somewhat higher percentage of the more local roads can be improved upon acceptably. Almost 17% of the non-Federal-Aid roads and over 19% of the non-state trunkline Federal-Aid roads represents (in technical terms) a whole bunch of work.

Also note that we assumed in the base case and in the proposed scenario that the current sources of revenue into the Michigan Transportation Fund (Gas tax, Diesel fuel tax, Vehicle registration fees and Federal gas tax allocations – with the uncertainty at the federal level, this may not be a safe assumption, but anything else would have been as much of a guess) would continue at current levels, and the question to be answered was how much additional money would be needed to pay for the least cost combination of fixes. The amounts of revenue going into each of the four segments of the system may be seen in the column labeled "Current Budget".

Deriving the "Current Budget" numbers was fairly straightforward for the state trunkline segments in our model, but challenging for the remainder of the system. The information used is included as Appendix C. The problem with the non-trunkline road segments is that the data has not been reported in the same fashion as the model was constructed. That is, we were looking for the costs of capital preventive maintenance, rehabilitation and reconstruction of existing roadways only. In the reports we dug up, safety projects, routine maintenance, and perhaps other costs were mixed in the numbers reported. We assumed that the non-pavement safety projects percentage was the same percentage for the non-state trunkline segments as for the state trunkline segments, and similarly for routine maintenance. Admittedly, this is somewhat of a SWAG but the best estimate the experts engaged could come up with. The feeling is that if anything, the "Current Budget" estimates may be on the high side for the non-state trunkline road segments, which would have the effect of possibly a lower "Shortfall" or "Additional Revenue Needed" than may actually be the case. That is, the final result is deemed on the conservative low side.

The averages, however interesting, are not as revealing as the year by year totals, as those totals are what we will need to match up any new or changed revenue stream to pay for the increased level of road maintenance. This table provides contains the annual additional requirements.

Additional Investment Needed (in millions)

Year	Total Funds Needed to meet Goals (Current plus Additional)	Total Additional Funding Above Current Investment Needed to Meet and Sustain Goals
2012	$2,703.13	$1,377.13
2013	$2,687.68	$1,361.68
2014	$2,691.92	$1,365.92
2015	$2,688.46	$1,362.46
2016	$2,834.30	$1,508.25
2017	$3,059.50	$1,733.10
2018	$3,202.86	$1,876.84
2019	$3,344.49	$2,018.61
2020	$3,503.72	$2,177.80
2021	$3,558.88	$2,231.77
2022	$3,707.19	$2,381.76
2023	$3,896.18	$2,569.40
Total	$37,878.31	$21,964.72

The detail for each of the four road segments and for bridges are attached as Appendix D.

Also, the further breakdown of cost for each fix per year for the non-state trunkline roads is attached as Appendix E.

Comparison With TF2 Report

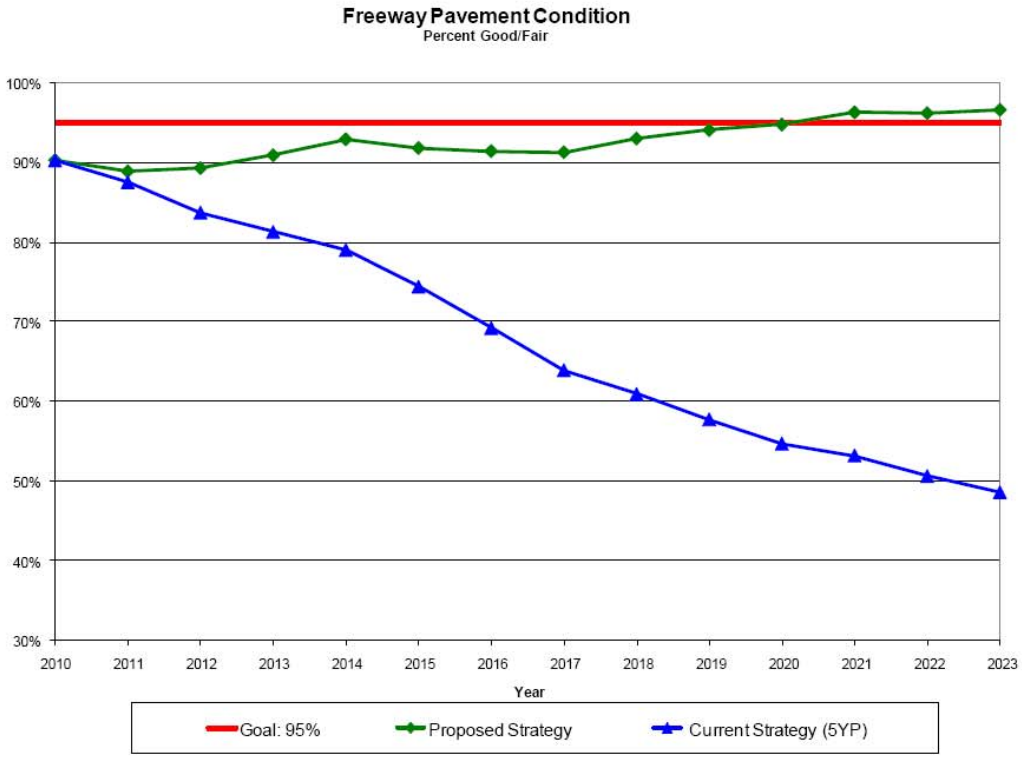
It is interesting to compare the current estimates with those of the TF2 report. The TF2 numbers are presumed to be averages over a period of years, and thus comparable to the 2012-2023 averages in the current estimates. The current estimates fall somewhere between the TF2's "good" and "better" scenarios. The current estimates thus give some support or corroboration of the earlier estimates.

Additional Funding Suggested by TF2 (in millions of dollars)			
Highway Preservation	**MDOT**	**Locals**	**Total**
Good	389	665	1,054
Better	1,149	2,045	3,194
Bridge Preservation			
Good	80	106	186
Better	110	292	402

Projected Road Quality with Proposed Additional Funding.

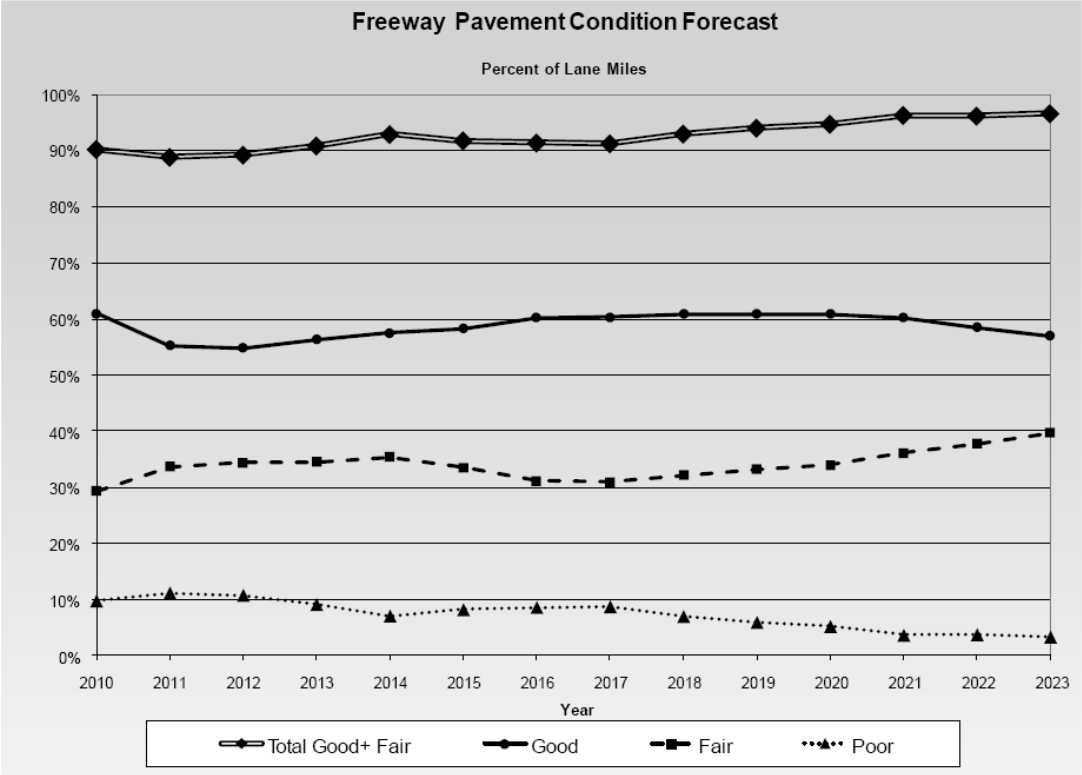
Now, the goal was to meet our 95% and 85% good or fair conditions. Here is how they have come out.

For the freeways, it takes us a few years to reach our goal of 95% good or fair, but ultimately we reach and maintain the goal. The result is much better than with status quo funding.

