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

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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%

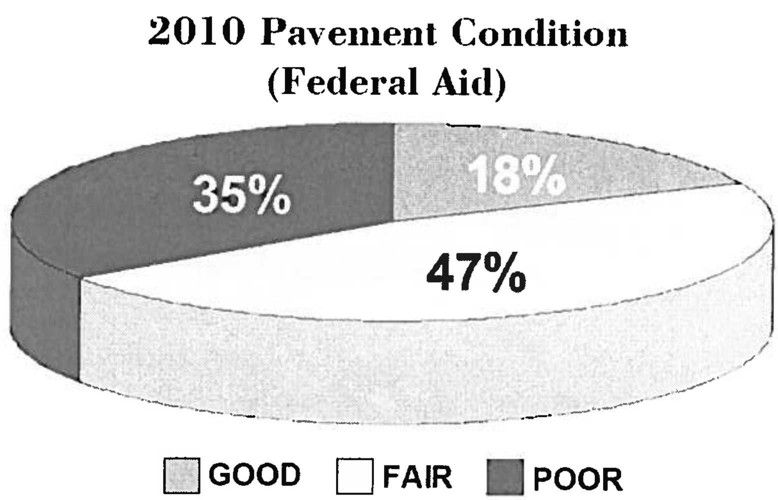
The amount of work that the model assumed could be done in some road segments and in some years was limited by the maximum percentage of roads that could be worked on without causing excessive congestion caused by road construction.

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.



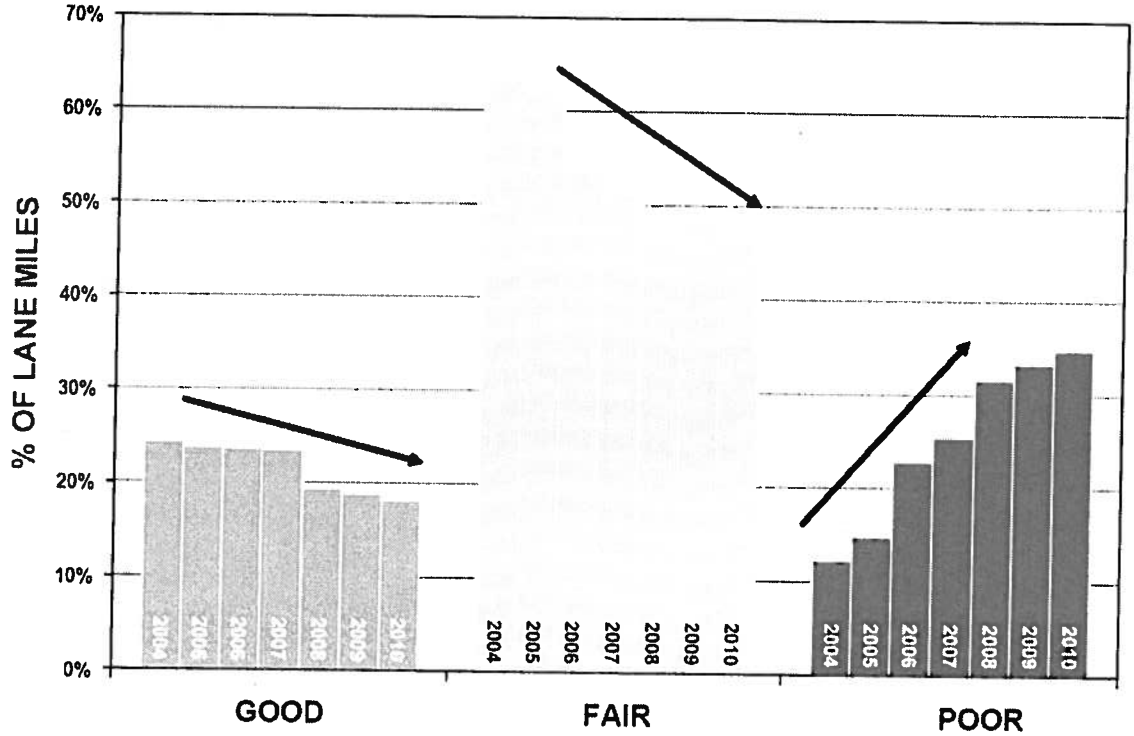
Source: TAMC 2010 PASER Data Collection
Figure 1

"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".

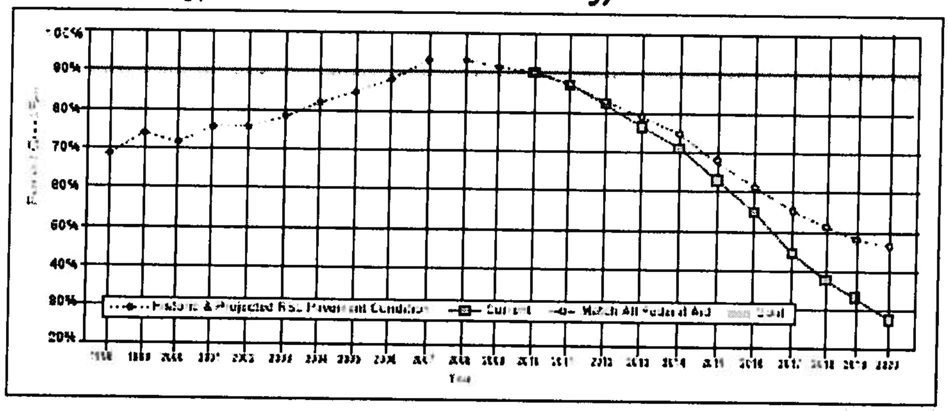
Roads eligible for federal aid have seen a significant increase since 2004 in the percentage that are rated "poor".

2004 - 2010 Pavement Condition
Federal-Aid Eligible Roads



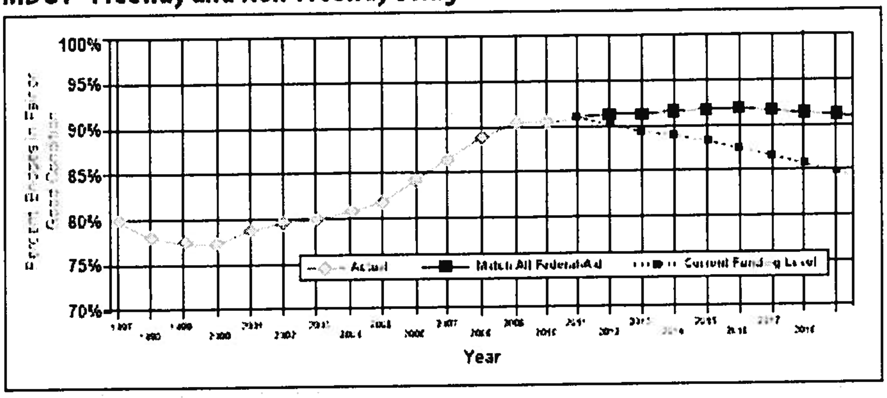
The bad news is that even with all federal gas tax matched so that we don't lose any, the condition of the roads is projected to significantly decline.

Historic and Projected RSL Pavement Condition
Current Strategy vs. Match All Federal Aid Strategy



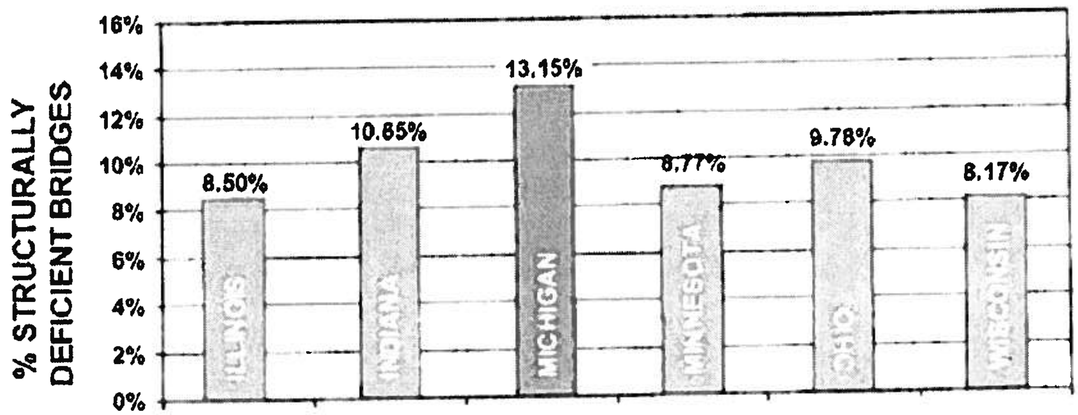
The prospects for bridge condition are much more favorable, despite the challenges of a number of bridges that need attention.

Bridge Condition Forcast System
MDOT - Freeway and Non-Freeway Bridges



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

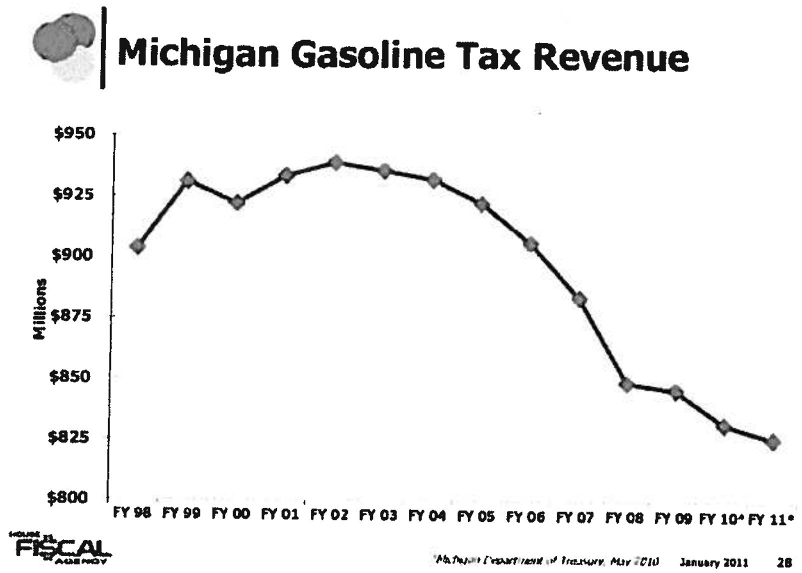
2010 Percent Structurally Deficient Bridges
All Roadway Bridges (Great Lakes States)

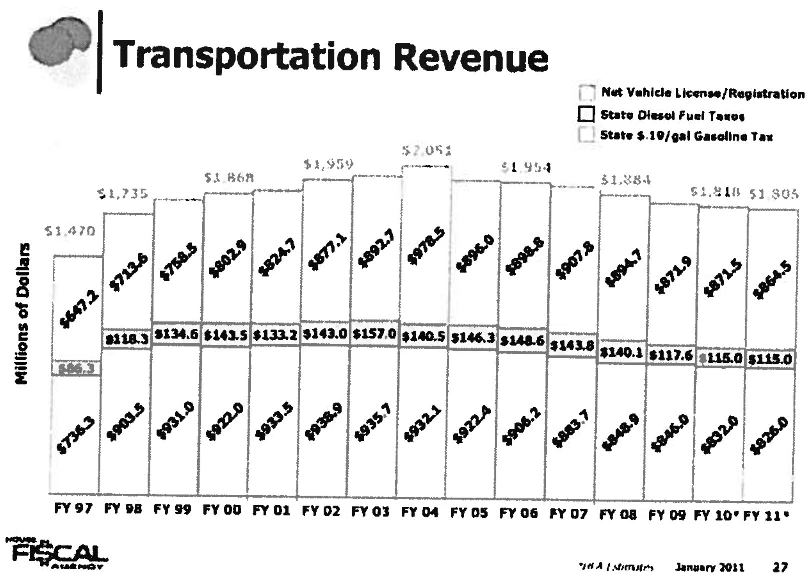


Source: MDOT April 2011
Figure 2

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.





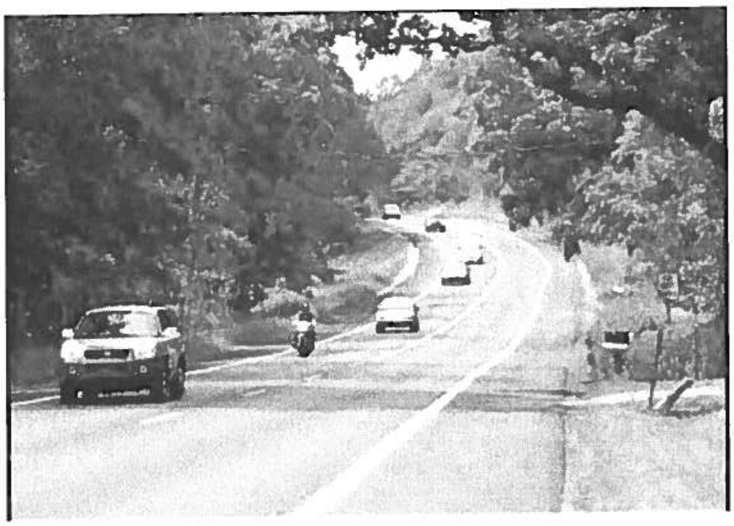
Background Information on Road Condition Rating and Prescribing Appropriate Fixes.

