

The State of Michigan Transportation



2003-2017 PASER Road Survey

For Cass County, Michigan



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INTRODUCTION

Every year since 2003 there has been an annual assessment of the condition of the southwest region's federal aid eligible roads, using the Pavement Surface Evaluation and Rating (PASER) system. The effort is funded and administered through the State of Michigan Transportation Asset Management Council (TAMC) and satisfies the Governmental Accounting Standards Board Statement 34 (GASB 34), requiring tri-annual road assessments for governmental units receiving federal aid, doing so with minimal staff over short time periods. SWMPC uses the data gathered to assist member agencies in developing plans for the effective management of their pavement networks.

From 2003 to 2007, SWMPC rated the entire county's federal aid eligible roads each year. Starting in 2008 funding from TAMC was redirected to pay for rating 50 percent of the road network each year. This led to an annual split in the road network into two approximately equal segments. On even number years, the northern half of the county is rated and in odd years the southern half is rated. Attempting to rate the entire county has its difficulties and due to previous budget and time constraints the entire road network was attempted but not completely rated. By splitting the network and its ratings over two years, the SWMPC insures county-wide coverage every two years.

In 2017 (an odd year), the southern half of the county was rated (see Appendix C). Since half ratings began in 2008, results are paired in two-year increments to show ratings for the county's entire federal aid network. The first set of paired ratings, 2008-2009, includes the ratings for the northern half in 2008, and the southern portion in 2009. Using this method, the most recent complete county rating is 2016-2017.

METHODOLOGY

PASER OVERVIEW

PASER, or Pavement Surface Evaluation and Rating, is a visual test of the surface condition of the road that utilizes a ten-point scale, focusing on pavement conditions; structural or geometric defects are not considered in determining the ratings. Ratings are applied to road segments of varying length, with ratings values ranging from 10 for a new road segment to 1 for a completely failed segment, and specific ratings determined by the number and type of surface defects. There are separate criteria for rating based on pavement type with concrete and asphalt being the two types rated in Cass County (for a full rating scale see Appendix A. Currently, gravel roads are not rated.). The ratings are compiled by teams of three to four individuals who drive the roads and conduct windshield surveys. The State of Michigan Transportation Asset Management Council has requested that the information gathered in this survey be reported using the following categories:

Roads with PASER ratings of 8-10 are in good condition and require routine maintenance. Routine maintenance encompasses day-to-day maintenance activities, such as street sweeping, drainage clearing, shoulder gravel grading, and sealing cracks to prevent water penetration.

Roads with PASER ratings of 5-7 are in fair condition and require capital preventative maintenance. Capital preventative maintenance is a planned set of cost effective treatments to an existing roadway system that retard future deterioration and maintain or improve the functional condition of the system without significantly increasing structural capacity. The purpose of capital preventative maintenance fixes is to protect the pavement structure, slow the rate of pavement deterioration, and/or correct pavement surface deficiencies. These treatments are targeted at pavement surface defects primarily caused by the environment and by pavement material deficiencies.

Roads with PASER ratings of 1-4 are in poor condition and require structural improvements. This category includes work identified as rehabilitation and reconstruction, addressing the structural integrity of a road.

EQUIPMENT AND STAFF TIME

The rating team consists of three people made up of a representative from the Southwest Michigan Planning Commission (SWMPC), the Cass County Road Commission, and the Michigan Department of Transportation (MDOT). The team collects data using a laptop computer with the Roadsoft GIS Laptop Data Collector software loaded. A GlobalSat BU-353 Waterproof USB GPS receiver was connected to the laptop to track position and locate road segments. Roadsoft GIS is an asset management software package created and distributed free of charge by the Michigan Technological University's Technology Development Group. The current version of the program was designed with a special module to collect PASER rating data, known as the Laptop Data Collector (LDC). Upon completion of ratings collection, another SWMPC team member loaded the data into the SWMPC Roadsoft database and generated reports for submission. All those who were in the vehicle during the rating process were required to attend a daylong training session on using the PASER system for road ratings. Participants also received an overview of the project and were given instruction on how to use the Roadsoft software.

RESULTS

SUMMARY OF 2016-2017 RATINGS

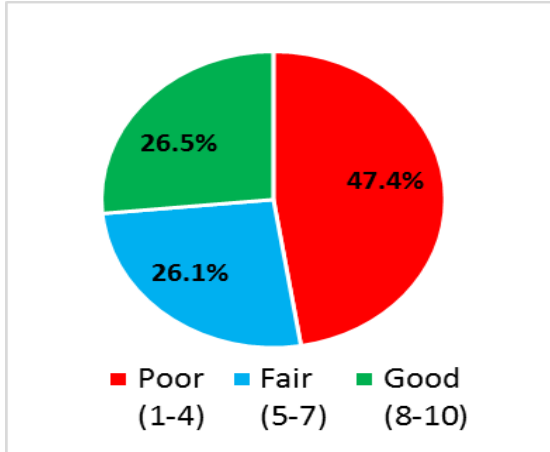


Figure 1. Percentage of Federal Aid Eligible Roads Rated Good, Fair, and Poor 2016/2017

In 2016 (an even numbered year) the northern half of Cass County was rated while in 2017 (an odd numbered year), the southern half was rated. The most recent full county rating therefore is the 2016-2017 ratings (Table 1). At 47.5 percent, a little under half of all federal aid eligible roads are in poor condition. On the other hand 26.5 percent of roads were rated good and 26.1 percent were rated fair. Overall, 20.7 percent of the roads are rated a 4 or had recently fallen out of the fair category. On the other hand, no roads were rated a 1 and only approximately 6 percent were rated a 2. This means that while roads are in poor condition very few have reached a point that could be considered to have completely failed.

