Village of Decatur
2020 Pavement
Asset Management Plan

A plan describing the Village of Decatur’s roadway assets and conditions

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EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, roads are among the most important assets in any community along with other assets like bridges, culverts, traffic signs, traffic signals, and utilities that support and affect roads. The Village of Decatur's roads, other transportation assets, and support systems are also some of the most valuable and extensive public assets, all of which are paid for with taxes collected from ordinary citizens and businesses. The cost of building and maintaining roads, their importance to society, and the investment made by taxpayers all place a high level of responsibility on local agencies to plan, build, and maintain the road network in an efficient and effective manner. This asset management plan is intended to report on how Decatur is meeting its obligations to maintain the public assets for which it is responsible.

This plan overviews Decatur's road assets and their condition and explains how Decatur works to maintain and improve the overall condition of those assets. These explanations can help answer the following questions:

- What kinds of road assets Decatur has in its jurisdiction, who owns them, and the different options for maintaining these assets.
- What tools and processes Decatur uses to track and manage road assets and funding.
- What condition Decatur's road assets are in compared to statewide averages.
- Why some road assets are in better condition than others and the path to maintaining and improving road asset conditions through proper planning and maintenance.
- How agency transportation assets are funded and where those funds come from.
- How funds are used, and the costs incurred during Decatur's road assets' normal life cycle.
- What condition Decatur can expect its road assets to be in if those assets continue to be funded at the current funding levels.
- How changes in funding levels can affect the overall condition of all of Decatur's road assets.

Decatur owns and manages 31.736 lane miles of roads. This road network can be divided into the city major network and city minor network based on the different factors these roads have that influence asset management decisions. A summary of Decatur's historical and current network conditions, projected trends, and goals for the city major network and city minor network can be seen in Figure A and Figure B:

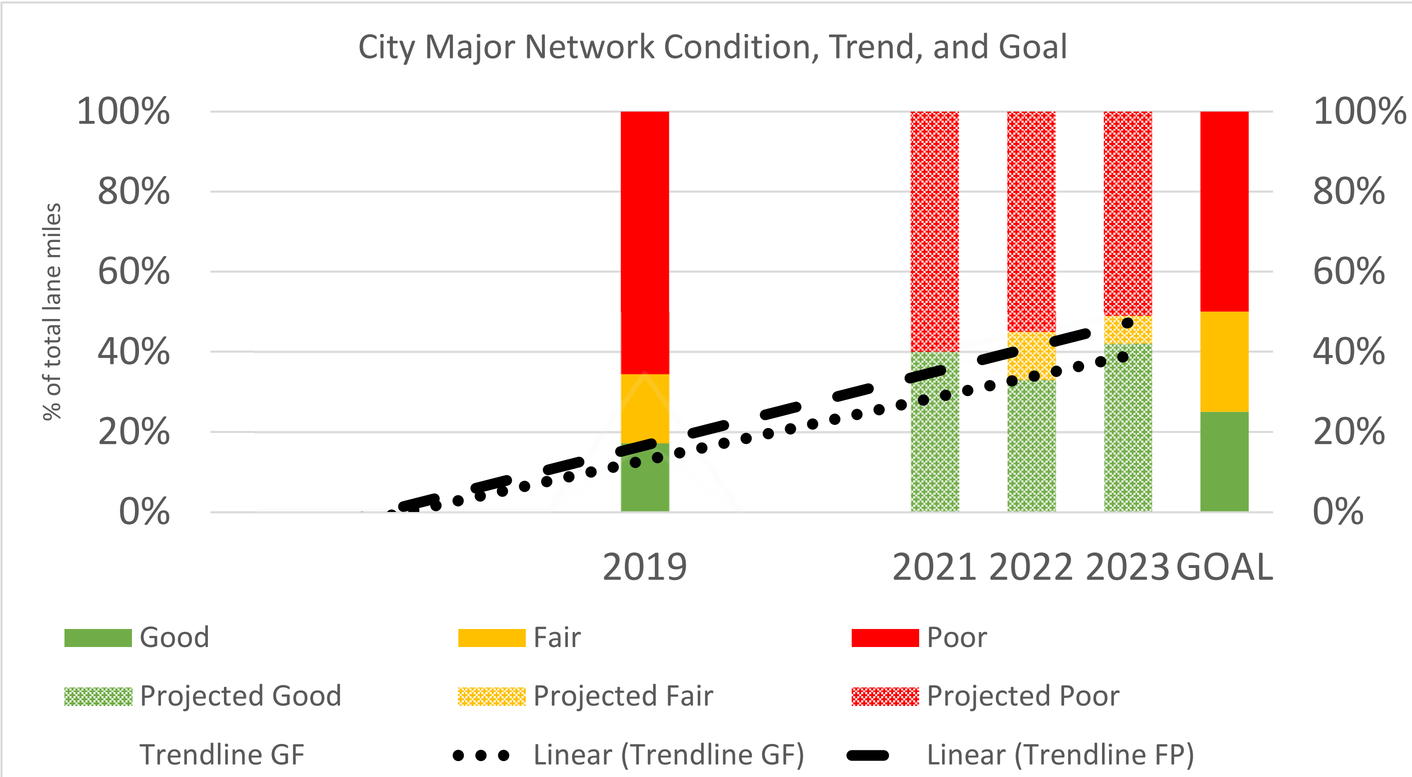


Figure A: Existing and future predicted conditions of City Major roads.

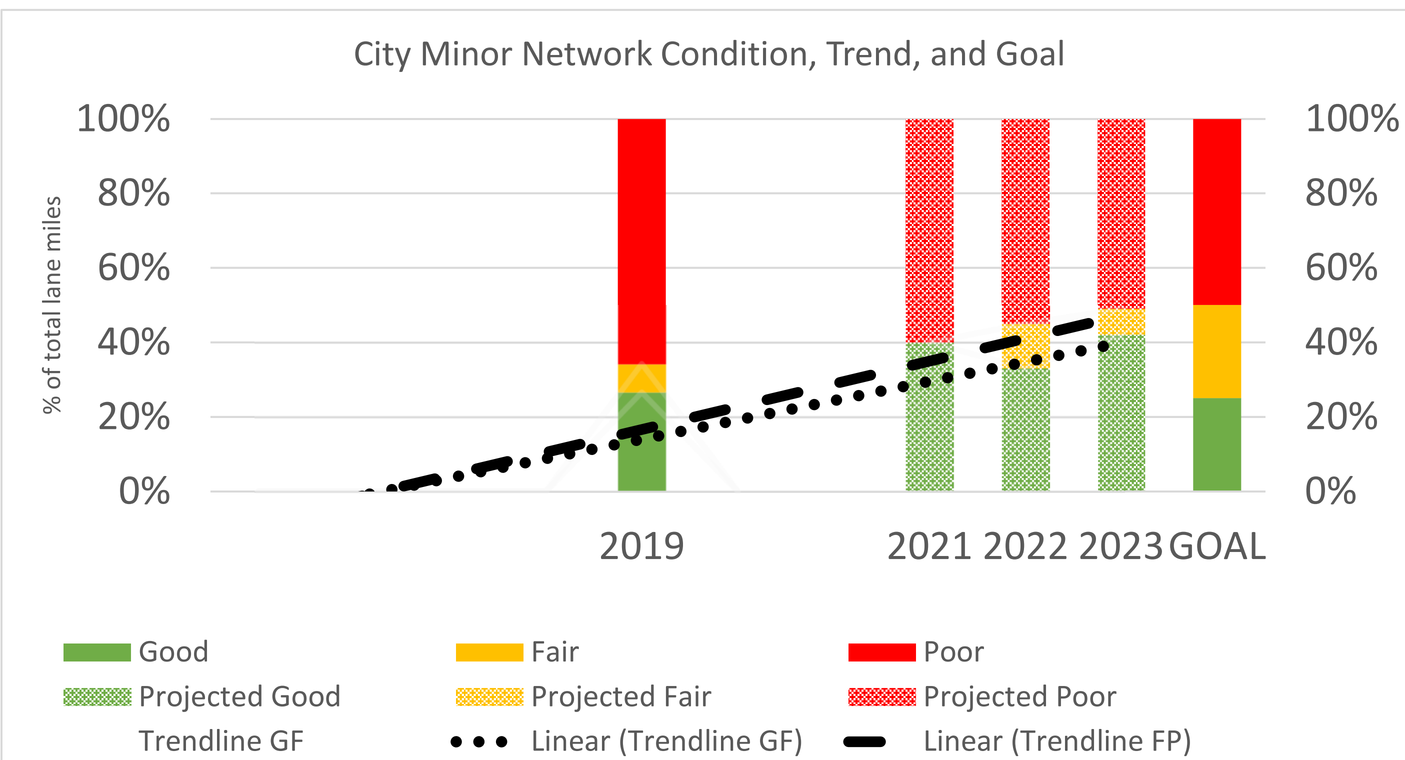


Figure B: Existing and future predicted conditions of City Minor roads.

An asset management plan is required by Michigan Public Act 325 of 2018 for agencies with more than 100 miles of certified roads. While the Village of Decatur does not meet this requirement, it has chosen to voluntarily complete an asset management plan in an effort to maintain roads in a more effective and efficient manner. This asset management plan also helps demonstrate Decatur's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of Decatur's road assets, and gives taxpayers the information they need to make informed decisions about investing in its essential transportation infrastructure

INTRODUCTION

Asset management is defined by Public Act 325 of 2018 as “an ongoing process of maintaining, preserving, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment and investment to achieve established performance goals”. In other words, asset management is a process that uses data to manage and track assets, like roads and bridges, in a cost-effective manner using a combination of engineering and business principles. This process is endorsed by leaders in municipal planning and transportation infrastructure, including the Michigan Municipal League, County Road Association of Michigan, the Michigan Department of Transportation (MDOT), and the Federal Highway Administration (FHWA). Decatur is supported in its use of asset management principles and processes by the Michigan Transportation Asset Management Council (TAMC), formed by the State of Michigan.

Asset management, in the context of this plan, ensures that public funds are spent as effectively as possible to maximize the condition of the road network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing road infrastructure with a limited budget.

The Village of Decatur has adopted an “asset management” business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet road users’ expectations. Decatur is responsible for maintaining and operating 31.736 lane miles of roads.

This plan outlines how Decatur determines its strategy to maintain and upgrade road asset conditions given agency goals, priorities of its road users, and resources provided. An updated plan is to be released approximately every three years to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to Matthew Newton at 114 N. Phelps Street, Decatur, MI 49045 or at (269) 423-6114 and/or mnewton@decaturmi.org. A copy of this plan can be accessed on our website at https://decaturmi.org. Key terms used in this plan are defined in Decatur’s comprehensive transportation asset management plan (also known as the “compliance plan”) used for compliance with PA 325 of 2018.

Knowing the basic features of the asset classes themselves is a crucial starting point to understanding the rationale behind an asset management approach. The following primer provides an introduction to pavements.

Pavement Primer

Roads come in two basic forms—paved and unpaved. Paved roads have hard surfaces. These hard surfaces can be constructed from asphalt, concrete, composite (asphalt and concrete), sealcoat, or brick and block materials. On the other hand, unpaved roads have no hard surfaces. Examples of these surfaces are gravel and unimproved earth.

The decision to pave with a particular material as well as the decision to leave a road unpaved allows road-owning agencies to tailor a road to a particular purpose, environment, and budget. Thus, selecting a pavement type or leaving a road unpaved depends upon purpose, materials available, and budget. Each choice represents a trade-off between budget and costs for construction and maintenance.

Maintenance enables the road to fulfill its particular purpose. To achieve the maximum service for a pavement or an unpaved road, continual monitoring of a road's pavement condition is essential for choosing the right time to apply the right fix in the right place.

Here is a brief overview of the different types of pavements within the Village's network, how condition is assessed, and treatment options that can lengthen a road's service life.

Surfacing

Pavement type is influenced by several different factors, such as cost of construction, cost of maintenance, frequency of maintenance, and type of maintenance. These factors can have benefits affecting asset life and road user experience.