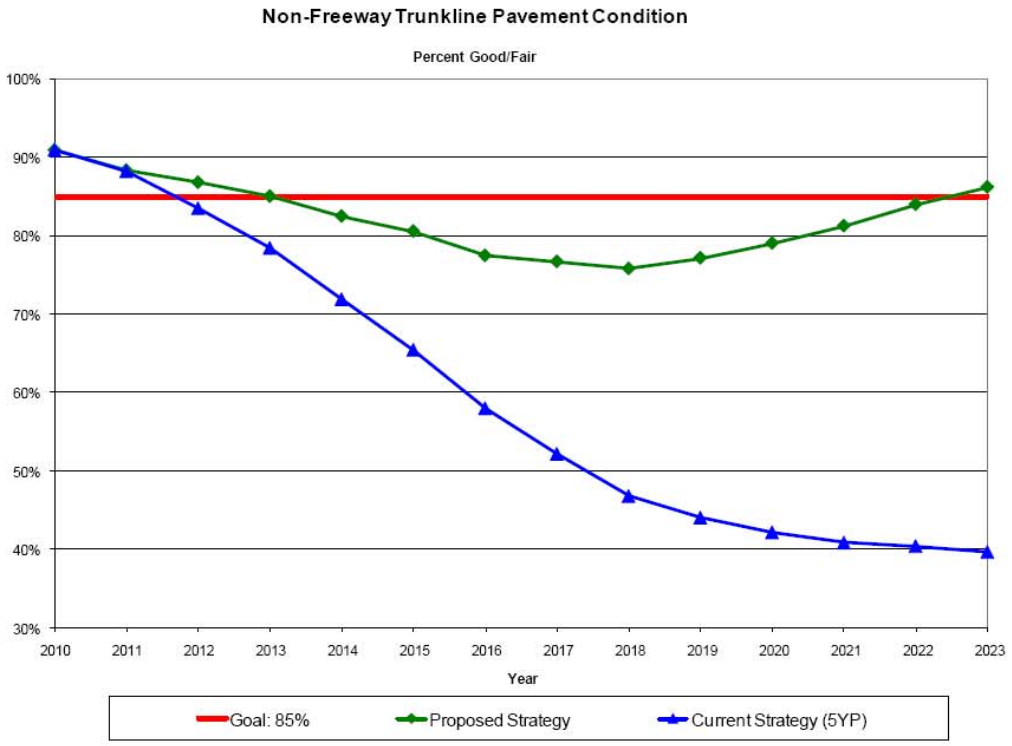


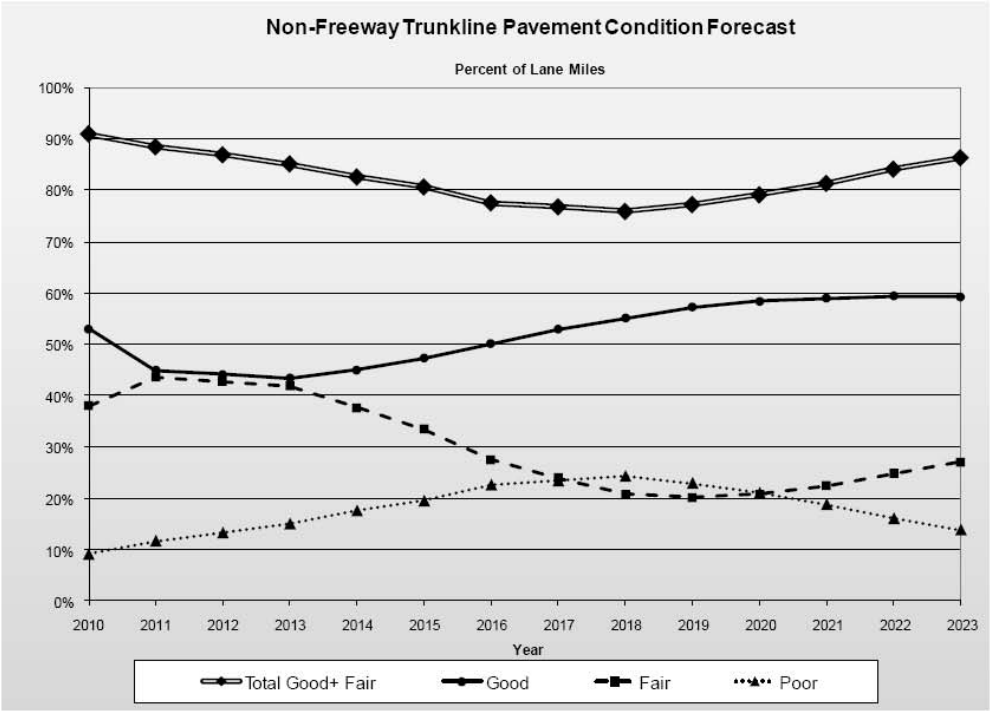
It is important to note that even when we approach, hit and maintain the 95% good or fair condition, all the roads will not look in "like-new" condition. Only abut 60% will be in the 8-10 "good" rating, between 30 and 40% in the 5-7 "fair" rating and the remaining less than 10% in the 1-4 "poor" condition. See the chart below. Some of the capital preventive maintenance, such as crack filling, will not be as aesthetically pleasing as fresh, smooth asphalt, but will be much more cost effective than a 1" or 2" hot asphalt mix overlay in circumstances that crack filling would be the "right fix at the right place at the right time".

Similar charts showing the make up of the three categories are provided for each of the four highway segments below.

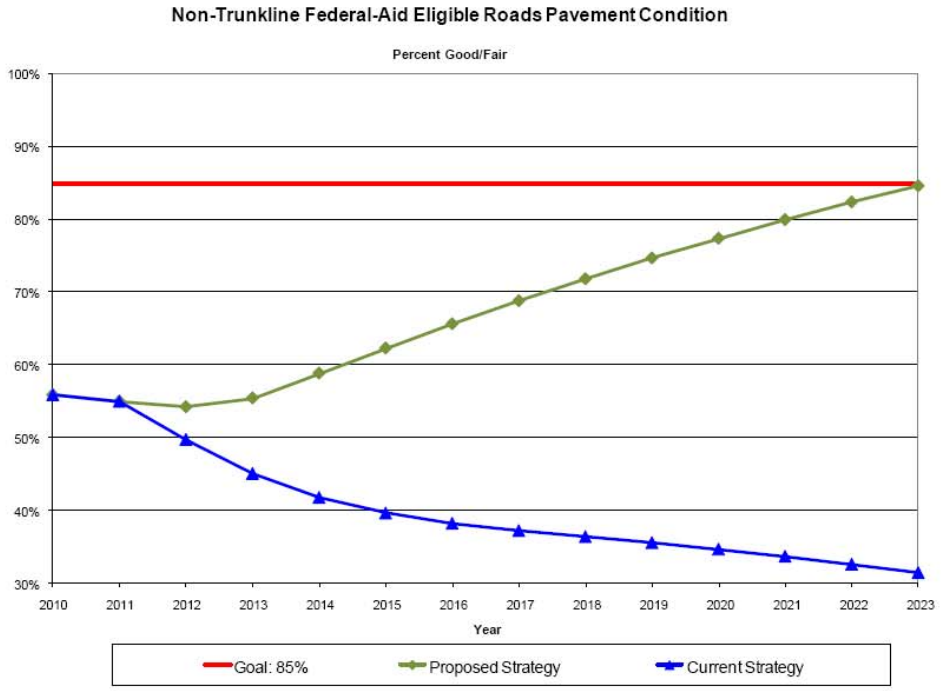


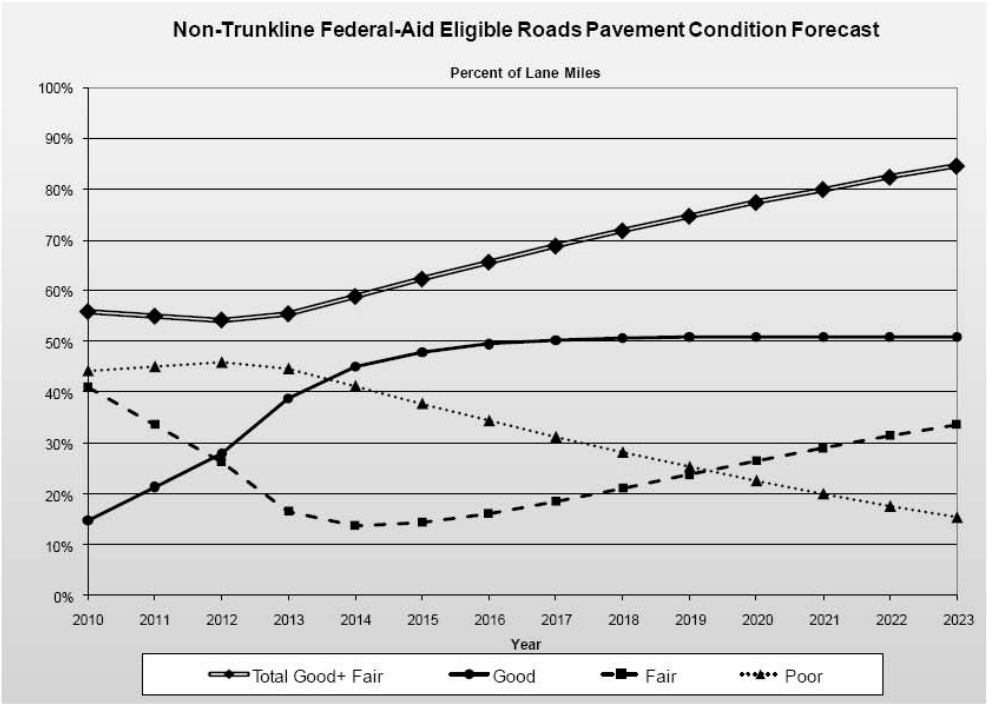
For the non-freeway portion of the state trunkline, the condition of the roads actually dips well below current levels of quality even with over 11% of the segment's lane miles being worked on each year, or 10,384 lane miles per year. If one is unhappy with the temporary reduction in quality, it must be pointed out that this quality level is much, much better than would be the case without additional funding. The condition of the roads has been allowed to deteriorate so much and held together with so many 3, 5 or 7 year fixes that the expiration dates are coming due faster than the roads can reasonably be worked on each year without causing unacceptable congestion and traffic tie-ups. We created an earlier run of the model that achieved the goal much sooner, but the percentage of roads that would need to be worked on each year was simply not feasible. The takeaway message is that we need to act now or this situation will get even worse without serious action soon. In short, it costs more to defer the capital preventive maintenance and we have poorer roads in the meantime.


Non-Freeway Trunkline Pavement Condition
Percent Good/Fair
100%
90%
80%
70%
60%
50%
40%
30%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year
Goal: 85%
Proposed Strategy
Current Strategy (5YP)

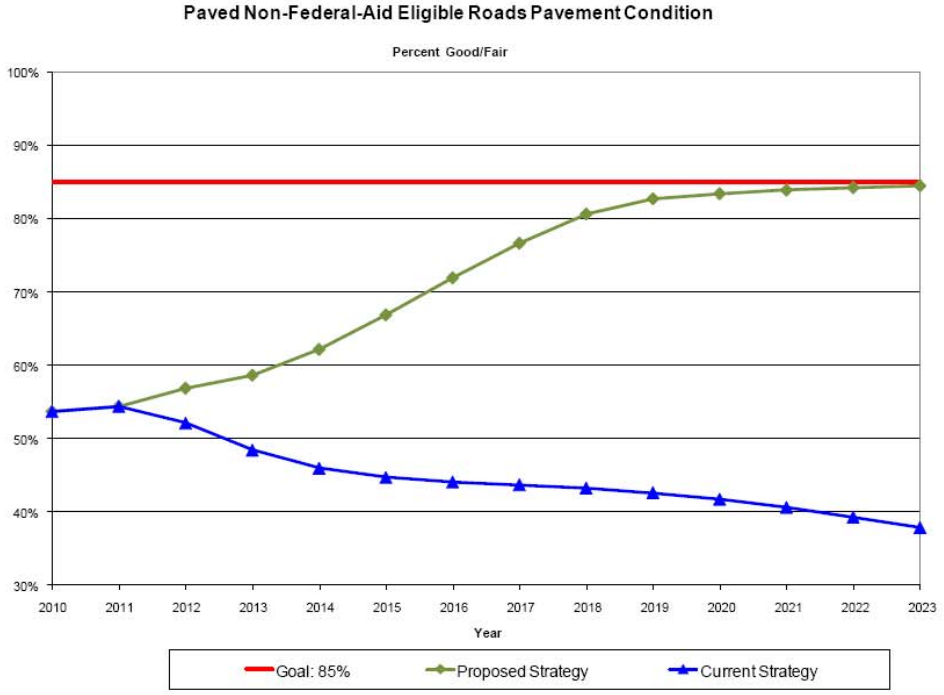

Non-Freeway Trunkline Pavement Condition Forecast
Percent of Lane Miles
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year
Total Good+ Fair
Good
Fair
Poor

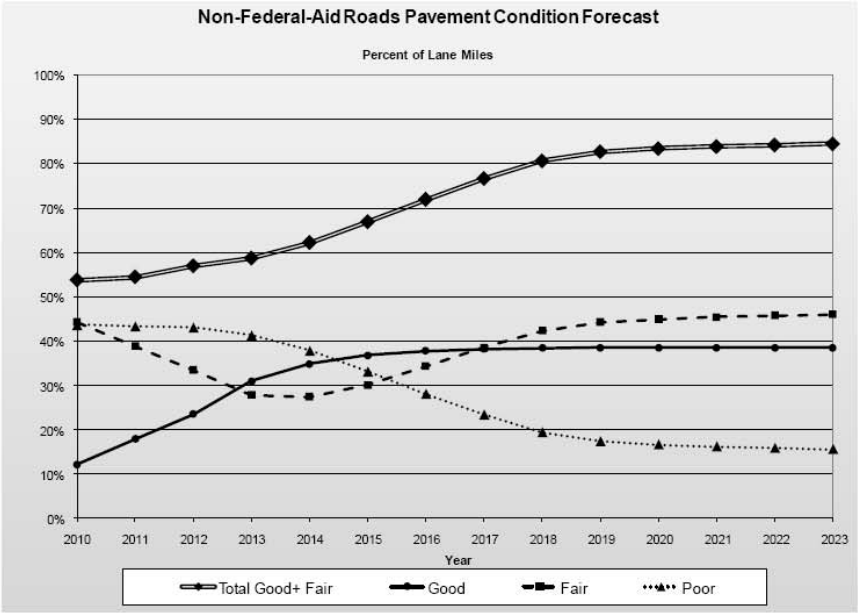
For the non-trunkline Federal-Aid roads, we project a continuous improvement from the current very low (mid-50%) towards the goal of 85% good or fair. It takes many years to get there, but eventually the goal is met if we simply stick to the plan.





