Michigan Transportation Asset Management Council

Meeting Agenda

Wednesday, August 7, 2019 @ 1:00 PM
Aeronautics Building – 2nd Floor Commission Room
2700 Port Lansing Rd., Lansing, MI

Meeting Telephone Conference Line: 1-877-336-1828 Access Code: 8553654#

Web Meeting Access Link: http://michigandot.adobeconnect.com/ru8nd0nta9jq/

1. **Welcome - Call to Order – Introductions**

2. **Changes or Additions to the Agenda (*Action Item as needed*)** ***Any items under the Consent Agenda may be moved to the regular agenda upon request of any Council member, member of the public or staff member.***

3. **Public Comments on Non-Agenda Item**

4. **Consent Agenda (Action Item)**
   - **4.1.** Approval of the July 10, 2019 Meeting Minutes ***(Attachment 1)***
   - **4.2.** TAMC Financial Report ***(Attachment 2)***

5. **New Business**
   - **5.1.** TAMC Asset Management Plan Template ***(Attachment 3)***

6. **Correspondence & Announcements**
   - **6.1.** Update on TAMC Conferences – *Strong/Mekjian* ***(Attachment 4)***
   - **6.2.** Update on MDOT Michigan Mobility 2045 Stakeholders Group – *Bolt & Mekjian TAMC Volunteers*

7. **Presentation: Statewide Strategy for National Functional Class –** *Chesbro/Lemon*

8. **Michigan Infrastructure Council Update** – *Moy/Johnson*
   - **8.1.** X-Council Meeting Update
   - **8.2.** Regional Summits Update

9. **Committee Review & Discussion Items**
   - **9.1. Bridge Committee –** *Curtis*
     - **9.1.1.** 2019 TAMC Annual Report – Bridge Section Preparations – *Jennett*
     - **9.1.2.** Review Draft 2020-2022 TAMC Work Program – Bridge Committee Section
   - **9.2. ACE Committee –** *Start*
     - **9.2.1.** Local Technical Assistance Program's *The Bridge* Newsletter Article Update
     - **9.2.2.** Review Draft 2020-2022 TAMC Work Program – ACE Committee Section
     - **9.2.3.** Review Draft Policy for Submittal and Review of Asset Management Plans ***(Attachment 5)***
   - **9.3. Data Committee –** *McEntee*
     - **9.3.1.** Review Draft 2020-2022 TAMC Work Program – Data Committee Section
     - **9.3.2.** Investment Reporting Compliance Summary Report ***(Attachment 6)***
     - **9.3.3.** Status of 2019 Pavement Surface Evaluation and Rating (PASER) Data Collection ***(Attachment 7)***
     - **9.3.4.** Update on Warranty Reporting and the TAMC IRT
     - **9.3.5.** Traffic Signal Survey/Inventory Pilot & Subject Matter Experts Update
   - **9.4. Michigan Center for Shared Solutions –** *Surber/Holmes*
     - **9.4.1.** FY2020 Center for Shared Solutions TAMC Work Program & Budget
   - **9.5. Michigan Technological University/Technical Assistance –** *Colling*
     - **9.5.1.** Monthly Activities Reports (June 2019) ***(Attachment 8)***
     - **9.5.2.** Monthly Training Report (June 2019) ***(Attachment 9)***

10. Public Comments

11. Member Comments

12. Adjournment: *Next meeting September 4, 2019 at 1:00 PM – 2700 Port Lansing Rd., Lansing, MI*

TRANSPORTATION ASSET MANAGEMENT COUNCIL

July 10, 2019 at 1:00 p.m.
MDOT Aeronautics Building, 2nd Floor Commission Room
2700 Port Lansing Road
Lansing, Michigan

MINUTES

**** Frequently Used Acronyms List attached**

Members Present:

Christopher Bolt, MAC, via Telephone
Joanna Johnson, CRA/RCKC – Chair
Gary Mekjian, MML
Jonathan Start, MTPA/KATS
Jennifer Tubbs, MTA
Brad Wieferich, MDOT
Derek Bradshaw, MAR/GLS Region V
Bill McEntee, CRA – Vice-Chair
Robert Slattery, MML , via Telephone
Rob Surber, DTMB/CSS
Todd White, MDOT

Support Staff Present:

Niles Annelin, MDOT
Tim Colling, MTU/LTAP, via Telephone
Dave Jennett, MDOT
Craig Newell, MDOT
Roger Belknap, MDOT
Cheryl Granger, DTMB/CSS
Tim Lauxmann, DTMB/CSS
Gloria Strong, MDOT

Public Present:

Jessica Moy, MIC Executive Director

Members Absent:

None

1. Welcome – Call-To-Order:

The meeting was called-to-order at 1:00 p.m. Everyone was welcomed to the meeting.

2. Changes or Additions to the Agenda (Action Item):

2.a. –J. Johnson would like to remove agenda item 4.2. – Approval of the June 5, 2019 Strategic Planning Session Minutes.

3. Public Comments on Non-Agenda Items:

None

4. Consent Agenda (Action Item):

4.1. – Approval of the April 10, 2019 Meeting Minutes (Attachment 1)

4.2. – TAMC Financial Report (Attachment 2)

R. Belknap provided the July 2, 2019 TAMC Budget Expenditure Report for the Council's review.

Motion: J. Start made a motion to approve the items under the Consent Agenda with the amendment to remove Consent Agenda item 4.2.; B. McEntee seconded the motion. The motion was approved by all members present.

5. Correspondence and Announcements:

5.1. – Update on TAMC Conferences – G. Strong/G. Mekjian

The TAMC 2019 Fall Conference will be held October 30, 2019 at the Holiday Inn of Marquette. TAMC and the American Public Works Association (APWA) are also planning to hold another collaborative conference in Spring 2020. G. Mekjian informed the Council that APWA plans to

hold the conference again at the Treetop Resort in Gaylord, Michigan. There were several comments on the May 22, 2019 TAMC/APWA Spring Conference post-conference attendees survey regarding Treetops that ACE Committee will review before making a final decision to hold the TAMC conference at this location.

Action Item: ACE Committee will review the survey results regarding holding the 2020 TAMC Spring Conference at Treetops in collaboration with APWA.

5.2. – Organizational Awards Press Releases – R. Belknap
R. Belknap sent out the Organizational Awards Press Releases. He had a discussion with Berrien County regarding a statewide evaluation of agencies on a "bomb chart" that shows the movement of agencies in agency performances. Beyond the TAMC dashboards, we do not have any evaluations such as this to help determine or back-up our selection of award winners. It was suggested to have past award winners come back and state what they are currently doing.

Action Item: Add to the Data Committee agenda to possibly have B. McEntee do an analysis of agency progresses such as he had provided at a past TAMC meeting.

5.3. – MDOT Michigan Mobility 2045 Stakeholders Group – TAMC Volunteers – J. Johnson
J. Johnson thanked G. Mekjian and C. Bolt for volunteering on behalf of TAMC to be in the 2045 Stakeholders Group.

6. – Michigan Infrastructure Council Update – J. Johnson/J. Moy:

6.1. – X-Council Meeting Update
There were discussions at the last X-Council meeting regarding MIC, TAMC, and the Water Asset Management Council (WAMC) working together across the councils on marketing opportunities. WAMC has access to contracts through the state of Michigan that they can leverage but they need to get a better understanding of scope. They want to find a better way to share success stories that are seen across the state between the Councils. Discussions were had to possibly get a consultant to assist with this effort. There are existing contracts, but they may need a cross council's sub-group to handle this. They want the legislatures to understand what the Councils are doing and why.

J. Johnson recently spoke with Rep. Jack O'Malley, chair of the Michigan House of Transportation, at a town hall meeting, who stated he may be able to bring TAMC before the House Transportation Committee to talk about the TAMC Annual Report, MIC, and WAMC. TAMC will need to provide hard copies of the annual report to the committee. J. Johnson will contact him in the near future to get TAMC on their agenda.

Action Item: J. Johnson will contact Jack O'Malley to get TAMC on the agenda at a House Transportation Committee meeting.

6.2. – Regional Summits Update – J. Moy
MIC just finished up their first round of 16 summits in 15 communities. There were 450 participants and over 879 pieces of feedback given. Most attendees were happy that someone personally called to ask them to attend. They enjoyed the summits and found them very informative. People are now requesting to come to the fall summits. Some even signed up to attend another summit outside of their region. The individual feedbacks will be compiled and placed on the MIC Website. There were a lot of good comments in the feedbacks. MIC is working with their Graphics Division and compiling the summit results into a four-page, graphic filled report similar to the TAMC Culvert Report Summary. The next round of summits will be in the fall. MIC sent out dates to the regions to help schedule the next fall summits.

Canadian Network of Asset Managers (CNAM) was awarded for their Readiness Assessment in Canada that they use to state where they are with asset management. All of their information is nonproprietary, and they are giving MIC access to their content. A kick-off was done this morning, training will be done with the regions, and an assessment will be rolled out at the fall summits.

6.3. – TAMC attended the June 27, 209 WAMC Meeting – J. Johnson

TAMC support staff - T. Colling and R. Belknap, and Council members - B. Slattery and B. McEntee attended the June 27, 2019 WAMC meeting and providing information regarding TAMC happenings, which was very much appreciated by WAMC. TAMC is always looking for opportunities to collaborate and share information regarding TAMC.

7. Committee Review and Discussion Items:

7.1. – Bridge Committee – J. Johnson

The items below will be on the agenda for the next Bridge Committee meeting, which will be held on July 25, 2019.

7.1.1. – Review Draft 2020-2022 TAMC Work Program

7.1.2. – Review Draft TAMC Asset Management Plan Template

7.1.3. – Culvert Data Collection Update

7.2. – ACE Committee – J. Start

7.2.1. – Review Draft 2020-2022 TAMC Work Program

At this morning's ACE Committee meeting the committee provided a brief review of their section of the draft work program from the June 5, 2019 TAMC Strategic Planning Session. They will do a more detailed review prior to the August ACE Committee meeting. Each committee will need to review their section of the draft document and provide any comments/corrections to R. Belknap. One concern was who will do the actual reviewing of the plans. The legislation specifically states that "the Council…" review the plans for adherence to Public Act 325.

Action Item: ACE Committee will hold a teleconference to review their section of the draft TAMC Work Plan prior to their August committee meeting.

Action Item: T. White will contact the Attorney General's Office and inquire if TAMC support staff can review on behalf of TAMC and bring their recommendation to the Council for final approval or does the Council need to do the actual reviewing of each of the plans. T. White will report to the ACE Committee his findings at the next ACE Committee meeting.

7.2.2. – Review Draft Policy for Submittal and Review of Asset Management Plans

A draft of the TAMC Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 and Public Act 338 of 2006, dated April 5, 2019 was reviewed at today's meeting. All updates submitted by the Council and support staff have been added to the draft. TAMC support staff will continue to work with Act 51 staff, who has also reviewed and approved the draft policy.

The ACE Committee recommended that the draft TAMC Policy for the Submittal and Review of Asset Management Plans go on to the full Council for their review and approval with the understanding that more discussions will need to be had on aspirational goals.

The committee also reviewed the draft Asset Management Template provided from MTU and agreed to the template. An item of discussion was goals for the agencies – aspirational vs. realistic. It is felt goals will be different to many communities. The Council will need

to figure out a way to evaluate each agencies goal's and if they are meeting those goals. As an agency they can make a goal, they can show the gap, then show where they are and what their targets will be. The ACE Committee will make a recommendation towards this and welcomes any comments from full Council.

The Committee had a discussion about how the plans could be reviewed in the IRT by CSS creating a series of check boxes in the IRT that covers the seven required elements per Public Act 325. When the agency submits their plan, they must check the boxes and provide page numbers of where the elements are within their plan and then check a box stating that their Asset Management Plan has been approved by their governing body. More to come on this.

The ACE Committee recommended that the template move on to full Council for their review and comment.

7.2.3. – Review Draft Policy for the Collection of Roadsoft Surface Condition Data
There was no need to discuss this policy at today's ACE Committee meeting.

7.3. – Data Committee – B. McEntee

7.3.1. – Review Draft 2020-2022 TAMC Work Program
The committee has not received their section of the Work Program for review and has not met since the strategic planning session in June. It will be reviewed at the next Data Committee meeting on July 24, 2019.

7.3.2. - Investment Reporting Compliance Summary Report (Attachment 3)
A copy of the July 2, 2019 Summary Statistics was shared with the Council. Committee members felt the Council will need to look at the level of participation in the IRT trainings and recommend agencies attend the trainings available to them.

7.3.3. - Update on Paving Warranties Reporting and the TAMC IRT – B. McEntee
CSS is about 90 % done with adding the warranty applications that will need to be used in order for agencies to submit their statewide warranty projects in the IRT. The main goal is to be able to generate a statewide report and map showing warranty projects across the state for all agencies. It is expected that this task will be completed by August. MTU will provide the training on the warranty program and this will begin sometime in January and February 2020. Warranty training will also be provided to the elected officials. CSS is testing the applications with two agencies. Those projects costing $2 million or higher are required to have warranties under state law. Projects below that amount are not required to be reported. There are currently 900 projects reported in the data set as having warranties. TAMC must have the warranty applications completed by September 2019, as everyone must have their program approved by September 12, 2019.

CSS will check to see if they can link to the State Transportation Improvement Program (STIP)/TIPs and if that warranty information can be uploaded into the IRT.

7.3.4. – Traffic Signal Survey/Inventory Pilot and Subject Matter Experts Update
Traffic signal inventory survey is on hold subject to the template. Currently, agencies just need to inform TAMC what inventory they currently have and then they will work on getting that information uploaded into the IRT.

CSS is close to completion for the integrated mapping for planned projects. It is in development and needs to be polished. They will complete the planned project task after the culverts task. CSS will give an update on progress with the culvert task.

7.4. - Michigan Center for Shared Solutions – M. Holmes

CSS met today with MDOT on important collaboration efforts that have come about from new staffing and new legislation. CSS also would like to discuss how to prioritize the tasks TAMC assigns to them and have the right level of participation from the Council. CSS will be providing quarterly proposals on TAMC tasks and priorities. For large tasks, CSS will need to inform the Council if they have time, staffing, monies, etc. to complete the tasks necessary for the Council. TAMC committees will need to be involved with this. The Council has asked CSS to forward the proposals on to the appropriate TAMC committee for review and then the committee forward on to the full Council with a recommendation.

CSS is also working on Legislative District Rating Maps for Monica Ware from MRPA. There are approximately 100 districts involved. CSS will take the maps once completed to Data Committee for their discussions on whether or not the Council may want to add the maps to the dashboards.

CSS would like to know what the Bridge Committee needs to see in the IRT for culverts. This is on the agenda for the next Bridge Committee Meeting, July 25, 2019.

7.5. – Michigan Technological University/Technical Assistance Reports – T. Colling

The Draft TAMC Asset Management Plan Template is on hold until all committees have reviewed the template and the Council submits their final decision to MTU. The template is approximately 80 pages. MTU has also created a shortened version of the template. The trainings are complete and MTU plans to provide the training workshops in the fall and will also hold training Webinars. The data from PASER trainings will be shared in the near future. Framework base map work information has been going out through MTU through the Round-Up and R. Belknap provided this information at the last Regions Coordination teleconference. They have also released an updated version of Roadsoft that they will be sharing with the regions.

Action Item: R. Belknap will send out the draft Asset Management Plan Template to the TAMC Committees and Council to review.

7.5.1. – Monthly Activities Report (Mar-Apr-May 2019) (Attachment 4)

A copy of the Activities Report for the reporting period of March 1- April 30, 2019, was provided to the Council.

7.5.2. – Monthly Training Report (Mar-Apr-May 2019) (Attachment 5)

A copy of the Training Report for the reporting period of May 1-31, 2019, was provided to the Council.

8. Public Comments:

The MIC will not meet in July or August 2019. When TAMC is ready to approve the asset management plans, the MIC is asking that support staff let MIC/WAMC know to have an opportunity to listen in and the same for WAMC. WAMC plans to possibly use Survey Monkey to send out the requirements to their 600+ agencies who already under regulatory permits, to see if they meet the necessary mandated requirements. WAMC is working with some interesting dynamics with their agencies.

9. Member Comments:

G. Strong and R. Belknap will be presenting on July 25, 2019 at the MTPA Conference at the Radisson Hotel, Lansing, on the Public Act 325 requirements.

J. Johnson will be speaking at the July 18, 2019 State Transportation Commission meeting on behalf of TAMC, reporting on the annual report.

G. Strong has a new work cell phone number, 517-243-7748.

C. Bolt is currently in Las Vegas to accept, on behalf of the Jackson County Department of Transportation, a National Award for their Road Recycling Program and a Best in Class Award for the transportation category.

12. Adjournment:

The meeting adjourned at 2:18 p.m. The next full Council meeting will be held August 7, 2019 at 1:00 p.m., MDOT Aeronautics Building, 2700 Port Lansing Road, 2nd Floor Conference Room, Lansing, Michigan.

TAMC FREQUENTLY USED ACRONYMS:	
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ACE	ADMINISTRATION, COMMUNICATION, AND EDUCATION (TAMC COMMITTEE)
ACT-51	PUBLIC ACT 51 OF 1951-DEFINITION: A CLASSIFICATION SYTEM DESIGNED TO DISTRIBUTE MICHIGAN'S ACT 51 FUNDS. A ROADWAY MUST BE CLASSIFIED ON THE ACT 51 LIST TO RECEIVE STATE MONEY.
ADA	ADULTS WITH DISABILITIES ACT
ADARS	ACT 51 DISTRIBUTION AND REPORTING SYSTEM
BTP	BUREAU OF TRANSPORTATION PLANNING (MDOT)
CFM	COUNCIL ON FUTURE MOBILITY
CPM	CAPITAL PREVENTATIVE MAINTENANCE
CRA	COUNTY ROAD ASSOCIATION (OF MICHIGAN)
CSD	CONTRACT SERVICES DIVISION (MDOT)
CSS	CENTER FOR SHARED SOLUTIONS
DI	DISTRESS INDEX
ESC	EXTENDED SERVICE LIFE
FAST	FIXING AMERICA'S SURFACE TRANSPORTATION ACT
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FOD	FINANCIAL OPERATIONS DIVISION (MDOT)
FY	FISCAL YEAR
GLS REGION V	GENESEE-LAPEER-SHIAWASSEE REGION V PLANNING AND DEVELOPMENT COMMISSION
GVMC	GRAND VALLEY METRO COUNCIL
HPMS	HIGHWAY PERFORMANCE MONITORING SYSTEM
IBR	INVENTORY BASED RATING
IRI	INTERNATIONAL ROUGHNESS INDEX
IRT	INVESTMENT REPORTING TOOL
KATS	KALAMAZOO AREA TRANSPORTATION STUDY
KCRC	KENT COUNTY ROAD COMMISSION
LDC	LAPTOP DATA COLLECTORS
LTAP	LOCAL TECHNICAL ASSISTANCE PROGRAM
MAC	MICHIGAN ASSOCIATION OF COUNTIES
MAP-21	MOVING AHEAD FOR PROGRESS IN THE 21ST CENTURY (ACT)
MAR	MICHIGAN ASSOCIATION OF REGIONS
MDOT	MICHIGAN DEPARTMENT OF TRANSPORTATION
MDTMB	MICHIGAN DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
MIC	MICHIGAN INFRASTRUCTURE COMMISSION
MITA	MICHIGAN INFRASTRUCTURE AND TRANSPORTATION ASSOCIATION
MML	MICHIGAN MUNICIPAL LEAGUE
MPO	METROPOLITAN PLANNING ORGANIZATION
MTA	MICHIGAN TOWNSHIPS ASSOCIATION
MTF	MICHIGAN TRANSPORTATION FUNDS
MTPA	MICHIGAN TRANSPORTATION PLANNING ASSOCIATION
MTU	MICHIGAN TECHNOLOGICAL UNIVERSITY
NBI	NATIONAL BRIDGE INVENTORY

NBIS	NATIONAL BRIDGE INSPECTION STANDARDS
NFA	NON-FEDERAL AID
NFC	NATIONAL FUNCTIONAL CLASSIFICATION
NHS	NATIONAL HIGHWAY SYSTEM
PASER	PAVEMENT SURFACE EVALUATION AND RATING
PNFA	PAVED NON-FEDERAL AID
PWA	PUBLIC WORKS ASSOCIATION
QA/QC	QUALITY ASSURANCE/QUALITY CONTROL
RBI	ROAD BASED INVENTORY
RCKC	ROAD COMMISSION OF KALAMAZOO COUNTY
ROW	RIGHT-OF-WAY
RPA	REGIONAL PLANNING AGENCY
RPO	REGIONAL PLANNING ORGANIZATION
SEMCOG	SOUTHEAST MICHIGAN COUNCIL OF GOVERNMENTS
STC	STATE TRANSPORTATION COMMISSION
STP	STATE TRANSPORTATION PROGRAM
TAMC	TRANSPORTATION ASSET MANAGEMENT COUNCIL
TAMCSD	TRANSPORTATION ASSET MANAGEMENT COUNCIL SUPPORT DIVISION
TAMP	TRANSPORTATION ASSET MANAGEMENT PLAN
TPM	TRANSPORTATION PERFORMANCE MEASURES
UWP	UNIFIED WORK PROGRAM

