

FEDERAL AID ROAD CONDITION REPORT FOR KALAMAZOO COUNTY

2017

Prepared by the Kalamazoo Area Transportation Study | (269) 343-0766 | info@KATSmpo.org | www.KATSmpo.org

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Executive Summary

The Kalamazoo Area Transportation Study assisted in the data collection of road inventory for Kalamazoo County in 2016 and 2017. The data collection efforts took place on Federal-Aid roads in the county. Since 2011 the Transportation Asset Management Council PASER data collection has changed what constitutes a “federal-aid eligible” road. This change excludes some Rural Minor Collectors that were rated during previous years.

According to 23 USC 101, “Federal-aid eligible” roads are “highways on the Federal-aid highway systems and all other public roads not classified as local roads or rural minor collectors.”

Within Kalamazoo County, there are:

- **737 miles of Federal-aid roads.** This includes roads that are maintained by the Michigan Department of Transportation, the Road Commission of Kalamazoo County, and the cities and villages within the county.
- **198 miles of Trunkline roadways.** These roadways are maintained by the Michigan Department of Transportation.

This report compiles ratings records for the last two years and compares the results with those from 2010 through 2017 to analyze the condition of the federal aid road system in Kalamazoo County.

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What is Asset Management?

“An ongoing process of maintaining, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment.”
- Act 499 of the Public Acts of 2002.

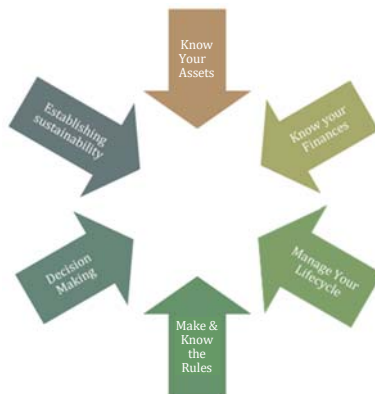
The State of Michigan defines asset management as “an ongoing process of maintaining, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment.” Asset management consists of a set of business principles and practices used to meet the goals of good ownership and effective, responsible management. The process allows transportation agencies to monitor the current condition of all federal aid eligible pavements, while also taking an inventory of potential preventative measures, to ensure the quality of the roads in the future. Implementation of asset management principles requires a shift from “Worst First” system management to one that considers the long range view of how the system functions.

Principles of Asset Management

Asset management follows five core principles. They are:

- **Performance-Based**-Allows policy objectives to be broken down into daily operations decisions and strategic maintenance decisions.
- **Decisions Based on Quality Information**-Accurate information regarding the inventory, condition, and available funding of any of the assets involved.
- **Policy-Driven**-Resource allocation decisions that are based on well-defined performance goals and objectives. Alternatives are examined, and often level of service, system conditions, and community goals are reflected.
- **Analysis of Mix of Fixes, Options and Tradeoffs**-A system-wide assessment is made to determine the most valuable alternatives to invest in current and future system performance.
- **Monitoring to Provide Clear Accountability and Feedback**-The system needs to be consistently monitored to ensure that the chosen investments are meeting the predetermined goals and policy objectives.

All agencies currently apply some form of these principles, and for that reason, existing principles can be easily built upon in order to implement a successful asset management plan.



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Benefits of Asset Management

Asset management provides public agencies with a better understanding of the relationship between cost and performance. This understanding allows for better management, which is often directly reflected in the improvement of performance. In addition to the overall improvement of an agency's performance, there are many benefits of implementing asset management principles and practices. These benefits include:

- Improved service to customers;
- Improved cost-effectiveness and use of available resources;
- Improved communication with elected officials and the public about level of service vs. cost of service; and
- Improved credibility and accountability for decision-making process and results.

In order to gain these benefits, an agency must evaluate its current business practices, establish where significant improvements can be made, and develop a plan to institute changes.

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PASER Rating System

PASER (Pavement Surface Evaluation and Rating) is a simple “windshield” survey of road surface quality, which was developed by the University of Wisconsin-Madison to be used as the state’s standard road rating system. The system uses manuals that provide visual aids for identifying different types and extents of various defects that may be visually present in any given section of road. This information is used to assign values from the ten point PASER scale to rate their condition. On the PASER rating scale, one represents a failed road, and ten, a new road. The time that it takes a road to cycle from excellent to poor on the PASER scale is largely dependent on traffic volume and construction quality.

Regularly recording and charting the PASER rating over time on paved surfaces aids in predicting deterioration rates of surfaces. This information is important in order to create a plan of maintenance and replacement that is both efficient and cost effective.

PASER Categories

When surveying a paved surface for defects, there are four main categories to keep in mind. These categories are:

- **Surface Defects-** These include raveling (loss of aggregate on pavement surface), flushing (excess asphalt binder on pavement surface), or polishing (worn down aggregate on pavement surface resulting in a loss of friction)
- **Surface Deformation-** Includes rutting of wheel paths and pavement distortion
- **Cracks-** Can be transverse, longitudinal, Reflection, slippage, alligator, and block cracks
- **Patches and Potholes-** Patches are when previous damage has been filled by new material. Potholes are surface damage caused by traffic, fatigue, and poor drainage.

How Data is Collected

Data is collected by three-person teams that consist of one MDOT employee, one member of the local road agency, and one member from the regional planning agency. Together, this team is responsible for evaluating pavement and recording information about each road, using a laptop and a GPS receiver. This information includes the road surface type, number of lanes, and road condition (PASER Rating).

Treatments

Applying a rating system like PASER to a paved network of roads allows for an efficient way to inventory and evaluate transportation assets. These evaluations can then be used to create a prioritized arrangement of projects, and select from any of the treatment alternatives. Effective management of pavement keeps the condition of the road ahead of rapid deterioration with treatments that are lower cost.

There are a number of treatment options that directly correlate to the PASER score of a paved surface. The better the road is rated, the less treatment it requires. For example, roads with a PASER rating 8-10 only require routine maintenance through scheduled activities like sweeping, drainage clearing, shoulder clearing/grading, and crack seal/slurry coat to prevent water infiltration. Roads rated 5-7 require capital preventative maintenance such as chip seal or non-structural overlay. If the roadway deteriorates past a 4 on the PASER scale, capital preventative maintenance methods of treatment are not effective. A road rated 1-4 on the PASER scale requires some form of structural improvement or full reconstruction.

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The following table illustrates PASER ratings for asphalt pavements, which constitute the majority of roads in Kalamazoo County.

Table 1

Rating	Visible Distress	General Treatment & Conditions
10 Good	None	New Construction up to one year old
9 Good	None	Recent Overlay or New Construction over 1 year old
8 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 1/4").	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Fair	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open 1/4") due to reflection or paving joints. Transverse cracks (open 1/4") 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 Fair	Slight raveling (loss of fines) and traffic wear. Longitudinal cracks (open 1/4" - 1/2"), some spaced less than 10'. 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 Fair	Moderate to severe raveling (loss of fine and coarse aggregate). Longitudinal and transverse cracks (open 1/2") 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 HMA overlay (less than 2")
4 Poor	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 (1/2" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from a structural HMA 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 HMA overlay. Milling and removal of deterioration extends the life of overlay.
2 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 Poor	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

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Table 2

Treatment	Life Extension (Average Years)	PASER Rating	Estimated Cost per Mile	Average Cost per Additional Year
Hot Mix Asphalt Crack Treatment	2	6 to 8	\$10,000	\$5,000
Fog Seal Coat	4	5 to 7	\$5,000	\$1,250
One Course Non-Structural HMA Overlay	7	5 to 6	\$60,000	\$8,571
Milling and One Course Non-Structural HMA Overlay	8	4 to 5	\$75,000	\$9,375
Single Course Chip Seal	6	5 to 7	\$15,000	\$2,500
Double Course Chip Seal	7.5	5 to 7	\$25,000	\$3,333
Single Course MicroSurface	5	4 to 6	\$20,000	\$4,000
Ultra-Thin HMA Overlay	8.5	4 to 6	\$30,000	\$3,529
Full-Depth Reconstruction	30	1 to 2	\$1,500,000	\$50,000

Capital Preventative Maintenance and Reconstructive Treatments

Table 2 details historical cost, lifespan, and rating of pavement treatment types that have been used in Kalamazoo County. These treatments range from the minimal (overband crack filling) to major construction. As noted these treatments and costs are historical; as new technologies emerge and become adopted some of them may be amended or superseded. The following list provides a brief overview of each treatment:

- Hot Mix Asphalt (HMA) Crack Treatments are the standard fix for working cracks on an asphalt surface. These cracks are blown out and sealed flush with a rubberized sealant to prevent water intrusion.
- Fog Seals provide a thin asphalt coating over existing pavement. This treatment seals aggregate in place, and prevents water permeation and oxidation of the asphalt binder.
- Non-Structural Overlays do not contribute to a pavement’s structural capacity. These treatments use thin layers of asphalt (1/2- 1 ½ inches) applied on top of existing pavement, with or without milling prior to placement. They improve surface ride quality and drainage, and help seal the surface from water permeation and oxidation.
- Chip Seals consist of a thin layer of emulsified asphalt applied to the road surface, which is topped with an aggregate usually consisting of crushed stone or slag. The treatment seals the underlying asphalt from water permeation and oxidation, and provides a renewed, high friction driving surface.
- Microsurfacing is a very thin application of cold mixture of emulsified asphalt and aggregate. Additives can be included to alter the final properties of the binder and/or decrease curing time to allow earlier opening of the treated roadway to traffic. The treatment seals the underlying pavement from water permeation and oxidation and provides a renewed high-friction driving surface. It can also be used to fill in pavement ruts, restoring an even driving surface.
- Ultra-Thin Hot Mix Asphalt Overlays are similar to microsurfacing, but utilize hot asphalt binder. They are typically more