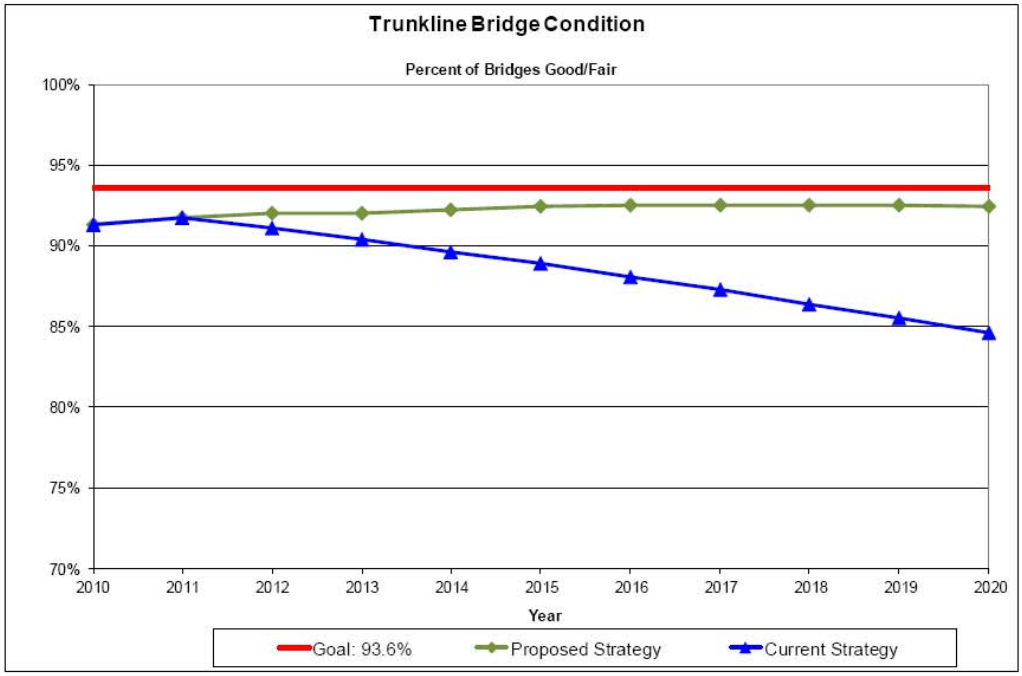
Again, for the non-Federal-Aid paved roads, as with the non-trunkline Federal-Aid roads, it takes a while to achieve the 85% goals, but we can get there, gaining incremental improvement year by year.

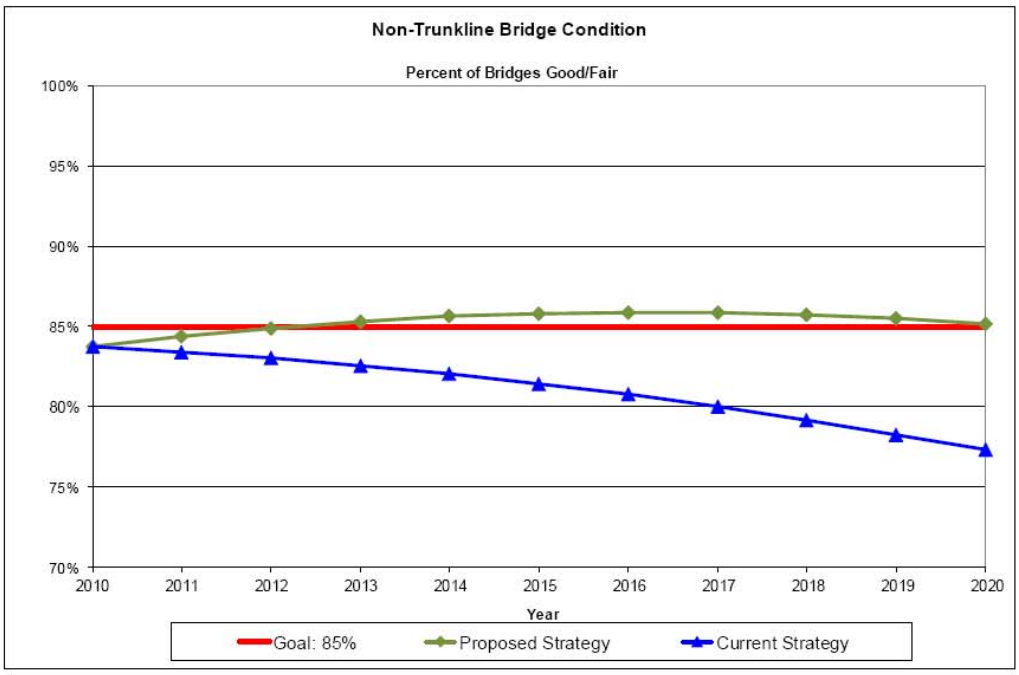




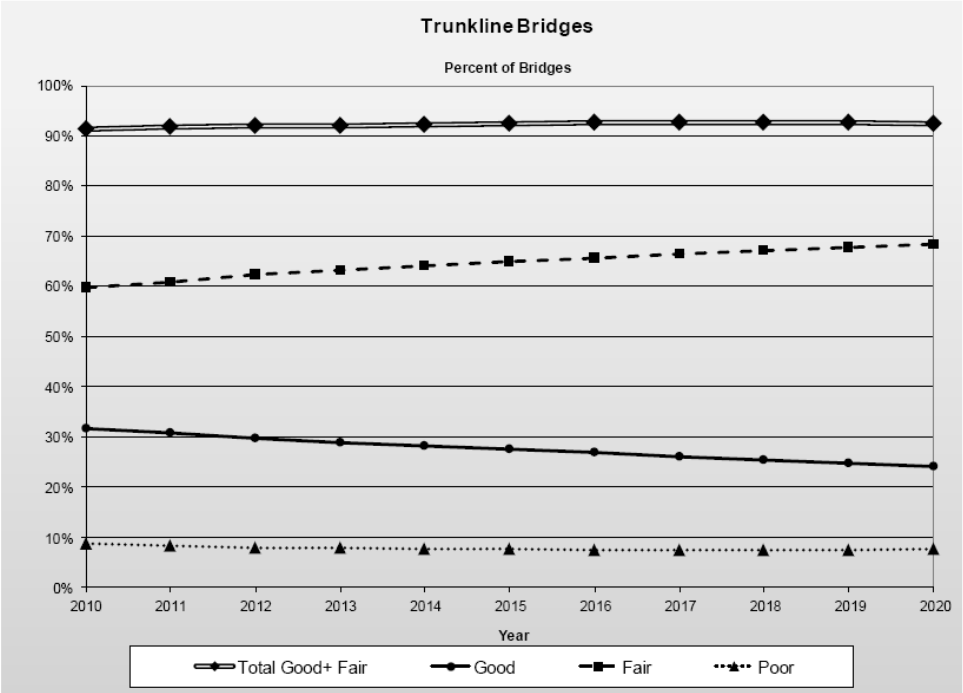
Projected Bridge Quality with Proposed Additional Funding.

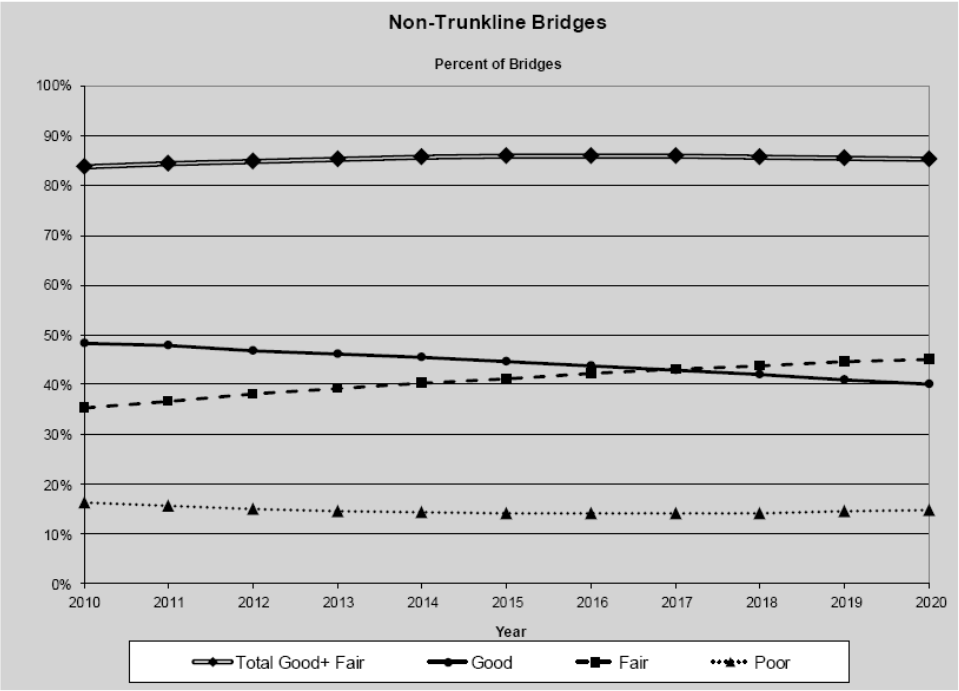
The additional money helps maintain the condition of the state trunkline highway bridges, rather than see the condition deteriorate.





Although the percentage of bridges that are good or fair remains above 90%, again, as with the roadways themselves, many of the bridges would still not be in the best condition.





Sensitivity Analysis.