Paved Surfacing

Typical benefits and tradeoffs for hard surface types include:

- **Hot-mix asphalt pavement (HMA):** HMA pavement, sometimes known as asphalt or flexible pavement, is currently less expensive to construct than concrete pavement (this is, in some part, due to the closer link between HMA material costs and oil prices that HMA pavements have in comparison with other pavement types). However, they require frequent maintenance activities to maximize their service life. A typical HMA pavement design life will provide service for 18 years before major rehabilitation is necessary. The vast majority of local-agency-owned pavements are HMA pavements.

Unpaved Surfacing

Typical benefits and tradeoffs for non-hard surfacing include:

- **Gravel:** Gravel is a low-cost, easy-to-maintain road surface made from layers of soil and aggregate (gravel). However, there are several potential drawbacks such as dust, mud, and ride smoothness when maintenance is delayed or traffic volume exceeds design expectations. Gravel roads require frequent low-cost maintenance activities. Gravel can be very cost effective for lower-volume, lower-speed roads. In the right conditions, a properly constructed and maintained gravel road can provide a service life comparable to an HMA pavement and can be significantly less expensive than the other pavement types.

Pavement Condition

Besides traffic congestion, pavement condition is what road users typically notice most about the quality of the roads that they regularly use—the better the pavement condition, the more satisfied users are with the service provided by the roadwork performed by road-owning agencies. Pavement condition is also a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital preventive maintenance, or structural improvement—for a given section of pavement. As pavements age, they transition between "windows" of opportunity when a specific type of treatment can be applied to gain an increase in quality and extension of service life. Routine maintenance is day-to-day, regularly-scheduled, low-cost activity applied to "good" roads to prevent water or debris intrusion. Capital preventive maintenance (CPM) is a planned set of cost-effective treatments for "fair" roads that corrects pavement defects, slows further deterioration, and maintains the functional condition without increasing structural capacity. Decatur uses pavement condition and age to anticipate when a specific section of pavement will be a potential candidate for preventive maintenance. More detail on this topic is included in the *Pavement Treatment* section of this primer.

Pavement condition data is also important because it allows road owners to evaluate the benefits of preventive maintenance projects. This data helps road owners to identify the most cost-effective use of road construction and maintenance dollars. Further, historic pavement condition data can enable road owners to predict future road conditions based on budget constraints and to determine if a road network's condition will improve, stay the same, or degrade at the current or planned investment level. This analysis can help determine how much additional funding is necessary to meet a network's condition improvement goals.

Paved Road Condition Rating System

Decatur is committed to monitoring the condition of its road network and using pavement condition data to drive cost-effective decision-making and preservation of valuable road assets. Decatur uses the Pavement Surface Evaluation and Rating (PASER) system to assess its paved roads. PASER was developed by the University of Wisconsin Transportation Information Center to provide a simple, efficient, and consistent method for evaluating road condition through visual inspection. The widely-used PASER system has specific criteria for assessing asphalt, concrete, sealcoat, and brick and block pavements. Information regarding the PASER system and PASER manuals may be found on the TAMC website at: http://www.michigan.gov/tamc/0,7308,7-356-82158_82627---,00.html.

The TAMC has adopted the PASER system for measuring statewide pavement conditions in Michigan for asphalt, concrete, composite, sealcoat, and brick-and-block paved roads. Broad use of the PASER system means that data collected at Decatur is consistent with data collected statewide. PASER data is collected using trained inspectors in a slow-moving vehicle using GPS-enabled data collection software provided to road-owning agencies at no cost to them. The method does not require extensive training or specialized equipment, and data can be collected rapidly, which minimizes the expense for collecting and maintaining this data.

The PASER system rates surface condition using a 1-10 scale where 10 is a brand new road with no defects that can be treated with routine maintenance, 5 is a road with distresses but is structurally sound that can be treated with preventive maintenance, and 1 is a road with extensive surface and structural distresses that is in need of total reconstruction.

Roads with lower PASER scores generally require costlier treatments to restore their quality than roads with higher PASER scores. The cost effectiveness of treatments generally decreases the as the PASER number decreases. In other words, as a road deteriorates, it costs more dollars per mile to fix it, and the dollars spent are less efficient in increasing the road’s service life. Nationwide experience and asset management principles tell us that a road that has deteriorated to a PASER 4 or less will cost more to improve and the dollars spent are less efficient. Understanding this cost principle helps to draw meaning from the current PASER condition assessment.

The TAMC has developed statewide definitions of road condition by creating three simplified condition categories—“good”, “fair”, and “poor”—that represent bin ranges of PASER scores having similar contexts with regard to maintenance and/or reconstruction. The definitions of these rating conditions are:

- “Good” roads, according to the TAMC, have PASER scores of 8, 9, or 10. Roads in this category have very few, if any, defects and only require minimal maintenance; they may be kept in this category longer using PPM. These roads may include those that have been recently seal coated or newly constructed. Figure 1 illustrates an example of a road in this category.
- “Fair” roads, according to the TAMC, have PASER scores of 5, 6, or 7. Roads in this category still show good structural support, but their surface is starting to deteriorate. Figure 1 illustrates two road examples in this category. CPM can be cost effective for maintaining the road’s “fair” condition or even raising it to “good” condition before the structural integrity of the pavement has been severely impacted. CPM treatments can be likened to shingles on a roof of a house: while the shingles add no structural value, they protect the house from structural damage by maintaining the protective function of a roof covering.
- “Poor” roads, according to the TAMC, have PASER scores of 1, 2, 3, or 4. These roads exhibit evidence that the underlying structure is failing, such as alligator cracking and rutting. These roads must be rehabilitated with treatments like a heavy overlay, crush and shape, or total reconstruction. Figure 1 illustrates a road in this category.

Figure 1: *Top image, right*– PASER 8 road that is considered “good” by the TAMC exhibit only minor defects. *Second image, right*– PASER 5 road that is considered “fair” by the TAMC. Exhibiting structural soundness but could benefit from CPM. *Third image, right*– PASER 6 road that is considered “fair” by the TAMC. *Bottom image, right*– PASER 2 road that is considered “poor” by the TAMC exhibiting significant structural distress.

The TAMC’s good, fair, and poor categories are based solely on the definitions, above. Therefore, caution should be exercised when comparing other condition assessments with these categories because other condition assessments may have “good”, “fair”, or “poor” designations similar to the TAMC condition categories but may not share the same definition. Often, other condition assessment systems define the “good”, “fair”, and “poor” categories differently, thus rendering the data of little use for cross-system comparison. The TAMC’s definitions provide a statewide standard for all of Michigan’s road-owning agencies to use for comparison purposes.

PASER data is collected 100 percent every two years on all federal-aid-eligible roads in Michigan. The TAMC dictates and funds the required training and the format for this collection, and it shares the data regionally and statewide. In addition, Decatur is committed to collecting approximately 100 percent of its paved non-federal-aid-eligible (Local) network every three years using its own staff and resources.

Pavement Treatments

Selection of repair treatments for roads aims to balance costs, benefits, and road life expectancy. All pavements are damaged by water, traffic weight, freeze/thaw cycles, and sunlight. Each of the following treatments and strategies—reconstruction, structural improvements, capital preventive maintenance, and others used by Decatur—counters at least one of these pavement-damaging forces.

Structural Improvement

Roads requiring structural improvements exhibit alligator cracking and rutting and are rated poor in the TAMC scale. Road rutting is evidence that the underlying structure is beginning to fail, and it must be rehabilitated with a structural treatment. Examples of structural improvement treatments include HMA overlay with or without milling, and crush and shape (Figure 2). The following descriptions outline the main structural improvement treatments used by Decatur.

Figure 2: Examples of structural improvement treatments—(from left) HMA overlay on an unmilled pavement, milling asphalt pavement, and pulverization of a road during a crush-and-shape project.

Hot-mix Asphalt (HMA) Overlay with/without Milling

An HMA overlay is a layer of new asphalt (liquid asphalt and stones) placed on an existing pavement (Figure 2). Depending on the overlay thickness, this treatment can add significant structural strength. This treatment also creates a new wearing surface for traffic and seals the pavement from water, debris, and sunlight damage. An HMA overlay lasts approximately five to ten years and costs $50,000 to $150,000 per lane mile. The top layer of severely damaged pavement can be removed by the milling, a technique that helps prevent structural problems from being quickly reflected up to the new surface. Milling is also done to keep roads at the same height of curb and gutter that is not being raised or reinstalled in the project. Milling adds $10,000 per lane mile to the HMA overlay cost.

Crush and Shape

During a crush and shape treatment, the existing pavement and base are pulverized and then the road surface is reshaped to correct imperfections in the road's profile (Figure 2). An additional layer of gravel is often added along with a new wearing surface such as an HMA overlay or chip seal. Additional gravel and an HMA overlay give an increase in the pavements structural capacity. This treatment is usually done on rural roads with severe structural distress; Adding gravel and a wearing surface makes it more prohibitive for urban roads if the curb and gutter is not raised up. Crush and shape treatments last approximately 14 years and cost $300,000 per lane mile.

Capital Preventive Maintenance

Capital preventive maintenance (CPM) addresses pavement problems of fair-rated roads before the structural integrity of the pavement has been severely impacted. CPM is a planned set of cost-effective treatments applied to an existing roadway that slows further deterioration and that maintains or improves the functional condition of the system without significantly increasing the structural capacity. Examples of such treatments include crack seal, fog seal, chip seal, slurry seal, and microsurface (Figure 3). The purpose of the following CPM treatments is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface deficiencies. The following descriptions outline the main CPM treatments used by Decatur.

Figure 3: Examples of capital preventive maintenance treatments—(from left) crack seal, fog seal, chip seal, and slurry seal/microsurface.

Crack Seal

Water that infiltrates the pavement surface softens the pavement structure and allows traffic loads to cause more damage to the pavement than in normal dry conditions. Crack sealing helps prevent water infiltration by sealing cracks in the pavement with asphalt sealant (Figure 3). Decatur seals pavement cracks early in the life of the pavement to keep it functioning as strong as it can and for as long as it can. Crack sealing lasts approximately two years and costs $1,200 per lane mile. Even though it does not last very long compared to other treatments, it does not cost very much compared to other treatments. This makes it a very cost effective treatment when Decatur looks at what crack filling costs per year of the treatment's life.

Chip Seal

A chip seal, also known as a sealcoat, is a two-part treatment that starts with liquid asphalt sprayed onto the old pavement surface followed by a single layer of small stone chips spread onto the wet liquid asphalt layer (Figure 3). The liquid asphalt seals the pavement from water and debris and holds the stone chips in place, providing a new wearing surface for traffic that can correct friction problems and helping to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. These treatments last approximately five years and cost $12,000 per lane mile.

Maintenance

Maintenance is the most cost-effective strategy for managing road infrastructure and prevents good and fair roads from reaching the poor category, which require costly rehabilitation and reconstruction treatments to create a year of service life. It is most effective to spend money on routine maintenance and CPM treatments, first; then, when all maintenance project candidates are treated, reconstruction and rehabilitation can be performed as money is available. This strategy is called a “mix-of-fixes” approach to managing pavements.

1. PAVEMENT ASSETS

Building a mile of new road can cost over $1 million due to the large volume of materials and equipment that are necessary. The high cost of constructing road assets underlines the critical nature of properly managing and maintaining the investments made in this vital infrastructure. The specific needs of every mile of road within an agency's overall road network is a complex assessment, especially when considering rapidly changing conditions and the varying requisites of road users; understanding each road-mile's needs is an essential duty of the road-owning agency.

In Michigan, many different governmental units (or agencies) own and maintain roads, so it can be difficult for the public to understand who is responsible for items such as planning and funding construction projects, [patching] repairs, traffic control, safety, and winter maintenance for any given road. MDOT is responsible for state trunkline roads, which are typically named with "M", "I", or "US" designations regardless of their geographic location in Michigan. Cities and villages are typically responsible for all public roads within their geographic boundary with the exception of the previously mentioned state trunkline roads managed by MDOT. County road commissions (or departments) are typically responsible for all public roads within the county's geographic boundary, with the exception of those managed by cities, villages, and MDOT.