S:/GLORIASTRONG/TAMC FREQUENTLY USED ACRONYMS.11.27.2018.GMS

TAMC Budget Expenditure Report

8/2/2019

Michigan Transportation Asset Management Council

	(most recent invoice date)	FY17 Budget $	FY17 Actual Spent	FY17 Actual Balance	FY18 Budget $	FY18 Actual Spent	FY18 Actual Balance	FY19 Budget $	FY19 Year to Date Spent	FY19 Year to Date Balance	FY20 Budget $
I. Data Collection & Regional-Metro Planning Asset Management Progam											
Battle Creek Area Transporation Study	3 QTR 19	$ 20,000.00	$ 15,444.03	$ 4,555.97	$ 20,500.00	$ 20,213.36	$ 286.64	$ 20,500.00	$ 6,100.76	$ 14,399.24	$ 20,500.00
Bay County Area Transportation Study	2 QTR 19	$ 20,000.00	$ 10,794.42	$ 9,205.58	$ 21,100.00	$ 8,028.84	$ 13,071.16	$ 21,100.00	$ 8,655.16	$ 12,444.84	$ 19,900.00
Central Upper Peninsula Planning and Development	2 QTR 19	$ 40,471.00	$ 40,471.00	$ -	$ 47,000.00	$ 47,000.00	$ -	$ 47,000.00	$ 9,487.29	$ 37,512.71	$ 50,000.00
East Michigan Council of Governments	June	$ 95,995.00	$ 80,092.75	$ 15,902.25	$ 111,000.00	$ 81,559.65	$ 29,440.35	$ 111,000.00	$ 55,886.10	$ 55,113.90	$ 108,000.00
Eastern Upper Peninsula Regional Planning & Devel.	3 QTR 19	$ 20,000.00	$ 20,000.00	$ -	$ 23,100.00	$ 23,100.00	$ -	$ 23,100.00	$ 10,522.89	$ 12,577.11	$ 25,000.00
Genesee Lapeer Shiawasse Region V Planning Com.	May	$ 39,423.00	$ 37,172.06	$ 2,250.94	$ 46,000.00	$ 45,954.99	$ 45.01	$ 46,000.00	$ 4,219.38	$ 41,780.62	$ 46,000.00
Grand Valley Metropolitan Council	3 QTR 19	$ 20,000.00	$ 18,974.64	$ 1,025.36	$ 25,000.00	$ 12,060.69	$ 12,939.31	$ 25,000.00	$ 9,869.35	$ 15,130.65	$ 24,000.00
Kalamazoo Area Transportation Study	3 QTR 19	$ 20,000.00	$ 19,128.11	$ 871.89	$ 22,000.00	$ 21,588.77	$ 411.23	$ 22,000.00	$ 11,553.11	$ 10,446.89	$ 22,000.00
Macatawa Area Coordinating Council	3 QTR 19	$ 20,000.00	$ 7,405.66	$ 12,594.34	$ 20,200.00	$ 9,575.57	$ 10,624.43	$ 20,200.00	$ 4,622.68	$ 15,577.32	$ 19,000.00
Midland Area Transportation Study	2 QTR 19	$ 20,000.00	$ 17,660.54	$ 2,339.46	$ 21,000.00	$ 20,857.81	$ 142.19	$ 21,000.00	$ 1,680.88	$ 19,319.12	$ 21,000.00
Northeast Michigan Council of Governments	June	$ 43,426.45	$ 43,426.45	$ -	$ 52,200.00	$ 52,200.00	$ -	$ 46,000.00	$ 32,318.91	$ 13,681.09	$ 51,000.00
Networks Northwest	2 QTR 19	$ 61,316.00	$ 61,316.00	$ -	$ 72,000.00	$ 71,915.46	$ 84.54	$ 72,000.00	$ 15,097.56	$ 56,902.44	$ 75,000.00
Region 2 Planning Commission	2 QTR 19	$ 37,940.00	$ 24,743.56	$ 13,196.44	$ 42,000.00	$ 29,362.33	$ 12,637.67	$ 42,000.00	$ 12,472.00	$ 29,528.00	$ 40,000.00
Saginaw County Metropolitan Plannning Commission	3 QTR 19	$ 20,000.00	$ 11,585.29	$ 8,414.71	$ 22,200.00	$ 22,000.00	$ 200.00	$ 22,200.00	$ 11,475.89	$ 10,724.11	$ 21,000.00
Southcentral Michigan Planning Commission	3 QTR 19	$ 53,162.00	$ 36,915.67	$ 16,246.33	$ 57,300.00	$ 37,137.28	$ 20,162.72	$ 57,300.00	$ 15,280.62	$ 42,019.38	$ 55,000.00
Southeast Michigan Council of Governments	May	$ 135,680.00	$ 135,679.60	$ 0.40	$ 174,000.00	$ 174,000.00	$ -	$ 174,000.00	$ 64,567.66	$ 109,432.34	$ 174,000.00
Southwest Michigan Planning Commission	3 QTR 19	$ 37,030.00	$ 37,030.00	$ -	$ 41,000.00	$ 41,000.00	$ -	$ 41,000.00	$ 14,315.05	$ 26,684.95	$ 41,000.00
Tri-County Regional Planning Commission	3 QTR 19	$ 33,786.00	$ 33,786.00	$ -	$ 40,000.00	$ 21,680.54	$ 18,319.46	$ 40,000.00	$ 15,926.00	$ 24,074.00	$ 40,000.00
West Michigan Regional Planning Commission	June	$ 82,467.00	$ 82,467.00	$ -	$ 91,000.00	$ 74,351.07	$ 16,648.93	$ 91,000.00	$ 45,865.37	$ 45,134.63	$ 88,000.00
West Michigan Shoreline Regional Development Com.	June	$ 46,781.56	$ 46,145.01	$ 636.55	$ 54,000.00	$ 51,333.45	$ 2,666.55	$ 54,000.00	$ 26,932.33	$ 27,067.67	$ 54,000.00
Western Upper Peninsula Regional Planning & Devel.	2 QTR 19	$ 34,867.00	$ 34,847.53	$ 19.47	$ 40,000.00	$ 40,000.00	$ -	$ 40,000.00	$ 11,521.12	$ 28,478.88	$ 42,000.00
MDOT Region Participation & PASER Quality Control	7/13/19	$ 62,750.00	$ 85,337.50	$ (22,587.50)	$ 80,000.00	$ 52,914.97	$ 27,085.03	$ 91,440.00	$ 82,322.29	$ 9,117.71	$ 80,000.00
Fed. Aid Data Collection & RPO/MPO Program Total		**$ 965,095.01**	**$ 900,422.82**	**$ 64,672.19**	**$ 1,116,400.00**	**$ 957,834.78**	**$ 158,565.22**	**$ 1,116,400.00**	**$ 470,692.40**	**$ 645,707.60**	**$ 1,116,400.00**
II. PASER Data Collection (Paved, Non-Federal-Aid System)											
PASER PNFA Data Collection Total		**$ 40,760.39**	**$ 40,760.39**	**$ -**	***(FY18 PNFA Moved Into Data Collection Program Above)***			***(FY19 PNFA Moved Into Data Collection Program Above)***			***(FY20 PNFA Move***
III. TAMC Central Data Agency (MCSS)											
Project Management	7/31/19	$ 37,800.00	$40,064.00	($2,264.00)	$ 42,000.00	$ 46,585.00	$ (4,585.00)	$ 60,000.00	$ 63,023.00	$ (3,023.00)	$ 380,000.00
Data Support /Hardware / Software	7/31/19	$ 60,200.00	$58,833.00	$1,367.00	$ 68,800.00	$ 67,800.00	$ 1,000.00	$ 55,000.00	$ 15,075.00	$ 39,925.00	$ -
Application Development / Maintenance / Testing	7/31/19	$ 83,280.00	$78,238.00	$5,042.00	$ 114,475.00	$ 115,250.00	$ (775.00)	$ 135,000.00	$ 76,475.00	$ 58,525.00	$ -
Help Desk / Misc Support / Coordination	7/31/19	$ 66,600.00	$65,652.00	$948.00	$ 70,200.00	$ 68,200.00	$ 2,000.00	$ 61,900.00	$ 43,225.00	$ 18,675.00	$ -
Training	7/31/19	$ 27,600.00	$29,133.00	($1,533.00)	$ 34,950.00	$ 24,850.00	$ 10,100.00	$ 28,660.00	$ 17,110.00	$ 11,550.00	$ -
Data Access / Reporting	7/31/19	$ 47,155.00	$45,696.00	$1,459.00	$ 49,575.00	$ 52,175.00	$ (2,600.00)	$ 38,000.00	$ 23,125.00	$ 14,875.00	$ -
FY17 Off Budget: IRT Re-write - $241,000	9/30/17	*$ 241,040.00*	*$ 260,023.00*	*$ (18,983.00)*							
TAMC Central Data Agency (MCSS) Total		**$ 322,635.00**	**$ 317,616.00**	**$ 5,019.00**	**$ 380,000.00**	**$ 374,860.00**	**$ 5,140.00**	**$ 378,560.00**	**$ 238,033.00**	**$ 140,527.00**	**$ 380,000.00**
IV. TAMC Training & Education (MTU) Calendar Year Z1	6/22/19	**$ 210,000.00**	**$ 208,658.90**	**$ 1,341.10**	**$ 235,000.00**	**$ 234,534.14**	**$ 465.86**	**$ 220,000.00**	**$ 103,618.47**	**$ 116,381.53**	**$ 220,000.00**
V. TAMC Activities (MTU) Z15/R1	6/22/19	**$ 70,000.00**	**$ 60,253.50**	**$ 9,746.50**	**$ 115,000.00**	**$ 114,089.32**	**$ 910.68**	**$ 120,000.00**	**$ 38,845.06**	**$ 81,154.94**	**$ 120,000.00**
VI. TAMC Expenses											
Fall Conference Expenses	12/11/18	$ 6,000.00	$ 8,312.40		$ 10,000.00	$ 7,269.00		$ 10,000.00	$ 7,507.40		$ 10,000.00
Fall Conf. Attendence Fees + sponsorship Fees	12/11/18	$ -	$ 2,625.00		$ -	$ 4,405.00		$ -	$ 6,755.00		$ -
Net Fall Conference	12/11/18	$ 8,625.00	$ 8,312.40	$ 312.60	$ 14,405.00	$ 7,269.00	$ 7,136.00	$ 16,755.00	$ 7,507.40	$ 9,247.60	$ -
Spring Conference Expenses	6/27/19	$ 8,000.00	$ 6,721.80	$ -	$ 3,800.00	$ 7,439.36		$ 10,000.00	$ -		$ 10,000.00
Spring Conf. Attendence Fees + sponsorship Fees	6/27/19	$ -	$ 6,140.00	$ -	$ -	$ 8,350.00		$ -	$ 9,790.00		$ -
Net Spring Conference	6/27/19	$ 14,140.00	$ 6,721.80	$ 7,418.20	$ 12,150.00	$ 7,439.36	$ 4,710.64	$ 19,790.00	$ 8,562.18	$ 11,227.82	$ 10,000.00
Other Council Expenses	7/9/19	$ 3,915.29	$ 8,483.24	$ (4,567.95)	$ 10,000.00	$ 7,301.72	$ 2,698.28	$ 10,000.00	$ 4,131.10	$ 5,868.90	$ 10,000.00
TAMC Expenses Total		**$ 26,680.29**	**$ 23,517.44**	**$ 3,162.85**	**$ 36,555.00**	**$ 22,010.08**	**$ 14,544.92**	**$ 46,545.00**	**$ 20,200.68**	**$ 26,344.32**	**$ 20,000.00**
VII. Culvert Pilot Project											
Central Data Agency (MCSS)	10/16/18	$ -	$ -	$ -	$ 15,000.00	$ 9,312.00	$ 5,688.00	$ 25,000.00	$ -	$ -	$ -
MTU Project Management & Training	1/2/19	$ -	$ -	$ -	$ 172,100.00	$ 172,100.00	$ -	$ 15,000.00	$ -	$ -	$ 15,000.00
TAMC Administration & Contingency	11/7/18	$ -	$ -	$ -	$ 84,438.00	$ -	$ 84,438.00	$ -	$ -	$ -	$ -
Central Upper Peninsula Planning and Development	3 qtr 18	$ -	$ -	$ -	$ 88,641.00	$ 51,909.64	$ 36,731.36	$ -	$ -	$ -	$ -
East Michigan Council of Governments	SEPT	$ -	$ -	$ -	$ 328,607.00	$ 259,229.13	$ 69,377.87	$ -	$ -	$ -	$ -
Eastern Upper Peninsula Regional Planning & Devel.	4 qtr 18	$ -	$ -	$ -	$ 5,688.00	$ 5,034.70	$ 653.30	$ -	$ -	$ -	$ -
Genesee Lapeer Shiawasse Region V Planning Com.	SEPT	$ -	$ -	$ -	$ 124,909.00	$ 54,266.60	$ 70,642.40	$ -	$ -	$ -	$ -
Grand Valley Metropolitan Council	4 qtr 18	$ -	$ -	$ -	$ 77,782.00	$ 69,733.25	$ 8,048.75	$ -	$ -	$ -	$ -
Kalamazoo Area Transportation Study	SEPT	$ -	$ -	$ -	$ 50,402.00	$ 15,879.65	$ 34,522.35	$ -	$ -	$ -	$ -
Northeast Michigan Council of Governments	SEPT	$ -	$ -	$ -	$ 33,506.00	$ 21,781.96	$ 11,724.04	$ -	$ -	$ -	$ -
Networks Northwest	SEPT	$ -	$ -	$ -	$ 184,513.00	$ 163,641.05	$ 20,871.95	$ -	$ -	$ -	$ -
Region 2 Planning Commission	3 qtr 18	$ -	$ -	$ -	$ 54,900.00	$ 22,776.80	$ 32,123.20	$ -	$ -	$ -	$ -
Southcentral Michigan Planning Commission	SEPT	$ -	$ -	$ -	$ 93,456.00	$ 36,137.17	$ 57,318.83	$ -	$ -	$ -	$ -
Southeast Michigan Council of Governments	SEPT	$ -	$ -	$ -	$ 87,644.00	$ 45,757.96	$ 41,886.04	$ -	$ -	$ -	$ -
Southwest Michigan Planning Commission	4 qtr 18	$ -	$ -	$ -	$ 101,849.00	$ 67,138.17	$ 34,710.83	$ -	$ -	$ -	$ -
Tri-County Regional Planning Commission	4 qtr 18	$ -	$ -	$ -	$ 47,587.00	$ 6,962.44	$ 40,624.56	$ -	$ -	$ -	$ -
West Michigan Regional Planning Commission	SEPT	$ -	$ -	$ -	$ 241,511.00	$ 181,441.39	$ 60,069.61	$ -	$ -	$ -	$ -
West Michigan Shoreline Regional Development Com.	SEPT	$ -	$ -	$ -	$ 144,238.00	$ 89,092.30	$ 55,145.70	$ -	$ -	$ -	$ -
Western Upper Peninsula Regional Planning & Devel.	4 qtr 18	$ -	$ -	$ -	$ 63,229.00	$ 46,960.41	$ 16,268.59	$ -	$ -	$ -	$ -
Culvert Pilot Project Total		$	$	$	**$ 2,000,000.00**	**$ 1,319,154.62**	**$ 680,845.38**	**$ 40,000.00**	**$ -**	**$ 40,000.00**	**$ -**
Total Program		**$ 1,635,170.69**	**$ 1,233,613.05**	**$ 83,941.64**	**$ 3,882,955.00**	**$ 3,022,482.94**	**$ 860,472.06**	**$ 1,921,505.00**	**$ 871,389.61**	**$ 1,050,115.39**	**$ 1,856,400.00**
Appropriation		**$ 1,626,400.00**		**5.13%**	**$ 3,876,400.00**		**22.16%**	**$ 1,876,400.00**		**54.65%**	**$ 1,876,400.00**

Michigan Transportation Asset Management Council

Memo

To: TAMC

From: Roger Belknap, TAMC Coordinator

Date: August 2, 2019

Re: Draft Transportation Asset Management Plan (TAMP) Template

Recommendation for the TAMC

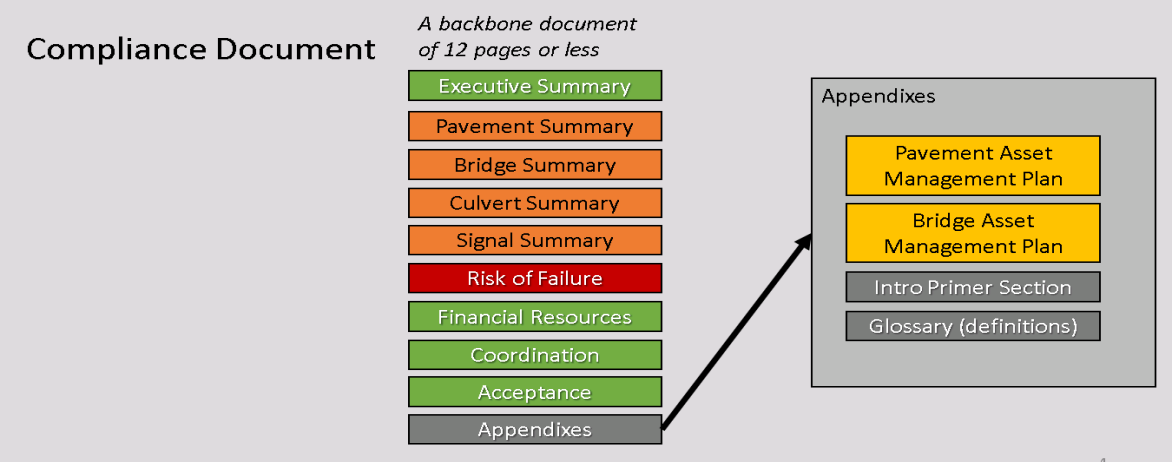
We recommend the TAMC discuss the draft TAMP Template and take action for approval.

Background

The TAMC is aware of the requirements per Public Act (PA) 325. PA 325 modifies TAMC's program to include requirements for asset management plans from local road agencies. No later than October 1, 2019, the TAMC shall develop a template for an asset management. TAMC currently provides a template for TAMPs and it is available on its website. We have been working on updating the template(s) to comply with the new law. In addition, the TAMC is working with Michigan Technological University (MTU) to provide formal training for TAMP development with modules designed to assist agencies in completing the required plan elements.

MTU provided a white paper and draft TAMP to the TAMC to assist in the process. Our Administrative, Communications, and Education (ACE) Committee approved the draft TAMP at their last meeting. However, the Bridge Committee at their last meeting provided the following action: "… *B. Vilmont made a motion that the TAMC Asset Management Plan Template include a bridge and a pavement asset management plan as appendices and those asset management plans will provide high level summaries for the main body of the Transportation Asset Management Plan Template, which will include coordination efforts with all asset classes and types; W. Harrell seconded the motion. The motion was approved by all members present."* The TAMC, after considering committee recommendations, takes final action. In this case, we have a difference of opinion on the draft TAMP.

Therefore, a conference call among TAMC Committee Chairs, MTU and TAMC Support Staff regarding the TAMC TAMP Template was scheduled. Various options were discussed. Then consensus in the discussion is as presented in the graphic below:



The following clarifications were discussed:

- The backbone document number of pages is an estimate. MTU is in the process of reformatting the initial draft TAMP. This is a work in progress and due to limited notice a final draft may not be available for the TAMC meeting.
- The backbone document is what is necessary to be in compliance.
- The appendixes are also required to be in compliance, however we are not prescribing what those look like for each local road agency.
- If an agency attends the TAMC TAMP training, those appendixes can be as provided during the training.
- The TAMP structure may need to be revised in the future. In 3 - year increments as TAMP's are due initially in 2020, 2021, and 2022. Changing versions annually may provide issues pending where local road agencies are in the process.
- Additional appendixes to include other infrastructure assets may be included. The TAMC may assist with these much like pavement and bridges, in the future.
- The submittal of the local road agency TAMP is being proposed for the Investment Reporting Tool (IRT) and CSS and support staff are coordinating proposed modifications to the Asset Management Status areas; these will be demonstrated by support staff.

Alternatives

TAMC could postpone action, however this will delay the necessary time to finalized the TAMP, notify our stakeholders and to prepare training.

Budget

The budget for the TAMP revisions is indicated within the MTU Technical Assistance program. Year to date, $38,845.06 of the $120,000 Activities Contract has been spent.

Attachments with Agenda Packet

Attachment 3 is the current Draft of the TAMC Asset Management Plan Template presented by Michigan Technological University's Center or Technology and Training that has been approved by ACE and Data Committees. For reference to the previous TAMC Bridge Asset Management Plan and TAMC Asset Management Plan for Pavements, please refer to the document found on the TAMC website here:
https://www.michigan.gov/documents/tamc/Local_Bridge_Asset_ManagementGuide_and_Sample_Preservation_Plan_May_2011_603941_7.pdf
https://www.michigan.gov/documents/tamc/Asset_Management_Plan_for_Pavements_May_2011_603934_7.docx

Summary

We recommend the TAMC discuss the proposed TAMP Template concept, in final design, and take action to move forward with the TAMP training.

Instructions for Use of This Template

Read instructions thoroughly before proceeding

1. Everything must be saved in the same folder to work properly.
2. Complete eight Roadsoft exports outlined in the instructions document first. All Roadsoft files must be saved as described in the export instructions.
3. Complete steps in the Excel workbook to create the graphs to fill this template.
4. Complete autofill information from Excel into this template.
5. Once information is transferred, edit/delete information from this template. DO NOT remove information prior to the transfer from Excel process.

Common checks that agencies need to do before finalizing the template

1. Insert cover logo in the picture placeholder by selecting the image in the center of the placeholder. Change color bar by selecting it; then select the Format ribbon and a color from the Shape Fill options in the Shape Styles group. Change color of Cover and Heading 1 styles by selecting Home ribbon, the expansion arrow in the lower right of the style group, the drop-down arrow at the right end of the style's name, and "Modify…" from the drop-down menu.
2. Search for autofill contextual errors or missed auto-fills. You may scroll to each of these using F11 on your keyboard; alternatively, you can find them by searching for orange text or doing a Find for: <# .
3. Remove all optional sections, which are placed in content controls. Instructions highlighted in blue precede or follow the content controls. Accept and modify suggested content by right-clicking anywhere in the control and selecting "Remove Control" from the drop-down menu; remove suggested content by selecting the handle in the upper left and striking the Delete key on your keyboard.
4. Remove/address comments. Search for comments and verify comments are addressed.
5. Update Table of Contents and Table of Figures. Create Table of Tables at end of document and cut/paste it in the current example location.

Updating in future years

1. Complete the required Roadsoft exports as before and complete the steps in the excel document.
2. An original template must be saved or requested from CTT with the link data.
3. Once an original template is available then the transfer can be completed from Excel to the Word template.

t Plan

A plan describing the <#AGENCY>'s roadway assets and conditions

Prepared by:
Author
Author's title
Contact information

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EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, roads and bridges are some of the most important assets in any community, and other assets like culverts, traffic signs, traffic signals, and utilities support and affect roads and bridges. The <#AGENCY>'s roads, bridges, 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 these assets, their importance to society, and the investment made by taxpayers all place a high level of responsibility on local agencies to efficiently and effectively plan, build, and maintain roads, bridges, and support assets. This asset management plan is intended to report on how <#AGENCY> is meeting its obligations to maintain the public assets for which it is responsible.

This plan gives an overview of <#AGENCY>'s assets and condition, and explains how <#AGENCY> works to maintain and improve the overall condition of our assets. These explanations can help answer the following questions:

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

An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of <#AGENCY>'s obligations towards meeting these requirements but, the plan is intended to be much more than this agency's required reporting. This asset management plan helps demonstrate <#AGENCY>'s responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of <#AGENCY>'s assets, and gives taxpayers the information they need to make informed decisions about investing in our essential transportation infrastructure.

DEFINITIONS

Alligator cracking: Cracking of the surface layer of an asphalt pavement that creates a pattern of interconnected cracks resembling an alligator hide. This is often due to overloading a pavement, sub-base failure, or poor drainage.[1]

Asset management: A process that uses data to manage and track road assets in a cost-effective manner using a combination of engineering and business principles. Public Act 325 of 2018 provides a legal definition: "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".[2]

Biennial inspection: Inspection of an agency's bridges every other year, which happens in accordance with National Bridge Inspection Standards and Michigan Department of Transportation requirements.

Bridge inspection program: A program implemented by a local agency to inspect the bridges within their jurisdiction systematically in order to ensure proper functioning and structural soundness.

Capital preventative maintenance: A planned set of cost-effective treatments to address pavement problems of fair-rated roads before the structural integrity of the pavement has been severely impacted. These treatments aim to slow deterioration and to maintain or improve the functional condition of the system without significantly increasing the structural capacity.

Chip seal: An asphalt pavement treatment method consisting of, first, spraying liquid asphalt onto the old pavement surface and, then, a single layer of small stone chips spread onto the wet asphalt layer.

Composite pavement: A pavement consisting of concrete and asphalt layers. Typically, composite pavements are old concrete pavements that were overlaid with HMA in order to gain more service life.

Concrete joint resealing: Resealing the joints of a concrete pavement with a flexible sealant to prevent moisture and debris from entering the joints. When debris becomes lodged inside a joint, it inhibits proper movement of the pavement and leads to joint deterioration and spalling.

Concrete pavement: Also known as rigid pavement, a pavement made from layers of portland concrete cement. Concrete pavement has a high initial cost to build but is a durable pavement that has an average service life of 30 years and typically does not require as much periodic maintenance as HMA.

Cost per lane mile: Associated cost of construction, measured on a per lane, per mile basis. Also see *lane-mile segment*.

Crack and seat: A concrete pavement treatment method that involves breaking old concrete pavement into small chunks and leaving the broken pavement in place to provide a base for a new surface. This provides a new wear surface that resists water infiltration and helps prevent damaged concrete from reflecting up to the new surface.

Crack seal: A pavement treatment method for both asphalt and concrete pavements that fills cracks with asphalt materials, which seals out water and debris and slows down the deterioration of the pavement. Crack seal may encompass the term "crack filling".

[1] https://en.wikipedia.org/wiki/Crocodile_cracking
[2] Inventory-based Rating System for Gravel Roads: Training Manual

Crush and shape: An asphalt pavement treatment method that involves pulverizing the existing asphalt pavement and base and then reshaping the road surface to correct imperfections in the road's profile. Often, a layer of gravel is added along with a new wearing surface such as an HMA overlay or chip seal.

Crust: A very tightly compacted surface on an unpaved road that sheds water with ease but takes time to be created.

Culvert: A pipe or structure used under a roadway that allows cross-road drainage while still allow traffic to pass without being impeded; culverts span a maximum of 20 feet (6.1 meters).[3]

Dowel bar retrofit repair: A concrete pavement treatment method that involves cutting slots in a cracked concrete slab, inserting steel bars into the slots, and placing concrete to cover the new bars and fill the slots. It aims to reinforce cracks in a concrete pavement.

Dust control: A gravel road surface treatment method that involves spraying chloride or other chemicals on the gravel surface to reduce dust loss, aggregate loss, and maintenance. This is a relatively short-term fix that helps create a crusted surface.

Expansion joint: Joints in a bridge that allow for slight expansion and contraction changes in response to temperature. Expansion joints prevent the build up of excessive pressure, which can cause structural damage to the bridge.

Federal Highway Administration: Also known as FHWA, this is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system.[4]

Federal-aid network: Portion of road network that is comprised of federal-aid routes. According to Title 23 of the United States Code, federal-aid-eligible roads are "highways on the federal-aid highways systems and all other public roads not classified as local roads or rural minor collectors".[5] Roads that are part of the federal-aid network are eligible for federal gas-tax monies.

FHWA: See *Federal Highway Administration*.

Flexible pavement: See *hot-mix asphalt pavement*.

Fog seal: An asphalt pavement treatment method that involves spraying a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight and oxidation. This method works best for good to very good pavements.

Full-depth concrete repair: A concrete pavement treatment method that involves removing sections of damaged concrete pavement and replacing it with new concrete of the same dimensions in order to restore the riding surface, delay water infiltration, restore load transfer from one slab to the next, and eliminate the need to perform costly temporary patching.

Geographic divides: Areas where a geographic feature (e.g., river, lake, mountain) limits crossing points of the feature.

[3] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual
[4] Federal Highway Administration webpage https://www.fhwa.dot.gov/
[5] Inventory-based Rating System for Gravel Roads: Training Manual

Grants: Competitive funding gained through an application process and targeted at a specific project type to accomplish a specific purpose. Grants can be provided both on the federal and state level and often make up part of the funds that a transportation agency receives.

Gravel surfacing: A low-cost, easy-to-maintain road surface made from aggregate and fines.

HMA: See *hot-mix asphalt pavement*.

Hot-mix asphalt overlay: Also known as HMA overlay, this a surface treatment that involves layering new asphalt over an existing pavement, either asphalt or concrete. It creates a new wearing surface for traffic and to seal the pavement from water, debris, and sunlight damage, and it often adds significant structural strength.

Hot-mix asphalt pavement: Also known as HMA pavement, this type of asphalt creates a flexible pavement composed of aggregates, asphalt binder, and air voids. HMA is heated for placement and compaction at high temperatures.[6] HMA is less expensive to construct than concrete pavement, however it requires frequent maintenance activities and generally lasts 18 years before major rehabilitation is necessary. HMA makes up the vast majority of local-agency-owned pavements.

IBR: See *IBR element*, *IBR number*, and/or *Inventory-based Rating System™*.

IBR element: A feature used in the IBR System™ for assessing the condition of roads. The system relies on assessing three elements: surface width, drainage adequacy, and structural adequacy.[7]

IBR number: The 1-10 rating determined from assessments of the weighted IBR elements. The weighting relates each element to the intensity road work needed to improve or enhance the IBR element category.[8]

Interstate highway system: The road system owned and operated by each state consisting of routes that cross between states, make travel easier and faster. The interstate roads are denoted by the prefix "I" or "U.S." and then a number, where odd routes run north-south and even routes run east-west. Examples are I-75 or U.S. 2.[9]

Inventory-based Rating System™: Also known as the IBR System™, a rating system designed to assess the capabilities of gravel and unpaved roads to support intended traffic volumes and types year round. It assesses roads based on how three IBR elements, or features—surface width, drainage adequacy, and structural adequacy—compare to a baseline, or "good", road.[10]

Jurisdictional borders: Borders between two road-owning-agency jurisdictions, or where the roads owned by one agency turn into roads owned by another agency. Examples of jurisdictional borders are township or county lines.

Lane-mile segment: A segment of road that is measured by multiplying the centerline miles of a roadway by the number of lanes present.

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[6] Paving Class Glossary (definitions that I wrote for Pete. My source for that document was reference books)
[7] Inventory-based Rating System for Gravel Roads: Training Manual
[8] Inventory-based Rating System for Gravel Roads: Training Manual
[9] https://www.fhwa.dot.gov/interstate/faq.cfm#question3
[10] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual

Lane-mile-years: A network's total lane-miles multiplied by one year; a method to quantify the measurable loss of pavement life.

Limited access areas: Areas—typically remote areas—serviced by few or seasonal roads that require long detours routes if servicing roads are closed.

Main access to key commercial districts: Areas where large number or large size business will be significantly impacted if a road is unavailable.

Maintenance grading: A surface treatment method for unpaved roads that involves re-grading the road to remove isolated potholes, washboarding, and ruts, and then restoring the compacted crust layer.

MDOT: See *Michigan Department of Transportation*.

MDOT's Local Bridge Program Call for Projects: A call for project proposals for replacement, rehabilitation, and/or preventive maintenance of local bridges that, if granted, receives bridge funding from the Michigan Department of Transportation. The Call for Projects is made by the Local Bridge Program.

Michigan Department of Transportation: Also known as MDOT, this is the state of Michigan's department of transportation, which oversees roads and bridges owned by the state or federal government in Michigan.

Michigan Public Act 51 of 1951: Also known as PA 51, this is a Michigan legislative act that served as the foundation for establishing a road funding structure by creating transportation funding distribution methods and means. It has been amended many times.[11]

Michigan Public Act 325 of 2018: Also known as PA 325, this legislation modified PA 51 of 1951 in regards to asset management in Michigan, specifically 1) re-designating the TAMC under Michigan Infrastructure Council (MIC); 2) promoting and overseeing the implementation of recommendations from the regional infrastructure asset management pilot program; 3) requiring local road three-year asset management plans beginning October 1, 2020; 4) adding asset classes that impact system performance, safety or risk management, including culverts and signals; 5) allowing MDOT to withhold funds if no asset management plan submitted; and 6) prohibiting shifting finds from a country primary to a county local, or from a city major to a city minor if no progress toward achieving the condition goals described in its asset plan.[12]

Michigan Public Act 499 of 2002: Also known as PA 499, this legislation requires road projects for the upcoming three years to be reported to the TAMC.

Michigan Transportation Asset Management Council: Also known as the TAMC, a council comprised of professionals from county road commissions, cities, a county commissioner, a township official, regional and metropolitan planning organizations, and state transportation department personnel. The council reports directly to the Michigan Infrastructure Council.[13] The TAMC provides resources and support to Michigan's road-owning agencies, and serves as a liaison in data collection requirements between agencies and the state.

[11] Inventory-based Rating System for Gravel Roads: Training Manual
[12] Inventory-based Rating System for Gravel Roads: Training Manual
[13] Inventory-based Rating System for Gravel Roads: Training Manual

Michigan Transportation Fund: Also known as MTF, this is a source of transportation funding supported by vehicle registration fees and the state's per-gallon gas tax.

Microsurface treatment: An asphalt pavement treatment method that involves applying modified liquid asphalt, small stones, water, and portland cement for the purpose of protecting a pavement from damage caused by water and sunlight.

Mill and hot-mix asphalt overlay: Also known as a mill and HMA overlay, this is a surface treatment that involves the removal of the top layer of pavement by milling and the replacement of the removed layer with a new HMA layer.

Mix-of-fixes: A strategy of maintaining roads and bridges that includes generally prioritizes the spending of money on routine maintenance and capital preventive maintenance treatments to impede deterioration and then, as money is available, performing reconstruction and rehabilitation.

MTF: See *Michigan Transportation Fund*.

National Bridge Inspection Standards: Also known as NBIS, standards created by the Federal Highway Administration to locate and evaluate existing bridge deficiencies in the federal-aid highway system to ensure the safety of the traveling public. The standards define the proper safety for inspection and evaluation of all highway bridges.[14]

National Center for Pavement Preservation: Also known as the NCPP, a center that offers education, research, and outreach in current and innovative pavement preservation practices. This collaborative effort of government, industry, and academia entities was established at Michigan State University.

National highway system: Also known as NHS, this is a network of roads that includes the interstate highway system and other major roads managed by state and local agencies that serve major airports, marine, rail, pipelines, truck terminals, railway stations, military bases, and other strategic facilities.