A key decision in the analysis conducted was what percentage of roads should be rated good or fair. We selected 95% as the goal for the freeways and 85% for all other paved roads. A fair question is, "What difference in cost might there be if the non-state trunkline highways with less traffic and at lower speeds were given a lower goal of 80%."

The following table shows that initially the difference would be just over $100 million per year and rising towards $150 million in 2023. In other words, the goal for how much additional money needs to be raised to meet the goals could be reduced in the near term about $100 million per year if we were to lower our goals with respect to the non-state trunkline roads. This is not a recommendation, just an observation.

Comparison of 80% and 85% Goals for Non-State Trunkline Highways

Additional Funding Above Current Investment Needed to Meet and Sustain Goal

(in millions of Dollars)

	Non-Trunkline Federal Aid			Non-Federal Aid			
Year	85%	80%	Difference	85%	80%	Difference	Total Difference
2012	442.00	387.00	55.00	226.00	180.00	46.00	**101.00**
2013	442.00	387.00	55.00	226.00	180.00	46.00	**101.00**
2014	442.00	387.00	55.00	226.00	180.00	46.00	**101.00**
2015	442.00	387.00	55.00	226.00	180.00	46.00	**101.00**
2016	483.00	425.25	57.75	250.00	201.70	48.30	**106.05**
2017	526.05	465.41	60.64	275.20	224.49	50.72	**111.35**
2018	571.25	507.58	63.67	301.66	248.41	53.25	**116.92**
2019	618.72	551.86	66.86	329.44	273.53	55.91	**122.77**
2020	668.55	598.36	70.19	358.62	299.91	58.71	**128.91**
2021	720.88	647.17	73.71	389.25	327.60	61.65	**135.36**
2022	775.82	698.43	77.39	421.41	356.68	64.73	**142.12**
2023	833.51	752.25	81.26	455.18	387.22	67.96	**149.22**

Key Questions Remaining.

As mentioned above, this analysis only involves estimating the cost of reasonably maintaining our current paved roads and bridges. It does not include any new or widened roads to improve capacity, relieve congestion or to improve safety. The TF2 report had cost estimates for three levels of action: current/do nothing, good or better. At even the "good" level, the amounts suggested are sizeable, as the following table shows. (It is not known if these numbers are averages over a period of years, or for the first year, but the amounts are nonetheless useful in gaining a sense of the magnitude of additional investment recommended by the TF2. The table does not contain the recommendations for additional funding for debt service or administration.)

Additional Funding Suggested by TF2 at the "Good" Level			
(in millions of dollars per year)			
	MDOT	**Locals**	
Capacity Improvements and Border Crossings	675	233	
Safety and ITS	35	118	
Other Highway Facilities	10	9	
Highway Maintenance	54	474	
	774	**834**	

Once the question of how much money we need is firmly answered, we will need to progress through the remainder of the questions raised, i.e. the following, which this report does not address. We will return to these questions soon.

- How do we raise the money?
- How do we get the money to roads and bridges?
- How do we deal with townships with minimal ability to have match money?
- How do we create the reality and perception that taxpayers are getting value for money?
- How (or do we) deal with the sales tax question?

Timing Goals

- Engagement of interest groups and legislators started July 26 at the Best Management Practices Conference on Road Maintenance and will be ongoing.
- A proposal for the legislature will be prepared for the fall, with legislative action expected in the September – December, 2011 time period. This may or may not be part of Governor Snyder's "Infrastructure Message" that he has announced will be released in October, 2011. The goal is to definitely get this done prior to an election year when votes in the legislature for new revenue may be harder to come by.

Conclusion

We are optimistic that we can finally solve the issue of adequately funding our road and bridge infrastructure this year. The key elements include the least cost business approach incorporated in the cost estimate, new revenue based on user fees, and a bi-partisan effort to increase road and bridge funding about $1.4 billion. This is a real problem, and many of the legislators and the Governor are intent on solving real problems. We need to seize this historic opportunity.

APPENDIX B:

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

RICK SNYDER
GOVERNOR

BRIAN CALLEY
LT. GOVERNOR

October 26, 2011

A Special Message from Governor Rick Snyder:
Reinventing Michigan's Infrastructure: Better Roads Drive Better Jobs

To Michiganders and the Michigan Legislature:

I. Introduction

Over the past ten months, we have taken important steps to turn Michigan's economy around. But as too many in Michigan know we still have a long way to go. Today we take yet another bold step forward to help ensure our economic prosperity, now and in the future.

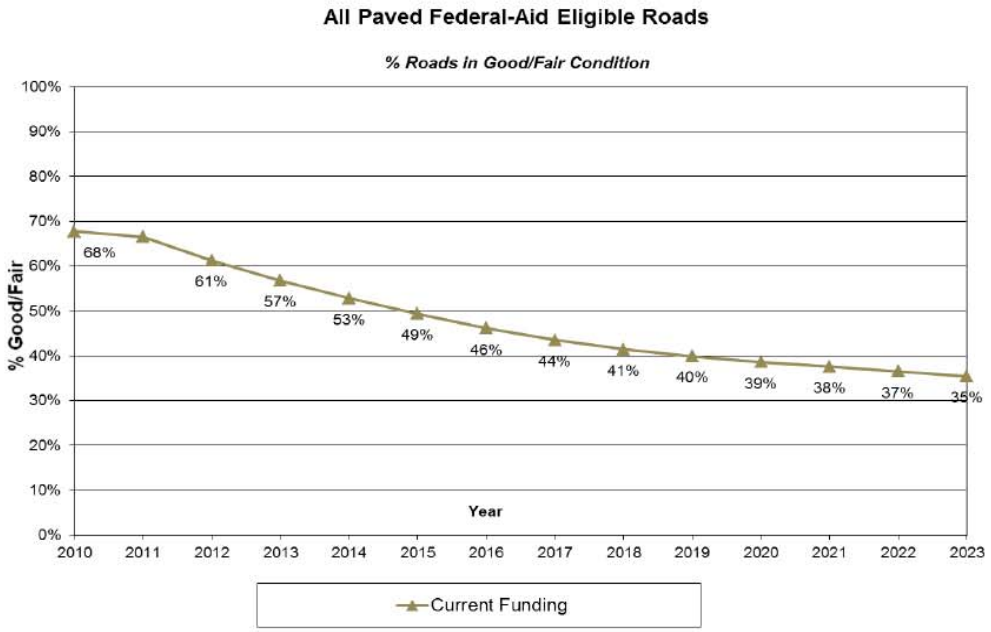
Reinventing Michigan's Infrastructure: Better Roads Drive Better Jobs

A sound and modern infrastructure is vital to attracting and retaining jobs. The state that put the world on wheels needs to continue to be a transportation leader in order to stay competitive in today's global economy. We need a modern transportation system that moves people and goods safely, reliably, and efficiently in order to increase productivity and our quality of life. We need a multi-modal system that will serve the movements of a new, more urban, more tech-savvy, and more active generation. We need water and sewer systems that support and protect Michigan's rich environment and water resources. We need to integrate our broadband telecommunications network and connect every business and every household to the internet.

The challenge is simple. Michigan's infrastructure is deteriorating from a lack of investment. If we are going to reinvent Michigan's economy, we have to reinvest in Michigan's infrastructure.

For the first time ever transportation revenues are declining. Simply put, better fuel economy and higher gas prices lead to lower road revenues from the fixed fuel tax. All the while, the cost of materials and labor continue to rise, seriously undermining our ability to keep up.

In 2008, a Transportation Funding Task Force recommended doubling Michigan's transportation investment, and warned strongly that doing nothing was unacceptable. At the time, members of the State Legislature made proposals for increased funding for transportation, and found support on all sides of the political spectrum, but nothing happened. And this year, a bipartisan House Transportation Committee workgroup underscored those findings, concluding once again that while doing nothing is a decision, it is the wrong one. The following graph illustrates the deterioration of our system at today's level of investment:



Underinvestment is also a problem for our water and sewer systems. It is easy to forget the large and invisible network of water and sewer lines below our feet. Unless there is a crisis, it remains out of sight and out of mind. But many of those systems are a hundred years old or more, and in need of reinvestment. To protect the quality of Michigan's abundant lakes, streams, wetlands and Great Lakes beaches, critical contributors to our economic vitality, we need to be a leader in this area.

We have a responsibility to ourselves and to future generations to maintain and improve the roads, bridges, and sewer and water systems that previous generations built for us. It is a responsibility we cannot ignore or postpone because waiting costs money.

Michigan loses nearly $3 million each day in the value of our transportation assets. That is $1 billion lost every year. One dollar spent today to preserve a road or bridge can save us at least $6 dollars in future rebuilding costs. Maintaining and upgrading our water and sewer lines can help avoid costly failures that close beaches and put public health at risk. It is less expensive and more cost effective to maintain our infrastructure now than to wait until it needs to be completely rebuilt.

In short, investing today not only saves money, but builds the foundation for a reinvented 21st century Michigan economy.

To meet these challenges, we cannot depend on Washington. We are a gas tax donor state and our rate of return must be improved. There is no reason why Michigan's gas taxes should be sent to Washington to fund infrastructure in other states. I will continue to work with Michigan's Congressional delegation to improve our rate of return.

Michigan can reclaim its role as a leading economic powerhouse by acting now to leverage our geographic location and reinvest in our extensive network of roads and railroads, bridges and byways, ports and airports. By investing in the means to move people and products with speed and efficiency, we can compete with other states and countries for business and jobs – and we can win.

I am asking your help to make new investments in Michigan's roads and bridges – significant new investments – but not as we have done in the past. Business as usual – doing things the way they have always been done and expecting different results – is not the road to economic renaissance. Pumping

new money in to old formulas, practices and programs will not produce better results. We need to do things differently.

We must target new investments on the roads and bridges that the data shows will have the most beneficial impact on our economy. And we must hold all road agencies accountable for the public dollars they spend. We must insist on value for our money.

II. Reforms and Best Practices

An investment in infrastructure has the potential to achieve great value, both at the time of the investment and well into the future. We have invested wisely but we cannot continue to sustain the value of those investments without additional reform and additional revenues.

Michigan is a recognized national leader in managing its road and bridge assets with a long term vision. The Legislature took decisive action nearly a decade ago to create the Transportation Asset Management Council. Through that council, Michigan has ensured that investments are made to maximize the life of our roads and bridges. That means making data-driven decisions to determine which roads need to be repaired and which roads need to be rebuilt.

We need to continue to extend that model to county road commissions and cities and villages. As a result, all transportation agencies will use this approach to make better, timelier, more effective decisions to preserve our existing infrastructure.