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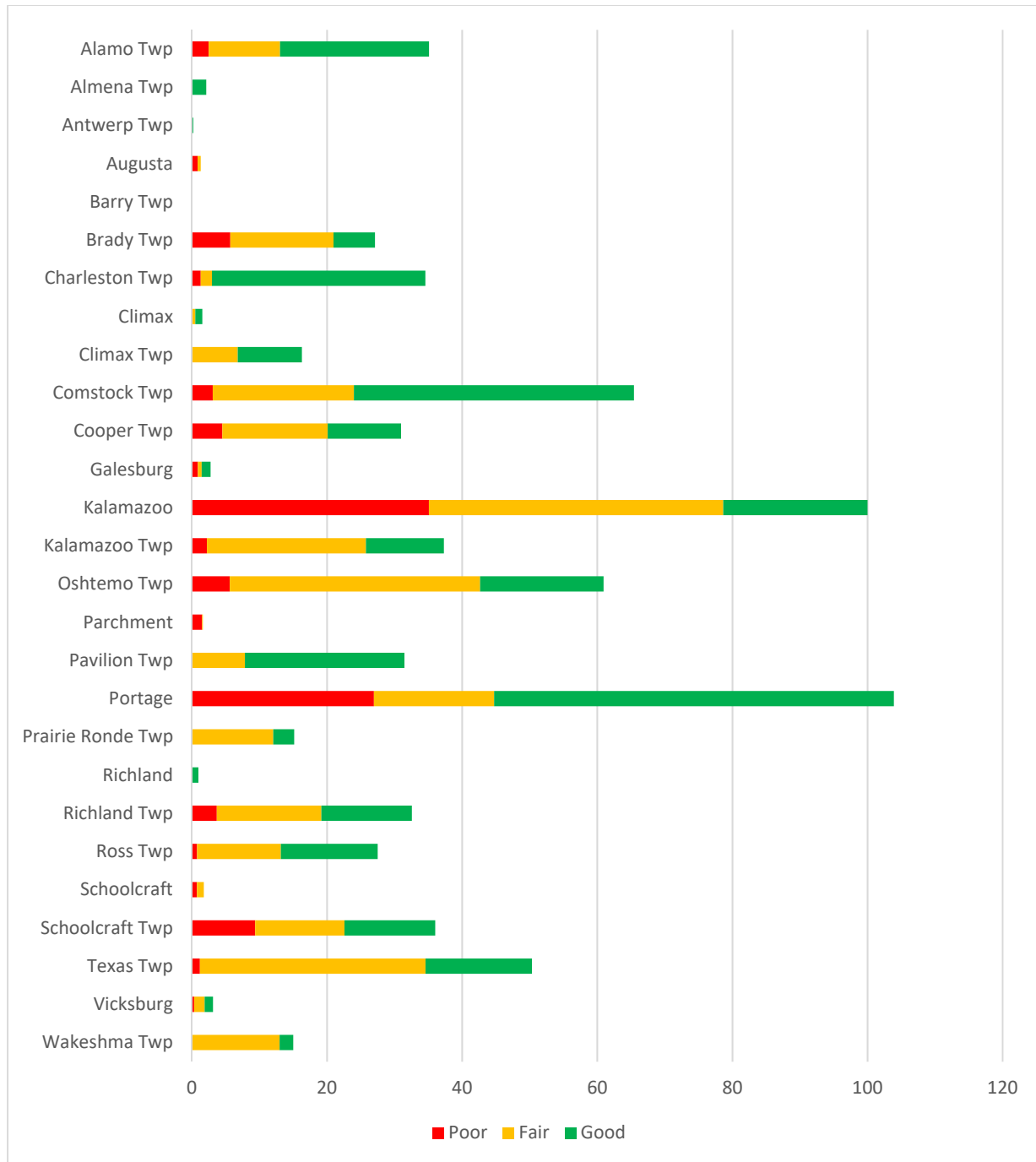
expensive to place than microsurfacing.

- Hot In-Place Asphalt Recycling heats up existing pavement to soften the binder. The heated material is then removed and mixed with additional virgin asphalt binder and used to repave the roadway.
- Full-Depth Reconstruction is the replacement of the entire roadway structure, including the base and subbase, with new material. It is used only when there is no salvage value to any of the existing components.

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Summary of 2016 and 2017 Ratings

2016/2017 PASER Ratings Kalamazoo County **All** Federal-Aid Miles by Jurisdiction



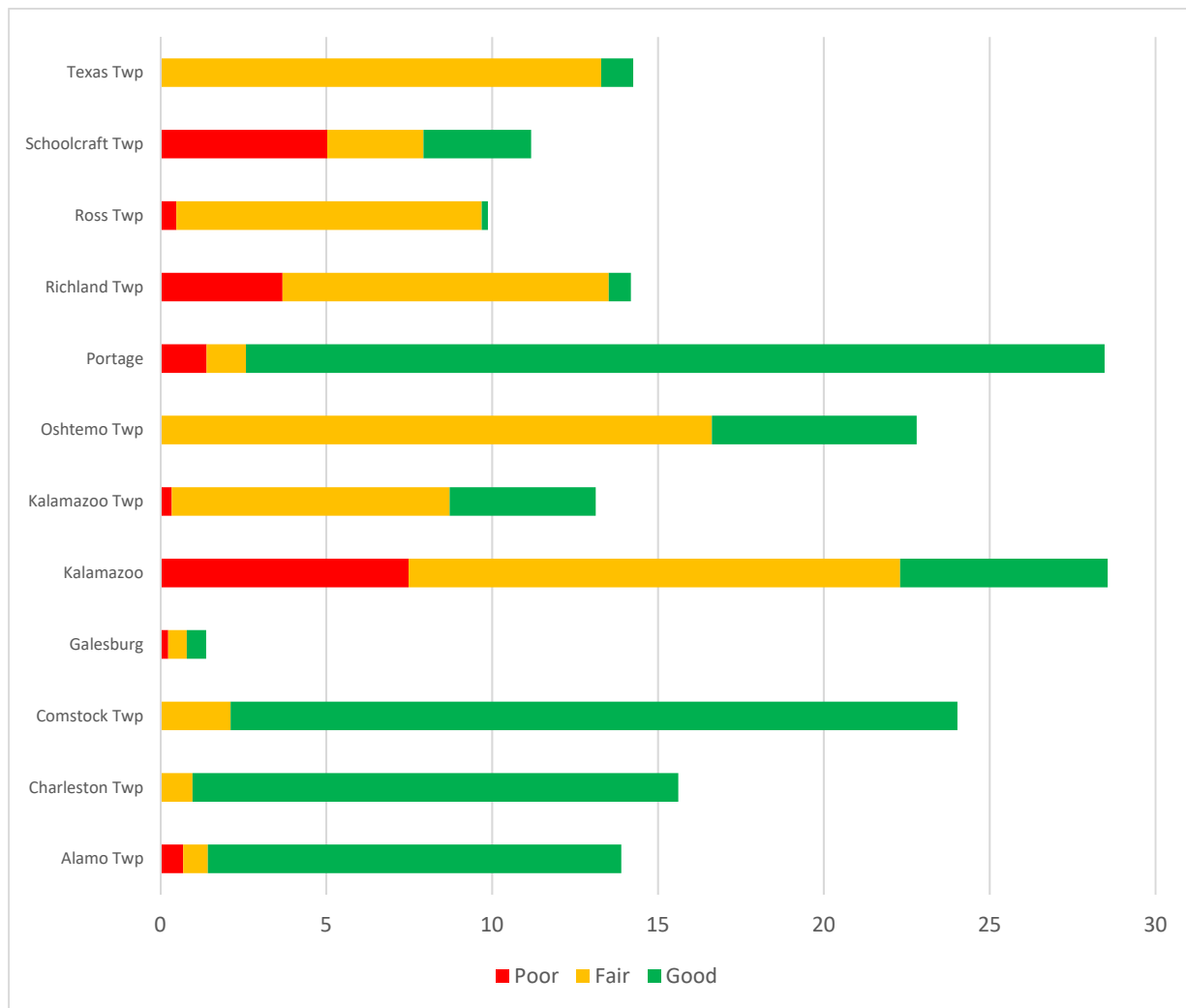
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2016/2017 PASER Ratings
Kalamazoo County **Non-Trunkline** Federal-Aid Miles



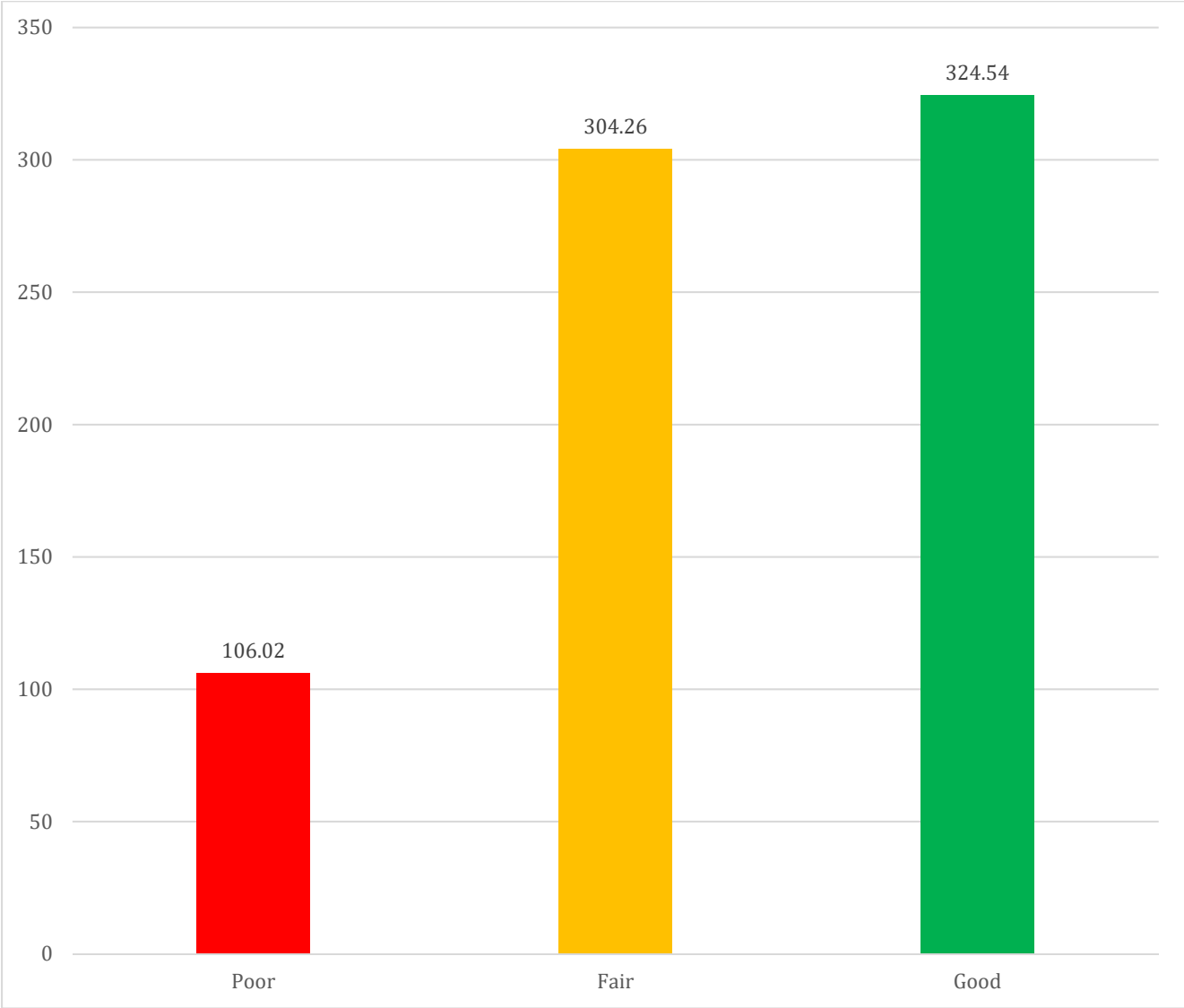
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2016/2017 PASER Ratings Kalamazoo County **Trunkline** Federal-Aid Miles