"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:

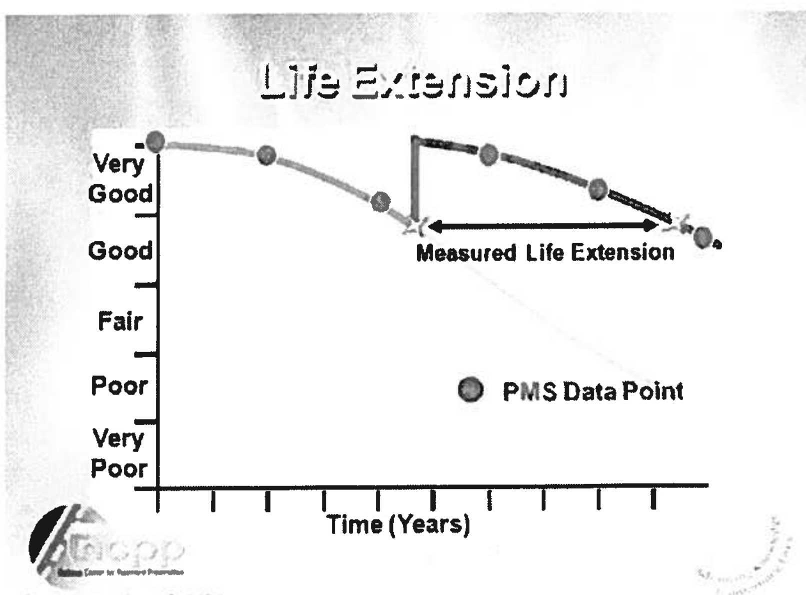
- Strategies to relieve congestion
- Reactions to address safety needs based on accident analysis
- Additions to paved roads or increased attention to gravel roads
- Local & State road agency equipment needs
- Transit: light rail, bus systems

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.)

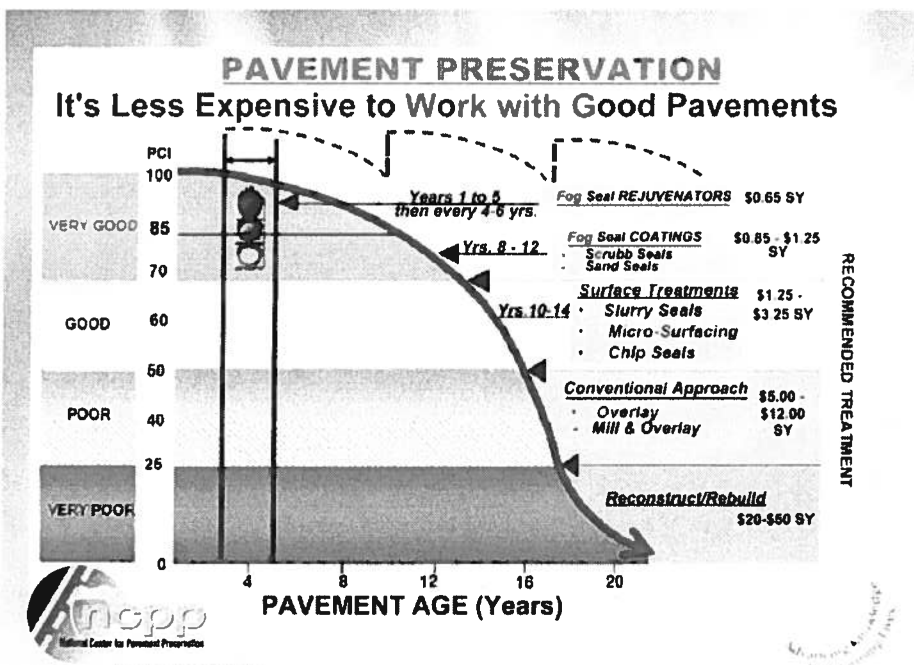


Typical Life Extensions
(Years)

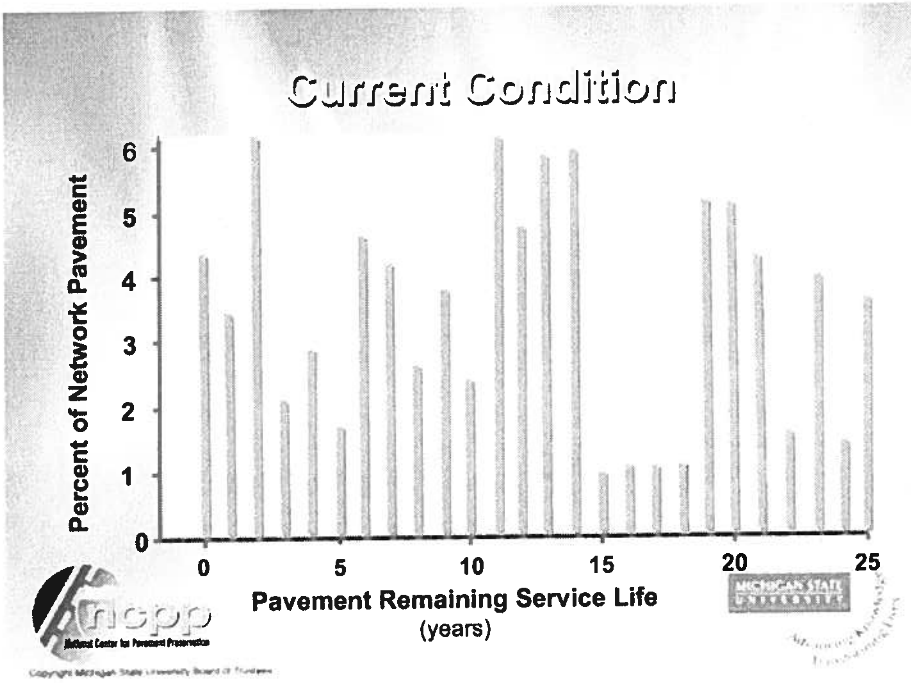
Treatment	Good Condition (PCI=80)	Fair Condition (PCI=60)	Poor Condition (PCI=40)
Crack Fill	1 - 3	0 - 2	0
Crack Seal	1 - 5	0 - 3	0
Fog Seal	1 - 3	0 - 1	0
Chip Seal	4 - 10	3 - 5	0 - 3
Micro-Surfacing	4 – 8	3 - 5	1 - 4
Thin HMA	4 - 10	3 - 7	2 - 4

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

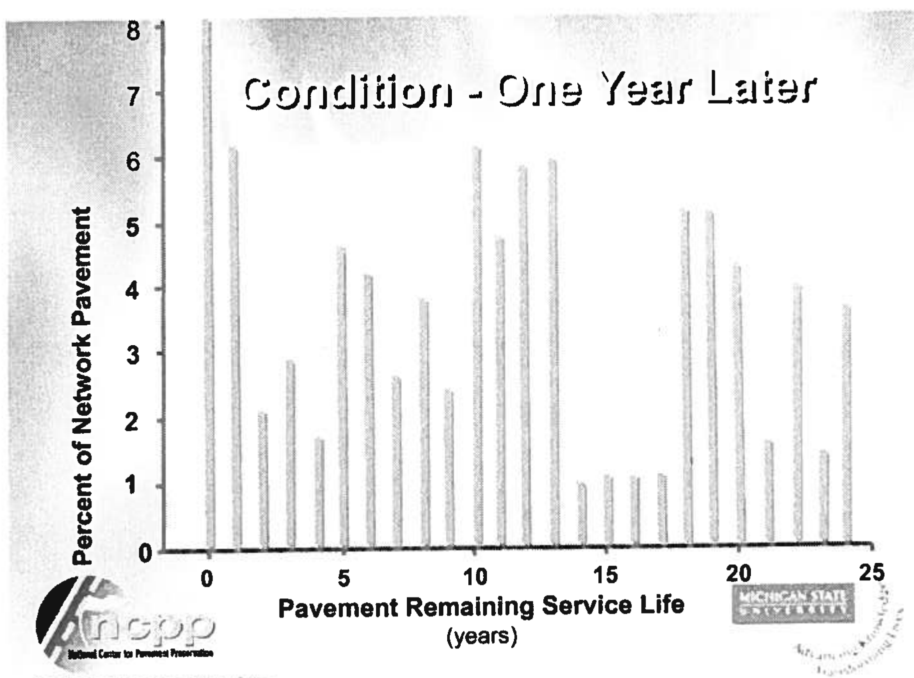
The asset management concept emphasizes that it is less expensive to maintain good pavements over the long-term than allow the pavements to deteriorate to the point of requiring more expensive "fixes", including reconstruction.



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	Per Lane Mile 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	Per Lane Mile 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.

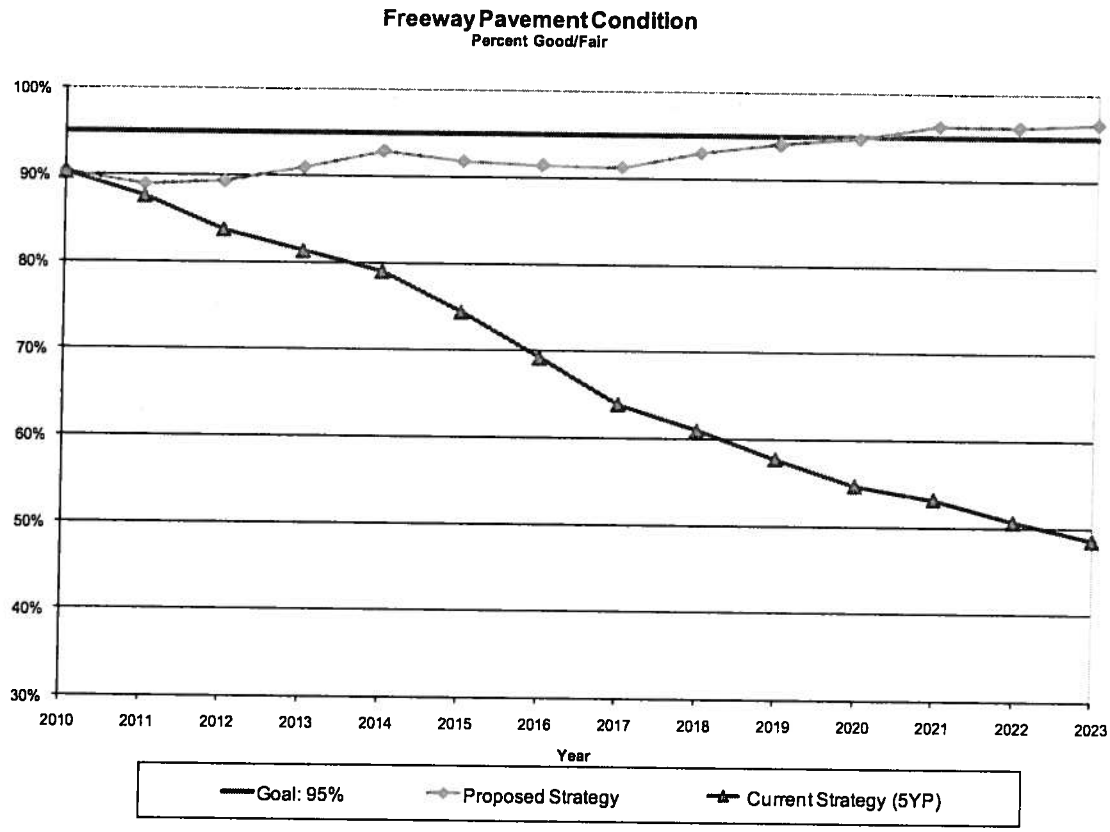
Additional Funding Suggested by TF2 (in millions of dollars)

	MDOT	Locals	Total
Highway Preservation			
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.

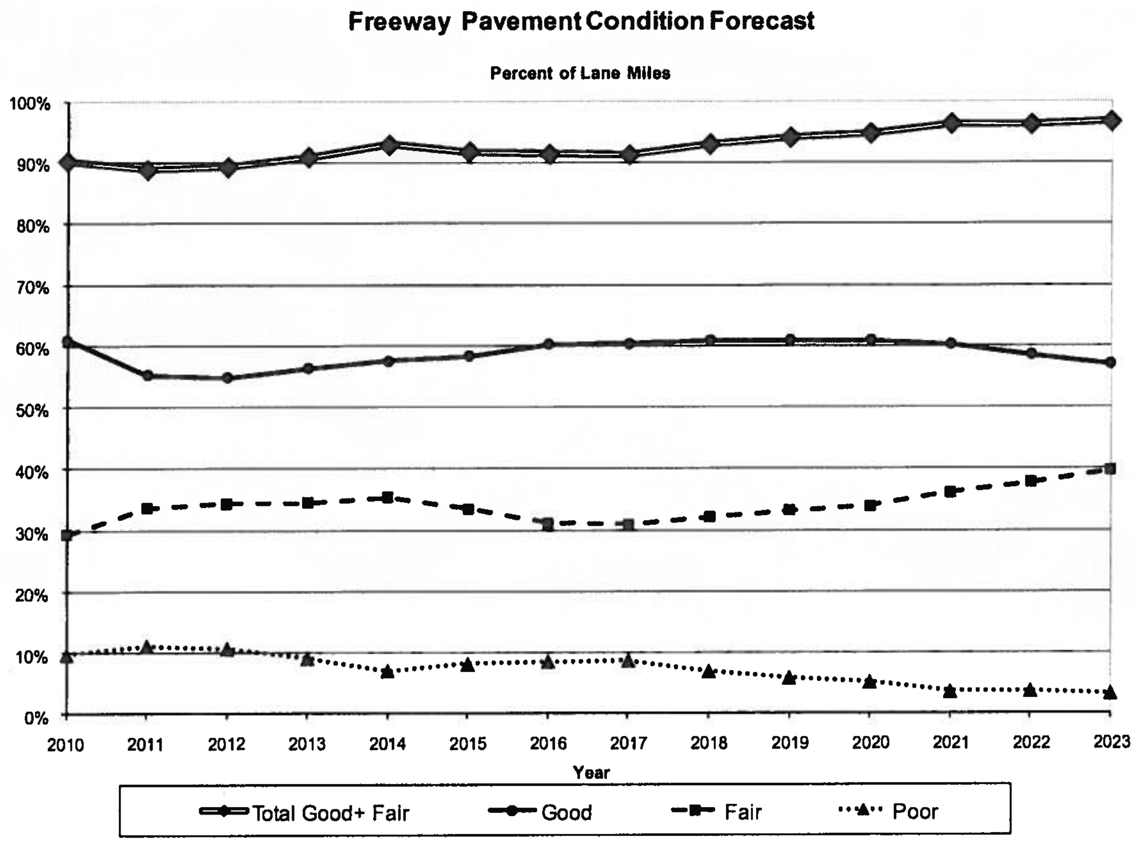
Now, the goal was to meet our 95% and 85% good or fair conditions. Here is how they have come out.