Michigan is also a national leader in the development of new technologies including:

- Life-cycle budgeting, a process that abandons the old, short-term approach of quick fixes for road maintenance and places emphasis on maximizing the life of the road. A Congressional Budget Office study shows life-cycle budgeting can reduce long-term maintenance costs by 40 percent.
- High-strength Carbon Fiber Reinforced Polymers (CFRP) to reinforce concrete bridges. The use of this new product offers several distinct advantages, one of which is the virtual elimination of corrosion, a common problem among steel reinforced bridges.
- Energy efficient LEDs in freeway lighting and trunkline signaling devices. Today, some 55 percent of state highway lights have been upgraded with LED lenses. As a result, MDOT is seeing a 90 percent power savings where LEDs are used.
- The use of solar power to reduce its energy consumption. A demonstration project undertaken with the Michigan Economic Development Corporation Michigan Energy Office is using elevated solar panels at an MDOT carpool lot in west Michigan to feed power directly into the electrical grid during the day and offset the power needed for the freeway interchange lights at night.
- A modern electronic bidding system developed in partnership with the private sector that uses the Internet to reduce errors, save taxpayer dollars, and shorten processing time. That means doing away with 10,000 pieces of paper that a single bid letting previously required along with the inefficiencies of such a labor-intensive process. For example, in 2002, the state had 34 low bid rejections, which cost about $370,000 to correct. In 2007, with the introduction of electronic bidding, there were no low bid rejections among 1,106 projects.

These innovations have saved money and stretched our transportation dollars, and we must do more. Today, I am challenging MDOT to provide opportunities for increased competition for maintenance services, like snow plowing. I propose taking a portion of the state network and competitively bidding for long-term engineering management services, construction and maintenance operations. I am giving the department 12 months to have the contracts in place and report back to me on the progress.

Moving to a performance-based system for managing and maintaining roads will lead to more efficiency in the preservation of our roads and bridges and save taxpayers money.

It is time to streamline the way we do business. We saw how successfully that worked for the auto companies who took painful steps to become leaner and more efficient. Ultimately, those difficult decisions helped make those companies sustainable. Many other businesses in Michigan have had to make similar painful choices in order to survive the past decade of difficult economic times.

It is time for transportation agencies to do the same. Michigan has 617 independent road agencies and 79 independent transit agencies. We are the only state in the country that has county road commissions – 81 of them in total – and 35 of those are not accountable to the rest of county government. We need to modernize the way we administer transportation programs and do business in a streamlined and transparent way.

For that reason I am asking the State Legislature to make some changes to current law. Today, only the largest counties are allowed to incorporate their county road commissions into county general government. Macomb County recently chose to do this, and Wayne County did it some time ago. I ask the State Legislature to change the law to allow any county to absorb its county road commission.

In addition, Act 51 – the 60-year-old law that governs how state transportation revenue is distributed and how it can be spent – includes archaic formulas that sprinkle state transportation revenue across all 617 road agencies, many of them responsible for only a few miles of road. The formulas are so outdated that two cities actually receive funds despite having no public roads or bridges in their jurisdiction.

Michigan can no longer afford to spread limited funding so thinly across so many small agencies. Consolidating local road agencies will help eliminate redundant administrative and equipment costs and ensure that local dollars go further. Some consolidation and sharing of resources already occurs, but much more is needed.

For that reason, I ask the state Legislature to revise Act 51 of 1951 to improve the efficiency and effectiveness of transportation revenue distribution. There are many changes needed to the old revenue formula. As a first step, I encourage the Legislature to remove cities and villages that receive less than $50,000 in transportation funding from the distribution of Act 51 funds. Instead of allocating the funding to those jurisdictions, let the money stay with the road and the funding be distributed to whatever larger road agency maintains those roads and bridges.

All agencies should be required to meet performance criteria as a condition for receiving state transportation revenue. These best practices should ensure administrative cost-saving results from the state's requirement that employees pay 20 percent of their health care premiums and that new employees are placed on a defined contribution pension plan. In addition, transportation agencies should be required to meet a minimum number of best practices including development of an asset management plan for federal-aid highways and bridges, a safety plan, competitive bidding on contracts to any public or private sector organizations, fulfillment of consolidation plans and an internet dashboard on operating and financial statistics to improve accountability.

I ask the Legislature to make the changes to allow for consolidation among larger jurisdictions or counties that might want to make similar arrangements to reduce costs or improve their road maintenance.

To further improve the value received for taxpayer investment in transportation, I ask the Legislature to change the old transportation revenue act to allow open, competitive bidding for road maintenance and construction for all roads across the state. Opening the competition for road maintenance contracts to all

bidders, from the public sector or the private sector, will reduce costs. Open competition will also help ensure that the roads are appropriately and cost-effectively maintained, summer and winter.

I also want the Legislature to amend the act to allow audits by MDOT of local road agencies' spending as a condition of receiving state funds, something that's not allowed in law today.

III. Revenue Reforms

Roads and bridges are assets that are paid for by those who use them. Transportation agencies need to cover the cost to provide a service that every one of us uses every day. Yet transportation user fees have not gone up in nearly 15 years, and as a result, Michigan's transportation network is not sustainable. Underfunding roads and bridges creates a vicious cycle. Insufficient funding means not enough repairs can be made when they are needed. Without constant repairs, damage to private vehicles increases, personal safety is threatened, and the long-term cost of maintaining the network increases.

It would be easy to put this off, but it would not be the responsible thing for those who believe in a prosperous future for Michigan.

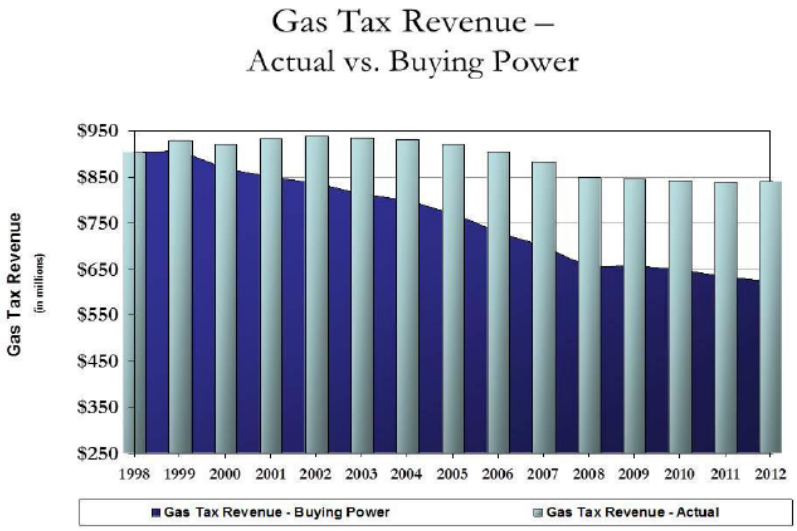
Many states rely on toll roads to supplement their state gas taxes, but the opportunity for constructing new toll roads in Michigan passed by long ago.

I also believe that we are not yet ready to consider the various pay-as-you-drive user fees employed in other parts of the world. While the technology is developing to implement a mileage-based user fee to replace our traditional transportation funding mechanisms, and while a handful of other states have investigated or even piloted those options, there are still too many questions to pursue such a dramatic change just yet.

However, there are a number of steps we can take now.

Funding for Roads and Bridges

Michigan's current system of raising revenue for roads and bridges relies on two principal sources of revenue – a registration fee for vehicles and a flat, per-gallon tax of 19 cents for gasoline and 15 cents for diesel fuel. The last time Michigan faced up to the need to maintain its current bridge and road infrastructure was 1997. The following chart lays out the decrease in buying power of our current system:



I am committed to maintaining a transportation system that enables our economy to grow in the years ahead. The simple truth is that our current gas tax is a 20th Century tax on a 19th Century resource. It cannot possibly meet the needs of the 21st Century. Therefore, I am proposing that Michigan now take the bold step of changing our system of taxing motor fuels.

I propose we eliminate the current gas tax on consumers.

It should be replaced with a uniform tax at the wholesale level on motor fuels. My proposal is to eliminate both the current 19 cents per gallon tax and the current 15-cent diesel tax for motor vehicles, and replace it with a percentage tax at the wholesale level that raises equivalent dollars. While this proposal is revenue neutral, it is a more viable long-term funding approach to maintaining roads and bridges. It will protect Michigan's purchasing power, and help assure over the long run that Michigan can meet the needs of state, county and local road maintenance without continually coming back to the legislature for increases.

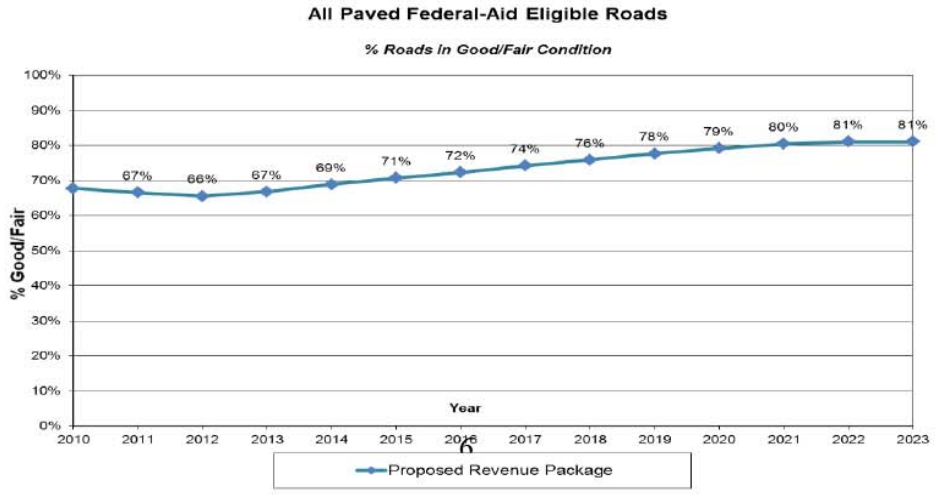
But taking that step alone does not solve Michigan's road and bridge maintenance problem. The simple truth is that if we are going to protect our past investments in our bridge and road infrastructure, more revenues are needed. That fact has been made clear over and over, including – most recently – in the 2008 report of the Transportation Funding Task Force and in a report this year of a bipartisan House Transportation Committee workgroup. The workgroup report identified the need for an additional $1.4 billion now to meet Michigan's road and bridge maintenance needs. It is hard to argue against their findings.

The longer we wait to address the problem, the bigger the bill we are handing to future citizens, manufacturers, and commercial businesses. Continued procrastination threatens Michigan's economic future. Those of us in elected office must face up to our responsibilities to that future by developing responsible, fiscally prudent policies that assure a bright future for Michigan companies and drivers.

Our goal should be to increase infrastructure investment by $1 to $1.4 billion each year. As one example, a state registration fee increase of an additional $10 per month on the average passenger vehicle would raise nearly $1 billion. In addition, a local or regional registration fee of $40 per year on the average vehicle would raise nearly $300 million.

I fully recognize that solving this decades-long challenge will not be easy, but I am convinced that starting the conversation and debate now is absolutely necessary for the future of our economy and our quality of life. I look forward to working with the legislature, our local communities and our citizens over the next several months to develop a plan and the political will to implement it.

The following chart illustrates how a $1 billion dollar investment would increase the condition of our federal-aid eligible roads:



Graph is based on the assumption that at least $1 billion of new revenue will be spent for capital projects on federal-aid eligible roads.

In addition to state needs, there are local roads, bridge and transit needs as well.

Presently, the largest source of funding for local roads is from state fuel taxes and registration fees. In Michigan, nearly two-thirds of local road funding comes from the state while the national average for state transfers is just 20 percent. In order to focus state funds on the roads that serve the most people and have the greatest economic impact, we must give local units of government the tools they need to support local roads and local economies.

