

TRANSPORTATION PERFORMANCE MANAGEMENT

HIGHWAY SAFETY IMPROVEMENT PROGRAM

SAFETY PERFORMANCE MEASURES

In March 2016, the Federal Highway Administration (FHWA) published in the Federal Register ([81 FR 13722](#)) a final rule revising [23 CFR part 924](#) and [23 U.S.C. 148](#) Highway Safety Improvement Program (HSIP) to incorporate new statutory requirements of MAP-21 and the FAST Act. The HSIP focuses on reducing fatalities and serious injuries on all public roads through targeted investment in infrastructure programs and projects to improve safety.

On the same date, FHWA published a companion Safety Performance Management (Safety PM) final rule ([81 FR 13881](#)) to support national safety goals and carryout the HSIP. The safety PM final rule has been codified in a new regulation [23 CFR Part 490, Subpart B](#). The purpose of the Safety PM is to improve transparency through use of a public reporting system using common data standards and elements, and aggregating progress toward the national goal of reducing traffic fatalities and serious injuries. The five safety performance measures identified in the regulation are applicable to all public roads regardless of jurisdiction.

In 2018, the National Highway Traffic Safety Administration (NHTSA) published the final Uniform Procedures for State Highway Safety Grants Program ([83 FR 3466](#)) and updated Highway Safety Plan (HSP) requirements. The purpose of the safety grants is to focus investments on reducing fatalities, injuries, and economic loss resulting from vehicle crashes through behavioral traffic safety programs.

The FHWA and NHTSA coordinated the final rules to identify three common performance measures (1 through 3 below) for which the annual performance targets must be identical as reported in the HSIP and HSP. The measures/targets are reported as five-year rolling averages.

1. **Number of Fatalities**
2. **Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)**
3. **Number of Serious Injuries**
4. Rate of Serious Injuries per 100 million VMT
5. Number of Non-motorized Fatalities and Serious Injuries

TARGET SETTING COORDINATION

The 23 CFR Part 490, Subpart B communicates the process for which State DOTs and Metropolitan Planning Organizations (MPOs) are to establish and report on the five HSIP safety targets, and the criteria FHWA will use to assess whether State DOTs have met or made significant progress toward meeting their safety targets.

With three common safety performance measures that must have identical targets reported in the annual HSIP and HSP, establishing targets is a coordinated effort between the Michigan Department of Transportation (MDOT), the Strategic Highway Safety Office (SHSO), and Michigan Metropolitan Planning Organizations (MPOs). The coordination and target requirements promotes working collaboratively to achieve the targets.

The annual timeline for establishing and reporting targets is as follows:

April/May: One or more coordination sessions between MDOT and MTPA members to develop safety targets for the next calendar year.

July 1: SHSO reports targets for the next calendar year to NHTSA through the HSP, including “identical” targets for the three common performance measures.

August 31: MDOT reports targets for the next calendar year to FHWA through the HSIP.

February 27 (following year): MPOs report targets for the current calendar year to MDOT. Refer to the MPO section for details regarding MPO target elections and reporting. MDOT must provide FHWA MPO targets, upon request. [Regulation Timeline: August 31 + 180 Days]

Annual targets should support the Long-Range Transportation Plan and Strategic Highway Safety Plan (SHSP) goals.

MPO TARGET SETTING

The MPO must report their safety targets to MDOT by February 27 of the year following MDOT reporting the State safety targets to FHWA (August 31 + 180 days). The target establishment and reporting process for MPOs was jointly developed, documented, and mutually agreed upon by the MPO and MDOT.

The MPO must establish annual targets for each of the five measures by either (1) agreeing to plan and program projects so that they contribute toward the accomplishment of the State safety target for that performance measure, or (2) committing to a quantifiable target for that performance measure for their metropolitan planning area. For each of the five measures, the MPO can make different elections to agree to support the State's targets or establish a quantifiable target.

MPOs must also report safety targets in their System Performance Report.

TARGET ACHIEVEMENT, CONSEQUENCE/PENALTY

FHWA will determine whether a State has met or made significant progress at the end of the following calendar year when target-year data is available and will report findings to the State and the public. A State is considered to have met or made progress when at least four out of five safety targets are met, or the actual safety performance is better than the baseline performance for the period for four out of five measures.

