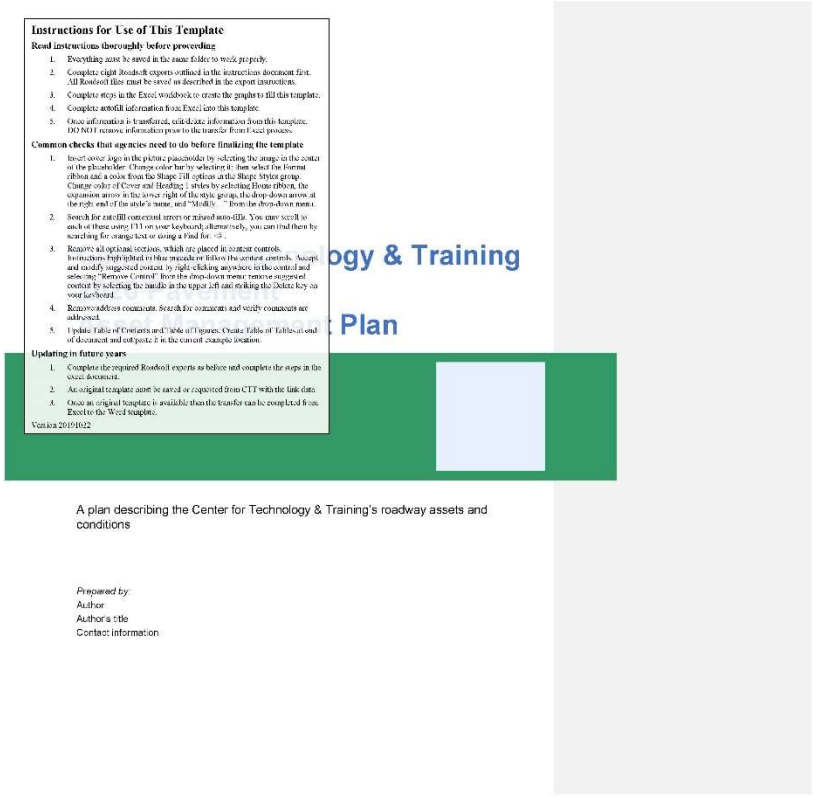
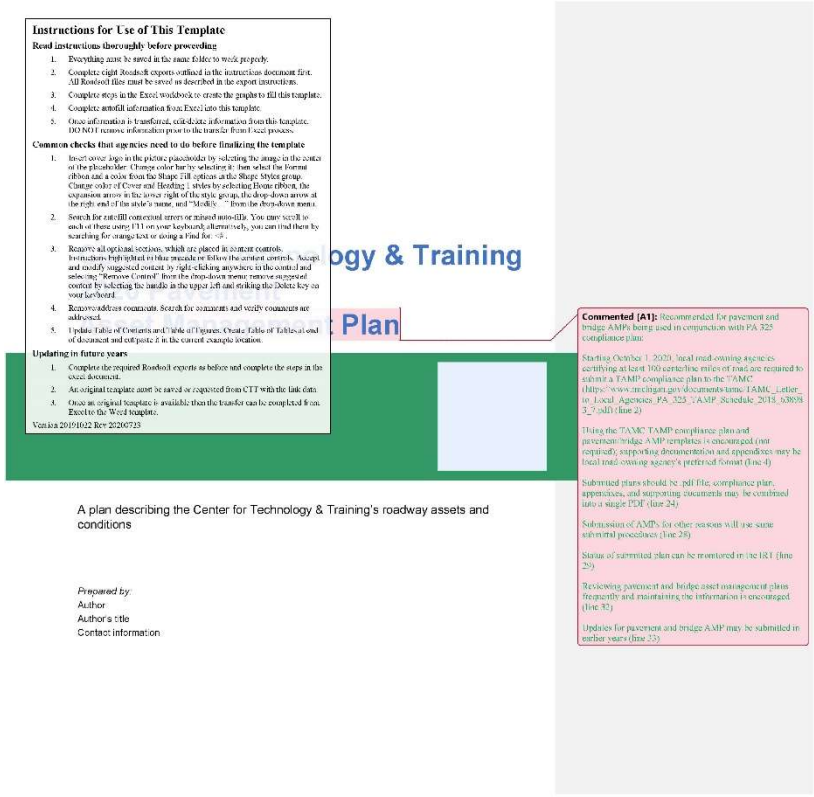
Center for Technology & Training
Asset Management Plan Tools Errata

Errata for the Pavement AMP, Bridge AMP, and Compliance Plan Tools Released Prior to 2021

Note: Templates are and have been correct; however, the tools automating data transfer into the templates misplaced data in the template, had calculation or graphing errors (marked in errata with yellow notes), and had grammatical errors/missing words.

Contents

Errata for the
Pavement Asset Management Plan Tools

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following
	

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

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 Center for Technology & Training's (CTT) 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 CTT is meeting its obligations to maintain the public assets for which it is responsible.

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

- What kinds of road assets CTT has in its jurisdiction, who owns them, and the different options for maintaining these assets.
- What tools and processes CTT uses to track and manage road assets and funds.
- What condition CTT'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 CTT's road assets' normal life cycle.
- What condition CTT can expect its road assets 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 CTT's road assets.

CTT owns and/or manages 2217.6 centerline of roads. This road network can be divided into the county primary network, the county local network, the unpaved road network, and the National Highway System (NHS) network based on the different factors these roads have that influence asset management decisions. A summary of CTT historical and current network conditions, projected trends, and goals for county primary network and county local network can be seen in Figure and Figure.

vi

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Asset inventory and condition data for paved and unpaved federal-aid-eligible county primary or city major road assets and all bridges; asset inventory must include location, material, size, and condition of the assets, in a format that allows for and encourages digital mapping (line 5)

Asset inventory condition data for unpaved roads may follow the IRR System (line 6)

Asset inventory for certified non-federal-aid-eligible county primary or city major road assets (line 7)

Asset inventory and condition data for non-federal-aid-eligible local road network is encouraged (much like bridges) (line 8)

Placeholder section for culvert and traffic signal asset classes is required; incorporating inventories and condition data on these and other asset classes is encouraged (line 9)

Asset descriptions (i.e., current status of) of culverts and traffic signals (line 10)

Commented [A3]: Recommended for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan:

Anticipated revenues and expenses, including a description of all revenue sources and anticipated receipts for the period covered by the asset management plan and expected infrastructure repair and replacement expenditures, including planned improvements and capital reconstruction (line 17)

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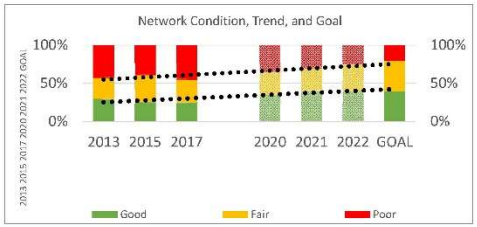
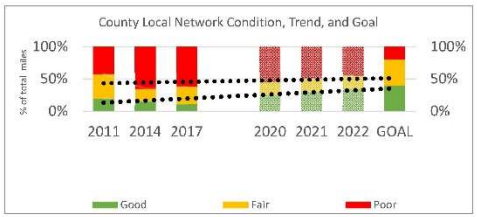
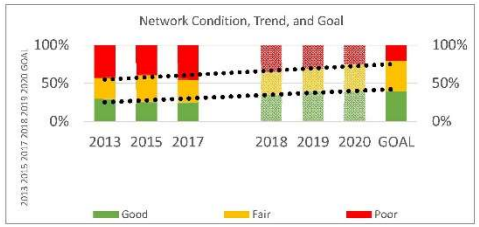
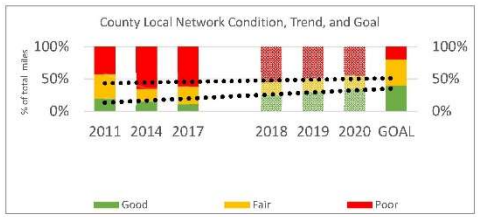
Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following
  A summary of CTT historical and current network conditions, projected trend and goal for the unpaved road network can be seen in Figure.	  A summary of CTT historical and current network conditions, projected trend and goal for the unpaved road network can be seen in the figure, below:
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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). CTT 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 Center for Technology & Training (CTT) 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. CTT is responsible for maintaining and operating over 2217.6 centerline of roads.

This plan outlines how CTT determines its strategy to maintain and upgrade road asset condition 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 John Doe at 1000 Main Street, Anytown, Michigan 49000 or at (906)-000-0111 and/or nobody@anywhere.com. A copy of this plan can be accessed on our website at ctt.mtu.edu/amp. Key terms used in this plan are defined in CTT's

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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 CTT is responsible for a total of 2217.6 centerline of public roads, as shown in Figure 1.

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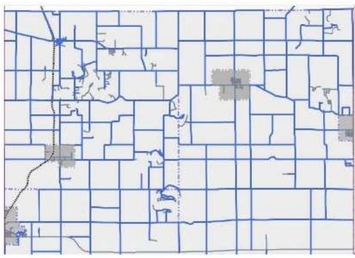
Commented [A29]: USE NEW MAP

Figure 7 Map showing location of CTT's paved roads (i.e., those managed by CTT) 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 CTT's unpaved roads in blue

Commented [A30]: All figure numbers from here down are incorrect. The previous figure was figure 6, so these should be figure 7ff.

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 CTT as either county primary or county local roads. State statute prioritizes expenditures on the county primary road network.

Of the 2217.6 centerline of public roads owned and/or managed by CTT, Approximately 82% of all County Primary roads are classified as federal aid eligible, which allows them to receive federal funding for their maintenance and construction. Only 1% of County Local roads are considered federal aid eligible, which means state and local funds must be used to manage these roads.

Commented [A31]: County paragraph: This paragraph is used by county agencies only.
To use/modify applicable content, right-click the content control and then select "Remove Control" to retain text; then, use/modify content.
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Figure 8 illustrates the percentage of roads owned by CTT that are classified as county primary and county local roads. Figure 9 illustrates this breakdown of these road networks by township boundary within CTT's jurisdiction.

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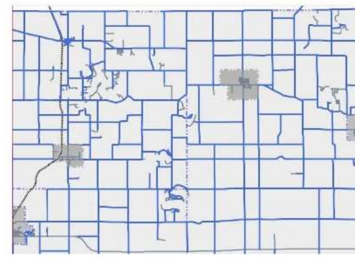
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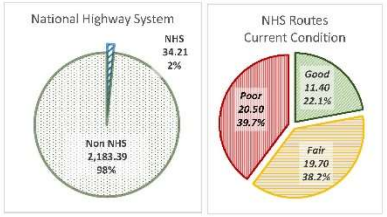

Figure 10: Miles of roads managed by CTT that are part of the National Highway System and condition.

CTT also owns and manages 140.1 miles of unpaved roads.

Types

CTT has multiple types of pavements in its jurisdiction, including: asphalt, sealcoat, concrete, brick/block, and undefined; 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 11 illustrates the percentage of various pavement types that CTT has in its network. Figure 12 shows the pavement type by Township boundary for CTT's jurisdiction.

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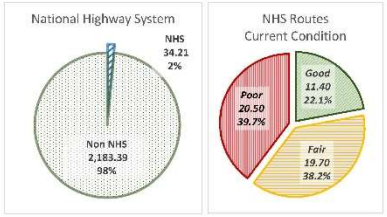

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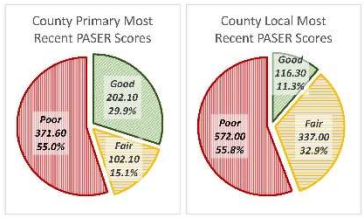	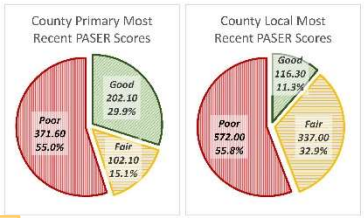
Figure 13: (A) Left: CTT paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor	Figure 12: (A) Left: CTT paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor
Calculation/graphing error	
In comparison, the statewide paved county primary road network has 20 percent of roads in the TAMC good condition category, 40 percent in fair, and 40 percent in poor (Figure 14A). The statewide paved county local road network has 19 percent in good, 38 percent in fair, and 49 percent in poor (Figure 14B). Comparing Figure 13A and Figure 14A shows that CTT's paved county primary road network is <#YOUR CONTENT HERE>Choose an item. than similarly-classified roads in the rest of the state, while Figure 13B and Figure 14B show that CTT's paved county local road network is <#YOUR CONTENT HERE>Choose an item. 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.	In comparison, the statewide paved county primary road network has 21 percent of roads in the TAMC good condition category, 40 percent in fair, and 39 percent in poor (Figure 14A). The statewide paved county local road network has 16 percent in good, 30 percent in fair, and 54 percent in poor (Figure 14B). Comparing Figure 13A and Figure 14A shows that CTT's paved county primary road network is <#YOUR CONTENT HERE>Choose an item. than similarly-classified roads in the rest of the state, while Figure 13B and Figure 14B show that CTT's paved county local road network is <#YOUR CONTENT HERE>Choose an item. 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.
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26	25

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

Pavement AMP Tools – Prior to 2021

Figure 14: (A) Left: Statewide paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

Commented [A41]: Updated value (see comment above)

<#YOUR CONTENT HERE>

Commented [A42]: Explain why your network conditions differ from the rest of the state, and justify the current conditions. Highlight factors that may be at work, such as climate, soils, traffic volume, trucks, budget, and practices

Figure 15 and Figure 16 show the number of miles for CTT's roads with **PASER** scores expressed in TAMC definition categories for the paved county primary road network (Figure 15) and the paved county local road network (Figure 16). CTT 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.

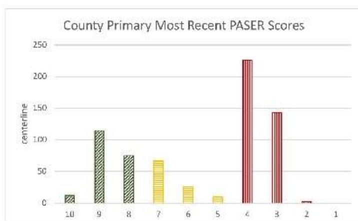

Figure 15: CTT paved county primary road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

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Pavement AMP Tools – 2021 & following

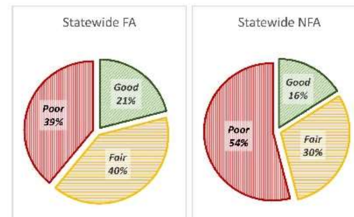

Figure 14: (A) Left: Statewide paved county primary road network conditions by percentage of good, fair, or poor, and (B) Right: paved county local road network conditions by percentage of good, fair, or poor

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Commented [A46]: Explain why your network conditions differ from the rest of the state, and justify the current conditions. Highlight factors that may be at work, such as climate, soils, traffic volume, trucks, budget, and practices

Figure 15 and Figure 16 show the number of miles for CTT's roads with **PASER** scores expressed in TAMC definition categories for the paved county primary road network (Figure 15) and the paved county local road network (Figure 16). CTT 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.

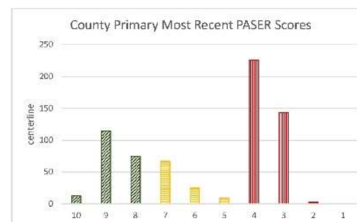


Figure 15: CTT paved county primary road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

26

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

Calculation/graphing error

Pavement AMP Tools – Prior to 2021

The overall goal for CTT's paved county primary road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 28.

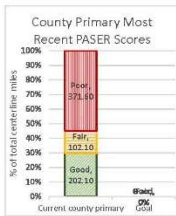


Figure 28 CTT's 2019 county primary road network condition by percentage of good/fair/poor

Commented [A57]: Data was not pulling through to the graph correctly

CTT's network-level pavement condition strategy for paved county primary roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county primary from becoming poor (PASER 4 - 1).
2. Move <#YOUR CONTENT HERE> percent of paved county primary roads out of the poor category.

Commented [A58]: Insert percentage goal in ## format

Goals for Paved County Local Roads

Commented [A59]: Alternate choices in separate content controls.
To use/modify applicable content, right-click the content control and then select "Remove Control" to retain text; then, use/modify content.
To delete, select the control handle and use your Delete key to delete content.

The overall goal for CTT's paved county local road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 29.

37

Pavement AMP Tools – 2021 & following

The overall goal for CTT's paved county primary road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 28.

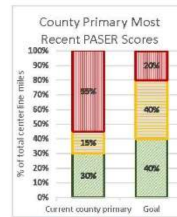


Figure 28 CTT's 2019 county primary road network condition by percentage of good/fair/poor

Commented [A62]: Data was not pulling through to the graph correctly

CTT's network-level pavement condition strategy for paved county primary roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county primary from becoming poor (PASER 4 - 1).
2. Move <#YOUR CONTENT HERE> percent of paved county primary roads out of the poor category.