Investment in local transportation infrastructure will help to grow local economies, but those investments need to be supported by revenue raised locally. In particular, investments to facilitate place-making infrastructure including public transit and improvement of local streets, bridges and sidewalks, can encourage new economic activity, increase property values, and create more attractive places to live, work and play.

In order to help local governments help themselves, we should create a law that allows counties and regional authorities to levy a local vehicle registration fee dedicated to transportation. Such a fee would take place only if approved by a vote of the local citizens and should not exceed an average cost of $40. It would be collected by the state and returned to the local agency.

One way to ensure that new revenue has the biggest impact is to invest it in the highways and bridges that are most highly used. That is why I propose we focus highway investment through a new distribution formula that links road investment to road use and to traffic. The highways and bridges that serve the most traffic should see the greatest new investment.

Likewise, highways and bridges that carry the largest amount of commercial traffic should get the largest share of funding from those users. Roads that are most critical to Michigan's economic future – roads that are important to shippers, or to a particular industry – will benefit most. Commercial carriers and truckers will see the results of their investment through the improvements on the highways they travel most.

Over the next 7 years, I propose we gradually subject all Act 51 distributions to the new formula, so that in 7 years all road funding is distributed by this new, more focused and efficient formula. This would include any new revenues beyond what is collected and spent today.

Working together, we have made great strides in reforming our tax system to encourage investment in our state, but if Michigan is going to grow, we need also to invest in the infrastructure that creates the network of commerce throughout our state, that connects us to the rest of the country, and that opens our state to the world.

IV. Bus and Rail Transit, Aviation and Ports

The Michigan constitution allows up to 10 percent of highway user fees to go to transit. That is appropriate, because transit systems reduce highway congestion by offering alternative ways to travel, particularly for those who do not own or cannot drive a car. New regional transit investments supported by a regional motor vehicle registration fee will allow funding for long-awaited transit improvements that will help jumpstart Michigan's urban areas and create jobs.

We must continue to support transit, particularly in large urban areas like metropolitan Detroit and Grand Rapids. Those vibrant urban areas are two examples of the state's economic engines and we need to make sure that they can continue to grow. Strong transit systems like The Rapid in Grand Rapids or The Ride in Ann Arbor demonstrate how transit can support a growing population, reduce traffic congestion and attract a young, tech-savvy generation to help revitalize urban centers.

Regional Transit Authority

Southeast Michigan is the largest metropolitan area in America that does not have a high capacity rapid transit service in place, or under development. Detroit metropolitan leaders have debated the development of a single transit authority to serve the 4.2 million residents of the region for decades, but have failed on every one of 23 documented attempts. Mayor Bing and I have worked with US Department of Transportation to form a task force including federal, state, city of Detroit and the counties of Wayne, Oakland, Macomb and Washtenaw to facilitate communication and achieve agreement to move forward on regional transit.

Continued failure is not an option.

Safe, reliable, and efficient transit can be the mobility backbone that supports the economic revival of Michigan's metropolitan areas by expanding labor markets for business and job opportunities for workers. Just like the highway system spurred economic development near interchanges and exits, transit oriented development will spur growth near stations and stops. Studies by the American Public Transportation Association conclude that every dollar invested in public transportation yields an average of four dollars of economic return.

I propose a new Regional Transit Authority for southeast Michigan, one with the teeth and the commitment to coordinate existing bus services and permanent, dedicated regional funding to invest in rapid transit. My proposal is for a new authority, free of legacy costs, which will establish rolling rapid transit along four critical routes including Gratiot, Woodward, Michigan Avenue and the M-59 corridor.

If three or more counties are willing to work together to form a regional transit authority, I propose that they be permitted to dedicate a portion of the regional registration fee I have proposed to support public transit. The approval should be subject to voter approval. A truly regional transit system will efficiently integrate services under one authority and help to revitalize regional identity and culture.

Finally, as we consider new revenue sources we must protect existing transit service, particularly in rural areas. I ask the Legislature as part of an overall effort to reform and adequately fund transportation to create a separate program within the Comprehensive Transportation Fund for new and expanded public transit services. That change will allow Michigan to see more modern transit systems developed, but not at the expense of existing service in other areas. I also want to encourage the consolidation of transit agencies and require that they achieve best practices similar to those required of road agencies as a condition of new and expanded funding.

Rail

Michigan currently invests about $16 million per year in rail programs, including funds for operation, grade crossing improvements, economic development programs and management of 540 miles of state-owned rail lines. With the completion of Michigan's State Rail Plan, required by federal law, the state is now in position to receive additional federal funds.

Rail investment and enhancement will mean that goods can move faster, cheaper, and more reliably, benefiting business productivity and helping create more jobs. In Michigan, railroads are critical to the success of agricultural production, whether they're hauling inbound fertilizer or outbound grain. Freight rail is not a luxury for the agriculture and agri-business industries – it is a necessity. I am directing the Departments of Transportation and Agriculture & Rural Development to coordinate with the food and agriculture industry to ensure their infrastructure needs are included in economic expansion opportunities.

There are a number of high-value rail freight projects ready and waiting to be implemented. The Detroit Intermodal Freight Terminal project is a public-private partnership that needs additional investment to become reality. The Detroit Railroad Tunnel expansion is a private sector project that is also ready to begin. Both projects will help increase the potential for rail shipping in Michigan, which will help remove

trucks from our freeways and reduce costly highway congestion, degradation, and pollution. These stand-alone projects could go forward at any time, but implementing them in combination with the New International Trade Crossing will accelerate Michigan's development as a center of global trade.

Over the past two decades, Michigan has made more than $100 million in incremental investment to improve grade crossings, signals and rail equipment. That relatively small but relentless positive action has paid off in a big way, laying the groundwork and encouraging additional investment that will pay off in an even bigger way in the future, by encouraging development, attracting businesses, and creating jobs.

In addition, there is significant federal support and momentum for the development of accelerated passenger rail service today, and Michigan has already benefitted from that. Provided additional federal funds continue to be available, Michigan will work to develop and support accelerated passenger rail service from Pontiac and Detroit to Chicago, and to initiate Ann Arbor to Detroit and Ann Arbor to Howell commuter rail service.

Thanks to the swift action of the legislature, Michigan has already successfully garnered $440 million in federal rail funds. This money will be used to improve train stations, acquire trains and accelerate rail speeds from Pontiac and Detroit to Chicago. Some of the money will be used to acquire and improve a deteriorating segment of the corridor between Kalamazoo and Dearborn where speeds have actually had to be decreased because of the poor condition of the infrastructure.

Airports

Aviation provides a truly global transportation network, making it essential for global business and tourism. We need to invest to preserve the safety and efficiency of our airports, particularly those that serve as a gateway for national and international visitors to our state. Airports are important economic generators, with passenger and freight activity reflecting the major economic activity of the community.

Michigan moves 520 million pounds of high-value cargo by air annually, and 36 million passengers pass through Michigan's airports each year. Households, businesses and government spend some $7 billion annually on aviation and aviation-related services. Local airports are strong economic engines for our communities, both as freight ports and as facilitators for entrepreneurs involved in airport businesses, repairs, fixed-base operators that deliver fuel and services, and the general vitality of the community.

Ports

We can make better use of Michigan's ports by ensuring continued investment in those vital transportation systems. The Great Lakes moves about 150 million tons of cargo each year, with more than a third of that – with a value of over $5 billion – handled at Michigan ports. They provide a vital service, particularly for the timber and mining industries in the Upper Peninsula. Michigan's vast water resources are unique, and the Great Lakes shipping corridor provides a significant and easily undervalued transportation option.

There are opportunities at the national level that I will continue to pursue to improve Michigan's ports. The national Harbor Maintenance Trust Fund currently has a $5 billion surplus that can be spent for port dredging. I intend to work with Michigan's Congressional delegation to make sure that some of those funds are spent to dredge ports in Michigan to maintain their productivity and their value to shippers. Unless those federal funds are used for their intended purpose, there are several ports in Michigan that may cease to function.

The Soo Locks help make Great Lakes shipping opportunities possible. A new lock has been authorized by Congress, providing redundancy for the existing locks and enhancing the reliability of the whole system. Over the past few years the Army Corps of Engineers has completed work to dredge and deepen the approach to the potential new lock, as well as work to construct two coffer dams, a first step that will allow the old lock to be drained and construction of a new lock to begin. Construction of this new lock is vital to ensure the continued viability of Great Lakes shipping for the 1000' freighters that make up

two-thirds of the Great Lakes shipping fleet. As importantly, this construction project will create thousands of jobs in the eastern Upper Peninsula over the life of the project.

I ask you to join me in urging our congressional delegation, and those of the Great Lakes region, to recognize the importance of this project to provide the funding essential to build this new lock and ensure the economic vitality of the region.

International Trade

Michigan needs a smarter and more strategic approach to investing in our infrastructure, and it starts with a bold vision to become a global trade center and logistics hub.

Our location between Chicago to the west, Toledo to the south, and Toronto and Montreal to the northeast puts Michigan squarely in the center of a global economic corridor. By any measure, the strength of the Chicago – Detroit – Toronto mega region compares favorably with any other region in North America. Innovative and collaborative agreements like the Detroit Region Aerotropolis contribute to the vision of establishing the region as an international shipping and logistics hub by streamlining permitting processes and creating a welcoming business climate. We have a deep pool of talented workers, plenty of usable land, and an abundance of natural resources that can be leveraged to help any industry flourish – provided we have the transportation systems to get products to the international marketplace.

We already have some of the busiest border crossings in North America. Detroit is the busiest crossing on the northern border and the busiest commercial crossing in North America. Today, it is also the biggest bottleneck in the entire Pan-American freeway system.

With more than 8,000 trucks crossing the Detroit border on a daily basis, 99 percent of the truck traffic crosses a narrow, 83-year-old bridge that has no direct freeway-to-freeway connection. The continual congestion at the old bridge clearly demonstrates the need for more capacity at the border.

Last spring, I joined every living governor of Michigan (democrat and republican), nearly every job provider, and almost every private labor organization in urging the completion of the New International Trade Crossing (NITC). It will provide a modern and direct freeway-to-freeway connection to speed international trade. With the commitment of $550 million from the Canadian government, the NITC will be completely paid for by the U.S. and Canadian governments and private investors. The NITC will be built, financed and eventually managed by private businesses through a public/private partnership, with Michigan and Canada still owning this valuable infrastructure. This allows Michigan to better position itself as a worldwide leader in foreign trade without assuming any risk or financial obligation.

Reinventing Michigan to become a center of global trade requires developing an infrastructure that will meet the modern day demands of the international economy. The New International Trade Crossing is a unique opportunity for Michigan that will expand our economy, support new trade, create new jobs and provide additional funds for our roads without costing Michigan taxpayers anything. The longer we delay in passing this proposal, the longer we deny Michigan citizens the opportunity to work.

The people of Michigan are counting on us to put them back to work. This bridge provides an unprecedented opportunity to do that. We must take this bold step forward to greater prosperity. This project is too important for Michigan's future to ignore any longer, so let us get it done.

V. Sewer and Water

Michigan's water and sewer systems are vital to our economic prosperity. These systems support businesses and manufacturing while also providing a quality of life for their workers. These infrastructure systems also service us by protecting our greatest natural asset, unique to Michigan in the world:

abundant freshwater. The economic and environmental value of our water assets will only increase with time, serving our children and grandchildren in ways we have yet to imagine.

While we have made enormous progress over the last few decades there are still too many sewer overflows and beach closings in parts of our state. Last year, 20 percent of our monitored beaches experienced a closing or had an unsafe advisory. And over 7 billion gallons of raw sewage was discharged into our waterways. We must do better to reverse this trend.

It is easy to forget or ignore the unseen, massive network of water and sewer infrastructure humming along below our feet. That infrastructure is rapidly aging, much of it nearing or past its useful life.

We usually hear about these systems when they fail. Yet we know that reliable, quality infrastructure is a fundamental building block of Michigan's economic prosperity. Clean, safe water and beaches are the face of Pure Michigan. Michigan, with its abundant lakes, streams, wetlands and Great Lakes beaches, should be a leader and must act to protect this asset and use it to our economic and environmental advantage.

As we look to protect and restore our aging infrastructure, the good news is that new and innovative techniques have been developed to help us keep our water clean and make our businesses and communities more desirable. Cities around the country are putting sustainable infrastructure measures in place to improve performance of their wastewater systems and improve water quality, as well as to beautify their neighborhoods and places of work.

State government needs to be a part of this team effort. I will direct the appropriate state agencies to consider implementation of green infrastructure options to protect water quality in project design, project construction, and at new development and redevelopment sites. State agencies will also be directed to cooperate and collaborate with local communities to plan for sustainable infrastructure solutions to communitywide water management and protection.

Michigan voters have already asked us to do more. In 2002, voters directed the state to invest $1 billion in projects to protect water quality through the sale of bonds. Working together, the State Revolving Fund Advisory group with representation from business, environmental groups, local government, regions and state government recently provided the administration and the legislature with a series of recommendations for future investment of the remaining voter-approved funds. That blueprint focuses on saving taxpayer money by incentivizing investment in asset management through a grant program. It also calls for the state to develop a streamlined program to continue investing in fixing some of our most chronic problems through a low interest loan program.

As recommended by the advisory group, I support changes in future investment of these bond dollars in order to:

- Create a grant program that emphasizes reducing long term costs by investing in asset management and storm water programs that produce cleaner water in our lakes and rivers
- Create a new state low interest loan program to increase the pace of investment in projects that improve and protect water quality
- Streamlining the federally funded, state operated, low interest loan program so that it easier for communities to access these funds for projects that improve water quality

These steps are the first of several steps I will be taking to ensure the protection of our lakes, rivers and streams. I will provide a special message to the legislature in the spring dealing with environmental and energy issues.

Removal of Dams

There are nearly 2,600 dams around the state. Most of these were built by private owners decades ago for power, milling, and recreation. The American Society of Civil Engineers recently gave Michigan a "D"

in its 2009 Dam Infrastructure report card, stating, "Over 90 percent of Michigan's dams will reach or exceed their design life by 2020. Many dams are abandoned, no longer serve any useful purpose, and pose safety hazards to downstream residents."

In Michigan, 74 percent of dams are privately owned. Repairs often exceed six figures. Removal can cost millions of dollars. Most private owners cannot afford fixes or removals.

I have directed the Michigan Department of Environmental Quality working with the Departments of Natural Resources, Agriculture and Transportation to identify, prioritize and streamline efforts to remove problem dams.

VI. Broadband

From government and schools to hospitals and private industry, our cyber networks are integral to Michigan's infrastructure, economic growth and quality of life.

Michigan has long-served as a conduit for speedy transport of goods via our great lakes, and the same can be true today for the transport of information along high-speed broadband. This kind of connectivity enables our government to step up our service levels and efficiency, our schools to expand their curriculums and research capabilities, our health industry to engage with patients remotely and our businesses to serve customers around the world.

Use of high-speed broadband at home is also a game-changer for our citizens, but only 67% of Michigan households choose to have a broadband connection in the home. I want the state to work with private sector broadband providers to help close that digital divide with better coordination, shared resources, more training, and greater investment, particularly to provide the "last-mile" connection in rural Michigan.

There are a number of efforts already underway, including:

- Michigan is maximizing more than $247 million in federal broadband investments to bridge the urban-rural divide. In cooperation with Merit Network and other Michigan-based private providers, 2,287 miles of fiber-optic infrastructure are being added to serve businesses and households and to interconnect government institutions. This includes a unique agreement to make the Mackinac Bridge part of the fiber-optic network, meaning the state's signature icon which linked our two great peninsulas in the 20th Century, will provide a 21st Century connection as well. Michigan's public sector broadband network is interconnecting with the state's local units of government and school districts to avoid duplication.
- We are working to open the state's 180 Michigan Public Safety Communications System (MPSCS) towers for use by Internet Service Providers (ISPs) to expand existing infrastructure and further expedite last-mile broadband availability. I urge the legislature to consider use of the system by ISPs, which is currently restricted by the Michigan Public Safety Communications System Act.
- We will streamline the broadband build-out process by establishing a one-stop shop for approving all utility work permit clearances within state road rights-of-way. The state with the least bureaucracy will win in the long-run in this arena. Let's make it easy for our partners to help us get there.

Michigan is in the middle of the pack nationally with regard to availability and use of broadband, yet the expansion, integration and adoption of broadband is essential to achieving our reinvention goals: jobs, better government, education, health and wellness. With new investment and a unified vision we can support a talented and engaged workforce, accelerate partnerships across and beyond government, and drive innovation and technology to reinvent Michigan.

VII. Conclusion

To be sure, the steps proposed here demand a new way of thinking. The proposals represent the kinds of innovative changes Michigan voters embraced when I was elected nearly a year ago.

I asked then for each of us to think about how we can help reinvent the state. Reinvention means reinvestment from us, the citizens of Michigan, in the infrastructure that allows us to work, play and live in our beautiful state.

We cannot reinvent our state without first shoring up its foundation. Whether traveling by foot, bicycle, car, truck, plane, train or bus, you deserve safe and unencumbered sidewalks, roads and rails.

The same innovative thinking will be vital as we seek to rebuild our aging sewer systems and ensure safe drinking water to our citizens.

Equally important is our goal to provide broadband Internet access to the vast rural areas in our geographically diverse state.

Each of these are fundamental priorities. We owe this to ourselves and our posterity.

There is no time to waste.

APPENDIX C:

STATE TRUNKLINE HIGHWAY SYSTEM (EXCERPT)
Act 51 of 1951

As Amended by Act No. 199 Public Acts of 2007

247.659a Definitions; transportation asset management council; creation; charge; membership; appointments; staff and technical assistance; requirements and procedures; technical advisory panel; multiyear program; funding; records on road and bridge work performed and funds expended; report.

Sec. 9a. (1) As used in this section:

(a) "Asset management" means an ongoing process of maintaining, upgrading, and operating physical assets cost-effectively, based on a continuous physical inventory and condition assessment.

(b) "Bridge" means a structure including supports erected over a depression or an obstruction, such as water, a highway, or a railway, for the purposes of carrying traffic or other moving loads, and having an opening measuring along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes where the clear distance between openings is less than 1/2 of the smaller contiguous opening.

(c) "Central storage data agency" means that agency or office chosen by the council where the data collected is stored and maintained.

(d) "Council" means the transportation asset management council created by this section.

(e) "County road commission" means the board of county road commissioners elected or appointed pursuant to section 6 of chapter IV of 1909 PA 283, MCL 224.6, or, in the case of a charter county with a population of 2,000,000 or more with an elected county executive that does not have a board of county road commissioners, the county executive for ministerial functions and the county commission provided for in section 14(1)(d) of 1966 PA 293, MCL 45.514, for legislative functions.

(f) "Department" means the state transportation department.

(g) "Federal-aid eligible" means any public road or bridge that is eligible for federal aid to be spent for the construction, repair, or maintenance of that road or bridge.

(h) "Local road agency" means a county road commission or designated county road agency or city or village that is responsible for the construction or maintenance of public roads within the state under this act.

(i) "Multiyear program" means a compilation of road and bridge projects anticipated to be contracted for by the department or a local road agency during a 3-year period.

The multiyear program shall include a listing of each project to be funded in whole or in part with state or federal funds.

(j) "State planning and development regions" means those agencies required by section 134(b) of title 23 of the United States Code, 23 USC 134, and those agencies established by Executive Directive 1968-1.

(2) In order to provide a coordinated, unified effort by the various roadway agencies within the state, the transportation asset management council is hereby created within the state transportation commission and is charged with advising the commission on a statewide asset management strategy and the processes and necessary tools needed to implement such a strategy beginning with the federal-aid eligible highway system, and once completed, continuing on with the county road and municipal systems, in a cost-effective, efficient manner. Nothing in this section shall prohibit a local road agency from using an asset management process on its non-federal-aid eligible system. The council shall consist of 10 voting members appointed by the state transportation commission. The council shall include 2 members from the county road association of Michigan, 2 members from the Michigan municipal league, 2 members from the state planning and development regions, 1 member from the Michigan townships association, 1 member from the Michigan association of counties, and 2 members from the department. Nonvoting members shall include 1 person from the agency or office selected as the location for central data storage. Each agency with voting rights shall submit a list of 2 nominees to the state transportation commission from which the appointments shall be made. The Michigan townships association shall submit 1 name, and the Michigan association of counties shall submit 1 name. Names shall be submitted within 30 days after the effective date of the 2002 amendatory act that amended this section. The state transportation commission shall make the appointments within 30 days after receipt of the lists.

(3) The positions for the department shall be permanent. The position of the central data storage agency shall be nonvoting and shall be for as long as the agency continues to serve as the data storage repository. The member from the Michigan association of counties shall be initially appointed for 2 years. The member from the Michigan townships association shall be initially appointed for 3 years. Of the members first appointed from the county road association of Michigan, the Michigan municipal league, and the state planning and development regions, 1 member of each group shall be appointed for 2 years and 1 member of each group shall be appointed for 3 years. At the end of the initial appointment, all terms shall be for 3 years. The chairperson shall be selected from among the voting members of the council.

(4) The department shall provide qualified administrative staff and the state planning and development regions shall provide qualified technical assistance to the council.

(5) The council shall develop and present to the state transportation commission for approval within 90 days after the date of the first meeting such procedures and requirements as are necessary for the administration of the asset management process. This shall, at a minimum, include the areas of training, data storage and collection, reporting, development of a multiyear program, budgeting and funding, and other issues related to asset management that may arise from time to time. All quality

control standards and protocols shall, at a minimum, be consistent with any existing federal requirements and regulations and existing government accounting standards.

(6) The council may appoint a technical advisory panel whose members shall be representatives from the transportation construction associations and related transportation road interests. The asset management council shall select members to the technical advisory panel from names submitted by the transportation construction associations and related transportation road interests. The technical advisory panel members shall be appointed for 3 years. The asset management council shall determine the research issues and assign projects to the technical advisory panel to assist in the development of statewide policies. The technical advisory panel's recommendations shall be advisory only and not binding on the asset management council.

(7) The department, each county road commission, and each city and village of this state shall annually submit a report to the transportation asset management council. This report shall include a multiyear program developed through the asset management process described in this section. Projects contained in the department's annual multiyear program shall be consistent with the department's asset management process and shall be reported consistent with categories established by the transportation asset management council. Projects contained in the annual multiyear program of each local road agency shall be consistent with the asset management process of each local road agency and shall be reported consistent with categories established by the transportation asset management council.

(8) Funding necessary to support the activities described in this section shall be provided by an annual appropriation from the Michigan transportation fund to the state transportation commission.

(9) The department and each local road agency shall keep accurate and uniform records on all road and bridge work performed and funds expended for the purposes of this section, according to the procedures developed by the council. Each local road agency and the department shall annually report to the council the mileage and condition of the road and bridge system under their jurisdiction and the receipts and disbursements of road and street funds in the manner prescribed by the council, which shall be consistent with any current accounting procedures. An annual report shall be prepared by the staff assigned to the council regarding the results of activities conducted during the preceding year and the expenditure of funds related to the processes and activities identified by the council. The report shall also include an overview of the activities identified for the succeeding year. The council shall submit this report to the state transportation commission, the legislature, and the transportation committees of the house and senate by May 2 of each year.

APPENDIX D

TRANSPORTATION ASSET MANAGEMENT COUNCIL MEMBERS

Carmine Palombo, Chair – Michigan Transportation Planners Association: Carmine is the Director of Transportation Programs for the Southeast Michigan Council of Governments. He is in his fourth term on the Council and has served as the Chair since the Council's first meeting in October 2002.

Bob D. Slattery, Jr., Vice-Chair – Michigan Municipal League: Bob the former Mayor of the City of Mt. Morris and lifetime member of MML. Bob is in his third term on the Council.

Spencer Nebel – Michigan Municipal League: Spencer is the City Manager for Sault Ste. Marie. He has been in that position since 1992. Spencer is in his third term on the Council.

William McEntee – County Road Association of Michigan: Bill recently retired as Director of the Permits & Environmental Concerns of the Road Commission for Oakland County. He served in that position since 1992. Bill is in his third and final term on the Council.

Steve Warren – County Road Association of Michigan: Steve is the Deputy Director of the Kent County Road Commission. He has served in that position since 1988. Steve is in his fifth term on the Council.

Roger Safford - Michigan Department of Transportation: Roger is the Engineer for the MDOT Grand Region. Roger is in his first term on the Council.

Dave Wresinski – Michigan Department of Transportation: Dave is Director of MDOT's Bureau of Transportation Planning. Dave is in his first term on the Council.

Don Disselkoen – Michigan Association of Counties: Don currently serves on the Ottawa County Board of Commissioners and represents the 8th district of Ottawa County, which is most of the city of Holland. Don is in his third term on the Council.

John Egelhaaf – Michigan Association of Regions: John has served as the Executive Director of the Southwest Michigan Planning Commission (SWMPC) since 2003. John is in his first term on the Council.

Jennifer Tubbs – Michigan Townships Association: Jennifer is the Manager of the Charter Township of Watertown. Jennifer is in her first term on the council.

Rob Surber: Rob is the Deputy Director of the Center for Shared Solutions (CSS), formally the Center for Geographic Information (CGI). The Center serves as the Council's data storage agency and is a non-voting member. Rob has been a member of the council since 2004.

For full bio and contact information, please visit Council's website: www.michigan.gov/tamc

APPENDIX E

STATE TRANSORTATION COMMISSION & MEMBERS

The State Transportation Commission is the policy-making body for all state transportation programs. It is comprised of six members appointed by the Governor with the advice and consent of the State Senate. Commissioners serve three-year terms, staggered so that the terms of two commissioners expire each year. No more than three Commissioners are from the same political party as required by the State Constitution.

The Commission establishes policy for the Michigan Department of Transportation in relation to transportation programs and facilities and other such works as related to transportation development, as provided by law. Responsibilities of the Commission include the development and implementation of comprehensive transportation plans for the entire state, including aeronautics, bus and rail transit, providing professional and technical assistance, and overseeing the administration of state and federal funds allocated for these programs.

The Office of Commission Audit reports directly to the Commission. The Office of Commission Audit is charged with the overall responsibility to supervise and conduct auditing activities for the Michigan Department of Transportation. The Auditor submits to the Commission reports of financial and operational audits and investigations performed by staff for acceptance. For more information on Commission, please visit MDOT's website: www.michigan.gov/mdot

COMMISSION MEMBERS:

Jerrold M. Jung, Chairman – Birmingham; Appointed on September 2, 2007 and reappointed in March 2010. His current term will expire on December 21, 2012.

Todd Wyett, Vice Chairman – Charlevoix and Bloomfield Township; Appointed on December 21, 2010. His current term will expire on December 21, 2013.

Linda Miller Atkinson, Commissioner – Channing; Appointed on March 18, 2004 and Reappointed on March 5, 2010. Her current term will expire on December 21, 2012.

Charles F. Moser, Commissioner – Drummond Island; Appointed on December 21, 2010. His current term will expire on December 21, 2013.

Michael D. Hayes, Commissioner – Midland; Appointed on December 28, 2011. His current term will expire on December 21, 2014.

Sharon Rothwell, Commissioner – Ann Arbor; Appointed on December 28, 2011. Her current term will expire on December 21, 2014.

For more information on the Commission, please visit MDOT's website: www.michigan.gov/mdot

APPENDIX F

DEFINITION OF TERMS

Asset Management: as defined in Michigan is "an ongoing process of maintaining, upgrading and operating physical assets cost-effectively, based on a continuous, physical inventory and condition assessment." [MCL 247.659(a)]

Bridge Replacement: Removing the old bridge and constructing a new bridge at the same location.

Bridge Recondition or Repair: All types of major repairs including the replacement of the deck.

Capital Preventive Maintenance: Capital preventive maintenance means a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserve assets by retarding deterioration and maintaining functional condition without increasing structural capacity. Work activities and actions that are included as a capital preventive maintenance activity are those that extend the life of the asset, but do not change the original design, function, or purpose of the asset; the primary purpose of the work is to repair the incremental effects of weather, age, and use; the useful service life or benefits extend beyond the next fiscal year; and the work may restore some structural capacity of the road but, it does not substantially increase the loading allowed.

Construction: Construction is the building of a new road, street or bridge on a new location, and the addition of lanes to increase the capacity for through traffic. It is the improving of an existing road or street by correcting the grade, drainage structures, width, alignment, or surface. It is the building of bridges or grade separations, and the repair of such structures by strengthening, widening, and the replacement of piers and abutments. It is the initial signing of newly constructed roads or streets, major resigning of projects, and the installation, replacement, or improvement of traffic signals.

Heavy Maintenance: The improving of an existing road or street by correcting the grades, drainage structures, width, alignment, surface, and the hard surfacing of gravel roads. It also includes the rebuilding of existing bridges or grade separations, and the repair of such structures by strengthening, and the replacement of piers and abutments.

Maintenance: According to Act 51, "maintenance" means routine maintenance or preventive maintenance, or both. Maintenance does not include capital preventive treatments, resurfacing, reconstruction, restoration, rehabilitation, safety projects, widening of less than one-lane width, adding auxiliary turn lanes of one-half mile or less, adding auxiliary weaving, climbing, or speed-change lanes, modernizing intersections, or the upgrading of aggregate surface roads to hard surface roads.

Pavement Surface Evaluation and Rating (PASER): is a visual survey of the condition of the surface of the road. It rates the condition of various types of pavement distress on a scale of 1-10. It is based on a system of pavement evaluation developed in Wisconsin and is used by most road agencies in the state.

Reconstruction: Any construction where the road is totally reconstructed by reditching, new subgrade, subbase, and surface at the same location.

Resurfacing: Resurfacing pavements with minor base repair, minor widening, and resurfacing the existing width. This would include any double or triple seal coating.

Routine Maintenance: Routine maintenance includes actions performed on a regular or controllable basis or in response to uncontrollable events upon a roadway. Work activities or actions considered to be routine maintenance are those where the benefit or effective service life of the work does not last beyond the next fiscal year; the work would not significantly change the surface rating of the road; or the work would rarely require acquisition of right-of-way or site specific design.

Structural Improvement: Structural improvement includes any activity that is undertaken to preserve or improve the structural integrity of an existing roadway. The structural improvement category includes those work activities where the safety or structural elements of the road are improved to satisfy current design requirements. Structural improvement does not include new construction on a new location of a roadway; a project that increases the capacity of a facility to accommodate that part of traffic having neither an origin nor destination within the local area; widening of a lane width or more; or adding turn lanes of more than one-half mile in length.

Structurally Deficient Bridge: Federal guidelines classify bridges as *structurally deficient* if at least one of three key bridge components (deck, superstructure, or substructure) is rated in poor condition. This means that qualified engineers have determined that the bridge requires significant maintenance, rehabilitation or replacement. A structurally deficient bridge may need to have heavy vehicle traffic restricted or eventually be closed until necessary repairs can be completed.

Vehicle Miles Traveled (VMT): The total number of miles driven by all vehicles in Michigan during any given year. VMT can also be shown for any segment of road (total number of miles driven by all vehicles on the segment during any given year), or by geographic area (such as the total number of miles driven by all vehicles in a county during any given year.

APPENDIX G

Cost of Returning Roads to Their 2004 Condition

Condition		2004 Non-Freeway	2004 Freeway	2011 Non-Freeway	2011 Freeway
Fair	Percent	**65.0%**	**61.0%**	**44.9%**	**50.3%**
	Lane Miles	53,844	6,122	33,465	5,039
	CPM %	100%	100%	100%	100%
	CPM cost/ln.mi.	$28,000	$42,000	$43,981	$66,600
	Total Need in Fair Cond.	$1,507,632,000	$257,124,000	$1,471,809,642	$335,585,292
Poor	Percent	**10.8%**	**6.4%**	**38.2%**	**10.0%**
	Lane Miles	8,915	646	28,442	1,005
	Rehabilitation %	70%	70%	70%	70%
	Rehab. cost/ ln.mi.	$100,000	$335,000	$190,012	$643,000
	Rehab. Sub Total	$624,050,000	$151,487,000	$3,782,955,666	$452,171,082
	Reconstruction %	30%	30%	30%	30%
	Reconst. cost/ln.mi	$360,000	$930,000	$590,102	$1,456,000
	Reconst. Sub Total	$962,820,000	$180,234,000	$5,035,020,240	$438,809,883
	Total Need in Poor Cond.	$1,586,870,000	$331,721,000	$8,817,975,907	$890,980,965
	Total Fair and Poor Cond.	$3,094,502,000	$588,845,000	$10,289,785,548	$1,226,566,257
	Grand Total	$3,683,347,000		$11,516,351,805	

Reduction in Asset Value 2004 to 2011 **$7,833,004,805**