NBIS: See *National Bridge Inspection Standards*.

NCPP: See *National Center for Pavement Preservation*.

NCPP Quick Check: A system created by the National Center for Pavement Preservation that 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.

Non-trunkline: A local road intended to be used over short distances but not recommended for long-distance travel.

Other funds: Expenditures for equipment, capital outlay, debt principal payment, interest expense, contributions to adjacent governmental units, principal, interest and bank fees, and miscellaneous for cities and villages.

PA: See *Michigan Public Act 51*, *Michigan Public Act 325*, and/or *Michigan Public Act 499*.

Partial-depth concrete repair: A concrete pavement treatment method that involves removing spalled or delaminated areas of concrete pavement, usually near joints and cracks, and replacing with new concrete.

[14] https://www.fhwa.dot.gov/bridge/nbis/

This is done to provide a new wearing surface in isolated areas, to slow down water infiltration, and to help delay further freeze-thaw damage.

PASER: See *Pavement Surface Evaluation and Rating system*.

Pavement reconstruction: A complete removal of the old pavement and base and construction of an entirely new road. This is the most expensive rehabilitation of the roadway and also the most disruptive to traffic patterns.

Pavement Surface Evaluation and Rating system: Also known as the PASER system, the PASER system rates surface condition on a 1-10 scale, where 10 is a brand new road with no defects, 5 is a road with distress but that is structurally sound and requires only preventative maintenance, and 1 is a road with extensive surface and structural distresses that is in need of total reconstruction. This system provides a simple, efficient, and consistent method for evaluating the condition of paved roads.[15]

Pothole: A defect in a road that is a localized depression, causing vehicles to jolt down and up when a tire passes over it.[16]

Preventive maintenance: Planned treatments to an existing asset to prevent deterioration and maintain functional condition. This can be a more effective use of funds than the costly alternative of major rehabilitation or replacement.

Proactive preventive maintenance: Also known as PPM, a method of performing capital preventive maintenance treatments very early in a pavement's life, often before it exhibits signs of pavement defect.

Public Act 51: See *Michigan Public Act 51 of 1951*

Public Act 325: See *Michigan Public Act 325 of 2018*

Public Act 499: See *Michigan Public Act 499 of 2002*

Reconstruction and rehabilitation programs: Programs intended to reconstruct and rehabilitate a road.

Restricted load postings: A restriction enacted on a bridge structure when is incapable of transporting loads above a certain weight.

Rights-of-way ownership: The owning of the right-of-way, which is the land over which a road or bridge travels. In order to build a road, road agencies must own the right-of-way or get permission to build on it.

Rigid pavement: See *concrete pavement*.

Road infrastructure: An agency's road network and assets necessary to make it function, such as traffic signage and ditches.

Road: The area consisting of the roadway (i.e., the travelled way or the portion of the road on which vehicles are intended to drive), shoulders, ditches, and areas of the right of way containing signage.[17]

Roadsoft: An asset management software suit that enables agencies to manage road and bridge related infrastructure. The software provides tools for collecting, storing, and analyzing data associated with

[15] Adapted from Inventory-based Rating System for Gravel Roads: Training Manual
[16] Inventory-based Rating System for Gravel Roads: Training Manual
[17] Inventory-based Rating System for Gravel Roads: Training Manual

transportation infrastructure. Built on an optimum combination of database engine and GIS mapping tools, Roadsoft provides a quick, smooth user experience and almost unlimited data handling capabilities.[18]

Ruts/rutting: Deformation of a road that usually forms as a permanent depression concentrated under the wheel path parallel to the direction of travel.[19], [20]

Scheduled maintenance: Low-cost, day-to-day activities applied to bridges on a scheduled basis that mitigates deterioration.[21]

Sealcoat pavement: A gravel road that has been sealed with a thin asphalt binder coating that has stone chips spread on top.

Service life: Time from when a road or treatment is first constructed to when it reaches a point where the distresses present change from age-related to structural-related (also known as the critical distress point).[22]

Slurry seal: An asphalt pavement treatment method that involves applying liquid asphalt, small stones, water, and portland cement in a very thin layer with the purpose of protecting an existing pavement from being damaged by water and sunlight.

Structural improvement: Pavement treatment that adds strength to the pavement. Roads requiring structural improvement exhibit alligator cracking and rutting and are considered poor on the TAMC scale.

Subsurface infrastructure: Infrastructure maintained by local agencies that reside underground, for example, drinking water distribution systems, wastewater collection systems, and storm sewer systems.

TAMC: See *Michigan Transportation Asset Management Council*.

TAMC pavement condition dashboard: Website for viewing graphs of pavement and bridge conditions, traffic and miles travelled, safety statistics, maintenance activities, and financial data for Michigan's cities and villages, counties, and regions, as well as the state of Michigan.

TAMC's good/fair/poor condition classes: Classification of road conditions defined by the Michigan Transportation Asset Management Council based on bin ranges of PASER scores and similarities in defects and treatment options. Good roads have PASER scores of 8, 9, or 10, have very few defects, and require minimal maintenance. Fair roads have PASER scores of 5, 6, or 7, have good structural support but a deteriorating surface, and can be maintained with CPM treatments. Poor roads have PASER scores of 1, 2, 3, or 4, exhibit evidence that the underlying structure is failing, such as alligator cracking and rutting. These roads must be rehabilitated with treatments like heavy overlay, crush and shape, or total reconstruction.

Tax millages: Local tax implemented to supplement an agency's budget, such as road funding.

[18] Inventory-based Rating System for Gravel Roads: Training Manual
[19] Paving Class Glossary
[20] Inventory-based Rating System for Gravel Roads: Training Manual
[21] Inventory-based Rating System for Gravel Roads: Training Manual
[22] Inventory-based Rating System for Gravel Roads: Training Manual

Thin hot-mix asphalt overlay: Application of a thin layer of hot-mix asphalt on an existing road to re-seal the road and protect it from damage caused by water. This also improves the ride quality and provides a smoother, uniform appearance that improves visibility of pavement markings.[23]

Transportation infrastructure: All of the elements that work together to make the surface transportation system function including roads, bridges, culverts, traffic signals, and signage.

Trigger: When a PASER score gives insight to the preferred timeline of a project for applying the correct treatment at the correct time.

Trunkline abbreviations: The prefixes *M-*, *I-*, and *US* indicate roads in Michigan that are part of the state trunkline system, the Interstate system, and the US Highway system. These roads consist of anything from 10-lane urban freeways to two-lane rural highways and even one non-motorized highway; they cover 9,668 centerline miles. Most of the roads are maintained by MDOT.

Trunkline bridges: Bridge present on a trunkline road, which typically connects cities or other strategic places and is the recommended rout for long-distance travel.[24]

Trunkline maintenance funds: Expenditures under a maintenance agreement with MDOT for maintenance activities performed on MDOT trunkline routes.

Trunkline: Major road that typically connects cities or other strategic places and is the recommended route for long-distance travel.[25]

Washboarding: Ripples in the road surface that are perpendicular to the direction of travel.[26]

Wedge/patch sealcoat treatment: An asphalt pavement treatment method that involves correcting the damage frequently found at the edge of a pavement by installing a narrow, 2- to 6-foot-wide wedge along the entire outside edge of a lane and layering with HMA. This extends the life of an HMA pavement or chip seal overlay by adding strength to significantly settled areas of the pavement.

Worst-first strategy: Asset management strategy that treats only the problems, often addressing the worst problems first, and ignoring preventive maintenance. This strategy is the opposite of the "mix of fixes" strategy. An example of a worst-first approach would be purchasing a new automobile, never changing the oil, and waiting till the engine fails at 50,000 miles to address any deterioration of the car.

LIST OF ACRONYMS

CPM: capital preventive maintenance

FHWA: Federal Highway Administration

HMA: hot-mix asphalt

I: trunkline abbreviation for routes on the Interstate system

[23] [second sentence] http://www.kentcountyroads.net/road-work/road-treatments/ultra-thin-overlay
[24] https://en.wikipedia.org/wiki/Trunk_road
[25] https://en.wikipedia.org/wiki/Trunk_road
[26] Inventory-based Rating System for Gravel Roads: Training Manual

IBR: Inventory-based Rating

M: trunkline abbreviation for Michigan state highways

MDOT: Michigan Department of Transportation

MTF: Michigan Transportation Fund

NBIS: National Bridge Inspection Standards

NCPP: National Center for Pavement Preservation

NHS: National Highway System

PA 51: Michigan Public Act 51 of 1951

PASER: Pavement Surface Evaluation and Rating

R&R: reconstruction and rehabilitation programs

TAMC: (Michigan) Transportation Asset Management Council

US: trunkline abbreviation for routes on the US Highway system

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). <#AGENCYSHORT> 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 <#AGENCY> (<#AGENCYSHORT>) 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. <#AGENCYSHORT> is responsible for maintaining and operating over <#MILES> <#MILETYPE> of roads. And, it is responsible for maintaining and operating <##OFBRIDGES> of bridges. It is also responsible for <##OFCULVERTS> of culverts, <##OFSIGNS> of traffic signs, and <##OF SIGNALS> of signals.

This plan outlines how <#AGENCYSHORT> determines its strategy to maintain and upgrade asset condition given agency goals, priorities of its road users, and resources provided. An updated plan is to be released approximately every <#YOUR CONTENT HERE: Enter number of years> years to reflect changes in road conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to:

Insert contact info

Knowing the basic features of the asset classes themselves is a crucial starting point to understanding the rationale behind an asset management approach. The following four primers provide an introduction to pavements, bridges, culverts, and traffic signals.

Pavement Primer

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

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

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

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

Surfacing

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

Paved Surfacing

Typical benefits and tradeoffs for hard surface types include:

- **Concrete pavement:** Concrete pavement, which is sometimes called a rigid pavement, is durable and lasts a long time when properly constructed and maintained. Concrete pavement can have longer service periods between maintenance activities, which can help reduce maintenance-related traffic disruptions. However, concrete pavements have a high initial cost and can be challenging to rehabilitate and maintain at the end of their service life. A typical concrete pavement design life will provide service for 30 years before major rehabilitation is necessary.
- **Hot-mix asphalt pavement (HMA):** HMA pavement, sometimes known as asphalt or flexible pavement, is currently less expensive to construct than concrete pavement (this is, in some part, due to the closer link between HMA material costs and oil prices that HMA pavements have in comparison with other pavement types). However, they require frequent maintenance activities to maximize their service life. A typical HMA pavement design life will provide service for 18 years

before major rehabilitation is necessary. The vast majority of local-agency-owned pavements are HMA pavements.

- **Composite pavements:** Composite pavement is a combination of concrete and asphalt layers. Typically, composite pavements are old concrete pavements exhibiting ride-related issues that were overlaid by several inches of HMA in order to gain more service life from the pavement before it would need reconstruction. Converting a concrete pavement to a composite pavement is typically used as a "holding pattern" treatment to maintain the road in usable condition until reconstruction funds become available.

- **Sealcoat pavement:** Sealcoat pavement is a gravel road that have been sealed with a thin asphalt binder coating that has stone chips spread on top (not to be confused with a chip seal treatment over HMA pavement). This type of a pavement relies on the gravel layer to provide structure to support traffic, and the asphalt binder coating and stone chips shed water and eliminate the need for maintenance grading. Nonetheless, sealcoat pavement does require additional maintenance steps that asphalt and gravel do not require and does not last as long as HMA pavement, but it provides a low-cost alternative for lightly-trafficked areas and competes with asphalt for ride quality when properly constructed and maintained. Sealcoat pavement can provide service for ten or more years before the surface layer deteriorates and needs to be replaced.

Unpaved Surfacing

Typical benefits and tradeoffs for non-hard surfacing include:

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

Pavement Condition

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

specific section of pavement will be a potential candidate for preventive maintenance. More detail on this topic is included in the *Pavement Treatment* section of this primer.

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

Paved Road Condition Rating System

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

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

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

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

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

- "Good" roads, according to the TAMC, have PASER scores of 8, 9, or 10. Roads in this category have very few, if any, defects and only require minimal maintenance; they may be kept in this category longer using PPM. These roads may include those that have been recently seal coated or newly constructed. Figure 1 illustrates an example of a road in this category.
- "Fair" roads, according to the TAMC, have PASER scores of 5, 6, or 7. Roads in this category still show good structural support, but their surface is starting to deteriorate. **Error! Reference source not found.** illustrates two road examples in this category. CPM can be cost effective for maintaining the road's "fair" condition or even raising it to "good" condition before the structural integrity of the pavement has been severely impacted. CPM treatments can be likened to shingles on a roof of a house: while the shingles add no structural value, they protect the house from structural damage by maintaining the protective function of a roof covering.
- "Poor" roads, according to the TAMC, have PASER scores of 1, 2, 3, or 4. These roads exhibit evidence that the underlying structure is failing, such as alligator cracking and rutting. These roads must be rehabilitated with treatments like a heavy overlay, crush and shape, or total reconstruction. Figure 1 illustrates a road in this category.

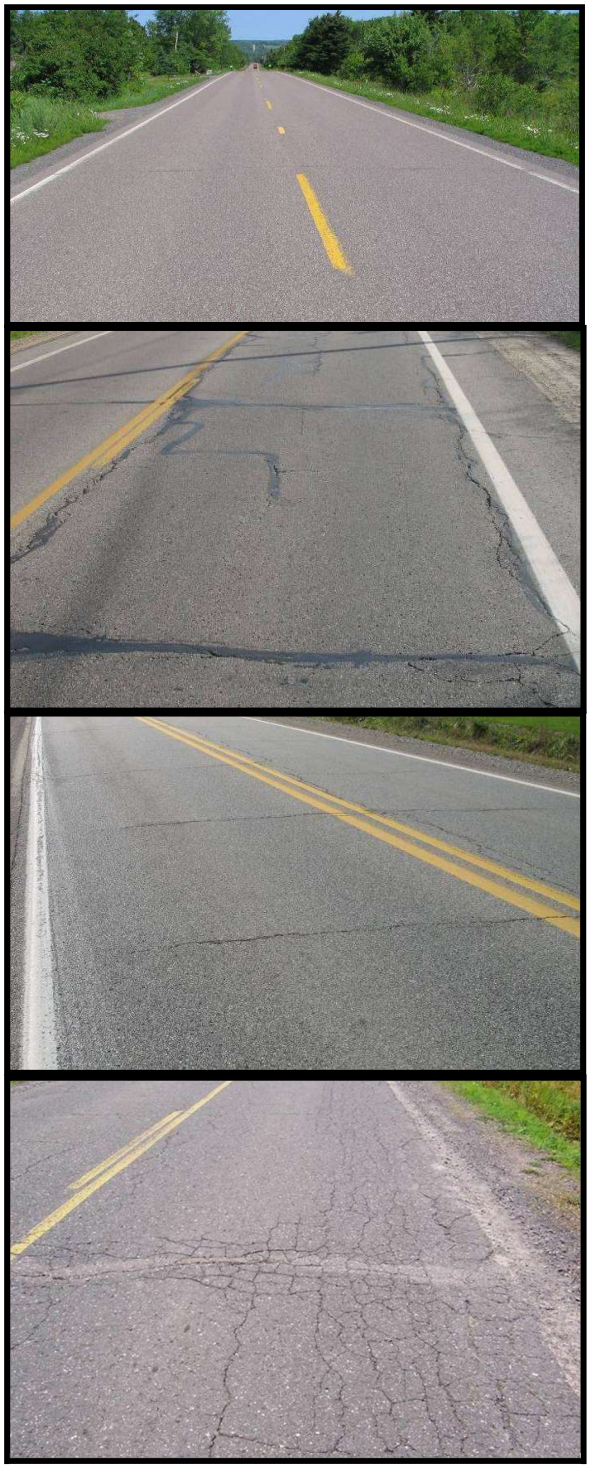


Figure 1: *Top image, right*– PASER 8 road that is considered "good" by the TAMC exhibit only minor defects. *Second image, right*– PASER 5 road that is considered "fair" by the TAMC. Exhibiting structural soundness but could benefit from CPM. *Third image, right*– PASER 6 road that is considered "fair"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

The TAMC's good, fair, and poor categories are based solely on the definitions, above. Therefore, caution should be exercised when comparing other condition assessments with these categories because other condition assessments may have "good", "fair", or "poor" designations similar to the TAMC condition categories but may not share the same definition. Often, other condition assessment systems define the

“good”, “fair”, and “poor” categories differently, thus rendering the data of little use for cross-system comparison. The TAMC’s definitions provide a statewide standard for all of Michigan’s road-owning agencies to use for comparison purposes.

PASER data is collected 100% every two years on all federal-aid-eligible roads in Michigan. The TAMC dictates and funds the required training and the format for this collection, and it shares the data regionally and statewide. In addition, <#AGENCYSHORT> collects <#YOUR CONTENT HERE: Insert the percentage appropriate to your agency's circumstance using ##% format.> of our paved non-federal-aid-eligible network using our own staff and resources.

<#YOUR CONTENT HERE: If you collect unpaved road condition data with the IBR System™, use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key.>

Unpaved Road Condition Rating System (IBR System™)

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The PASER system works well on most paved roads, which have a relatively-stable surface condition over several months, but it is difficult to adapt to unpaved roads. To address the need for a reliable condition assessment system for unpaved roads, the TAMC adopted the Inventory Based Rating (IBR) System™, and the <#AGENCYSHORT> also uses the IBR System™ for rating our unpaved roads. Information about the IBR System™ can be found at http://ctt.mtu.edu/inventory-based-rating-system.

Figure 2: *Top*– Road with IBR number of 1 road that has poor surface width, poor drainage adequacy, and poor structural adequacy. *Middle*– Road IBR number of 7 that has fair surface width, fair drainage adequacy, and fair structural adequacy. *Bottom*– Road with IBR number of 9 road that has good surface width, good drainage adequacy, and good structural adequacy.

The IBR System™ gathers reliable condition assessment data for unpaved road by evaluating three features—surface width, drainage adequacy, and structural adequacy—in comparison to a baseline, or generally considered "good", road. These three assessments come together to generate an overall 1-10 IBR number. A high IBR number reflects a road with wide surface width, good drainage, and a well-designed and well-constructed base, whereas a low IBR number reflects a narrow road with no ditches and little gravel. A good, fair, or poor assessment of each feature is not an endorsement or indictment of a road's suitability for use but simply provides context on how these road elements compare to a baseline condition.

Figure 2 illustrates the range over which features may be assessed. The top example in Figure 2 shows an unpaved road with a narrow surface width, little or no drainage, and very little gravel thickness. Using the IBR System™, these assessments would yield an IBR number of "1" for this road. The middle example in Figure 2 shows a road with fair surface width, fair drainage adequacy, and fair structural adequacy. These assessments would yield an IBR number of "7" for this road. The bottom example in Figure 2 shows a road with good surface width, good drainage adequacy, and good structural adequacy. These assessments would yield an IBR number of "9" for this road.

Unpaved roads are constructed and used differently throughout Michigan. A narrow, unpaved road with no ditches and very little gravel (low IBR number) may be perfectly acceptable in a short, terminal end of the road network, for example, on a road segment that ends at a lake or serves a limited number of unoccupied private properties. However, high-volume unpaved roads that serve agricultural or other industrial activities with heavy trucks and equipment will require wide surface width, good drainage, and a well-designed and well-constructed base structure (high IBR number). Where the unpaved road is and

how it is used determines how the road must be constructed and maintained: just because a road has a low IBR number does not necessarily mean that it needs to be upgraded. The IBR number are not an endorsement or indictment of the road's suitability for use but rather, an indication of a road's capabilities to support different traffic volumes and types in all weather.

Pavement Treatments

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

Reconstruction

Pavement reconstruction treats failing or failed pavements by completely removing the old pavement and base and constructing an entirely new road (Figure 3). Every pavement has to eventually be reconstructed and it is usually done as a last resort after more cost-effective treatments are done, or if the road requires significant changes to road geometry, base, or buried utilities. Compared to the other treatments, which are all improvements of the existing road, reconstruction is the most extensive rehabilitation of the roadway and therefore, also the most expensive per mile and most disruptive to regular traffic patterns. Reconstructed pavement will subsequently require one or more of the previous maintenance treatments to maximize service life and performance. A reconstructed road lasts approximately 15 years and costs $250,000 per lane mile. The following descriptions outline the main reconstruction treatments used by <#AGENCYSHORT>.

Figure 3: Examples of reconstruction treatments—(left) reconstructing a road and (right) road prepared for full-depth repair.

Full-depth Concrete Repair

A full-depth concrete repair removes sections of damaged concrete pavement and replaces it with new concrete of the same dimensions (Figure 3). It is usually performed on isolated deteriorated joint locations or entire slabs that are much further deteriorated than adjacent slabs. The purpose is to restore the riding surface, delay water infiltration, restore load transfer from one slab to the next, and eliminate the need to perform costly temporary patching. This repair lasts approximately twelve years and typically costs $100,000 per mile.

Ditching (for Unpaved Roads)

Water needs to drain away from any roadway to delay softening of the pavement structure, and proper drainage is critical for unpaved roads where there is no hard surface on top to stop water infiltration into the road surface and base. To improve drainage, new ditches are dug or old ones are cleaned out. Unpaved roads typically need to be re-ditched every 15 years at a cost of $10,000 per mile.

Gravel Overlay (for Unpaved Roads)

Unpaved roads will exhibit gravel loss over time due to traffic, wind, and rain. Gravel on an unpaved road provides a wear surface and contributes to the structure of the entire road. Unpaved roads typically need to be overlaid with four inches of new gravel every 15 years at a cost of $25,000 per mile.

<#YOUR CONTENT HERE: Discuss the innovative treatments that apply to your agency. Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Structural Improvement

Roads requiring structural improvements exhibit alligator cracking and rutting and rated poor in the TAMC scale. Road rutting is evidence that the underlying structure is beginning to fail and it must be either rehabilitated with a structural treatment. Examples of structural improvement treatments include HMA overlay with or without milling, and crush and shape (Figure 4). The following descriptions outline the main structural improvement treatments used by <#AGENCYSHORT>.

Figure 4: Examples of structural improvement treatments—(from left) HMA overlay on an unmilled pavement, milling asphalt pavement, and pulverization of a road during a crush-and-shape project.

<#YOUR CONTENT HERE: Discuss the pavement treatment tools that apply to your agency. Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

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

An HMA overlay is a layer of new asphalt (liquid asphalt and stones) placed on an existing pavement (Figure 4). Depending on the overlay thickness, this treatment can add significant structural strength. This treatment also creates a new wearing surface for traffic and seals the pavement from water, debris, and sunlight damage. An HMA overlay lasts approximately five to ten years and costs $50,000 to $100,000 per lane mile. The top layer of severely damaged pavement can be removed by the milling, a technique that helps prevent structural problems from being quickly reflected up to the new surface. Milling is also

done to keep roads at the same height of curb and gutter that is not being raised or reinstalled in the project. Milling adds $10,000 per lane mile to the HMA overlay cost.

Crush and Shape

During a crush and shape treatment, the existing pavement and base are pulverized and then the road surface is reshaped to correct imperfections in the road's profile (Figure 4). An additional layer of gravel is often added along with a new wearing surface such as an HMA overlay or chip seal. Additional gravel and an HMA overlay give an increase in the pavements structural capacity. This treatment is usually done on rural roads with severe structural distress; Adding gravel and a wearing surface makes it more prohibitive for urban roads if the curb and gutter is not raised up. Crush and shape treatments last approximately 14 years and cost $150,000 per lane mile.

Capital Preventive Maintenance

Capital preventive maintenance (CPM) addresses pavement problems of fair-rated roads before the structural integrity of the pavement has been severely impacted. CPM is a planned set of cost-effective treatments applied to an existing roadway that slows further deterioration and that maintains or improves the functional condition of the system without significantly increasing the structural capacity. Examples of such treatments include crack seal, fog seal, chip seal, slurry seal, and microsurface (Figure 5). The purpose of the following CPM treatments is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface deficiencies. The following descriptions outline the main CPM treatments used by <#AGENCYSHORT>.

Figure 5: Examples of capital preventive maintenance treatments—(from left) crack seal, fog seal, chip seal, and slurry seal/microsurface.

<#YOUR CONTENT HERE: Discuss the pavement treatment tools that apply to your agency. Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Crack Seal

Water that infiltrates the pavement surface softens the pavement structure and allows traffic loads to cause more damage to the pavement than in normal dry conditions. Crack sealing helps prevent water infiltration by sealing cracks in the pavement with asphalt sealant (Figure 5). We seal pavement cracks early in the life of the pavement to keep it functioning as strong as it can and for as long as it can. Crack sealing lasts approximately two years and costs $4,000 per lane mile. Even though it does not last very

long compared to other treatments, it does not cost very much compared to other treatments. This makes it a very cost effective treatment when we look at what crack filling costs per year of the treatment's life.

Fog Seal

Fog sealing sprays a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight (Figure 5). Fog seals are best for good to very good pavements and last approximately two years at a cost of $1,000 per lane mile.

Chip Seal

A chip seal, also known as a sealcoat, is a two-part treatment that starts with liquid asphalt sprayed onto the old pavement surface followed by a single layer of small stone chips spread onto the wet liquid asphalt layer (Figure 5). The liquid asphalt seals the pavement from water and debris and holds the stone chips in place, providing a new wearing surface for traffic that can correct friction problems and helping to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. These treatments last approximately five years and cost $12,000 per lane mile.

Slurry Seal/Microsurface

A slurry seal or microsurface's purpose is to protect existing pavement from being damaged by water and sunlight. The primary ingredients are liquid asphalt (slurry seal) or modified liquid asphalt (microsurface), small stones, water and portland cement applied in a very thin (less than a half an inch) layer (Figure 5). The main difference between a slurry seal and a microsurface is the modified liquid asphalt used in microsurfacing provides different curing and durability properties, which allows microsurfacing to be used for filling pavement ruts. Since the application is very thin, these treatments do not add any strength to the pavement and only serves to protect the pavement's existing strength by sealing the pavement from sunlight and water damage. These treatments work best when applied before cracks are too wide and too numerous. A slurry seal treatment lasts approximately four years and costs $20,000 per lane mile, while a microsurface treatment tends to last for seven years and costs $25,000 per lane mile.

Partial-Depth Concrete Repair

A partial-depth concrete repair involves removing spalled (i.e., fragmented) or delaminated (i.e., separated into layers) areas of concrete pavement, usually near joints and cracks and replacing with new concrete (Figure 6). This is done to provide a new wearing surface in isolated areas, to slow down water infiltration, and to help delay further freeze/thaw damage. This repair lasts approximately five years and typically costs $20,000 per mile.

Maintenance Grading (for Unpaved Roads)

Maintenance grading involves regrading an unpaved road to remove isolated potholes, washboarding, and ruts then restoring the compacted crust layer (Figure 6). Crust on an unpaved road is a very tightly compacted surface that sheds water with ease but takes time to be created, so destroying a crusted surface

with maintenance grading requires a plan to restore the crust. Maintenance grading often needs to be performed three to five times per year and each grading costs $300 per mile.

Dust Control (for Unpaved Roads)

Dust control typically involves spraying chloride or other chemicals on a gravel surface to reduce dust loss, aggregate loss, and maintenance (Figure 6). This is a relatively short-term fix that helps create a crusted surface. Chlorides work by attracting moisture from the air and existing gravel. This fix is not effective if the surface is too dry or heavy rain is imminent, so timing is very important. Dust control is done two to four times per year and each application costs $700 per mile.

Figure 6: Examples of capital preventive maintenance treatments, cont'd—(from left) concrete road prepared for partial-depth repair, gravel road undergoing maintenance grading, and gravel road receiving dust control application (dust control photo courtesy of Weld County, Colorado, weldgov.com).

Innovative Treatments

<#YOUR CONTENT HERE: Detail the innovative treatments that your agency is employing. For example, this content may read like this: Our agency strives to be innovative with our pavement treatments by looking for ways to prevent pavement damage and save taxpayer dollars. One such innovation is undersealing, which was performed on a test section on Main Street in 2016. This treatment consists of chip seal that then has an HMA overlay applied. This treatment has been shown by the Minnesota Department of Transportation to delay old pavement cracks from reflecting up into new HMA overlays. We hope to gain favorable results from this trial on our roads and use this treatment as another one of our pavement preservation best practices.>

Bridge Primer

Bridge Types

Bridges are structures that span 20 feet (6.1 meters) or more over water or other thoroughfares. If culverts are placed side by side to form a span of 20 feet or more, then this culvert system would be defined as a bridge.