If the State did not meet or make significant progress toward targets, the State (MDOT) must (1) submit an HSIP Implementation Plan (consequence) and (2) use obligation authority equal to or greater than the HSIP apportionment for the prior year only for highway safety improvement projects (penalty).

There is no federal- or state-imposed consequence or penalty for an MPO that does not demonstrate they have met or made significant progress toward target achievement.

2022 MICHIGAN SAFETY TARGETS

Existing Trend

The first step in developing annual safety targets is to establish the 5-year rolling average baseline trend. FHWA prescribes the calculation as follows: For each measure, sum the most recent five consecutive years actual performance, ending in the year the targets for the next year are being developed, divide by five, and round to the tenth decimal place. For each rate measure, first calculate the number of fatalities or serious injuries per 100 million VMT, then divide by five, and round to the thousandth decimal place.

Data for calculation: The Fatalities Analysis Report System (FARS) is to be used for fatality related measures, and the State of Michigan Crash database is used for serious injury related measures. The VMT is calculated annually from the Highway Performance Monitoring System (HPMS).

Exogenous Factors

The next step in the target development process is to consider how exogenous factors influence/impact traffic fatalities and serious injuries. The respective parties have agreed to utilize a fatality prediction model developed and maintained by the University of Michigan Transportation Research Institute (UMTRI). The UMTRI model relies on results of a completed research report titled [Identification of Factors Contributing to the Decline of Traffic Fatalities in the United States](#), which was completed as part of the National Cooperative Highway Research Program project 17-67 ([presentation](#)). The model, predicting the change in counts of fatalities, relies on the correlation between traffic crashes, vehicle miles traveled (VMT), and risk. UMTRI identified four factors that can influence the outcome: the economy, safety and capital expenditures, vehicle safety, and safety regulations. Within the model, economic factors such as the Gross Domestic Product (GDP) per capita, median annual income, the unemployment rate among 16 to 24-year old's, and alcohol consumption had the greatest impact at approximately 85 percent. Preliminary findings indicate individual acceptance of

risk appears to have a greater impact on the number of fatalities and serious injuries than fluctuations in traffic volume. In other words, the better the economy, the greater the level of risk individuals are willing to take.

2021-2022 Target Overview

To determine a forecasted value for the five-year rolling average for the first four measures listed above, the decision was made to use the change model created by UMTRI used for establishing previous targets. UMTRI predicts 1,123 fatalities in CY 2021, and 1,158 in 2022.

The change model predicts change in fatalities from the previous year based on several predictors. This log-change regression model is tied closely to whatever happened recently, so it cannot diverge very far from the current time unless we predict many years out into the future. The change model predicts a steady (slow) decrease in fatalities. The dataset is a collection of differences from one year to the next within the state, expressed as a percentage of the previous year. Thus, the predictors can influence exposure and/or risk.

Alternatively, the count model directly predicts counts so it could diverge from observed by a lot if the patterns change in the real world. Based on known factors the count model shows a steady increase in fatalities through 2025. As this is not what is expected the change model was selected in developing the targets.

While serious injuries have fluctuated over the past several years, the linear relationship of the ratio of serious injuries and fatalities (A/K) going back to 2003 is still evident. However, this trend suggests a greater reduction in serious injuries than being observed. Therefore, a quadratic model was used which projects an increase in relation to the increase of fatalities. The model predicts 5,928 serious injuries in CY 2021, and 6,090 in 2022.

VMT values have been predicted for CYs 2020, 2021 and 2022. VMT estimates for CY 2020 and CY 2021 are reduced due to COVID-19. Using the fatal and serious injury values, along with the respective predicted VMT, the forecasted fatality rates are 1.187 for CY 2021, and 1.133 for CY 2022, and annual serious injury rates of 6.266 for CY 2021, and 5.959 for CY 2022.

Results from the UMTRI model (the fatality and serious injury relationship) were also used to generate non-motorized forecasted annual values of 828 for CY 2021, and 854 for CY 2022.