Table 1. Pavement Ratings for Cass County for 2016-2017

Rating	1	2	3	4	5	6	7	8	9	10	Total
Miles	0.0	22.8	75.8	76.4	23.5	44.7	28.0	83.1	14.7	0.0	369.0
Percent	0.0%	6.2%	20.6%	20.7%	6.4%	12.1%	7.6%	22.5%	4.0%	0.0%	100%

Although nearly half of roads are rated poor, there are still differences in the treatment between roads rated 4 versus 3. At a rating of 4, a structural overlay is recommended (Appendix A), but Capital Preventive Maintenance (CPM) can still be performed, such as a “mill and fill.” CPM guidelines fall under MDOT’s local agency program guidelines for resurfacing, restoration, and rehabilitation (3R). Once a road deteriorates below a 4, a more extensive repair is required such as a full depth reconstruction. These fall under the new constructing/reconstruction (4R) guidelines.

The entire federal aid network includes state trunkline roads (roads maintained by MDOT) as well as locally maintained roads. Trunkline roads include the interstate and other limited access highways (US-31) as well as other non-divided or “surface streets.” Maintenance on Non-Trunkline Federal Aid (NTFA) roads within a city or village are the responsibility of a city or village, while NTFA roads within townships are maintained by the Cass County Road Commission. In 2016-2017, of the total 369 miles rated, 130.5 miles were trunkline roads, while 238.5 miles were NTFA.

Trunkline roads are in better condition overall than the NTFA (Table 2, Figure 2). When the total miles of Cass County federal aid eligible roads are considered there is a noticeable difference in condition between them and the NTFA category. Only 29.9 percent of trunkline roads are in poor condition compared to 57 percent of the NTFA. There is also a noticeable difference between the two categories in the percentage in fair condition with 36.4 percent of trunkline roads compared to 20.4 percent for NTFA. The difference in roads rated in good condition has a similar gap with 33.7 percent of trunkline roads in good condition compared to 22.5 percent of the NTFA. There is an acknowledged gap in funding for road maintenance statewide. Federal resources are most heavily applied to the Interstate system followed by the major arterials, which are mostly maintained by MDOT (the National Highway System). Therefore, the conditions are worse for the roads in the NTFA network. However, this speaks to the opportunity of asset management principles applied in an environment where resources are diminished.

Table 2. Pavement Ratings for Cass County by Trunkline vs. NTFA in 2016-2017

Rating	1	2	3	4	5	6	7	8	9	10	Total
Trunkline	0.0%	2.8%	8.1%	19.0%	8.0%	18.2%	10.1%	31.7%	2.0%	0.0%	100.0%
NTFA	0.0%	8.0%	27.4%	21.6%	5.5%	8.8%	6.2%	17.5%	5.0%	0.0%	100.0%

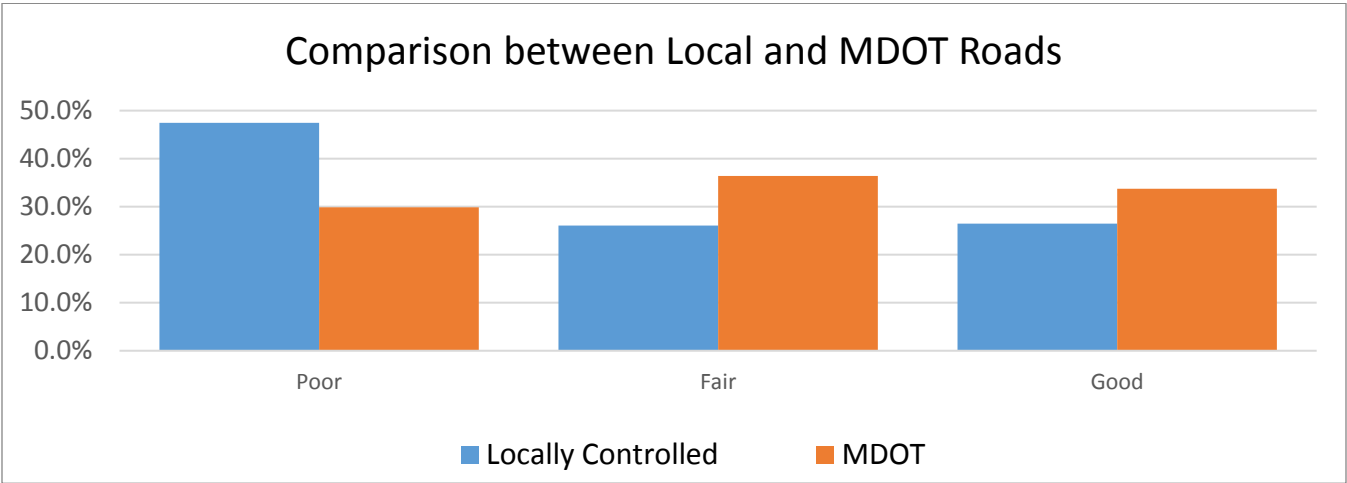


Figure 2. Percentage of Federal Aid Eligible Road Segments Falling Under Each PASER Rating Classification, by Ownership in Cass County for 2016-2017

COUNTYWIDE TRENDS

Ratings for Cass County over the previous fourteen years show a steady decrease in road quality (Table 3, Figure 3). In the fourteen years since PASER rating began, the percentage of assessed road segments receiving a good rating (8-10) has decreased from a high of 35.4 percent in 2003 to a low of 4.4 percent in 2010-2011. Fortunately, since 2010-2011 the percent of roads in good condition has increased to 26.5 percent in 2016-2017. The roads rated fair have fallen from a peak of 57 percent in 2004 to a low of 26.1

percent in 2016-2017. While ratings of “good” have increased since 2010-2011 and ratings of “fair” have consistently decreased since 2003, the result leaves a significant increase in roads rated “poor.” The percentage of road segments rated poor (1-4) grew from a low of 10.7 percent in 2003 to a high of 47.4 percent in 2016-2017. With an increase of 36.7 percentage points, this represents the greatest change across the three PASER categories.