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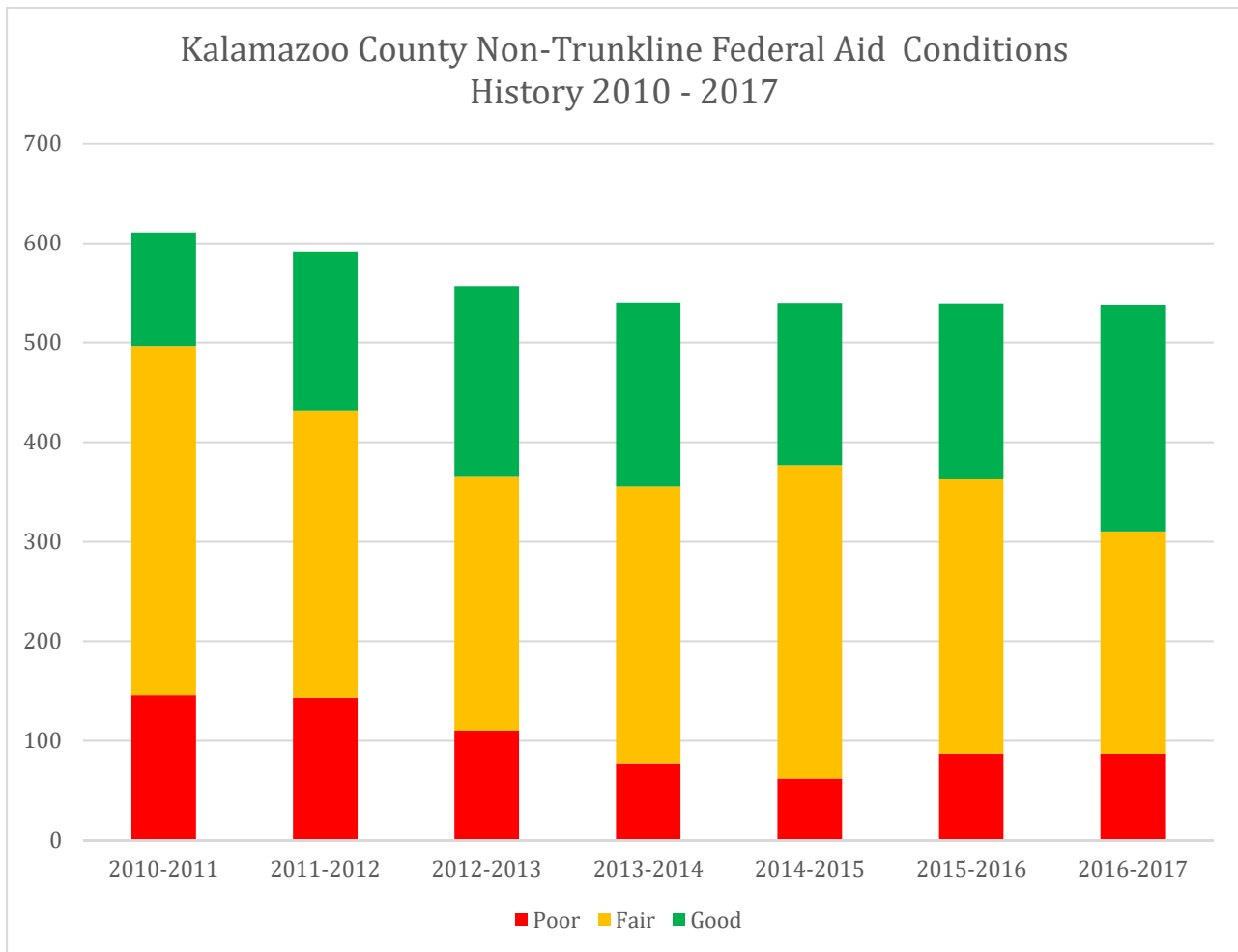
2016-2017 Kalamazoo Countywide PASER Ratings



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Federal Aid Conditions History and Trends

2010-2017 PASER Road Condition Ratings Kalamazoo County Federal-Aid Roads

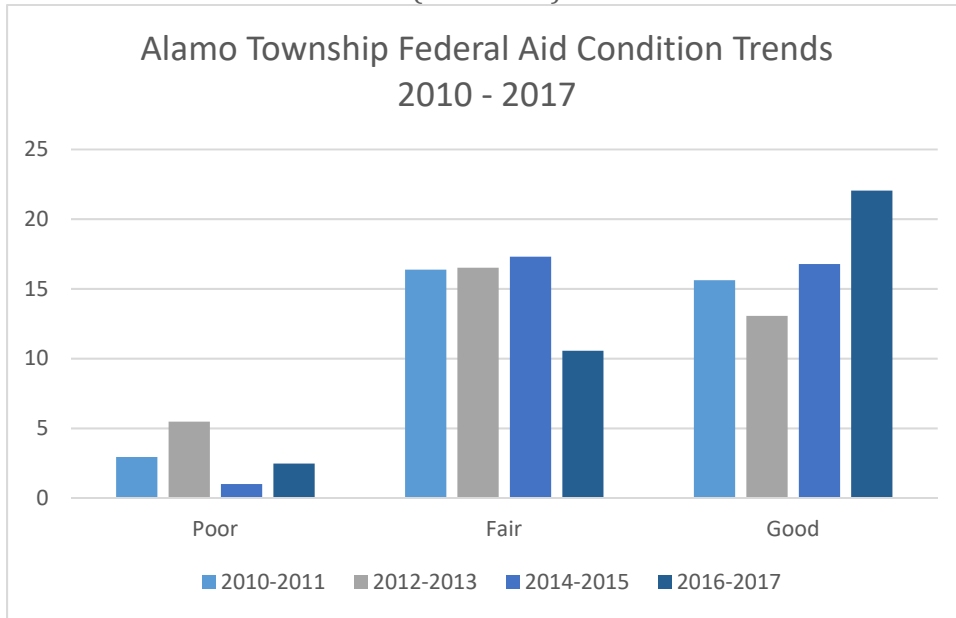


The chart above reflects the progression of Kalamazoo County's federal-aid roads as-rated over an eight year period. From 2011 to 2015, there was a steady decrease in the number of federal aid road miles that are rated as Poor. In 2016 this number increased slightly and ever so slightly again in 2017. The quantity of Good rated road mileage has fluctuated but has generally increased since 2010. Fair rated road miles had been generally been making up an increasingly large proportion of the federal aid total until 2016. In 2017 Fair mileage decreased again as the amounts of Good rated road mileage increased.

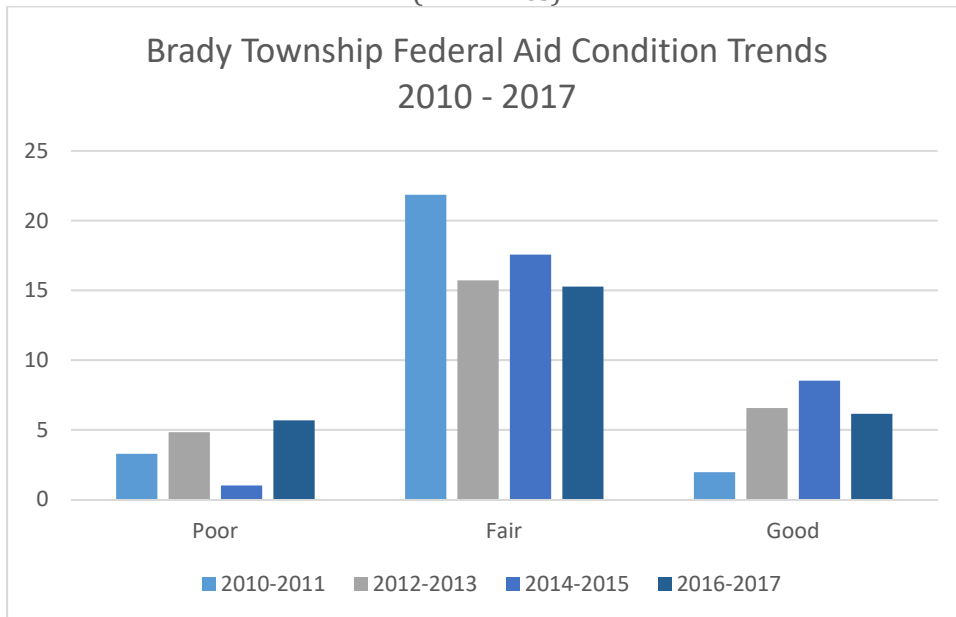
When looking at city/township breakdowns from 2010 to 2017 on the following pages of this document, it is apparent that in most jurisdictions, the majority of federal aid roads are rated Fair and Good, with Poor rated roads constituting a smaller percentage of the total miles. This is the case for all federal aid roads, both trunkline and non-trunkline in Kalamazoo County.