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.

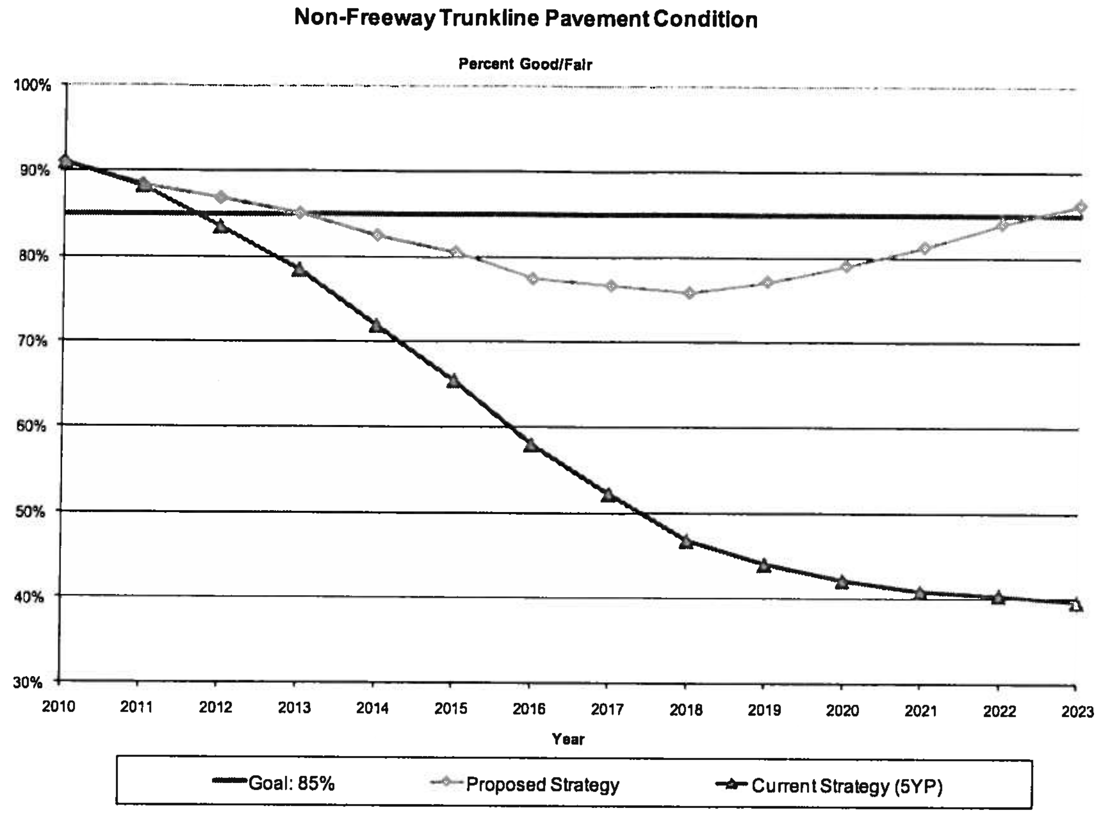


It is important to note that even when we approach, hit and maintain the 95% good or fair condition, all the roads will not look in "like-new" condition. Only abut 60% will be in the 8-10 "good" rating, between 30 and 40% in the 5-7 "fair" rating and the remaining less than 10% in the 1-4 "poor" condition. 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".

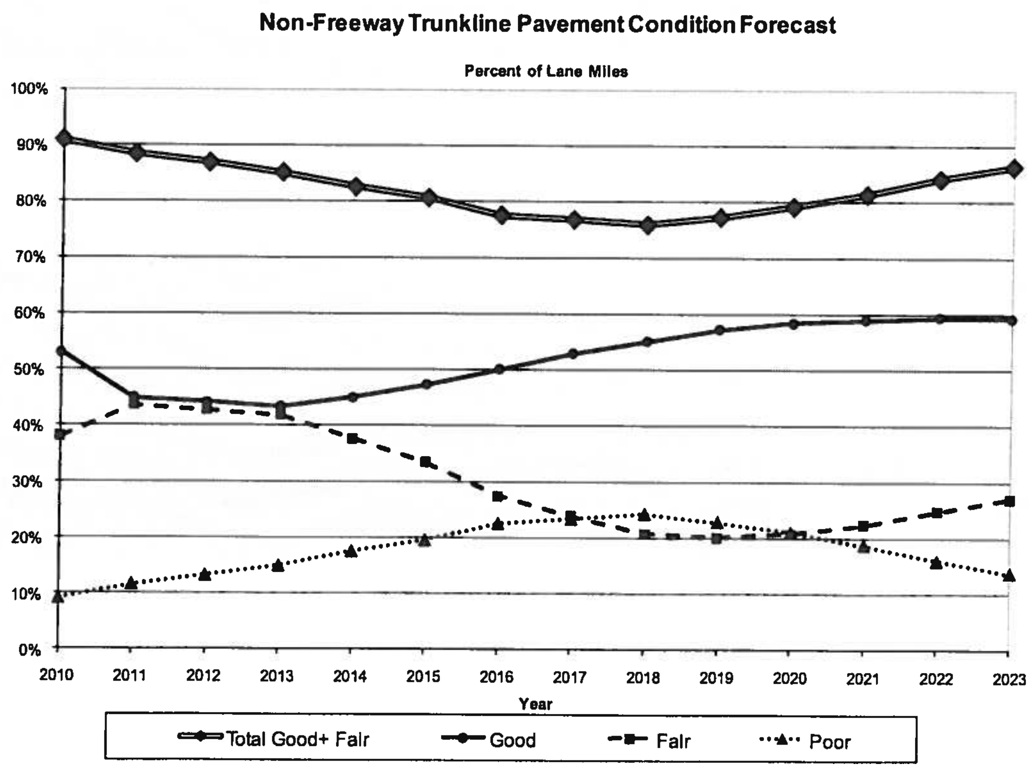
Similar charts showing the make up of the three categories are provided for each of the four highway segments below.



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.

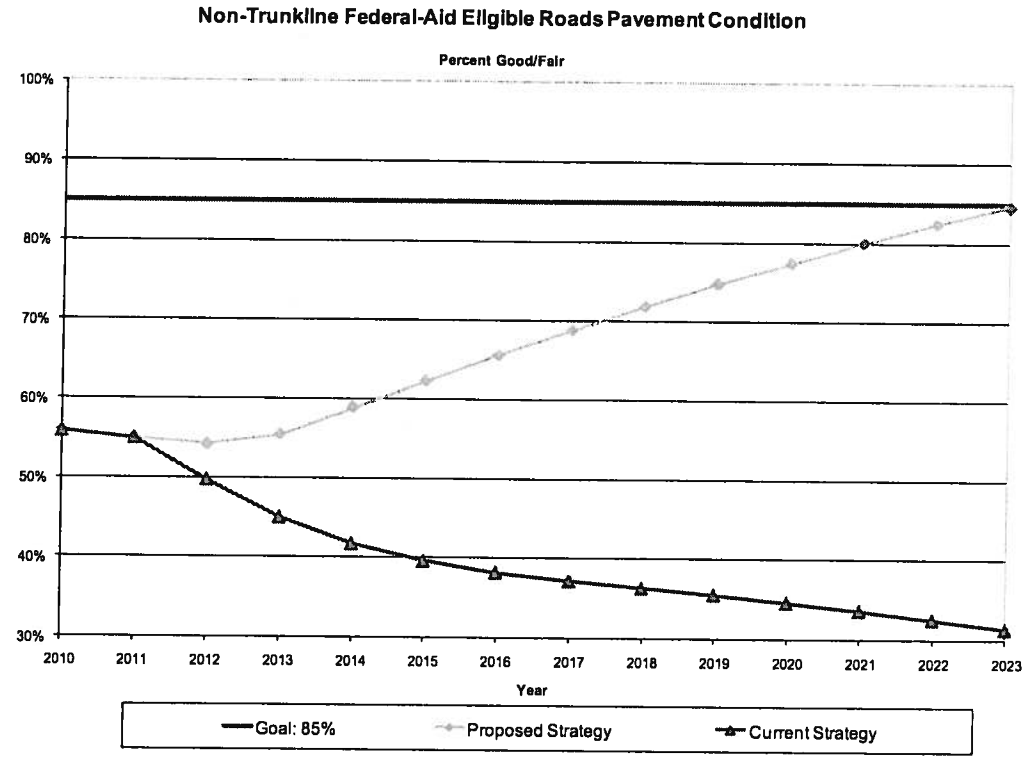


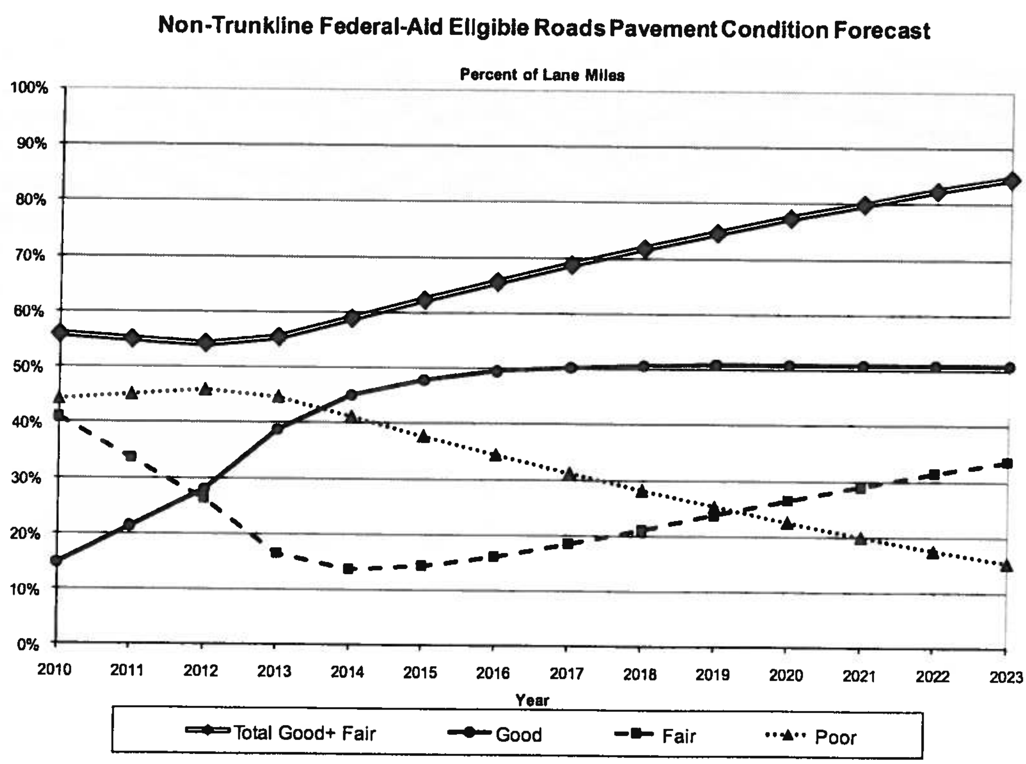
Non-Freeway Trunkline Pavement Condition
Percent Good/Fair
100%
90%
80%
70%
60%
50%
40%
30%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year
Goal: 85%
Proposed Strategy
Current Strategy (5YP)



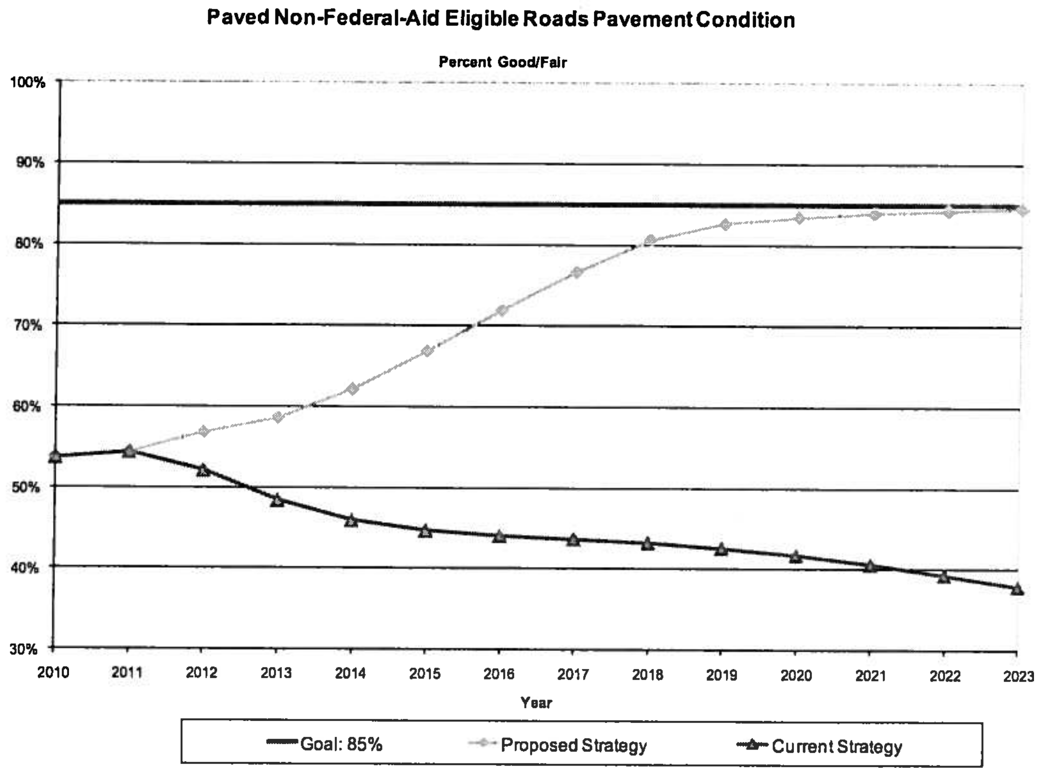
Non-Freeway Trunkline Pavement Condition Forecast
Percent of Lane Miles
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year
Total Good+ Fair
Good
Fair
Poor