Commented [A63]: Insert percentage goal in ## format

Goals for Paved County Local Roads

Commented [A64]: Alternate choices in separate content controls.
To use/modify applicable content, right-click the content control and then select "Remove Control" to retain text; then, use/modify content.
To delete, select the control handle and use your Delete key to delete content.

The overall goal for CTT's paved county local road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 29.

36

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

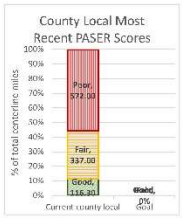


Figure 29 CTT 2019 paved county local road network condition by percentage of good/fair/poor

Commented [A60]: Data was not pulling through on the graph correctly

CTT's network-level pavement condition strategy for paved county local roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county local roads from becoming poor (PASER 4 - 1).
2. Move <<YOUR CONTENT HERE>> percent of paved county local roads out of the poor category.

Commented [A61]: Insert percentage goal in ## format

Goals for Unpaved Roads

Commented [A62]: Alternate choices in separate content controls:
To use, modify applicable content, right-click the content control and then select "Remove Control" to retain text, then, use/modify content.
To delete, select the control handle and use your Delete key to delete content.

The overall goal for CTT's unpaved road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 30.

38

Calculation/graphing error

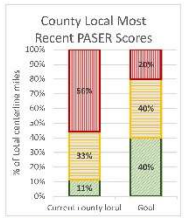


Figure 29 CTT 2019 paved county local road network condition by percentage of good/fair/poor

Commented [A65]: Data was not pulling through on the graph correctly

CTT's network-level pavement condition strategy for paved county local roads is:

1. Prevent its good and fair (PASER 10 - 5) paved county local roads from becoming poor (PASER 4 - 1).
2. Move <<YOUR CONTENT HERE>> percent of paved county local roads out of the poor category.

Commented [A66]: Insert percentage goal in ## format

Goals for Unpaved Roads

Commented [A67]: Alternate choices in separate content controls:
To use, modify applicable content, right-click the content control and then select "Remove Content Control" to retain text, then, use/modify content.
To delete, select the control handle and use your Delete key to delete content.

The overall goal for CTT's unpaved road network is to maintain or improve road conditions network-wide at 2019 levels. The baseline condition for this goal is illustrated in Figure 30.

37

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

NCPP Network Quick Check to Forecast Future Trends

The National Center for Pavement Preservation (NCPP) has developed an analysis method that gives an overall indicator of likely future road network condition trends. An example of this method along with a description is included as Appendix D.

The NCPP Quick Check works under the premise that a one-mile road segment loses one year of life each year that it is not treated with a maintenance, rehabilitation, or reconstruction project. For example, a 100-mile network loses 100 mile-years' worth of life each year that it is not treated. Construction and maintenance projects add life to a road network, offsetting the steady yearly loss. For example, an overlay project that is expected to last 10 years and constructed on 5 miles of pavement will add 10-years x 5 miles – 50 mile-years of improvement, which is about half the value lost in one year on the example 100-mile network. In order for the network to remain stable, an agency would need to complete projects every year that offset all of the mile-years of loss, for this example 100 mile-years.

Paved County Primary Roads

Table 2 illustrates the calculations for the NCPP Quick Check method of CTT's paved county primary road network. The treatments outlined in Table 2 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE>. The *1. Pavement Assets: Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved county primary roads indicate the average volume of work that CTT has been able to afford over the last five years <#YOUR CONTENT HERE>Choose an item. keeping up with the natural deterioration of the road network due to age and use. Continuing the current treatment volume on this network will result in an ongoing <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 2: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: NCPP Quick Check Method for Paved County Primary Road Network (774.6 miles)

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	10	1	10
Chip Seal	15	2	30
Overlay	20	3	60
Reconstruction	25	4	100
[Treatment 5]	30	5	150
[Treatment 6]	35	6	210
[Treatment 7]	40	7	280
[Treatment 8]	45	8	360
[Treatment 9]			1200
[Treatment 10]			524

Commented [A66]: If your agency uses the NCPP method and NOT Roadsoft, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and proceed to the Roadsoft forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Commented [A67]: Insert the range in years appropriate to your agency's circumstance (e.g. 2018-2020)

Commented [A68]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: is or is not

Commented [A69]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A70]: Insert the number of miles-years here (e.g., 100)

Commented [A71]: Insert the number of miles in the network (e.g. 100)

42

NCPP Network Quick Check to Forecast Future Trends

The National Center for Pavement Preservation (NCPP) has developed an analysis method that gives an overall indicator of likely future road network condition trends. An example of this method along with a description is included as Appendix D.

The NCPP Quick Check works under the premise that a one-mile road segment loses one year of life each year that it is not treated with a maintenance, rehabilitation, or reconstruction project. For example, a 100-mile network loses 100 mile-years' worth of life each year that it is not treated. Construction and maintenance projects add life to a road network, offsetting the steady yearly loss. For example, an overlay project that is expected to last 10 years and constructed on 5 miles of pavement will add 10-years x 5 miles – 50 mile-years of improvement, which is about half the value lost in one year on the example 100-mile network. In order for the network to remain stable, an agency would need to complete projects every year that offset all of the mile-years of loss, for this example 100 mile-years.

Paved County Primary Roads

Table 2 illustrates the calculations for the NCPP Quick Check method of CTT's paved county primary road network. The treatments outlined in Table 2 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE>. The *1. Pavement Assets: Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved county primary roads indicate the average volume of work that CTT has been able to afford over the last five years <#YOUR CONTENT HERE>Choose an item. keeping up with the natural deterioration of the road network due to age and use. Continuing the current treatment volume on this network will result in an ongoing <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 2: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: NCPP Quick Check Method for Paved County Primary Road Network (774.6 miles)

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	10	1	10
[Treatment 2]	15	2	30
[Treatment 3]	20	3	60
[Treatment 4]	25	4	100
[Treatment 5]	30	5	150
[Treatment 6]	35	6	210
[Treatment 7]	40	7	280
[Treatment 8]	45	8	360
Total			1200
Gap Analysis: (Deficit)/Surplus			524

Commented [A72]: If your agency uses the NCPP method and NOT Roadsoft, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and proceed to the Roadsoft forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Commented [A73]: Insert the range in years appropriate to your agency's circumstance (e.g. 2018-2020)

Commented [A74]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: is or is not

Commented [A75]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A76]: Insert the number of miles-years here (e.g., 100)

Commented [A77]: Insert the number of miles in the network (e.g. 100)

41

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

The NCPP analysis of CTT's planned projects from its currently-available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to reach its pavement condition goal given the projects planned for the next three years.<#YOUR CONTENT HERE>

Paved County Local Road

Table 3 illustrates the calculations for the NCPP Quick Check method of CTT's paved county local road network. The treatments outlined in Table 3 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE>. The *1. Pavement Assets: Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved county local roads indicate the average volume of work that CTT has been able to afford over the last five years <#YOUR CONTENT HERE>Choose an item. keeping up with the natural deterioration of the road network due to age and use. Continuing the current treatment volume on this network will result in an ongoing <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 3: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: NCPP Quick Check Method for Paved County Local Road Network (1443 miles)

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	9	2	18
Chip Seal	14	3	42
Overlay	19	4	76
Reconstruction	24	5	120
[Treatment 5]	29	6	174
[Treatment 6]	34	7	238
[Treatment 7]	39	8	312
[Treatment 8]	44	9	396
[Treatment 9]			1376
[Treatment 9]			351

The NCPP analysis of CTT's planned projects from its currently available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to reach its pavement condition goals given the projects planned for the next three years.<#YOUR CONTENT HERE>

***Roadsoft** Pavement Condition Forecast to Forecast Future Trends*

CTT 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

43

Commented [A72]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Commented [A73]: Explain why you can or cannot meet your goals. What can be done to help reach your goals if you have not been able to reach them thus far?

Commented [A74]: Insert the range in years appropriate to your agency's circumstance (e.g. 2018-2020)

Commented [A75]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **is** or **is not**

Commented [A76]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A77]: Insert the number of miles-years here (e.g., 100)

Commented [A78]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Commented [A79]: Explain why you can or cannot meet your goals. What can be done to help reach your goals if you have not been able to reach them thus far?

Commented [A80]: If your agency uses the Roadsoft for modelling and forecasting, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and scroll back up to the NCPP forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

The NCPP analysis of CTT's planned projects from its currently-available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to reach its pavement condition goal given the projects planned for the next three years.<#YOUR CONTENT HERE>

Paved County Local Road

Table 3 illustrates the calculations for the NCPP Quick Check method of CTT's paved county local road network. The treatments outlined in Table 3 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE>. The *1. Pavement Assets: Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved county local roads indicate the average volume of work that CTT has been able to afford over the last five years <#YOUR CONTENT HERE>Choose an item. keeping up with the natural deterioration of the road network due to age and use. Continuing the current treatment volume on this network will result in an ongoing <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 3: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: NCPP Quick Check Method for Paved County Local Road Network (1443 miles)

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	9	2	18
[Treatment 2]	14	3	42
[Treatment 3]	19	4	76
[Treatment 4]	24	5	120
[Treatment 5]	29	6	174
[Treatment 6]	34	7	238
[Treatment 7]	39	8	312
[Treatment 8]	44	9	396
Total			1376
Gap Analysis: (Deficit)/Surplus			351

The NCPP analysis of CTT's planned projects from its currently available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to reach its pavement condition goals given the projects planned for the next three years.<#YOUR CONTENT HERE>

***Roadsoft** Pavement Condition Forecast to Forecast Future Trends*

CTT 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 31.

42

Commented [A78]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Commented [A79]: Explain why you can or cannot meet your goals. What can be done to help reach your goals if you have not been able to reach them thus far?

Commented [A80]: Insert the range in years appropriate to your agency's circumstance (e.g. 2018-2020)

Commented [A81]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **is** or **is not**

Commented [A82]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A83]: Insert the number of miles-years here (e.g., 100)

Commented [A84]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Commented [A85]: Explain why you can or cannot meet your goals. What can be done to help reach your goals if you have not been able to reach them thus far?

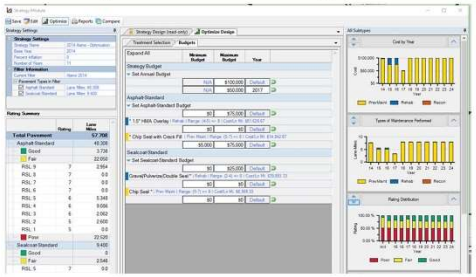
Commented [A86]: If your agency uses the Roadsoft for modelling and forecasting, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and scroll back up to the NCPP forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

work. A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 31.

Figure 31: Pavement condition forecast model in the software program Roadsoft



Paved County Primary Roads

Table 4 illustrates the network-level model inputs for Roadsoft on the paved county primary road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 4 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE>. See Appendix A of this plan for details on planned projects. Full model inputs and outputs are included in Appendix D.

Commented [A81]: Insert the range in years appropriate to your agency's circumstances (e.g. 2018-2020)

Table 4: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Primary Road Network Forecast

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	10	1	10
Chip Seal	15	2	30
Overlay	20	3	60
Reconstruction	25	4	100
[Treatment 5]	30	5	150
[Treatment 6]	35	6	210
[Treatment 7]	40	7	280
[Treatment 8]	45	8	360

Table 4: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Primary Road Network Forecast

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Treatment 1	10	1	10
Treatment 2	15	2	30
Treatment 3	20	3	60
Treatment 4	25	4	100
[Treatment 5]	30	5	150
[Treatment 6]	35	6	210
[Treatment 7]	40	7	280
[Treatment 8]	45	8	360

Results from the Roadsoft network condition model for the county primary roads are shown in Figure 32. The Roadsoft network analysis of CTT's planned projects from its currently-available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to reach its pavement condition goals given the projects planned for the next three years.

Commented [A88]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: does or does not

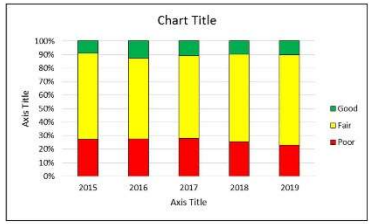


Figure 32: Forecast good/fair/poor changes to CTT network condition from planned projects on the county primary road network.

<#YOUR CONTENT HERE>

Commented [A89]: Explain the condition trends shown in previous sections as related to the results of the Roadsoft model. Relate decreases or increases in overall condition of the network over the same period of time. Describe why there is a decrease or an increase in condition.

Paved County Local Road

A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 33.

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

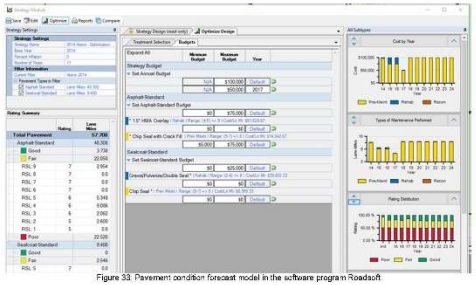


Figure 33: Pavement condition forecast model in the software program Roadsoft.

Table 5 illustrates the network-level model inputs for Roadsoft on the paved county local road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 5 are the average treatment volume of planned projects scheduled to be completed in <<YOUR CONTENT HERE>>. Details on planned projects are included in Appendix A, and full model inputs and outputs are included in Appendix D.

Commented [A84]: Is/are the range in years appropriate for your agency's circumstance (e.g. 2018-2020)

Table 5: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Local Road Network Forecast

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	9	2	18
Chip Seal	14	3	42
Overlay	19	4	76
Reconstruct/Full Rebuild	24	5	120
[Treatment 5]	29	6	174
[Treatment 6]	34	7	238
[Treatment 7]	39	8	312
[Treatment 8]	44	9	396

Results from the Roadsoft network condition model for the paved county local roads are shown in Figure 34. The Roadsoft network analysis of CTT's planned projects from its currently available budget

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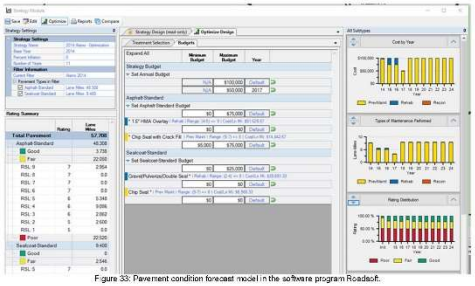

Figure 33: Pavement condition forecast model in the software program Roadsoft.

Table 5 illustrates the network-level model inputs for Roadsoft on the paved county local road network. Other pavement types in this network were neglected due to their small numbers relative to HMA pavements. The treatments outlined in Table 5 are the average treatment volume of planned projects scheduled to be completed in <<YOUR CONTENT HERE>>. Details on planned projects are included in Appendix A, and full model inputs and outputs are included in Appendix D.

Commented [A90]: Is/are the range in years appropriate for your agency's circumstance (e.g. 2018-2020)

Table 5: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Modelled Trends: Roadsoft Annual Work Program for the Paved County Local Road Network Forecast

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	9	2	18
[Treatment 2]	14	3	42
[Treatment 3]	19	4	76
[Treatment 4]	24	5	120
[Treatment 5]	29	6	174
[Treatment 6]	34	7	238
[Treatment 7]	39	8	312
[Treatment 8]	44	9	396

Results from the Roadsoft network condition model for the paved county local roads are shown in Figure 34. The Roadsoft network analysis of CTT's planned projects from its currently available budget

45

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

county local road network will have a <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of improvement. To maintain current road conditions, the deficit must be overcome with a combination of maintenance and construction work.

Commented [A102]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: deficit or surplus

Commented [A103]: Insert the number of miles-years here (e.g., 430)

Commented [A104]: Update from the NCPP section for the selected network that does not meet goals

Table 6: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: NCPP Quick Check Method for Paved County Primary Road Network (774.6 miles)

Additional Annual Work Necessary To Overcome Deficit

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	20	1	20
Chip Seal	25	2	50
Overlay	30	3	90
Reconstruction	35	4	140
[Treatment 5]	40	5	200
[Treatment 6]	45	6	270
[Treatment 7]	50	7	350
[Treatment 8]	55	8	440
[Treatment 9]			1560
[Treatment 6]			884

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack seal	15	1	15
Chip seal	20	2	40
Overlay	25	3	75
Reconstruction	30	4	120
[Treatment 5]	35	5	175
[Treatment 6]	40	6	240
[Treatment 7]	45	7	315
[Treatment 8]	50	8	400
[Treatment 5]			1380
[Treatment 6]			0

53

The NCPP Quick Check can be used as an indicator of potential change in future pavement conditions based on the planned maintenance and construction work and the network size. This method is described in the *1. Pavement Assets: Modelled Trends* section of this plan and further detailed in Appendix D.