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2010-2017 PASER Road Condition Ratings Alamo Township (35.1 Miles)

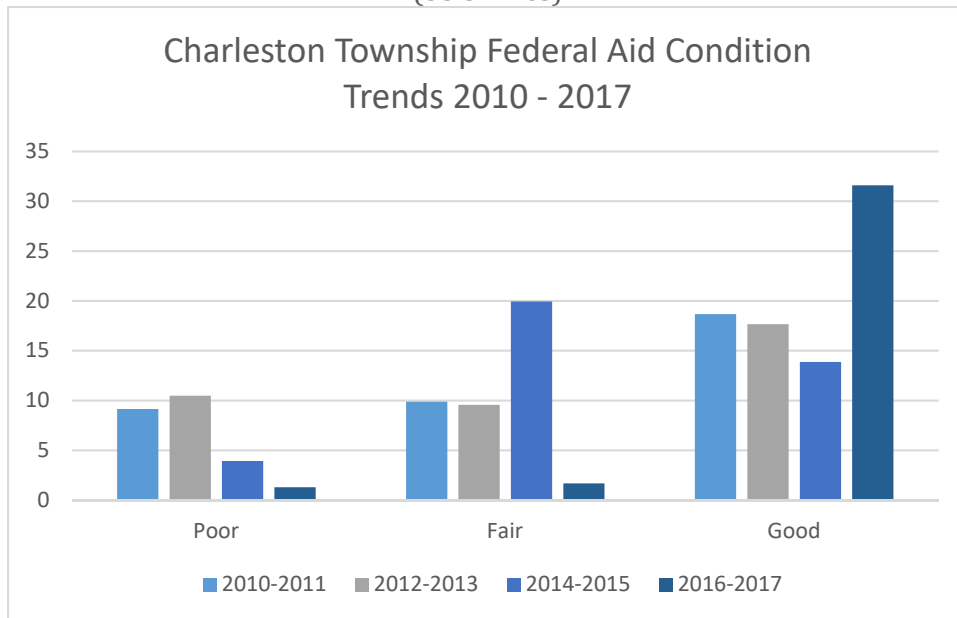


2010-2017 PASER Condition Ratings Brady Township (27.1 Miles)

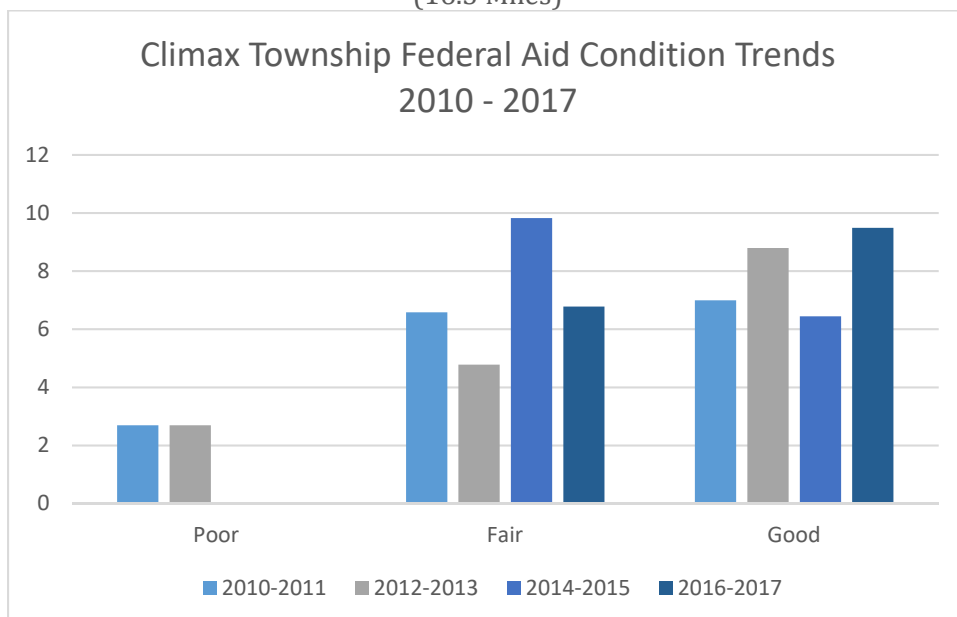


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2010-2017 PASER Condition Ratings Charleston Township (35.5 Miles)

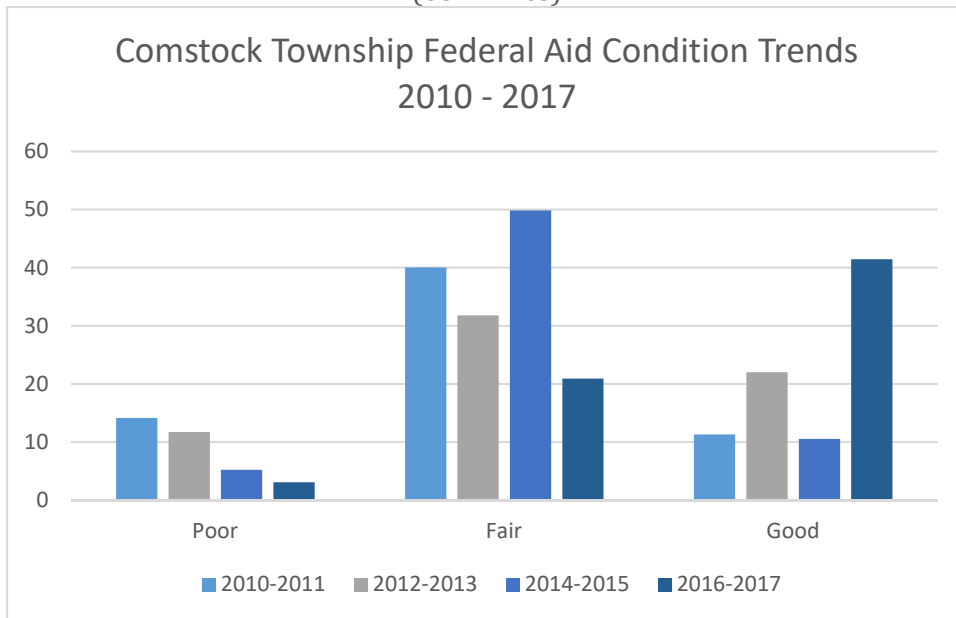


2010-2017 PASER Condition Ratings Climax Township (16.3 Miles)

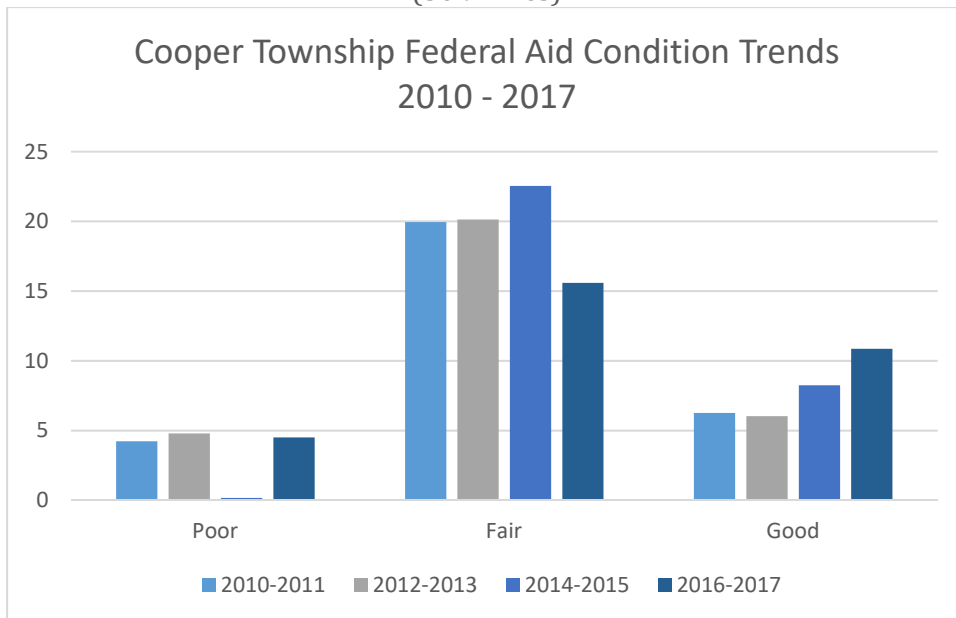


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2010-2017 PASER Condition Ratings Comstock Township (65.4 Miles)

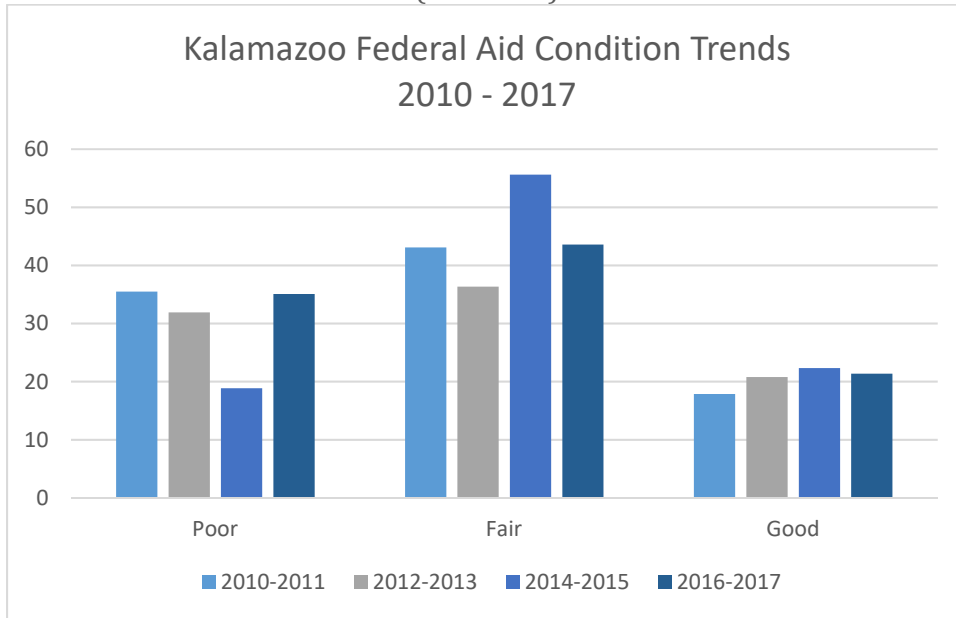


2010-2017 PASER Condition Ratings Cooper Township (30.9 Miles)