In cases where non-trunkline roads fall along jurisdictional borders, local and intergovernmental agreements dictate ownership and maintenance responsibility. Quite frequently, roads owned by one agency may be maintained by another agency because of geographic features that make it more cost effective for a neighboring agency to maintain the road instead of the actual road owner. Other times, road-owning agencies may mutually agree to coordinate maintenance activities in order to create economies of scale and take advantage of those efficiencies.

The Village of Decatur is responsible for a total of 31.736 lane of public roads, as shown in Figure 4.

Figure 4: Map showing location of Decatur’s paved roads (i.e., those managed by Decatur) and their current condition for paved roads with green for good (i.e., PASER 10, 9, 8), yellow for fair (i.e., PASER 7, 6, 5), and red for poor (i.e., PASER 4, 3, 2, 1), as well as the location of Decatur’s unpaved roads in blue

Inventory

Michigan Public Act 51 of 1951 (PA 51), which defines how funds from the Michigan Transportation Fund (MTF) are distributed to and spent by road-owning agencies, classifies roads owned by Decatur as either city major or city minor roads. State statute prioritizes expenditures on the city major road network.

Figure 5 illustrates the percentage of roads owned by Decatur that are classified as city major and city minor roads.

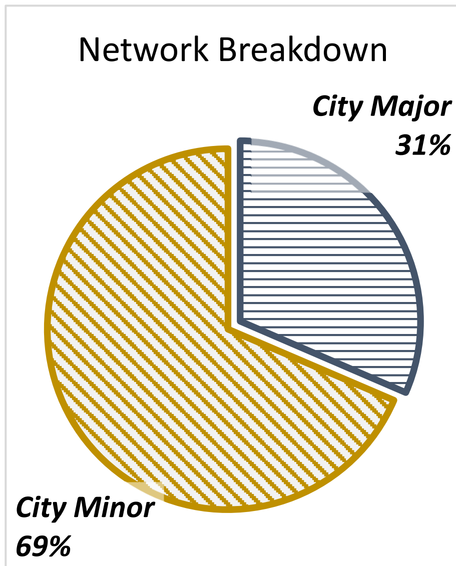


Figure 5: Percentage of city major and city minor roads for Decatur.

Types

Decatur roads primarily consist of asphalt paved roads; it also has unpaved roads (i.e, gravel and/or earth). Factors influencing pavement type include cost of construction, cost of maintenance, frequency of maintenance, type of maintenance, asset life, and road user experience. More information on pavement types is available in the Introduction's Pavement Primer.

Figure 6 illustrates the percentage of various pavement types that Decatur has in its network. .

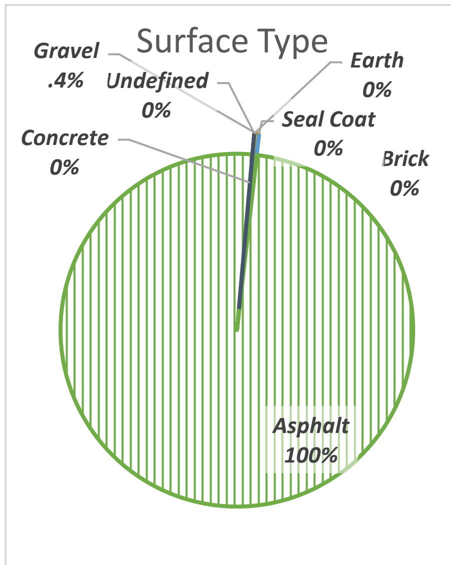


Figure 6: Pavement type by percentage maintained by Decatur Undefined pavements have not been inventoried in Decatur's asset management system to date, but will be included as data becomes available.

Locations

Locations and sizes of each asset can be found in Decatur's Roadsoft database. For more detail, please refer to the agency contact listed in the *Introduction* of this pavement asset management plan.

Condition

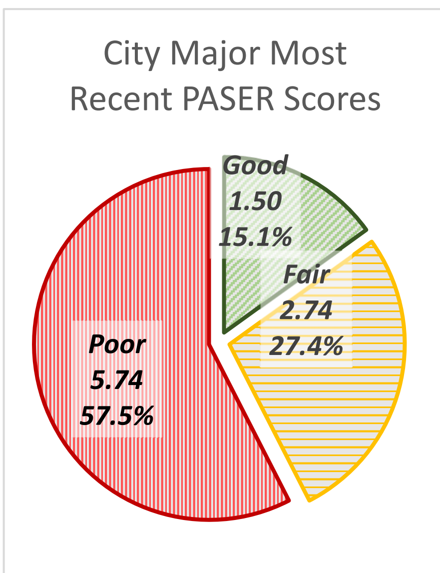
The road characteristic that road users most readily notice is pavement condition. Pavement condition is a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital preventive maintenance, or structural improvement—for a given section of pavement. Decatur uses pavement condition and age to anticipate when a specific section of pavement will be a potential candidate for preventive maintenance. Pavement condition data enables Decatur to evaluate the benefits of preventive maintenance projects and to identify the most cost-effective use of road construction and maintenance dollars. Historic pavement condition data can be used to predict future road conditions based on budget constraints and to determine if a road network's condition will improve, stay the same, or degrade at the current or planned investment level. This analysis helps to determine how much additional funding is necessary to meet a network's condition improvement goals. More detail on this topic is included in the Introduction's *Pavement Primer*.

Paved Roads

Decatur is committed to monitoring the condition of its road network and using pavement condition data to drive cost-effective decision-making and preservation of valuable road assets. Decatur uses the Pavement Surface Evaluation and Rating (PASER) system, which has been adopted by the TAMC for measuring statewide pavement conditions, to assess its paved roads. The PASER system provides a simple, efficient, and consistent method for evaluating road condition through visual inspection. More information regarding the PASER system can be found in the Introduction's Pavement Primer.

Decatur collects 100 percent of its PASER data every two years on all federal-aid-eligible roads in Michigan. In addition, Decatur collects 100 percent of its paved non-federal-aid-eligible network every three years using its own resources.

Decatur's 2019 paved city major road network has 15 percent of roads in the TAMC good condition category, 27 percent in fair, and 58 percent in poor (Figure 7A). The paved city minor road network has 26 percent in good, 8 percent in fair, and 66 percent in poor (Figure 7B).



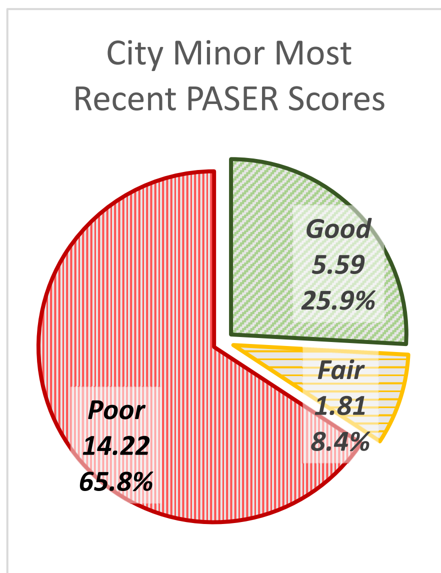


Figure 7: (A) Left: Decatur paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city minor road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved city major road network has 20 percent of roads in the TAMC good condition category, 40 percent in fair, and 40 percent in poor (Figure 8A). The statewide paved city minor road network has 19 percent in good, 38 percent in fair, and 49 percent in poor (Figure 8B). Comparing Figure 7A and Figure 8A shows that Decatur's paved city major road network is worse than similarly-classified roads in the rest of the state, while Figure 7B and Figure 8B show that Decatur's paved city minor road network is also worse than similarly-classified roads in the rest of the state. Other road condition graphs can be viewed on the TAMC pavement condition dashboard at: http://www.mcgi.state.mi.us/mitrp/Data/PaserDashboard.aspx.

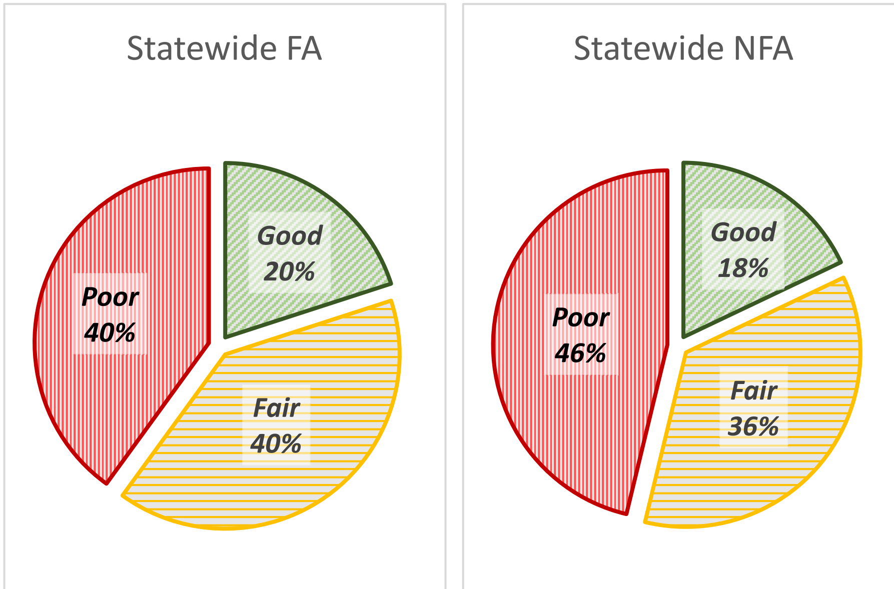


Figure 8: (A) Left: Statewide paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city minor road network conditions by percentage of good, fair, or poor

Figure 9 and Figure 10 show the number of miles for Decatur's roads with PASER scores expressed in TAMC definition categories for the paved city major road network (Figure 9) and the paved city minor road network (Figure 10). Decatur considers road miles on the transition line between good and fair (PASER 8) and the transition line between fair and poor (PASER 5) as representing parts of the road network where there is a risk of losing the opportunity to apply less expensive treatments that gain significant improvements in service life.

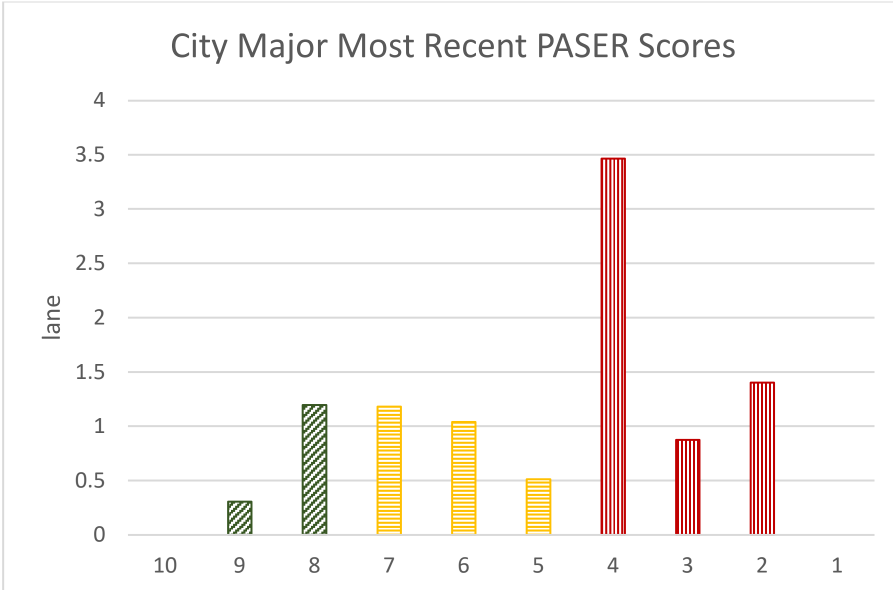


Figure 9: Decatur paved city major road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