Table 6 and Table 7 illustrate the results of the NCPP Quick Check method. Table 6 shows that the paved county primary road network will have a <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of improvement. Table 7 shows that the paved county local road network will have a <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of improvement. To maintain current road conditions, the deficit must be overcome with a combination of maintenance and construction work.

Commented [A108]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: deficit or surplus

Commented [A109]: Insert the number of miles-years here (e.g., 430)

Commented [A110]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: deficit or surplus

Commented [A111]: Insert the number of miles-years here (e.g., 430)

Commented [A112]: Update from the NCPP section for the selected network that does not meet goals

Table 6: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: NCPP Quick Check Method for Paved County Primary Road Network (774.6 miles)

Additional Annual Work Necessary To Overcome Deficit

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	20	1	20
[Treatment 2]	25	2	50
[Treatment 3]	30	3	90
[Treatment 4]	35	4	140
[Treatment 5]	40	5	200
[Treatment 6]	45	6	270
[Treatment 7]	50	7	350
[Treatment 8]	55	8	440
Total			1560
Gap Analysis: (Deficit)/Surplus			884

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	15	1	15
[Treatment 2]	20	2	40
[Treatment 3]	25	3	75
[Treatment 4]	30	4	120
[Treatment 5]	35	5	175
[Treatment 6]	40	6	240
[Treatment 7]	45	7	315
[Treatment 8]	50	8	400
Total			1380
Gap Analysis: (Deficit)/Surplus			0

52

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

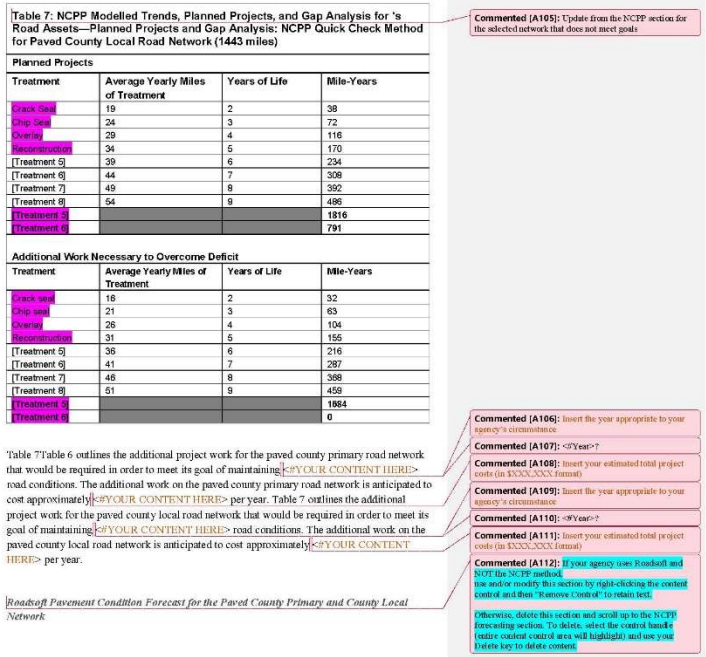

Table 7: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: NCPP Quick Check Method for Paved County Local Road Network (1443 miles)

Commented [A105]: Update from the NCPP section for the selected network that does not meet goals

Planned Projects

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	19	2	38
Chip Seal	24	3	72
Overlay	29	4	116
Reconstruction	34	5	170
[Treatment 5]	39	6	234
[Treatment 6]	44	7	308
[Treatment 7]	49	8	392
[Treatment 8]	54	9	486
[Treatment 5]			1816
[Treatment 6]			791

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack seal	16	2	32
Chip seal	21	3	63
Overlay	26	4	104
Reconstruction	31	5	155
[Treatment 5]	36	6	216
[Treatment 6]	41	7	287
[Treatment 7]	46	8	368
[Treatment 8]	51	9	459
[Treatment 5]			1684
[Treatment 6]			0

Table 7Table 6 outlines the additional project work for the paved county primary road network that would be required in order to meet its goal of maintaining <#YOUR CONTENT HERE> road conditions. The additional work on the paved county primary road network is anticipated to cost approximately <#YOUR CONTENT HERE> per year. Table 7 outlines the additional project work for the paved county local road network that would be required in order to meet its goal of maintaining <#YOUR CONTENT HERE> road conditions. The additional work on the paved county local road network is anticipated to cost approximately <#YOUR CONTENT HERE> per year.

Roadsoft Pavement Condition Forecast for the Paved County Primary and County Local Network

54

Commented [A106]: Insert the year appropriate to your agency's circumstance

Commented [A107]: <#Year>?

Commented [A108]: Insert your estimated total project costs (in $XXX,XXX format)

Commented [A109]: Insert the year appropriate to your agency's circumstance

Commented [A110]: <#Year>?

Commented [A111]: Insert your estimated total project costs (in $XXX,XXX format)

Commented [A112]: If your agency uses Roadsoft and NOT the NCPP method, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and scroll up to the NCPP forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

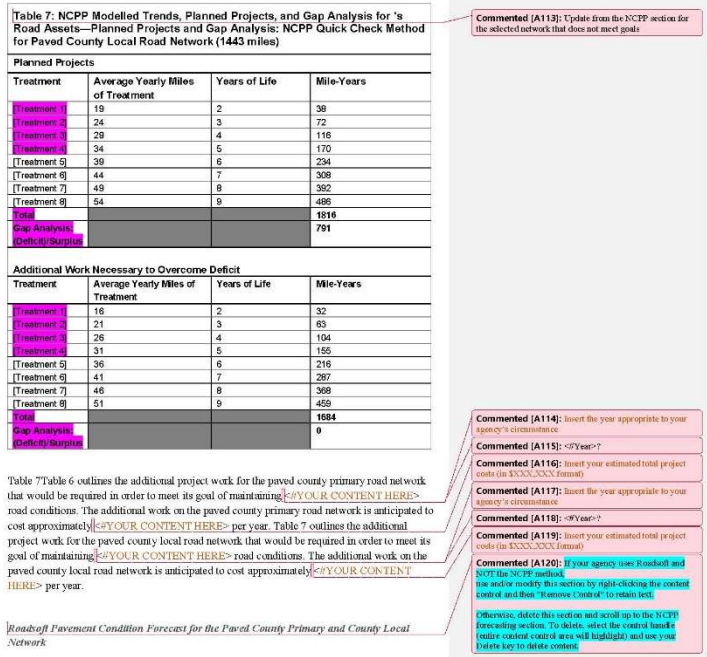

Table 7: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: NCPP Quick Check Method for Paved County Local Road Network (1443 miles)

Commented [A113]: Update from the NCPP section for the selected network that does not meet goals

Planned Projects

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	19	2	38
[Treatment 2]	24	3	72
[Treatment 3]	29	4	116
[Treatment 4]	34	5	170
[Treatment 5]	39	6	234
[Treatment 6]	44	7	308
[Treatment 7]	49	8	392
[Treatment 8]	54	9	486
Total			1816
Gap Analysis: (Deficit)/Surplus			791

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	16	2	32
[Treatment 2]	21	3	63
[Treatment 3]	26	4	104
[Treatment 4]	31	5	155
[Treatment 5]	36	6	216
[Treatment 6]	41	7	287
[Treatment 7]	46	8	368
[Treatment 8]	51	9	459
Total			1684
Gap Analysis: (Deficit)/Surplus			0

Table 7Table 6 outlines the additional project work for the paved county primary road network that would be required in order to meet its goal of maintaining <#YOUR CONTENT HERE> road conditions. The additional work on the paved county primary road network is anticipated to cost approximately <#YOUR CONTENT HERE> per year. Table 7 outlines the additional project work for the paved county local road network that would be required in order to meet its goal of maintaining <#YOUR CONTENT HERE> road conditions. The additional work on the paved county local road network is anticipated to cost approximately <#YOUR CONTENT HERE> per year.

Roadsoft Pavement Condition Forecast for the Paved County Primary and County Local Network

53

Commented [A114]: Insert the year appropriate to your agency's circumstance

Commented [A115]: <#Year>?

Commented [A116]: Insert your estimated total project costs (in $XXX,XXX format)

Commented [A117]: Insert the year appropriate to your agency's circumstance

Commented [A118]: <#Year>?

Commented [A119]: Insert your estimated total project costs (in $XXX,XXX format)

Commented [A120]: If your agency uses Roadsoft and NOT the NCPP method, use and/or modify this section by right-clicking the content control and then "Remove Control" to retain text.

Otherwise, delete this section and scroll up to the NCPP forecasting section. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

CTT used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved county primary and county local road networks. Table 8 and Table 9 illustrate the network-level model inputs used for this simulation. Full model inputs and outputs are included in Appendix D.

Table 8: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: Roadsoft Annual Work Program for Paved County Primary Road Network Forecast

Planned Projects

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	20	1	20
Chip Seal	25	2	50
Overlay	30	3	90
Reconstruction	35	4	140
[Treatment 5]	40	5	200
[Treatment 6]	45	6	270
[Treatment 7]	50	7	350
[Treatment 8]	55	8	440

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack seal	15	1	15
Chip seal	20	2	40
Overlay	25	3	75
Reconstruction	30	4	120
[Treatment 5]	35	5	175
[Treatment 6]	40	6	240
[Treatment 7]	45	7	315
[Treatment 8]	50	8	400

55

CTT used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved county primary and county local road networks. Table 8 and Table 9 illustrate the network-level model inputs used for this simulation. Full model inputs and outputs are included in Appendix D.

Table 8: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: Roadsoft Annual Work Program for Paved County Primary Road Network Forecast

Planned Projects

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	20	1	20
[Treatment 2]	25	2	50
[Treatment 3]	30	3	90
[Treatment 4]	35	4	140
[Treatment 5]	40	5	200
[Treatment 6]	45	6	270
[Treatment 7]	50	7	350
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Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	15	1	15
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[Treatment 4]	30	4	120
[Treatment 5]	35	5	175
[Treatment 6]	40	6	240
[Treatment 7]	45	7	315
[Treatment 8]	50	8	400

54

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

Table 9: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: Roadsoft Annual Work Program for Paved County Local Road Network Forecast

Planned Projects

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack Seal	19	2	38
Chip Seal	24	3	72
Overlay	29	4	116
Reconstruction	34	5	170
[Treatment 5]	39	6	234
[Treatment 6]	44	7	308
[Treatment 7]	49	8	392
[Treatment 8]	54	9	486

Additional Work Necessary to Overcome Deficit

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
Crack seal	16	2	32
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Reconstruction	31	5	155
[Treatment 5]	36	6	216
[Treatment 6]	41	7	287
[Treatment 7]	46	8	368

Results for the paved county local road network from the Roadsoft network condition model given the inputs in Table 9 are shown in Figure 42 below. Results indicate that the necessary additional work needed to meet the agency condition goal would cost and additional [<#YOUR CONTENT HERE> per year.

Commented [A113]: Insert your estimated total project costs (in $XXX,XXX format)

56

Table 9: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Planned Projects and Gap Analysis: Roadsoft Annual Work Program for Paved County Local Road Network Forecast

Planned Projects

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile-Years
[Treatment 1]	19	2	38
[Treatment 2]	24	3	72
[Treatment 3]	29	4	116
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Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years
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Results for the paved county local road network from the Roadsoft network condition model given the inputs in Table 9 are shown in Figure 42 below. Results indicate that the necessary additional work needed to meet the agency condition goal would cost and additional [<#YOUR CONTENT HERE> per year.

Commented [A121]: Insert your estimated total project costs (in $XXX,XXX format)

55

Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following

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. CTT 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 ctt.mtu.edu/financials or by request submitted to our agency contact (listed in this plan).

CTT has a total budget for pavement asset management of $5,000,000.

County Primary Network

CTT has historical spent $3,500,000 annually on pavement-related projects. Over the next three years, CTT plans to spend $4,000,000 on county primary-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), millages, and federal/state programs.

County Local Network

CTT has historical spent annually on pavement-related projects. Over the next three years, CTT plans to spend on county local-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from

Commented [A115]: Data did not pull through

Commented [A116]: Data did not pull through

Commented [A117]: Data did not pull through

2. FINANCIAL RESOURCES

Commented [A123]: Recommended for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan:

Anticipated revenues and expenses, including a description of all revenue sources and anticipated receipts for the period covered by the asset management plan and expected infrastructure repair and replacement expenditures, including planned improvements and capital reconstruction (line 17)

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. CTT 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 ctt.mtu.edu/financials or by request submitted to our agency contact (listed in this plan).

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CTT has historically spent $3,500,000 annually on pavement-related projects. Over the next three years, CTT plans to spend $4,000,000 on county primary-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), millages, and federal/state programs.

County Local Network

CTT has historically spent $2,000,000 annually on pavement-related projects. Over the next three years, CTT plans to spend $3,500,000 on county local-network projects consisting of, but not limited to, reconstruction, overlay, culvert replacement, and preventive maintenance. Spending on projects depends on revenue from bonds, millages, township contributions, and federal/state programs.

