Office of the Auditor General
Performance Audit Report

Traffic and Safety Section
Michigan Department of Transportation

December 2015

State of Michigan Auditor General
Doug A. Ringler, CPA, CIA

591-0162-15

The auditor general shall conduct post audits of financial transactions and accounts of the state and of all branches, departments, offices, boards, commissions, agencies, authorities and institutions of the state established by this constitution or by law, and performance post audits thereof.

Article IV, Section 53 of the Michigan Constitution

OAG
Office of the Auditor General

Report Summary

Performance Audit

Traffic and Safety Section

Michigan Department of Transportation (MDOT)

Report Number:
591-0162-15

Released:
December 2015

The Traffic and Safety Section has a major role in helping to implement MDOT's overall safety program and fulfill the purpose of the Strategic Highway Safety Plan to identify the key safety needs in the State and to guide investment decisions to achieve significant reductions in traffic fatalities and serious traffic injuries on Michigan roadways. The Section, in conjunction with the 7 MDOT region offices and 22 MDOT transportation service centers, conducts various activities to meet this purpose. MDOT allocated $53.0 million in federal and State funding for fiscal year 2015 projects related to safety improvement, traffic signs, and pavement markings.

Audit Objective	Conclusion
Objective #1: To assess the Section's efforts to ensure that it appropriately selected priority traffic and safety improvement projects.	Effective

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
The Section did not ensure that all required road safety audits (RSAs) were conducted. All regions are required to have at least one RSA conducted each year; however, 2 (29%) of the 7 MDOT regions did not meet the annual requirement (Finding #1).		X	Agrees
MDOT did not maintain updated inventory databases for guardrails and traffic signs on the State trunkline system. A majority of the records in MDOT's guardrail database had not been updated since 2007, and MDOT infrequently used its traffic sign inventory system (Finding #2).		X	Agrees

Audit Objective	Conclusion
Objective #2: To assess the Section's efforts to appropriately review highway construction design plans for the proper geometric features, pavement markings and delineation, and traffic signing.	Effective

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
None reported.	Not applicable	Not applicable	Not applicable

Audit Objective			Conclusion
Objective #3: To assess the Section's efforts to ensure the accuracy of performance measurements related to traffic and safety improvement activities.			Effective
Findings Related to This Audit Objective	**Material Condition**	**Reportable Condition**	**Agency Preliminary Response**
None reported.	Not applicable	Not applicable	Not applicable

A copy of the full report can be obtained by calling 517.334.8050 or by visiting our Web site at: www.audgen.michigan.gov

Office of the Auditor General
201 N. Washington Square, Sixth Floor
Lansing, Michigan 48913

Doug A. Ringler, CPA, CIA
Auditor General

Laura J. Hirst, CPA
Deputy Auditor General

OAG
Office of the Auditor General
Doug A. Ringler, CPA, CIA
Auditor General
201 N. Washington Square, Sixth Floor • Lansing, Michigan 48913 • Phone: (517) 334-8050 • www.audgen.michigan.gov

December 22, 2015

Mr. Jerrold M. Jung, Chair
State Transportation Commission
and
Kirk T. Steudle, PE, Director
Michigan Department of Transportation
Murray Van Wagoner Transportation Building
Lansing, Michigan

Dear Mr. Jung and Mr. Steudle:

I am pleased to provide this performance audit report on the Traffic and Safety Section, Michigan Department of Transportation.

We organize our findings and observations by audit objective. Your agency provided preliminary responses to the recommendations at the end of our fieldwork. The *Michigan Compiled Laws* and administrative procedures require an audited agency to develop a plan to comply with the recommendations and submit it within 60 days of the date above to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

We appreciate the courtesy and cooperation extended to us during this audit.

Sincerely,

Doug Ringler

Doug Ringler
Auditor General

This Page Left Intentionally Blank

TABLE OF CONTENTS

TRAFFIC AND SAFETY SECTION

This Page Left Intentionally Blank

AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

SELECTION OF PRIORITY TRAFFIC AND SAFETY IMPROVEMENT PROJECTS

BACKGROUND

The Traffic and Safety Section has a major role in helping to implement the Michigan Department of Transportation's (MDOT's) overall safety program that supports the goals* of the Strategic Highway Safety Plan (SHSP). The purpose of the SHSP is to identify the key safety needs in the State and to guide investment decisions to achieve significant reductions in traffic fatalities and serious traffic injuries on Michigan roadways.

The Section obtains traffic crash data from the Michigan Department of State Police's (MSP's) Traffic Crash Reporting System (TCRS) database* to track and analyze traffic crash trends and data to determine opportunities for improvement on the State trunkline system* and local road systems. The TCRS database is owned and maintained by MSP and serves as the central repository for all traffic crash data in the State. MDOT uses MSP's traffic crash data to assist with analyzing high crash locations, identifying traffic safety problems, and developing solutions for highway and vehicle safety hazards.

MDOT undertakes an annual Call for Projects* (CFP) process to identify, select, and approve highway safety projects that align with MDOT's goals and the SHSP. As part of the identification and selection process, the Section obtains Statewide crash data information from the TCRS database to provide to each of the 7 MDOT regions. The regions use the information to analyze each high crash location within their region and identify the most cost-effective safety improvement projects that effectively address safety hazards, align with SHSP goals, and meet all specified criteria. Regions submit an application for each candidate project to be considered for funding and an MDOT central office review team evaluates each application to ensure that the desired project meets all criteria for consideration for funding approval. The desired projects then compete for limited funding as part of the CFP process for safety improvement projects.