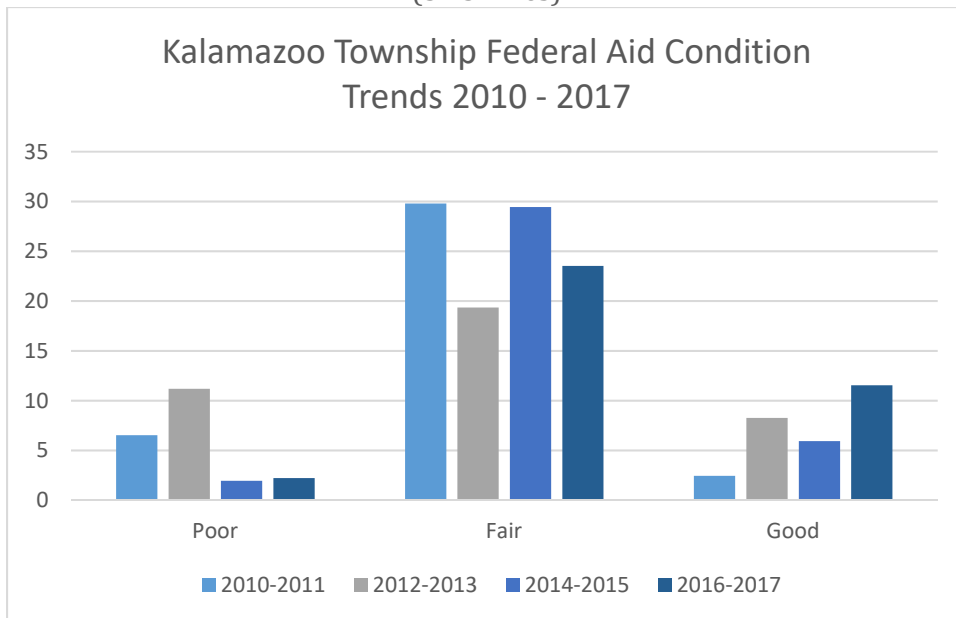


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2010-2017 PASER Condition Ratings
City of Kalamazoo
(100 Miles)

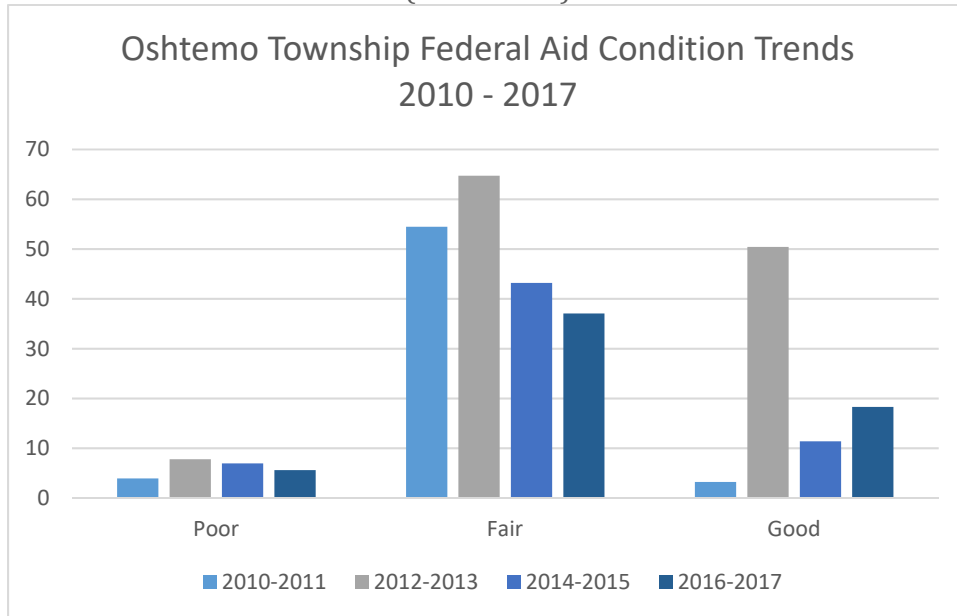


2010-2017 PASER Condition Ratings
Kalamazoo Township
(37.3 Miles)

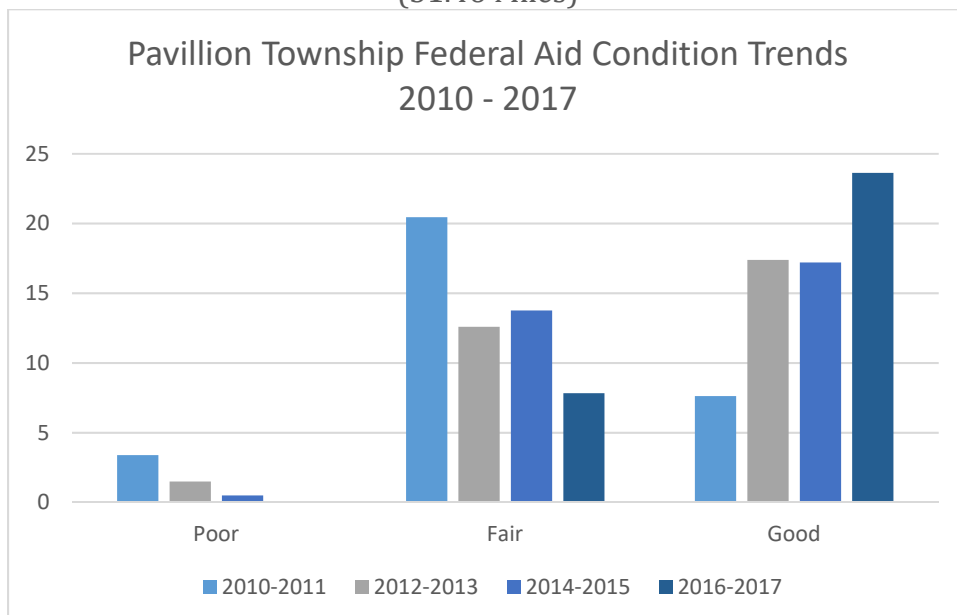


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2010-2017 PASER Condition Ratings Oshtemo Township (60.58 Miles)

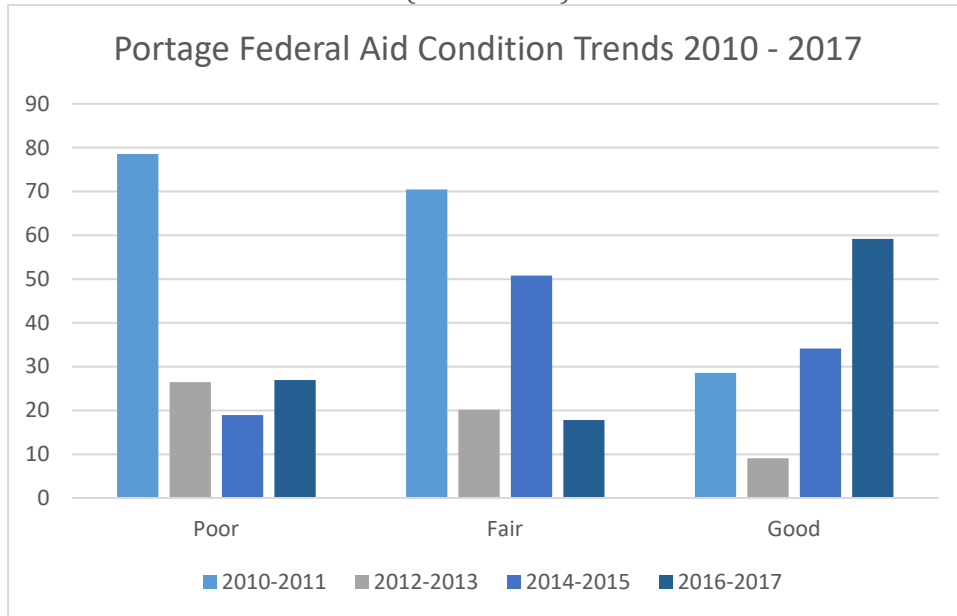


2010-2017 PASER Condition Ratings Pavilion Township (31.46 Miles)

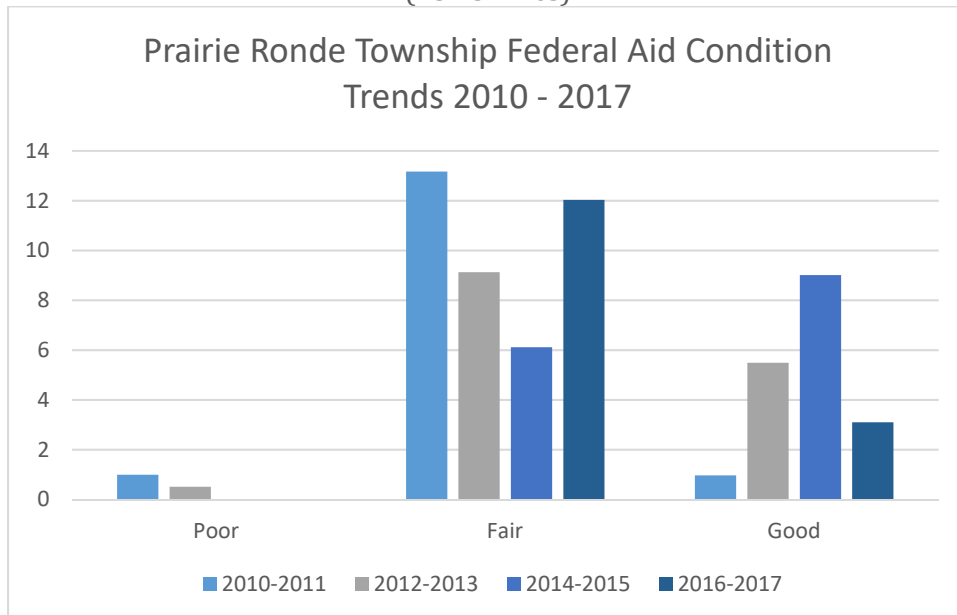


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2010-2017 PASER Condition Ratings City of Portage (103.9 Miles)