The above annual forecasted values for CY 2021 and CY 2022 along with the actual values from CY 2018 to 2020 to determine the 2022 Targets (five-year rolling average) are shown in the 2022 Target Summary table. In addition, actual values dating back to CY 2016 are included as part of the determination of the 2020 baseline condition.

2022 Predictions (Targets)

Number of Fatalities	1,065.2
Rate of Fatalities per 100M VMT	1.098
Number of Serious Injuries	5,733.2
Rate of Serious Injuries per 100M VMT	5.892
Number of Non-Motorized Fatalities and Serious Injuries	791.6

Strategic Highway Safety Plan (SHSP)

While MDOT and the SHSO are responsible for setting the targets in collaboration with Metropolitan Planning Organizations (MPOs), traffic fatalities and serious injuries are a State of Michigan issue that requires awareness and intentional action from all levels of government and the public to change the overall safety culture. Over 90 percent of fatal crashes are the result of human behavior and the most effective safety feature is changing user behavior to be more risk adverse. Crashes are not accidents.

Michigan's [Strategic Highway Safety Plan \(SHSP\)](#) is the blueprint for addressing both fatalities and serious injuries. Under the guidance of the Governors Traffic Safety Advisory Commission (GTSAC) the SHSP has adopted the vision of Toward Zero Deaths. The strategy is a statewide campaign to positively enhance road user's behavior and safety. Nearly 1,000 people do not return home in Michigan annually due to traffic crashes. The TZD strategy invokes enhancing driver

education, emergency response, enforcement, engineering, policy, communications, and other efforts that will move Michigan closer to zero fatalities. By incorporating safety into all facets of transportation, Michigan can achieve this vision. But to get there the GTSAC has adopted interim goals to reach every four years. To carry forth the SHSP is focused on four broad emphasis areas:

1. High-Risk Behaviors
2. At-Risk Road Users
3. Engineering Infrastructure
4. System Administration

Within these emphasis areas, 11 action teams provide more targeted guidance on area-specific safety issues. Structuring these action teams under the broad umbrella of these four emphasis areas creates efficiencies given the degree of overlap amongst the teams. Updated goals, strategies, objectives, and activities for each are based on current traffic crash data. More information on the GTSAC and the SHSP can be found at the GTSAC website.

All citizens of Michigan are welcome and encouraged to participate in the action teams and attend the annual Safety Summit to learn more about the SHSP and what part they can play in changing the safety culture of Michigan. MDOT offers scholarships for local officials and MPOs to attend the summit.

Michigan is committed to the goal of reducing traffic crashes and resulting injuries and fatalities. MDOT implements countermeasures such as intersection-related improvements including signalization and geometric changes by converting traditional intersections to roundabouts where feasible. Other improvements include converting four-lane roadways to three lanes, restriping improvements, the installation of centerline and shoulder rumble strips, guardrail upgrades, clear zone improvements, delineation, signing and other projects that target locations that have experienced fatal and incapacitating injury crashes. These projects, along with other research and systemic and systematic safety improvements, including safety funding for local agencies for road safety audits, have provided the foundation for deeper understanding of crash characteristics and prospective countermeasures.

Regarding the numbers, annual fatalities had decreased from 1,031 in 2017 to 985 in 2019 (as reported by FARS) but made an increase in 2020 with 1,083. This is reflected in the five-year average or target of 1,065.2 for 2022. For the same time serious injuries have decreased from 6,084 to 5,433 and is reflected in the five-year target of 5,733.2.

Below is a chart comparing the targets since their inception. In addition, the crash data for 2014 to 2020 are shown. Imagine what these could be if all participated in driving the numbers down.

Targets Reported to FHWA (5-Year Moving Average)

Year	Fatality	Fatality Rate	Serious Injury	Serious Injury Rate	Non-Motorized Fatality/ Serious Injury
Year	Reported Target	Reported Target	Reported Target	Reported Target	Reported Target
2018	1,003.2	1.020	5,136.4	5.230	743.6
2019	1,023.2	1.020	5,406.8	5.410	759.8
2020	999.4	0.970	5,520.4	5.340	735.8
2021	968.6	0.982	5,533.6	5.609	771.2
2022	1,065.2	1.098	5,733.2	5.892	791.6

Targets as reported to FHWA for the respective year

Annual Crash Data

Year	Fatality	Fatality Rate	Serious Injury	Serious Injury Rate	Non-Motorized Fatality/ Serious Injury
2014	901	0.925	4,909	5.040	691
2015	967	0.989	4,865	4.974	761
2016	1,065	1.074	5,634	5.679	740
2017	1,031	1.013	6,084	5.976	798
2018	977	0.954	5,586	5.455	740
2019	985	0.964	5,629	5.508	794
2020	1,083	1.251	5,433	6.274	742

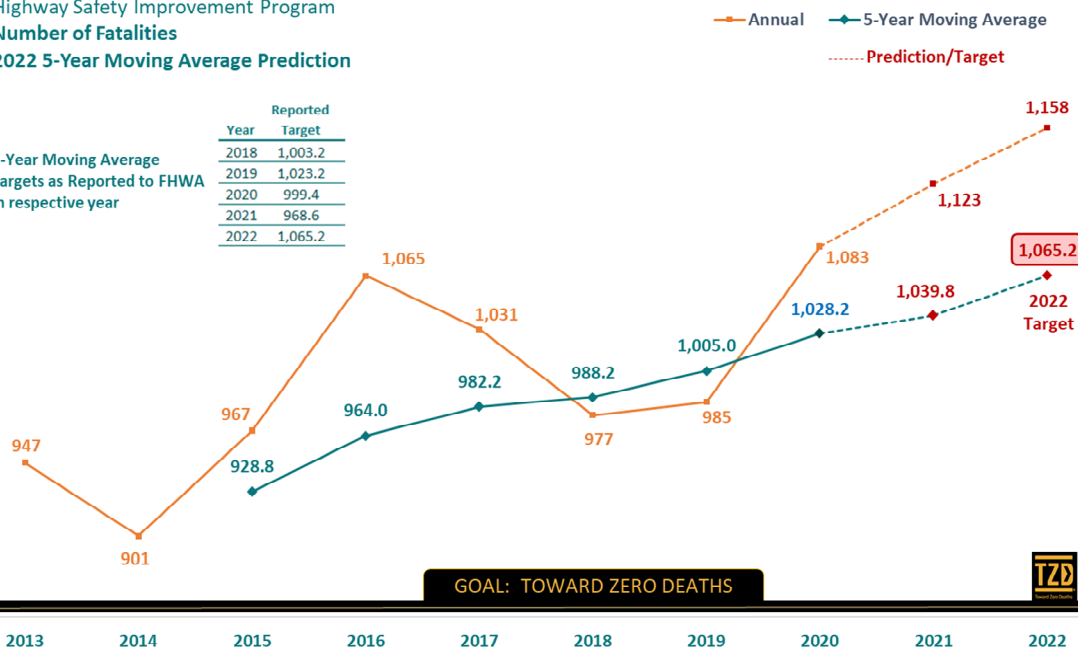
Reference:

- [Safety Performance Measure Final Rule](#)
- [HSIP Final Rule](#)
- [Planning Final Rule](#)
- [NHTSA Uniform Procedures for Safety Highway Safety Grants Program Final Rule](#)
- [FHWA Procedure for Safety Performance Measure Computation and State Target Achievement Assessment](#)
- [Strategic Highway Safety Plan](#)
- [FARS](#)
- [Michigan Traffic Crash Facts](#)
- [Highway Safety Improvement Program/Dashboard](#)

Highway Safety Improvement Program Number of Fatalities 2022 5-Year Moving Average Prediction

5-Year Moving Average
Targets as Reported to FHWA
in respective year

Year	Reported Target
2018	1,003.2
2019	1,023.2
2020	999.4
2021	968.6
2022	1,065.2



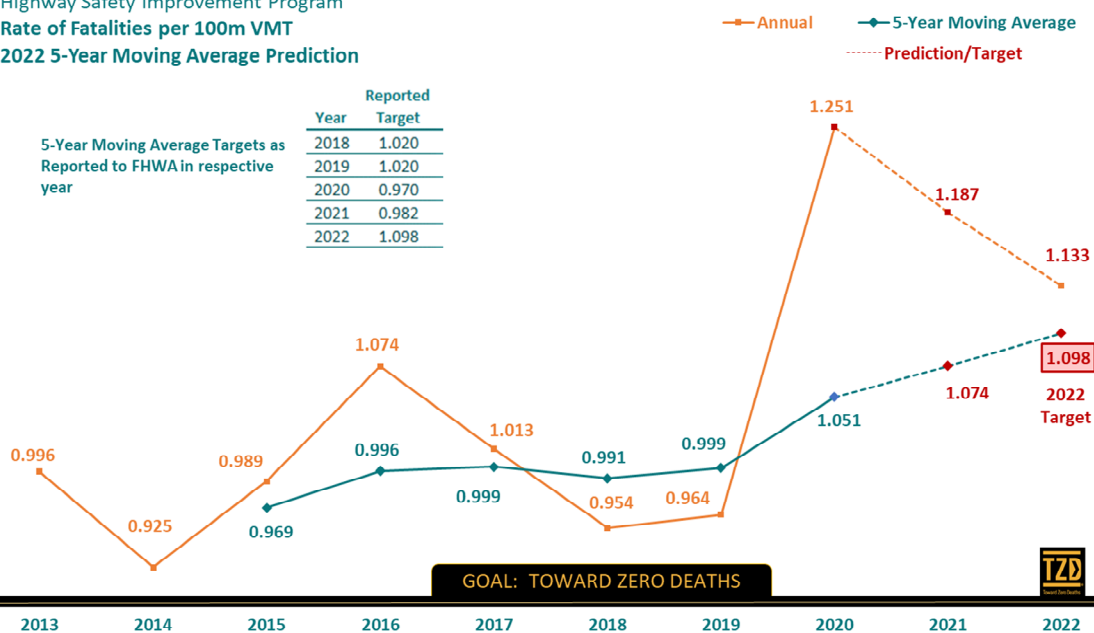
NOTE: 2021 and 2022 forecasted values are based on (1) 2015-2019 5-year rolling average, (2) UMTRI Change-Model prediction for establishing the CY 2022 target, and (3) accounts for exogenous factors and safety programming outcomes

All Michigan public roads

Highway Safety Improvement Program Rate of Fatalities per 100m VMT 2022 5-Year Moving Average Prediction

5-Year Moving Average Targets as
Reported to FHWA in respective
year

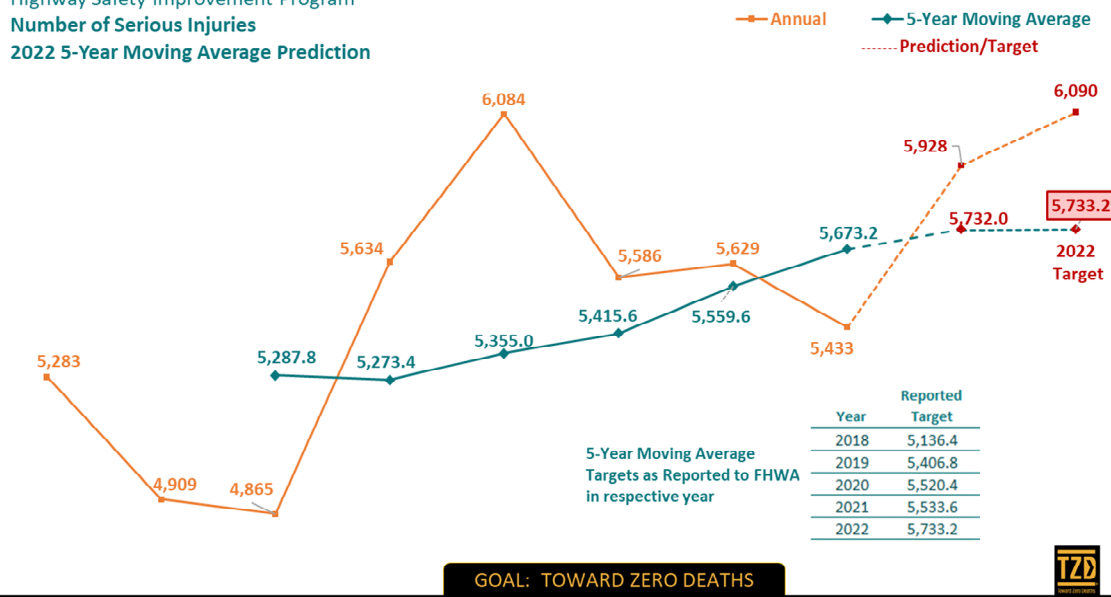
Year	Reported Target
2018	1.020
2019	1.020
2020	0.970
2021	0.982
2022	1.098



NOTE: 2021 and 2022 forecasted values are based on (1) 2016-2020 5-year rolling average, (2) UMTRI Change-Model prediction for establishing the CY 2022 target, and (3) accounts for exogenous factors and safety programming outcomes

All Michigan public roads

Highway Safety Improvement Program Number of Serious Injuries 2022 5-Year Moving Average Prediction

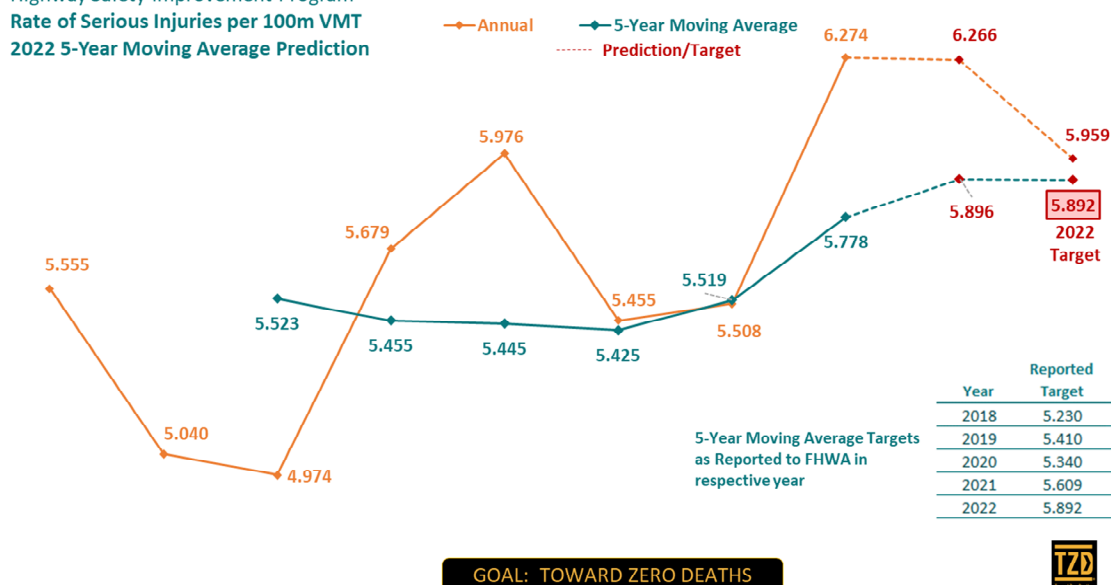


2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

NOTE: 2021 and 2022 forecasted values are based on (1) 2016-2020 5-year rolling average, (2) UMTRI Change-Model prediction for establishing the CY 2022 target, and (3) accounts for exogenous factors and safety programming outcomes

All Michigan public roads

Highway Safety Improvement Program Rate of Serious Injuries per 100m VMT 2022 5-Year Moving Average Prediction



2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

NOTE: 2021 and 2022 forecasted values are based on (1) 2016-2020 5-year rolling average, (2) UMTRI Change-Model prediction for establishing the CY 2022 target, and (3) accounts for exogenous factors and safety programming outcomes

All Michigan public roads

Highway Safety Improvement Program
 Number of Non-Motorized Fatalities and Serious Injuries
 2022 5-Year Moving Average Prediction

5-Year Moving Average
Targets as Reported to
FHWA in respective year

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