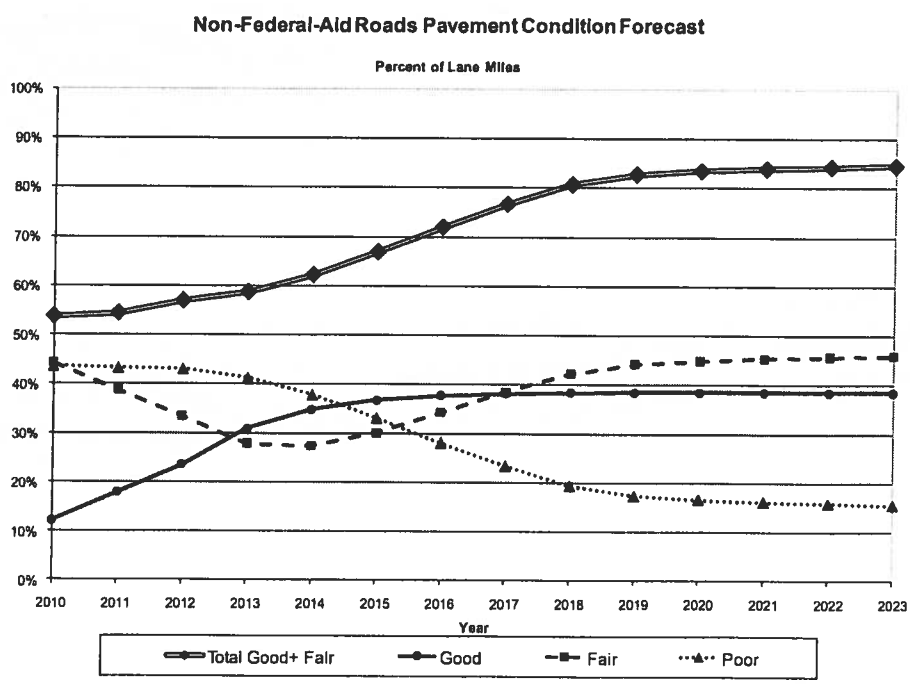
For the non-trunkline Federal-Aid roads, we project a continuous improvement from the current very low (mid-50%) towards the goal of 85% good or fair. It takes many years to get there, but eventually the goal is met if we simply stick to the plan.





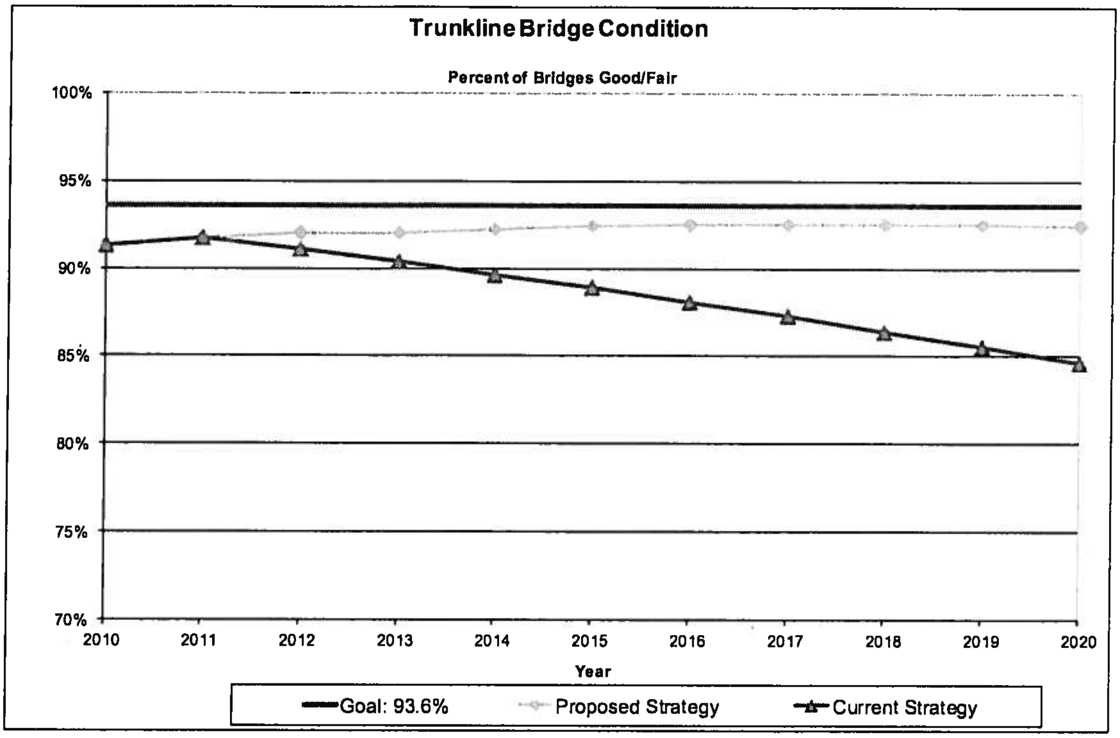
Again, for the non-Federal-Aid paved roads, as with the non-trunkline Federal-Aid roads, it takes a while to achieve the 85% goals, but we can get there, gaining incremental improvement year by year.

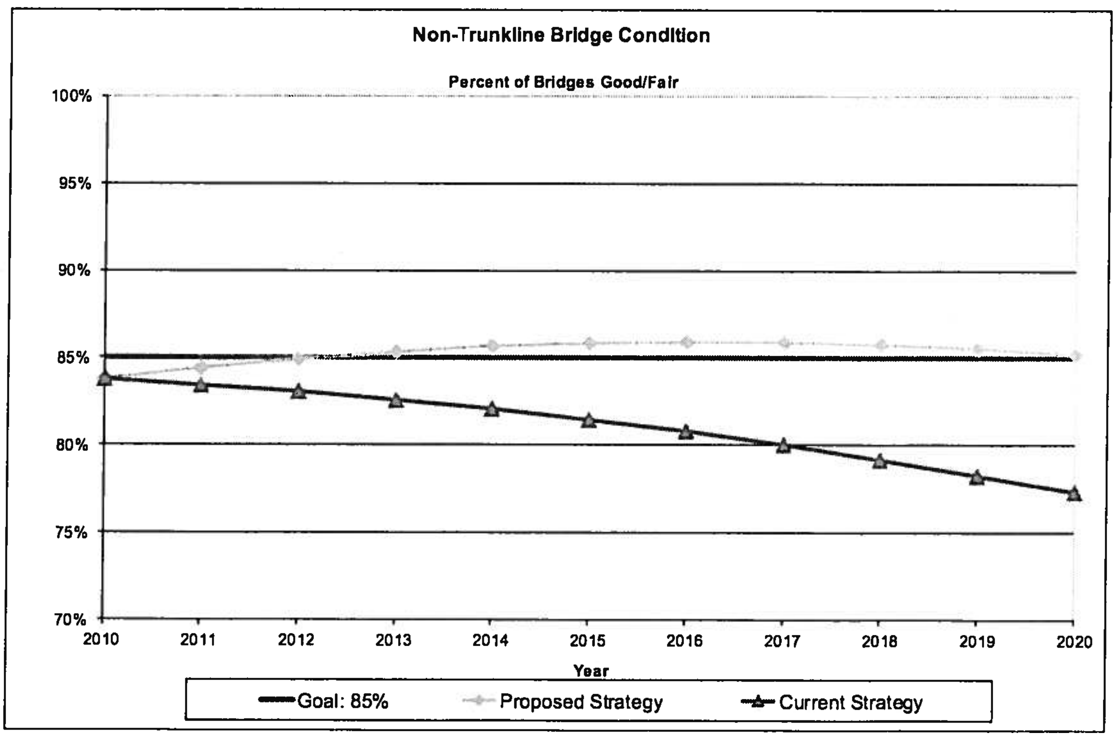




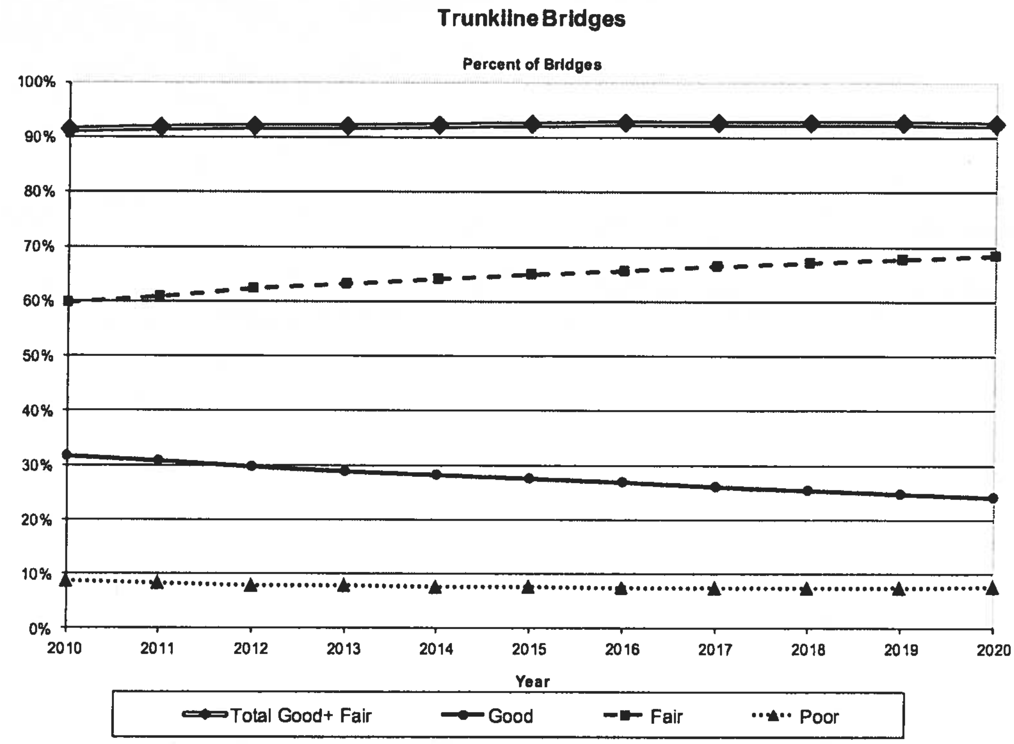
Projected Bridge Quality with Proposed Additional Funding.

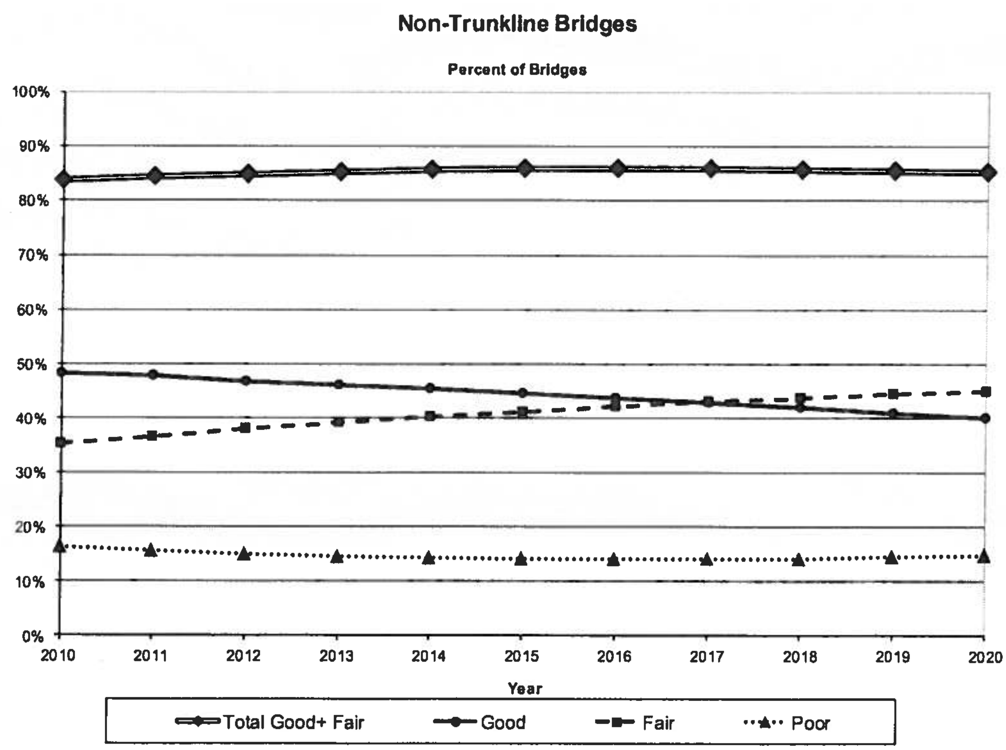
The additional money helps maintain the condition of the state trunkline highway bridges, rather than see the condition deteriorate.