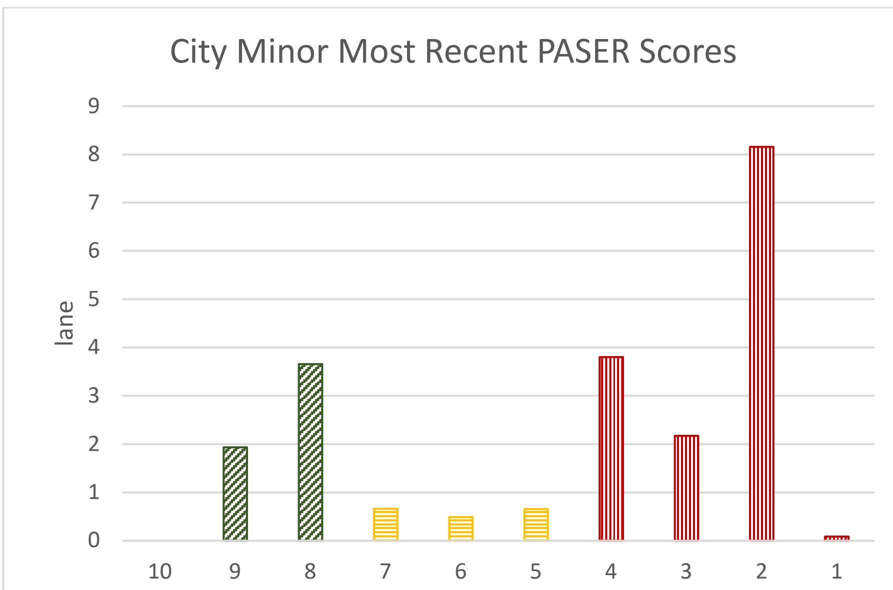


Figure 10: Decatur paved city minor network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 11 provides a map illustrating the geographic location of paved roads and their respective PASER condition. An online version of the most recent PASER data is located at https://www.mcgi.state.mi.us/tamcMap/.

Figure 11: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by Decatur are shown.

As shown in Figure 11, a majority of Decatur's roads are in poor condition. A large portion of the poor roads are lower volume roads serving residential areas of the Village. Some of the more critical roads in Decatur which serve commercial areas or critical assets have had recent improvements performed, but many of these roads also remain in fair or poor condition.

Historically, the overall quality of Decatur's paved city major and minor roads has been decreasing. As a small Village with few miles of federal aid eligible roads Decatur does not receive a significant amount of outside funding to maintain roads. The Village does receive MTF funding, which is supplements by a streets millage. This level of funding does allow for regular road work to occur, but simply does not allow for the amount of significant structural improvements necessary to fix the majority of roads presently in poor condition.

Comparing Decatur's paved road condition trends with overall statewide condition trends it is apparent that Decatur is seeing the same condition trends as many other municipalities throughout the state. The Village has made recent changes including increasing the streets millage and implementing a Pavement Asset Management Plan, but it will be difficult to significantly decrease the amount of poor roads with current funding levels.

Goals

Goals help set expectations to how pavement conditions will change in the future. Pavement condition changes are influenced by water infiltration, soil conditions, sunlight exposure, traffic loading, and repair work performed. Decatur is not able to control any of these factors fully due to seasonal weather changes, traffic pattern changes, and its limited budget. In spite of the uncontrollable variables, it is still important to set realistic network condition goals that efficiently use budget resources to build and maintain roads meeting taxpayer expectations. An assessment of the progress toward these goals is provided in the *1. Pavement Assets*: *Gap Analysis* section of this plan.

Goals for Paved City Roads

The overall goal for Decatur's paved city major and city minor road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 12 and 13.

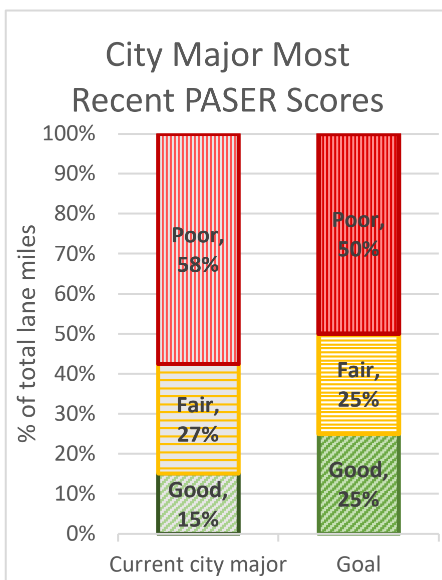


Figure 12: Decatur's 2019 city major road network condition by percentage of good/fair/poor

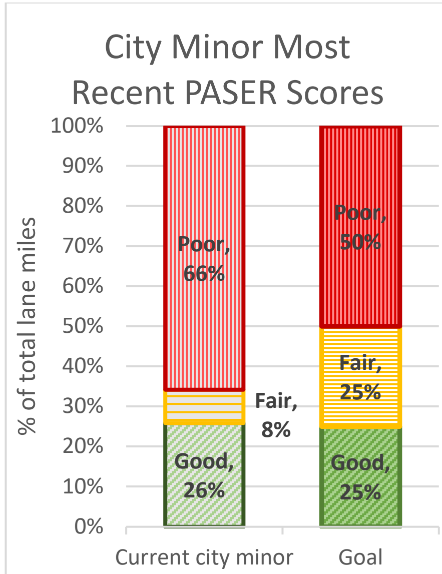


Figure 13: Decatur 2019 paved city minor road network condition by percentage of good/fair/poor

Decatur's network-level pavement condition strategy for paved roads owned and maintained by the Village is:

1. Decrease the percentage of poor roads to 50 across the Village's entire road network.
2. Focus work on streets identified as critical by the Village, shown in Figure 20. Move as many of these critical streets as possible to good or fair condition.
3. Establish and complete scheduled preventative maintenance projects.

Modeled Trends

Roads age and deteriorate just like any other asset. All pavements are damaged by water, traffic weight, freeze/thaw cycles, sunlight, and traffic weight. To offset natural deterioration and normal wear-and-tear on the road, Decatur must complete treatment projects that either protect and/or add life to its pavements. The year-end condition of the whole network depends upon changes or preservation of individual road section conditions that preservation treatments have affected.

By the adoption of this plan, Decatur plans to use many types of repair treatments for its roads, each selected to balance costs, benefits, and road life expectancy. When agency trends are Modeled, any gap between goals and accomplishable work becomes evident. Financial resources influence how much work can be accomplished across the network within agency budget and what treatments and strategies can be afforded; a full discussion of Decatur's financial resources can be found in the *5. Financial Resources* section.

Treatments and strategies that counter pavement-damaging forces include reconstruction, structural improvement, capital preventive maintenance, innovative treatments, and maintenance. For a complete discussion on the pavement treatment tools, refer to the *1. Introduction*'s *Pavement Primer*.

Correlating with each PASER score are specific types of treatments best performed either to protect the pavement (CPM) or to add strength back into the pavement (structural improvement) (Table 1). MDOT provides guidance regarding when a specific pavement may be a candidate for a particular treatment. These identified PASER scores "trigger" the timing of projects appropriately to direct the right pavement fix at the right time, thereby providing the best chance for a successful project. The information provided in Table 1 is a guide for identifying potential projects; however, this table should not be the sole criteria for pavement treatment selection. Other information such as future development, traffic volume, utility projects, and budget play a role in project selection. The Village has also put an emphasis selecting streets considered critical due the businesses, community facilities, or infrastructure they serve. These streets are shown in Figure 20. This table should also not be used as a substitute for engineering judgement.

Table 1: Service Life Extension (in Years) for Pavement Types Gained by Fix Type[1]				
	Life Extension (in years)*			
Fix Type	**Flexible**	**Composite**	**Rigid**	**PASER**
HMA crack treatment	1-3	1-3	N/A	6-7
Overband crack filling	1-2	1-2	N/A	6-7
One course non-structural HMA overlay	5-7	4-7	N/A	4-5****
Mill and one course non-structural HMA overlay	5-7	4-7	N/A	3-5
Single course chip seal	3-6	N/A	N/A	5-7†
Double chip seal	4-7	3-6	N/A	5-7†
Single course microsurface	3-5	**	N/A	5-6
Multiple course microsurface	4-6	**	N/A	4-6****
Ultra-thin HMA overlay	3-6	3-6	N/A	4-6****
Paver placed surface seal	4-6	**	N/A	5-7
Full-depth concrete repair	N/A	N/A	3-10	4-5***
Concrete joint resealing	N/A	N/A	1-3	5-8
Concrete spall repair	N/A	N/A	1-3	5-7
Concrete crack sealing	N/A	N/A	1-3	4-7
Diamond grinding	N/A	N/A	3-5	4-6
Dowel bar retrofit	N/A	N/A	2-3	3-5***
Longitudinal HMA wedge/scratch coat with surface treatment	3-7	N/A	N/A	3-5****
Flexible patching	**	**	N/A	N/A
Mastic joint repair	1-3	1-3	N/A	4-7
Cape seal	4-7	4-7	N/A	4-7
Flexible interlayer “A”	4-7	4-7	N/A	4-7
Flexible interlayer “B” (SAMI)	4-7	4-7	N/A	3-7
Flexible interlayer “C”	4-7	4-7	N/A	3-7
Fiber reinforced flexible membrane	4-7	4-7	N/A	3-7
Fog seal	**	**	N/A	7-10
GSB 88	**	**	N/A	7-10
Mastic surface treatment	**	**	N/A	7-10
Scrub seal	**	**	N/A	4-8
* The time range is the expected life extending benefit given to the pavement, not the anticipated longevity of the treatment.				
** Data is not available to quantify the life extension.				
*** The concrete slabs must be in fair to good condition.				
**** Can be used on a pavement with a PASER equal to 3 when the sole reason for rating is rutting or severe raveling of the surface asphalt layer.				
† For PASER 4 or less providing structural soundness exists and that additional pre-treatment will be required for example, wedging, bar seals, spot double chip seals, injection spray patching or other pre-treatments.				
[1] Part of Appendix D-1 from *MDOT Local Agency Programs Guidelines for Geometrics on Local Agency Projects* 2017 Edition Approved Preventive Maintenance Treatments				

Roadsoft Pavement Condition Forecast to Forecast Future Trends

Decatur uses Roadsoft, an asset management software suite, to manage road- and bridge-related infrastructure. Roadsoft is developed by Michigan Technological University and is available for Michigan local agencies at no cost to them. Roadsoft uses pavement condition data to drive network-level deterioration models that forecast future road conditions based on planned construction and maintenance work. A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 14.

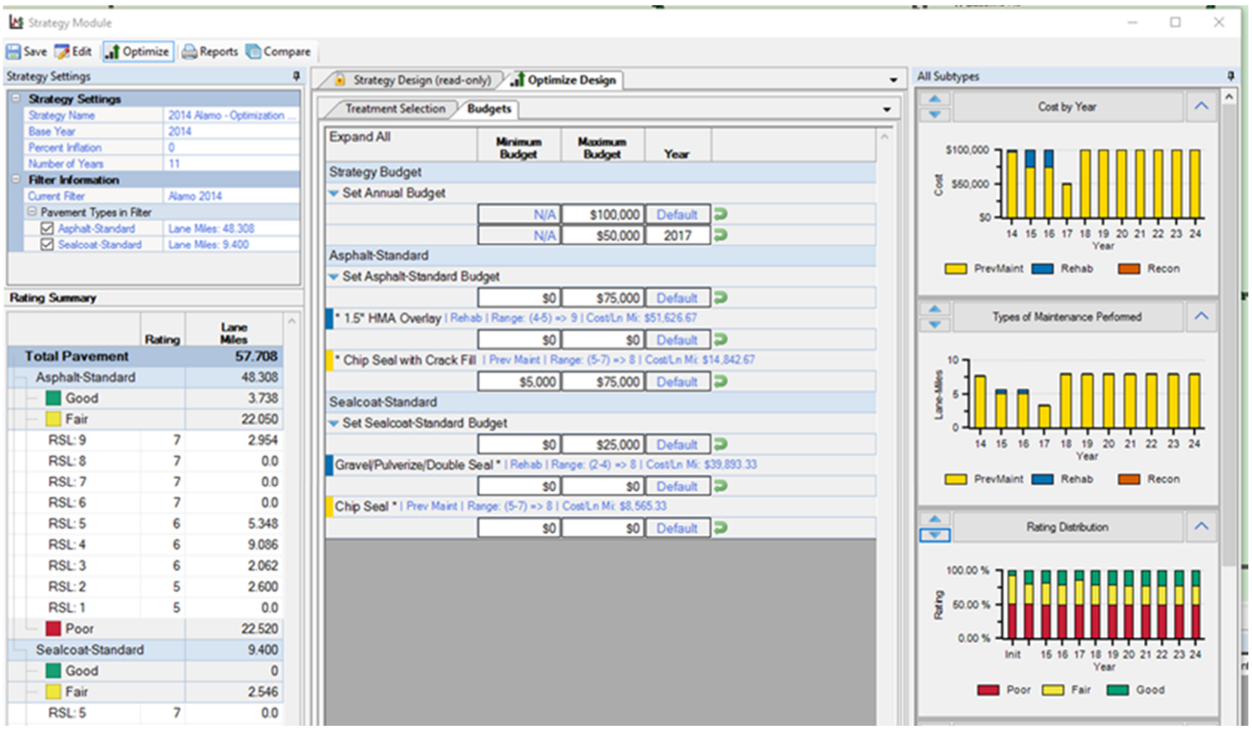


Figure 14: Pavement condition forecast model in the software program Roadsoft.