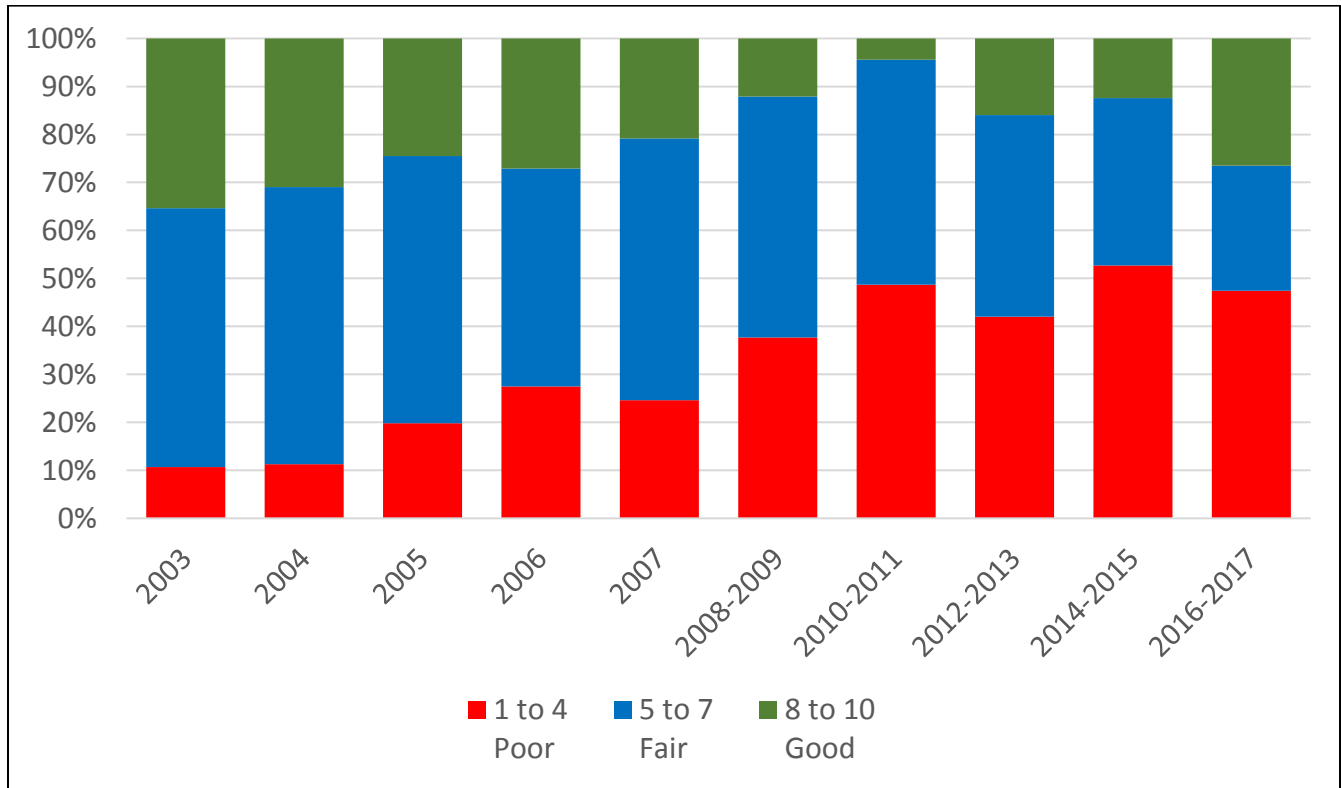


Figure 3. Percentage of Federal Aid Eligible Road Segments Falling in Each PASER Rating Classification, for Cass County, from 2003 to 2016-2017.

Table 3. Road Segment Classifications and Total Road-Miles Rated, by Year

Year	1 to 4: Poor	5 to 7: Fair	8 to 10: Good	Total Miles Rated
2003	10.70%	54.00%	35.40%	404.7
2004	11.30%	57.70%	31.00%	406
2005	19.80%	55.70%	24.50%	409.8
2006	27.50%	45.40%	27.10%	368.4
2007	24.60%	54.50%	20.80%	367.5
2008-2009	37.71%	50.20%	12.10%	414.2
2010-2011	48.71%	46.85%	4.44%	413
2012-2013	42.00%	42.02%	15.98%	365.5
2014-2015	52.70%	34.90%	12.40%	366.5
2016-2017	47.43%	26.07%	26.50%	369.0
Change from 2003 to 2016-2017	36.73%	-27.93%	-10.37%	

ROAD RATINGS BY JURISDICTION

In addition to the aggregate county-wide conditions displayed above, Table 4 (starting on page 9) displays yearly ratings data by local jurisdiction. The table displayed on page 17 of this document provides a detailed list of how road conditions have changed at the jurisdictional level over the past 14 years.

Of the 20 cities, villages, and townships in Cass County, 4 have had the percentage of federal aid eligible road segments in good condition increase. Overall, the amount of roads in poor condition have grown more quickly. Only 2 jurisdictions have had the percentage of road segments in poor condition decrease over the fourteen years of analysis.