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.

Appendices:

Appendix A: Pages 15-25 from PASER (Pavement Surface Evaluation and Rating Manual – Asphalt Roads available at http://epdfiles.engr.wisc.edu/pdf_web_files/tic/manuals/Asphalt-PASER_02.pdf

Appendix B: Cost Assumption Detail (State Trunkline Highways)

Appendix C: MDOT Highway Funding Allocation Process and Calculation of "Current Budget"

Appendix D: The detail for each of the four road segments and for bridges

Appendix E: Breakdown of cost for each fix per year for the non-trunkline roads

Appendix A

Rating system

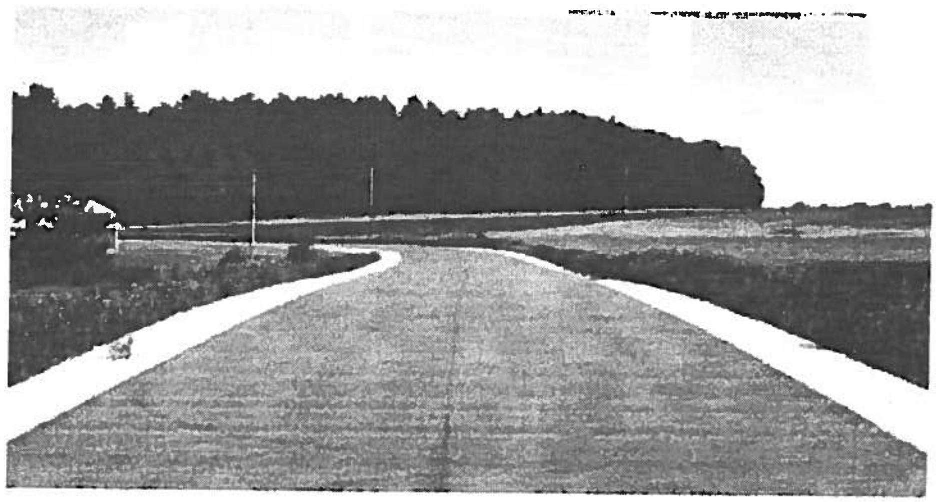
Surface rating	Visible distress*	General condition/ treatment measures
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay. Like new.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40′ or greater). All cracks sealed or tight (open less than ¼″).	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open ¼″) due to reflection or paving joints. Transverse cracks (open ¼″) spaced 10′ or more apart, little or slight crack raveling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight raveling (loss of fines) and traffic wear. Longitudinal cracks (open ¼″–½″), some spaced less than 10′. First sign of block cracking. Sight to moderate flushing or polishing. Occasional patching in good condition.	Shows signs of aging. Sound structural condition. Could extend life with sealcoat.
5 Fair	Moderate to severe raveling (loss of fine and coarse aggregate). Longitudinal and transverse cracks (open ½″) show first signs of slight raveling and secondary cracks. First signs of longitudinal cracks near pavement edge. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging. Sound structural condition. Needs sealcoat or thin non-structural overlay (less than 2″)
4 Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Longitudinal cracking in wheel path. Block cracking (over 50% of surface). Patching in fair condition. Slight rutting or distortions (½″ deep or less).	Significant aging and first signs of need for strengthening. Would benefit from a structural overlay (2″ or more).
3 Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Severe block cracking. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1″ or 2″ deep). Occasional potholes.	Needs patching and repair prior to major overlay. Milling and removal of deterioration extends the life of overlay.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2″ deep) Extensive patching in poor condition. Potholes.	Severe deterioration. Needs reconstruction with extensive base repair. Pulverization of old pavement is effective.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

** Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.*

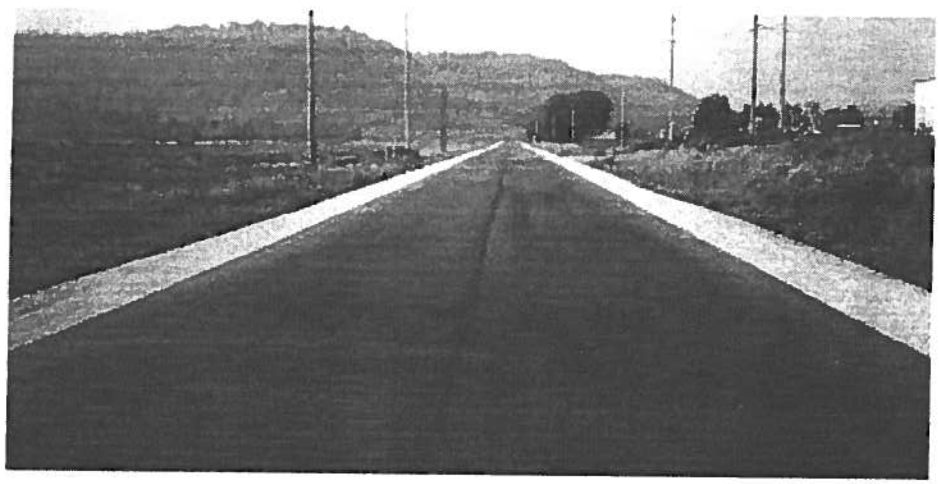
RATING 10 & 9

EXCELLENT —
No maintenance required

Newly constructed or recently overlaid roads are in excellent condition and require no maintenance.



▶
RATING 10
New construction.



▶
RATING 9
Recent overlay, rural.

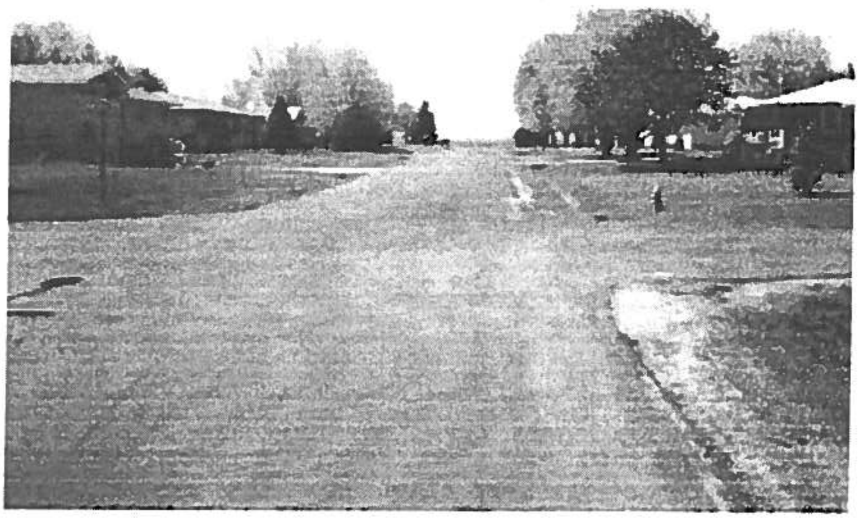
▶
RATING 9
Recent overlay, urban.

RATING 8

VERY GOOD — Little or no maintenance required

This category includes roads which have been recently sealcoated or overlaid with new cold mix. It also includes recently constructed or overlaid roads which may show longitudinal or transverse cracks. All cracks are tight or sealed.

◄ **Recent chip seal.**



◄ **Recent slurry seal.**

▼ **Widely spaced, sealed cracks.**

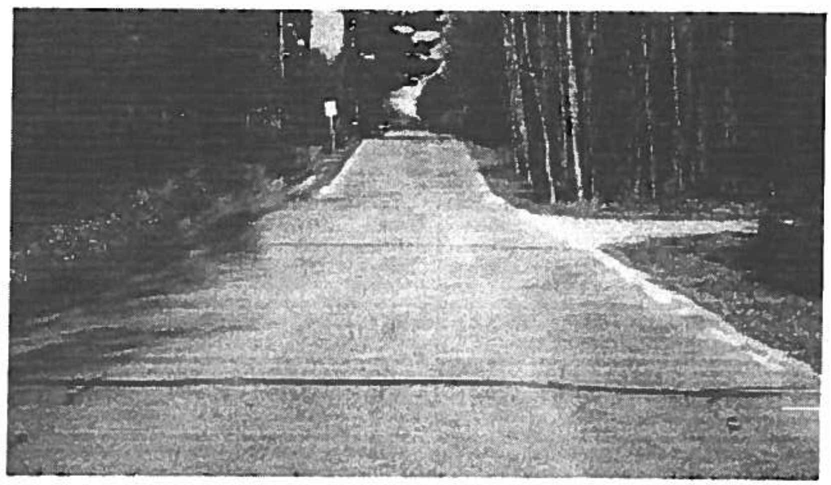
▲ **New cold mix surface.**

RATING 7

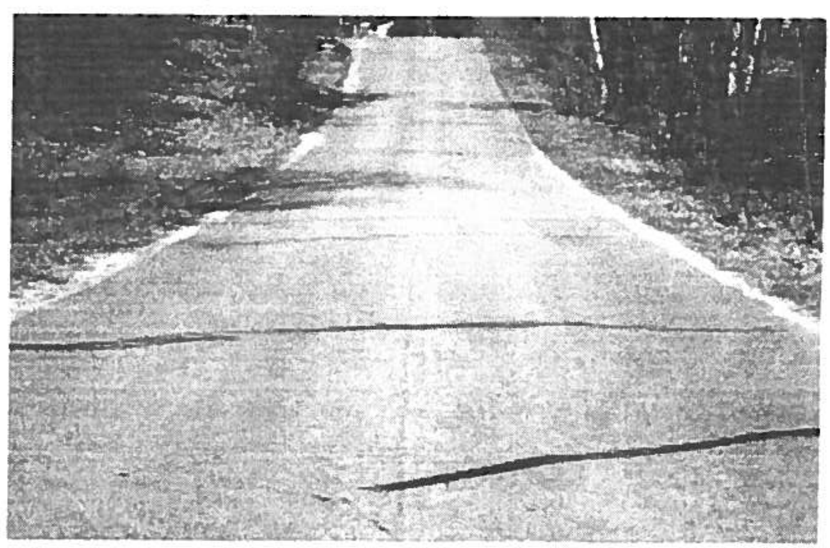
GOOD — Routine sealing recommended

Roads show first signs of aging, and they may have very slight raveling. Any longitudinal cracks are along paving joint. Transverse cracks may be approximately 10' or more apart. All cracks are ¼" or less, with little or no crack erosion. Few if any patches, all in very good condition. Maintain a crack sealing program.

▶ **Tight and sealed transverse and longitudinal cracks. Maintain crack sealing program.**



▶ **Tight and sealed transverse and longitudinal cracks.**



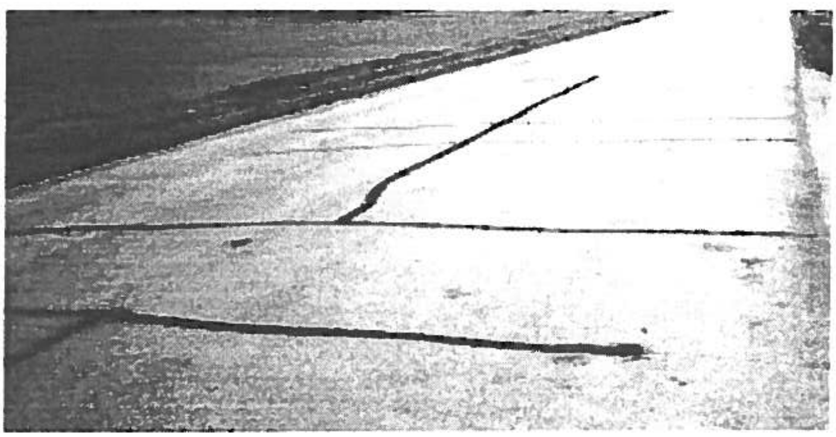
▶ **Transverse cracks about 10' or more apart. Maintain crack sealing program.**

RATING 6

GOOD — Consider preservative treatment

Roads are in sound structural condition but show definite signs of aging. Seal-coating could extend their useful life. There may be slight surface raveling. Transverse cracks can be frequent, less than 10′ apart. Cracks may be $\frac{1}{4}$–$\frac{1}{2}$″ and sealed or open. Pavement is generally sound adjacent to cracks. First signs of block cracking may be evident. May have slight or moderate bleeding or polishing. Patches are in good condition.

◄ **Slight surface raveling with tight cracks, less than 10′ apart.**



◄ **Transverse cracking less than 10′ apart; cracks well-sealed.**

▼ **Large blocks, early signs of raveling and block cracking.**

Open crack, $\frac{1}{2}$″ wide; adjoining ▼ **pavement sound.**

▼ **Moderate flushing.**

RATING 5

FAIR —
Preservative maintenance treatment required

Roads are still in good structural condition but clearly need sealcoating or overlay. They may have moderate to severe surface raveling with significant loss of aggregate. First signs of longitudinal cracks near the edge. First signs of raveling along cracks. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Any patches or edge wedges are in good condition.