Paved City Roads

Table 2 and 3 illustrate the network-level model inputs for Roadsoft on the paved city major and minor road networks. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 2 and 3 are the average treatment volume of planned projects scheduled to be completed in 2020-2023. See Appendix A of this plan for details on planned projects.

Table 2: Roadsoft Modeled Trends, Planned Projects, and Gap Analysis for Decatur's Road Assets—Modeled Trends: Roadsoft Annual Work Program for the Paved City Major Road Network Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	1	1	7–7
Chip Seal	0.2	5	6,7-8
Overlay	0.21	10	4, 9
Reconstruction	0.14	20	1, 2, 3, 4-10

Table 3: Roadsoft Modeled Trends, Planned Projects, and Gap Analysis for Decatur's Road Assets—Modeled Trends: Roadsoft Annual Work Program for the Paved City Minor Road Network Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	2	1	7–7
Chip Seal	0.2	5	6,7-8
Overlay	0.1	10	4, 9
Reconstruction	0.1	20	1, 2, 3, 4-10

Results from the Roadsoft network condition model for Decatur's roads are shown in Figure 15. Due to an increase in the streets millage and forecasted increases in MTF funding Roadsoft's network analysis of Decatur's planned projects from its future available budget show Decatur will reach its pavement condition goals given the projects planned for 2020-2023.

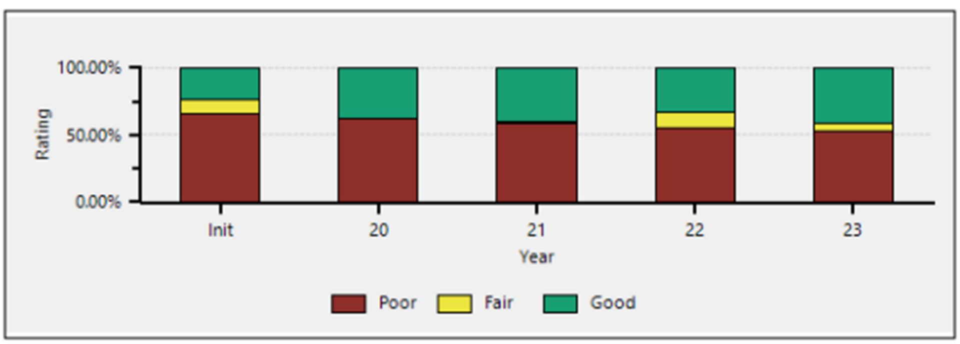


Figure 15: Forecast good/fair/poor changes to Decatur network condition from planned projects on the road network.

Planned Projects

Decatur intends to plan construction and maintenance projects several years in advance. A multi-year planning threshold is required due to the time necessary to plan, design, and finance construction and maintenance projects on the city's paved road network. This includes planning and programming requirements from state and federal agencies that must be met prior to starting a project and can include studies on environmental and archeological impacts, review of construction and design documents and plans, documentation of rights-of-way ownership, planning and permitting for storm water discharges, and other regulatory and administrative requirements.

Per PA 499 of 2002 (later amended by PA 199 of 2007), road projects for the upcoming three years are required to be reported annually to the TAMC. Planned projects represent the best estimate of future activity; however, changes in design, funding, and permitting may require Decatur to alter initial plans. Project planning information is used to predict the future condition of the road networks that Decatur maintains. The *1. Pavement Assets*: *Modeled Trends* section of this plan provides a detailed analysis of the impact of the proposed projects on Decatur's road network.

For 2020-2023, Decatur plans to do the following projects:

Paved City Road Projects

Decatur is currently planning the construction and maintenance projects listed in Appendix A for the road network. The locations of these projects are shown in Figure 16, Figure 17,

Figure 18, and Figure 19. The total cost of these projects is approximately $1,540,500.

Figure 16: Map showing paved road projects planned for 2020.

Figure 17: Map showing paved road projects planned for 2021.

Figure 18: Map showing paved road projects planned for 2022.

Figure 19: Map showing paved road projects planned for 2023.

Gap Analysis

The future available funding levels that Decatur has planned for are sufficient to meet the goals for the paved road network. The *1. Pavement Assets*: *Goals* section of this plan provides further detail about the goals and the *1. Pavement Assets*: *Modeled Trends* section provides further detail on pavement conditions predicted with the future budget. A predicted increase in MTF funding and an increase in the Village streets millage are necessary to meet the goals.

Roadsoft Pavement Condition Forecast for the Paved City Major and City Minor Network

Decatur used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved city major and city minor road networks. Table 4 and Table 5 illustrate the network-level model inputs used for this simulation.

Table 4: Roadsoft Modeled Trends, Planned Projects, and Gap Analysis for Decatur's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Major Road Network Forecast

Pavement Condition Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	1	1	7–7
Chip Seal	0.2	5	6,7-8
Overlay	0.2	10	4, 9
Crush and Shape	0.1	20	1, 2, 3, 4-10
Additional Work Necessary to Overcome Deficit			
Treatment	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack seal	0	1	7–7
Chip seal	0	5	6,7-8
Overlay	0	10	4, 9
Crush and Shape	0	20	1, 2, 3, 4-10

Table 5: Roadsoft Modeled Trends, Planned Projects, and Gap Analysis for Decatur's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Minor Road Network Forecast			
Pavement Condition Forecast			
Treatment Name	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack Seal	1	1	7–7
Chip Seal	0.2	5	6,7-8
Overlay	0.1	10	4, 9
Crush and Shape	0.1	20	1, 2, 3, 4-10
Additional Work Necessary to Overcome Deficit			
Treatment	**Annual Miles of Treatment**	**Years of Life**	**Trigger-Reset**
Crack seal	0	1	7–7
Chip seal	0	5	6,7-8
Overlay	0	10	4, 9
Crush and Shape	0	20	1, 2, 3, 4-10

Results for the paved city minor road network from the Roadsoft network condition model given the inputs in Table 5 are shown in Figure 20 below. Results indicate that work proposed as part of this plan is sufficient to meet the pavement condition goal.

Figure 20: Forecast good/fair/poor Changes to Decatur Network Condition from planned projects on the paved road network.

2. FINANCIAL RESOURCES

Public entities must balance the quality and extent of services they can provide with the tax resources provided by citizens and businesses, all while maximizing how efficiently funds are used. Decatur will overview its general expenditures and financial resources currently devoted to pavement maintenance and construction. This financial information is not intended to be a full financial disclosure or a formal report. Michigan agencies are required to submit an Act 51 Report to the Michigan Department of Transportation each year; this is a full financial report that outlines revenues and expenditures. This report can be obtained on our website at https://decaturmi.org/departments/clerk-treasurer/ or by request submitted to our agency contact (listed in this plan).

The Village of Decatur has implemented a streets millage which provides an additional source of funding for road construction and maintenance within the village. Historically, the millage has generated an average of approximately $100,000 a year which was split between the major and minor road funds following the MTF distribution guidelines. Moving forward the Village has chosen to increase the millage to generate approximately $176,500 of yearly revenue. Additionally, budgeting practices will be modified such that the millage revenue will be distributed on an as needed basis as projects are selected.

Decatur has an average annual budget for pavement asset management of approximately $270,000. The Village also regularly seeks outside funding sources to supplement its own. In 2020 the Village is scheduled to receive a one time grant of approximately $321,000 for the Williams St project. Additionally, a grant for the Prairie Ronde St project is scheduled to be received in 2022 in the amount of approximately $254,000. Both grants are coming from the region 4 Rural Task Force transportation funding.

City Major Network

Decatur has historically spent $60,000 annually on pavement-related projects. Over the next four years, Decatur plans to spend $160,000 on city major-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from Michigan Transportation Fund (MTF) and millages.

City Minor Network

Decatur has historical spent $70,000 annually on pavement-related projects. Over the next four years, Decatur plans to spend $110,000 on city minor-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from the MTF and millages.

3. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads maintained by Decatur provides road users with multiple alternate options in the event of an unplanned disruption of one part of the system. There are, however, key links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic. Figure 21 illustrates the key transportation links in Decatur's road network, including those that meet the following types of situations:

- **Emergency alternate routes for high-volume roads:** Roads which are routinely used as alternate routes for high volume roads or roads that are included in an emergency response plan
- **Limited access areas:** Roads that serve remote or limited access areas that result in long detours if closed
- **Main access to key districts:** Areas where a large number of residents or businesses will be significantly impacted if a road is unavailable.

Our road network includes the following critical assets: (see Figure 21).

- St. Marys Street, serves a large residential area of the Village
- Cedar Street, serves the school complex
- Prairie Ronde St, east/west access point to Village and serves well field
- S. Williams St, cross-village thoroughfare and serves a number of commercial properties
- Lagoon Street, only paved access to sewage lagoons
- W. Edgar Burgen Boulevard, cross-village traffic
- Phelps Street, cross-village traffic
- George Street, cross-village traffic
- Beers Street, serves industrial area
- Bronson Street, serves industrial area
- Sherwood Street, serves commercial area
- South Street, single access point to electrical sub-station
- Pine Street, services residential area and single access point to public recreation area
- Sandy Knoll, single access point to residential area

Figure 21: Key transportation links in Decatur's road network

4. COORDINATION WITH OTHER ENTITIES

An asset management plan provides a significant value for infrastructure owners because it serves as a platform to engage other infrastructure owners using the same shared right-of-way space. Decatur communicates with both public and private infrastructure owners to coordinate work in the following ways:

Decatur maintains drinking water, sanitary and storm sewer assets in addition to transportation assets. Decatur follows an asset management process for all of its assets by coordinating the upgrade, maintenance, and operation of all major assets.

Planned projects for subsurface infrastructure that Decatur owns have been developed by a variety of other planning efforts. The village coordinates projects across all asset plans to maximize value and minimize service disruptions and cost to the public.

Decatur takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following policies:

- Roads which are in poor condition that have a subsurface infrastructure project planned which will destroy more than half the lane with will be rehabilitated or reconstructed full width using transportation funds to repair the balance of the road width.
- Subsurface infrastructure projects which will cause damage to pavements in good condition will be delayed as long as possible, or will consider methods that do not require pavement cuts.
- Subsurface utility projects will be coordinated to allow all under pavement assets to be upgraded in the same project regardless of ownership.