Bridge types classify based on two features: design and material.

The most basic bridge designs are beam bridges and slab bridges. A **girder**, or beam, **bridge** is one that has beam(s) across a span supported by the abutments and any intermediate piers, while a **slab bridge** is a concrete slab supported by the abutments and, if necessary, piers (Figure 7). These bridges can extend across one or multiple spans.

Similarly, **arch bridges**, whose name derives from its shape, extend across a span and rest on abutments (Figure 7). Beam and arch bridges function differently, however, when it comes to load transfer.

Trusses are a support structure that is created when structural members are connected at joints to form interconnected triangles. Structural members may consist of steel tubes or angles, and joints are the steel plates connecting members together. When a bridge consists of a truss superstructure as part of its load-transfer mechanism, it is called a **truss bridge**. Trusses can be seen in use on the Sault Sainte Marie International Bridge (Figure 7).

Another common bridge design in Michigan is the three-sided pre-cast box or arch bridge (Figure 8).

Figure 8: Example of a three-sided box bridge spanning 20 feet or more.

Figure 7: Examples of bridge types in Michigan

Michigan is also home to several unique bridge designs. A **suspension bridge** hangs the load-bearing deck from suspension cables, like the Mackinac Bridge (Figure 9). Other unique designs include the **movable bridge** used for the Portage Lake Lift Bridge and the historic **covered bridge** used for such bridges as the Holz Brücke wooden bridge in Frankenmuth (Figure 9).

Figure 9: Examples of unique bridge types found in Michigan

Adding another layer of complexity to bridge typing is the primary construction materials used (**Error! Reference source not found.**). Bridges are generally constructed from concrete, steel, pre-stressed concrete, or timber. Some historical bridges in Michigan are constructed from masonry and occasionally bridges may employ aluminum components.

Figure 10: Examples of common bridge construction materials used in Michigan

Bridge Condition

Michigan inspectors rate bridge condition on a 0-9 scale known as the National Bridge Inventory (NBI) Rating Scale. Elements of the bridge's superstructure, deck, and substructure receive a 9 if they are in excellent condition down to a 0 if they are in failed condition. A complete guide for Michigan bridge condition rating according to the NBI can be found at https://www.michigan.gov/documents/mdot/MDOT_BIR_Ratings_Guide_367482_7.pdf.

Bridge Treatments

Replacement

Different levels of replacement can be performed on a bridge structure. The most extensive is total replacement, which removes the entire bridge before re-building a bridge at the same location. Total replacement is done when the cost of rehabilitation exceeds the cost of replacement or when there are no counter-measures available to fix its condition. Partial replacements can include superstructure replacement, deck replacement, and substructure replacement (Figure 11). Superstructure replacement – removes and rebuilds the main structural components of the bridge and deck. Deck replacement either fully or partially removes and rebuilds the deck, or riding surface, of the bridge. Substructure replacement removes and rebuilds the system supporting the bridge's superstructure. This is commonly done when there are existing open cracks, signs of differential settlement, presence of active movement, or when the bridge is scour critical with no counter-measures available. In all cases, replacement is chosen when the cost of rehabilitation exceeds the replacement cost. Replacement is generally the most expensive of the treatment options.

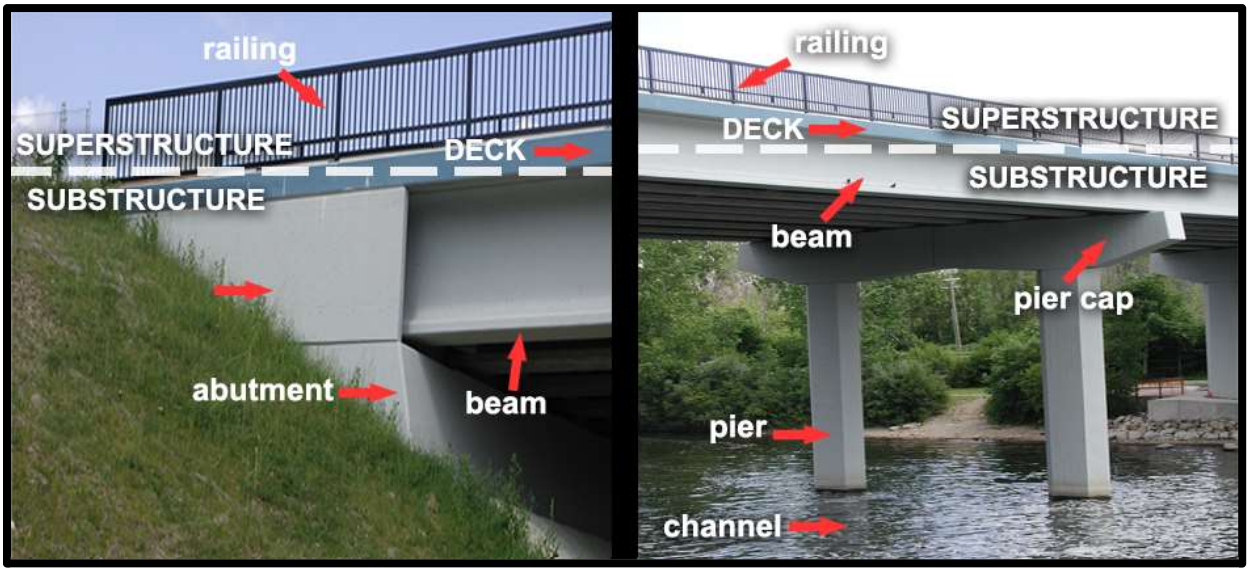


Figure 11: Diagram of basic elements of a bridge

Rehabilitation

Unlike replacing the entire structure, rehabilitation involves repairs or replacements that improve the existing condition and extend the service life provided by the structure and the riding surface. Most often, rehabilitation options are associated with bridges that have degraded beyond what can be fixed with general maintenance. While typically more expensive than general maintenance, rehabilitation treatments may be more cost-effective than replacing the entire structure.

Deck overlay

A concrete deck overlay involves paving over the riding surface of the bridge with new material to extend the life of the deck (Figure 11). Typically, this is done when the NBI deck rating is less than 5 for the surface and greater than 4 for the underneath portion of the deck.

Railing retrofit/replacement

A railing retrofit or replacement either reinforces the existing railing or replaces it entirely (Figure 11). This rehabilitation is driven by a need for safety improvements, if the NBI deck rating is greater than 5, or when an NBI railing or barrier rating less than 5.

Beam repair and pin-and-hanger replacement

Beam repair on a bridge involves repairing either the steel or concrete beams in order to correct damage that impairs beam strength (Figure 11). In the case of steel beams, it is also done if there is 25 percent or more of section loss in an area of the beam that affects load-carrying capacity. In the case of concrete beams, it is also done if there is 50 percent or more spalling (i.e., fragmenting) at the ends of beams. A pin-and-hanger assembly may join two steel beams (Figure 12). Replacing the pin-and-hanger assembly is done when there excessive section loss around the pin and hanger, severe pack rust, out-of-plane distortion, or an NBI rating of 4 or lower.

Figure 12: Pin-and-hanger assembly (left) and bearing (right, shown by arrow)

Substructure concrete patching and repair

Patching and repairing the main structure supporting the bridge is essential to keep a bridge in service. These rehabilitation efforts are done in response to an inspector's work recommendation, when the abutments or piers have an NBI rating of 5 or 4, or if spalling and delamination (i.e., separation into layers) affect less than 30 percent of the bridge surface.

Wing wall repair/replacement

The wing wall of a bridge structure helps maintain the ground contour and slope at the opposite ends of the bridge (Figure 13). When a bridge's wing wall develops open cracks, has signs of differential settlement or active movement, or has an NBI rating of 4 or less, the wall will need repair or replacement.

Drainage culvert repair/replacement

When the bridge's drainage culvert develops cracks, has deformation, shows signs of movement or differential settlement, or has an NBI rating of 4 or less, the culvert will need repair or replacement.

Figure 13: Diagram of basic elements of a bridge, cont'd

Preventive Maintenance

Preventive maintenance is those activities or treatments that extend the service life of a bridge in a cost-effective manner. AASHTO defines preventive maintenance as "a planned strategy of cost-effective treatment to an existing roadway system and its appurtenances that preserves the system, retards future deterioration and maintains or improves the functional condition of the system without increasing structural capacity".

Deck repairs

Deck repairs include three common techniques: HMA overlay cap without membrane, concrete patching, and joint repair/replacement. Overlaying a bridge deck with an HMA cap without membrane serves as a temporary holdover, typically within five years of performing rehabilitation or repair, that improves ride quality. Markers that indicate the need for this type of maintenance include an NBI rating for both deck surface and deck bottom of 3 or less. Another type of preventive maintenance involves patching the concrete on the bridge deck. This is done in response to an inspector's work recommendation or when the deck surface has an NBI rating of 5, 6, or 7 with minor delamination and spalling. When doing an overlay of a bridge deck, repair or replacement of the expansion joint may accompany it. The expansion joint occurs where two sections of bridge deck come together. The joint allows for expansion or contraction of the deck pavement in response to temperature. Generally, this type of replacement is precipitated by an NBI rating for the joint of 4 or less or by significant leaking from the joint.

Steel bearing repair/replacement

Rather than sitting directly on the piers, a bridge deck is separated from the piers by bearings (Figure 12). Bearings allow for a certain degree of movement due to temperature or other forces. Repairing or replacing the bearings is considered preventive maintenance. An NBI rating for girders and deck of 5 or higher and an NBI rating for bearings of 4 or lower identifies candidates for this maintenance activity.

Painting

Re-painting a bridge structure can either be done in totality or in part. Total re-painting is done in response to an inspector's work recommendation or when the NBI rating for paint condition is 3 or less.

Partial re-painting can either consist of zone re-painting, which is a preventive maintenance technique, or spot re-painting, which is scheduled maintenance (see below). Zone re-painting, on the other hand, is done when less than 15 percent of the paint in a smaller area, or zone, has failed while the rest of the bridge is in good or fair condition. It is also done if the paint condition has an NBI rating of 5 or 4.

Channel improvements

Occasionally, it is necessary to make improvements to the waterway that flows underneath the bridge. Such channel improvements are driven by an inspector's work recommendation or to remove vegetation, debris, or sediment from the channel and banks (Figure 11).

Scour countermeasures

The act of filling scour holes to prevent further damage to a structure. This is done when a structure is categorized as scour critical and is not scheduled for replacement or when NBI comments in abutment and pier ratings indicate the presence of scour holes.

Scheduled Maintenance

Scheduled maintenance is those activities or treatments that are regularly scheduled and intend to maintain serviceability while reducing the rate of deterioration.

Superstructure washing

Washing the superstructure, or the main structure supporting the bridge, typically occurs in response to an inspector's work recommendation or when salt-contaminated dirt and debris collected on the superstructure is causing corrosion or deterioration by trapping moisture.

Deck repairs/replacement

A bridge deck's structure is typically concrete and may have an asphalt wearing surface on top. Repairing or replacing the bridge deck's asphalt wearing surface is an effective scheduled maintenance technique that can be recommended by an inspector or should be done when the asphalt wearing surface is in poor condition. In order to repair minor delamination and spalling of concrete decks, minor concrete patching may be used. Typically, an inspector will recommend this technique. Cracks or open joints in a pavement surface can also clog with debris, which lessens the ability of the deck to expand and contract properly and, under traffic weight, will cause the pavement to deteriorate. Therefore, sealing the cracks and joints of the bridge deck's asphalt surface may be recommended upon inspection and is advisable when the surface is in good or fair condition and the cracks only extend to the surface of the underlying slab or sub course. Sealing cracks and joints of a deck's concrete surface is done when concrete is in good or fair condition, when cracks extend to the reinforcement inside the pavement, or in response to an inspector's work recommendation.

Drainage system cleanout/repair

Keeping a bridge's drainage system clean and in good working order allows the bridge to shed water effectively. This is important for the bridge to achieve its maximum service life. Occasionally, it is necessary to clean or repair the drainage system. Signs that a drainage system needs cleaning or repair include clogs and broken, deteriorated, or damaged drainage elements.

Guardrail repair/replacement

A guardrail is a safety feature on many roads and bridges that prevents or minimizes the effects of lane departure incidents (Figure 13). Keeping bridge guardrails in good condition is important. Repair or replacement of bridge guardrail should be done when a guardrail is missing or damaged, or when it needs a safety improvement.

Approaches repaving

A bridge's approach is the transition area between the roadway leading up to and away from the bridge and the bridge deck. Repaving the approach areas is a scheduled maintenance effort done in response to an inspector's work recommendation or when the asphalt surface is in poor condition.

Timber repairs

If a bridge has timber components, those components are susceptible to rot and insect-related damage. To keep a bridge with timber components functional, it is important to repair any damaged timbers. Timber repair should be done when there is extensive rot or insect-related damage, or when the timber members have an NBI rating of 4 or less.

Spot painting

Another form of partial bridge painting is spot painting. This scheduled maintenance technique involves painting a small portion of a bridge. Generally, this is done in response to an inspector's work recommendation and is used for zinc-based paint systems only.

Slope repair/reinforcement

The terrain on either side of the bridge that slopes down toward the channel is called the slope. At times, it is necessary to repair the slope. Situations that call for slope repair include when the slope is degraded, when the slope has significant areas of distress or failure, when the slope has settled, or if the slope has an NBI rating of 5 or less. Other times, it is necessary to reinforce the slope. Reinforcement can be added by installing Riprap, which is a side-slope covering made of stones. Riprap protects the stability of side slopes of channel banks when erosion threatens the surface (Figure 13).

Vegetation control and debris removal

Keeping the area around a bridge structure free of vegetation and debris safeguards the bridge structure from these potentially damaging forces. Removing or restricting vegetation around bridges prevents damage to the structure. Vegetation control is done in response to an inspector's work recommendation or when vegetation traps moisture on structural elements or is growing from joints or cracks. Debris in the water channel or in the bridge can also cause damage to the structure. Removing this debris is typically done in response to an inspector's work recommendation or when vegetation, debris, or sediment accumulates on the structure or channel.

Miscellaneous repairs

These are uncategorized repairs in response to an inspector's work recommendation.

Culvert Primer

Culverts are structures that lie underneath roads, enabling water to flow from one side of the roadway to the other (Figure 14). The important distinguishing factor between a culvert and a bridge is the size. Culverts are considered anything under 20 feet while bridges, according to the Federal Highway Administration, are 20 feet or more. While similar in function to storm sewers, culverts differ from storm sewers in that culverts are open on both ends, are constructed as straight-line conduits, and lack intermediate drainage structures like manholes and catch basins (Figure 14). Culverts are critical to the service life of a road because of the important role they play in keeping the pavement layers well drained and free from the forces of water building up on one side of the roadway.

Figure 14: Culverts allow water to pass under the roadway (left), they are straight-line conduits with no immediate drainage structures (middle), and they come in various materials (left: metal; middle and right: concrete) and shapes (left: arch; middle: round; right: box).

Culvert Types

Michigan conducted its first pilot data collection on local agency culverts in the state in 2018. Of almost 50,000 culverts, the material type used for constructing culverts ranged from (in order of predominance) corrugated steel pipe, concrete, plastic, aluminum, and masonry/tile, to timber materials (Figure 14). The shapes of the culverts were (in order of predominance) circular, pipe arch, arch, rectangular, horizontal ellipse, or box (Figure 14). Of almost 36,000 culverts, the diameter for the majority of culverts ranged from less than 12 inches to 24 inches; a portion, however, ranged from 30 inches to more than 48 inches.

Culvert Condition

Several culvert condition assessment practices exist. The FHWA has an evaluation method in their 1986 *Culvert Inspection Manual*. In conjunction with descriptions and details in the Ohio Department of Transportation's 2017 *Culvert Inspection Manual* and Wisconsin DOT's *Bridge Inspection Field Manual*, the FHWA method served as the method for evaluating Michigan culverts in the pilot. Full detail on the condition assessment system used in the Michigan culvert pilot data collection can be found in Appendix G of the report (https://www.michigan.gov/documents/tamc/TAMC_2018_Culvert_Pilot_Report_Complete_634795_7.pdf).

The Michigan culvert pilot data collection used a 1 through 10 rating system, where 10 is considered a new culvert with no deterioration or distress and 1 is considered total failure. Each of the different culvert material types requires the assessment of features unique to that material type, including structural deterioration, invert deterioration, section deformation, blockage(s) and scour. Corrugated metal pipe, concrete pipe, plastic pipe, and masonry culverts require an additional assessment of joints and seams. Slab abutment culverts require an additional assessment of the concrete abutment and the masonry abutment. Assessment of timber culverts only relied on blockage(s) and scour. The assessments come together to generate a condition rating categories of good (rated as 10, 9, or 8), fair (rated as 7 or 6), poor (rated as 5 or 4), or failed (rated as 3, 2, or 1).

Culvert Treatments

The *MDOT Drainage Manual* addresses culvert design and treatments. Of most importance to the longevity of culverts is regular cleaning to prevent clogs. More-extensive treatments may include re-positioning the pipe to improve its grade and lining a culvert to achieve more service life after structural deterioration has begun.

Traffic Signals Primer

Types

Traffic signals communicate a vast array of messaging that can also be grouped into basic categories. Traffic signal categories include case signs (e.g., keep right/left, no right/left turn, reversible lanes), controllers (e.g., flashers), detection (e.g., cameras, push buttons), electrical devices (e.g., clocks, crossing gates), flashing beacons, interconnects (e.g., DSL, fire station, phone line, radio), pedestrian heads (e.g., hand-man), and traffic heads (Figure 15). Poles and spans support traffic signals.

Figure 15: Examples of traffic signals

Condition

Traffic signal assessment considers the functioning of basic tests on a pass/fail basis. These tests include battery backup testing, components testing, conflict monitor testing, radio testing, and underground detection.

Treatments

Traffic signals are maintained in accordance with the *Michigan Manual on Uniform Traffic Control Devices*. Maintenance of traffic signals includes regular maintenance of all components, cleaning and servicing to prevent undue failures, immediate maintenance in the case of emergency calls, and provision of stand-by equipment. Timing changes are restricted to authorized personnel only.

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 <#AGENCYSHORT> is responsible for <#MILES> <#MILETYPE> of public roads, as shown in Figure 16. An inventory of these miles divides them into different network classes based on funding priorities identified at the state level.

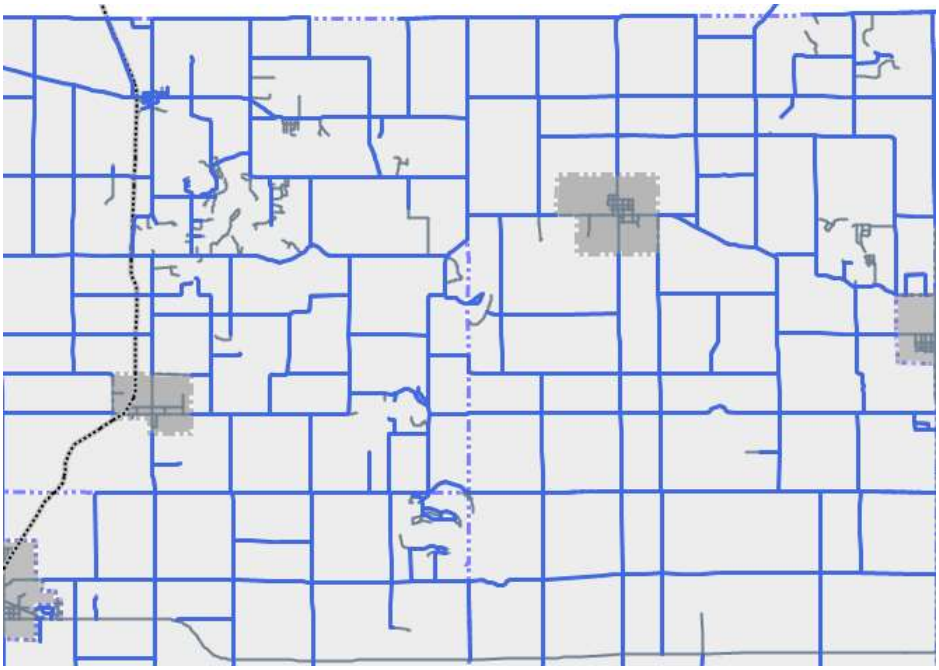


Figure 16: Highlighted roads are managed by the <#AGENCYSHORT>

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 <#AGENCYSHORT> as either <#NETWORK1> or <#NETWORK2> roads. State statute prioritizes expenditures on the <#NETWORK1> road system.

<#YOUR CONTENT HERE: The following paragraph is used by county agencies only. Use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key.>

Of the <#MILES> <#MILETYPE> of public roads owned and/or managed by <#AGENCYSHORT>, <#ROADCLASS1> <#ROADCLASS2> <#ROADCLASS3>

Figure 17 illustrates the percentage of roads owned by the <#AGENCYSHORT> that are classified as <#NETWORK1> and <#NETWORK2> roads. Figure 18 illustrates this breakdown of these road networks by township boundary within <#JURISDICTION>. <#YOUR CONTENT HERE: The preceding sentence is used by county agencies only. Use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key.>

Figure 17: Percentage of <#NETWORK1> and <#NETWORK2> roads for the <#AGENCYSHORT>.

Figure 18: <#NETWORK1> and <#NETWORK2> roads by township for <#JURISDICTION>.

<#AGENCYSHORT> manages roads that are part of the National Highway System (NHS)—in other words, those roads that are critical to the nation's economy, defense, and mobility—and monitors and maintains their condition. The NHS is subject to special rules and regulations and has its own performance metrics dictated by the FHWA. While most NHS roads in Michigan are managed by MDOT, <#AGENCYSHORT> manages a percentage of those roads located in its jurisdiction, as shown in Figure 19.

Figure 19: Miles of roads managed by <#AGENCYSHORT> that are part of the National Highway System and condition.

Types

The <#AGENCYSHORT> has multiple types of pavements in its jurisdiction, including <#YOURCONTENTHERE: concrete, hot-mix asphalt (HMA), composite, and sealcoat; it also has unpaved, or gravel, roads>. 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 20 illustrates the percentage of various pavement types that the <#AGENCYSHORT> has in its network. <#YOUR CONTENT HERE: The following sentence is used by county agencies only. Use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key.> Figure 21 shows the pavement type by Township boundary for <#JURISDICTION>>.

Figure 20: Pavement type by percentage maintained by the <#AGENCYSHORT> Undefined pavements have not been inventoried in<#AGENCYSHORT>'s asset management system to date, but will be included as data becomes available.

Figure 21: Pavement type by township within <#JURISDICTION> Undefined pavements have not been inventoried in <#AGENCYSHORT>'s asset management system to date, but will be included as data becomes available.

Locations

Locations and sizes of each asset can be found in <#AGENCYSHORT>'s Roadsoft database. For more detail, please contact:

Insert contact info

Condition

The road characteristic that road users most readily notice is pavement condition. Pavement condition is a major factor in determining the most cost-effective treatment—that is, routine maintenance, capital

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

Paved Roads

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

<#AGENCYSHORT> collects 100% of its PASER data every two years on all federal-aid-eligible roads in Michigan. In addition, <#AGENCYSHORT> collects <#YOUR CONTENT HERE: Insert the percentage appropriate to your agency's circumstance using ##% format.> of our paved non-federal-aid-eligible network using our own staff and resources.

<#AGENCYSHORT>'s <#YEAR> paved <#NETWORK1> road network and paved <#NETWORK2> road network have <#YOUR CONTENT HERE: percent> percent roads in the TAMC's good/fair/poor condition classes (Figure 22).

Figure 22: <#AGENCYSHORT> paved <#NETWORK1> road network and paved <#NETWORK2> road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved <#NETWORK1> road network and statewide paved <#NETWORK2> road network have <#YOUR CONTENT HERE: percent> percent roads in the TAMC's good/fair/poor condition categories (Figure 23). Comparing Figure 22 and Figure 23 shows that <#AGENCYSHORT>'s road network is <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **better**, **worse**, **the same**> than similarly-classified roads in the rest of the state. Other road condition graphs can be viewed on the TAMC pavement condition dashboard at: http://www.mcgi.state.mi.us/mitrp/Data/PaserDashboard.aspx.

Figure 23: State wide <#NETWORK1> and paved <#NETWORK2> road network conditions by percentage of good, fair, or poor

<#YOUR CONTENT HERE: 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 24 and Figure 25 show the number of miles for <#AGENCYSHORT>'s roads with PASER scores expressed in TAMC definition categories for the paved <#NETWORK1> road network (Figure 24) and the paved <#NETWORK2> road network (Figure 25). <#AGENCYSHORT> 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 24: <#AGENCYSHORT> paved <#NETWORK1> road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 25: <#AGENCYSHORT> paved <#NETWORK2> network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 26 illustrates <#AGENCYSHORT>'s entire paved road network divided by township into the TAMC good/fair/poor designations.

Figure 27 provides a map illustrating the geographic location of paved roads and their respective PASER condition. An online version of the most recent PASER data is located at https://www.mcgi.state.mi.us/tamcMap/.

Figure 26: Number of miles of paved road in each township divided in categories of good (PASER 10, 9, 8), fair (PASER 7, 6, 5), and poor (PASER 4, 3, 2, 1).

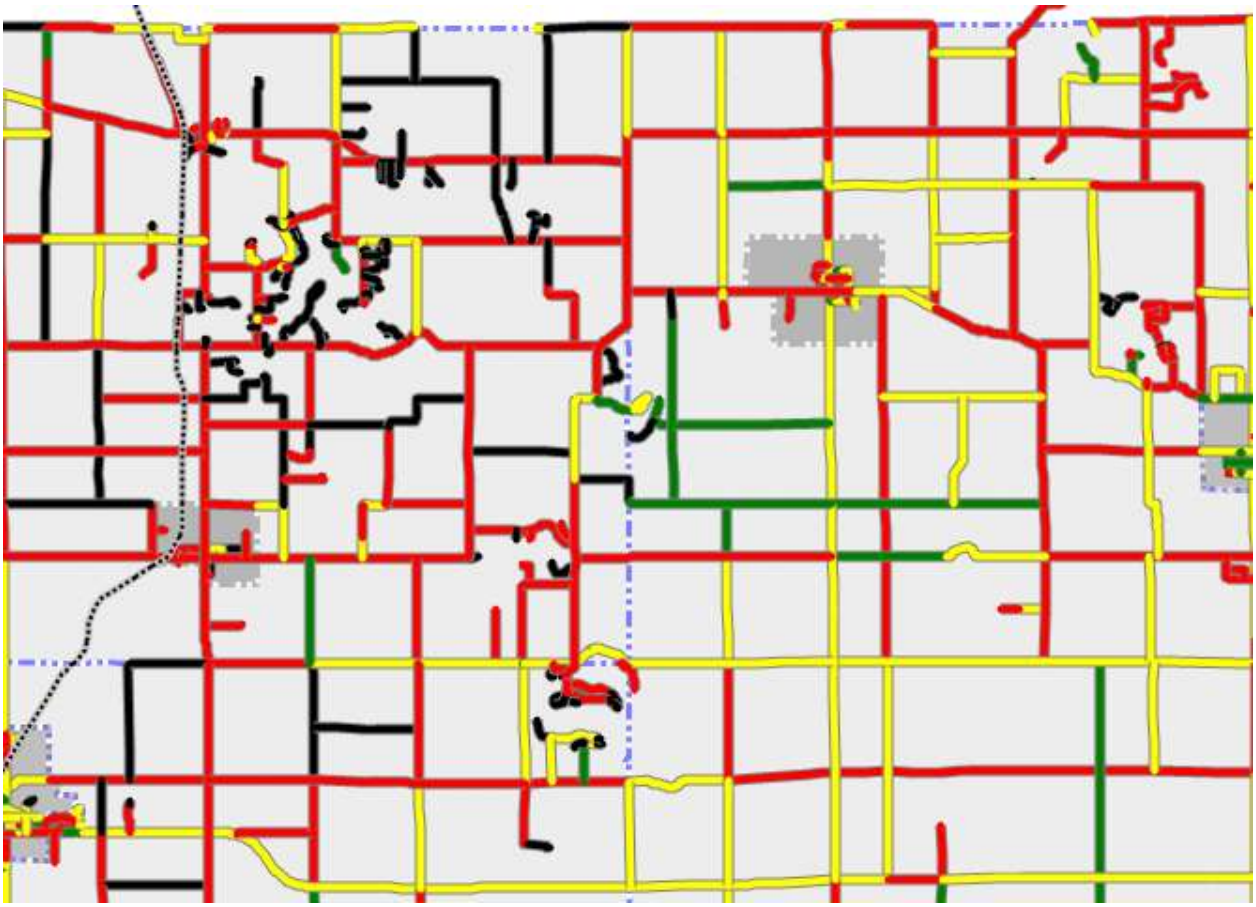


Figure 27: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by <#AGENCYSHORT> are shown.