▼ **Block cracking with open cracks.**

▶ **Moderate to severe raveling in wheel paths.**

▼ **Severe flushing.**

▲ **Wedges and patches extensive but in good condition.**

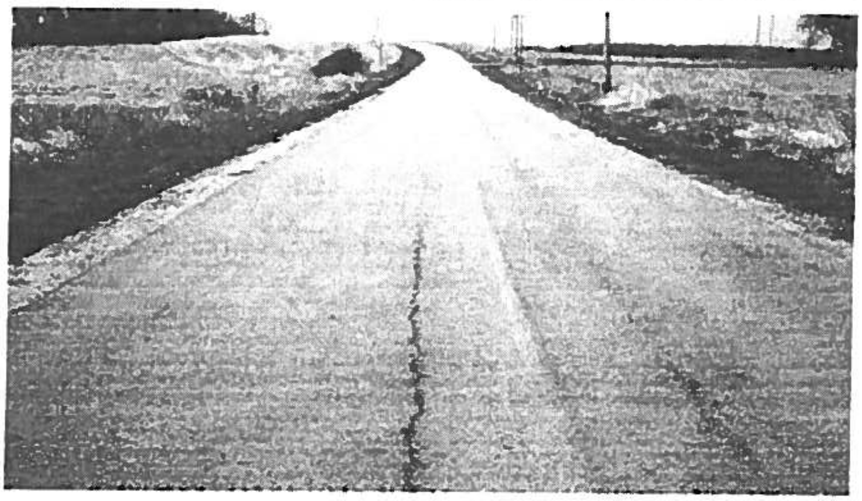
▼ Severe raveling with extreme loss of aggregate.

▼ Load cracking and slight rutting in wheel path.

RATING 4

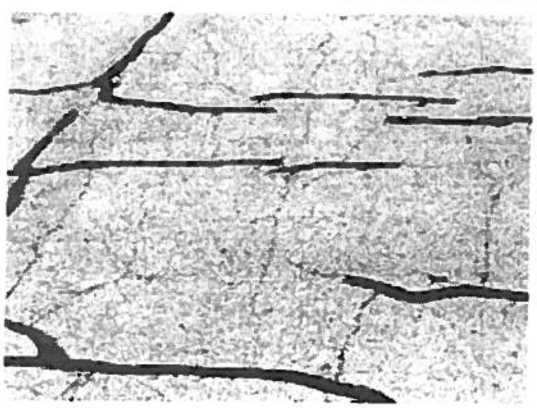
FAIR —
Structural improvement required

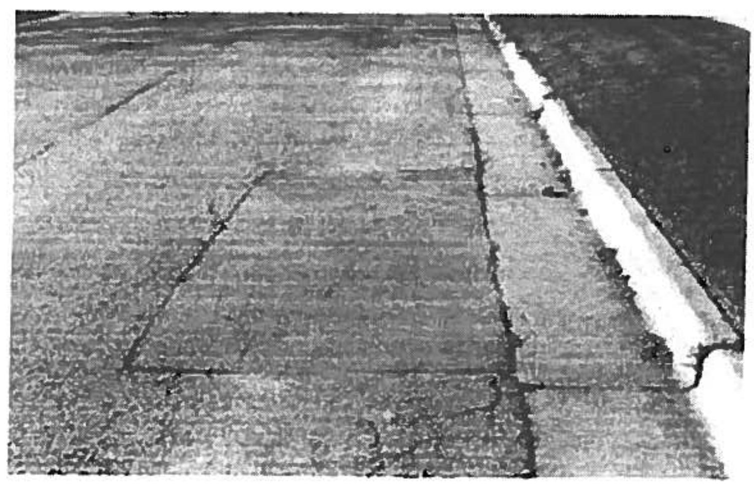
Roads show first signs of needing strengthening by overlay. They have very severe surface raveling which should no longer be sealed. First longitudinal cracking in wheel path. Many transverse cracks and some may be raveling slightly. Over 50% of the surface may have block cracking. Patches are in fair condition. They may have rutting less than ½" deep or slight distortion.

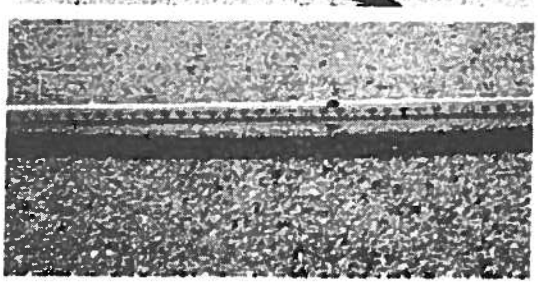


◄ Longitudinal cracking; early load-related distress in wheel path. Strengthening needed.

▼ Slight rutting; patch in good condition.







▼ Extensive block cracking. Blocks tight and sound.

◄ Slight rutting in wheel path.

RATING 3

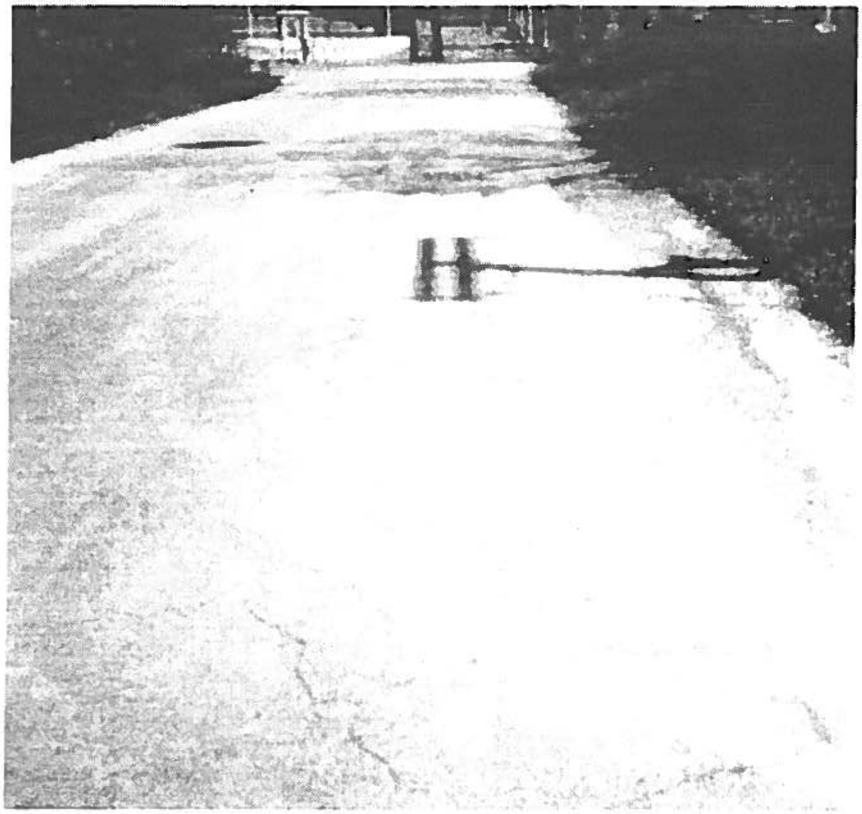
POOR—
Structural improvement required

Roads must be strengthened with a structural overlay (2" or more). Will benefit from milling and very likely will require pavement patching and repair beforehand. Cracking will likely be extensive. Raveling and erosion in cracks may be common. Surface may have severe block cracking and show first signs of alligator cracking. Patches are in fair to poor condition. There is moderate distortion or rutting (1-2") and occasional potholes.

Many wide and raveled cracks indicate need for milling and overlay.

2" ruts need mill and overlay.

Open and raveled block cracks.



RATING 3

POOR — (continued)
Structural improvement required

◄ **Alligator cracking. Edge needs repair and drainage needs improvement prior to rehabilitation.**

▼ **Distortion with patches in poor condition. Repair and overlay.**

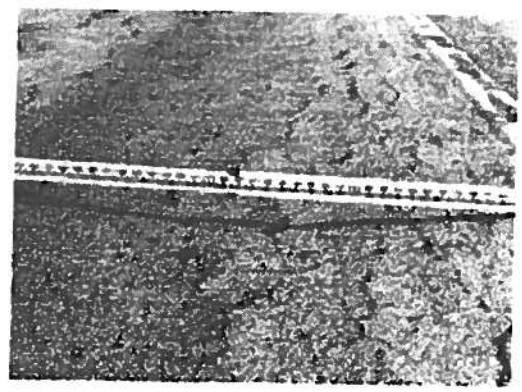
RATING 2

VERY POOR— Reconstruction required

Roads are severely deteriorated and need reconstruction. Surface pulverization and additional base may be cost-effective. These roads have more than 25% alligator cracking, severe distortion or rutting, as well as potholes or extensive patches in poor condition.

▶ **Extensive alligator cracking. Pulverize and rebuild.**

▲ **Patches in poor condition, wheelpath rutting. Pulverize, strengthen and reconstruct.**



▲ **Severe rutting. Strengthen base and reconstruct.**

▶ **Severe frost damage. Reconstruct.**

RATING 1

FAILED —
Reconstruction required

Roads have failed, showing severe distress and extensive loss of surface integrity.

◄ **Potholes from frost damage. Reconstruct.**

◄ **Potholes and severe alligator cracking. Failed pavement. Reconstruct.**

◄ **Extensive loss of surface. Rebuild.**

Appendix B

RQFS Model Costs and Road Reconstruction and Rehabilitation (R&R)/CPM Detail Costs

There are differences in the average pavement lane mile cost used in the RQFS model cost tables and the detailed work costs as reflected in Appendix B. These differences are primarily a reflection of the point in time which the subset of data was captured.

RQFS cost tables currently are based on 2009 base year costs, which included actual project costs from 2007-2008 and the Five-Year Program estimated project costs for FY 2009-2015. These costs were finalized in August 2009. These costs were approved by region pavement engineering staff and utilized for model base costs. The RQFS cost table is in the process of being updated with region staff and will be finalized in August 2011.

The R&R/CPM detail chart, in Appendix B, includes actual costs from 2009-2010 and estimated project costs for FY 2011-2016. These costs were pulled from the MDOT's corporate program development (MAP) database in February, 2011.

Reconstruction costs in the RQFS model include work type codes 160 through 164. Rehabilitation costs in the RQFS model include "resurfacing" which includes work type codes 140 through 146, and "rehabilitation" work type codes which includes 155 and 156, in addition to 165 though 170.

R & R

Statewide	Work Type Code	Type of Work	Average Cost Per Mile	Number of Jobs used for Average
Freeway				
	Resurfacing			
	140	Bituminous Resurfacing	$1,106,157.71	7
	141	Bitum. Resurf and Shoulders	$955,072.02	6
	142	Resurface, Mill & Pulver	$945,566.94	8
	146	Bit Resurface and Drainage Imp.	$755,570.92	2
Subtotal			*$874,207.71*	*23*
	Rehabilitation			
	167	Crush and Shape & Resurface	$448,745.25	6
	169	Concrete Pvmet Rubble and Bit. Resurface	$876,504.56	
	170	Major Rehabilitation	$853,659.48	7
Subtotal			*$705,945.13*	*15*
	Reconstruction			
	160	Reconst. Existing, No widen	$1,810,757.12	11
	162	Intersection Reconstruct	$3,885,611.65	2
	163	Concrete Reconstruction	$1,306,436.94	11
	164	Bituminous Reconstruction	$1,089,438.06	1
Subtotal			*$1,571,010.84*	*25*
	Total Freeway		**$1,118,485.09**	**63**
Non-Freeway				
	Resurfacing			
	140	Bituminous Resurfacing	$516,940.91	35
	141	Bitum. Resurf and Shoulders	$475,694.81	15
	142	Resurface, Mill & Pulver	$490,784.47	35
	143	Bit Resurface and Minor Widening	$360,660.04	3
	146	Bit Resurface and Drainage Imp.	$645,647.26	10
	147	Bit Resurface, curb & gutter	$530,840.29	5
Subtotal			*$505,642.20*	*103*
	Rehabilitation			
	155	Crack and Surface over Old Pavement	$390,685.50	3
	166	Crcr Pave Repair & Diam. Grind	$396,862.05	4
	167	Crush and Shape & Resurface	$359,905.22	22
	170	Major Rehabilitation	$812,463.07	17
Subtotal			*$536,258 56*	*46*
	Reconstruction			
	160	Reconst. Existing, No widen	$1,416,880.09	27
	163	Concrete Reconstruction	$999,712.74	12
	164	Bituminous Reconstruction	$1,270,731.20	37
Subtotal			*$1,312,757.10*	*76*
	Total Non Freeway		**$707,046.73**	**225**

BTP: Statewide System Management Section
Source: MAP database-FY 2009-2016 data pulled 2-11
Ashman, Michigan DOT, 12 July 2011

CPM

Statewide	Work Type Code	Type of Work	Average Cost Per Mile	Number of Jobs used for Average
Freeway				
	Flexible & Composite Pavements-CPM			
	407	Ultra-Thin Bituminous Overlay	$38,153	4
	408	Cold Milling and Bituminous Overlay	$104,211	52
	410	Single Course Micro-Surfacing	$48,198	3
	411	Multiple Course Micro-Surfacing	$41,830	5
	443	Bituminous Overlay	$86,428	4
	Subtotal:		**$92,824**	**68**
	Concrete Pavements-CPM			
	412	Concrete Joint & Surface Spall Repair	$71,436	4
	415	Concrete Pavement Restoration	$40,232	10
	450	Full Depth Concrete Pavement Repair	$32,237	14
	Subtotal:		**$39,399**	**28**
	416	New Treatment Technology Concrete Pavement	$39,537	3
	Total Statewide Freeway		***$70,349***	***99***

Statewide	Work Type Code	Type of Work	Average Cost Per Mile	Number of Jobs used for Average
Non-Freeway				
	Flexible & Composite Pavements-CPM			
	149	One Course Overlay	$320,967	3
	400	MultiCourse Chip Seal	$34,247	23
	407	Ultra-Thin Bituminous Overlay	$39,042	15
	408	Cold Milling and Bituminous Overlay	$90,491	196
	410	Single Course Micro-Surfacing	$35,809	12
	411	Multiple Course Micro-Surfacing	$46,063	47
	414	Paver Placed Surface Seal	$62,692	7
	440	Single Course Chip Seal	$21,731	30
	443	Bituminous Overlay	$66,317	45
	Subtotal:		**$63,136**	**378**
	Concrete Pavements-CPM			
	412	Concrete Joint & Surface Spall Repair	$140,061	5
	415	Concrete Pavement Restoration	$90,513	10
	450	Full Depth Concrete Pavement Repair	$48,400	17
	Subtotal:		**$71,260**	**32**
	Total Statewide Non-Freeway		***$63,676***	***410***

Appendix C

MDOT Highway Funding Allocation Process

Highway Program Investment Template:

The Michigan Department of Transportation (MDOT) has developed a Investment Template process to accomplish the effective usage of financial resources on Michigan's Highway Capital program. This process allocates estimated financial resources to infrastructure asset categories or programs in order to achieve approved transportation improvement goals and allow for the ability to monitor that the program improvement strategies are constrained within the department's available revenue.