Asset management principles advocate for preventative maintenance on fair roads to improve their current condition and extend their life. For roads in poor condition, even resurfacing without a full reconstruction is only a partial solution. A road rated a 4 can be resurfaced to a rating of 9 but without the necessary structural repairs including drainage, the road will deteriorate quickly back to fair condition. Total reconstruction, which turns the road into a rating of 10, is the costliest solution and thus should be minimized, but once a road reaches a condition of 1 or 2, it is the only available option (see Appendix B). Further, once a road reaches a rating of 2 there is the possibility that it could degrade to a 1 which is considered a complete failure and a major safety risk for drivers. Part of the purpose in compiling the PASER ratings and publishing an annual report is to promote planning that emphasizes a balance of structural improvements, preventative maintenance, and routine maintenance as a coordinated strategy for achieving and sustaining high-quality infrastructure.

Table 4. Percentage of Federal Aid Eligible Roads in Each PASER Category by Jurisdiction

Cass County Jurisdictions	2 0 0 3				2 0 0 4			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	6.8%	46.1%	47.1%	25.8	1.8%	68.9%	29.3%	25.8
Cassopolis	0.0%	81.2%	18.8%	1.3	0.0%	74.9%	25.1%	1.3
Dowagiac	10.0%	56.0%	34.0%	14.4	17.1%	56.6%	26.3%	14.7
Edwardsburg	11.3%	52.3%	36.5%	0.9	0.0%	100.0%	0.0%	0.9
Howard Twp	0.0%	74.1%	25.9%	27.3	2.3%	83.2%	14.5%	28.1
Jefferson Twp	3.2%	74.2%	22.6%	31.2	0.0%	81.3%	18.7%	31.2
Lagrange Twp	19.6%	39.0%	41.4%	36.1	21.6%	40.2%	38.2%	36.2
Marcellus	78.6%	21.4%	0.0%	0.3	86.5%	13.5%	0.0%	0.3
Marcellus Twp	8.0%	62.1%	29.9%	15.0	19.6%	31.0%	49.4%	15.0
Mason Twp	0.9%	39.6%	59.5%	20.5	0.0%	50.8%	49.2%	20.5
Milton Twp	4.3%	73.4%	22.3%	26.3	1.1%	77.8%	21.2%	26.3
Newberg Twp	24.9%	26.5%	48.6%	32.3	29.3%	28.0%	42.8%	32.3
Ontwa Twp	0.0%	58.7%	41.3%	22.9	0.0%	76.8%	23.2%	22.9
Penn Twp	18.8%	53.2%	28.0%	29.0	22.1%	47.4%	30.5%	29.0
Pokagon Twp	4.9%	82.0%	13.1%	24.4	11.0%	72.2%	16.8%	24.4
Porter Twp	7.2%	70.8%	22.1%	32.0	11.8%	60.2%	28.0%	32.0
Silver Creek Twp	18.2%	38.4%	43.5%	22.8	16.0%	33.3%	50.7%	22.9
Volinia Twp	21.2%	29.6%	49.2%	21.2	18.8%	55.8%	25.4%	21.2
Wayne Twp	16.6%	37.0%	46.5%	20.7	5.1%	50.0%	44.9%	20.8

Cass County Jurisdictions	2 0 0 5				2 0 0 6			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	5.7%	61.3%	33.0%	25.8	20.1%	60.7%	19.2%	23.9
Cassopolis	6.1%	88.7%	5.2%	1.3	52.7%	47.3%	0.0%	1.2
Dowagiac	26.6%	52.0%	21.5%	14.7	36.6%	43.3%	20.1%	14.7
Edwardsburg	11.3%	88.7%	0.0%	0.9	0.0%	56.1%	43.9%	0.9
Howard Twp	24.7%	53.9%	21.4%	29.4	44.9%	29.5%	25.7%	29.8
Jefferson Twp	8.2%	64.9%	26.9%	31.2	35.7%	49.8%	14.5%	31.2
Lagrange Twp	18.6%	66.5%	14.9%	36.2	19.8%	65.7%	14.5%	32.6
Marcellus	100.0%	0.0%	0.0%	0.3	0.0%	0.0%	100.0%	0.3
Marcellus Twp	24.5%	49.6%	25.9%	15.0	16.8%	49.8%	33.3%	16.2
Mason Twp	6.4%	31.5%	62.1%	20.5	15.3%	14.6%	70.1%	17.3
Milton Twp	31.0%	51.1%	17.9%	27.1	56.4%	33.4%	10.2%	27.6
Newberg Twp	32.1%	49.4%	18.6%	32.3	27.5%	48.5%	24.0%	21.8
Ontwa Twp	23.4%	60.0%	16.7%	23.9	27.4%	32.0%	40.6%	24.2
Penn Twp	16.2%	57.7%	26.0%	29.0	30.6%	39.3%	30.0%	19.1
Pokagon Twp	13.9%	77.2%	8.8%	24.9	17.6%	41.9%	40.6%	24.9
Porter Twp	35.0%	38.1%	26.9%	32.0	25.6%	34.5%	39.9%	31.5
Silver Creek Twp	15.4%	74.9%	9.7%	22.9	19.7%	53.9%	26.3%	22.9
Volinia Twp	18.8%	45.8%	35.4%	21.2	0.0%	91.3%	8.7%	12.7
Wayne Twp	13.1%	44.5%	42.4%	20.8	20.2%	54.3%	25.5%	15.8