<#YOUR CONTENT HERE: Explain the distribution of your roads along the PASER spectrum. Where is your agency in terms of meeting condition goals or user's needs, or where is there a risk of not meeting those goals or needs? What is your agency doing or what would you like to do to offset these risks? Is your agency happy with the network distribution? Is there a specific part detailed on this network map that concerns you? Tell the story of your data and what it means to your agency as the road owner.>

<#YOUR CONTENT HERE: If you collect unpaved road condition data with the IBR System™, use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key.>

Historically, the overall quality of <#AGENCYSHORT>'s paved <#NETWORK1> roads have been <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **decreasing**, **increasing**, **staying the same**>, as can be observed in Figure 28. <#YOUR CONTENT HERE: Explain how conditions have changed over the years as shown in the chart>

Comparing <#AGENCYSHORT>'s <#NETWORK1> road condition trends illustrated in Figure 28 with overall statewide condition trends for all paved <#NETWORK1> roads, which are illustrated in Figure

29, shows a <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **similar**, **different**> trend locally as in the rest of the state.

<#YOUR CONTENT HERE: If your network condition has been decreasing, you may wish to include some explanation of that trend here. An example of this discussion is: The decrease in overall condition of our paved <#NETWORK1> road system can be observed in Figure 28 by noting the increase in roads in poor condition. Between 2010 and 2016 the percentage of roads in poor condition doubled, from 10% of the network to 20% of the network. This indicates an increasing number of roads that will require costly reconstruction or rehabilitation. The percentage of fair roads increased slightly during this same period, increasing from 50% to 70%. This indicates that there is a growing backlog of preventive maintenance projects that have not been addressed with the current budget. This class of roads requires attention before they transition into costlier reconstruct projects. During this time the number of maintenance, reconstruction, and rehabilitation projects were steady, indicating that funding levels are not sufficient to support the current paved <#NETWORK1> road network in its current state.>

Figure 28: Historical <#AGENCYSHORT> paved <#NETWORK1>road network condition trend

Figure 29: Historical statewide <#NETWORK1>road network condition trend

Historically, the overall quality of <#AGENCYSHORT>'s paved <#NETWORK2> roads have been <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **the same**, **much worse**, **better**> than the <#NETWORK1> road network because they lack a source of state and federal funding and therefore must be supported locally. Figure 30 illustrates the condition of the paved <#NETWORK2> road network in <#AGENCYSHORT> while Figure 31 illustrates these conditions statewide.

Comparing <#AGENCYSHORT>'s <#NETWORK2> road condition trends illustrated in Figure 30 with overall statewide condition trends for all paved <#NETWORK2> roads illustrated in Figure 31 indicates a <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **similar**, **different**> trend locally as in the rest of the state. <#YOUR CONTENT HERE: Verify that the following statement is appropriate for your agency's plan and reflects your agency's procedures (to retain the sample text, select it and then select Ctrl +Shift +F9): The year-to-year variation in the paved <#NETWORK2> road network is likely due to the fact that only a portion of the network is collected each year, both locally and statewide. This variation is likely a result of reporting bias since a representative sample of roads is not collected each year.

Figure 30: Historical <#AGENCYSHORT> paved <#NETWORK2> road network condition trend

Figure 31: Historical statewide paved <#NETWORK2> road network condition trend

Unpaved Roads

The condition of unpaved roads can be rapidly changing, which makes it difficult to obtain a consistent surface condition rating over the course of weeks or even days. The TAMC adopted the Inventory Based Rating (IBR) System™ for rating unpaved roads, and <#AGENCYSHORT> uses the IBR System™ for rating our unpaved roads. More information regarding the IBR System™ can be found in Introduction's Pavement Primer.

<#YOUR CONTENT HERE: Explain how unpaved roads are used in your network.> Are they commonly short terminal ends of the system? Or, do they form a grid network that serves as access to agricultural industries? What criteria do you use to determine whether an unpaved road should be paved?>

Figure 32 shows the percentage of unpaved roads in each IBR number ranges of 10, 9, and 8; 7, 6, and 5; and 4, 3, 2, and 1, for all roads. Figure 33 illustrates the miles of unpaved roads in IBR number ranges of 10, 9, and 8; 7, 6, and 5; and 4, 3, 2, and 1, for each township.

Figure 32: <#AGENCYSHORT>'s unpaved road network condition by percentage of roads with IBR numbers of 10, 9, and 8; roads with IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

Figure 33: Number of miles of unpaved road in each township divided in categories of roads with IBR numbers of 10, 9, and 8; IBR numbers of 7, 6, and 5; and IBR numbers of 4, 3, 2, and 1.

Figure 35, Figure 36, and Figure 52 are maps illustrating the geographic location of unpaved roads and the assessment of the IBR elements, respectively: surface width, drainage adequecy, and structural adequecy.

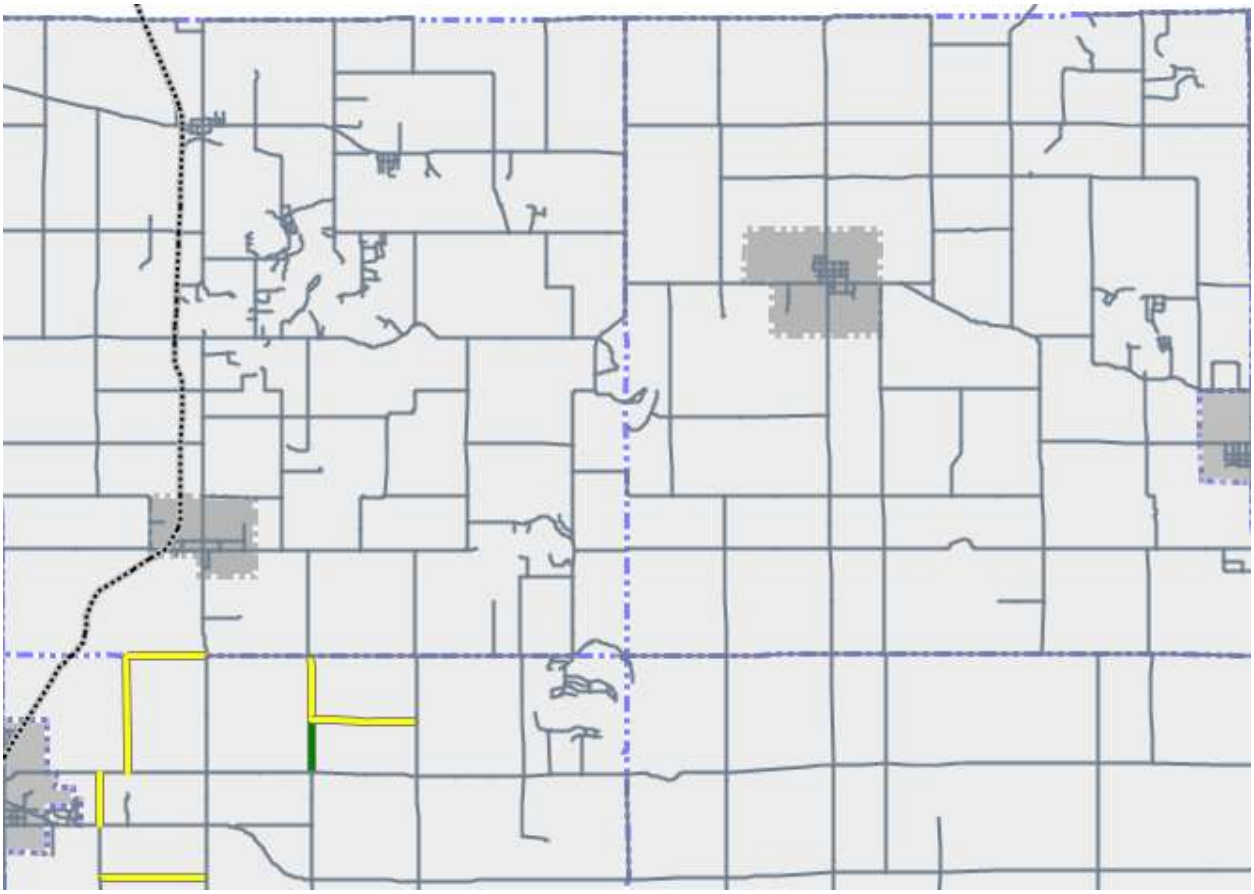


Figure 34: Map of the current IBR for surface width with good (22’ and greater) shown in green, fair (16’ to 21’) shown in orange, and poor (15’ or less) shown in red. Only unpaved roads owned by <#AGENCYSHORT> are shown.

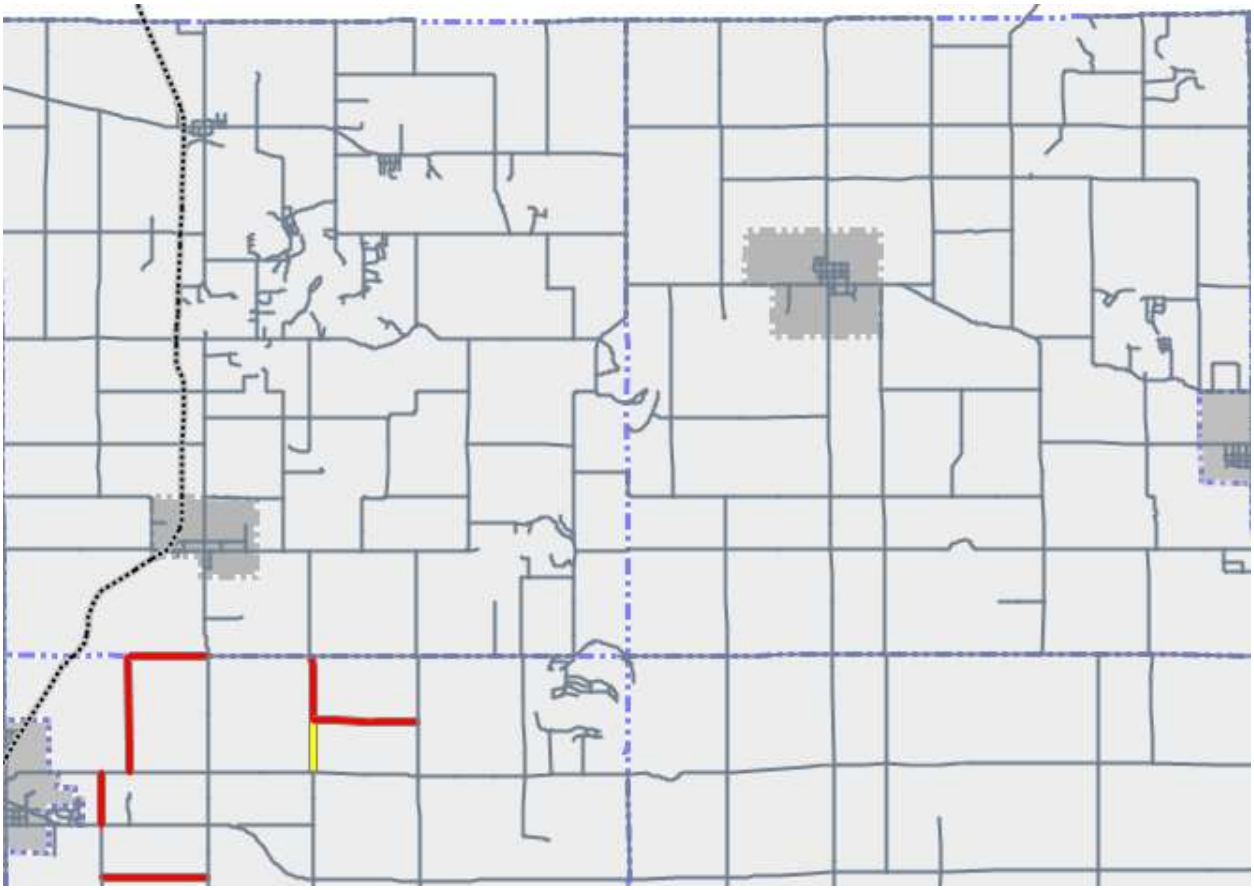


Figure 35: Map of the current IBR for drainage adequacy with good (2’ or more) shown in green, fair (0.5’ to less than 2’) shown in orange, and poor (less than 0.5’) shown in red. Only unpaved roads owned by <#AGENCYSHORT> are shown.

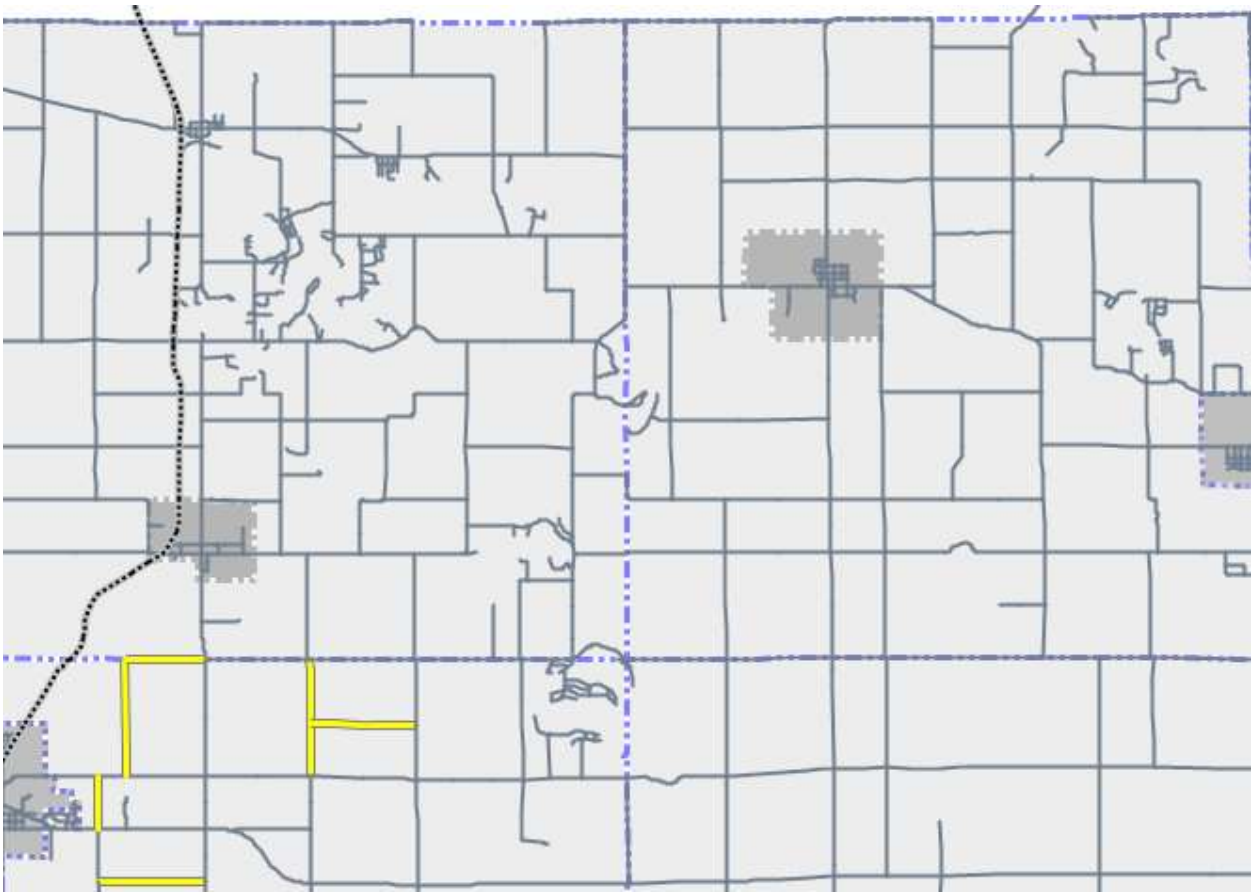


Figure 36: Map of the current IBR structural adequacy good (greater than 7”) shown in green, fair (4” to 7”) shown in orange, and poor (less than 4”) shown in red. Only unpaved roads owned by <#AGENCYSHORT> are shown.

<#YOUR CONTENT HERE: Explain the state of gravel roads in your network with respect to widening work, drainage work, and re-gravelling that may be apparent from the above data.>

Goals

Goals help set expectations to how pavement conditions will change in the future. Pavement condition changes are influenced by water infiltration, soil conditions, sunlight exposure, traffic loading, and repair work performed. <#AGENCYSHORT> is not able to control any of these factors fully due to seasonal weather changes, traffic pattern changes, and our limited budget. In spite of the uncontrollable variables, it is still important to set realistic network condition goals that efficiently use budget resources to build and maintain roads meeting taxpayer expectations. An assessment of the progress toward these goals is provided in the *Future Pavement Condition Trend* and *Alternate Strategy* sections of this plan.

Goals for Paved <#NETWORK1> Roads

<#YOUR CONTENT HERE: Discuss condition goals for your first network type with one of the optional guides. Use/modify content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

The overall goal for <#AGENCYSHORT>'s paved <#NETWORK1> road network is to maintain or improve road conditions network-wide at <#YEAR> levels. The baseline condition for this goal is illustrated in Figure 37.

Figure 37: <#AGENCYSHORT>'s <#YEAR> <#NETWORK1> road network condition by percentage of good/fair/poor

<#AGENCYSHORT>'s network-level pavement condition strategy for paved <#NETWORK1> roads is:

1. Prevent our good and fair (PASER 10 - 5) paved <#NETWORK1> from becoming poor (PASER 4 - 1).
2. Move <#YOUR CONTENT HERE: Insert percent in ## format> percent of paved <#NETWORK1> roads out of the poor category.

Goals for Paved <#NETWORK2> Roads

<#YOUR CONTENT HERE: Discuss condition goals for your second network type with one of the optional guides. Use/modify content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

The overall goal for <#AGENCYSHORT>'s paved <#NETWORK2> road network is to maintain or improve road conditions network-wide at <#YEAR> levels. The baseline condition for this goal is illustrated in Figure 38.

Figure 38: <#AGENCYSHORT> <#YEAR> paved <#NETWORK2> road network condition by percentage of good/fair/poor

<#AGENCYSHORT>'s network-level pavement condition strategy for paved <#NETWORK2> roads is:

1. Prevent our good and fair (PASER 10 - 5) paved <#NETWORK2> roads from becoming poor (PASER 4 - 1).
2. Move <#YOUR CONTENT HERE: Insert percent in ## format> percent of paved <#NETWORK2> roads out of the poor category.

Goals for Unpaved Roads

<#YOUR CONTENT HERE: Discuss condition goals for your unpaved road network with one of the optional guides. Use/modify content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

The overall goal for <#AGENCYSHORT>'s unpaved road network is to maintain or improve road conditions network-wide at <#YEAR> levels. The baseline condition for this goal is illustrated in Figure 39.

Figure 39: <#AGENCYSHORT>'s <#YEAR> unpaved road network condition by percentage of good/fair/poor

Our year-round unpaved roads will be maintained at their current structural adequacy assessments and current drainage adequacy assessments for roads where these two IBR elements are assessed as good or fair. Currently, <#YOUR CONTENT HERE: Insert percent in ## format> of our year-round unpaved roads have good or fair structural adequacy and <#YOUR CONTENT HERE: Insert percent in ## format> have good or fair drainage adequacy. Year-round unpaved roads that have either or both of these two categories assessed as poor will be strategically upgraded as funding is available to address, first, drainage issues and, then, structural issues. Surface widths will be addressed on an as-needed basis to provide service or to address safety issues. Seasonal roads will be addressed to provide passability and safety but do not have a goal associated with them.

Modelled Trends

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

<#AGENCYSHORT> uses many types of repair treatments for our roads, each selected to balance costs, benefits, and road life expectancy. When agency trends are modelled, any gap between goals and accomplishable work becomes evident. Financial resources influence how much work can be accomplished across the network within agency budget and what treatments and strategies can be afforded; a full discussion of <#AGENCYSHORT>'s financial resources can be found in the *5. Financial Resources* section.

Treatments and strategies that counter pavement-damaging forces include:

> **Structural improvement** is required for roads exhibiting alligator cracking and rutting and rated poor in the TAMC scale. Road rutting is evidence that the underlying structure is beginning to fail and it must be either rehabilitated with a structural treatment such as a crush and shape or totally reconstructed using the following types of structural treatments. Structural improvement

tools include hot-mix asphalt (HMA) overlay with/without overlay, crush and shape, and reconstruction. Those tools specific to treating concrete pavements include full-depth repair. Structural improvement tools for unpaved roads include ditching and gravel overlay.

Capital preventive maintenance (CPM) addresses pavement problems of fair-rated roads before the structural integrity of the pavement has been severely impacted. CPM is a planned set of cost-effective treatments applied to an existing roadway that slows further deterioration and that maintains or improves the functional condition of the system without significantly increasing the structural capacity. The purpose of the following CPM treatments is to protect the pavement structure, slow the rate of deterioration, and/or correct pavement surface deficiencies. CPM tools for paved roads include crack seal, fog seal, chip seal, slurry seal/microsurface, and partial-depth concrete repair or concrete spall repair. CPM tools for unpaved roads include maintenance grading and dust control.

Innovative treatments…<#YOUR CONTENT HERE: Detail the innovative treatments that your agency is employing. For example, this content may read like this: Our agency strives to be innovative with our pavement treatments by looking for ways to prevent pavement damage and save taxpayer dollars. One such innovation is undersealing, which was performed on a test section on Main Street in 2016. This treatment consists of chip seal that then has an HMA overlay applied. This treatment has been shown by the Minnesota Department of Transportation to delay old pavement cracks from reflecting up into new HMA overlays. We hope to gain favorable results from this trial on our roads and use this treatment as another one of our pavement preservation best practices.>

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

For a more complete discussion on the pavement treatment tools, refer to the Introduction's Pavement Primer.

Correlating with each PASER score are specific types of treatments best performed either to protect the pavement (CPM) or to add strength back into the pavement (structural improvement) (Table 1). MDOT provides guidance regarding when a specific pavement may be a candidate for a particular treatment. These identified PASER scores "trigger" the timing of projects appropriately to direct the right pavement fix at the right time, thereby providing the best chance for a successful project. The information provided in Table 1 is a guide for identifying potential projects; however, this table should not be the sole criteria for pavement treatment selection. Other information such as future development, traffic volume, utility projects, and budget play a role in project selection. This table should not be a substitute for engineering judgement <#YOUR CONTENT HERE: Explain the other factors that the agency may use for selection of projects><#YOUR CONTENT HERE: Explain the other factors that the agency may use for selection of projects>

Table 1: Service Life Extension (in Years) for Pavement Types Gained by Fix Type[1]

Fix Type	Life Extension (in years)*			PASER
	Flexible	Composite	Rigid	
HMA crack treatment	1-3	1-3	N/A	6-7
Overband crack filling	1-2	1-2	N/A	6-7
One course non-structural HMA overlay	5-7	4-7	N/A	4-5****
Mill and one course non-structural HMA overlay	5-7	4-7	N/A	3-5
Single course chip seal	3-6	N/A	N/A	5-7†
Double chip seal	4-7	3-6	N/A	5-7†
Single course microsurface	3-5	**	N/A	5-6
Multiple course microsurface	4-6	**	N/A	4-6****
Ultra-thin HMA overlay	3-6	3-6	N/A	4-6****
Paver placed surface seal	4-6	**	N/A	5-7
Full-depth concrete repair	N/A	N/A	3-10	4-5***
Concrete joint resealing	N/A	N/A	1-3	5-8
Concrete spall repair	N/A	N/A	1-3	5-7
Concrete crack sealing	N/A	N/A	1-3	4-7
Diamond grinding	N/A	N/A	3-5	4-6
Dowel bar retrofit	N/A	N/A	2-3	3-5***
Longitudinal HMA wedge/scratch coat with surface treatment	3-7	N/A	N/A	3-5****
Flexible patching	**	**	N/A	N/A
Mastic joint repair	1-3	1-3	N/A	4-7
Cape seal	4-7	4-7	N/A	4-7
Flexible interlayer “A”	4-7	4-7	N/A	4-7
Flexible interlayer “B” (SAMI)	4-7	4-7	N/A	3-7
Flexible interlayer “C”	4-7	4-7	N/A	3-7
Fiber reinforced flexible membrane	4-7	4-7	N/A	3-7
Fog seal	**	**	N/A	7-10
GSB 88	**	**	N/A	7-10
Mastic surface treatment	**	**	N/A	7-10
Scrub seal	**	**	N/A	4-8

* The time range is the expected life extending benefit given to the pavement, not the anticipated longevity of the treatment.

** Data is not available to quantify the life extension.

*** The concrete slabs must be in fair to good condition.

**** Can be used on a pavement with a PASER equal to 3 when the sole reason for rating is rutting or severe raveling of the surface asphalt layer.

† For PASER 4 or less providing structural soundness exists and that additional pre-treatment will be required for example, wedging, bar seals, spot double chip seals, injection spray patching or other pre-treatments.

[1] Part of Appendix D-1 from *MDOT Local Agency Programs Guidelines for Geometrics on Local Agency Projects* 2017 Edition Approved Preventive Maintenance Treatments

<#YOUR CONTENT HERE: If you are using the NCPP method and NOT Roadsoft—Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

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 <#NETWORK1> Roads

Table 2 illustrates the calculations for the NCPP Quick Check method of <#AGENCYSHORT>'s paved <#NETWORK1> road network. The treatments outlined in **Error! Reference source not found.** are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE: Insert the range in years appropriate to your agency's circumstance. An example is: 2018-2020>. The *Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved <#NETWORK1> roads indicate the average volume of work that <#AGENCYSHORT> has been able to afford over the last five years, <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **is**, **is not**> 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: Select from the following the word/phrase that best fits your agency's circumstance: **deficit**, **surplus**)> of <#YOUR CONTENT HERE: Insert the number of miles here, e.g. 100> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 2: NCPP Quick Check Method for Paved <#NETWORK1> Road Network – <#YOUR CONTENT HERE: Insert the number of miles in the network, e.g. 100> miles

Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile - Years
Crack Seal	50	1	50
Chip Seal	30	5	150
Overlay	10	10	100
Reconstruction	5	20	100
Total			**400**
(Deficit)/Surplus			**(100)**

The NCPP analysis of our planned projects from our currently-available budget <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **does**, **does not**> allows <#AGENCYSHORT> to reach its pavement condition goal given the projects planned for the next three years. <#YOUR CONTENT HERE: 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?>

Paved <#NETWORK2> Road

Table 3 illustrates the calculations for the NCPP Quick Check method of <#AGENCYSHORT>'s paved <#NETWORK2> road network. The treatments outlined in Table 3 are the average treatment volume of planned projects scheduled to be completed in <#YOUR CONTENT HERE: Insert the range in years appropriate to your agency's circumstance. An example is: 2018-2020>. The *Planned Projects* section of this plan provides further detail. Results from the NCPP Quick Check for the paved <#NETWORK2> roads indicate the average volume of work that <#AGENCYSHORT> has been able to afford over the last five years <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **is**, **is not**> 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: Select from the following the word/phrase that best fits your agency's circumstance: **deficit**, **surplus**> of <#YOUR CONTENT HERE: Insert the number of miles here, e.g. 100> mile-years of project benefit to stabilize this trend and maintain current conditions.