APPENDIX A: 2020 - 2023 PAVED ROAD PLANNED PROJECTS

Project Planner Detailed Projects By Year Report

Decatur (CityVillage)

Report Module: Planner Evaluation
Today's Date: Wednesday, May 27, 2020

2020 TAMP

Last Modified: 5/27/2020
Percent Inflation: 2
Number of Years: 4
Strategy/Filter Name: 2020 TAMP
Strategy Filter: AM Plan Base (City)
Plan Memo:

Project Planner Detailed Projects By Year Report

Planner Name: **2020 TAMP**

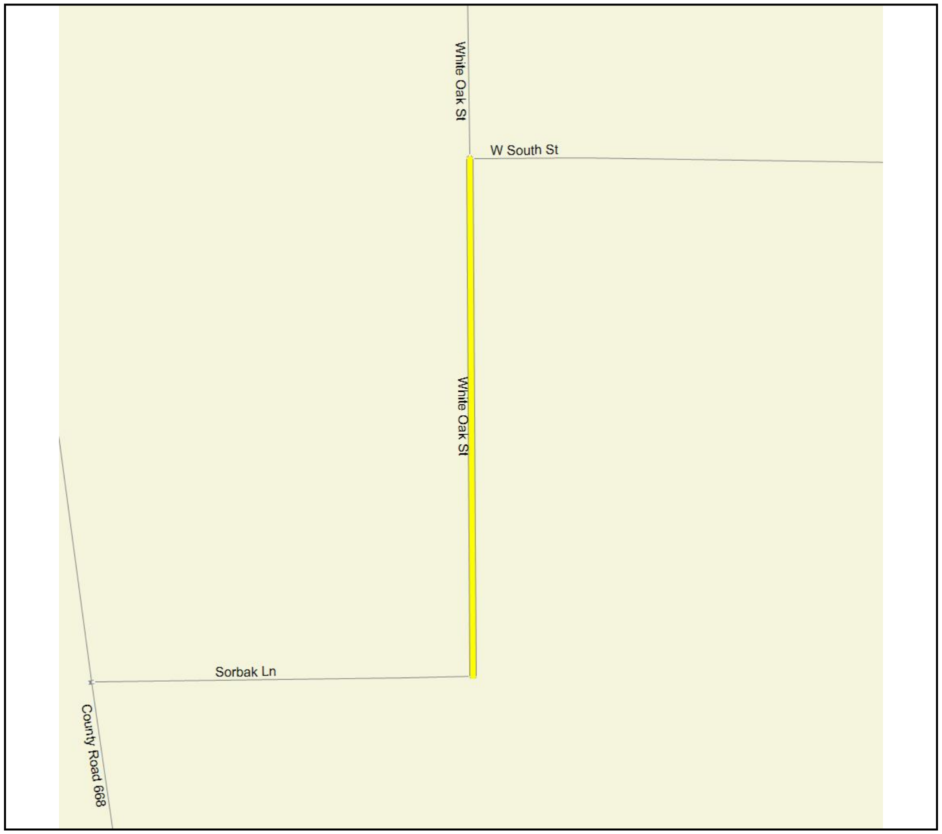
2020 **Asphalt-Standard** **Crush & Shape**

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
Project - 1		591707	White Oak St	W South St	0.105	0.071	0	0.142	0.00	$43,319
				W Champion St	0.176					
				Crush & Shape Totals:		**0.071**		**0.142**		**$43,319**

2020 Asphalt-Standard Mill & Overlay - 3" Thick



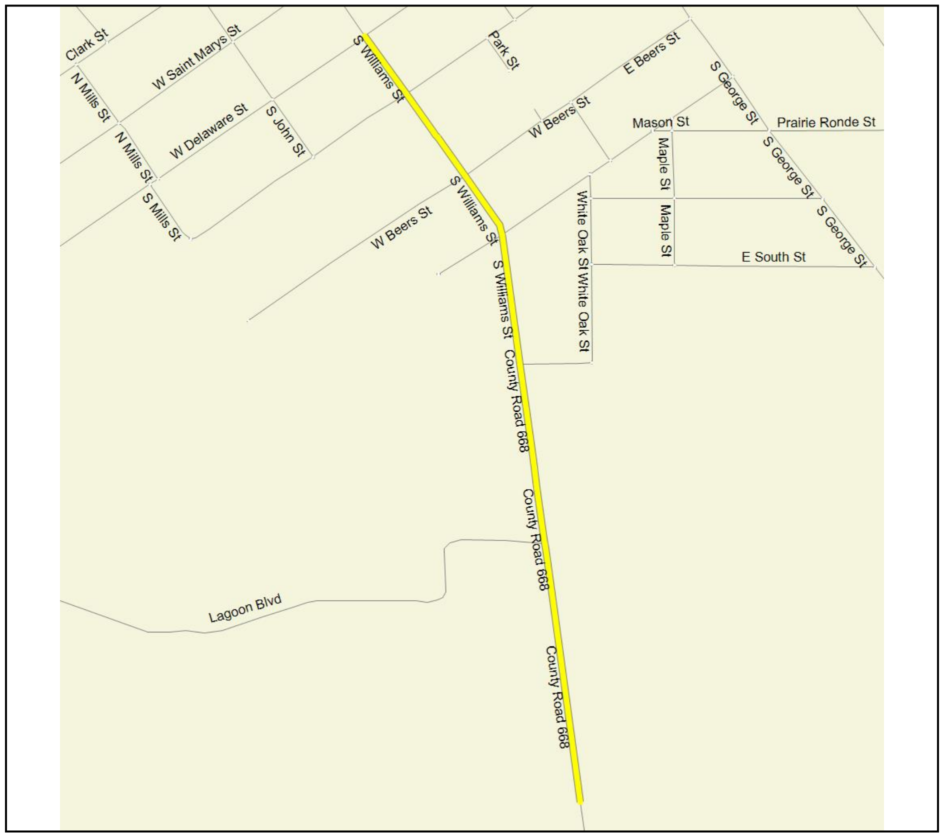
Note: Zero lanes default to 2 for lane length calculation.

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		591707	White Oak St	Sorbak Ln	0.000	0.105	2	0.210	0.00	$32,032
				W South St	0.105					
				Mill & Overlay - 3" Thick Totals:		**0.105**		**0.21**		**$32,032**

2020 Asphalt-Standard Mill and Overlay - 4" Thick



Project Planner Detailed Projects By Year Report

Planner Name: **2020 TAMP**

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		3140082	County Road 668	City/Twp Line Lagoon Blvd	2.279 2.557	0.278	2	0.556	26.00	$144,175
		3140082	County Road 668	Lagoon Blvd Sorbak Ln & S Williams St	2.557 2.568	0.011	0	0.022	0.00	$5,705
		3140082	County Road 668	Lagoon Blvd Sorbak Ln & S Williams St	2.568 2.617	0.049	0	0.098	0.00	$25,412
		3140082	County Road 668	Lagoon Blvd Sorbak Ln & S Williams St	2.617 2.646	0.029	0	0.058	0.00	$15,040
		3140082	County Road 668	Lagoon Blvd Sorbak Ln & S Williams St	2.646 2.671	0.025	0	0.050	0.00	$12,965
		3140082	County Road 668	Lagoon Blvd Sorbak Ln & S Williams St	2.671 2.751	0.080	2	0.160	26.00	$41,489
		3140082	County Road 668	Sorbak Ln & County Road 668 W Bronson St	2.751 2.891	0.140	2	0.280	0.00	$72,606
		3140082	County Road 668	W Bronson St W Beers St	2.891 2.965	0.074	2	0.148	0.00	$38,377
		3140082	County Road 668	W Beers St Amtrak	2.965 3.016	0.051	2	0.102	0.00	$26,449
		3140082	County Road 668	Amtrak W Sherwood St	3.016 3.074	0.058	2	0.116	0.00	$30,080
		3140082	County Road 668	W Sherwood St N Williams St & W Delaware St	3.074 3.149	0.075	2	0.150	0.00	$38,896
				Mill and Overlay - 4" Thick Totals:		**0.87**		**1.74**		**$451,194**

Note: Zero lanes default to 2 for lane length calculation.

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

Asphalt-Standard Totals:	**1.046**	**2.092**	**$526,545**
Year 2020 Totals:	**1.046**	**2.092**	**$526,545**

2021 Asphalt-Standard Crack Seal

Project Planner Detailed Projects By Year Report

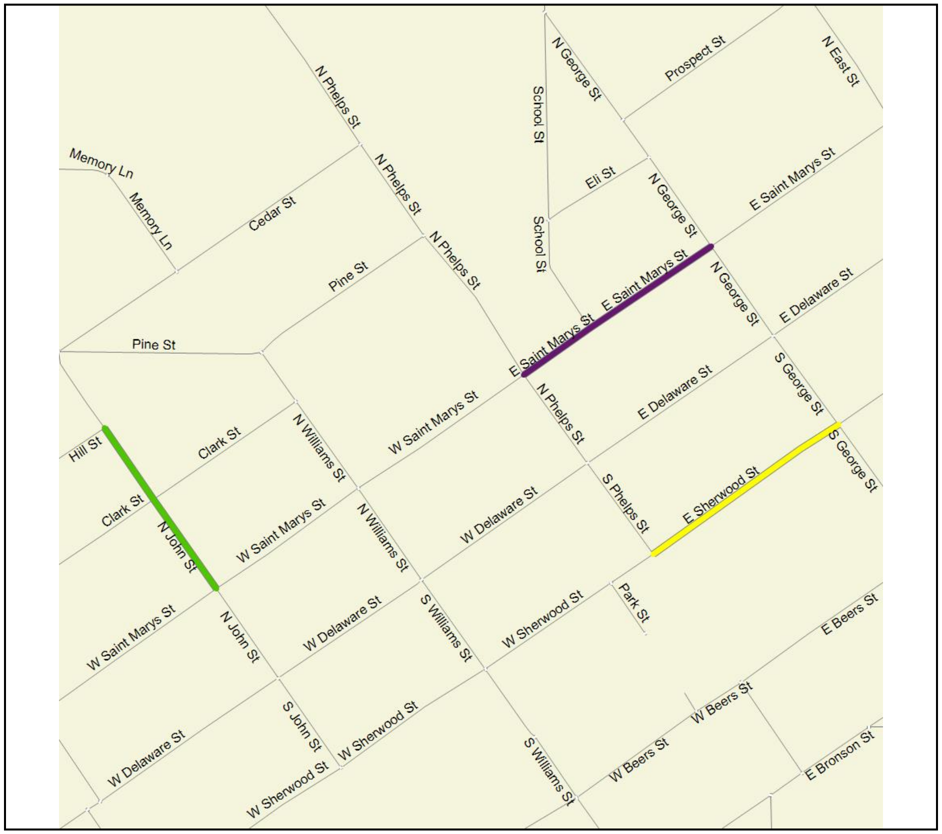
Planner Name: **2020 TAMP**

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		579605	Cedar St	Pine St & N John St & Douglas Dr Hill St	0.252 0.385	0.133	2	0.266	0.00	$350
		591709	Hill St	N John St Hill St	0.000 0.117	0.117	2	0.234	0.00	$308
		3800014	Hill St	Hill St Cedar St	0.063 0.131	0.068	2	0.136	0.00	$179
				Crack Seal Totals:		**0.318**		**0.636**		**$837**

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

2021 Asphalt-Standard **Mill & Overlay - 3" Thick**



Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		581806	E Sherwood St	S Phelps St & W Sherwood St S George St	0.418 0.574	0.156	2	0.312	0.00	$48,542
Project - 2		579603	N John St	W Saint Marys St Clark St	0.150 0.225	0.075	2	0.150	0.00	$23,338
		579603	N John St	Clark St Hill St	0.225 0.285	0.060	2	0.120	0.00	$18,670
Project - 3		581703	W Saint Marys St	W Saint Marys St & N Phelps St School St	1.741 1.797	0.056	2	0.112	0.00	$17,425
		581703	W Saint Marys St	School St N George St	1.797 1.898	0.101	2	0.202	0.00	$31,428
				Mill & Overlay - 3" Thick Totals:		**0.448**		**0.896**		**$139,403**
				Asphalt-Standard Totals:		**0.766**		**1.532**		**$140,241**
				Year 2021 Totals:		**0.766**		**1.532**		**$140,241**

Note: Zero lanes default to 2 for lane length calculation.