Cass County Jurisdictions	2 0 0 7			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	24.4%	58.8%	16.8%	23.9
Cassopolis	60.7%	39.3%	0.0%	1.3
Dowagiac	26.4%	42.1%	31.5%	14.7
Edwardsburg	56.1%	0.0%	43.9%	0.9
Howard Twp	25.8%	48.5%	25.6%	29.8
Jefferson Twp	37.8%	57.4%	4.8%	31.3
Lagrange Twp	11.1%	69.5%	19.4%	32.7
Marcellus	0.0%	16.7%	83.3%	0.3
Marcellus Twp	23.0%	77.0%	0.0%	17.1
Mason Twp	8.7%	57.1%	34.1%	15.1
Milton Twp	45.8%	45.8%	8.4%	27.7
Newberg Twp	0.0%	68.5%	31.5%	21.8
Ontwa Twp	32.1%	32.5%	35.4%	24.2
Penn Twp	19.3%	59.4%	21.3%	19.1
Porter Twp	31.6%	25.6%	42.8%	31.5
Silver Creek Twp	29.5%	66.3%	4.2%	22.9
Vandalia	N/A	N/A	N/A	0.0
Volinia Twp	3.9%	92.4%	3.7%	12.7
Wayne Twp	24.1%	75.9%	0.0%	15.8

Cass County Jurisdictions	2 0 0 8				2 0 0 9			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	0.0%	0.0%	0.0%	0.0	37.7%	62.3%	0.0%	25.8
Cassopolis	60.3%	39.7%	0.0%	1.2	41.3%	58.7%	0.0%	0.4
Dowagiac	39.3%	46.3%	14.4%	14.7	N/A	N/A	N/A	0.0
Edwardsburg	0.0%	0.0%	0.0%	0.0	0.0%	0.0%	100.0%	0.9
Howard Twp	0.0%	0.0%	0.0%	0.0	23.5%	71.8%	4.8%	29.9
Jefferson Twp	0.0%	0.0%	0.0%	0.0	59.3%	40.7%	0.0%	31.3
Lagrange Twp	20.5%	53.8%	25.6%	32.6	74.6%	25.4%	0.0%	4.1
Marcellus	0.0%	15.1%	84.9%	0.3	N/A	N/A	N/A	0.0
Marcellus Twp	20.1%	63.7%	16.2%	16.2	100.0%	0.0%	0.0%	0.9
Mason Twp	0.0%	0.0%	0.0%	0.0	21.6%	42.9%	35.5%	20.5
Milton Twp	0.0%	0.0%	0.0%	0.0	61.4%	36.5%	2.2%	27.7
Newberg Twp	4.6%	39.3%	56.1%	21.8	84.2%	15.8%	0.0%	10.5
Ontwa Twp	0.0%	0.0%	0.0%	0.0	47.6%	32.2%	20.2%	24.1
Penn Twp	27.5%	63.1%	9.4%	19.1	35.0%	65.0%	0.0%	9.9
Pokagon Twp	31.0%	50.5%	18.5%	24.7	0.0%	100.0%	0.0%	0.1
Porter Twp	51.1%	39.1%	9.8%	32.0	100.0%	0.0%	0.0%	0.3
Silver Creek Twp	39.2%	60.8%	0.0%	22.9	N/A	N/A	N/A	0.0
Vandalia	N/A	N/A	N/A	0.0	50.6%	49.4%	0.0%	0.4
Volinia Twp	37.9%	62.1%	0.0%	12.7	41.5%	58.5%	0.0%	8.5
Wayne Twp	30.9%	68.6%	0.5%	15.8	39.9%	60.1%	0.0%	5.0

Cass County Jurisdictions	2 0 1 0				2 0 1 1			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	N/A	N/A	N/A	0.0	54.4%	45.6%	0.0%	23.9
Cassopolis	45.9%	54.1%	0.0%	1.3	N/A	N/A	N/A	0.0
Dowagiac	43.9%	53.3%	2.7%	14.7	N/A	N/A	N/A	0.0
Edwardsburg	N/A	N/A	N/A	0.0	0.0%	88.7%	11.3%	0.9
Howard Twp	N/A	N/A	N/A	0.0	55.5%	44.5%	0.0%	30.0
Jefferson Twp	N/A	N/A	N/A	0.0	67.2%	32.8%	0.0%	31.2
Lagrange Twp	35.9%	57.0%	7.0%	36.2	N/A	N/A	N/A	0.0
Marcellus	0.0%	100.0%	0.0%	0.3	N/A	N/A	N/A	0.0
Marcellus Twp	59.3%	40.7%	0.0%	17.1	N/A	N/A	N/A	0.0
Mason Twp	N/A	N/A	N/A	N/A	22.7%	77.3%	0.0%	15.1
Milton Twp	49.3%	50.7%	0.0%	0.6	74.2%	25.8%	0.0%	27.7
Newberg Twp	26.9%	54.5%	18.5%	32.3	N/A	N/A	N/A	0.0
Ontwa Twp	N/A	N/A	N/A	0.0	62.6%	36.4%	1.0%	24.2
Penn Twp	39.7%	52.2%	8.2%	29.0	N/A	N/A	N/A	0.0
Pokagon Twp	54.0%	40.3%	5.7%	23.8	N/A	N/A	N/A	0.0
Porter Twp	43.3%	48.4%	8.2%	32.0	N/A	N/A	N/A	0.0
Silver Creek Twp	51.1%	44.5%	4.4%	22.9	N/A	N/A	N/A	0.0
Vandalia	0.0%	100.0%	0.0%	0.4	N/A	N/A	N/A	0.0
Volinia Twp	55.9%	44.1%	0.0%	21.2	N/A	N/A	N/A	0.0
Wayne Twp	36.8%	56.2%	7.0%	20.8	N/A	N/A	N/A	0.0