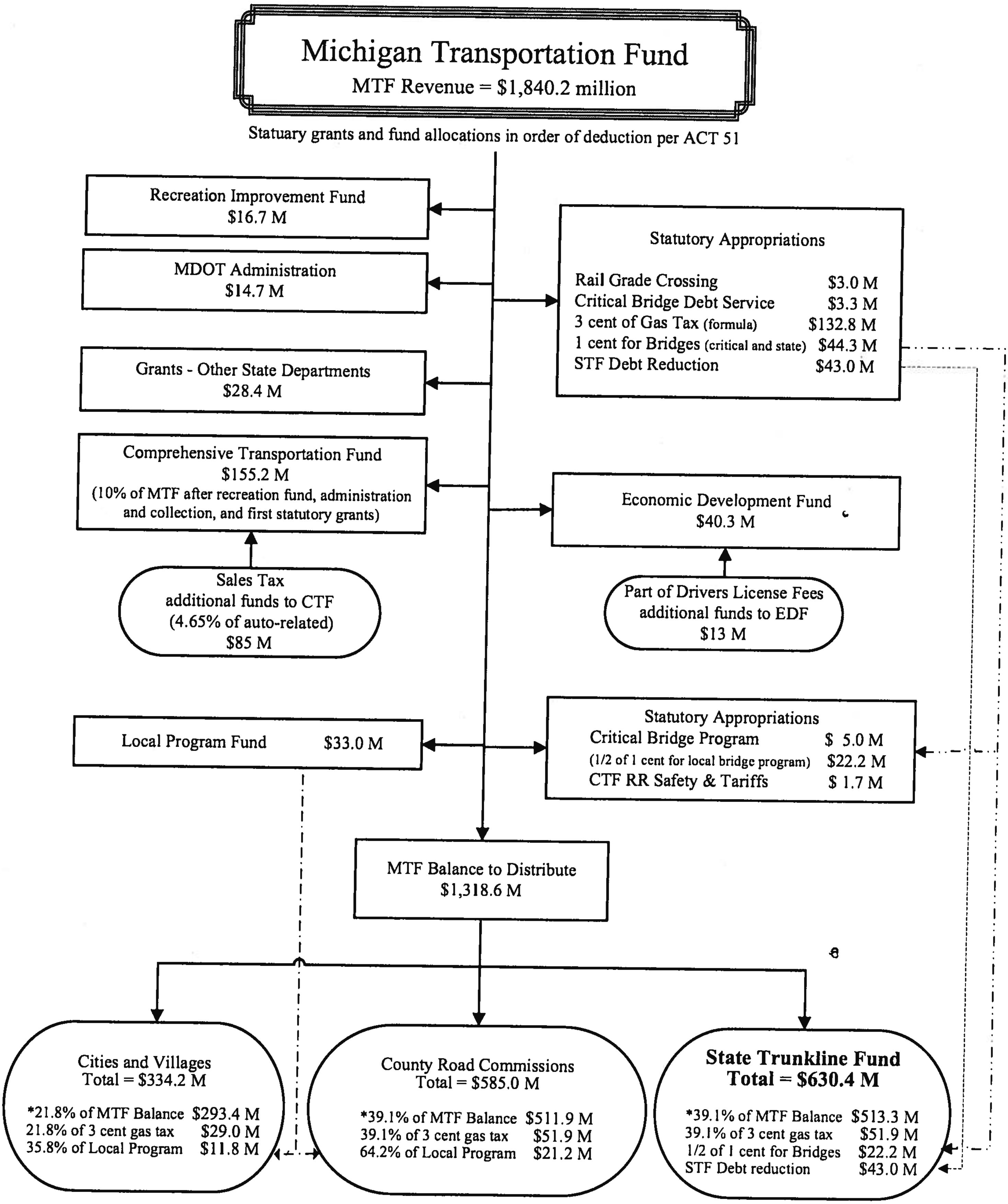
The process allocates a target amount to a template category annually based on approved goals, improvement strategy, and needs. The amount reflects an estimated level of obligation authority from federal aid and state revenues to be provided during the specified timeframe. As revenues increase or decrease the investment template is reviewed and adjustments made accordingly. Target changes due to the extra funds and/or target transfers between template programs are also administered throughout the year to fully utilize the approved obligation authority.

The template target development and monitoring process assists in setting the level of funding to achieve highway improvement goals and provides a tool to constrain the overall statewide program against available revenues.

Financial resources:

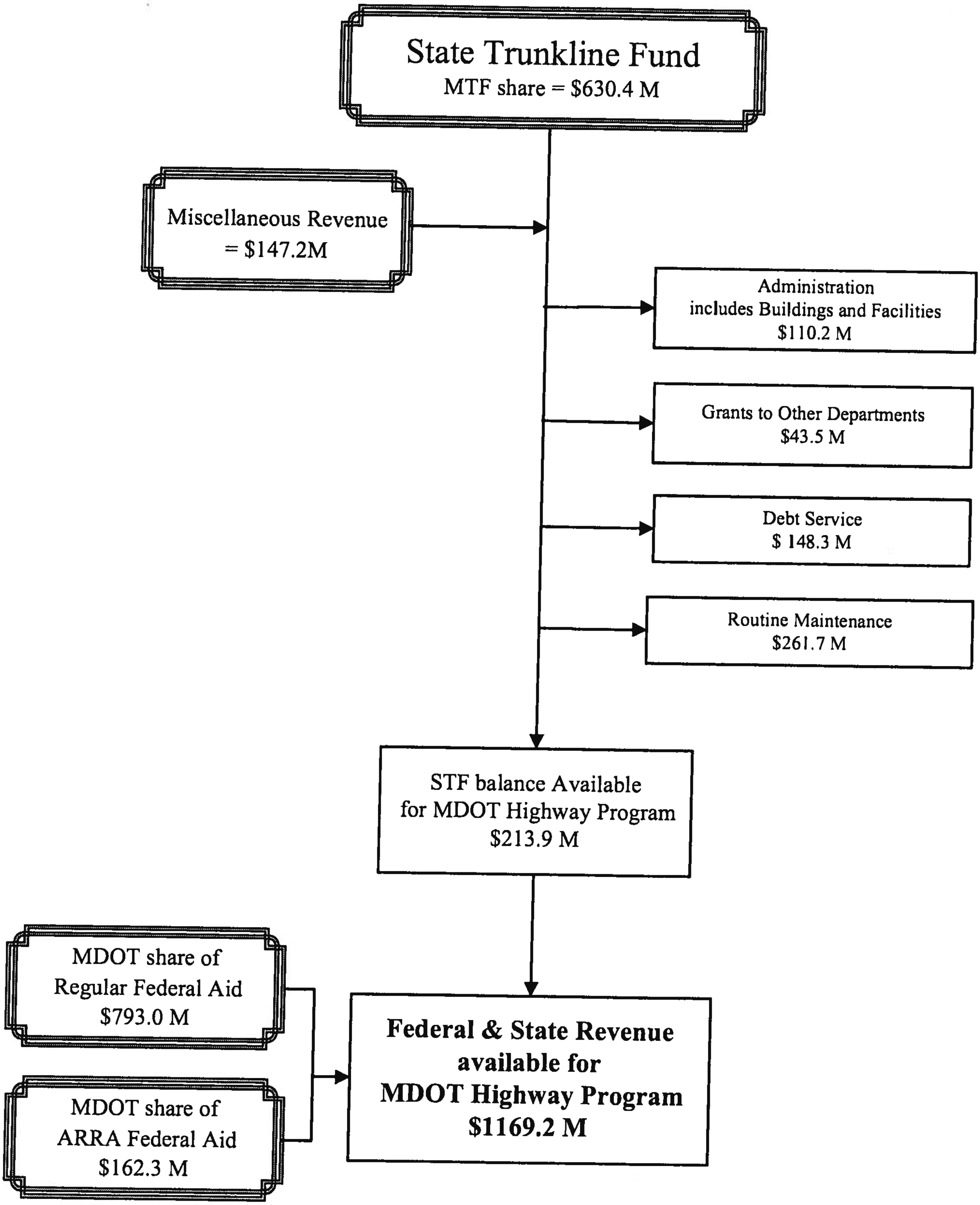
- Federal Source:
    - Annual federal aid obligation authority for state trunkline system (MDOT) excluding local program funding
- State Source:
    - Distribution from Michigan Transportation Fund (MTF) based on Act 51 formula to State Trunkline Fund (STF)
    - Available Bond proceeds

FY 2010 State Transportation Tax Revenues and Distribution per ACT 51



* Actual shares are not exactly 39.1% & 21.8% due to jurisdictional transfers.

09/2011


State Trunkline Fund
MTF share = $630.4 M
Miscellaneous Revenue
= $147.2M
Administration
includes Buildings and Facilities
$110.2 M
Grants to Other Departments
$43.5 M
Debt Service
$ 148.3 M
Routine Maintenance
$261.7 M
STF balance Available
for MDOT Highway Program
$213.9 M
MDOT share of
Regular Federal Aid
$793.0 M
MDOT share of
ARRA Federal Aid
$162.3 M
Federal & State Revenue
available for
MDOT Highway Program
$1169.2 M

08/2011

MDOT FY 2010 Highway Funding

Michigan Transportation Fund (MTF) Revenue		1,840.20
Distribution		
Statutory Grants and Deductions		(95.10)
Recreation Fund	(16.70)	
MDOT Administration	(14.70)	
Grants - Other State Departments	(28.40)	
Rail Grade Crossing	(3.00)	
Critical Bridge Debt Service	(3.30)	
Comprehensive Transportation Fund RR Safety and Tariffs	(1.70)	
Critical Bridge	(5.00)	
1/2 share of 1 cent for bridges	(22.[illegible])	
Distribution to Economic Development Fund		(40.30)
Distribution to Comprehensive Transportation Fund		(155.20)
Distribution to County Road Commissions		(585.00)
Distribution to Cities and Villages		(334.20)
MTF Share of State Trunkline Fund		620.[illegible]
Formula distribution	512.30	
3 cent formula distribution	51.90	
1/2 share of 1 cent for bridges	22.20	
STF debt reduction	43.00	
Additional Revenue		
Miscellaneous Revenue to State Trunkline Fund (STF)		147.20
Distribution		
Administration (includes building and facilities)		(110.20)
Grants to other Departments		(47.50)
Debt Service		(148.20)
Routine Maintenance		(261.70)
STF Balance Available for MDOT Highway Program		213.9[illegible]
Additional Revenue		
MDOT share of Federal Aid		793.00
(excludes $162.3 of ARRA Federal Aid)		
State and Federal Revenue available for MDOT Highway Program		1,006.91
Allocations		
Capacity Improvements		(89.60)
Safety & System Operations		(131.00)
Other Federally and Non-Federally funded projects		(108.30)
State and Federal Revenue available for MDOT Road and Bridge projects		**678.01**

Local FY 2010 Road Funding

Distribution to County Road Commissions	585.[illegible]
Distribution to Cities and Villages	334.[illegible]
Local share of regular Federal aid	252.[illegible]
(excludes $[illegible] of ARRA Federal Aid - Local share)	
Total	**1,172.10**
Distribution	
Administration	[illegible]
Maintenance	[illegible]
Debt Service	[illegible]
Capital Program	[illegible]

MDOT FY 2010 HIGHWAY PROGRAM

Individual Program amounts include ARRA funding

REPAIR & MAINTAIN ROADS AND BRIDGES	
REPAIR AND REBUILD ROADS	
Preserve Rehabilitation & Reconstruction	$ 463.1million
Capital Preventive Maintenance	94.3 million
TOTAL REPAIR AND REBUILD ROADS	**$ 557.4 million**
REPAIR AND REBUILD BRIDGES	
Preserve Rehabilitation & Reconstruction	$ 211.6 million
Capital and Scheduled Preventive Maintenance	29.8 million
Big Bridge	8.1 million
Special Needs	6.5 million
Blue Water Bridge	7.0 million
TOTAL REPAIR AND REBUILD BRIDGES	**$ 263.0 million**
TOTAL ROADS & BRIDGES	**$820.4 million**
CAPACITY IMPROVEMENTS (CI)[1] AND NEW ROADS (NR)	
Capacity Improvements	$ 57.9 million
New Road Construction	31.7 million
TOTAL CI & NR	**$ 89.6 million**
SAFETY AND SYSTEM OPERATIONS	
Safety Programs	21.7 million
Safety Installations	56.3 million
Intelligent Transportation Systems	11.3 million
Congestion Mitigation and Air Quality	32.7 million
Operations	9.0 million
TOTAL OPERATIONS PROGRAM	**$ 131.0 million**
OTHER	
Federally Funded Programs [2]	$ 64.7 million
Non-Federally Funded Programs [3]	43.6 million
TOTAL OTHER	**$ 108.3 million**
FY 2010 HIGHWAY PROGRAM	**$ 1,149.3 million**

[1] A substantial portion of capacity improvement projects includes the preservation of the existing road. Approximately 50 percent of the capacity improvement construction funding is for preserving the existing road adjacent to the new lane.

[2] Federally funded programs include Enhancement, Railroad Crossings, Safe Routes to Schools, Noise Abatement, Wetland Pre-Mitigation, Discretionary, Recreation Trails, Commercial Vehicle Enforcement, Carpool Parking Lots, Freeway Lighting and Pump Stations.

[3] Non-federally funded programs include Transportation Economic Development Fund – Category A, Advanced ROW acquisition, Michigan Institutional Roads program, State Funded Required Programs, Program Development and Scoping, State Railroad Crossing.

2009 STATEWIDE SUMMARY REPORT
ALL COUNTIES HAVE BEEN APPROVED
STATEMENT OF EXPENDITURES

		Primary Road Fund (P)	Local Road Fund (L)	Co. Road Comm. Fund (C)	Total (T)
Construction/Capacity Improvement					
Roads		34,574,063.50	4,144,229.24		38,718,292.74
Structures		4,716,716.11	252,110.10		4,968,826.21
Roadside Parks					.00
Special Assessments					.00
Other		2,138,127.28	2,518,560.00		4,656,687.28
Total Construction/Cap Imp		41,428,906.89	6,914,899.34		48,343,806.23 ✓
Preservations - Structural Imp					
Roads		$\boxed{211,025,139.02}$	$\boxed{85,669,577.41}$		296,694,716.43
Structures		43,208,084.67	16,986,094.18		60,194,178.85
Safety Projects		$\boxed{9,764,598.75}$	$\boxed{1,170,654.22}$		10,935,252.97
Roadside Parks					.00
Special Assessments			8,497,003.30		8,497,003.30
Other		2,905,184.21	279,211.64		3,184,395.85
Total Preserv - Struct Imp		266,903,006.65	112,602,540.75		379,505,547.40 ✓
Routine and Preventive Maintan					
Roads		$\boxed{129,450,702.01}$	$\boxed{185,545,036.28}$		314,995,738.29 ✓
Structures		2,891,922.12	938,825.21		3,830,747.33 ✓
Roadside Parks		68,561.93	10,958.27		79,520.20 ✓
Winter Maintenance		65,092,154.95	50,748,736.73		115,840,891.68 ✓
Traffic Control		31,347,211.34	8,867,421.96		40,214,633.30 ✓
Total Maintenance		228,850,552.35	246,110,978.45		474,961,530.80
Total Constr. and Maint.		537,182,465.89	365,628,418.54		902,810,884.43
Other					
Trunkline Maintenance		14,915,401.37		104,758,814.02	119,674,215.39
Trunkline Nonmaintenance		859,899.56		6,329,113.24	7,189,012.80
Administrative Expense		29,236,591.48	23,253,493.09		52,490,084.57 ✓
Equipment Expense - Net		(1,652,691.83)	(2,444,963.71)	(709,559.99)	(4,807,215.53) ✓
Capital Outlay - Net		(1,575,751.63)	(1,183,584.89)	(10,864,340.83)	(13,623,677.35) ✓
Debt Principal Payment		11,519,125.19	4,222,568.09	8,858,463.02	24,600,156.30
Interest Expense		3,010,344.23	1,005,824.70	2,636,576.84	6,652,745.77
Drain Assessment		574,858.25	143,963.88	45,284.41	764,106.54 ✓
Other	598,566,398.79	1,665,420.40	1,752,284.85	10,136,498.61	13,554,203.86 ✓
Other	394,163,765.35	2,834,110.09	1,790,022.95	16,653,818.02	21,277,951.06 ✓
	137,834,544.71				
Total Other		61,387,307.11	28,539,608.96	137,844,667.34	227,771,583.41
Total Expenditures		598,569,773.00	394,168,027.50	137,844,667.34	1,130,582,467.84

ACT 51
CITY/VILLAGE STREET FINANCIAL REPORT

Statement of Revenues Summary Report
2010 Cities and Villages - Long Form Only

REVENUES	MAJOR STREET FUND	LOCAL STREET FUND
15. Tax Levies	$ 2,641,164	$ 12,458,371
16. Federal Grants		
a. MDOT Payments to Private Contractors	39467024	444503
b. Negotiated Contracts	8653623	659147
17. State Grants		
a. Michigan Transportation Fund (Act 51)	236,779,194	79,145,849
b. Winter Maintenance (Act 51)	1,295,611	856,403
c. State Critical Bridge	2,076,135	3,995
d. Transportation Economic Development Fund	8,591,847	11,067
e. Metro Act Funds	6,293,812	3,047,672
f. Other (Identify)	2,627,417	1,878,098
18. State Trunkline Preservation (must show expenditures on line 34)	6,955,951	
19. Interest	2,368,310	1,210,885
20. Special Assessments	932,414	4,005,088
21. Contributions From Counties (Counties Names)	1,209,261	467,255
22. Contributions From Adjacent Governmental Units (Identify)	2,219,351	1,110,424
23. Miscellaneous (Identify)	15,197,407	9,480,434
24. TOTAL REVENUES	$ 337,308,521	$ 114,779,191

EXPENDITURES	MAJOR STREET FUND	LOCAL STREET FUND
25. Construction - Streets (Incl. Eng. R.O.W.)*	$ 24,954,049	$ 8,151,982
26. Construction - Structures (Incl. Eng. R.O.W.)*	517,688	3,763
27. Preservation - Streets	203,841,750	173,765,561
28. Preservation - Structures	11,980,730	1,552,611
29. Traffic Services - Streets and Structures	45,832,112	12,982,884
30. Winter Maintenance - Streets and Structures	29,081,595	22,316,153
31. Administration, Engineering Record Keeping	17,833,946	9,602,513
32. Roadside Parks (Major Street Only)	91,372	
33. Contributions to Adjacent Governmental Units (Identify)	960,040	44,971
34. State Trunkline Preservation (Must show revenue on line 18.)	7,535,014	0
35. Miscellaneous (Identify)	4,745,804	3,934,512
36. Principal	13,639,370	4,753,309
37. Interest and Bank Fees	5,158,713	1,994,891
38. TOTAL EXPENDITURES (Sum of all expenditures)	$ 366,172,183	$ 239,103,150

***Must have a minimum of 50 percent local match (local street fund only).**

Fed-Aid Non-Trunkline Expenditures

County Primary & City Major

	Category		Reported		Adjusted
County	Preservation	Roads	211,025,139		211,025,139
		Safety Projects	9,764,599	-70% non-pavement	2,929,380
	Routine & Preventive Maint	Roads	129,450,702	-74% routine maintenance	33,657,183
City & Villages	Preservation (includes routine & preventive maint)	Roads	203,841,750	-36% routine maintenance	130,458,720
		Total	$554,082,190		$378,070,421

Non-Fed-Aid Expenditures

County Local & City Local

	Category		Reported		Adjusted
County	Preservation	Roads	85,669,577		85,669,577
		Safety Projects	1,170,654	-70% non-pavement	351,196
	Special Assesments		8,497,003		8,497,003
	Routine & Preventive Maint	Roads	185,545,036	-74% routine maintenance	48,241,709
City & Villages	Preservation (includes routine & preventive maint)	Roads	173,765,561	-36% routine maintenance	111,209,959
		Total	$454,647,831		$253,969,445

Non-Trunkline Total	**$1,008,730,021**	**$632,039,866**

Appendix D

Year	Proposed Freeway Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$514.80	$366.80
2013	$503.91	$355.91
2014	$508.44	$360.44
2015	$503.39	$355.39
2016	$528.15	$380.15
2017	$665.48	$517.48
2018	$690.79	$542.79
2019	$708.29	$560.29
2020	$737.03	$589.03
2021	$654.07	$506.07
2022	$660.39	$512.39
2023	$697.18	$549.18

Year	Proposed Non-Freeway Trunkline Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$609.33	$292.33
2013	$604.77	$287.77
2014	$604.48	$287.48
2015	$606.07	$289.07
2016	$648.15	$331.15
2017	$652.77	$335.77
2018	$684.16	$367.16
2019	$717.04	$400.04
2020	$751.52	$434.52
2021	$787.68	$470.68
2022	$825.57	$508.57
2023	$865.31	$548.31

Year	Proposed Non-Trunkline Federal-Aid Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$820.00	$442.00
2013	$820.00	$442.00
2014	$820.00	$442.00
2015	$820.00	$442.00
2016	$861.00	$483.00
2017	$904.05	$526.05
2018	$949.25	$571.25
2019	$996.72	$618.72
2020	$1,046.55	$668.55
2021	$1,098.88	$720.88
2022	$1,153.82	$775.82
2023	$1,211.51	$833.51

Year	Proposed Non-Federal-Aid Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$480.00	$226.00
2013	$480.00	$226.00
2014	$480.00	$226.00
2015	$480.00	$226.00
2016	$504.00	$250.00
2017	$529.20	$275.20
2018	$555.66	$301.66
2019	$583.44	$329.44
2020	$612.62	$358.62
2021	$643.25	$389.25
2022	$675.41	$421.41
2023	$709.18	$455.18

Year	Freeway Bridge Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$178	$30.00
2013	$178	$30.00
2014	$178	$30.00
2015	$178	$30.00
2016	$187	$38.90
2017	$196	$48.25
2018	$206	$58.06
2019	$216	$68.36
2020	$227	$79.18
2021	$239	$90.54
2022	$250	$102.46
2023	$263	$114.99

Year	Non-Freeway Trunkline Bridge Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$37	$0.00
2013	$37	$0.00
2014	$37	$0.00
2015	$37	$0.00
2016	$39	$1.85
2017	$41	$3.79
2018	$43	$5.83
2019	$45	$7.97
2020	$47	$10.22
2021	$50	$12.58
2022	$52	$15.06
2023	$55	$17.67

Year	Non-Trunkline Bridge Strategy (millions)	Additional Funding Above Current Investment Needed to Meet and Sustain Goal (millions)
2012	$64	$20.00
2013	$64	$20.00
2014	$64	$20.00
2015	$64	$20.00
2016	$67	$23.20
2017	$71	$26.56
2018	$74	$30.09
2019	$78	$33.79
2020	$82	$37.68
2021	$86	$41.77
2022	$90	$46.05
2023	$95	$50.56

Appendix E

Non-Federal-Aid Roads

Year	Strategy Budget	85% good/fair by 2023 %PM	% Rehab	% Recon.	79,482 Reconstruct Budget	Total Lane Miles Reconstruct Lane Miles	Rehab Budget	Rehab Lane Miles	PM Budget	PM Lane Miles	Total Lane Miles
2012	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2013	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2014	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2015	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2016	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2017	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2018	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2019	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2020	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2021	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2022	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
2023	$480,000,000	0.49	0.3	0.21	$100,800,000	276	$144,000,000	1371	$235,200,000	11,760	13,407
Total	$5,760,000,000				$1,209,600,000	3,312	$1,728,000,000	16,452	$2,822,400,000	141,120	160,884
			Cost Per Lane Mile			$365,217		$105,033		$20,000	

Year	Reconstruct	Rehab	PM	Total
2012	0.35%	1.72%	14.80%	16.87%
2013	0.35%	1.72%	14.80%	16.87%
2014	0.35%	1.72%	14.80%	16.87%
2015	0.35%	1.72%	14.80%	16.87%
2016	0.35%	1.72%	14.80%	16.87%
2017	0.35%	1.72%	14.80%	16.87%
2018	0.35%	1.72%	14.80%	16.87%
2019	0.35%	1.72%	14.80%	16.87%
2020	0.35%	1.72%	14.80%	16.87%
2021	0.35%	1.72%	14.80%	16.87%
2022	0.35%	1.72%	14.80%	16.87%
2023	0.35%	1.72%	14.80%	16.87%
Total	4.17%	20.70%	177.55%	202.42%

Non-Trunkline Federal-Aid Roads

	Strategy	85% Good/Fair by 2023				54,452 Total Lane Miles					
Year	Budget	%PM	% Rehab	% Recon.	Reconstruct Budget	Reconstruct Lane Miles	Rehab Budget	Rehab Lane Miles	PM Budget	PM Lane Miles	Total Lane Miles
2012	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2013	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2014	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2015	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2016	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2017	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2018	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2019	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2020	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2021	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2022	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
2023	$820,000,000	0.25	0.4	0.35	$287,000,000	511	$328,000,000	1,988	$205,000,000	7,885	10,384
Total	$9,840,000,000				$3,444,000,000	6,132	$3,936,000,000	23,856	$2,460,000,000	94,620	124,608
			Cost Per Lane Mile			$561,644		$164,990		$25,999	

Year		Reconstruct	Rehab	PM	Total
	2012	0.94%	3.65%	14.48%	19.07%
	2013	0.94%	3.65%	14.48%	19.07%
	2014	0.94%	3.65%	14.48%	19.07%
	2015	0.94%	3.65%	14.48%	19.07%
	2016	0.94%	3.65%	14.48%	19.07%
	2017	0.94%	3.65%	14.48%	19.07%
	2018	0.94%	3.65%	14.48%	19.07%
	2019	0.94%	3.65%	14.48%	19.07%
	2020	0.94%	3.65%	14.48%	19.07%
	2021	0.94%	3.65%	14.48%	19.07%
	2022	0.94%	3.65%	14.48%	19.07%
	2023	0.94%	3.65%	14.48%	19.07%
	Total	11.26%	43.81%	173.77%	228.84%