Table 3: NCPP Quick Check Method for Paved <#NETWORK2> Road Network – <#YOUR CONTENT HERE: Insert the number of miles in the network, e.g. 100> miles

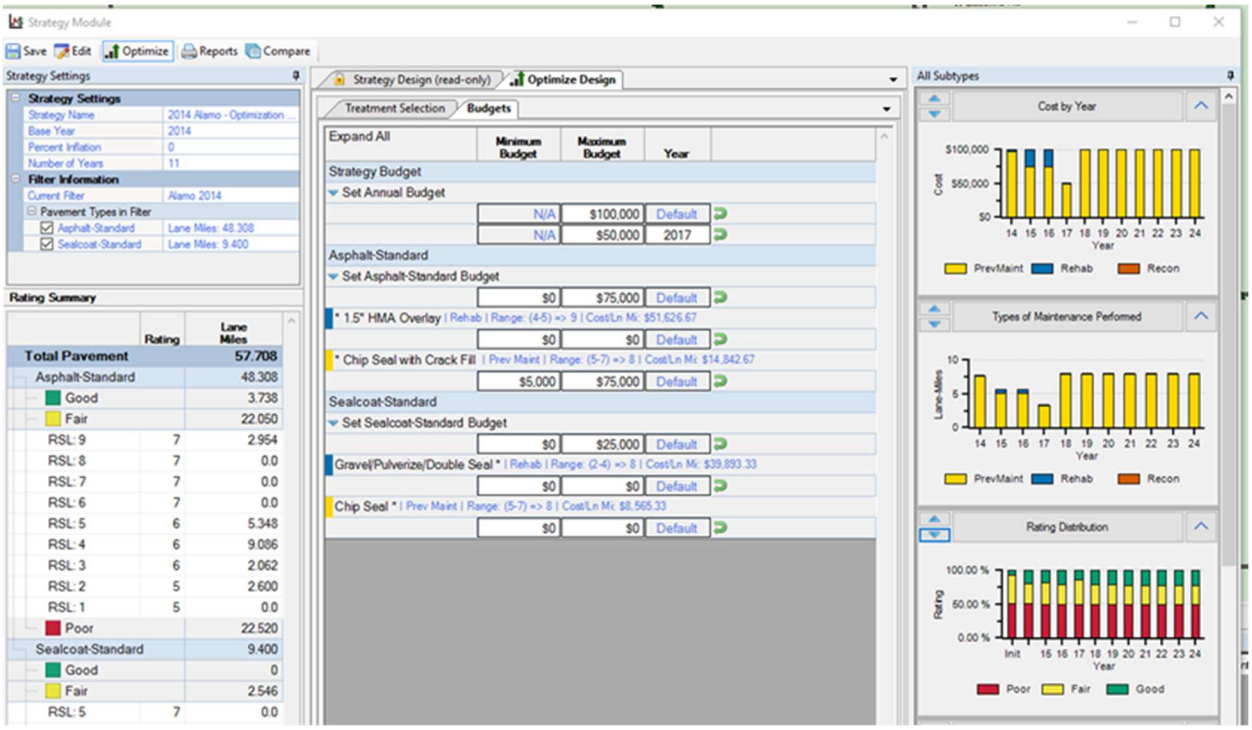
Treatment Name	Average Yearly Miles of Treatment	Years of Life	Mile - Years
Crack Seal	50	1	50
Chip Seal	60	5	300
Overlay	0	10	0
Reconstruction	1	20	20
Total			**370**
(Deficit)/Surplus			**(430)**

The NCPP analysis of our planned projects from our currently available budget <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: does, does not> allow <#AGENCY> to reach its pavement condition goals given the projects planned for the next three years.

<#YOUR CONTENT HERE: If you are using Roadsoft and NOT the the NCPP method—Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Roadsoft Pavement Condition Forecast to Forecast Future Trends

The <#AGENCYSHORT> 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 40.

Figure 40: Pavement condition forecast model in the software program Roadsoft.

Paved <#NETWORK1> Roads

Table 4 illustrates the network-level model inputs for Roadsoft on the HMA-paved <#NETWORK1> 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 by <#YOUR CONTENT HERE: Insert the range in years appropriate to your agency's circumstance. An example is: 2018-2020>. See Appendix A of this plan for details on planned projects. Full model inputs and outputs are included in Appendix D.

Table 4: Roadsoft Annual Work Program for HMA Paved <#NETWORK1> Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger - Reset
Crack Seal	50	1	7-7
Chip Seal	60	5	5,6-8
Overlay	0	10	3,4-9
Reconstruction	1	18	1,2,3-10

Results from the Roadsoft network condition model for the <#NETWORK1> roads are shown in Figure 41. The Roadsoft network analysis of our planned projects from our currently-available budget <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **does, does not**> allow <#AGENCYSHORT> to reach its pavement condition goals given the projects planned for the next three years.

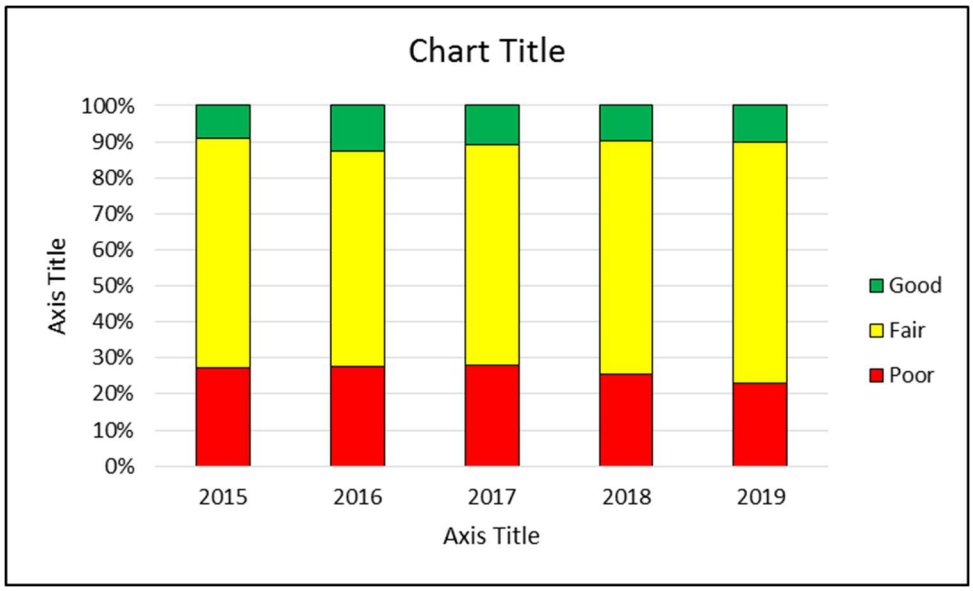


Figure 41: Forecast good/fair/poor Changes to <#AGENCYSHORT> Network Condition from planned projects on the <#NETWORK1> road network.

<#YOUR CONTENT HERE: Explain the condition trends shown in previous sections are related to the results of the Roadsoft model. Relate decreases or increase in overall condition of the network over the same period of time. Describe why there is an increase or decrease in condition.>

Paved <#NETWORK2> Road

A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 42.

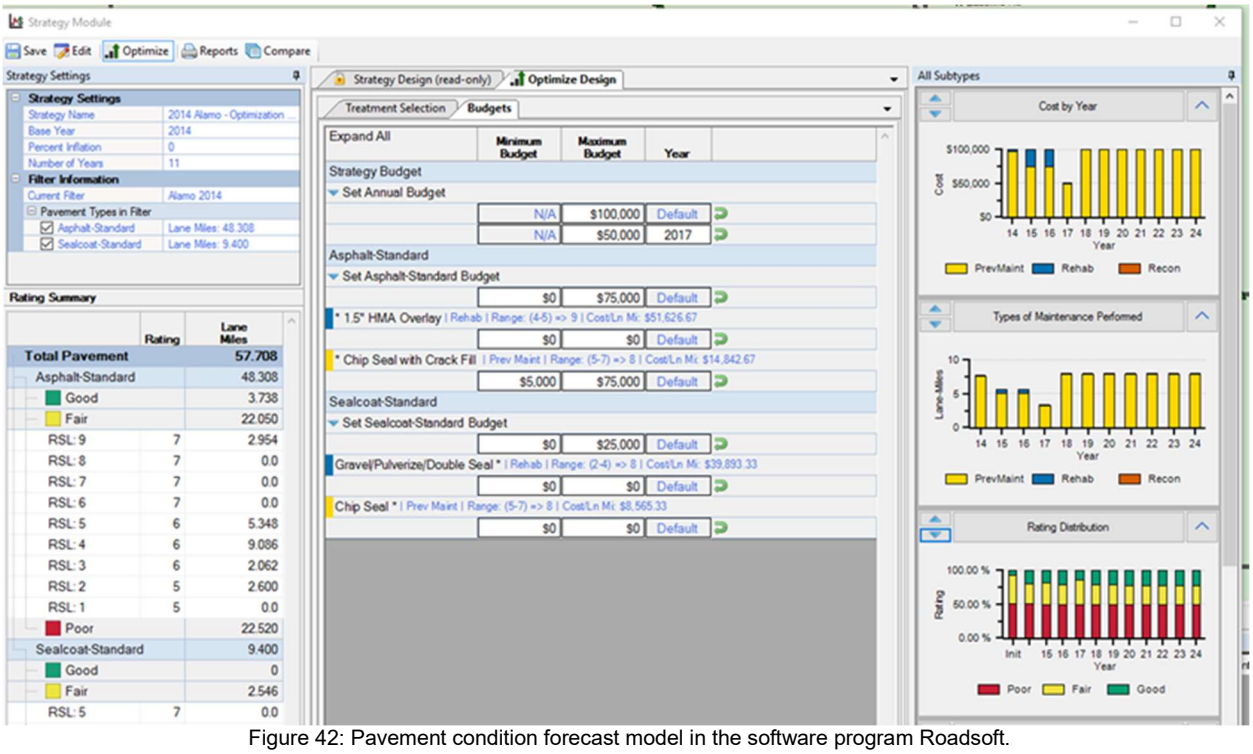


Figure 42: Pavement condition forecast model in the software program Roadsoft.

Table 5 illustrates the network-level model inputs for Roadsoft on the HMA-paved <#NETWORK2> 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 by <#YOUR CONTENT HERE: Insert the range in years appropriate to your agency's circumstance. An example is: 2018-2020>. Details on planned projects are included in Appendix A, and full model inputs and outputs are included in Appendix D.

Table 5: Roadsoft Annual Work Program for HMA-paved <#NETWORK2> Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger - Reset
Crack Seal	50	1	7-7
Chip Seal	60	5	5,6-8
Overlay	0	10	3,4-9
Reconstruction	1	18	1,2,3-10

Results from the Roadsoft network condition model for the paved <#NETWORK2> roads are shown in Figure 43. The Roadsoft network analysis of our planned projects from our currently available budget <#YOUR CONTENT HERE: Select from the following the word/phrase that best fits your agency's circumstance: **does**, **does not**> allow <#AGENCYSHORT> to reach its pavement condition goal given the projects planned for the next three years.

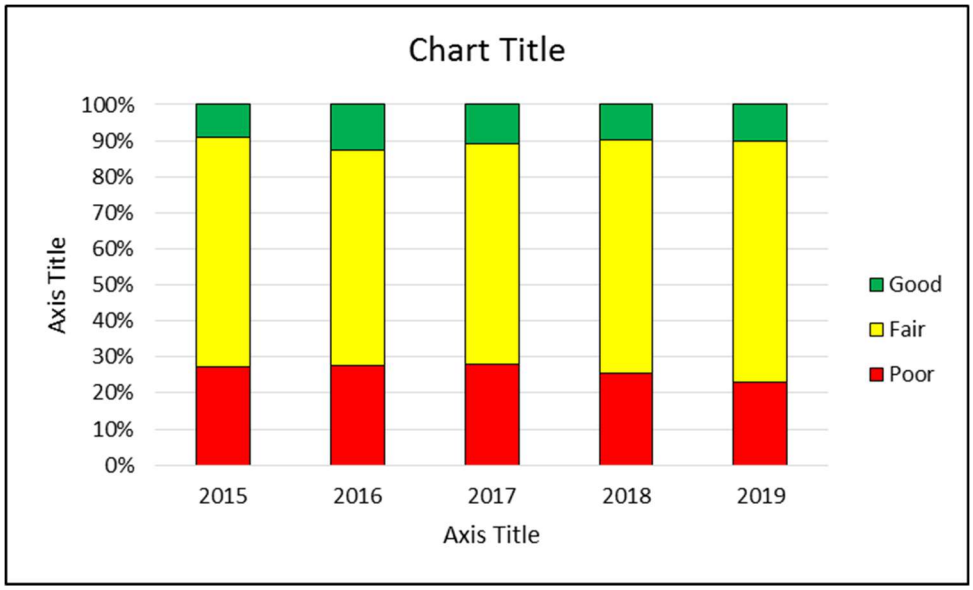


Figure 43: Forecast good/fair/poor Changes to <#AGENCYSHORT> Network Condition from planned projects on the paved <#NETWORK2> road network.

<#YOUR CONTENT HERE: Explain the condition trends shown in previous sections and how they are related to the results of the Roadsoft model. Relate decreases or increase in overall condition of the network over the same period of time. Describe why there is an increase or decrease in condition.>

<#YOUR CONTENT HERE: If you are using neither Roadsoft nor the NCPP method but another method—Create applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Title - Heading 4

Body

<#YOUR CONTENT HERE: If unpaved roads condition trends are applicable for your agency's plan—Use and/or modify content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Unpaved Road Condition Trends

<#YOUR CONTENT HERE: Since only a limited unpaved road condition history is likely, explain the expected condition trends on the unpaved road network. Explain the strategy for maintaining gravel roads and the general quantity of work involved.>

Planned Projects

The <#AGENCYSHORT> plans construction and maintenance projects several years in advance. A multi-year planning threshold is required due to the time necessary to plan, design, and finance

construction and maintenance projects on the paved <#NETWORK1> road network. This includes planning and programming requirements from state and federal agencies that must be met prior to starting a project and can include studies on environmental and archeological impacts, review of construction and design documents and plans, documentation of rights-of-way ownership, planning and permitting for storm water discharges, and other regulatory and administrative requirements.

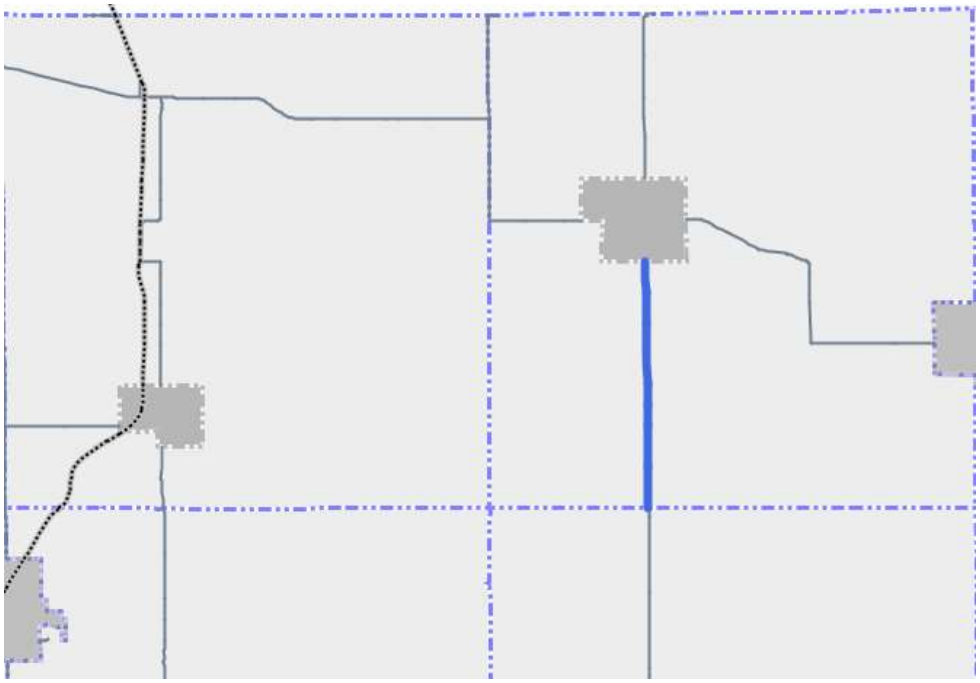
Per PA 499 of 2002 (later amended by PA 199 of 2007), road projects for the upcoming three years are required to be reported annually to the TAMC. Planned projects represent the best estimate of future activity; however, changes in design, funding, and permitting may require the <#AGENCYSHORT> to alter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

For <#YOUR CONTENT HERE: Insert Year Span>, <#AGENCYSHORT> plans to do the following projects:

Paved <#NETWORK1> Projects

The <#AGENCYSHORT> is currently planning the construction and maintenance projects listed in Appendix A for the paved <#NETWORK1> road network. The locations of these projects are shown in Figure 44, Figure 45, and Figure 46. The total cost of these projects is approximately <#YOUR CONTENT HERE: Insert your cost in $ XXX,XXX format>.

Figure 44: Map showing paved <#NETWORK1> road projects planned for 2018
Figure 45: Map showing paved <#NETWORK1> road projects planned for 2019.



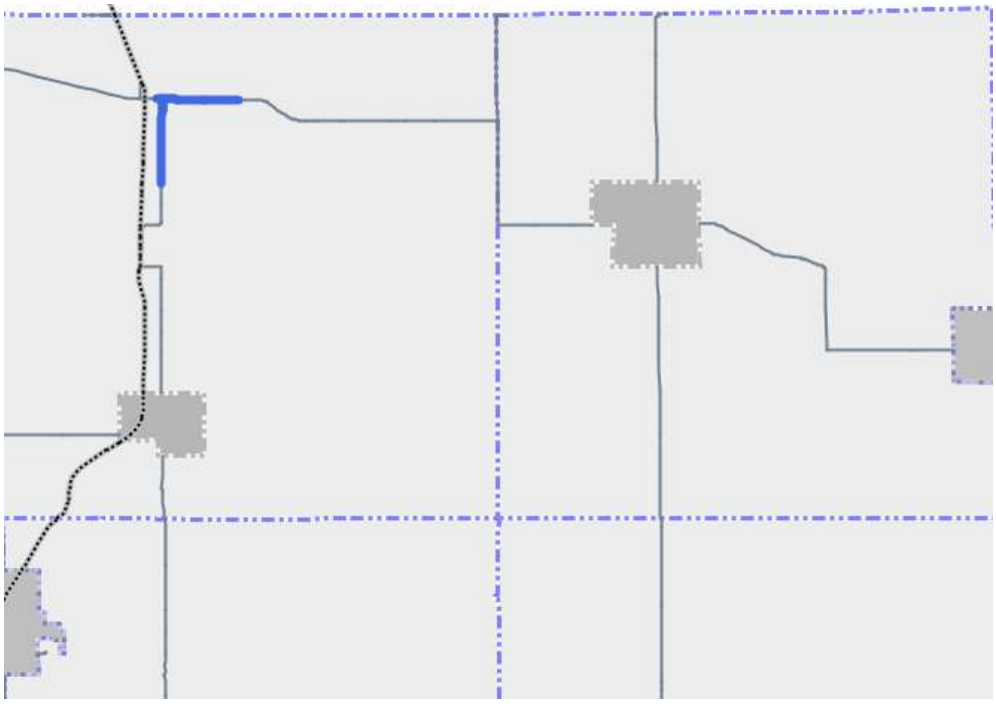


Figure 46: Map showing paved <#NETWORK1> road projects planned for 2020.

Paved <#NETWORK2> Projects

The <#AGENCYSHORT> is currently planning the construction and maintenance projects listed in Appendix B for the paved <#NETWORK2> road network. The locations of these projects are shown in Figure 47, Figure 48, and Figure 49. The total cost of these projects is approximately <#YOUR CONTENT HERE: Insert your cost in $ XXX,XXX format.>.

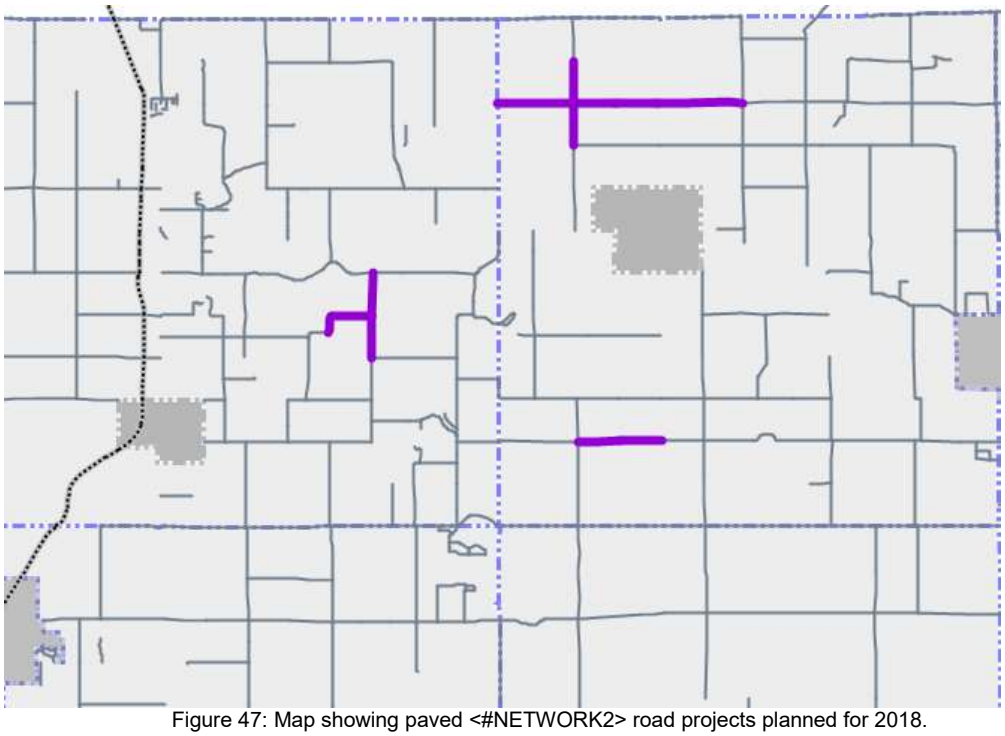


Figure 47: Map showing paved <#NETWORK2> road projects planned for 2018.

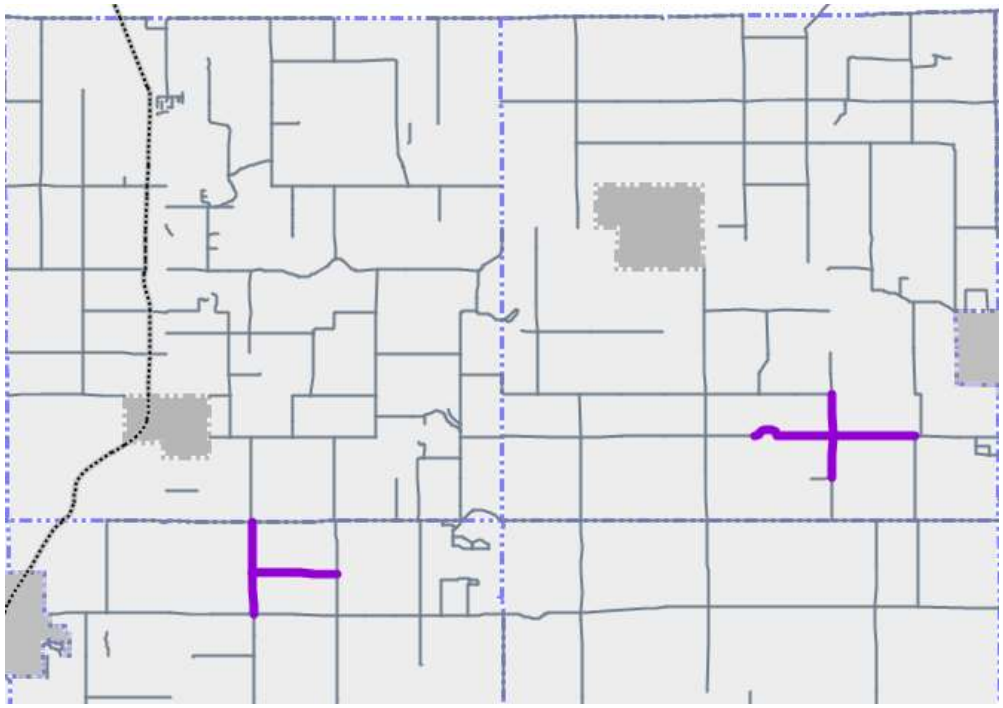


Figure 48: Map showing paved <#NETWORK2> road projects planned for 2019.

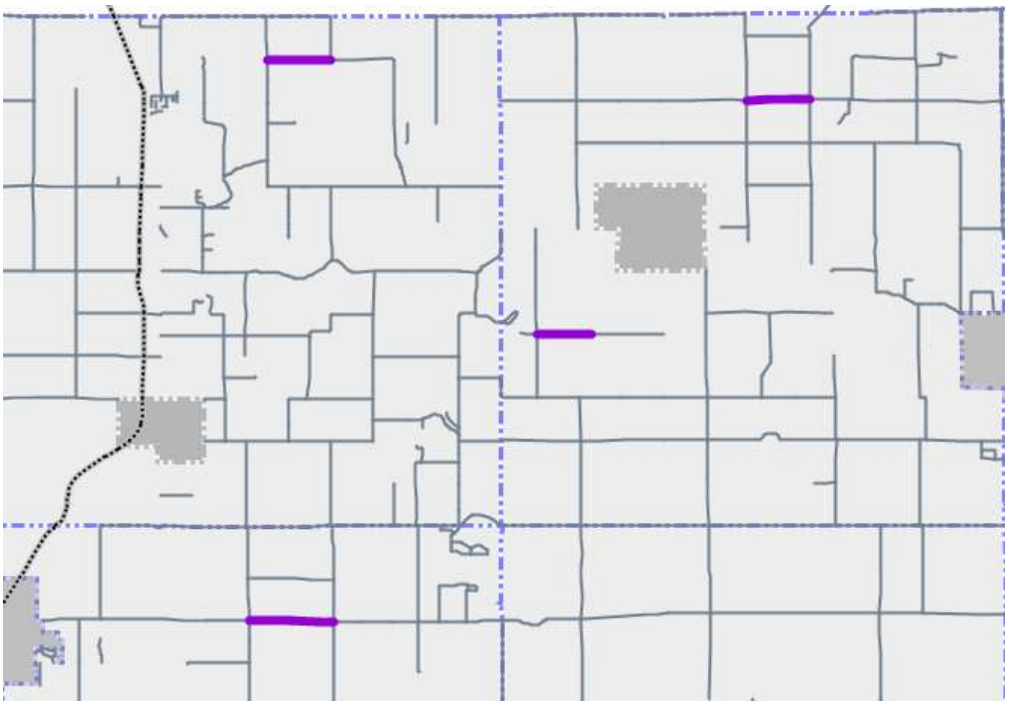


Figure 49: Map showing paved <#NETWORK2> road projects planned for 2020.

Unpaved Road Projects

The <#AGENCYSHORT> is currently planning the construction and maintenance projects listed in Appendix C for the unpaved road network. The location of these projects are shown in Figure 50. The total cost of these projects is approximately <#YOUR CONTENT HERE: Insert your cost in $ XXX,XXX format>.