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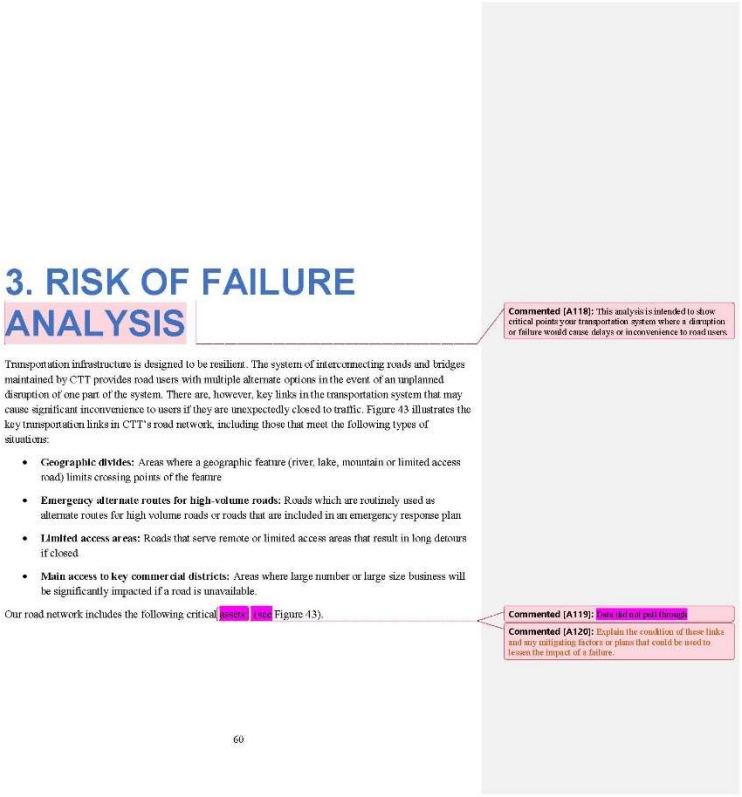
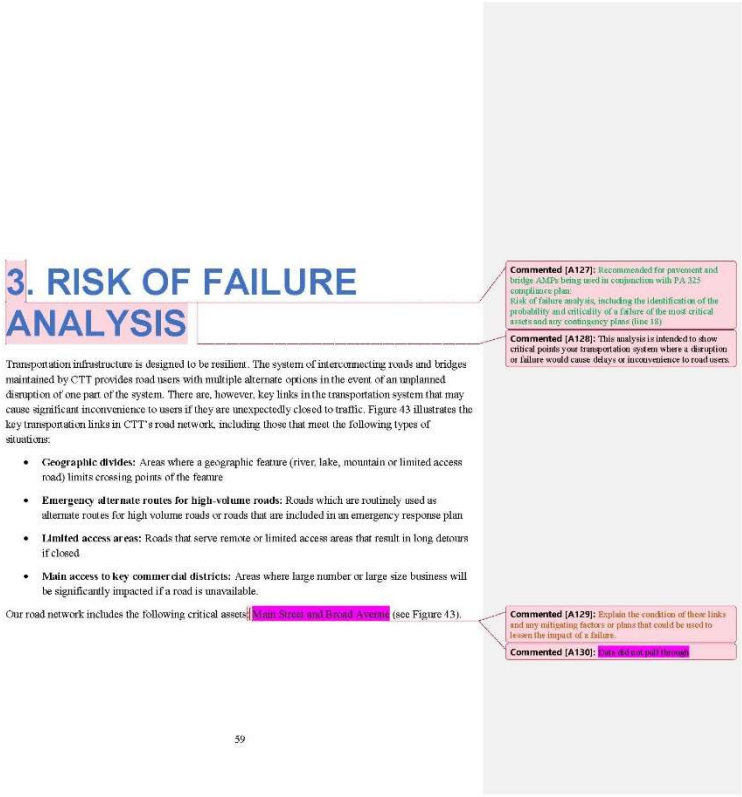
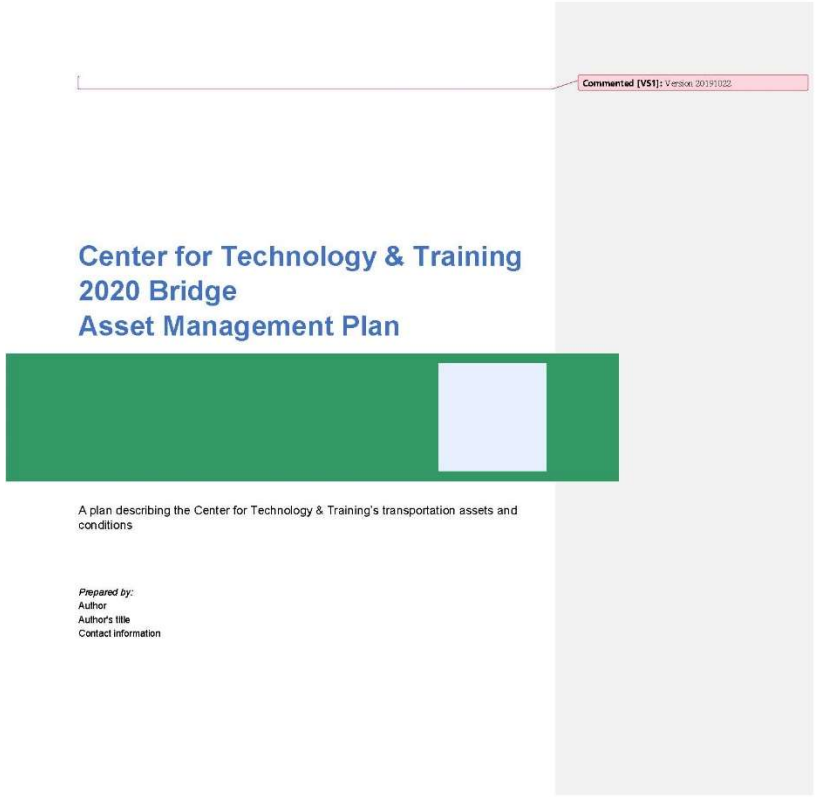
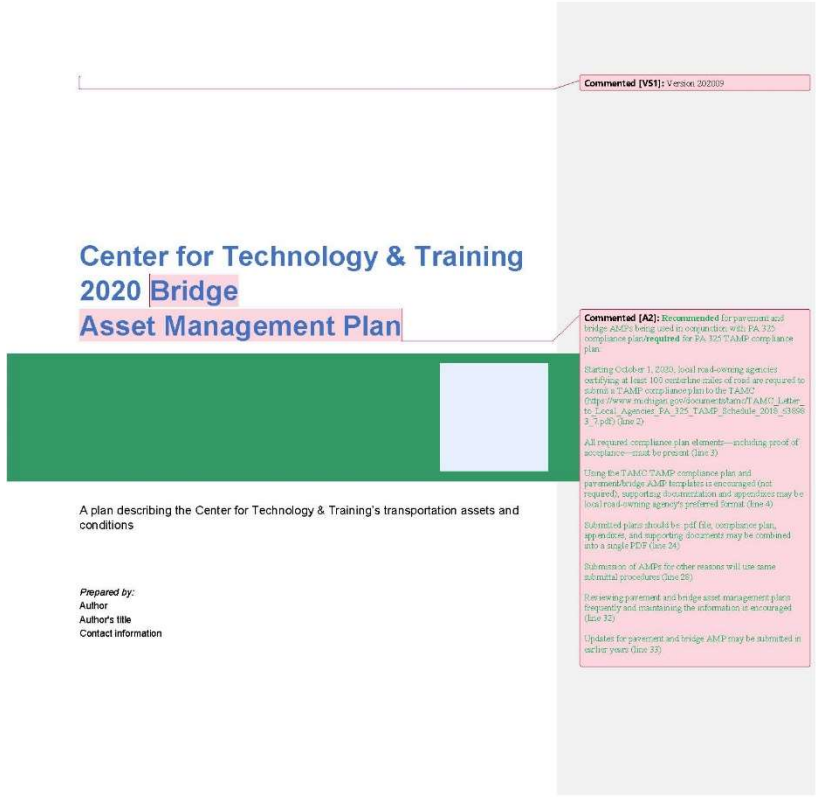
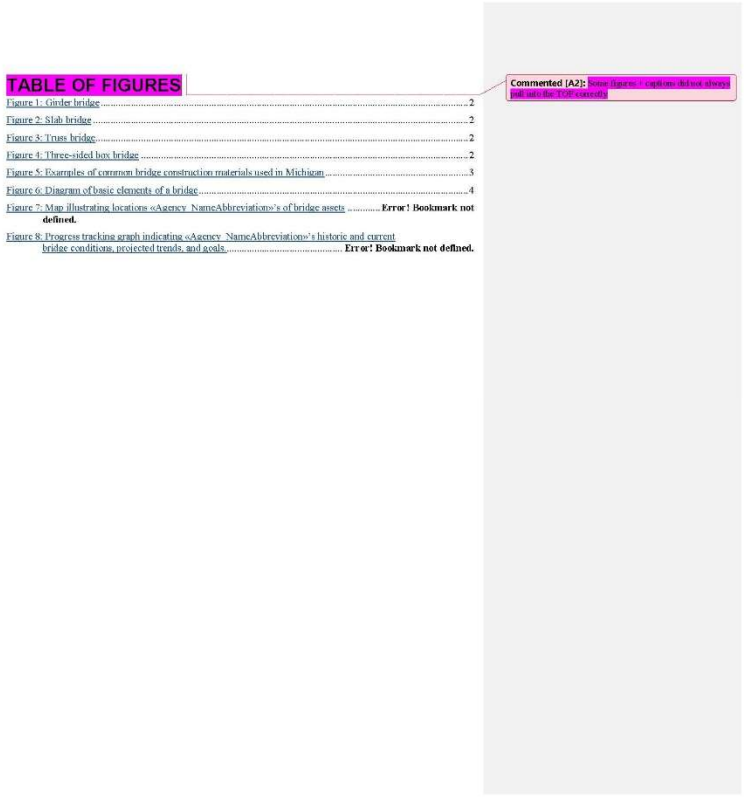
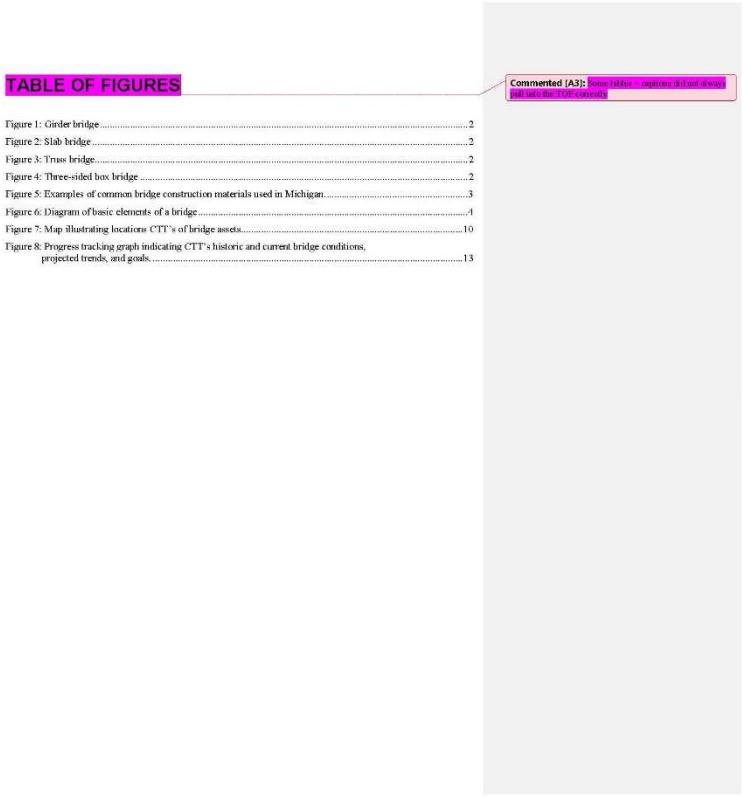
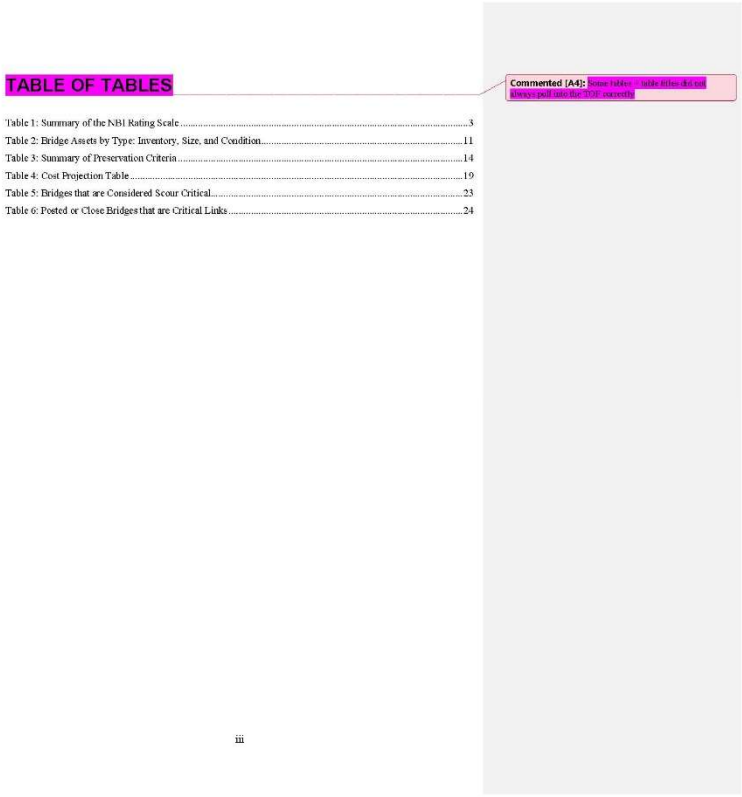
Pavement AMP Tools – Prior to 2021	Pavement AMP Tools – 2021 & following
	

Errata for the
Bridge Asset Management Plan Tools

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
	

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
	

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
	

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, bridges are among the most important assets in any community along with other assets like roads, culverts, traffic signs, traffic signals, and utilities that support and affect the road network. The Center for Technology & Training's (CTT) bridges, other road-related assets, and support systems are 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 bridges, 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 and bridge network in an efficient and effective manner. This asset management plan is intended to report on how CTT is meeting its obligations to maintain the bridges for which it is responsible.

This plan overviews CTT's bridge assets and conditions and explains how Center for Technology & Training works to maintain and improve the overall condition of those assets. These explanations can help answer:

- What kinds of bridge assets CTT has in its jurisdiction and the different options for maintaining these assets.
- What tools and processes CTT uses to track and manage bridge assets and funds.
- What condition CTT's bridge assets are in compared to statewide averages.
- Why some bridge assets are in better condition than others and the path to maintaining and improving bridge asset conditions through proper planning and maintenance.
- How agency bridge assets are funded and where those funds come from.
- How funds are used and the costs incurred during CTT's bridge assets' normal life cycle.
- What condition CTT can expect of its bridge assets 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 CTT's bridge assets.

CTT owns and/or manages 33 bridges. A summary of its historical and current bridge asset conditions, projected trends, and goals can be seen in the figure, below.

EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, bridges are among the most important assets in any community along with other assets like roads, culverts, traffic signs, traffic signals, and utilities that support and affect the road network. The Center for Technology & Training's (CTT) bridges, other road-related assets, and support systems are 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 bridges, 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 and bridge network in an efficient and effective manner. This asset management plan is intended to report on how CTT is meeting its obligations to maintain the bridges for which it is responsible.

This plan overviews CTT's bridge assets and conditions and explains how Center for Technology & Training works to maintain and improve the overall condition of those assets. These explanations can help answer:

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- What tools and processes CTT uses to track and manage bridge assets and funds.
- What condition CTT's bridge assets are in compared to statewide averages.
- Why some bridge assets are in better condition than others and the path to maintaining and improving bridge asset conditions through proper planning and maintenance.
- How agency bridge assets are funded and where those funds come from.
- How funds are used and the costs incurred during CTT's bridge assets' normal life cycle.
- What condition CTT can expect of its bridge assets 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 CTT's bridge assets.

CTT owns and/or manages 56 bridges. A summary of its historical and current bridge asset conditions, projected trends, and goals can be seen in the figure, below.

Commented [A5]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Asset inventory and condition data for paved and unpaved federal-aid-eligible county primary or city major road assets and all bridges; asset inventory must include location, material, size, and condition of the assets, in a format that allows for and encourages digital mapping (line 5)

Asset inventory and condition data for non-federal-aid-eligible local road network is encouraged (much like bridges) (line 6)

Commented [A6]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Asset inventory and condition data for paved and unpaved federal-aid-eligible county primary or city major road assets and all bridges; asset inventory must include location, material, size, and condition of the assets, in a format that allows for and encourages digital mapping (line 5)

Commented [A7]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Anticipated revenues and expenses, including a description of all revenue sources and anticipated receipts for the period covered by the asset management plan and expected infrastructure repair and replacement expenditures, including planned improvements and capital reconstruction (line 17)

Commented [A8]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Performance outcomes, including a determination of how the local road-owning agency's investment strategy will achieve the desired levels of service and performance goals and the steps necessary to ensure asset conditions meet or achieve stated goals (line 11)

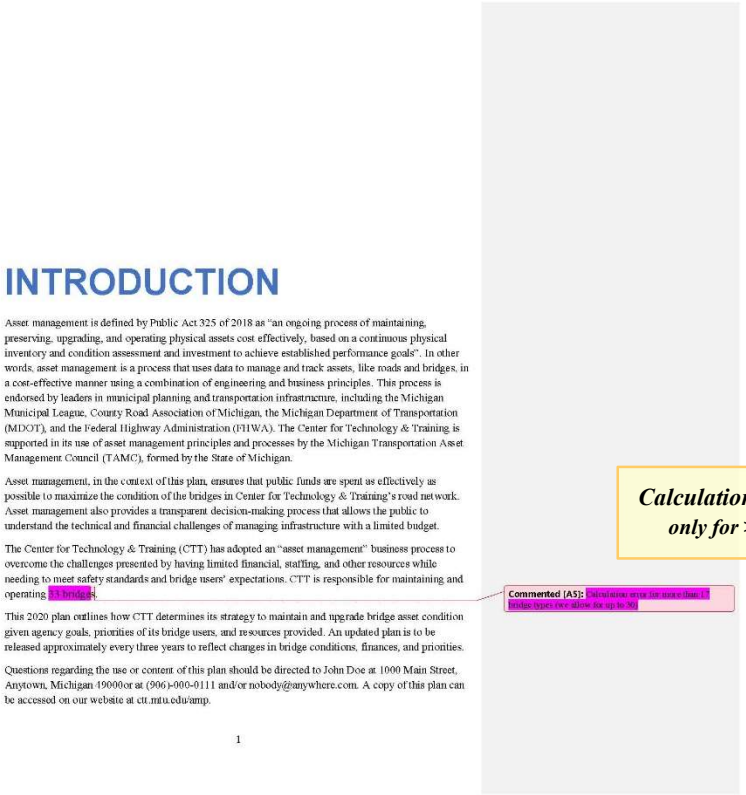
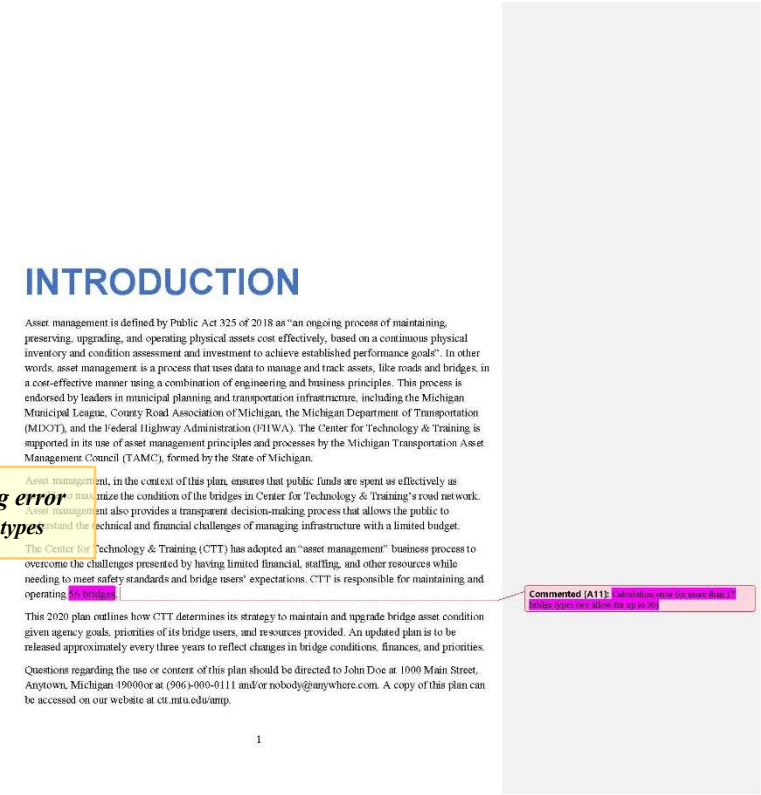
Performance outcomes, including a description and explanation of any gap between achievable condition and performance through the investment strategy and desired goals (line 12)

Commented [A9]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Performance outcomes, including a description and explanation of any gap between achievable condition and performance through the investment strategy and desired goals (line 12)

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
 Commented [A4]: Calculation error for more than 17 bridge types (we allow for 30) An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of CTT's obligations towards meeting these requirements. This asset management plan also helps demonstrate CTT's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of CTT's bridge assets, and gives taxpayers the information they need to make informed decisions about investing in essential transportation infrastructure. v	 Commented [A10]: Calculation error for more than 17 bridge types (we allow for 30) An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of CTT's obligations towards meeting these requirements. This asset management plan also helps demonstrate CTT's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of CTT's bridge assets, and gives taxpayers the information they need to make informed decisions about investing in essential transportation infrastructure. v

Calculation/graphing error only for >17 bridge types

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
	

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

- Dedicated county resources
- County funding through Michigan's Local Bridge Program
- Opportunities to obtain other funding

- To prioritize the programmed actions within available funding limitations
- To improve the condition of bridges currently rated poor (4 or lower) and preserve bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life.

Calculation/graphing error only for >17 bridge types

Inventory

CTT is responsible for 77 local bridges. Table 2 summarizes CTT's bridge assets by type, sizes by bridge type, and condition by bridge type. Additional inventory data, condition ratings, and proposed preventive maintenance actions for each bridge are contained in the tables in Appendixes 3, 4, and 5. The bridge inventory data was obtained from MDOT MiBRIDGE and other sources, and the 2019 condition data and maintenance actions are taken from the inspector's summary report (see Appendix 2).

Commented [A6]: Calculation error for more than 17 bridge types (we allow for up to 30)

Types

Of the CTT's 93 structures, 9 are concrete bridges, 5 are steel bridges, 17 are pre-stressed concrete bridges, and 17 are timber bridges.

Commented [A7]: Calculation error for more than 17 bridge types (we allow for up to 30)

Locations and Sizes

Figure 7 illustrates the locations of bridge assets owned by CTT. Details about the locations and sizes of each individual asset can be found in CTT's MiBRIDGE database. For more information, please refer to the agency contact listed in the *Introduction* of this bridge asset management plan.

9

- Dedicated county resources
- County funding through Michigan's Local Bridge Program
- Opportunities to obtain other funding

- To prioritize the programmed actions within available funding limitations
- To improve the condition of bridges currently rated poor (4 or lower) and preserve bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life.

Inventory

CTT is responsible for 86 local bridges. Table 2 summarizes CTT's bridge assets by type, sizes by bridge type, and condition by bridge type. Additional inventory data, condition ratings, and proposed preventive maintenance actions for each bridge are contained in the tables in Appendixes 3, 4, and 5. The bridge inventory data was obtained from MDOT MiBRIDGE and other sources, and the 2019 condition data and maintenance actions are taken from the inspector's summary report (see Appendix 2).

Commented [A13]: Calculation error for more than 17 bridge types (we allow for up to 30)

Types

Of the CTT's 86 structures, 9 are concrete bridges, 5 are steel bridges, 17 are pre-stressed concrete bridges, and 17 are timber bridges.

Commented [A14]: Calculation error for more than 17 bridge types (we allow for up to 30)

Locations and Sizes

Figure 7 illustrates the locations of bridge assets owned by CTT. Details about the locations and sizes of each individual asset can be found in CTT's MiBRIDGE database. For more information, please refer to the agency contact listed in the *Introduction* of this bridge asset management plan.

9

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

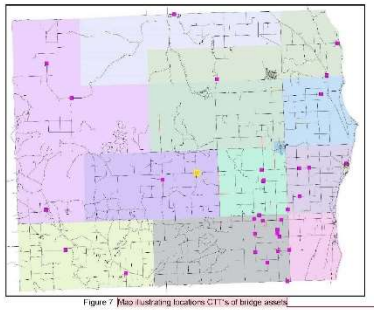
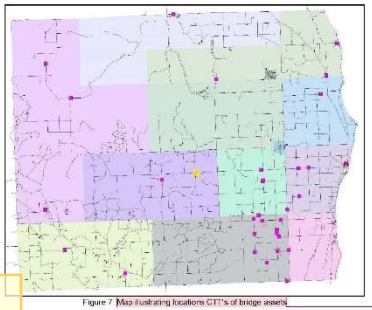

	

Figure 7 Map illustrating locations CTT's of bridge assets	Figure 7 Map illustrating locations CTT's of bridge assets
Condition	***Condition***
CTT evaluates its bridges according to the National Bridge Inspection Standards rating scale, with a rating of 9 to 7 being like new to good condition, a rating of 6 and 5 being fair condition, and a rating of 4 or lower being poor or serious/critical condition. The current condition of CTT's bridge network is 24 (9%) are good, 8 (24%) are fair, and 16 (48%) are poor or lower.	CTT evaluates its bridges according to the National Bridge Inspection Standards rating scale, with a rating of 9 to 7 being like new to good condition, a rating of 6 and 5 being fair condition, and a rating of 4 or lower being poor or serious/critical condition. The current condition of CTT's bridge network is 24 (57%) are good, 8 (14%) are fair, and 16 (29%) are poor or lower.
Another layer of classification of CTT's bridge inventory classifies 16 (48%) bridges as structurally deficient, 24 (73) bridges as posted, and 0 (0) bridges as closed. Structurally deficient bridges are those with a deck, superstructure, substructure, and/or culvert rated as "poor" according to the NBI rating scale, with a load-carrying capacity significantly below design standards, or with a waterway that regularly overtops the bridge during floods. Posted bridges are those that have declined in condition to a point where a restriction is necessary for what would be considered a safe vehicular or traffic load passing over the bridge; designating a bridge as "posted" has no influence on its condition rating. Closed bridges are those that are closed to all traffic; closing a bridge is contingent upon its ability to carry a set minimum live load.	Another layer of classification of CTT's bridge inventory classifies 16 (29%) bridges as structurally deficient, 24 (43) bridges as posted, and 0 (0) bridges as closed. Structurally deficient bridges are those with a deck, superstructure, substructure, and/or culvert rated as "poor" according to the NBI rating scale, with a load-carrying capacity significantly below design standards, or with a waterway that regularly overtops the bridge during floods. Posted bridges are those that have declined in condition to a point where a restriction is necessary for what would be considered a safe vehicular or traffic load passing over the bridge; designating a bridge as "posted" has no influence on its condition rating. Closed bridges are those that are closed to all traffic; closing a bridge is contingent upon its ability to carry a set minimum live load.
Commented [Author8]: In**Displaying Bridges Accordi**Select "Bridges" from the list the screen. A prompt will appe imported. To re-import bridge "Bridges" category and select Once the data is imported, sel Select "Good/Fair/Poor Rating" in the Legend Builder window. Select the "Good", "Fair", and "Poor" values so that they are highlighted blue. Then click the "Add Selected Unique Value(s)" buttons. Change the color of the bridges before clicking "Apply". **Adding a Filter to Display Bridges Based on Ownership** Select "Filter Builder" from the "Filter" tab located above the map. Search for "owner" in the search bar of the Filter Builder window. Add the desired value option. Select "Apply as Filter". Check to make sure only the bridges with owned by the value chosen are displayed on the map.	**Commented [Author15]:** Inventory of Bridges **Displaying Bridges According to Rating** Select "Bridges" from the list of categories on the left side of the screen. A prompt will appear if bridge data needs to be imported. To re-import bridge data, right-click on the "Bridges" category and select "Re-Import Bridge Data". Once the data is imported, select the "Legend Builder" icon. Select "Good/Fair/Poor Rating" from the dropdown options in the Legend Builder window. Select the "Good", "Fair", and "Poor" values so that they are highlighted blue. Then click the "Add Selected Unique Value(s)" buttons. Change the color of the bridges before clicking "Apply". **Adding a Filter to Display Bridges Based on Ownership** Select "Filter Builder" from the "Filter" tab located above the map. Search for "owner" in the search bar of the Filter Builder window. Add the desired value option. Select "Apply as Filter". Check to make sure only the bridges with owned by the value chosen are displayed on the map.
Commented [A9]: Calculation error for more than 17 bridge types (see screen for up to 30)	**Commented [A16]:** Calculation error for more than 17 bridge types (see screen for up to 30)
Commented [A10]: Calculation error for more than 17 bridge types (see screen for up to 30) Calculation error for all 16 Closed	**Commented [A17]:** Calculation error for more than 17 bridge types (see screen for up to 30)
10	10

Calculation/graphing error only for >17 bridge types

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

Table 2: Bridge Assets by Type: Inventory, Size, and Condition

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2019 Condition		
			Struct. Defic	Posted	Closed	Poor	Fair	Good
Aluminum – Box beam/girders—single/spread	1	940	0	1	0	0	0	1
Aluminum – Culvert	4	4,520	0	3	0	0	0	4
Aluminum – Movable—bascule	1	940	0	1	0	0	0	1
Aluminum – Multistringer	2	1,880	0	2	0	0	0	2
Concrete – Arch—thru	1	1,700	0	0	0	0	0	1
Concrete – Culvert	1	1,700	0	0	0	0	0	1
Concrete – Girder and floorbeam	1	1,700	0	0	0	0	0	1
Concrete – Movable—swing	1	1,700	0	0	0	0	0	1
Concrete – Slab	4	7,100	0	0	0	0	0	4
Concrete continuous – Multistringer	1	1,700	0	0	0	0	0	1
Prestressed concrete – Arch—deck	1	4,100	0	0	0	0	0	1
Prestressed concrete – Box beam/girders—multiple	5	10,030	1	0	0	1	0	4
Prestressed concrete – Culvert	3	0	1	1	0	1	0	2
Prestressed concrete – Multistringer	4	9,800	0	0	0	0	1	3
Prestressed concrete – Orthotopic	1	2,300	0	0	0	0	0	1
Prestressed concrete – Suspension	1	1,400	0	0	0	0	0	1
Prestressed concrete – Tee beam	1	1,400	0	0	0	0	0	1
Prestressed concrete continuous – Multistringer	1	590	1	1	0	1	0	0
Steel – Box beam/girders—multiple	1	1,600	0	1	0	0	1	0
Steel – Multistringer	2	2,540	0	2	0	0	1	1
Steel – Truss—thru and pony	1	1,600	0	1	0	0	1	0
Steel continuous – Slab	1	590	1	1	0	1	0	0
Timber – Box beam/girders—multiple	1	590	1	1	0	1	0	0
Timber – Culvert	4	4,910	3	2	0	3	1	0
Timber – Frame	1	830	1	0	0	1	0	0
Timber – Movable—lift	1	590	1	1	0	1	0	0
Timber – Multistringer	2	3,490	1	1	0	1	1	0

11

Commented [A11]: Calculation error for RT10 Closed

Calculation/graphing error

Table 2: Bridge Assets by Type: Inventory, Size, and Condition

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2019 Condition		
			Struct. Defic	Posted	Closed	Poor	Fair	Good
Aluminum – Box beam/girders—single/spread	1	940	0	1	0	0	0	1
Aluminum – Culvert	4	4,520	0	3	0	0	0	4
Aluminum – Movable—bascule	1	940	0	1	0	0	0	1
Aluminum – Multistringer	2	1,880	0	2	0	0	0	2
Concrete – Arch—thru	1	1,700	0	0	0	0	0	1
Concrete – Culvert	1	1,700	0	0	0	0	0	1
Concrete – Girder and floorbeam	1	1,700	0	0	0	0	0	1
Concrete – Movable—swing	1	1,700	0	0	0	0	0	1
Concrete – Slab	4	7,100	0	0	0	0	0	4
Concrete continuous – Multistringer	1	1,700	0	0	0	0	0	1
Prestressed concrete – Arch—deck	1	4,100	0	0	0	0	0	1
Prestressed concrete – Box beam/girders—multiple	5	10,030	1	0	0	1	0	4
Prestressed concrete – Culvert	3	0	1	1	0	1	0	2
Prestressed concrete – Multistringer	4	9,800	0	0	0	0	1	3
Prestressed concrete – Orthotopic	1	2,300	0	0	0	0	0	1
Prestressed concrete – Suspension	1	1,400	0	0	0	0	0	1
Prestressed concrete – Tee beam	1	1,400	0	0	0	0	0	1
Prestressed concrete continuous – Multistringer	1	590	1	1	0	1	0	0
Steel – Box beam/girders—multiple	1	1,600	0	1	0	0	1	0
Steel – Multistringer	2	2,540	0	2	0	0	1	1
Steel – Truss—thru and pony	1	1,600	0	1	0	0	1	0
Steel continuous – Slab	1	590	1	1	0	1	0	0
Timber – Box beam/girders—multiple	1	590	1	1	0	1	0	0
Timber – Culvert	4	4,910	3	2	0	3	1	0
Timber – Frame	1	830	1	0	0	1	0	0
Timber – Movable—lift	1	590	1	1	0	1	0	0
Timber – Multistringer	2	3,490	1	1	0	1	1	0

11

Commented [A18]: Calculation error for RT10 Closed

Bridge AMP Tools – Prior to 2021

Table 2: Bridge Assets by Type: Inventory, Size, and Condition

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2019 Condition		
			Struct. Defic	Posted	Closed	Poor	Fair	Good
Timber – Slab	6	8,300	4	4	0	4	1	1
Timber – Stayed girder	1	590	1	1	0	1	0	0
Timber – Truss—deck	1	2,900	0	0	0	0	1	0
Total SD/Posted/Closed			**16**	**24**	**0**			
Total	**33**	**82,030**				**16**	**8**	**32**
Percentage (%)			**48%**	**73**	**0**	**48**	**24**	**97**

Statewide, MDOT's statistics for local agency bridges show that 14% are poor and 86% are good/fair, indicating that the CTT has a greater percentage of poor bridges compared to the statewide average for local agencies. Correspondingly, CTT has 121% of its bridges in fair/good condition versus the statewide average of 86% for local agency bridges. Statewide, 8% of local agency bridge deck area classifies as structurally deficient compared to 48% of CTT's bridge deck area.

Commented [A12]: Calculation error for more than 17 bridge types (we allow for up to 30)

Commented [A13]: Calculation error for more than 17 bridge types (we allow for up to 30)

Goals

The goal of CTT's asset management program is the preservation and safety of its bridge network; it also aims to extend the period of time that bridges remain in good and fair condition, thereby increasing their useful service life and reducing future maintenance costs.

Specifically, this goal translates into long-range goals of having 80% of its bridges rated fair/good and having less than 20% classify as structurally deficient within 10 years. These goals are juxtaposed with the historic and current condition and the projected trend in Figure 8.

Several metrics will be used to assess the effectiveness of this asset management program. CTT will monitor and report the annual change in the number of its bridges rated fair/good (5 or higher) and the annual change in the number of its bridges classified as structurally deficient.

12

Calculation/graphing error only for >17 bridge types

Bridge AMP Tools – 2021 & following

Table 2: Bridge Assets by Type: Inventory, Size, and Condition

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2019 Condition		
			Struct. Defic	Posted	Closed	Poor	Fair	Good
Timber – Slab	6	8,300	4	4	0	4	1	1
Timber – Stayed girder	1	590	1	1	0	1	0	0
Timber – Truss—deck	1	2,900	0	0	0	0	1	0
SD/Posted/Closed			**16**	**24**	**0**			
Total	56	82,030				**16**	**8**	**32**
Percentage (%)			**29%**	**43**	**0**	**29**	**14**	**57**

Statewide, MDOT's statistics for local agency bridges show that 14% are poor and 86% are good/fair, indicating that the CTT has a greater percentage of poor bridges compared to the statewide average for local agencies. Correspondingly, CTT has 71% of its bridges in fair/good condition versus the statewide average of 86% for local agency bridges. Statewide, 8% of local agency bridge deck area classifies as structurally deficient compared to 29% of CTT's bridge deck area.

Commented [A19]: Calculation error for more than 17 bridge types (we allow for up to 30)

Commented [A20]: Calculation error for more than 17 bridge types (we allow for up to 30)

Goals

Commented [A21]: **Recommended** for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/**required** for PA 325 TAMP compliance plan:

Performance goals, including desired condition and performance of each asset class and is set by the local road-owning agency (line 13)

Performance goals consistent with established federal performance targets for federal National Highway System (NHS) roads and bridges under local road-owning agency's jurisdiction (line 14)

Goals are to be aspirational, and local road-owning agencies should be encouraged to set them as challenging but realistically achievable (line 15)

Program (i.e., local road-owning agency is making a good faith effort to conform to the conditions of its TAMP through management and planning) must be made toward goals by 2025 (line 16)

The goal of CTT's asset management program is the preservation and safety of its bridge network; it also aims to extend the period of time that bridges remain in good and fair condition, thereby increasing their useful service life and reducing future maintenance costs.

Specifically, this goal translates into long-range goals of having 80% of its bridges rated fair/good and having less than 20% classify as structurally deficient within 10 years. These goals are juxtaposed with the historic and current condition and the projected trend in Figure 8.

Several metrics will be used to assess the effectiveness of this asset management program. CTT will monitor and report the annual change in the number of its bridges rated fair/good (5 or higher) and the annual change in the number of its bridges classified as structurally deficient.

12

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

Figure 9 Program tracking graph showing CTT's historic and current bridge conditions, projected trends, and goals

Commented [A14]: Calculation error for more than 17 bridge types (we allow for up to 30)

Based on past inspection records and condition ratings, CTT will establish a baseline of past performance by determining the average period of time that a bridge remains in good or fair condition. The performance measure will be the increased average amount of time a bridge is in the good or fair condition status after implementation of the asset management strategy when compared to the baseline time before implementation.

Commented [A15]: NOTE TO AGENCY: Review and revise this section to suit your agency-specific needs.

Prioritization, Programmed/Funded Projects, and Planned Projects

Prioritization

CTT's asset management program aims to address the structures of critical concern by targeting elements rated as being in poor condition and to improve and maintain the overall condition of the bridge network to good or fair condition through a "mix of fixes" strategy. Therefore, CTT prioritizes bridges for projects by evaluating five factors and weighting them as follows: condition –20%, load capacity –25%, traffic –15%, safety –30%, and detour –10%. There are several components within each factor that are used to arrive at its score. Each project under consideration is scored, and its total score is then compared with other proposed project to establish a priority order.

Commented [Author16]: NOTE TO AGENCY: Review and revise this section to suit your agency-specific needs.

CTT annually reviews the current condition of each of the its bridges using the NBIS inspection data contained in the *MDOT Bridge Safety Inspection Report* and the inspector's work recommendations contained in MDOT's *Bridge Inspection Report*. The inspection inventory and condition data are consolidated in spreadsheet format for CTT's bridges in Appendix 3. CTT then determines management and preservation needs and corresponding actions for each bridge(Appendix 4) As well as inspection

13

Calculation/graphing error only for >17 bridge types

Figure 9 Program tracking graph showing CTT's historic and current bridge conditions, projected trends, and goals

Commented [A22]: Calculation error for more than 17 bridge types (we allow for up to 30)

Based on past inspection records and condition ratings, CTT will establish a baseline of past performance by determining the average period of time that a bridge remains in good or fair condition. The performance measure will be the increased average amount of time a bridge is in the good or fair condition status after implementation of the asset management strategy when compared to the baseline time before implementation.

Commented [A23]: NOTE TO AGENCY: Review and revise this section to suit your agency-specific needs.

Prioritization, Programmed/Funded Projects, and Planned Projects

Commented [A24]: Recommended for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/required for PA 325 TAMP compliance plan:

Performance outcomes, including a determination of how the local road-owning agency's investment strategy will achieve the desired levels of service and performance goals and the steps necessary to ensure asset conditions meet or achieve stated goals (line 11)

Prioritization

CTT's asset management program aims to address the structures of critical concern by targeting elements rated as being in poor condition and to improve and maintain the overall condition of the bridge network to good or fair condition through a "mix of fixes" strategy. Therefore, CTT prioritizes bridges for projects by evaluating five factors and weighting them as follows: condition –20%, load capacity –25%, traffic –15%, safety –30%, and detour –10%. There are several components within each factor that are used to arrive at its score. Each project under consideration is scored, and its total score is then compared with other proposed project to establish a priority order.

Commented [Author25]: NOTE TO AGENCY: Review and revise this section to suit your agency-specific needs.

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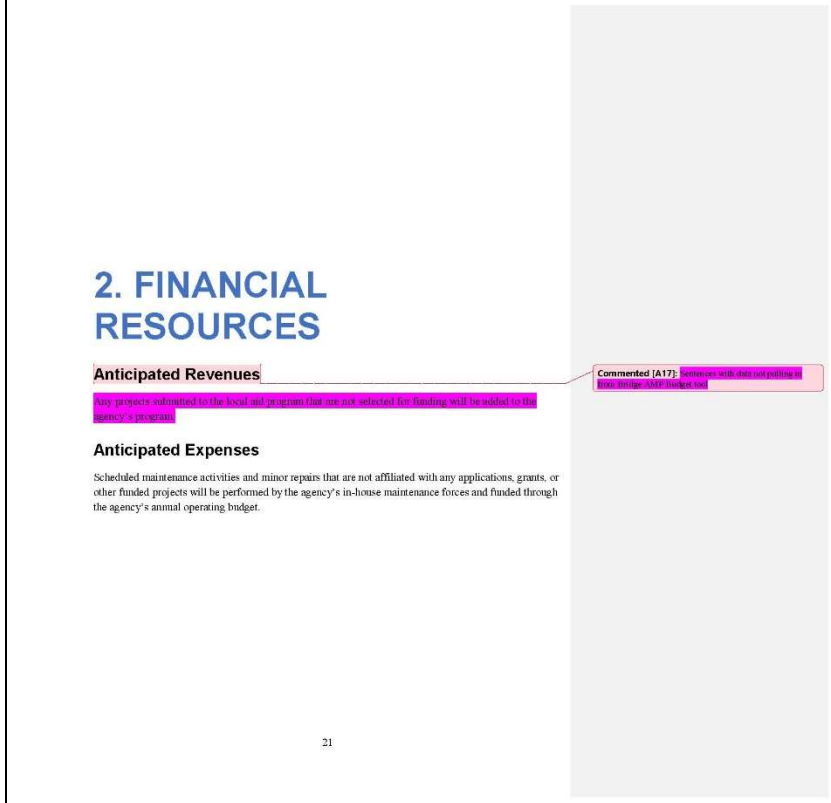
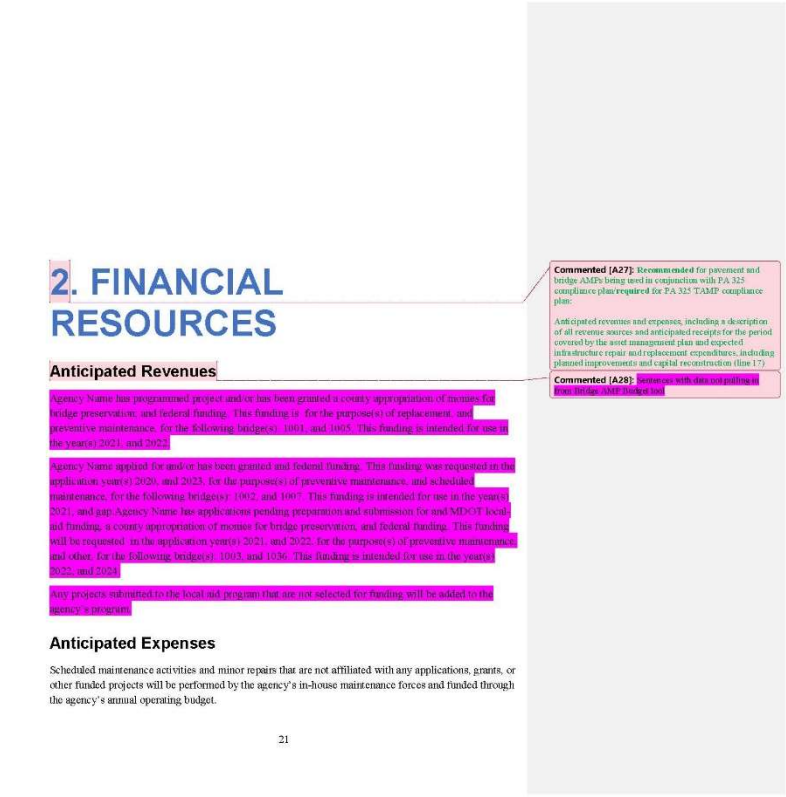
13

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following
	

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

3. RISK MANAGEMENT

CTT recognizes that the potential risks associated with bridges generally fall into several categories:

- Personal injury and property damage resulting from a bridge collapse or partial failure;
- Loss of access to a region or individual properties resulting from bridge closures, restricted load postings, or extended outages for rehabilitation and repair activities; and
- Delays, congestion, and inconvenience due to serviceability issues, such as poor quality riding surface, loose expansion joints, or missing expansion joints.

CTT addresses these risks by implementing regular bridge inspections and a preservation strategy consisting of preventive maintenance.

CTT administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of CTT's bridges and evaluates them in order to identify new defects and monitor advancing deterioration. The summary inspection report in Appendix 1 identifies items needing follow-up, special inspection actions, and recommended bridge-by-bridge maintenance activities.

Bridges that are considered "scour critical" pose a risk to CTT's road and bridge network. Scour is the depletion of sediment from around the foundation elements of a bridge commonly caused by fast-moving water. According to MDOT's *Michigan Structure Inventory and Appraisal Coding Guide*, a scour critical bridge is one that has unstable abutment(s) and/or pier(s) due to observed or potential (based on an evaluation study) scour. Bridges receiving a scour rating of 3 or less are considered scour critical. CTT has scour critical bridges, which are listed in Table 5.

Table 5

Scour Critical Bridges	
Bridge Structure Number	Scour Critical Rating

Commented [A19]: Bridge title missing; not labelled in TOC

3. RISK MANAGEMENT

Commented [A29]: Recommended for pavement and bridge AMPs being used in conjunction with PA 325 compliance plan/required for PA 325 TAMP compliance plan:

Risk of failure analysis, including the identification of the probability and criticality of a failure of the most critical assets and any contingency plans (line 18)

CTT recognizes that the potential risks associated with bridges generally fall into several categories:

- Personal injury and property damage resulting from a bridge collapse or partial failure;
- Loss of access to a region or individual properties resulting from bridge closures, restricted load postings, or extended outages for rehabilitation and repair activities; and
- Delays, congestion, and inconvenience due to serviceability issues, such as poor quality riding surface, loose expansion joints, or missing expansion joints.

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Table 5: Bridges that are Considered Scour Critical

Scour Critical Bridges

Commented [A30]: Bridge title missing; not labelled in TOC

Bridge AMP Tools – Prior to 2021	Bridge AMP Tools – 2021 & following

1034	3
1035	3
1036	3
1037	2
1038	2
1039	2
1040	1
1041	1
1042	1

CTT has posted or closed bridges that are critical to accessing entire areas or individual properties within its jurisdiction. These bridges are listed in Table 6.

Table 6

Commented [A19]: Bridge title missing, not labelled in TOC

Posted/Closed Bridges that are Critical Links		
Bridge Structure Number	P/K	Comments
1002	P	
1007	P	
1012	P	
1016	P	
1021	P	
1026	P	
1030	P	
1035	P	
1040	P	
1044	P	
1049	P	
1054	P	

The preservation strategy identifies actions in the operations and maintenance plan that are preventive or are responsive to specific bridge conditions. The actions are prioritized to correct critical structural safety and traffic issues first, and then to address other needs based on the operational importance of each bridge and the long-term preservation of the network. The inspection results serve as a basis for modifying and updating the operations and maintenance plan annually.

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Bridge Structure Number	Scour Critical Rating
1034	3
1035	3
1036	3
1037	2
1038	2
1039	2
1040	1
1041	1
1042	1

CTT has posted or closed bridges that are critical to accessing entire areas or individual properties within its jurisdiction. These bridges are listed in Table 6.

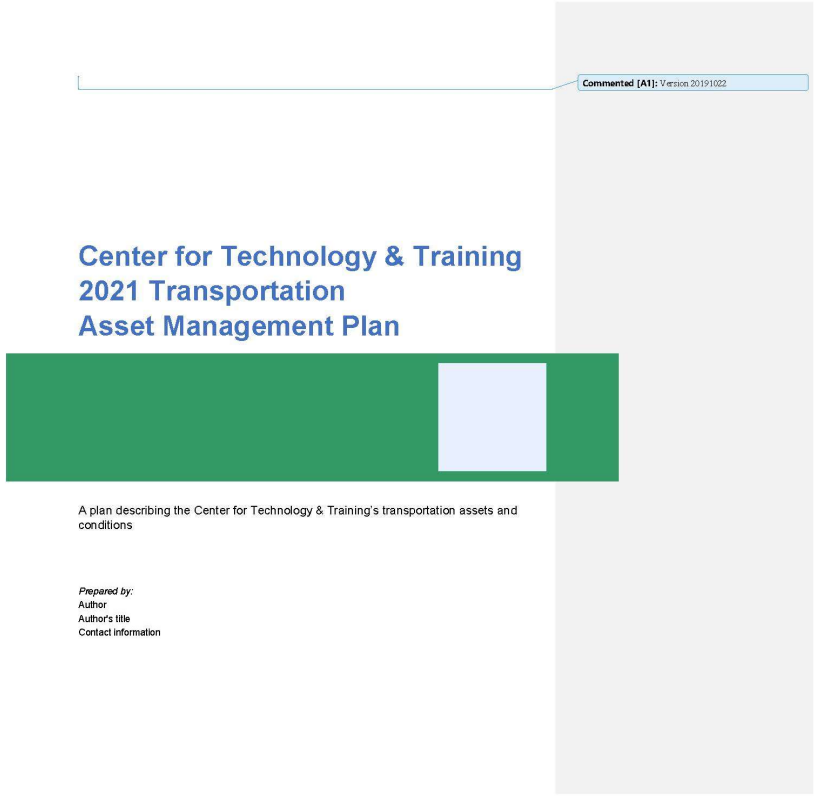
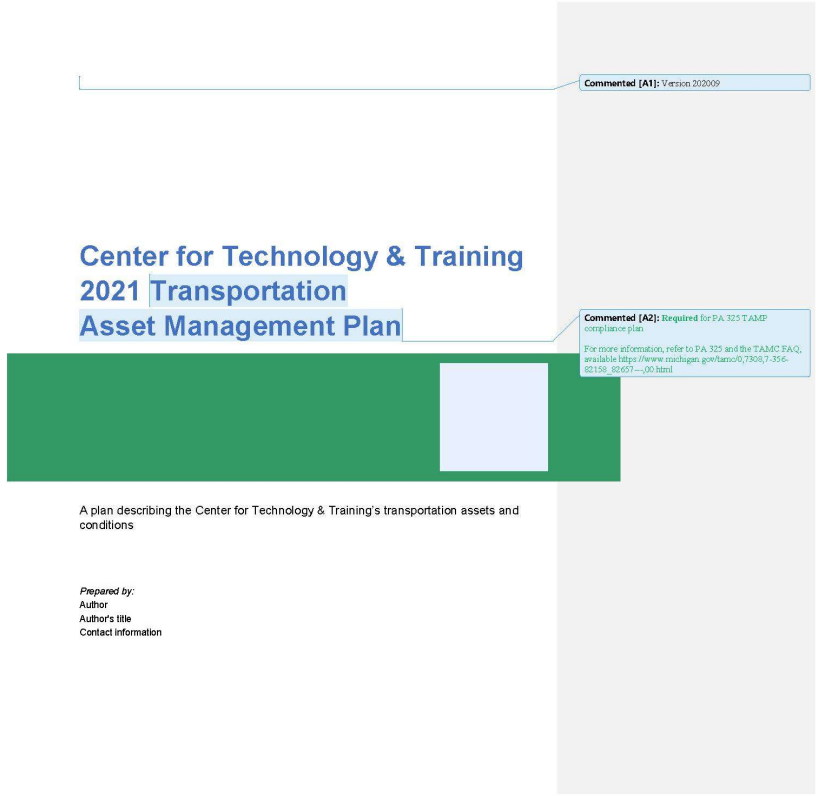
Table 6: Posted or Close Bridges that are Critical Links

Commented [A31]: Bridge title missing, not labelled in TOC

Posted/Closed Bridges that are Critical Links		
Bridge Structure Number	P/K	Comments
1002	P	
1007	P	
1012	P	
1016	P	
1021	P	
1026	P	
1030	P	
1035	P	
1040	P	
1044	P	

24

Errata for the Compliance Plan Tools

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following
	

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following

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). The Center for Technology & Training 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 and bridge network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing transportation infrastructure with a limited budget.

The Center for Technology & Training (CTT) 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. CTT is responsible for maintaining and operating over 2217.6 centerline miles of roads and 0 bridge structures. It is also responsible for 1,700 culverts and 3,100 signals.

This 2021 plan identifies CTT's transportation assets and their condition as well as the strategy that CTT uses to maintain and upgrade particular assets given CTT's condition goals, priorities of network's road users, and resources. An updated plan is to be released approximately every three years both to comply with Public Act 325 and to reflect changes in road conditions, finances, and priorities.

Commented [A2]: Enter frequency with which you plan to update this AMP (in number of years)

NOTE: Per Public Act 325 of 2018, agencies with 100 or more certified centerline miles will need to update this plan AT LEAST every three years.

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). The Center for Technology & Training 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 and bridge network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing transportation infrastructure with a limited budget.

The Center for Technology & Training (CTT) 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. CTT is responsible for maintaining and operating over 2217.6 centerline miles of roads and 56 bridge structures. It is also responsible for 200 culverts and 50 signals.

This 2021 plan identifies CTT's transportation assets and their condition as well as the strategy that CTT uses to maintain and upgrade particular assets given CTT's condition goals, priorities of network's road users, and resources. An updated plan is to be released approximately every three years both to comply with Public Act 325 and to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to John Doe at 1000 Main Street, Anytown, Michigan 49000or at (906)-000-0111 and/or nobody@anywhere.com.A copy of this plan can be accessed on our website at ctt.mtu.edu/amp.

Commented [A3]: Enter frequency with which you plan to update this AMP (in number of years)

NOTE: Per Public Act 325 of 2018, agencies with 100 or more certified centerline miles will need to update this plan AT LEAST every three years.

Commented [A4]: Verify/update with contact info

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following

Types

CTT has multiple types of pavements in its jurisdiction, including asphalt, sealcoat, concrete, brick/block, and undefined; it also has unpaved roads (i.e, gravel and/or earth). Figure 2 shows a breakdown of these pavement types for all of CTT's road assets.

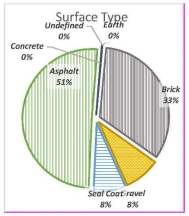


Figure 2: Pavement type by percentage maintained by CTT. Undefined pavements have not been inventoried in CTT's asset management system to date, but will be included as data becomes available.

Condition, Goals, and Trend

Paved Roads

Paved roads in Michigan are rated using the Pavement Surface Evaluation and Rating (PASER) system, which is a 1 to 10 scale with 10 being a newly constructed surface and 1 being a completely failed surface. PASER scores are grouped into TAMC definition categories of good (8-10), fair (5-7), and poor (1-4) categories. CTT collects PASER data every two years on 100 percent of those portions of its county primary and county local networks that are eligible for federal funding. In addition, CTT uses its own staff and resources to collect PASER data on <#YOUR CONTENT HERE> percent of its county primary and county local networks that are not eligible for federal funding.

Commented [A5]: Insert percentage of network collected each year as appropriate to your agency's circumstance (use ## format)
NOTE: This answer should be the same as the answer given in the *Introduction > Pavement Primer > Paved Roads > Paved Road Condition Rating System.*

Currently, the county primary network has 30% of its roads in good condition, 15% in fair condition, and 55% in poor condition, and the county local network has 11% of its roads in good condition, 33% in fair condition, and 56% in poor condition (Figure 3 and Figure 4). CTT's long-range goal for the county primary network is to have #REF!% of roads in good condition, #REF!% in fair condition, and #REF!% in poor condition, and for the county local network is to have #REF!% of roads in good condition, #REF!% in fair condition, and #REF!% in poor condition (Figure 3 and Figure 4). Figure 3 and Figure 4 illustrate the historical and current condition (solid bars) of CTT's county primary and county local

5

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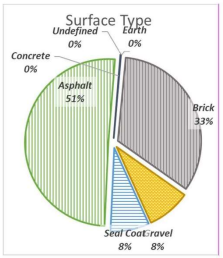

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Condition, Goals, and Trend

Commented [A7]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

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Commented [A8]: Insert percentage of network collected each year as appropriate to your agency's circumstance (use ## format)
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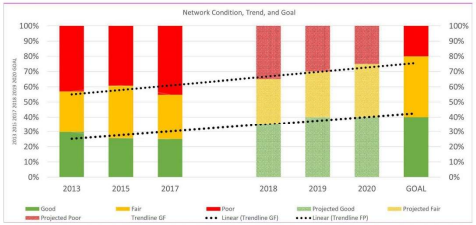
4

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following
	Currently, the county primary network has 30% of its roads in good condition, 15% in fair condition, and 55% in poor condition, and the county local network has 11% of its roads in good condition, 33% in fair condition, and 56% in poor condition (Figure 3 and Figure 4). CTT's long-range goal for the county primary network is to have 40% of roads in good condition, 40% in fair condition, and 20% in poor condition, and for the county local network is to have 40% of roads in good condition, 40% in fair condition, and 20% in poor condition (Figure 3 and Figure 4). Figure 3 and Figure 4 illustrate the historical and current condition (solid bars) of CTT's county primary and county local networks, respectively; they also illustrate the projected trend (shaded bars), the overall trend in condition (trendlines), and CTT's goal (final solid bar).  Figure 3 county primary network condition, goals, and trend 5

Compliance Plan Tools – Prior to 2021

networks, respectively; they also illustrate the projected trend (shaded bars), the overall trend in condition (trendlines), and CTT's goal (final solid bar).

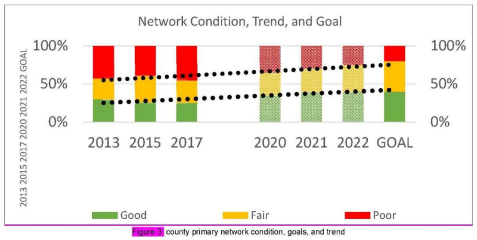


Figure 3: county primary network condition, goals, and trend

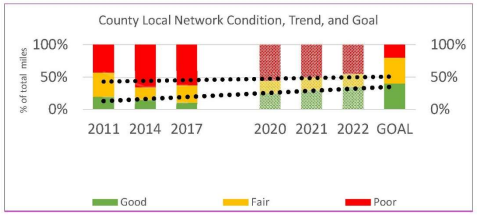


Figure 4: county local network condition, goals, and trend

Unpaved Roads

Unpaved roads rated with the Inventory-based Rating System™ receive an IBR number ranging from 1 to 10, with a 9 or 10 (less than one year old) having good surface width, good or fair drainage, and good

6

Commented [A6]: If your agency collects unpaved road data with the IBR System™, use and/or modify the following section Unpaved Condition Rating System (IBR System™) by right-clicking the content control and then "Remove Control" to retain text.

If your agency uses PASER Gravel or another rating system, delete this section and write appropriate content. To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Compliance Plan Tools – 2021 & following

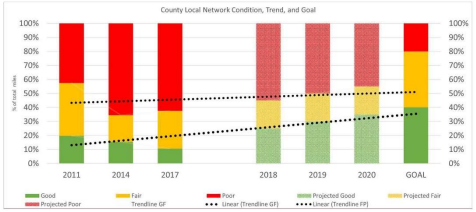


Figure 4: county local network condition, goals, and trend

Unpaved Roads

Unpaved roads rated with the Inventory-based Rating System™ receive an IBR number ranging from 1 to 10, with a 9 or 10 (less than one year old) having good surface width, good or fair drainage, and good structural adequacy and a 1 having poor surface width, poor drainage, and poor structural adequacy. IBR numbers can be groupcd in a similar fashion as the TAMC definitions into good (8-10), fair (5-7), and poor (1-4) categories. Figure 5 illustrates the historical and/or current condition (solid bar[s]), the projected trend (shaded bars), and CTT's goal (final solid bar).

6

Commented [A9]: If your agency collects unpaved road data with the IBR System™, use and/or modify the following section Unpaved Condition Rating System (IBR System™) by right-clicking the content control and then "Remove Control" to retain text.

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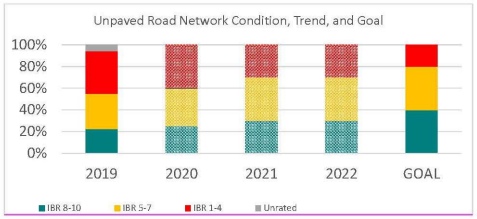
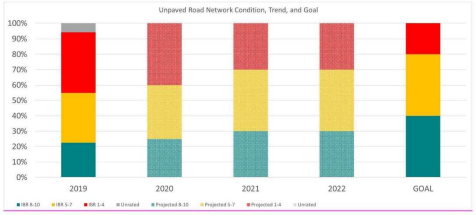
Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following
structural adequacy and a 1 having poor surface width, poor drainage, and poor structural adequacy. IBR numbers can be grouped in a similar fashion as the TAMC definitions into good (8-10), fair (5-7), and poor (1-4) categories. Figure 5 illustrates the historical and/or current condition (solid bar[s]), the projected trend (shaded bars), and CTT's goal (final solid bar).  Figure 5: Distribution of IBR numbers for current condition (solid) and for goals (dotted) 7	 Figure 5: Distribution of IBR numbers for current condition (solid) and for goals (dotted) 7

Compliance Plan Tools – Prior to 2021

Modelled Trends, Gap Analysis, and Planned Projects

Table 1: NCPP Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets

Network 1 (<774.6 miles)

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years	Planned Projects: Average Yearly Miles of Treatment	Planned Projects: Mile-Years	Additional Work Necessary to Overcome Deficit: Average Yearly Miles of Treatment	Additional Work Necessary to Overcome Deficit: Mile-Years
Crack Seal	10	1	10	20	20	15	15
Chip Seal	15	2	30	[redacted]	50	20	40
Overlay	20	3	60	30	90	25	75
Reconstruction	25	4	100	[redacted]	140	30	120
[Treatment 5]	30	5	150	40	200	35	175
[Treatment 6]	35	6	210	45	270	40	240
[Treatment 7]	40	7	280	50	350	45	315
[Treatment 8]	45	8	360	55	440	50	400
Total			1200		1560		1380
Gap Analysis: (Deficit)/Surplus			524		884		

Network 2 (1443 miles)

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years	Planned Projects: Average Yearly Miles of Treatment	Planned Projects: Mile-Years	Additional Work Necessary to Overcome Deficit: Average Yearly Miles of Treatment	Additional Work Necessary to Overcome Deficit: Mile-Years
Crack Seal	9	2	[redacted]	19	38	16	32
Chip Seal	14	3	42	24	72	21	63
Overlay	19	4	76	29	116	26	104
Reconstruction	24	5	120	34	170	31	155
[Treatment 5]	29	6	174	39	234	36	216
[Treatment 6]	34	7	238	44	308	41	287
[Treatment 7]	39	8	312	49	392	46	368
[Treatment 8]	44	9	396	54	486	51	459
Total			1376		1816		1684
Gap Analysis: (Deficit)/Surplus			351		791		

Modelled Trends & Gap Analysis

Results from the NCPP Quick Check for the paved county primary and county local networks roads indicate the average volume of work that CTT has been able to afford over the last five years <#YOUR CONTENT HERE>Choose an item. keeping up with the natural deterioration of the road network due to age and use. Continuing the current treatment volume on this network will result in an ongoing <#YOUR CONTENT HERE>Choose an item. of <#YOUR CONTENT HERE> mile-years of project benefit needed to stabilize this trend and maintain current conditions.

The NCPP analysis of CTT's planned projects from CTT's currently-available budget <#YOUR CONTENT HERE>Choose an item. allow CTT to head in the direction of its pavement condition goal

Commented [A7]: When generating this document from the pavement asset management plan workbook, an automation will delete all NCPP or all Roadsoft content depending on your chosen method for modelling and forecasting. The tags [FFTNCPP] and [FFTRs] flag for the automated process where to delete sections in this document.

Commented [A8]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **is** or **is not**

Commented [A9]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A10]: Insert the number of miles-years here (e.g., 100)

Commented [A11]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Compliance Plan Tools – 2021 & following

Modelled Trends, Gap Analysis, and Planned Projects

Commented [A10]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html.

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Crack Seal	10	1	10	20	20	15	15
Chip Seal	15	2	30	[redacted]	50	20	40
Overlay	20	3	60	30	90	25	75
Reconstruction	25	4	100	[redacted]	140	30	120
[Treatment 5]	30	5	150	40	200	35	175
[Treatment 6]	35	6	210	45	270	40	240
[Treatment 7]	40	7	280	50	350	45	315
[Treatment 8]	45	8	360	55	440	50	400
Total			1200		1560		1380
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Network 2 (1443 miles)

Treatment	Average Yearly Miles of Treatment	Years of Life	Mile-Years	Planned Projects: Average Yearly Miles of Treatment	Planned Projects: Mile-Years	Additional Work Necessary to Overcome Deficit: Average Yearly Miles of Treatment	Additional Work Necessary to Overcome Deficit: Mile-Years
Crack Seal	9	2	[redacted]	19	38	16	32
Chip Seal	14	3	42	24	72	21	63
Overlay	19	4	76	29	116	26	104
Reconstruction	24	5	120	34	170	31	155
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Commented [A12]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **is** or **is not**

Commented [A13]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **deficit** or **surplus**

Commented [A14]: Insert the number of miles-years here (e.g., 100)

Commented [A15]: Select from the drop-down list the word/phrase that best fits your agency's circumstance: **does** or **does not**

Compliance Plan Tools – Prior to 2021

CTT is responsible for 1 bridges that provide safe service to road users across the agency network. CTT seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life and safety of the local bridges under its jurisdiction.

Inventory of Assets

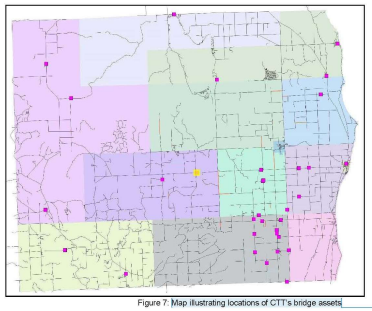

Figure 7. Map illustrating locations of CTT's bridge assets

CTT has 1 total bridges in its road and bridge network; these bridges connect various points of the road network, as illustrated in Figure 7. These bridge structures can be summarized by type, size, and condition, which are detailed in Table 2. More information about each of these structures can be found in CTT's MiBRIDGE database or by contacting CTT.

Table 2: Type, Size, and Condition of CTT's Bridge Assets

Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			# Condition		
			Struct. Deficient	Posted	Closed	Poor	Fair	Good
1	1	1	1	Prestress or concrete - Arch - deck	1	#1/0!	1	1

12

Commented [A21]: Inventory of Bridges
Displaying Bridges According to Rating
Select "Bridges" from the list of categories on the left side of the screen. A prompt will appear if bridge data needs to be imported. To re-import bridge data, right-click on the "Bridges" category and select "Re-Import Bridge Data".
Once the data is imported, select the "Legend Builder" icon.
Select "Good/Fair/Poor Rating" from the dropdown options in the Legend Builder window.
Select the "Good", "Fair", and "Poor" values so that they are highlighted blue. Then click the "Add Selected Unique Value(s)" buttons.
Change the color of the bridges before clicking "Apply".

Adding a Filter to Display Bridges Based on Ownership
Select "Filter Builder" from the "Filter" tab located above the map.
Search for "owner" in the search bar of the Filter Builder window.
Add the desired value option.
Select "Apply as Filter".
Check to make sure only the bridges with owned by the value chosen are displayed on the map.

Compliance Plan Tools – 2021 & following

CTT is responsible for 56 bridges that provide safe service to road users across the agency network. CTT seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life and safety of the local bridges under its jurisdiction.