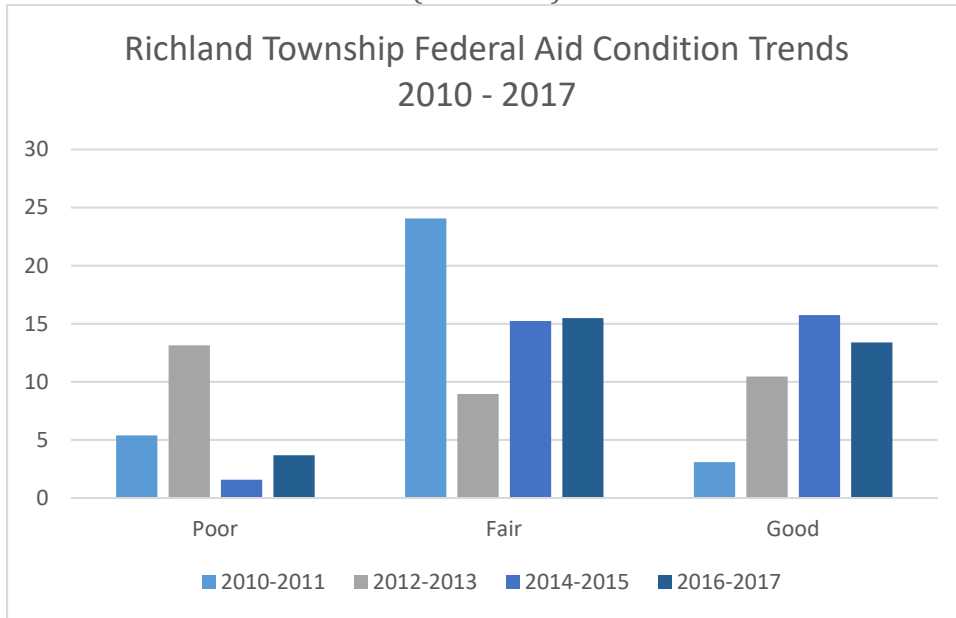


2010-2017 PASER Condition Ratings Prairie Ronde Township (15.13 Miles)

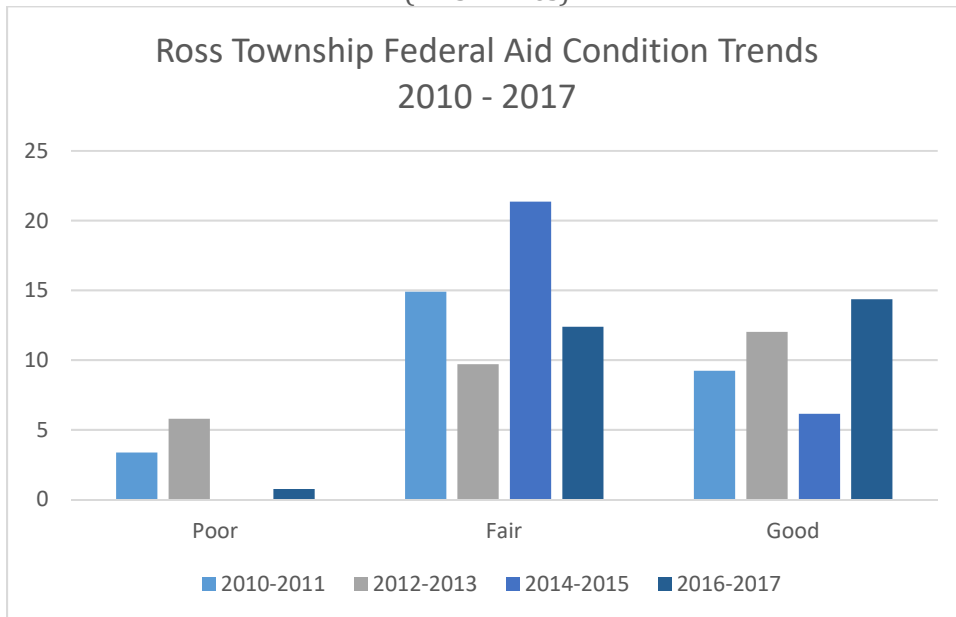


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2010-2017 PASER Condition Ratings Richland Township (32.6 Miles)

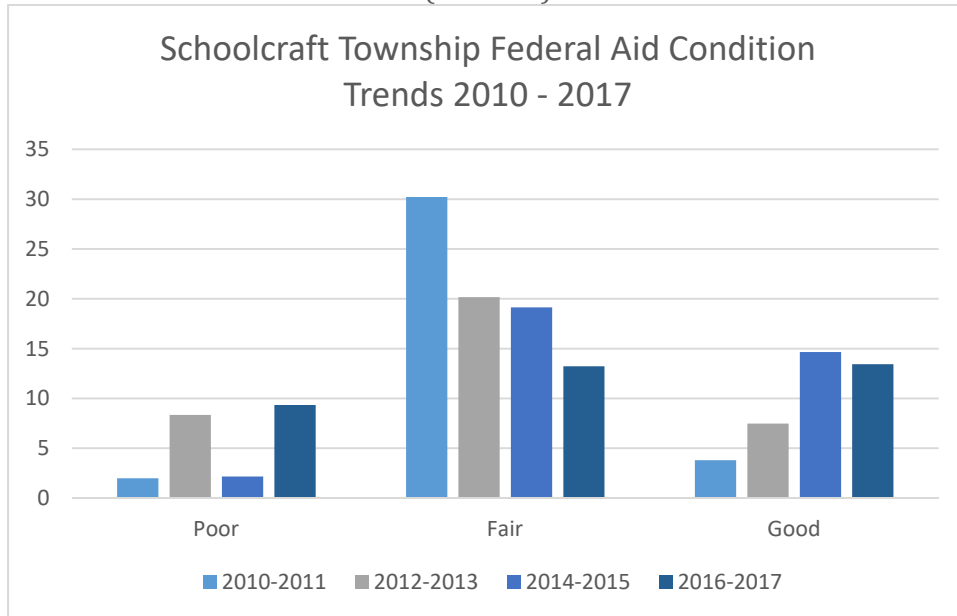


2010-2017 PASER Condition Ratings Ross Township (27.51 Miles)

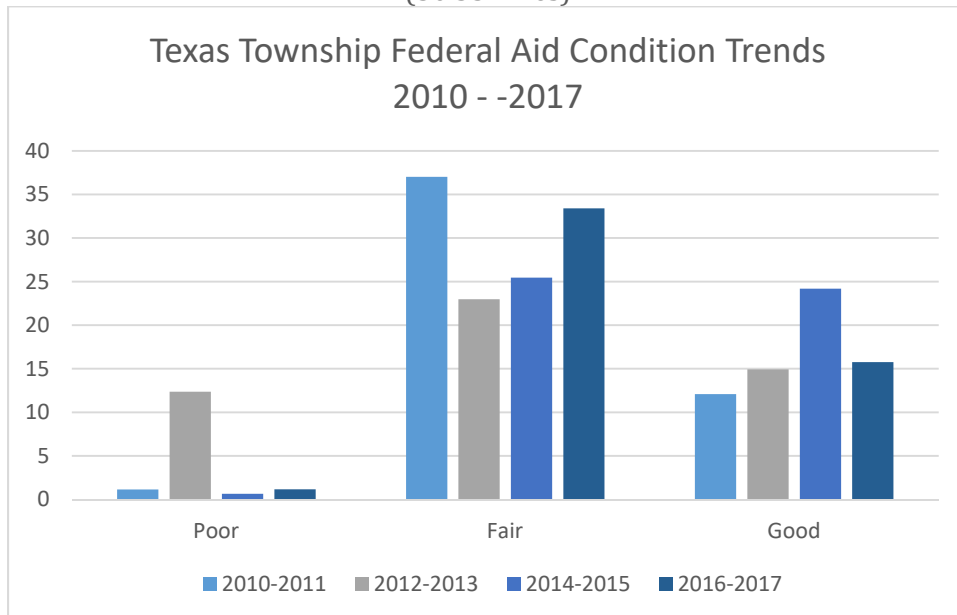


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2010-2017 PASER Condition Ratings Schoolcraft Township (36 Miles)

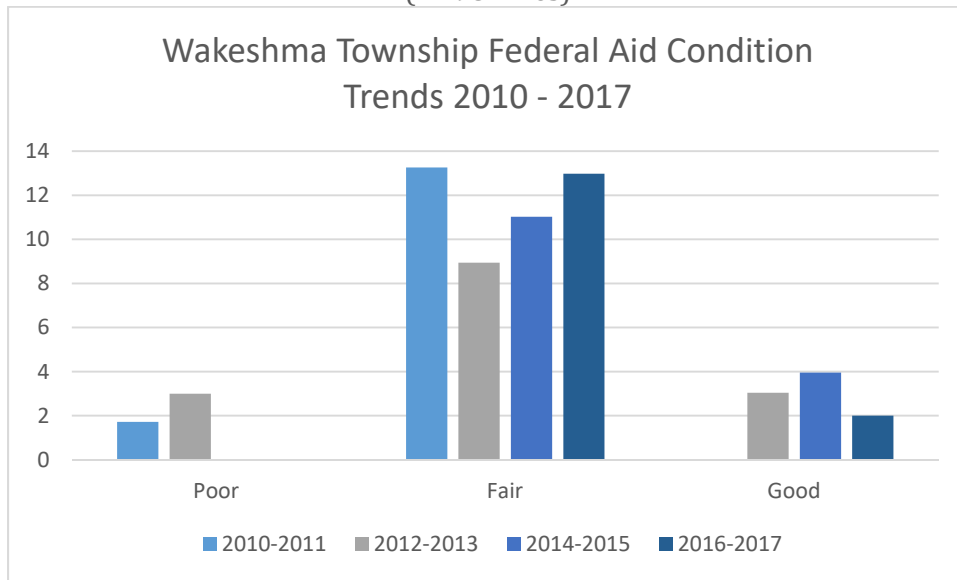


2010-2017 PASER Condition Ratings Texas Township (50.33 Miles)



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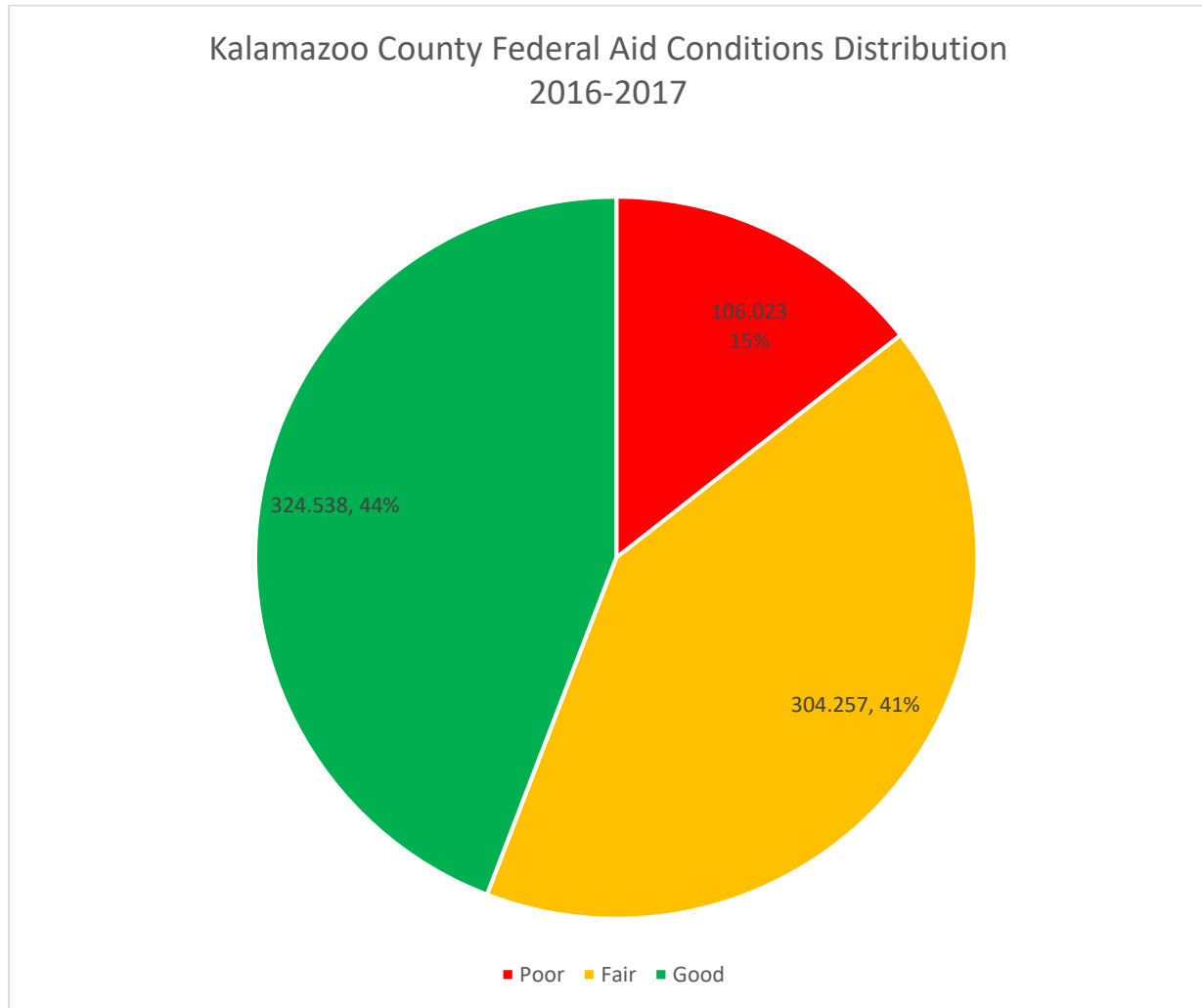
2010-2017 PASER Condition Ratings Wakeshma Township (14.98 Miles)



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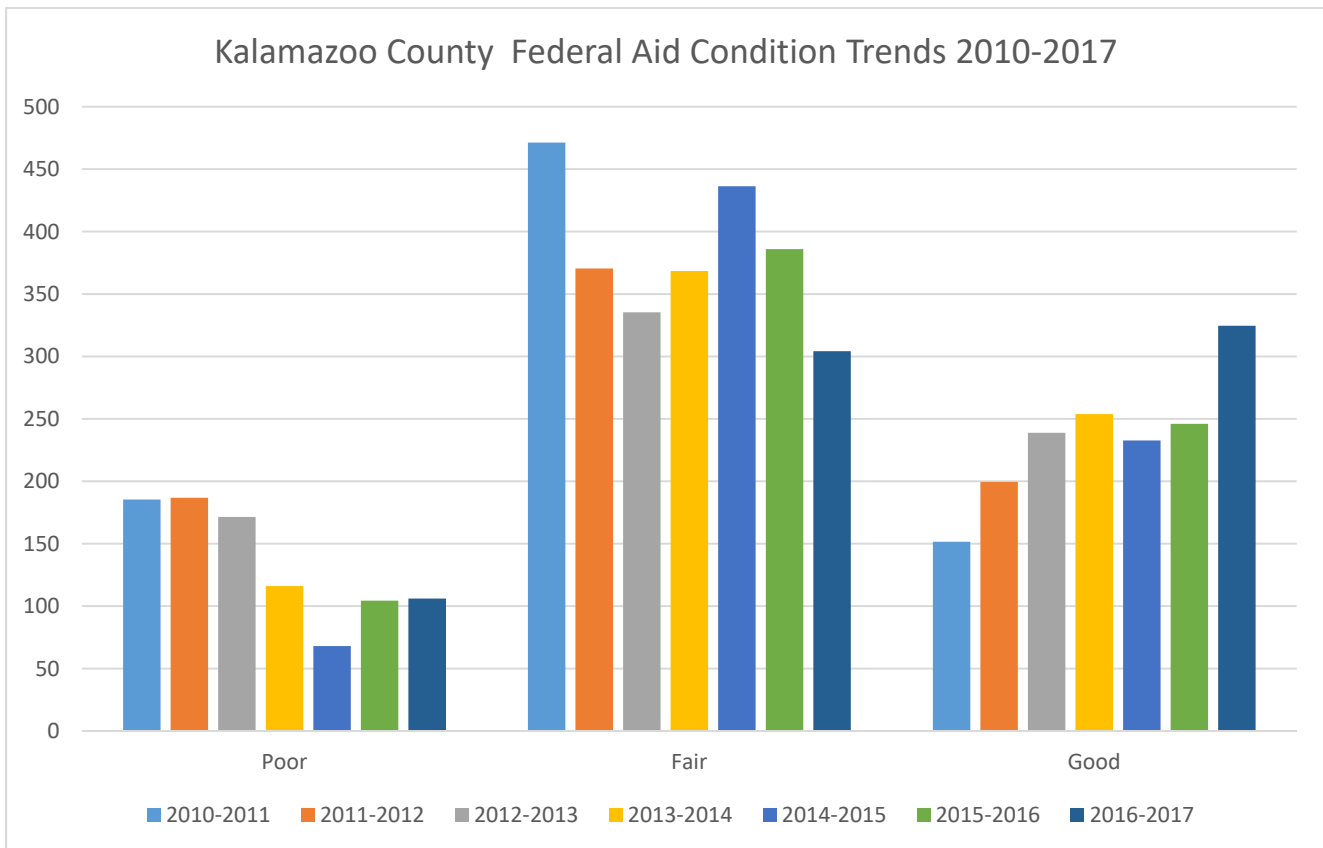
Pavement Condition Summary

Of the 735 miles of federal-aid roads that were most recently rated (2016-2017), approximately 106 miles were rated as being in Poor condition, 304 miles Fair, and 325 miles Good. Thus, 85% of federal aid road miles in Kalamazoo County are rated Fair or Good.



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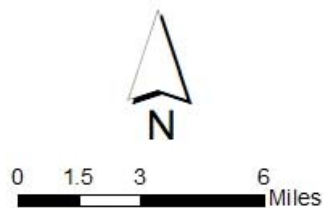
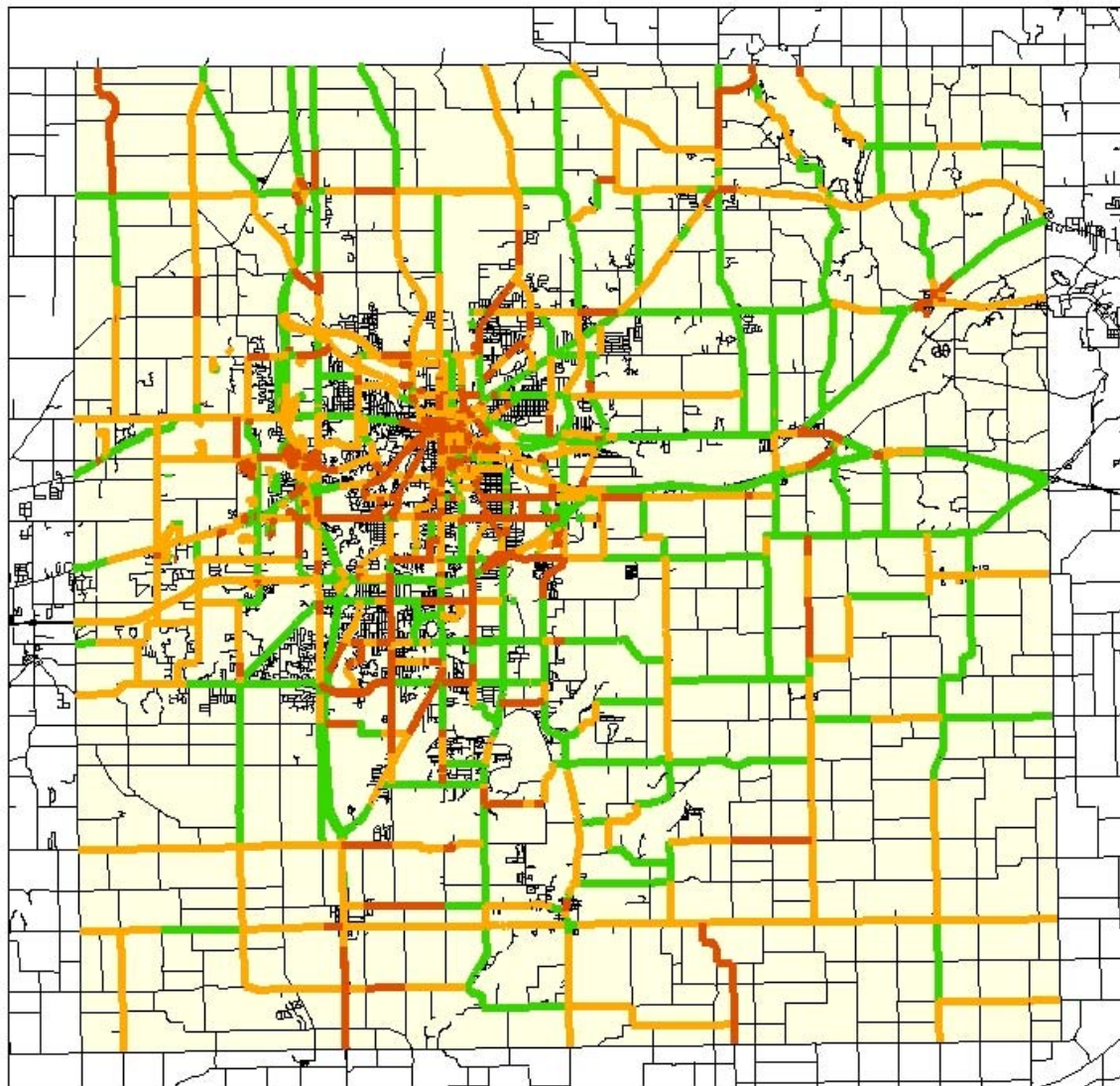
Condition Trends of Federal-Aid Roads Kalamazoo County 2010-2017



The bar graph above shows the Poor, Fair, and Good categories as rated for Federal Aid roads in Kalamazoo County each of the seven two-year periods since 2010. From this chart it appears that road agencies in Kalamazoo County have made a good effort overall at maintaining or increasing the quantity of Fair and Good rated road miles. The results of the most recent two-year rating period, with the apparent shift of some Fair roads to Good would seem to indicate that most agencies are performing preventive maintenance before roads deteriorate to Poor. Kalamazoo County road agencies should continue to focus on maintaining roads in Fair and Good condition in order to keep the amount of Poor roads relatively low countywide. It is important for the road agencies in Kalamazoo County to administer capital preventative maintenance treatments that are less expensive before higher cost structural improvements become necessary.

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Kalamazoo County Federal Aid Road Conditions 2016 - 2017



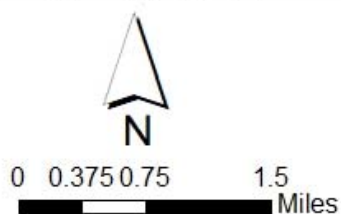
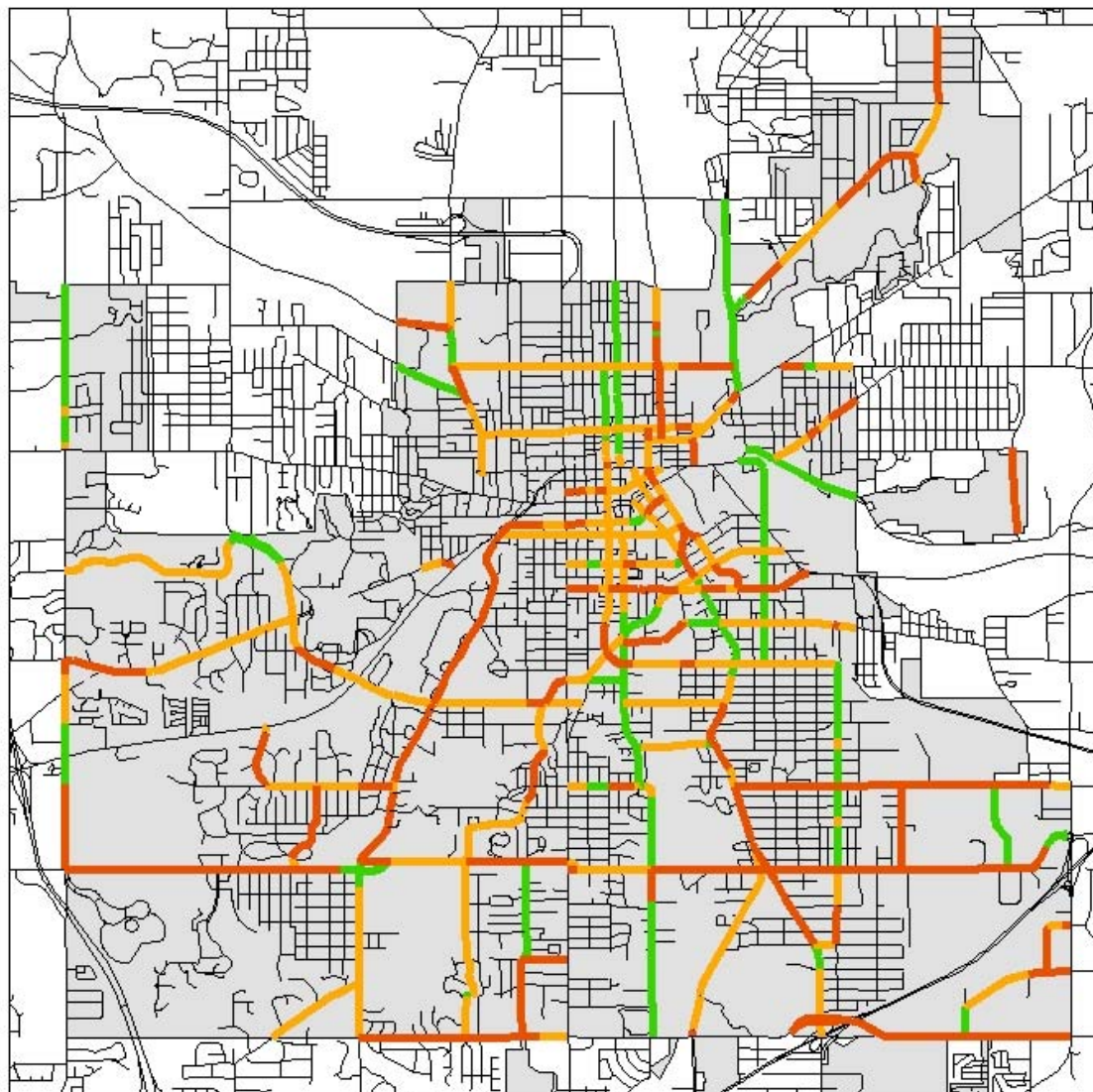
PASER Road Conditions

- Poor (PASER 1 - 4)
- Fair (PASER 5 - 7)
- Good (PASER 8 - 10)



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City of Kalamazoo Federal Aid Road Conditions 2016 - 2017



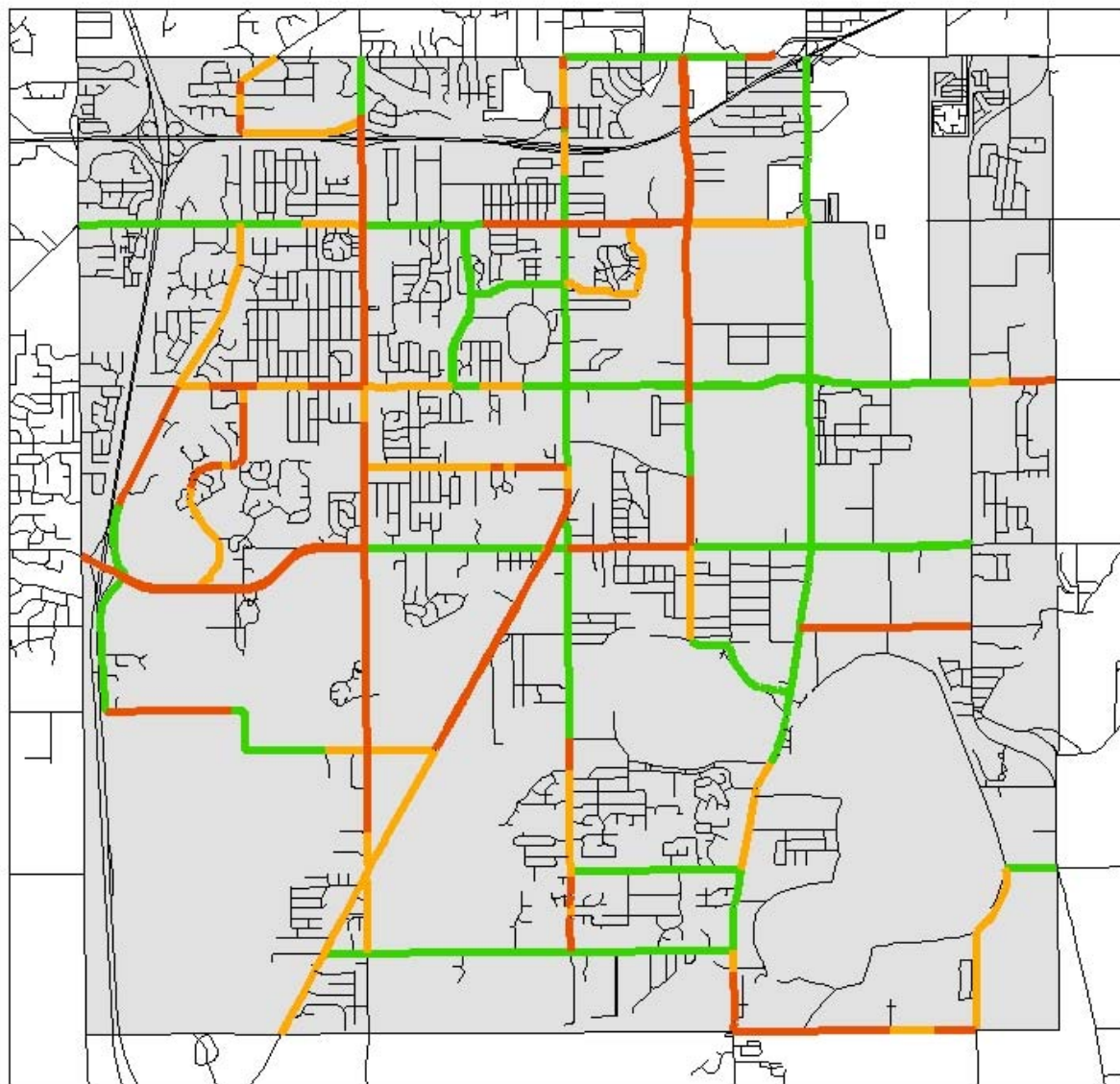
PASER Road Conditions

- Poor (PASER 1 - 4)
- Fair (PASER 5 - 7)
- Good (PASER 8 - 10)



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City of Portage Federal Aid Road Conditions 2016 - 2017



PASER Road Conditions

- Poor (PASER 1 - 4)
- Fair (PASER 5 - 7)
- Good (PASER 8 - 10)



ROAD CONDITION REPORT FOR KALAMAZOO COUNTY

Contact Information

For more information regarding the Kalamazoo County Road Condition report, contact:

- Road Commission of Kalamazoo County
3801 E Kilgore Rd • Kalamazoo, Michigan • 49001
(269) 381-3171 • info@kalamazoocountyroads.com
- Kalamazoo Area Transportation Study
5220 Lovers Ln • Suite 110 • Portage, Michigan • 49002 (269)343-0766 •
info@katsmpo.org
- City of Kalamazoo
415 E Stockbridge Ave • Kalamazoo, Michigan • 49001 (269) 337-8601 •
cokpublicservices@kalamazoo-city.org
- City of Portage
7900 S Westnedge Ave • Portage, Michigan • 49024
(269) 329-4422 • www.portagemi.gov
- For Villages, Townships, and Cities not listed above, contact Kalamazoo Area Transportation Study to get contact information.