<#YOUR CONTENT HERE: Detail the significant projects your agency plans to complete, address differences in project volume between your Federal-aid paved, non-Federal-aid paved, and/or unpaved road networks.>

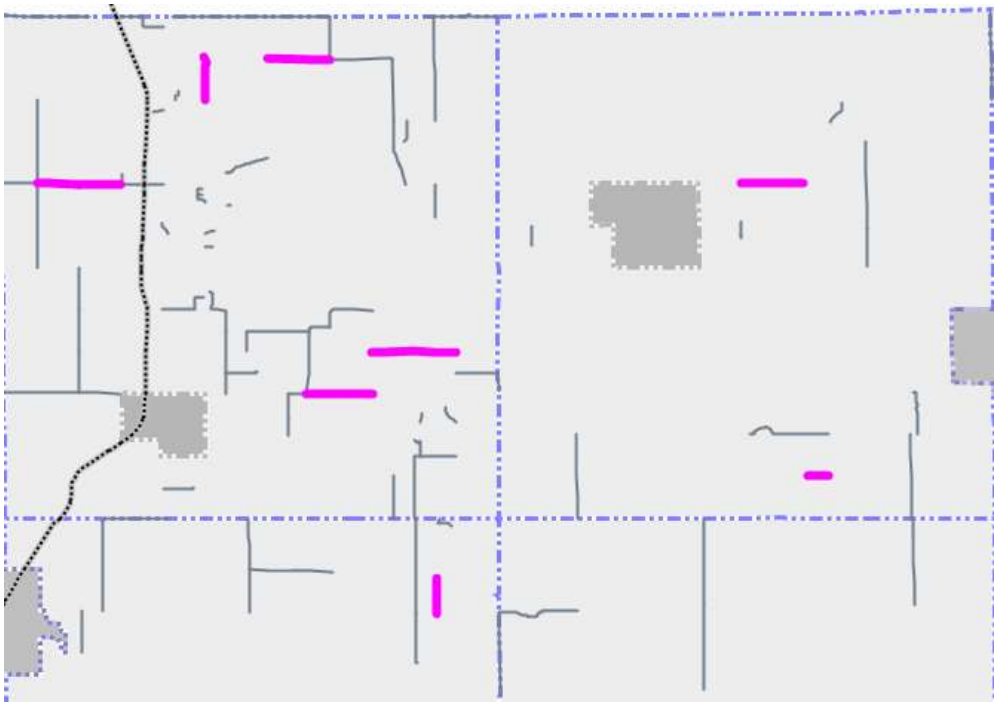


Figure 50: Map showing unpaved road projects planned for 2018-2020.

More detailed information on these projects can be found in Appendix ##.

Gap Analysis

The current funding levels that <#AGENCYSHORT> receives are not sufficient to meet the goals for the paved <#NETWORK1> road network, the paved <#NETWORK2> road network, and the unpaved road network. The *1. Pavement Assets: Goals* section of this plan provides further detail about the goals and the *1. Pavement Assets: Modelled Trends* section provides further detail on the shortfall given the current budget. However, <#AGENCYSHORT> believes that the overall condition of this network can be maintained or improved with additional funding for construction and maintenance. An alternate strategy may be used to overcome the current shortfall and meet the goals on the paved <#NETWORK1> road network, the paved <#NETWORK2> road network, and the unpaved road network:

<#YOUR CONTENT HERE: If you are using the NCPP method and NOT Roadsoft—Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

NCPP Network Quick Check to Meet Goals on the Paved <#NETWORK2> Network

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 in the *1. Pavement Assets: Modelled Trends* section of this plan illustrates the results of the NCPP Quick Check method. It shows that there will be a deficit of <#YOUR CONTENT HERE: Insert the number of deficit mile years appropriate to your agency's circumstance (e.g., 430)> mile-years of improvement on the paved <#NETWORK2> road network. To maintain current road conditions, this deficit must be overcome with a combination of maintenance and construction work.

Table 6: NCPP Quick Check Method for Paved <#NETWORK2> Road Network – <#YOUR CONTENT HERE: Insert the number of miles in the network, e.g. 100> miles—Future Annual Planned Work & Additional Work Needed to Overcome Deficit

Additional Annual Work Necessary To Overcome Deficit			
Treatment Name	**Average Yearly Miles of Treatment**	**Years of Life**	**Mile - Years**
Crack Seal	50	1	50
Chip Seal	60	5	300
Overlay	0	10	0
Reconstruction	1	20	20
Total			**370**
(Deficit)/Surplus			**(430)**
Additional Annual Work Necessary To Overcome Deficit			
Chip Seal	40	5	200
Overlay	13	10	130
Reconstruction	5	20	100
Total			**430**
(Deficit)/Surplus			**0**

Table 6 outlines the additional project work that would be required for the paved <#NETWORK2> road network to meet its goal of maintaining <#YOUR CONTENT HERE: Insert the year appropriate to your agency's circumstance> road conditions. This additional work is anticipated to cost approximately <#YOUR CONTENT HERE: Insert the cost appropriate to your agency's circumstance in $XXXXXX format> per year.

<#YOUR CONTENT HERE: If you are using Roadsoft and not the NCPP method—Use/modify applicable content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Roadsoft Pavement Condition Forecast for the Paved <#NETWORK2> Network

The <#AGENCYSHORT> used Roadsoft to forecast the necessary additional construction and maintenance work for meeting agency goals on the paved <#NETWORK2> road network. Table 7 illustrates the network-level model inputs used for this simulation (Table 9). Full model inputs and outputs are included in Appendix D.

Table 7: Roadsoft Annual Work Program for HMA Paved <#NETWORK2> Road Network Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger - Reset
Crack Seal	50	1	7-7
Chip Seal	100	5	5,6-8
Overlay	13	10	3,4-9
Reconstruction	6	18	1,2,3-10

Results from the Roadsoft network condition model given the inputs in Table 7 are shown in Figure 51 below. Results indicate that the necessary additional work needed to meet the agency condition goal would cost and additional <#YOUR CONTENT HERE: Insert the cost appropriate to your agency's circumstance in $XXX,XXX format> per year.

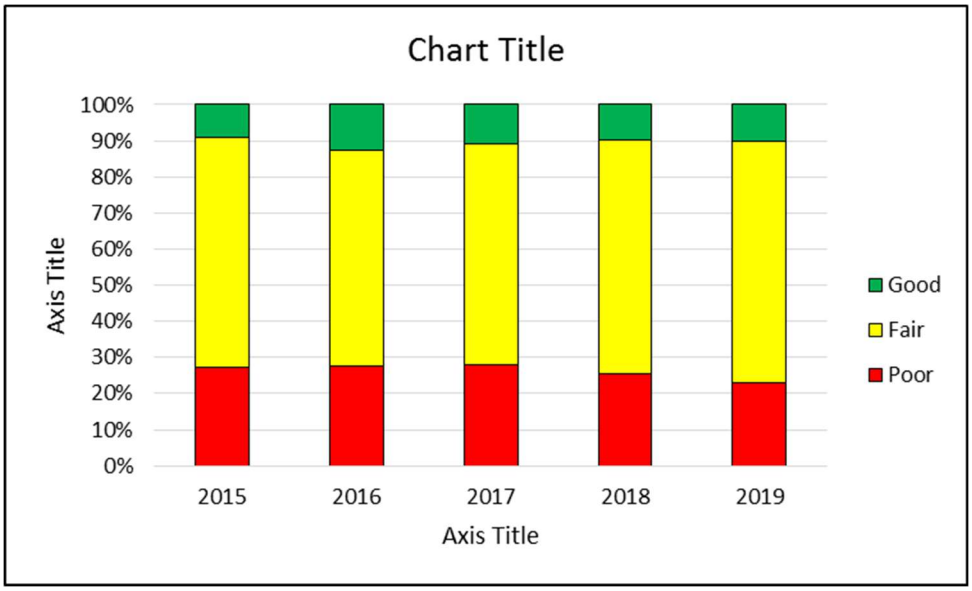


Figure 51: Forecast good/fair/poor Changes to <#AGENCYSHORT> Network Condition from planned projects on the <#NETWORK2> paved road network.

<#YOUR CONTENT HERE: Explain the condition trends shown in previous sections and how they relate to the results of the Roadsoft model. Relate decreases or increase in overall condition of the network over the same period of time. Describe why there is an increase or decrease in condition.>

2. BRIDGE ASSETS

<#AGENCYSHORT> seeks to implement a cost-effective program of preventive maintenance to maximize the useful service life of the local bridges under its jurisdiction. A comprehensive asset management plan for <#AGENCYSHORT>'s bridge network is available <#YOUR CONTENT HERE: in Appendix ##/on our website or by request from our agency's office>.

Inventory of Assets

Locations and sizes of each asset can be found in <#AGENCYSHORT>'s MiBRIDGE database. For more detail, please contact:

Insert contact info

The current condition of <#AGENCYSHORT>'s bridge network is <##ofGOOD> structures rated good, <##ofFAIR> structures rated fair, and <##ofPOOR> structures rated poor according to the National Bridge Inspection Standards rating scale.

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. <#AGENCYSHORT> has <##ofPOSTED> structures that are posted for load restriction. 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.

Goals

The goal of the program is the preservation of our bridge network. <#AGENCYSHORT> is responsible for <##ofStructures> structures.

Modelled Trends and Planned Projects

<#AGENCYSHORT> received <##TOTALBRIDGEFUNDING> in total funding. Preventive maintenance is a more effective use of these funds that the costly alternative of major rehabilitation or replacement. Since <#AGENCYSHORT> recognizes that limited funds are available for improving the bridge network, we seek to identify those bridges that will benefit from a planned maintenance program and we plan to spend <##DOLLARSALLOTTED> per year for the next three years on preventive maintenance of bridges. <#AGENCYSHORT> plans to replace <##REPLACEBRIDGE> bridges within the next three years at a cost of <##COSTTOREPLACE> dollars. By performing the aforementioned preventive maintenance and replacement of bridge structures, <#AGENCYSHORT> should achieve its goal of keeping its overall bridge network at the same condition.

3. CULVERT ASSETS

<#YOUR CONTENT HERE: Include a short description of the state of assets in your agency here. Note that the TAMC currently does not require a formal management plan of culvert assets. Per their 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.>

<#AGENCYSHORT> exercises awareness of its culvert assets.

Inventory of Assets

Locations, types, and sizes of each asset can be found in <#AGENCYSHORT>'s <#CHOOSE: Roadsoft database/asset tracking spreadsheet/ledgers>. For more detail, please contact:

Insert contact info

At present, <#AGENCYSHORT> tracks inventory data of their culvert assets only.

At present, <#AGENCYSHORT> tracks inventory and condition data of their culvert assets. Of our tracked and rated culverts, <#AGENCYSHORT> has <##ofGOODC> culverts considered good, <##ofFAIRC> culverts considered fair, <##ofPOORC> culverts considered poor, and <##ofFAILEDC> culverts considered failed based on the culvert rating system we use (see the Introduction's Culvert Primer).

Goals

The goal of the <#AGENCYSHORT>'s asset management program is the preservation of our culvert network. <#AGENCYSHORT> is responsible for preserving <##ofCULVERTS> inventoried culverts as well as any uninventoried culverts that underlie our entire road network.

Planned Projects

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

4. TRAFFIC SIGNAL ASSETS

<#YOUR CONTENT HERE: Include a short description of the state of your traffic signal assets here. Note that the TAMC currently does not require a formal management plan of traffic signal assets. Per their 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.>

<#AGENCYSHORT> exercises awareness of its traffic sign and signal assets.

Inventory of Assets

Locations and element data of each asset can be found in <#AGENCYSHORT>'s <#CHOOSE: Roadsoft database/asset tracking spreadsheet/ledgers>. For more detail, please contact:

Insert contact info

At present, <#AGENCYSHORT> tracks only inventory data for traffic signals.

At present, <#AGENCYSHORT> tracks inventory and condition data for traffic signals. Of our <##ofSIGNALS> tracked and rated traffic signals, <#AGENCYSHORT> has <##ofSIGNALSpass> signals in passing condition and <##ofSIGNALSfail> signals with one or multiple elements in failing condition.

Goals

The goal of the <#AGENCYSHORT>'s asset management program is the preservation of our traffic signals. <#AGENCYSHORT> is responsible for preserving <##ofTOTALSIGNALS> inventoried traffic signals as well as any uninventoried traffic signals along our entire road network.

Planned Projects

<#AGENCYSHORT>'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. We also conduct replacements or repairs for those traffic signal assets reported as non-functional or as performing with reduced function. <#AGENCYSHORT> adheres to regular maintenance and servicing policies outlined in the Michigan Manual of Uniform Traffic Control Devices.

5. 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. Therefore, the <#AGENCYSHORT> will overview its general expenditures and financial resources currently devoted to pavement maintenance. This financial information is not intended to be a full financial disclosure or a formal report. Full details of <#AGENCYSHORT>'s financial status can be found at: <#YOUR CONTENT HERE: Insert a web link for your agency's full financial report>.

Anticipated Revenues

The <#AGENCYSHORT>'s principal source of transportation funding is received from the Michigan Transportation Fund (MTF). This fund is supported by vehicle registration fees and the state's per-gallon gas tax. Allocation from the MTF are distributed to state and local governmental units based on a legislated formula, which includes factors such as population, miles of certified roads, and vehicle registration fees for vehicles registered in the agency's jurisdiction.

<#YOUR CONTENT HERE: If you are an agency contracting with MDOT, use and modify this content by right-clicking the content control and then "Remove Control". Otherwise, select the control handle and use your Delete key; if desired, write alternate text.>

The <#AGENCYSHORT> receives revenue from the Michigan Department of Transportation to maintain (e.g. plow, patch, mow) the state trunklines within our jurisdictional boundary. Revenue from these maintenance contracts are received on a time and materials basis as resources are expended to maintain the State's roads. While these contracts do not allow for capital gain (profit) and only bring in revenue to cover the cost of the work, they do provide a benefit to <#AGENCYSHORT> by allowing an economy of

scale that enables us to provide better service at a lower cost for <#AGENCYSHORT>'s roads while allowing the same for the State of Michigan.

Many local agencies in Michigan use local tax millages to supplement their road-funding budget. These taxes can provide for additional construction and maintenance for new or existing roads that are also funded using MTF or MDOT funds. <#AGENCYSHORT> <#YOUR CONTENT HERE: Select one of the following words/phrases that reflects whether your agency has a local tax millage: **has**, **does not have**> local tax millages in their road-funding budget. <#YOUR CONTENT HERE: Write an explanation of the millage(s) in your agency's jurisdiction and the intended use of the funds.>

Other sources of transportation funds that <#AGENCYSHORT> receives are:

- Federal and state grants for individual projects. These are typically competitive funding applications that are targeted at a specific project type to accomplish a specific purpose. These may include safety enhancement projects, economic development projects, or other targeted funding.
- Construction project funding from private developers or governmental entities for specific improvements. This category includes funding received to mitigate the impact of commercial developments as a condition of construction of a specific development project, and can include funds from a special assessment district levied by another governmental unit.
- Permit fees, which generally cover the cost of a permit application review.
- Interest from invested funds.
- Funds from partner agencies who contract with our agency to construct or maintain their roads, or roads under joint or neighboring jurisdictions.

Table 8 lists the anticipated revenues for the <#FISCALYR> fiscal year.

Table 8: Anticipated Revenues for <#FISCALYR> Fiscal Year			
Revenue Source	**Estimated ($)**	**County**	**Cities and Villages**
State Funds		MFT funds (engineering, snow removal urban road and allocation) Local bridge Economic Development Funds • Target industries (A) • Urban congestion (C) • Rural primary (D) • Forest road (E) • Urban area (F) Other	State Grants (MFT allocation, winter maintenance, local bridges, economic development, and metro funds)
Federal Funds		Surface Transportation Program (STP) C Funds D Funds Bridge High Priority Other	MDOT payments to private contractors Negotiated contracts
Contributions from Local Units		City and village contributions Township contributions Other contributions County-wide millage taxes Other taxes Special assessments County appropriations Bond proceeds Note proceeds	Tax levies Special assessments Contributions from counties Contributions from adjacent Governmental units City general fund transfers City municipal street funds Capital improvement funds Bond proceeds
Interest, Rents and Other		Licenses and permits Salvage sales Interest earned Property rentals Land and building sales Sundry refunds Gain or loss on equipment Disposition Contributions from private sources Installment purchases and leases Other financing	Interest Equipment installment Purchase proceeds Miscellaneous Other
Charges for Services		Trunkline maintenance Trunkline non-maintenance	State trunkline preservation
Total			

Anticipated Expenses

<#AGENCYSHORT> is required to report transportation fund expenditures to the State of Michigan using a prescribed format with predefined expenditure categories. The definitions of these categories according to Public Act 51 of 1951 may differ from common pavement management nomenclature and practice. For the purposes of reporting under PA 51, the expenditure categories are:

Construction/Capacity Improvement Funds– According to PA 51 of 1951, this financial classification of projects includes, "new construction of highways, roads, streets, or bridges, a project that increases the capacity of a highway facility to accommodate that part of traffic having neither an origin nor destination within the local area, widening of a lane width or more, or adding turn lanes of more than 1/2 mile in length."[27]

Preservation and Structural Improvement Funds – Preservation and structural improvements are "activit[ies] undertaken to preserve the integrity of the existing roadway system."[28] Preservation includes items such as a reconstruction of an existing road or adding structure to an existing road. Pavement treatments that may fall into this classification include crush and shape or HMA overlay projects. Descriptions of these types of projects can be found in the Introduction's *Pavement Primer*.

Routine and Preventive Maintenance Funds – Routine maintenance are "actions performed on a regular or controllable basis or in response to uncontrollable events upon a highway, road, street, or bridge".[29] Routine maintenance may include items such as mowing, pothole patching and grading. Preventive maintenance activities are "planned strategy[ies] of cost-effective treatments to an existing roadway system and its appurtenances that preserve assets by retarding deterioration and maintaining functional condition without significantly increasing structural capacity".[30] Pavement treatments that may fall into this classification include chip sealing, crack sealing and concrete patching. Descriptions of these types of projects can be found in the Introduction's *Pavement Primer*.

Winter Maintenance Funds– Expenditures for snow and ice control.

Trunkline Maintenance Funds – Expenditures spent under our maintenance agreement with MDOT for maintenance we perform on MDOT trunkline routes.

Administrative Funds – There are specific items that can and cannot be included in administrative expenditures as specified in PA 51 of 1951. The law also states that the amount of MTF revenues that are spent on administrative expenditures is limited to 10 percent of the annual MTF funds that are received.

[27] Public Act 51 of 1951, 247.660c Definitions
[28] Public Act 51 of 1951, 247.660c Definitions
[29] Public Act 51 of 1951, 247.660c Definitions
[30] Public Act 51 of 1951, 247.660c Definitions

Other Funds– Expenditures for equipment, capital outlay, debt principal payment, interest expense, contributions to adjacent governmental units, principal, interest and bank fees, and miscellaneous for cities and villages.

Expenditures are broken down below for <#FISCALYR> in Table 9. Figure 52 and Figure 53 illustrate historical expenditures and historical funding sources respectively for the past three years.

Table 9: Expenditures by Fiscal Year

Expenditure Item	<#FISCALYR> Cost	Percent of Total
CCI – Construction & Capacity Improvement	<#exCCI>	<#exCCIP>
PSI – Preservation & Structural Improvement	<#exPSI>	<#exPSIP>
Routine – Routine Maintenance	<#exRM>	<#exRMP>
Winter – Winter Maintenance	<#exW>	<#exWP>
Trunkline – Trunkline Maintenance	<#exTL>	<#exTLP>
Admin – Administrative	<#exADM>	<#exADMP>
Other	<#exO>	<#exOP>

Figure 52: Historical expenditure categories

Figure 53: Historical revenue sources

<#YOUR CONTENT HERE: It is highly recommended that you include a discussion of your financial trends. Use/modify content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

Historical Trends

<#YOUR CONTENT HERE: Explain the historical trends. How have funding levels changed in the past five years? How have the costs of maintaining their roads changed in the past five years? Detail your agency's historical equipment costs, snow removal costs, construction costs, and others?>

MTF Funding Trends

<#YOUR CONTENT HERE: Explain the MTF trends in your agency's budget. Is the historical trend of the MTF going up or down? For information on the MTF, visit http://www.michigan.gov/mdot/0,4616,7-151-9620_67094---,00.html and select "New Revenue Package". How is the MTF divided out between MDOT, counties, and cities?>

Local Agency Funds

<#YOUR CONTENT HERE: Explain local agency funding that impacts your budget. Have there been any specific millage approvals or proposals that may change the financial outlook? Are there any private development projects or partnering projects that will add significantly to the overall network condition?>

6. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by <#AGENCYSHORT> provides road users with multiple alternate options in the event of an unplanned disruption of one part of the system. There are, however, key links in the transportation system that may cause significant inconvenience to users if they are unexpectedly closed to traffic. Figure 54 illustrates the key transportation links in <#AGENCYSHORT>'s road network, including those that meet the following types of situations:

- **Geographic divides:** Areas where a geographic feature (river, lake, mountain or limited access road) limits crossing points of the feature
- **Emergency alternate routes for high-volume roads:** Roads which are routinely used as alternate routes for high volume roads or roads that are included in an emergency response plan
- **Limited access areas:** Roads that serve remote or limited access areas that result in long detours if closed
- **Main access to key commercial districts:** Areas where large number or large size business will be significantly impacted if a road is unavailable.

Our road network includes the following critical assets: <#YOUR CONTENT HERE: Explain the condition of these links and any mitigating factors or plans that could be used to lessen the impact of a failure> (see Figure 54).

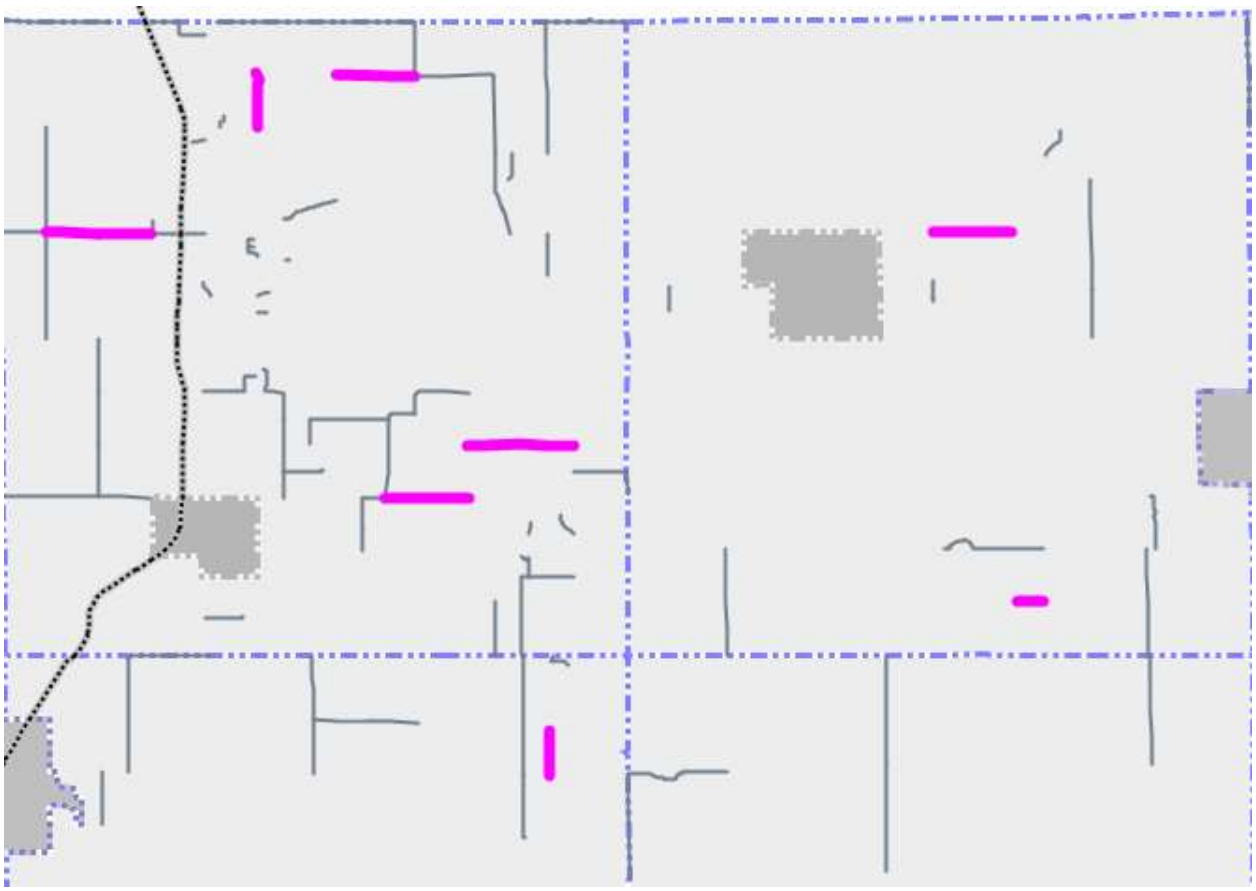


Figure 54: Key transportation links in <#AGENCYSHORT>’s road network

7. COORDINATION WITH OTHER ENTITIES

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

<#YOUR CONTENT HERE: Use/modify the sample content by right-clicking the content control and then "Remove Control"; otherwise, select the control handle and use your Delete key.>

<#YOUR CONTENT HERE: Explain on how the agency coordinates with other asset owners. This can be internal to the agency, such as including a short description of an integrated asset management processes for municipalities illustrating how water and sewer assets the municipality are considered when determining pavement projects, with a link to the agency's water and sewer asset management plan. This could also include holding an annual infrastructure summit that includes invitations to all public and private utility owners where future planned projects are presented to other infrastructure owners in an attempt to coordinate. This section is intended to show tax payers the thought and planning that goes into coordination of infrastructure projects.>

EXAMPLE COORDINATED PLANNING TEXT

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

Planned projects for subsurface infrastructure that <#AGENCYSHORT> owns are listed in the following asset management plans: drinking water distribution system asset management plan, wastewater collection system asset management plan, storm sewer system asset management plan. These three sub-

surface utility plans are coordinated with the transportation infrastructure plans to maximize value and minimize service disruptions and cost to the public.

<#AGENCYSHORT> takes advantage of coordinated infrastructure work to reduce cost and maximize value using the following policies:

- Roads which are in poor condition that have a subsurface infrastructure project planned which will destroy more than half the lane with will be rehabilitated or reconstructed full width using transportation funds to repair the balance of the road width.
- Subsurface infrastructure projects which will cause damage to pavements in good condition will be delayed as long as possible, or will consider methods that do not require pavement cuts.
- Subsurface utility projects will be coordinated to allow all under pavement assets to be upgraded in the same project regardless of ownership.
- Road reconstruction projects will not be completed until agency owned sub surface utilities are upgraded to have at least a 40 years of remaining service life.

EXAMPLE SUMMIT TEXT

Annually <#AGENCYSHORT> convenes an infrastructure planning summit in the first quarter of the year. Representatives from all of the major public and private infrastructure owners that have assets in the road right of way are provided notice for the meeting and are invited to attend. An attempt is made to coordinate the schedule of the event to allow the majority of infrastructure owners to attend.

<#AGENCYSHORT> provides all attendees of the infrastructure planning summit with a list of all planned road projects for the next three years that include new pavement structure. Infrastructure owners are encouraged to discuss planned projects that would disrupt transportation services or cause damage to pavements. Projects which may cause damage to pavements in good or fair condition are discussed and mitigation measures are proposed to minimize the impact to pavements. Mitigation measures could include rescheduling and coordinating projects to maximize value and minimize disruptions and cost to the public.

8. PROOF OF ACCEPTANCE

PUBLIC ACT 325

CERTIFICATION OF TRANSPORTATION ASSET MANAGEMENT PLAN

Certification Year: _____

Local Road-owning Agency Name: _____

Beginning October 2019 and on a three-year cycle thereafter, certification must be made for compliance to Public Act 325. A local road-owning agency with 100 certified miles or more must certify that it has developed an asset management plan for the road, bridge, culvert, and traffic signal assets. Signing this form certifies that the hitherto referred agency meets with minimum requirements as outlined by Public Act 325 and agency-defined goals and objectives.

This form must be signed by the chairperson of the local road-owning agency or the county executive and chief financial officer of the local road-owning agency.

Signature		Signature	
Printed Name		Printed Name	
Title	Date	Title	Date

Due every three years based on agency submission schedule

Submittal Date: _____

See attached council meeting minutes and/or resolution.

APPENDIX A: <#YOUR CONTENT HERE: INSERT THE RANGE IN YEARS APPROPRIATE TO YOUR AGENCY'S CIRCUMSTANCE. AN EXAMPLE IS: 2018-2020> PAVED <#NETWORK1> ROAD PLANNED PROJECTS

APPENDIX B: <#YOUR CONTENT HERE: INSERT THE RANGE IN YEARS APPROPRIATE TO YOUR AGENCY'S CIRCUMSTANCE. AN EXAMPLE IS: 2018-2020> PAVED <#NETWORK2> ROAD PLANNED PROJECTS

APPENDIX C: <#YOUR CONTENT HERE: INSERT THE RANGE IN YEARS APPROPRIATE TO YOUR AGENCY'S CIRCUMSTANCE. AN EXAMPLE IS: 2018-2020> UNPAVED ROAD PLANNED PROJECTS

APPENDIX D

A Quick Check of Your Highway Network Health

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

Jim Sorenson, Team Leader, FHWA Office of Asset Management

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

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

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

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

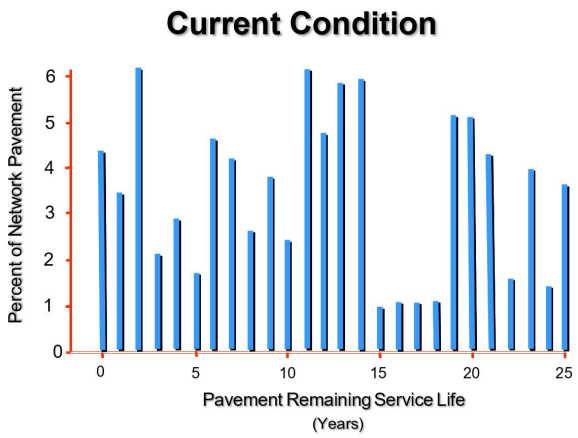


Figure 1 – Current Condition

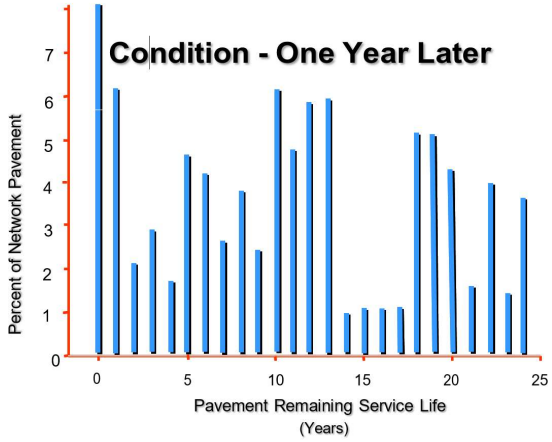


Figure 2 – Condition 1-Year Later

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

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

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

Agency Highway Network = 4,356 lane miles

Each year the network will lose

4,356 lane-mile-years

Figure 3 – Network Lane Miles

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

status quo. However, if the agency produces more than 4,356 lane-mile-years, it will improve the network.

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

Reconstruction Evaluation

Projects this Year = 2

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

Figure 4 - Reconstruction

Rehabilitation Evaluation

Projects this Year = 3

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

Figure 5 – Rehabilitation

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

Preservation Evaluation

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

Figure 6 – Preservation

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

Network Trend

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

Figure 7 – Programmed Tally

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

Once the pavement network is benchmarked, an opportunity exists to correct any shortcomings in the programmed tally. A decision must first be made whether to improve the

network condition or just to maintain the status quo. This is a management decision and system goal.

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

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

Program Modification

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

Figure 8 – Revised R & R Programs

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

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

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

Figure 9 – New Program Tally

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

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

APPENDIX E: ROADSOFT NETWORK-LEVEL MODEL INPUTS AND OUTPUTS

APPENDIX F: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY

2019 Fall Transportation Asset Management Conference

SAVE THE DATE

October 30, 2019

Marquette, MI

7:30 am - 4:00 pm

Holiday Inn of Marquette

1951 US-41, Marquette, MI 49855

Michigan Transportation Asset Management Council

Memo

To: TAMC

From: Roger Belknap, TAMC Coordinator

Date: August 2, 2019

Re: Review Draft Policy for Submittal and Review of Asset Management Plans

Recommendation for the TAMC

The TAMC ACE Committee has taken action to recommend full TAMC review of the Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 and Public Act 338 of 2006 (DRAFT 7-23-19). This policy should be contemplated alongside developments of the TAMC Transportation Asset Management Plan (TAMP) template and modifications to the TAMC Investment Reporting Tool (IRT) applications as these are integral to the overall task of TAMC's administration of TAMP submittals, review and certification.

Background

The TAMC is aware of the requirements per Public Act (PA) 325. PA 325 modifies TAMC's program to include requirements for asset management plans from local road agencies. No later than October 1, 2019, the TAMC shall develop a template for an asset management plan as well as establish a schedule of due dates of these plans for agencies that certify 100 miles of road or more. TAMC has taken action to identify the schedule of due dates of these plans as communicated in the letter to Public Act 51 agencies on November 20, 2018. This policy, when adopted, should provide direction to TAMC, support staff and contractors of TAMC and local agencies that have TAMP requirements. The policy should clarify the elements required, methodology of submittal and procedures of review and certification as well as communication steps along the process.

Attachments with Agenda Packet

Attachment 5 is the current Draft (dated 7-23-19) of the Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 and Public Act 338 of 2006 that has been approved by ACE Committee on July 10, 2019.

Summary

We recommend the TAMC discuss the draft policy language, taken in consideration with draft TAMC TAMP template and Investment Reporting Tool (IRT) modifications. Further, it is recommended that TAMC adopt a policy for the submittal, review and certification of TAMPs prior to the October 1, 2019 date. Additionally, TAMC should develop and submit communication materials regarding this policy, TAMP template and due dates prior to the October 1, 2019 date.

Michigan Transportation Asset Management Council

Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 & PA 338 of 2006

The Transportation Asset Management Council adopted this policy on _____.

Introduction:
The Transportation Asset Management Council (TAMC) was established to expand the practice of asset management statewide to enhance the productivity of investing in Michigan's roads and bridges. Recent amendments to Public Act 51 have outlined additional responsibilities for TAMC to develop a template and a schedule for the submittal of asset management plans from road-owning agencies. This document describes the policy, submission procedures and required elements for these asset management plans as well as role of TAMC and the Michigan Department of Transportation (MDOT) to receive, review and determine compliance with the public act.

Asset Management Planning for Agencies Not Subject to PA 325 Requirements:
PA 325 amended Public Act 51 of 1951 to require road agencies responsible for 100 or more certified centerline mile of public roads to submit asset management plans to TAMC. Agencies that certify less than 100 miles of roads do not have asset management plan submittal requirements under this PA 325 requirement. The Michigan Department of Transportation (MDOT) is not subject to the asset management plan submittal requirement as the Federal Highway Administration provides oversight of asset management plans coming from state transportation departments. TAMC does encourage all road agencies regardless of size to utilize asset management training programs, the TAMC Asset Management Plan Template and processes to assist in management of public road systems and transportation assets. Cities and Villages that are not required to submit asset management plans in response to Public Act 325 of 2018, but that choose to do so in order to shift funding in accordance with MCL 247.663 (Public Act 338 of 2006) shall follow the same procedures for plan submittal and will receive the same review and notification.

Submission of Asset Management Plans to TAMC:
As directed in Public Act 325 of 2018, no later than October 1, 2019, the TAMC shall develop a schedule for due dates of asset management plans by local road agencies responsible for 100 or more certified miles of roads and require its submission to the TAMC.

In 2007, TAMC created the Investment Reporting Tool (IRT) for road agencies to submit road and bridge project information for past and future reporting. In 2017, the IRT was enhanced to allow online submittal of asset management plans and other condition data.

Agencies required to submit asset management plans to remain in compliance with the new law are required to directly submit or coordinate submittal of their asset management plan files using the IRT. The IRT will provide acknowledgement of receipt for files submitted through electronic email sent to the address of the IRT account from which the files were uploaded. TAMC Support Staff will also receive electronic email notification of asset management plan submittals into the IRT from road agencies.

Asset Management Plan Template:
As directed in Public Act 325 of 2018, no later than October 1, 2019, the TAMC shall develop a template for an asset management plan for use by local road agencies responsible for 100 or more certified miles of road and required to submit reports to the TAMC. The TAMC will provide public, digital access to the asset management plan template by making it available for download on the TAMC website; TAMC will also provide for direct distribution of the template through electronic email upon request. TAMC will also provide training and workshops as part of the TAMC Work Program to assist agencies with the creation of their asset management plans.

Asset Management Plan Elements:
The TAMC Asset Management Plan Template outlined above will contain all seven elements required of asset management plans as outlined in Public Act 325 of 2018. The basis of review by TAMC and certification of submitted plans for compliance to this act are the following elements and a defined multi-year capital program; guidance on these elements is provided in italics:

(a) Asset inventory, including the location, material, size, and condition of the assets, in a format that allows for and encourages digital mapping. All standards and protocols for assets shall be consistent with government accounting standards. Standards and protocols for assets that are eligible for federal aid shall be consistent with federal requirements and regulations.

Specific transportation assets included in this inventory, at a minimum, will include roadway surfaces on the County Primary and City Major system and all bridge structures. Until TAMC develops guidance on traffic signals and culverts at a statewide level, road agencies are only required to include a short description of the current status of these two assets within the agency. The TAMC Asset Management Plan Template will include a placeholder section for these asset classes; agencies with inventories and condition data on these and other asset classes are encouraged to incorporate these into their asset management plan.

"Inventory" and "location": These requirements are currently met since the entire public road system is on the framework base map, and all public bridges are located in the MI Bridge system.

"Format that allows digital mapping": Local road agencies using Geographic Information Systems (GIS) must be able to translate location data in their GIS system to the current Michigan framework base map. Limited extent (less than ten) assets that are not kept in a GIS system should be located using the "on/from" system using framework base map road and intersection names.

"Material, size and condition": Currently the TAMC requires this data to be updated for 50% of the federal aid eligible roads, each year using the Pavement Surfaced Evaluation and Rating (PASER) and Inventory Based Rating (IBR) systems. Bridges are as required by federal inspection requirements. This data should also be collected for non-federal aid eligible roads, but there is no minimum requirement.

(b) Performance goals, including the desired condition and performance of the assets, which shall be set by the local road agency. Performance goals may vary among asset classes under the local road agency's jurisdiction. If a local road agency has jurisdiction over roads or bridges that are designated as part of the federal National Highway System, performance goals for that portion of the system shall be consistent with established federal performance targets.

"Performance goals": It is suggested that these goals be set relative to a condition state that the public can understand. For example: Agency will maintain overall paved road conditions at or

better than their 2017 condition of XX% Good and Fair roads. Goals are aspirational, but yet achievable and should be set as such.

"National Highway System (NHS) performance goals": The Michigan Department of Transportation (MDOT) sets statewide performance targets for the NHS system in Michigan. Metropolitan Planning Organizations then have the option of adopting the statewide targets or committing to a quantifiable target for their area. If an MPO adopts the statewide target, they agree to plan and program projects that contribute toward the accomplishment of the statewide performance targets. Local road agency owners of the NHS system, while not required to meet this state wide goal on the individual parts of the NHS that they own, are expected to plan and program projects that will contribute to meeting state goals. As such, the locally owned NHS system should be maintained in a condition that is as good or better than the rest of the federal aid eligible road system within in each local agency as illustrated by comparative PASER ratings..

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

"Risk of failure": At a minimum, a local road agency will identify the critical linkages in their system that, if not functioning, will cause disruptions to the road users. Critical linkages could include roads or bridges, regardless of condition, that serve either high traffic areas, or link disparate population or industrial centers. Critical linkages could also include assets in poor condition that are likely to cause disruptions or risks to road users.

(d) 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.

"Revenues and expenses": This is not intended to be a detailed financial report, but rather a high level assessment of agency funding. Reporting expenses via the Act 51 Distribution and Reporting System (ADARS) system meets this requirement. As with MCL 247.668j (c) A financial performance dashboard that contains information on revenues, expenditures, and unfunded liabilities. Local road agencies may link to financial information provided by the TAMC.

"Infrastructure repair and replacement expenditures": This requirement is met by complying with the TAMC existing investment reporting requirement.

(e) Performance outcomes, including a determination of how the local road 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 and a description and explanation of any gap between achievable condition and performance through the investment strategy and desired goals.

"Performance outcomes": Performance outcomes are the anticipated condition of the asset as a whole from five to ten years in the future, using a quantitatively based prediction method. Prediction methods can include modeling by pavement management software, historical trends, or service cycle based methods such as the National Center for Pavement Preservation network quick check.

(f) A description of any plans of the asset owner to coordinate with other entities, including neighboring jurisdictions and utilities, to minimize duplication of effort regarding infrastructure preservation and maintenance.

"plans of the asset owner to coordinate with other entities": At a minimum, this should include a narrative describing the process for publicly announcing planned projects, and coordinating with agencies responsible for other transportation services or other infrastructure, including buried infrastructure both public and private.

(g) Proof of acceptance, certification, or adoption by the local road agency's governing body.

"Proof of acceptance": At a minimum a board or council approved action to accept the asset management plan. This can be in the form of minutes or resolution.

(h) Multi-year Program, Asset Management Plans will also contain a multi-year program containing road and bridge projects. The projects contained in multiyear program shall be consistent with the asset management process and asset management plan of that local road agency and shall be reported consistent with categories established by TAMC. This includes annual reporting with TAMC's Investment Reporting Tool (IRT), ensuring identified projects in the multi-year program are included with estimated costs, scope and dates of planned activities.

Projects that are planned for future years will meet the general intent of the strategy outlined by the plan. For example: a local road agency cannot detail a strategy to accomplish its goals using a mix of preventive maintenance and reconstruction, then propose only reconstruction projects for three years without some justification for this action.

Schedule for Asset Management Plan Submissions:
In November 2018, TAMC established a schedule for the submission of asset management plans by local road agencies that ensures that 1/3 of these local road agencies submit an asset management plan each year. Local road agencies may submit plans in earlier years, however they may not delay to a later year.

This schedule is as follows:

	October 1, 2020		October 1, 2021		October 1, 2022
1	Alger County	1	Alcona County	1	Allegan County
2	Baraga County	2	Alpena County	2	Antrim County
3	Bay County	3	Arenac County	3	Barry County
4	Berrien County	4	Benzie County	4	Branch County
5	Calhoun County	5	Charlevoix County	5	Cass County
6	Cheboygan County	6	City Garden City	6	Chippewa County
7	City of Ann Arbor	7	City of Battle Creek	7	City of Bay City
8	City of Dearborn Heights	8	City of Burton	8	City of Flint
9	City of Farmington Hills	9	City of Dearborn	9	City of Holland
10	City of Grand Rapids	10	City of Detroit	10	City of Lincoln Park
11	City of Jackson	11	City of Kalamazoo	11	City of Midland
12	City of Kentwood	12	City of Port Huron	12	City of Muskegon
13	City of Lansing	13	City of Rochester Hills	13	City of Novi
14	City of Livonia	14	City of Roseville	14	City of Pontiac
15	City of Norton Shores	15	City of Saginaw	15	City of Sterling Heights
16	City of Portage	16	City of St. Clair Shores	16	City of Warren
17	City of Romulus	17	City of Taylor	17	City of Westland
18	City of Royal Oak	18	Clare County	18	Crawford County

19	City of Southfield	19	Emmet County	19	Delta County
20	City of Troy	20	Gogebic County	20	Eaton County
21	City of Walker	21	Gratiot County	21	Gladwin County
22	City of Wyoming	22	Houghton County	22	Grand Traverse County
23	Clinton County	23	Ionia County	23	Ingham County
24	Dickinson County	24	Isabella County	24	Iron County
25	Genesee County	25	Kent County	25	Jackson County
26	Hillsdale County	26	Lake County	26	Kalkaska County
27	Huron County	27	Leelanau County	27	Keweenaw County
28	Iosco County	28	Livingston County	28	Lapeer County
29	Kalamazoo County	29	Mackinac County	29	Luce County
30	Lenawee County	30	Marquette County	30	Manistee County
31	Macomb County	31	Menominee County	31	Mecosta County
32	Mason County	32	Missaukee County	32	Montcalm County
33	Midland County	33	Montmorency County	33	Ogemaw County
34	Monroe County	34	Newaygo County	34	Oscoda County
35	Muskegon County	35	Oakland County	35	Presque Isle County
36	Oceana County	36	Ontonagon County	36	Roscommon County
37	Osceola County	37	Otsego County	37	Saginaw County
38	Ottawa County	38	Shiawassee County	38	Schoolcraft County
39	Sanilac County	39	Van Buren County	39	St. Clair County
40	St. Joseph County	40	Washtenaw County	40	Tuscola County
41	Wayne County	41	Wexford County		

Compliance Review Asset Management Plans:
As an element of ongoing compliance reviews for Public Act 51, MDOT and TAMC Support Staff will review asset management plans submitted through the IRT for completion against the asset management plan elements as outlined in Public Act 325 of 2018 and in this policy. Asset management plans that meet these required elements will be approved and notification will be provided to MDOT's Act 51 staff.

Asset management plans submitted that do not meet required elements as outlined in this policy and Public Act 325 of 2018 will be determined to be out of compliance, and the road agency will receive written notice from MDOT's Act 51 staff with directives on how to revise the asset management plan. Non-compliant agencies will also receive contact information for TAMC Support Staff in this notification. Failure to resolve non-compliance standing with Act 51 reporting requirements can lead to Act 51 funds being withheld until such a time that compliance can be determined.

Progress Towards Asset Management Plan Goals:
Beginning October 1, 2025, if the TAMC determines, and MDOT concurs, that a local road agency has not demonstrated progress toward achieving the condition goals described in its TAMP for its federal-aid eligible county primary road system or city major street system, as applicable, the TAMC shall provide notice to the local road agency of the reasons that it has determined progress is not being made. The local road agency shall provide a plan to become compliant within 6 months after receiving the notification. Guidance for progress as it pertains to this policy is as follows:

"Demonstrated progress toward achieving the condition goals": Goals are aspirational, and local road agencies should be encouraged to set them high, but realistically achievable. Demonstrated progress means that the road agency is making a good faith effort to conform to the conditions of its asset management plan through management and planning.

"Become compliant": This means the local road agency will either reassess its condition goals and strategy in their asset management plan, or develop a strategy of planned, fundable projects that will make progress towards its goals as written.

If you have any questions relating to this policy, please contact:

TAMC Asset Management Coordinator
Michigan Department of Transportation
P.O. Box 30050, 425 W. Ottawa Street
Lansing, MI 48909
(517) 230-8192
www.michigan.gov/tamc

Summary Statistics – TAMC Investment Reporting Compliance

As of August 1, 2019

Fiscal Year 2016

Counties	
Agencies Approved for Investment Reporting	83
Cities/Villages	
Agencies Approved for Investment Reporting	526
Not Approved: #1 – No Data or IRT User	2
Not Approved: #2 – IRT & ADARS Not Matching	4
Agency Not Yet Reported (Not Yet Due or Extension)	1
MDOT – Approved for Investment Reporting	1

Fiscal Year 2017

Counties	
Agencies Approved for Investment Reporting	83
Cities/Villages	
Agencies Approved for Investment Reporting	527
Not Approved: #1 – No Data or IRT User	2
Not Approved: #2 – IRT & ADARS Not Matching	2
Not Approved: #3 – IRT Status Not Updated	1
Agency Not Yet Reported (Not Yet Due or Extension)	1
MDOT – Approved for Investment Reporting (3-5-18)	1

Fiscal Year 2018

Counties	
Agencies Approved for Investment Reporting	61
Not Approved: #2 – IRT & ADARS Not Matching	1
Not Approved: #3 – IRT Status Not Updated	7
Not Approved: #4 – Needs to complete survey	7
Agencies Not Yet Submitted Act 51 Report	7

Cities/Villages	
Agencies Approved for Investment Reporting	499
Not Approved: #1 – No IRT User or Data	2
Not Approved: #3 – IRT Status Not Updated	11
Not Approved: #4 – Needs to complete survey	1
Agency Not Yet Reported (Not Yet Due)	20
MDOT – Approved for Investment Reporting (5-6-19)	1

Fiscal Year 2019

Counties	
Agencies Not Yet Due for Reporting	83
Cities/Villages	
Agencies Approved for Investment Reporting	51
Not Approved: #3 – IRT Status Not Updated	15
Not Approved: #4 – Needs to complete survey	1
Agency Not Yet Reported (Not Yet Due)	467
MDOT – Not Yet Due for Reporting	1

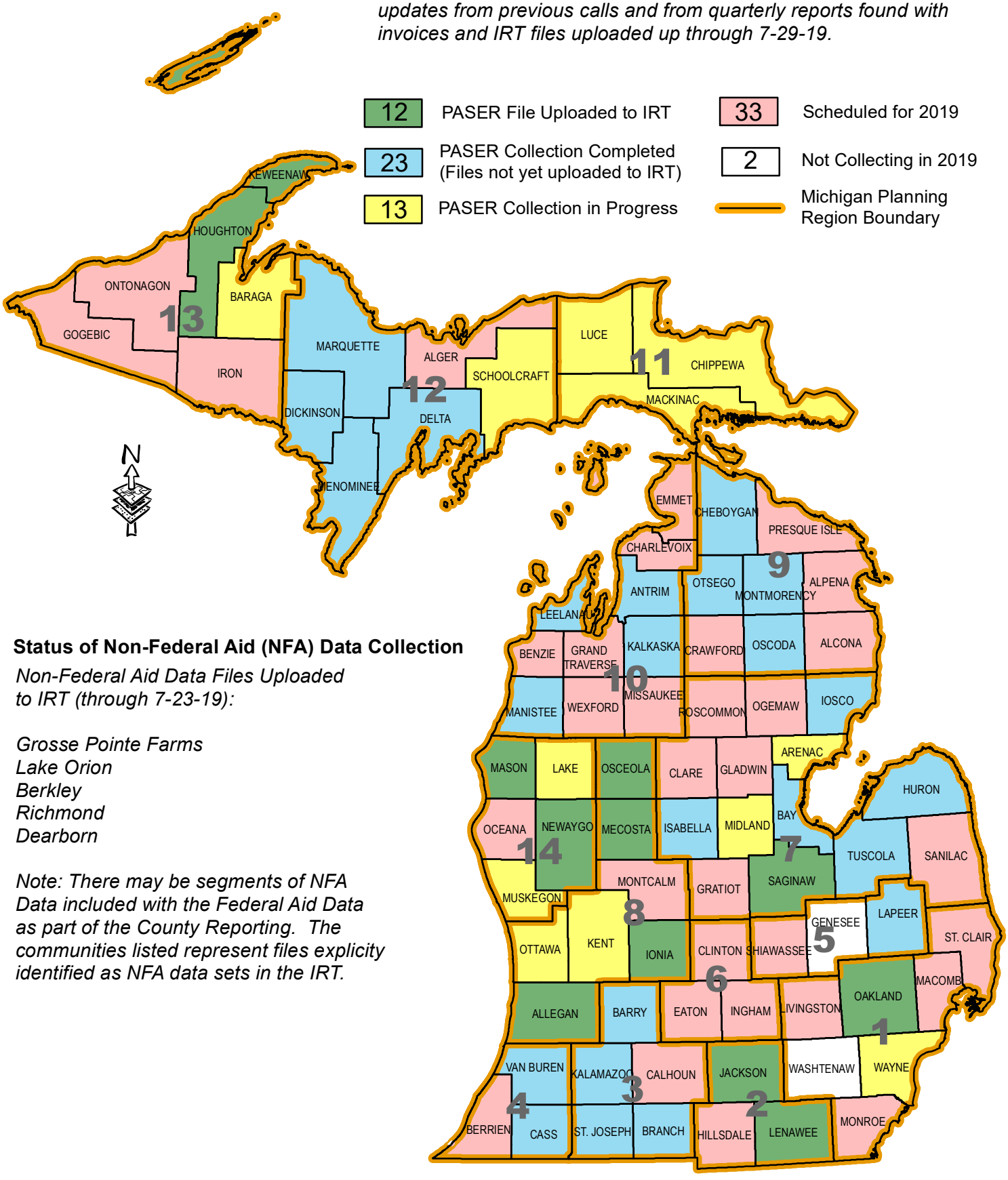
RAB 8-1-19

Michigan Transportation Asset Management Council

www.Michigan.gov/TAMC

2019 - PASER Status by County

Map indicates completion status of TAMC sponsored Federal Aid PASER Data Collection as reported by Regional Planning Agency and Metro Planning Organziation Coordinators. Data also includes updates from previous calls and from quarterly reports found with invoices and IRT files uploaded up through 7-29-19.



Status of Non-Federal Aid (NFA) Data Collection

Non-Federal Aid Data Files Uploaded to IRT (through 7-23-19):

Grosse Pointe Farms
Lake Orion
Berkley
Richmond
Dearborn

Note: There may be segments of NFA Data included with the Federal Aid Data as part of the County Reporting. The communities listed represent files explicity identified as NFA data sets in the IRT.

Reporting Period: June 1 - 30, 2019

Monthly Project Progress Report

TAMC Activities 2019

July 25, 2019

Project Manager: Roger Belknap

MDOT Contract 2018-0057 Authorization Z3

Contract Dates: 10/01/2018 – 9/30/2019

Contract Amount: $118,203

Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Task	% of Budgeted Dollars Spent	Notes
Attend Council Meetings	51%	
Attend Committee Meetings	111%	
Review Data Collection & QC Collection Results	1%	
Maintain Roadsoft-IRT Data Submission Protocols	14%	
Maintenance of PASER Training Cert. Testing Instruments & Records	4%	
Revision of the TAMC AM Plan Templates for Roads and Bridges	54%	
Undefined Staff Support	18%	
Project Management & Monthly Reporting	51%	

Current Tasks Completed

Traveled to Lansing to attend the TAMC strategic planning meeting and traveled back, attended the WAMC/TAMC joint meeting via telephone, made some updates to the 2020 PASER certification exam, worked on reviewing the Asset Management Plan Templates and making revisions, had a discussion regarding the Roadsoft IRT data submission, ideas for improvements and worked on testing, completed the May reporting and general project management.

Project's Financial Summary

June Expense Reimbursement Submitted	$11,185
Total Project Expenses to Date	$39,872
Contract Balance Available	$78,331

Reporting Period: June 1 – 30, 2019

Monthly Project Progress Report

TAMC Training 2019

July 25, 2019

Project Manager: Roger Belknap

MDOT Contract 2018-0057 Authorization Z4

Contract Dates: 01/01/2019 – 12/31/2019

Contract Amount: $219,311

Michigan Technological University

Center for Technology & Training

Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Task	% of Budgeted Dollars Spent	Notes
Assist Coordinating the MI Transportation Asset Management Conferences	59%	Spring AM Conference is completed.
Conduct MI Transportation Asset Management Workshops	0%	
Conduct Introduction to Transportation Asset Management for Local Officials Training or Gravel Road Basics for Local Officials	39%	Completed two TAM for LO training sessions. Completed one GRB for LO training session.
Conduct TAMC PASER Training	86%	Completed four PASER webinars and ten on-site PASER Trainings. TASK COMPLETED
Conduct Inventory Based Rating Training	37%	Completed three IBR Training webinars. TASK COMPLETED
Conduct Michigan Bridge Asset Management Workshop	21%	Completed one Part 1 & Part 2 webinars. Completed one on-site Bridge AM Workshop
Creating Asset Management Plan Workshops	25%	
Project Management and Reporting	41%	

Tasks Completed

Summarized the AM Conference evaluations and developed email with a fillable PDF to solicit additional feedback from conference attendees, reviewed the conference recordings; researched and updated county miles data, reviewed other ratings systems and research innovations to include on training slides for Asset Management for Local Officials class; worked on securing venues for the 2020 PASER sessions, prepared for the final 2019 PASER session, traveled to Mt. Pleasant presented the training and traveled back; prepared for the final IBR webinar, conducted the training webinar and closed out the event; summarized evaluations

from the Bridge AM workshop; reviewed the Asset Management Plan word document; completed the May reporting and general project management.

Project's Financial Summary

May Expense Reimbursement Submitted	$33,914
Total Project Expenses to Date	$148,364
Contract Balance Available	$70,947