Cass County Jurisdictions	2 0 1 2				2 0 1 3			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	N/A	N/A	N/A	0.0	50.2%	49.8%	0.0%	23.9
Cassopolis	45.5%	54.5%	0.0%	1.3	N/A	N/A	N/A	0.0
Dowagiac	40.1%	38.1%	21.8%	14.6	N/A	N/A	N/A	0.0
Edwardsburg	N/A	N/A	N/A	0.0	17.1%	82.9%	11.3%	0.9
Howard Twp	N/A	N/A	N/A	0.0	36.8%	62.4%	0.8%	30.0
Jefferson Twp	N/A	N/A	N/A	0.0	67.7%	23.5%	8.9%	31.2
Lagrange Twp	47.0%	50.8%	2.2%	32.7	N/A	N/A	N/A	0.0
Marcellus	0.0%	0.0%	100%	0.3	N/A	N/A	N/A	0.0
Marcellus Twp	51.9%	25.1%	23.0%	16.2	N/A	N/A	N/A	0.0
Mason Twp	N/A	N/A	N/A	0.0	15.1%	41.9%	43.0%	15.1
Milton Twp	N/A	N/A	N/A	0.0	45.3%	29.7%	25.0%	27.7
Newberg Twp	19.8%	53.1%	27.0%	21.8	N/A	N/A	N/A	0.0
Ontwa Twp	N/A	N/A	N/A	0.0	45.7%	18.0%	36.3%	24.2
Penn Twp	22.7%	56.4%	20.9%	19.1	N/A	N/A	N/A	0.0
Pokagon Twp	52.8%	44.6%	2.5%	24.9	N/A	N/A	N/A	0.0
Porter Twp	26.1%	52.9%	21.0%	31.2	N/A	N/A	N/A	0.0
Silver Creek Twp	52.2%	32.9%	14.9%	22.9	N/A	N/A	N/A	0.0
Vandalia	N/A	N/A	N/A	0.0	N/A	N/A	N/A	0.0
Volinia Twp	56.1%	12.1%	31.8%	12.7	N/A	N/A	N/A	0.0
Wayne Twp	27.8%	67.3%	4.9%	15.0	N/A	N/A	N/A	0.0

Cass County Jurisdictions	2 0 1 4				2 0 1 5			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	N/A	N/A	N/A	0.0	81.2%	13.6%	5.2%	23.9
Cassopolis	64.9%	35.1%	0.0%	1.2	N/A	N/A	N/A	0.0
Dowagiac	49.5%	38.9%	11.7%	14.6	N/A	N/A	N/A	0.0
Edwardsburg	N/A	N/A	N/A	0.0	56.1%	43.9%	0.0%	0.9
Howard Twp	N/A	N/A	N/A	0.0	62.3%	37.7%	0.0%	30.0
Jefferson Twp	N/A	N/A	N/A	0.0	91.1%	5.9%	3.0%	31.2
Lagrange Twp	65.1%	32.9%	2.0%	32.7	N/A	N/A	N/A	0.0
Marcellus	0.0	100.0%	0.0%	0.3	N/A	N/A	N/A	0.0
Marcellus Twp	67.9%	20.5%	11.6%	16.2	N/A	N/A	N/A	0.0
Mason Twp	N/A	N/A	N/A	0.0	44.9%	51.8%	3.3%	15.1
Milton Twp	N/A	N/A	N/A	0.0	88.8%	11.2%	0.0%	27.7
Newberg Twp	59.9%	31.3%	8.8%	21.8	N/A	N/A	N/A	0.0
Ontwa Twp	N/A	N/A	N/A	0.0	64.6%	34.0%	1.4%	24.2
Penn Twp	57.8%	38.2%	4.0%	19.1	N/A	N/A	N/A	0.0
Pokagon Twp	82.9%	17.1%	0.0%	24.9	N/A	N/A	N/A	0.0
Porter Twp	46.5%	5.7%	47.9%	31.2	N/A	N/A	N/A	0.0
Silver Creek Twp	68.7%	31.3%	0.0%	22.9	N/A	N/A	N/A	0.0
Vandalia	N/A	N/A	N/A	0.0	N/A	N/A	N/A	0.0
Volinia Twp	74.4%	25.6%	0.0%	12.7	N/A	N/A	N/A	0.0
Wayne Twp	54.6%	39.1%	6.2%	15.8	N/A	N/A	N/A	0.0

Cass County Jurisdictions	2 0 1 6				2 0 1 7			
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)	Total Miles Rated
Calvin Twp	N/A	N/A	N/A	0.0	46.7%	13.4%	40.0%	23.91
Cassopolis	45.4%	38.5%	15.3%	4.73	N/A	N/A	N/A	0.0
Dowagiac	31.4%	59.8%	8.8%	15.32	N/A	N/A	N/A	0.0
Edwardsburg	N/A	N/A	N/A	0.0	54.1%	45.9%	0.0%	3.11
Howard Twp	N/A	N/A	N/A	0.0	70.4%	14.4%	15.3%	31.99
Jefferson Twp	N/A	N/A	N/A	0.0	66.6%	22.0%	11.4%	31.26
Lagrange Twp	45.5%	17.4%	37.2%	29.17	N/A	N/A	N/A	0.0
Marcellus	6.2%	35.3%	58.6%	1.62	N/A	N/A	N/A	0.0
Marcellus Twp	48.4%	2.5%	49.1%	14.83	N/A	N/A	N/A	0.0
Mason Twp	N/A	N/A	N/A	0.0	38.7%	18.1%	43.2%	15.12
Milton Twp	N/A	N/A	N/A	0.0	47.2%	15.1%	37.7%	27.69
Newberg Twp	28.8%	36.6%	34.7%	21.81	N/A	N/A	N/A	0.0
Ontwa Twp	N/A	N/A	N/A	0.0	27.5%	38.8%	33.7%	21.94
Penn Twp	42.2%	40.1%	17.7%	18.11	N/A	N/A	N/A	0.0
Pokagon Twp	73.9%	25.5%	0.6%	24.89	N/A	N/A	N/A	0.0
Porter Twp	47.1%	12.1%	40.8%	31.25	N/A	N/A	N/A	0.0
Silver Creek Twp	32.7%	62.9%	4.4%	22.86	N/A	N/A	N/A	0.0
Vandalia	0.0%	100.0%	0.0%	1.01	N/A	N/A	N/A	0.0
Volinia Twp	23.4%	18.3%	58.3%	12.69	N/A	N/A	N/A	0.0
Wayne Twp	56.8%	29.2%	13.9%	15.69	N/A	N/A	N/A	0.0