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

2022 Asphalt-Standard Crack Seal

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
Project - 1		581708	Old Swamp Rd	E Delaware St & S George St E Saint Marys St	3.424 3.499	0.075	2	0.150	0.00	$201
		581708	Old Swamp Rd	E Saint Marys St Eli St	3.499 3.573	0.074	2	0.148	0.00	$199
		581708	Old Swamp Rd	Eli St Prospect St	3.573 3.605	0.032	2	0.064	0.00	$86
		581708	Old Swamp Rd	Prospect St School St	3.605 3.696	0.091	2	0.182	0.00	$244
		581803	W Bronson St	S George St Maple St	0.000 0.079	0.079	2	0.158	0.00	$212
		581803	W Bronson St	Maple St Mason St	0.079 0.103	0.024	2	0.048	0.00	$64
		581803	W Bronson St	Mason St S Phelps St & W Bronson St	0.103 0.158	0.055	2	0.110	0.00	$148
		581803	W Bronson St	S Phelps St & E Bronson St White Oak St	0.158 0.185	0.027	2	0.054	0.00	$73
		581803	W Bronson St	White Oak St S Williams St	0.185 0.298	0.113	2	0.226	0.00	$303
		583007	E Edgar Bergan Blvd	N Phelps St & W Edgar Bergan Blvd School St	0.367 0.575	0.208	2	0.416	0.00	$559
		583007	E Edgar Bergan Blvd	School St N East St & Prospect St	0.575 0.753	0.178	2	0.356	0.00	$478
		583007	E Edgar Bergan Blvd	N East St & Prospect St Rogers St	0.753 0.827	0.074	2	0.148	0.00	$199

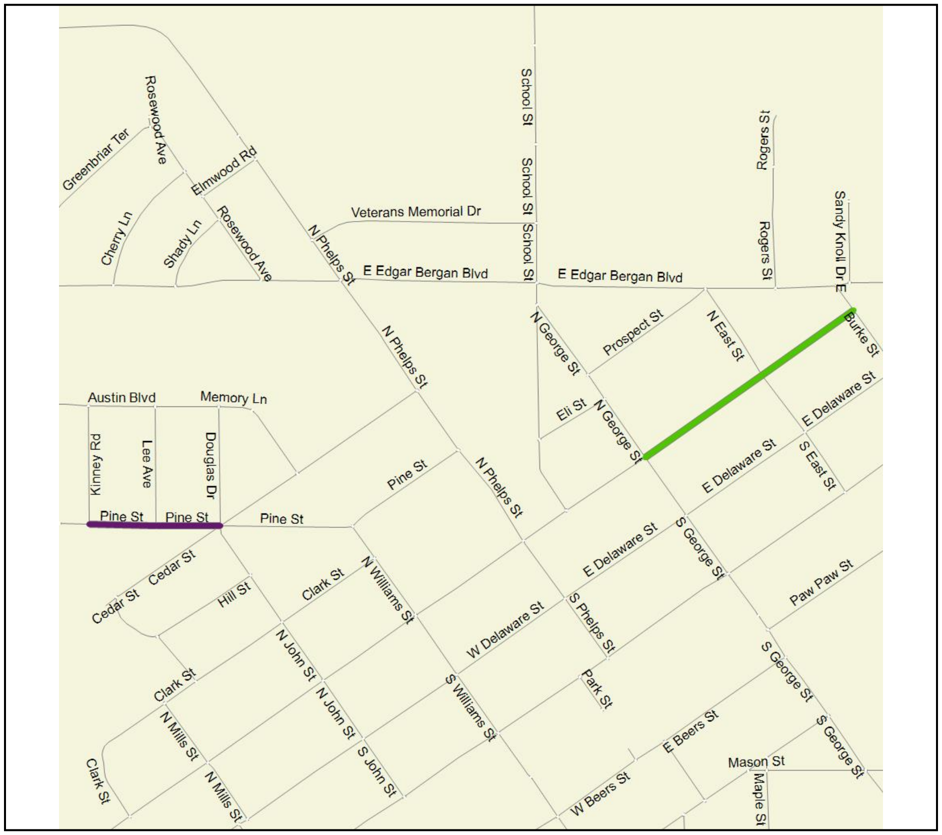
Note: Zero lanes default to 2 for lane length calculation.

Project Planner Detailed Projects By Year Report

Planner Name: 2020 TAMP

583007	E Edgar Bergan Blvd	Rogers St Burke St	0.827 0.891	0.064	2	0.128	0.00	$172
583007	E Edgar Bergan Blvd	Burke St Sandy Knoll Dr E	0.891 0.906	0.015	2	0.030	0.00	$40
583007	E Edgar Bergan Blvd	Sandy Knoll Dr E M 51 & E Delaware St	0.906 1.071	0.165	2	0.330	0.00	$443
		Crack Seal Totals:		**1.274**		**2.548**		**$3,421**

2022 Asphalt-Standard Crush & Shape



Project Planner Detailed Projects By Year Report

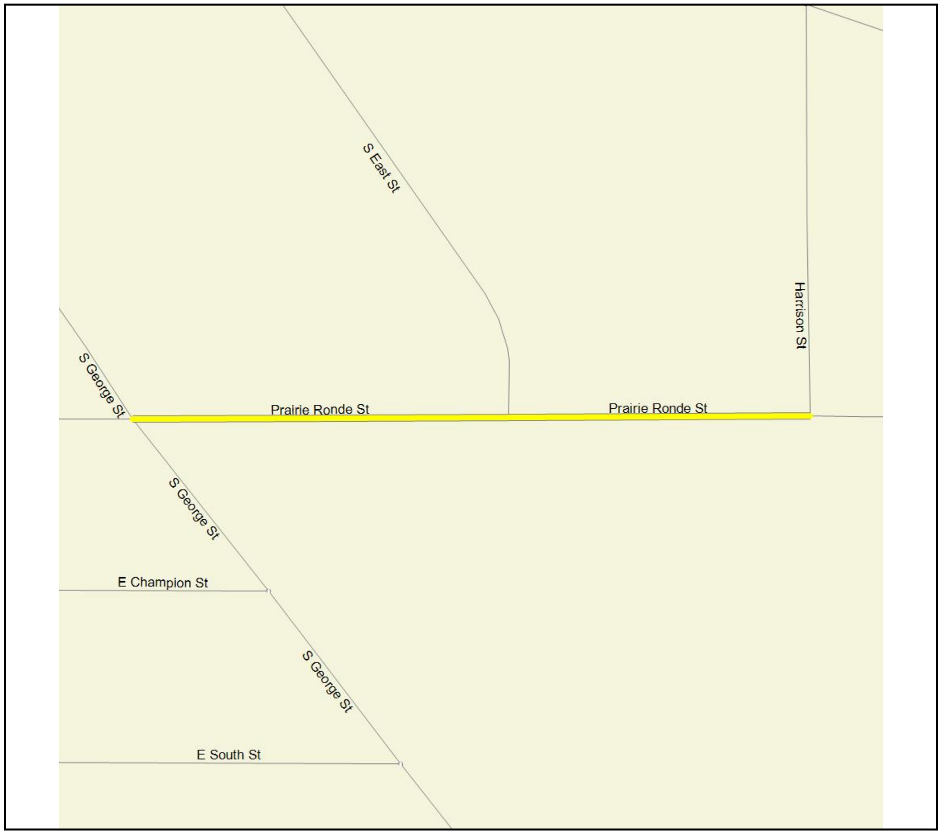
Planner Name: 2020 TAMP

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		589903	Pine St	Kinney Rd	0.191	0.070	2	0.140	0.00	$44,435
				Lee Ave	0.261					
		589903	Pine St	Lee Ave	0.261	0.069	2	0.138	0.00	$43,800
				Cedar St & N John St & Douglas Dr	0.330					
Project - 2		581703	W Saint Marys St	N George St	1.898	0.151	2	0.302	0.00	$95,852
				N East St	2.049					
		581703	W Saint Marys St	N East St	2.049	0.119	2	0.238	0.00	$75,539
				Burke St	2.168					
				Crush & Shape Totals:		**0.409**		**0.818**		**$259,626**

Project Planner Detailed Projects By Year Report

Planner Name: **2020 TAMP**

2022 **Asphalt-Standard** **Recon - No C&G**



Project Planner Detailed Projects By Year Report

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
Project - 1		579606	County Road 352	Mason St & S George St	0.124	0.159	2	0.318	0.00	$189,245
				S East St	0.283					
		579606	County Road 352	S East St	0.283	0.127	2	0.254	0.00	$151,158
				Harrison St & County Road 352	0.410					
				Recon - No C&G Totals:		**0.286**		**0.572**		**$340,402**
				Asphalt-Standard Totals:		**1.969**		**3.938**		**$603,450**
				Year 2022 Totals:		**1.969**		**3.938**		**$603,450**

Project Planner Detailed Projects By Year Report

2023 Asphalt-Standard Chip Seal

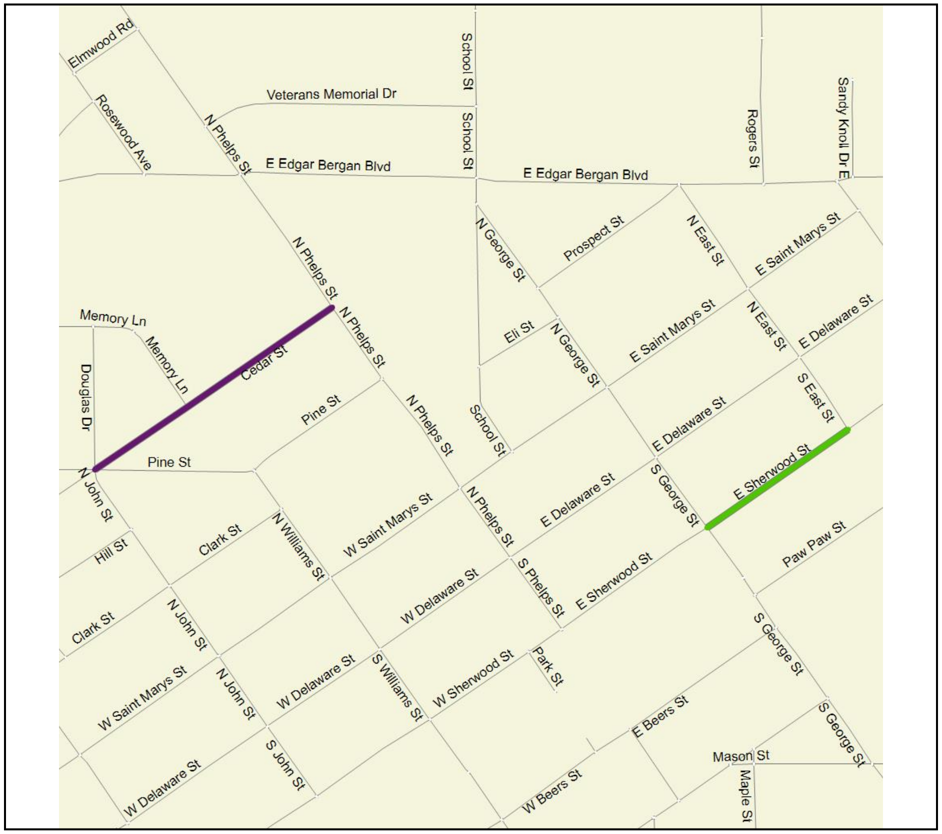
Note: Zero lanes default to 2 for lane length calculation.