Inventory of Assets

Commented [A25]: **Required** for PA 325 TAMP compliance plan

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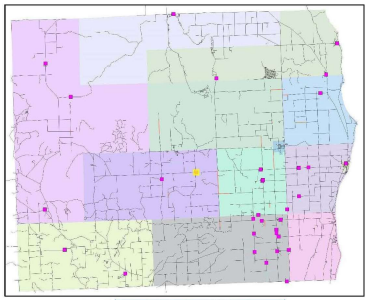

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12

Commented [A26]: Inventory of Bridges
Displaying Bridges According to Rating
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Compliance Plan Tools – Prior to 2021

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	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			0 Condition		
Bridge Type			Struct. Deficient	Posted	Closed	Poor	Fair	Good
0	0	0	1	Prestressed concrete – Box beam/girders—multiple	3	7,800	0	0
0	0	0	3	Prestressed concrete – Culvert	3	0	0	0
0	0	0	3	Prestressed concrete – Multistringer	3	6,900	0	0
0	0	0	3	Prestressed concrete – Orthotopic	1	2,300	0	0
0	0	0	1	Prestressed concrete – Suspension	1	1,400	0	0
0	0	0	1	Prestressed concrete – Tee beam	1	1,400	0	0
0	0	0	3	Prestressed concrete continuous – Multistringer	1	590	0	1
0	1	0	0	Steel – Box beam/girders—multiple	1	1,600	0	1

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Compliance Plan Tools – 2021 & following

Table 2: Type, Size, and Condition of CTT's Bridge Assets								
	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			2019 Condition		
Bridge Type			Struct. Deficient	Posted	Closed	Poor	Fair	Good
Aluminum – Box beam/girders—single/spread	1	940	0	1	0	0	0	1
Aluminum – Culvert	4	4520	0	3	0	0	0	4
Aluminum – Movable—bascule	1	940	0	1	0	0	0	1
Aluminum – Multistringer	2	1880	0	2	0	0	0	2
Concrete – Arch—thru	1	1700	0	0	0	0	0	1
Concrete – Culvert	1	1700	0	0	0	0	0	1
Concrete – Girder and floorbeam	1	1700	0	0	0	0	0	1
Concrete – Movable—swing	1	1700	0	0	0	0	0	1
Concrete – Slab	4	7100	0	0	0	0	0	4
Concrete continuous – Multistringer	1	1700	0	0	0	0	0	1
Prestressed concrete – Arch—deck	1	4100	0	0	0	0	0	1
Prestressed concrete – Box beam/girders—multiple	5	10030	1	0	0	1	0	4
Prestressed concrete – Culvert	3	0	1	1	0	1	0	2
Prestressed concrete – Multistringer	4	9800	0	0	0	0	1	3
Prestressed concrete – Orthotopic	1	2300	0	0	0	0	0	1
Prestressed concrete – Suspension	1	1400	0	0	0	0	0	1
Prestressed concrete – Tee beam	1	1400	0	0	0	0	0	1
Prestressed concrete continuous – Multistringer	1	590	1	1	0	1	0	0
Steel – Box beam/girders—multiple	1	1600	0	1	0	0	1	0
Steel – Multistringer	2	2540	0	2	0	0	1	1
Steel – Truss—thru and pony	1	1600	0	1	0	0	1	0
Steel continuous – Slab	1	590	1	1	0	1	0	0
Timber – Box beam/girders—multiple	1	590	1	1	0	1	0	0
Timber – Culvert	4	4910	3	2	0	3	1	0
Timber – Frame	1	830	1	0	0	1	0	0
Timber – Movable—lift	1	590	1	1	0	1	0	0
Timber – Multistringer	2	3490	1	1	0	1	1	0

13

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following

Table 2: Type, Size, and Condition of CTT's Bridge Assets								
	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			0 Condition		
Bridge Type			Struct. Deficient	Posted	Closed	Poor	Fair	Good
0	0	1	0	Steel – Multistringer	1	1,600	0	1
0	0	1	0	Steel – Truss—thru and pony	1	1,600	0	1
0	0	1	0	Steel continuous – Slab	1	590	1	1
0	1	0	0	Timber – Box beam/girders—multiple	1	590	1	1
0	1	0	0	Timber – Culvert	5	7,810	3	2
0	3	2	0	Timber – Frame	1	830	1	0
0	1	0	0	Timber – Movable—lift	1	590	1	1
0	1	0	0	Timber – Multistringer	1	2,900	0	0
0	0	1	0	Timber – Slab	4	2,600	4	3
0	4	0	0	Timber – Stayed girder	1	590	1	1
0	1	0	0	Timber – Truss—deck	1	2,900	0	0
0	0	1	0	27	67,170	13	20	0
13	7	27	48%	74	0	48	26	100
7	4	14	15	0	7	126%		
Total SD/Posted/Closed								

14

Compliance Plan Tools – Prior to 2021

Table 2: Type, Size, and Condition of CTT's Bridge Assets								
	Total Number of Bridges	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, or Closed			0 Condition		
Bridge Type			Struct. Deficient	Posted	Closed	Poor	Fair	Good
Total	0							
Percentage (%)								

Condition, Goals, and Trend

Bridges in Michigan are given a good, fair, or poor rating based on the National Bridge Inspection Standards (NBIS) rating scale, which was created by the Federal Highway Administration to evaluate a bridge's deficiencies and to ensure the safety of road users. The current condition of CTT's bridge network based on the NBIS is structures rated good, structures rated fair, and structures rated poor (Table 2).

Bridges are designed to carry legal loads in terms of vehicles and traffic. Due to a decline in condition, a bridge may be "posted" with a restriction for what would be considered safe loads passing over the bridge. On occasion, posting a bridge may also restrict other load-capacity-related elements like speed and number of vehicles on the bridge, but this type of posting designates the bridge differently. CTT has structures that are posted for load restriction (Table 2). Designating a bridge as "posted" has no influence on its condition rating. A "closed" bridge is one that is closed to all traffic. Closing a bridge is contingent upon its ability to carry a set minimum live load. CTT has structures that are closed (Table 2).

The goal of the program is the preservation and safety of CTT's bridge network.

Figure 8 illustrates the baseline condition, projected trend, and goal that CTT has for its good/fair and its structurally deficient bridges.

Compliance Plan Tools – 2021 & following

Timber—Slab	0	8300	0	0	0	0	0	0
Timber—Stayed girder	1	500	1	0	0	1	0	0
Timber—Truss—deck	1	2900	0	0	0	0	0	0
Total SD/Posted/Closed			16	24	0			
Total	54	82038				16	8	32
Percentage (%)			29%	44	0	29	14	57

Condition, Goals, and Trend

Commented [A27]: Required for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Bridges in Michigan are given a good, fair, or poor rating based on the National Bridge Inspection Standards (NBIS) rating scale, which was created by the Federal Highway Administration to evaluate a bridge's deficiencies and to ensure the safety of road users. The current condition of CTT's bridge network based on the NBIS is 32 structures rated good, 8 structures rated fair, and 14 structures rated poor (Table 2).

Bridges are designed to carry legal loads in terms of vehicles and traffic. Due to a decline in condition, a bridge may be "posted" with a restriction for what would be considered safe loads passing over the bridge. On occasion, posting a bridge may also restrict other load-capacity-related elements like speed and number of vehicles on the bridge, but this type of posting designates the bridge differently. CTT has 24 structures that are posted for load restriction (Table 2). Designating a bridge as "posted" has no influence on its condition rating. A "closed" bridge is one that is closed to all traffic. Closing a bridge is contingent upon its ability to carry a set minimum live load. CTT has 0 structures that are closed (Table 2).

The goal of the program is the preservation and safety of CTT's bridge network.

Figure 8 illustrates the baseline condition, projected trend, and goal that CTT has for its good/fair and its structurally deficient bridges.

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following

Figure 8 Condition, projected trend, and goal for CTT's good/fair and structurally deficient bridges

Programmed/Funded Projects, Gap Analysis, and Planned Projects

CTT will receive [illegible] in total funding for the years [illegible]. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement. Since CTT recognizes that limited funds are available for improving the bridge network, it seeks to identify those bridges that will benefit from a planned maintenance program, and it plans to spend [illegible] per year for the next three years on preventive maintenance of bridges. CTT plans to replace [illegible] bridges within the next three years at a cost of Concrete continuous – Multistringer. By performing the aforementioned preventive maintenance and replacement of bridge structures, CTT [illegible] achieve its goal of keeping its overall bridge network at the same condition.

Table 3 illustrates the programmed/funded projects that will be undertaken in order to achieve CTT's goal. These programmed/funded projects are juxtaposed with priority projects that remain unfunded.

16

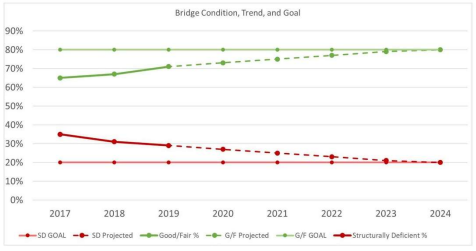

Figure 8 Condition, projected trend, and goal for CTT's good/fair and structurally deficient bridges

Programmed/Funded Projects, Gap Analysis, and Planned Projects

CTT will receive $5,000,000 in total funding for the years 2020-2024. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement. Since CTT recognizes that limited funds are available for improving the bridge network, it seeks to identify those bridges that will benefit from a planned maintenance program, and it plans to spend $2,000,000 per year for the next three years on preventive maintenance of bridges. CTT plans to replace three bridges within the next three years at a cost of $3,500,000. By performing the aforementioned preventive maintenance and replacement of bridge structures, CTT may or may not achieve its goal of keeping its overall bridge network at the same condition.

Table 3 illustrates the programmed/funded projects that will be undertaken in order to achieve CTT's goal. These programmed/funded projects are juxtaposed with priority projects that remain unfunded.

15

Commented [A28]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Compliance Plan Tools – Prior to 2021

<#YOUR CONTENT HERE>CTT exercises awareness of its culvert assets.

Inventory of Assets

At present, CTT tracks inventory data of its culvert assets only. CTT has inventoried [ ] culverts, which is [ ] percent of the 0 1,700 culverts that CTT owns.

At present, CTT tracks inventory and condition data of its culvert assets. CTT has inventoried [ ] culverts, which is [ ] percent of the 0 1,700 culverts that CTT owns. Of CTT's [ ] tracked and rated culverts, CTT has [ ] culverts considered good, [ ] culverts considered fair, [ ] culverts considered poor, and Character – Slab culverts considered failed based on the culvert rating system that CTT uses (see Appendix *C Culvert Asset Management Plan Supplement*).

More detail about these culvert assets can be found in CTT's Roadsoft database or by contacting CTT.

Goals

The goal of CTT's asset management program is the preservation of its culvert network. CTT is responsible for preserving [ ] inventoried culverts as well as any un-inventoried culverts that underlie its entire road network.

Planned Projects

CTT's policy is to replace or repair culvert assets concurrent with projects affecting road segments carried by the particular culverts. CTT also includes culvert assets in scheduled maintenance projects affecting road segments carried by the particular culverts.

19

Commented [A23]: Include a short description of the state of your agency's culvert assets here. Note that the TAMC currently does not require a formal management plan of culvert assets. Per its September 12, 2018 letter from TAMC Chair Joanna Johnson, local agencies are only required to include a short description of the state of these assets. The TAMC estimates there are approximately 1.81 culverts per centerline mile for counties, and 0.95 culverts per centerline mile for cities. For more details on these estimates see the 2018 Michigan Local Agency Culvert Inventory Pilot Evaluation Report on the TAMC's website.

Commented [A24]: Select ONLY ONE of the next two paragraphs:
If your agency tracks culvert inventory data only, select the first paragraph.
If your agency tracks BOTH inventory and condition data, select the second paragraph.

To use and/or modify a paragraph, right-click the content control and then "Remove Control" to retain text.

To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Compliance Plan Tools – 2021 & following

<#YOUR CONTENT HERE>CTT exercises awareness of its culvert assets.

Inventory of Assets

At present, CTT tracks inventory data of its culvert assets only. CTT has inventoried 50 culverts, which is 25 percent of the estimated 200 culverts that CTT owns.

At present, CTT tracks inventory and condition data of its culvert assets. CTT has inventoried 50 culverts, which is 25 percent of the estimated 200 culverts that CTT owns. Of CTT's 50 tracked and rated culverts, CTT has 15 culverts considered good, 5 culverts considered fair, 1 culverts considered poor, and 1 culverts considered failed based on the culvert rating system that CTT uses (see Appendix *C Culvert Asset Management Plan Supplement*).

More detail about these culvert assets can be found in CTT's Roadsoft database or by contacting CTT.

Goals

The goal of CTT's asset management program is the preservation of its culvert network. CTT is responsible for preserving 50 inventoried culverts as well as any un-inventoried culverts that underlie its entire road network.

Planned Projects

CTT's policy is to replace or repair culvert assets concurrent with projects affecting road segments carried by the particular culverts. CTT also includes culvert assets in scheduled maintenance projects affecting road segments carried by the particular culverts.

18

Commented [A29]: Include a short description of the state of your agency's culvert assets here. Note that the TAMC currently does not require a formal management plan of culvert assets. Per its September 12, 2018 letter from TAMC Chair Joanna Johnson, local agencies are only required to include a short description of the state of these assets. The TAMC estimates there are approximately 1.81 culverts per centerline mile for counties, and 0.95 culverts per centerline mile for cities. For more details on these estimates see the 2018 Michigan Local Agency Culvert Inventory Pilot Evaluation Report on the TAMC's website.

Commented [A30]: Select ONLY ONE of the next two paragraphs:
If your agency tracks culvert inventory data only, select the first paragraph.
If your agency tracks BOTH inventory and condition data, select the second paragraph.

To use and/or modify a paragraph, right-click the content control and then "Remove Control" to retain text.

To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Commented [A31]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Commented [A32]: **Required** for PA 325 TAMP compliance plan

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Commented [A33]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Compliance Plan Tools – Prior to 2021	Compliance Plan Tools – 2021 & following

<#YOUR CONTENT HERE>CTT exercises awareness of its traffic sign and signal assets.

Inventory of Assets

At present, CTT tracks only inventory data for traffic signals. CTT has inventoried [ ] traffic signals, which is [ ] percent of the [ ],400 traffic signals that CTT owns.

More detail about these traffic signal assets can be obtained by contacting CTT.

Goals

The goal of CTT's asset management program is the preservation of its traffic signals. CTT is responsible for preserving [ ] inventoried traffic signals as well as any un-inventoried traffic signals along its entire road network.

Planned Projects

CTT's policy is to evaluate traffic signal assets based on condition assessment for replacement or repair during any reconstruction, rehabilitation, preventive maintenance, of schedule maintenance activities on the roadway affected by the particular signal. It also conducts replacements or repairs for those traffic signal assets reported as non-functional or as performing with reduced function. CTT adheres to regular maintenance and servicing policies outlined in the *Michigan Manual of Uniform Traffic Control Devices*.

21

Commented [A25]: Include a short description of the state of traffic signal assets here. Note that the TAMC currently does not require a formal management plan of traffic signal assets. Per its September 12, 2018 letter from TAMC Chair Joanna Johnson, local agencies are only required to include a short description of the state of these assets. If known, list the approximate number of signals in the agency.

Commented [A26]: Select **ONLY ONE** of the next two paragraphs:
If your agency tracks culvert inventory data only, select the first paragraph.
If your agency tracks BOTH inventory and condition data, select the second paragraph.

To use and/or modify a paragraph, right-click the content control and then "Remove Control" to retain text.

To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

<#YOUR CONTENT HERE>CTT exercises awareness of its traffic sign and signal assets.

Inventory of Assets

At present, CTT tracks only inventory data for traffic signals. CTT has inventoried [ ] traffic signals, which is [ ] percent of the actual [ ] traffic signals that CTT owns.

More detail about these traffic signal assets can be obtained by contacting CTT.

Goals

The goal of CTT's asset management program is the preservation of its traffic signals. CTT is responsible for preserving [ ] inventoried traffic signals as well as any un-inventoried traffic signals along its entire road network.

Planned Projects

CTT's policy is to evaluate traffic signal assets based on condition assessment for replacement or repair during any reconstruction, rehabilitation, preventive maintenance, of schedule maintenance activities on the roadway affected by the particular signal. It also conducts replacements or repairs for those traffic signal assets reported as non-functional or as performing with reduced function. CTT adheres to regular maintenance and servicing policies outlined in the *Michigan Manual of Uniform Traffic Control Devices*.

20

Commented [A34]: Include a short description of the state of traffic signal assets here. Note that the TAMC currently does not require a formal management plan of traffic signal assets. Per its September 12, 2018 letter from TAMC Chair Joanna Johnson, local agencies are only required to include a short description of the state of these assets. If known, list the approximate number of signals in the agency.

Commented [A35]: Select **ONLY ONE** of the next two paragraphs:
If your agency tracks culvert inventory data only, select the first paragraph.
If your agency tracks BOTH inventory and condition data, select the second paragraph.

To use and/or modify a paragraph, right-click the content control and then "Remove Control" to retain text.

To delete, select the control handle (entire content control area will highlight) and use your Delete key to delete content.

Commented [A36]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Commented [A37]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html

Commented [A38]: **Required** for PA 325 TAMP compliance plan

For more information, refer to PA 325 and the TAMC FAQ, available https://www.michigan.gov/tamc/0,7308,7-356-82158_82657---,00.html