Cass County Jurisdictions	Change from 2003 to 2016-2017		
	Struc. Impr. (1 to 4)	Cap. Prev. (5 to 7)	Rout. Maint. (8 to 10)
Calvin Twp	39.9%	-32.7%	-7.1%
Cassopolis	45.4%	-42.7%	-3.5%
Dowagiac	21.4%	3.8%	-25.2%
Edwardsburg	42.8%	-6.4%	-36.5%
Howard Twp	70.4%	-59.7%	-10.6%
Jefferson Twp	63.4%	-52.2%	-11.2%
Lagrange Twp	25.9%	-21.6%	-4.2%
Marcellus	-72.4%	13.9%	58.6%
Marcellus Twp	40.4%	-59.6%	19.2%
Mason Twp	37.8%	-21.5%	-16.3%
Milton Twp	42.9%	-58.3%	15.4%
Newberg Twp	3.9%	10.1%	-13.9%
Ontwa Twp	27.5%	-19.9%	-7.6%
Penn Twp	23.4%	-13.1%	-10.3%
Pokagon Twp	69.0%	-56.5%	-12.5%
Porter Twp	39.9%	-58.7%	18.7%
Silver Creek Twp	14.5%	24.5%	-39.1%
Volinia Twp	-21.2%	70.4%	-49.2%
Wayne Twp	6.8%	-18.7%	11.8%

PASER Asphalt Rating Chart		
Surface Rating	Visible Distress *	General Condition/ Treatment Measures
10	None	New construction.
9	None	Recent overlay, like new.
8	<ul style="list-style-type: none"> • No longitudinal cracks except reflection of paving joints. • Occasional transverse cracks, widely spaced (40' or greater). 	Recent sealcoat or new road mix. Little or no maintenance required.
7	<ul style="list-style-type: none"> • 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 feet 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	<ul style="list-style-type: none"> • Slight raveling (loss of lines) and traffic wear. • Longitudinal cracks (open ¼" – ½") due to reflection and paving joints. • Transverse cracking (open ¼" to ½") some spaced less than 10 feet. • First sign of block cracking • Slight to moderate flushing or polishing. • Occasional patching in good condition. 	Shows signs of aging, sound structural condition. Could extend life with sealcoat.
5	<ul style="list-style-type: none"> • Moderate to severe ravelling (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 nonstructural overlay.
4	<ul style="list-style-type: none"> • Severe surface ravelling. • Multiple longitudinal and transverse cracking with slight ravelling. • 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 recycling or overlay.
3	<ul style="list-style-type: none"> • Closely spaced longitudinal and transverse cracks often showing ravelling 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 major overlay or complete recycling.
2	<ul style="list-style-type: none"> • 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.
1	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

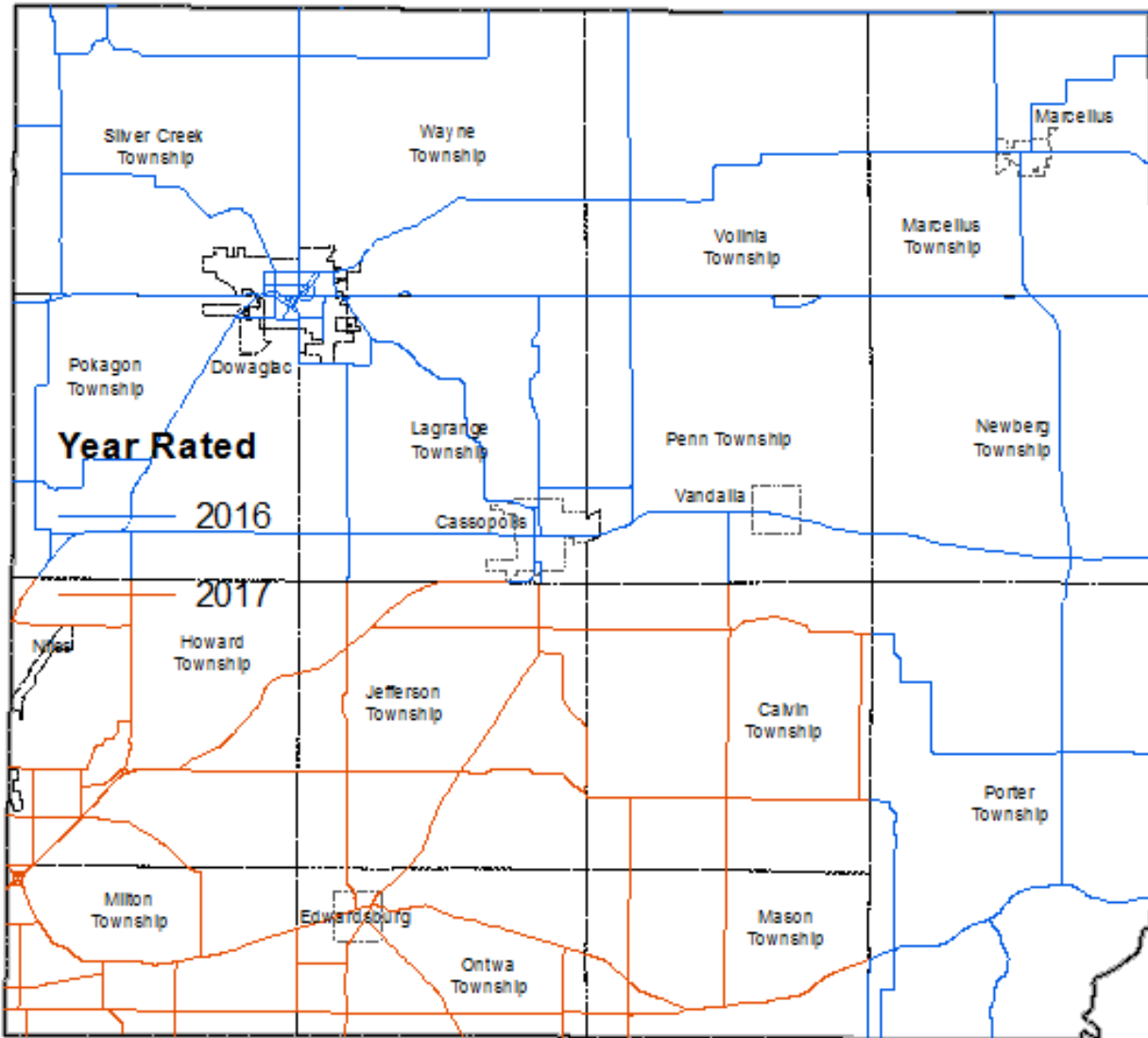
*** Note: Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.**