Project Planner Detailed Projects By Year Report

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		581803	W Bronson St	Mason St S Phelps St & W Bronson St	0.103 0.158	0.055	2	0.110	0.00	$2,808
		581803	W Bronson St	S Phelps St & E Bronson St White Oak St	0.158 0.185	0.027	2	0.054	0.00	$1,378
		581803	W Bronson St	White Oak St S Williams St	0.185 0.298	0.113	2	0.226	0.00	$5,769
				Chip Seal Totals:		**0.195**		**0.39**		**$9,955**

Project Planner Detailed Projects By Year Report

2023 Asphalt-Standard Crush & Shape



Project Planner Detailed Projects By Year Report

Project	Key	PR Number	Road Name	From/To Desc	Bmp/Emp	Length	Lanes	Lane Length	Width	Surface Cost
		581806	E Sherwood St	S George St S East St	0.574 0.724	0.150	2	0.300	0.00	$97,122
Project - 2		579605	Cedar St	N Phelps St Memory Ln	0.000 0.154	0.154	2	0.308	0.00	$99,712
		579605	Cedar St	Memory Ln Pine St & N John St & Douglas Dr	0.154 0.252	0.098	2	0.196	0.00	$63,453
				Crush & Shape Totals:		**0.402**		**0.804**		**$260,286**
				Asphalt-Standard Totals:		**0.597**		**1.194**		**$270,241**
				Year 2023 Totals:		**0.597**		**1.194**		**$270,241**
				Report Totals:		**4.378**		**8.756**		**$1,540,477**

APPENDIX B

A Quick Check of Your Highway Network Health

By Larry Galehouse, Director, National Center for Pavement Preservation and

Jim Sorenson, Team Leader, FHWA Office of Asset Management

Historically, many highway agency managers and administrators have tended to view their highway systems as simply a collection of projects. By viewing the network in this manner, there is a certain comfort derived from the ability to match pavement actions with their physical/functional needs. However, by only focusing on projects, opportunities for strategically managing entire road networks and asset needs are overlooked. While the "bottom up" approach is analytically possible, managing networks this way can be a daunting prospect. Instead, road agency administrators have tackled the network problem from the "top down" by allocating budgets and resources based on historical estimates of need. Implicit in this approach, is a belief that the allocated resources will be wisely used and prove adequate to achieve desirable network service levels.

Using a quick checkup tool, road agency managers and administrators can assess the needs of their network and other highway assets and determine the adequacy of their resource allocation effort. A quick checkup is readily available and can be usefully applied with minimum calculations.

It is essential to know whether present and planned program actions (reconstruction, rehabilitation, and preservation) will produce a <u>net</u> improvement in the condition of the network. However, before the effects of any planned actions on the highway network can be analyzed, some basic concepts should be considered.

Assume every lane-mile segment of road in the network was rated by the number of years remaining until the end of life (terminal condition). Remember that terminal condition does not mean a failed road. Rather, it is the level of deterioration that management has set as a minimum operating condition for that road or network. Consider the rated result of the current network condition as shown in Figure 1.

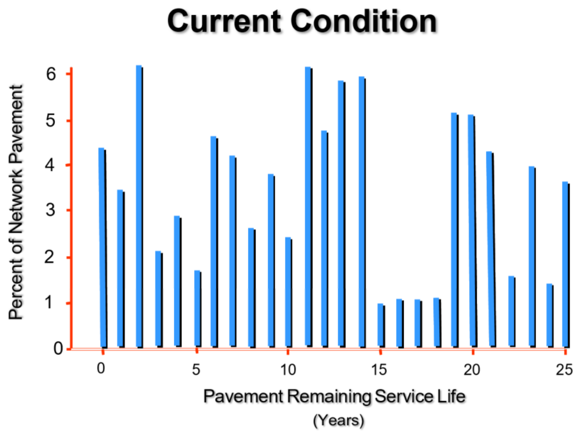


Figure 1 – Current Condition

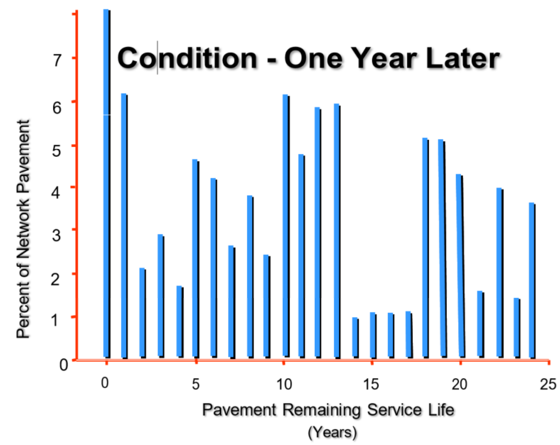


Figure 2 – Condition 1-Year Later

If no improvements are made for one year, then the number of years remaining until the end of life will decrease by one year for each road segment, except for those stacked at zero. The zero- stack will increase significantly because it maintains its previous balance and also becomes the recipient of those roads having previously been stacked with one year remaining. Thus, the entire network will age one year to the condition shown in Figure 2, with the net lane-miles in the zero stack raised from 4% to 8% of the network.

Some highway agencies still subscribe to the old practice of assigning their highest priorities to the reconstruction or rehabilitation of the worst roads. This practice of "worst first", i.e., continually addressing only those roads in the zero-stack, is a proven death spiral strategy because reconstruction and rehabilitation are the most expensive ways to maintain or restore serviceability. Rarely does sufficient funding exist to sustain such a strategy.

The measurable loss of pavement life can be thought of as the network's total lane-miles multiplied by 1 year, i.e., lane-mile-years. Consider the following quantitative illustration. Suppose your agency's highway network consisted of 4,356 lane-miles. Figure 3 shows that without intervention, it will lose 4,356 lane-mile-years per year.

Agency Highway Network = 4,356 lane miles

Each year the network will lose

4,356 lane-mile-years

Figure 3 – Network Lane Miles

To offset this amount of deterioration over the entire network, the agency would need to annually perform a quantity of work equal to the total number of lane-mile-years lost just to maintain the status quo. Performing work which produces fewer than 4,356 lane-mile-years would lessen the natural decline of the overall network, but still fall short of maintaining the status quo. However, if the agency produces more than 4,356 lane-mile-years, it will improve the network.

In the following example, an agency can easily identify the effect of an annual program consisting of reconstruction, rehabilitation, and preservation projects on its network. This assessment involves knowing the only two components for reconstruction and rehabilitation projects: lane-miles and design life of each project fix. Figure 4 displays the agency's programmed activities for reconstruction and Figure 5 displays it for rehabilitation.

Reconstruction Evaluation

Projects this Year = 2

Project	Design Life	Lane Miles	Lane Mile Years	Lane Mile Cost	Total Cost
No. 1	25 yrs	22	550	$463,425	$10,195,350
No. 2	30 yrs	18	540	$556,110	$10,009,980
	Total	=	**1,090**		$20,205,330

Figure 4 - Reconstruction

Rehabilitation Evaluation

Projects this Year = 3

Project	Design Life	Lane Miles	Lane Mile Years	Lane Mile Cost	Total Cost
No. 10	18 yrs	22	396	$263,268	$5,791,896
No. 11	15 yrs	28	420	$219,390	$6,142,920
No. 12	12 yrs	32	384	$115,848	$3,707,136
	Total	=	**1,200**		$15,641,952

Figure 5 – Rehabilitation

When evaluating pavement preservation treatments in this analysis, it is appropriate to think in terms of "extended life" rather than design life. The term design life, as used in the reconstruction and rehabilitation tables, relates better to the new pavement's structural adequacy to handle repetitive loadings and environmental factors. This is not the goal of pavement preservation. Each type of treatment/repair has unique benefits that should be targeted to the specific mode of pavement deterioration. This means that life extension depends on factors such as type and severity of distress, traffic volume, environment, etc. Figure 6 exhibits the agency's programmed activities for preservation.

Preservation Evaluation

Project	Life Extension	Lane Miles	Lane Mile Years	Lane Mile Cost	Total Cost
No. 101	2 yrs	12	24	$2,562	$30,744
No. 102	3 yrs	22	66	$7,743	$170,346
No. 103	5 yrs	26	130	$13,980	$363,480
No. 104	7 yrs	16	112	$29,750	$476,000
No. 105	10 yrs	8	80	$54,410	$435,280
	Total	=	412		$1,475,850

Figure 6 – Preservation

To satisfy the needs of its highway network, the agency must accomplish 4,356 lane-mile-years of work per year. The agency's program will derive 1,090 lane-mile-years from reconstruction, 1,200 lane-mile-years from rehabilitation, and 412 lane-mile-years from pavement preservation, for a total of 2,702 lane-mile-years. Thus, these programmed activities fall short of the minimum required to maintain the status quo, and hence would contribute to a net loss in network pavement condition of 1,653 lane-mile-years. The agency's programmed tally is shown in Figure 7.

Network Trend

Programmed Activity	Lane-Mile-Years	Total Cost
Reconstruction	1,090	$20,205,330
Rehabilitation	1,200	$15,641,952
Preservation	412	$1,475,850
Total	**2,702**	**$37,323,132**
Network Needs (Loss)	(-) 4,356	
Deficit =	**- 1,654**	

Figure 7 – Programmed Tally

This exercise can be performed for any pavement network to benchmark its current trend. Using this approach, it is possible to see how various long-term strategies could be devised and evaluated against a policy objective related to total-network condition.

Once the pavement network is benchmarked, an opportunity exists to correct any shortcomings in the programmed tally. A decision must first be made whether to improve the network condition or just to maintain the status quo. This is a management decision and system goal.

Continuing with the previous example, a strategy will be proposed to prevent further network deterioration until additional funding is secured.

The first step is to modify the reconstruction and rehabilitation (R&R) programs. An agonizing decision must be made about which projects to defer, eliminate, or phase differently with multi- year activity. In Figure 8, reductions are made in the R&R programs to recover funds for less costly treatments in the pavement preservation program. The result of this decision recovered slightly over $6 million.

Program Modification

Programmed Activity		Lane-Mile-Years	Cost Savings
Reconstruction	***31 lane miles*** ~~(40 lane miles)~~	***820*** ~~(1,090)~~	**$5,004,990**
Rehabilitation	***77 lane miles*** ~~(82 lane miles)~~	***1,125*** ~~(1,200)~~	**$1,096,950**
Pavement Preservation	(84 lane-miles)	(412)	**0**
Total =		***2,357*** **(2,702)**	**$6,101,940**

Figure 8 – Revised R & R Programs

Modifying the reconstruction and rehabilitation programs has reduced the number of lane-mile- years added to the network from 2,702 to 2,357 lane-mile-years. However, using less costly treatments elsewhere in the network to address roads in better condition will increase the number of lane-mile-years added to the network. A palette of pavement preservation treatments, or mix of fixes, is available to address the network needs at a much lower cost than traditional methods.

Preservation treatments are only suitable if the right treatment is used on the right road at the right time. In Figure 9, the added treatments used include concrete joint resealing, thin hot-mix asphalt (HMA) overlay (≤ 1.5”), microsurfacing, chip seal, and crack seal. By knowing the cost per lane-mile and the treatment life-extension, it is possible to create a new strategy (costing $36,781,144) that satisfies the network need. In this example, the agency saved in excess of $500,000 from traditional methods (costing $37,323,132), while erasing the 1,653 lane-mile-year deficit produced by the initial program tally. Network Strategy

Programmed Activity		Lane Mile Years	Total Cost
Reconstruction	(31 lane-miles)	820	$15,200,340
Rehabilitation	(77 lane-miles)	1,125	$14,545,002
Pavement Preservation	(84 lane-miles)	412	$1,475,850
Concrete Resealing	(4 years x 31 lane-miles)	124	$979,600
Thin HMA Overlay	(10 years x 16 lane-miles)	160	$870,560
Microsurfacing	(7 years x 44 lane-miles)	308	$1,309,000
Chip Seal	(5 years x 79 lane-miles)	395	$1,104,420
Crack Seal	(2 years x 506 lane-miles)	1,012	$1,296,372
	Total =	4,356	$36,781,144

Figure 9 – New Program Tally

In a real-world situation, the highway agency would program its budget to achieve the greatest impact on its network condition. Funds allocated for reconstruction and rehabilitation projects must be viewed as investments in the infrastructure. Conversely, funds directed for preservation projects must be regarded as protecting and preserving past infrastructure investments.

Integrating reconstruction, rehabilitation, and preservation in the proper proportions will substantially improve network conditions for the taxpayer while safeguarding the highway investment.

APPENDIX C: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY