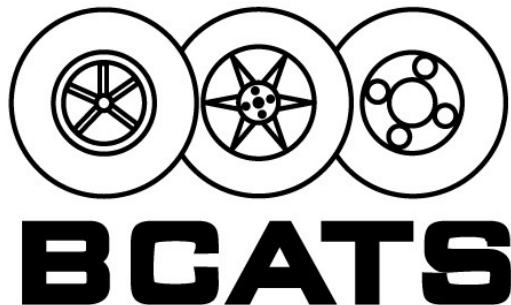# System Performance Report
2023 Update

Battle Creek Area Transportation Study
February, 2023

601 Avenue A
Springfield, MI 49037
Phone: (269) 963-1158
e-mail: bcats@bcatsmpo.org
website: https://www.bcatsmpo.org

BCATS

Battle Creek Area Transportation Study (BCATS)
System Performance Report - February 2023

The Fixing America's Surface Transportation Act or FAST Act authorized transportation funding in the United States for 2016-2020. The Act provided for some changes to the way transportation planning is to be conducted in the states and metropolitan planning area (MPOs). According to the FAST Act, a long-range transportation plan needs to include a system performance report (SPR) and subsequent annual SPR updates evaluating the condition and performance of the transportation system with respect to the performance targets. The information should include progress achieved by the MPO in meeting the established performance targets in comparison with system performance recorded in previous reports, including baseline data. The long-range transportation plan is to provide information on the current and proposed target information adopted by MDOT for roads, highways and transit. The long range plan is a separately prepared document. Updates to target data are reflected on the BCATS website and in annual System Performance Reports. The current BCATS long range plan is the 2045 Metropolitan Transportation Plan, adopted in February 2022. The next Plan update is to be completed by February 2027, a five year cycle. The last federal transportation authorizing legislation, the Bipartisan Infrastructure Act (BIL) continued these same requirements for performance targets at least through 2026.

Roads and Highways Reporting Requirements
MDOT is required to report to FHWA on the establishment of state performance targets and the progress made in attaining the state targets on biennial basis (October 1 of each even numbered year). One exception to the reporting requirements is for the safety performance measures, which are required to be reported by MDOT to FHWA through the Highway Safety Improvement Program Annual Report by August 31 of each year.

MPOs are not required to provide annual reports other than MPO decisions on targets. MPOs are required to report MPO performance targets, or support of state targets, to MDOT in accordance with the documented procedures.

2023 Safety Targets – Road and Highways
Federal regulations require the use of five-year rolling averages for each of the performance measures which include Fatalities, Fatality Rate per 100 million VMT, Serious Injuries, Serious Injury rate per 100 million VMT, Non-Motorized Fatalities and Serious Injuries. The charts for 2022 and for the 2023 estimates were provided by MDOT.
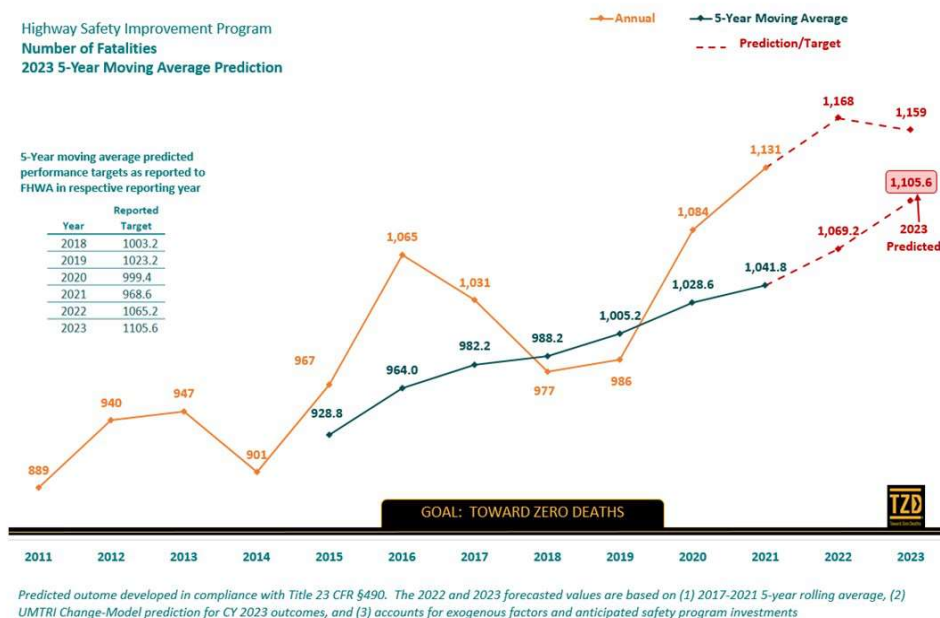
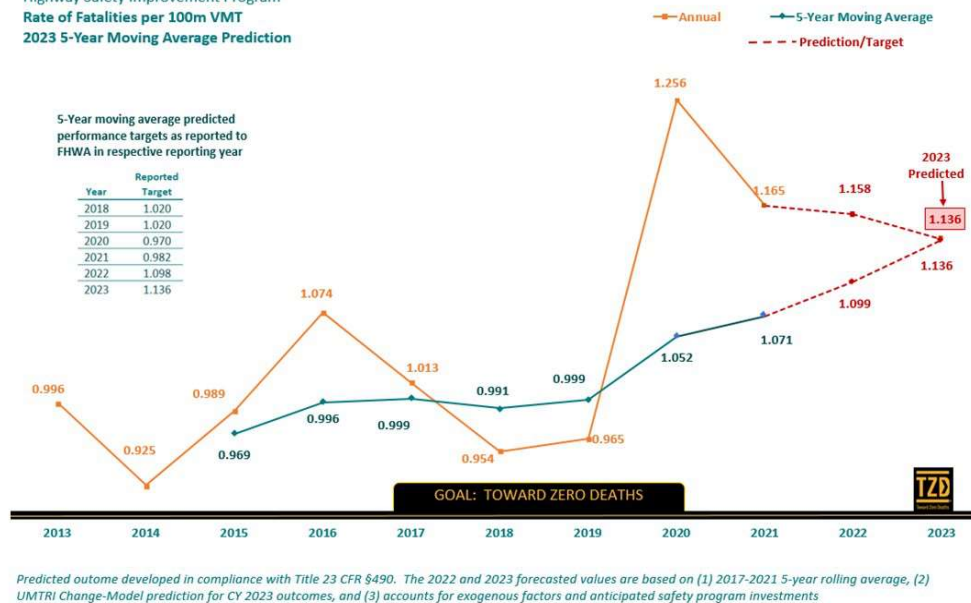## Total Fatalities & Fatalities Rate

How StateTargets Were Set
MDOT and Office of Highway Safety Planning used two different models to forecast the total fatalities and serious injuries for target setting at the state level. The fatality models developed by MDOT relied on the relationship between oil prices, the Dow

Jones Industrial (DJI) futures and fatalities. The price of oil and the level and changes in the DJI futures are closely correlated to the travel demand and traffic crashes. The second model was developed and maintained by the University of Michigan Transportation Research Institute (UMTRI). The UMTRI model relies on results of a recently completed research report titled *Identification of Factors Contributing to the Decline of Traffic Fatalities in the United States.* The model relies on the correlation between traffic crashes and vehicle miles traveled (VMT), Gross Domestic Product (GDP) per capita, median annual income, and the unemployment rate among 16–24-year-olds.

To determine the forecasted five-year rolling average for Fatalities, Fatality Rate per 100 million VMT, Serious Injuries, and Serious Injury Rate per 100 million VMT, the forecast was obtained from the models for 2021 and 2022. The final forecasted value for fatalities statewide is the average of MDOT and UMTRI forecasted values which predicts a final number of 1,123 in 2021 and 1,158 in 2022. The state targets for calendar year 2023 are 1,105.6 for fatalities and 1.136 for fatality rate, which are shown in the following charts:

Highway Safety Improvement Program
Number of Fatalities
2023 5-Year Moving Average Prediction

Legend: —●— Annual   —◆— 5-Year Moving Average   - - - Prediction/Target

5-Year moving average predicted performance targets as reported to FHWA in respective reporting year

Year	Reported Target
2018	1003.2
2019	1023.2
2020	999.4
2021	968.6
2022	1065.2
2023	1105.6

Annual values: 889 (2011), 940 (2012), 947 (2013), 901 (2014), 967 (2015), 1,065 (2016), 1,031 (2017), 977 (2018), 986 (2019), 1,084 (2020), 1,131 (2021), 1,168 (2022), 1,159 (2023)

5-Year Moving Average values: 928.8, 964.0, 982.2, 988.2, 1,005.2, 1,028.6, 1,041.8, 1,069.2, 1,105.6 (2023 Predicted)

GOAL: TOWARD ZERO DEATHS

TZD

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

Predicted outcome developed in compliance with Title 23 CFR §490. The 2022 and 2023 forecasted values are based on (1) 2017-2021 5-year rolling average, (2) UMTRI Change-Model prediction for CY 2023 outcomes, and (3) accounts for exogenous factors and anticipated safety program investments

Highway Safety Improvement Program
Rate of Fatalities per 100m VMT
2023 5-Year Moving Average Prediction

5-Year moving average predicted performance targets as reported to FHWA in respective reporting year

Year	Reported Target
2018	1.020
2019	1.020
2020	0.970
2021	0.982
2022	1.098
2023	1.136

GOAL: TOWARD ZERO DEATHS

Predicted outcome developed in compliance with Title 23 CFR §490. The 2022 and 2023 forecasted values are based on (1) 2017-2021 5-year rolling average, (2) UMTRI Change-Model prediction for CY 2023 outcomes, and (3) accounts for exogenous factors and anticipated safety program investments

Reporting Requirements

MDOT is required to report to FHWA on the establishment of state performance targets and the progress made in attaining the state targets for safety each year through the Highway Safety Improvement Program Annual Report due by August 31st of each year.

State Actions

· To meet the safety goal of reducing fatalities and serious injuries on the state trunkline system, the strategy of the Safety Program is to select cost-effective safety improvements, as identified in Michigan's Strategic Highway Safety Plan (SHSP), to address trunkline locations with correctable fatality and serious injury crashes.

· All proposed safety funded improvements must be supported by the MDOT Region's Toward Zero Deaths Implementation Plan to mitigate crashes within the area. Priority is given to those projects with SHSP focus area improvements that have the most advantageous cost/benefit analysis or are a proven low-cost safety improvement to address the correctable crash pattern.

· On the local road system, MDOT administers federal safety funds for safety improvements supported by a Local Road Safety Plan or addressed by means of a low-cost safety project. High Risk Rural Road is one program used to address rural roadways where fatalities and serious injuries exceed the statewide average for that class of roadway.

MPO Actions

·　As shown in the table below, the Battle Creek MPO supported the adoption of MDOT's State Targets for Safety Performance Measures for Calendar Year 2023 in November 2022. This established targets for performance measures based on five-year rolling averages, including:

Total Number of Fatalities and Rate of Fatalities

o　Number of Fatalities,

o　Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT).

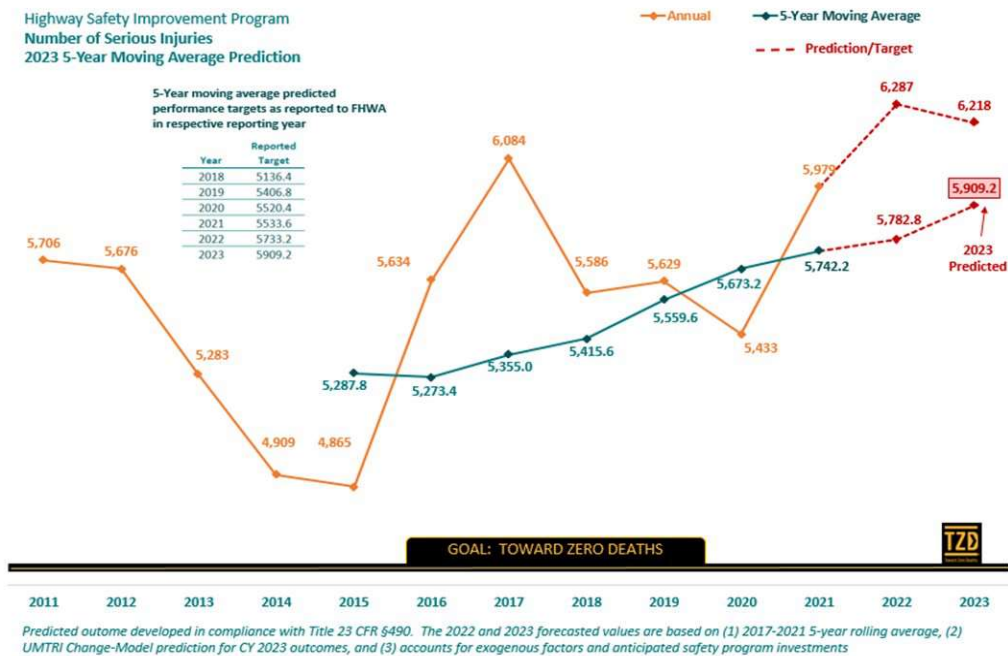| Michigan's State Safety Targets for Calendar Year 2023		
Safety Performance Measure	5-Year Baseline Average	2023 Targets
Fatalities	1,041.8	1,105.6
Fatality Rate	1.071	1.136

MPO support actions:

·　Give priority in the Transportation Improvement Program (TIP) to projects that address safety.

·　Encourage Act 51 Agencies to apply for local safety funds for all available categories of projects which address safety concerns within the BCATS area.

·　Promote safe travel habits for all users of the transportation system through education opportunities.

Total Serious Injuries & Serious Injuries Rate

How StateTargets Were Set
The UMTRI model was the sole model used in forecasting total serious injuries as it exhibited a strong linear relationship of the ratio of serious injuries and fatalities (A/K). The forecasted state total for serious injuries was 6,287 in 2022. The state targets for calendar year 2023 are 5,090.2 for serious injuries and 6.058 for serious injury rate. See the chart on the next page for details.

Highway Safety Improvement Program
Number of Serious Injuries
2023 5-Year Moving Average Prediction

5-Year moving average predicted performance targets as reported to FHWA in respective reporting year

Year	Reported Target
2018	5136.4
2019	5406.8
2020	5520.4
2021	5533.6
2022	5733.2
2023	5909.2

GOAL: TOWARD ZERO DEATHS

Predicted outcome developed in compliance with Title 23 CFR §490. The 2022 and 2023 forecasted values are based on (1) 2017-2021 5-year rolling average, (2) UMTRI Change-Model prediction for CY 2023 outcomes, and (3) accounts for exogenous factors and anticipated safety program investments

State Actions

·   To meet the safety goal of reducing fatalities and serious injuries on the state trunkline system, the strategy of the Safety Program is to select cost-effective safety improvements as identified in Michigan's SHSP to address trunkline locations with the correctable fatality and serious injury crashes.

·   All proposed safety funded improvements must be supported by the MDOT Region's Toward Zero Deaths Implementation Plan to mitigate crashes within the region. Priority is given to those projects within each Region, with SHSP focus area improvements that have the best cost/benefit analysis or are proven low-cost safety improvements to address the correctable crash pattern.

·   On the local road system, MDOT administers federal safety funds for safety improvements supported by a Local Road Safety Plan or addressed by means of a low-cost safety project. High Risk Rural Road is one program used to address rural roadways where fatalities and serious injuries exceed the statewide average for that class of roadway.

MPO Actions

·   As shown in the following table, the Battle Creek MPO supported the adoption of MDOT's State Targets for Safety Performance Measures for Calendar Year 2023 in November 2022. This established targets for performance measures based on a five-year rolling average, including:

o   Number of Serious Injuries.

o   Rate of Serious Injuries per 100 million VMT.

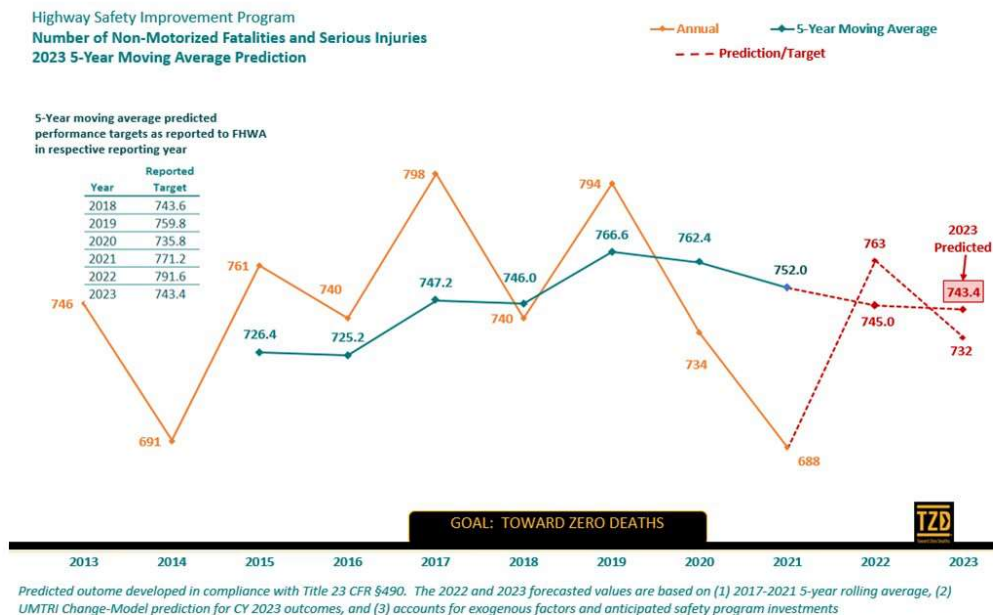| Michigan's State Safety Targets for Calendar Year 2023		
Safety Performance Measure	5-Year Baseline Avg.	2022 Targets
Serious Injuries	5,742.2	5,090.2
Serious Injury Rate	5.878	6.058

MPO support actions:

· Give priority in the TIP to projects that address safety.

· Encourage Act 51 Agencies to apply for local safety funds for all available categories of projects which address safety concerns within the BCATS area.

· Promote safe travel habits for all users of the transportation system through education opportunities

Total Bicycle & Pedestrian Fatality and Serious Injuries

How State Targets Were Set
Results from the UMTRI model (the A/K relationship) were also used to generate forecasted 5-year moving average values for statewide bicycle and pedestrian fatalities and serious injuries for 2022 and 2023. The forecasting total for fatalities and serious injuries is 763 for 2022 and 732 in 2023. The state target for calendar year 2023 is 743.4 for non-motorized fatalities and serious injuries.

Highway Safety Improvement Program
Number of Non-Motorized Fatalities and Serious Injuries
2023 5-Year Moving Average Prediction

5-Year moving average predicted performance targets as reported to FHWA in respective reporting year

Year	Reported Target
2018	743.6
2019	759.8
2020	735.8
2021	771.2
2022	791.6
2023	743.4

GOAL: TOWARD ZERO DEATHS

Predicted outome developed in compliance with Title 23 CFR §490. The 2022 and 2023 forecasted values are based on (1) 2017-2021 5-year rolling average, (2) UMTRI Change-Model prediction for CY 2023 outcomes, and (3) accounts for exogenous factors and anticipated safety program investments

State Actions

- MDOT continues to work with researchers to improve pedestrian and bicycle safety. Examples of current or past work include the development of gateway treatments for pedestrian and Michigan bicycle and pedestrian travel modes.

- MDOT supports Western Michigan University's participation in the Roadway Safety Institute as part of the Region 5 University Transportation Center aimed at high-risk road users.

- MDOT also participates with UMTRI in the development of a risk model for non-motorized users, and with Wayne State University in research to further side-path safety.

MPO Actions

- As shown in the table below, the Battle Creek MPO supported the adoption of MDOT's State Targets for Safety Performance Measures for Calendar Year 2023. This established targets for performance measures based on five-year rolling averages, including the number of non-motorized fatalities and serious injuries.

Michigan's State Safety Targets for Calendar Year 2023		
Safety Performance Measure	5-Year Baseline Avg.	2023 Target
Non-Motorized Fatalities & Serous Injuries	752.0	743.4

MPO support actions:

- Address safety issues, concerns, and needs for bicyclists and pedestrians in the development of the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program.

- Utilization of MDOT road safety audits and engineering countermeasures and other initiatives, programs or designs that are promoted as part of the Toward Zero Deaths National Strategy.

Battle Creek Area Transportation Study - Traffic Crash Statistics

Calendar Years 2017-2021

Year	Total Crashes	Bicycle Involved	Pedestrian Involved	Fatalities/ Fatality Crashes	Serious Injuries/Crashes
2021	2,879	8	22	35/14	57/XX*
2020	2,172	11	16	30/13	55/45
2019	2,672	15	8	23/11	35/32
2018	2,883	15	25	13/7	38/34
2017	2,729	9	20	27/12	59/53
Total	13,335	58	91	128/57	244/209

*total injuries provided for 2021, but not total crashes associated with those injuries, so no figure is shown for the number of crashes

Transit Reporting Requirements

The Federal Transit Administration Transit Asset Management Rule requires a Transit Asset Management (TAM) plan to set one or more performance targets for each applicable performance measure. The goal is to establish a strategic and systematic process of operation, maintaining, and improving public capital assets effectively through their entire life cycle. The targets should be based on realistic expectations, the recent data available, and the financial resources from all sources that the area reasonably expected during the TAM plan horizon period. The three asset classes to be in the Transit Asset Management plan are Revenue Vehicles, Equipment/Service Vehicles, and Facilities.

The targets for 2023 are reflective of the current status of the Battle Creek Transit (BCT) fleet. Although BCT received a significant Section 5339 grant for vehicle replacement in FY 2021, those vehicles will be phased-in over time through FY 2028.

How Transit Operator Targets were Set

Battle Creek Transit annually sets State of Good Repair targets for its assets based on recent and anticipated capital funding available to updates to rolling stock, equipment/service vehicles, and facilities. Transit agencies in an urban area are required to develop targets for State of Good Repair. The purpose of the State of Good Repair is to establish a strategic and systematic process of operation, maintaining and improving public capital assets effectively through their entire life cycle.

The BCATS Policy Committee voted to support the 2023 BCT State of Good Repair targets at its meeting on December 14, 2022.

Battle Creek Transit's "State of Good Repair" Targets for Year 2023

Asset Category – Performance Measure	Categories	2023 Targets
REVENUE VEHICLES Age - % of revenue vehicles within a particular asset class that have met or exceeded their Useful Life Benchmark (ULB)	BU - Bus MB - Mini-bus MV - Mini	77% 100% 0%
EQUIPMENT Age - % of vehicles that have met or exceeded their Useful Life Benchmark (ULB)	Non-Revenue/Service Automobile Trucks & other Rubber Tire Vehicles Maintenance Equipment	100% 75% 0%
FACILITIES Condition - % of facilities with a condition rating below 3.0 on the FTA Transit Economic Requirements Model (TERM) Scale	Administration Maintenance Passenger Facilities	50% 50% 100%

An additional transit performance measure requirement from the FTA is the development of a Public Transportation Agency Safety Plan (PTASP) which sets Safety Performance Targets for the public transportation agency. The transit agency is to provide the PTASP, with targets, to the MPO when it is developed. Upon receipt of BCT's Plan and targets in July of 2020, the BCATS Policy Committee acknowledged receipt of the Plan and adopted a resolution acknowledging the intent to plan and program projects that contribute to the accomplishment of BCT's safety targets. The BCT safety targets, as reported to BCATS, are shown in the table below.

Battle Creek Transit's Safety Performance Targets*

Mode of Transit Service	Fatalities (total)	Fatalities (per 10k VRM)	Injuries (total)	Injuries (per 10k VRM)	Safety Events (total)	Safety Events (per 10kVRM)	System Reliability (VRM/failures)
Fixed Route Bus	0	0	3	.055	5	.091	15,000
ADA/ Paratransit	0	0	2	.036	4	.073	20,000

* Targets above are based on the previous 5 years of BCT's safety performance data.

BCATS has recently received an updated table of BCT safety performance targets which will be address by the BCATS Committees after the publication of this update of the System Performance Report.

National Highway System Bridge Condition Targets

The Transportation Performance Measure regulatory requirements outlined in 23 CFR 490.105 and 23 CFR 490.107 regarding bridge condition targets, are based on a state adjusted 4-year National Highway System targets. The Battle Creek Area Transportation Study recognizes the importance of a safe transportation system and supports the cooperatively developed bridge targets from the Michigan Department of Transportation. MDOT adopted a new set of 4-year bridge targets and transmitted those targets to the MPOs in December 2022. BCATS adopted a resolution to support the state's new 4-year bridge targets on January 25, 2023.

Michigan's State 2022-2025 4-Year NHS Bridge Targets

Bridge Performance Measure	Baseline Condition	2-Year Predicted Performance Target	4-Year Predicted Performance Target
% National Highway System Deck Area in Good Condition	22.1%	15.2%	12.8%
% National Highway System Deck Area in Poor Condition	7.0%	6.8%	8.0%

The current condition of NHS bridges in the BCATS area, as reported by MDOT in April 2022, is shown in the table below.

BCATS MPO April 2022 NHS Bridge Conditions		
Deck Area in Good Condition	Deck Area in Fair Condition	Deck Area in Poor Condition
1%	92%	7%
3,429 square feet	420,443 square feet	31,720 square feet

The total NHS bridge deck area in the BCATS area is 455,593 square feet.

National Highway System Pavement Condition Targets

The federal regulations require the state to establish targets for pavement condition measures Percent Good and Percent Poor on the Interstate and non-Interstate National Highway System. Targets were to be set for two and four-year intervals for each measure, or eight targets total. However, for the Interstate measures, there were no two-year targets required for the first performance period of 2018 to 2021. Therefore, only six targets were set by the state in the first period. The regulations dictated the measuring tools to be used in defining the pavement condition. As with the other target categories, MPOs were to either support the state targets or establish their own independent targets for the required categories within 180 days of the state establishing targets.

MDOT officially adopted new state pavement targets for 2022-2025 and transmitted those targets to the MPOs in December 2022. BCATS acted to support those targets on January 25, 2023. The table below indicates the Michigan State Pavement Targets.

Michigan's State NHS Pavement Targets

| Pavement Performance Measure	Baseline Condition Calendar Year 2021	2-Year Targets	4-Year Targets
% Interstate Pavement in Good Condition	70.4%	59.2%	56.7%
% Interstate Pavement in Poor Condition	1.8%	5.0%	5.0%
% Non-Interstate NHS in Good Condition	41.6%	33.1%	33.1%
% Non-Interstate NHS in Poor Condition	8.9%	10.0%	10.0%

MPO Status

MDOT reports that the 2021 Interstate Pavement Conditions in the BCATS area are: 80.0% Good, 18.6% Fair, 0.7% Poor on 66.5 Interstate Thru Miles. The figures for the 2021 Non-Interstate NHS Pavement Conditions in the BCATS area area: 31.1% Good, 58.5% Fair, 10.4% Poor on a total of 101.7 Non-Interstate Thru Miles.

Pavement condition on all federal-aid eligible roadways in the BCATS area has been measured for approximately 20 years using the PASER data collection process implemented by the Michigan Transportation Asset Management Council (TAMC). State of Michigan Act 51 (P.A. 499 202, P.A. 199 2007 requires each local road agency to annually report the mileage and condition of the road and bridge system within their jurisdiction and provide this data to the TAMC. The uniform PASER process for

collection of condition data on federal-aid eligible roadways (which includes all Interstate and non-Interstate NHS facilities) uses a visual inspection to evaluate pavement surface condition. It rates various types of pavement distress on a scale of 1-10, with 1 being the worst and 10 being the best. PASER helps to predict the remaining service life of a road and the type of maintenance needed to maximize pavement life. PASER data is to be collected in each Michigan county at 50% of the federal-aid eligible system each year. It so happens that the BCATS area includes approximately 50% of the federal-aid roadways in Calhoun County. Therefore, the PASER data collection process has been occurring every other year in the MPO area. The following charts show the results of recent PASER data collection for the BCATS area.

Federal Aid Rated Pavement Conditions
MPO - Battle Creek Area Transportation Study, All Roads, 2021

Lane Miles Good | Lane Miles Fair | Lane Miles Poor

205.3 (30.8%)
164.3 (24.6%)
297.1 (44.6%)
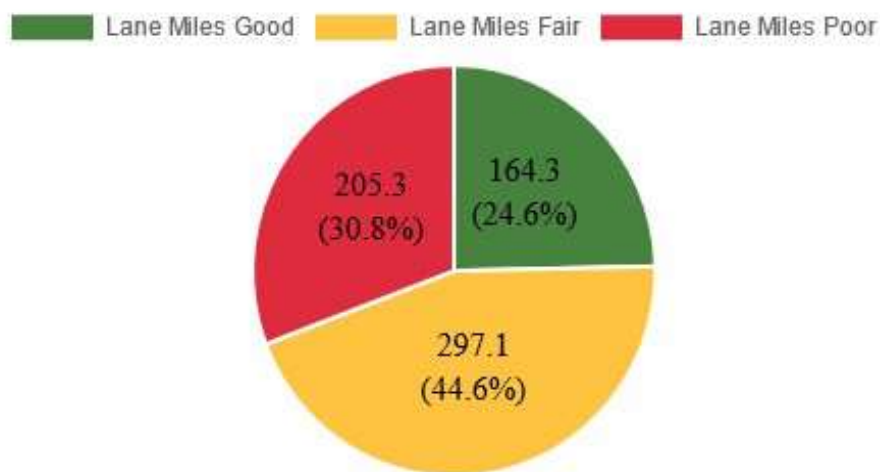
Pavement Condition Trends
MPO - Battle Creek Area Transportation Study, All Roads, Percent of Federal Aid Lane Miles

2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2021

Percent Lane Miles Good: 11.8, 17.7, 18.9, 15.9, 24.6
Percent Lane Miles Fair: 85.1, 67.8, 59.1, 63.2, 44.6
Percent Lane Miles Poor: 3.1, 14.5, 22, 20.9, 30.8

System Performance – National Highway System (NHS) Travel Time Reliability

Travel Time Reliability relates to the consistency or dependability in travel time. It is measured from day to day, or across differing times of the day. Unreliable travel times usually occur during the "peak" periods of the day. Most travelers are less tolerant of "unexpected" delays since they cannot plan for it. The Travel Time Index (TTI) is the ratio of the congested travel time to the time it takes to make the same trip at free-flow speeds (light traffic conditions). When congestion gets worse, the TTI increases. Performance on the National Highway System (NHS) uses Level of Travel Time Reliability (LOTTR) to measure interstate and non-interstate travel. The interstate travel time reliability measure is the percent of "person-miles" traveled that are reliable. Non-interstate travel time reliability is measured by percent of "person-miles" traveled that are reliable. These measures correspond to 80th and 50th percentile travel times. Freight movement on the NHS is measured for reliability using the Truck Travel Time Reliability Index (TTTR) and corresponds to 95th and 50th percentile travel times. Note that the lower the Freight number the better the travel time reliability is for trucks.

Travel time reliability in the BCATS area, as reported by MDOT for 2021 is shown on the table below.

Battle Creek Area 2021* Travel Time Reliability Data

MPO/Study Area	Interstate Reliability	Non-Interstate Reliability	Freight Reliability
BCATS	100.0%	93.6%	1.15

* most recently reported data

MDOT established new 2022-2025 Travel Time Reliability Targets for the state in December 2022 and provided those targets to the MPOs. MDOT has set conservative targets for this measure. The BCATS Policy Committee approved supporting the MDOT targets for this category on January 25, 2023.

Michigan's State NHS 2022-2025 Travel Time Reliability Targets

NHS Travel Time Reliability Performance Measure	Baseline Condition	2-Year Performance Targets	4-Year Performance Targets
Interstate Travel Time Reliability	97.1%	80.0%	80.0%
Non-Interstate Travel Time Reliability	94.4%	75.0%	75.0%
Freight Reliability (truck travel time reliability)	1.31	1.60	1.60