PASER Concrete Rating Chart		
Surface Rating	Visible Distress *	General Condition/ Treatment Measures
10	None	New construction.
9	<ul style="list-style-type: none"> • Traffic wear in wheelpath. • Slight map cracking or pop-outs. 	Recent concrete overlay or joint rehabilitation, like new
8	<ul style="list-style-type: none"> • Pop-outs, map cracking, or minor surface defects. • Slight surface scaling. • Partial loss of joint sealant. • Isolated meander cracks and cracks at manholes, tight or well sealed. 	More surface wear or slight defects. Recent asphalt overlay. Little or no maintenance required.
7	<ul style="list-style-type: none"> • More extensive surface scaling. • Some open joints. • Isolated transverse or longitudinal cracks, tight or well sealed. • Some manhole displacement and cracking. • First utility patch, in good condition. • First noticeable settlement or heave area. 	First sign of transverse cracks (all tight) or utility patch. More extensive surface scaling. Seal open joints and other routine maintenance.
6	<ul style="list-style-type: none"> • Moderate scaling in several locations. • A few isolated surface spalls. • Shallow reinforcement causing cracks. • Several corner cracks, tight or well sealed. • Open (¼" wide) longitudinal or transverse joints and more frequent transverse cracks (some open ¼"). 	First signs of shallow reinforcement or corner cracking. Needs general joint and crack sealing. Scaled areas could be overlaid.
5	<ul style="list-style-type: none"> • Moderate to severe polishing or scaling over 25% of the surface. • High reinforcing steel causing surface spalling. • Some joints and cracks have begun spalling. • First signs of joint or crack faulting (1/4"). • Multiple corner cracks with broken pieces. • Moderate settlement or frost heave areas. • Patching showing distress. 	First signs of joint or crack spalling or faulting. Grind to repair surface defects. Some partial depth joint repairs needed.
4	<ul style="list-style-type: none"> • Severe polishing, scaling, cracking or spalling, over 50% of the area. • Joints and cracks show moderate to severe spalling. • Pumping and faulting of joints (1/2") with fair ride. • Several slabs have multiple transverse or meander cracks with moderate spalling. Spalled area broken into several pieces. • Corner cracks with missing pieces or patches. • Pavement blowups. 	Needs some full depth repairs, grinding, and/or asphalt overlay to correct surface defects.
3	<ul style="list-style-type: none"> • Most joints and cracks are open, with multiple parallel cracks, severe spalling or faulting. • D-cracking is evident. • Severe faulting (1") giving poor ride. • Extensive patching in fair to poor condition. • Many transverse and meander cracks, open and severely spalled. 	Needs extensive full depth patching plus some full slab replacement.
2	<ul style="list-style-type: none"> • Extensive slab cracking, severely spalled and patched. • Joints failed. • Patching in very poor condition. • Severe and extensive settlements or front heaves. 	Recycle and/or rebuild pavement.
1	<ul style="list-style-type: none"> • Restricted speed. • Extensive potholes. • Almost total loss of pavement integrity. 	Total reconstruction.

APPENDIX B: TREATMENT OPTIONS

Treatment	Life Extension (Average Years)	PASER Rating	Cost per Mile	Average Cost per Additional Year
Overband Crack Filling	4	7 to 9	\$5,000	\$1,250
Fog Seal Coat	0	8	\$5,000	N/A
One Course Non-Structural Overlay	10	5 to 6	\$75,000	\$7,500
Milling and One Course Non-Structural Overlay	10	4 to 5	\$95,000	\$9,500
Single Course Chip Seal	7	6 to 7	\$23,000	\$3,286
Double Course Chip Seal	9	5 to 6	\$46,000	\$5,111
Structural Crush & Shape	25	2 to 3	\$200,000	\$8,000
Full-Depth Reconstruction	30	1 to 2	\$400,000	\$13,333

Costs are included for comparison purposes. actual costs for Cass County will differ.



Year Rated

— 2016

— 2017