In addition to the CFP process, the Section also administers a traffic signing program to identify projects for traffic sign upgrading and maintenance of the retroreflectivity of traffic signs on the State trunkline system and a pavement marking program that includes an annual re-striping project for all State trunkline highways.

The Section allocated $53.0 million in federal and State funding for fiscal year 2015 projects related to safety improvement ($18.0 million), traffic signs ($13.7 million), and pavement markings ($21.3 million).

** See glossary at end of report for definition.*

AUDIT OBJECTIVE

To assess the Section's efforts to ensure that it appropriately selected priority traffic and safety improvement projects.

CONCLUSION

Effective.

FACTORS IMPACTING CONCLUSION

- All 10 safety project files we reviewed that MDOT selected and approved under the CFP process were complete, and the projects met all criteria for approval and funding.
- All 68 (100%) randomly selected high crash location analysis files we reviewed from four judgmentally selected regions were complete, accurate, and appropriately supported.
- The Section provided all 7 regions with updated information for all high crash locations within each region during the most recent three-year cycle to aid in the prioritization and selection of safety projects.
- The Section used a five-year freeway and non-freeway plan to identify stretches of roadways in each region and prioritize, by project year, the traffic signs to be replaced or upgraded.
- The Section conducted an annual project for re-striping State trunkline highways and held contracts for pavement marking projects in all 7 regions during the audit period.
- Reportable conditions* related to:
    - Road safety audits.
    - Guardrail and traffic sign inventory databases.

** See glossary at end of report for definition.*

FINDING #1

Need to complete all required RSAs to ensure that proposed safety improvement projects address all fixes.

The Section did not ensure that all required road safety audits (RSAs) were conducted. The lack of an RSA could result in a proposed safety improvement project that does not incorporate all appropriate safety fixes.

MDOT's annual CFP criteria states that each region shall conduct an RSA for one or more of the proposed improvements within the region and an RSA should be conducted for all proposals exceeding $750,000 in programmed construction costs. The purpose of an RSA is to ensure that appropriate safety fixes are incorporated into the overall design of proposed projects, and the RSA should be completed prior to 30% completion of the proposed project.

Required RSAs were not conducted in 2 of the 7 MDOT regions.

We identified 17 projects submitted by the 7 MDOT regions for approval in 2011 and 2012 that required an RSA. MDOT abandoned 3 of the projects prior to completion of an RSA and informed us that it substituted 2 projects to conduct RSAs for projects in other regions. As a result of the abandoned projects and substitutions, 2 (29%) of the 7 MDOT regions did not have at least 1 RSA completed annually.

RECOMMENDATION

We recommend that the Section ensure that all required RSAs are conducted.

AGENCY PRELIMINARY RESPONSE

MDOT provided us with the following response:

MDOT concurs with the recommendation.

The finding indicated that two regions did not complete an RSA, as required by current departmental procedures. MDOT considered the benefits versus the costs of its decision to forego RSAs for the two regions. As a consequence, MDOT focused its limited RSA resources on projects in other regions that, based on identified risks, MDOT expected would provide a larger increase to safety than the projects initially selected for the two regions.

In consideration of the finding:

- *MDOT plans to update its procedures to include a risk-based approach that would allow MDOT to conduct RSAs on projects, Statewide, that would receive the highest safety benefit, regardless of region.*

- *MDOT has concluded that RSAs provide an incremental benefit to safety when performed during the design process. MDOT is therefore considering whether to expand the RSA process to more projects than is required by current departmental procedures.*

FINDING #2

Updated inventory databases for guardrails and traffic signs are needed to enhance MDOT's planning efforts.

MDOT did not maintain updated inventory databases for guardrails and traffic signs on the State trunkline system. Maintaining updated inventory databases would enhance MDOT's planning efforts by ensuring that MDOT has the information it needs to readily identify guardrail and traffic signs in need of replacement or upgrade.

The MDOT region offices are required to monitor the guardrail within their region and recommend guardrail replacement projects for implementation. MDOT implemented a guardrail inventory database in 2005; however, MDOT had not updated 78.6% of guardrail database records since 2007. The region offices informed us that they primarily relied on physical inspections and/or reports of damage to identify guardrails in need of replacement rather than using the guardrail inventory database.

78.6% of the records in MDOT's guardrail database had not been updated since 2007, and MDOT infrequently used its traffic sign inventory system.

MDOT implemented the Michigan Traffic Sign Inventory System (MTSIS) database in 1984 to comply with federal standards and to identify and document all traffic sign inventory located along the State trunkline system. However, MDOT region office staff and transportation service center (TSC) staff informed us that they infrequently used the MTSIS database because it was outdated and difficult to use. Instead, they used manual paper plans to track sign inventory and monitor traffic sign condition in their respective areas.

RECOMMENDATION

We recommend that MDOT maintain updated inventory databases for guardrails and traffic signs on the State trunkline system.

AGENCY PRELIMINARY RESPONSE

MDOT provided us with the following response:

MDOT agrees with the recommendation.

Accurate guardrail and signage databases will provide MDOT with information that will augment MDOT's long-term planning efforts and its corridor approach to replacing guardrails and signs. To that end, prior to the start of this audit, MDOT was already in the process of developing a new Transportation Asset Management System, which is scheduled for implementation in late 2016. This system will incorporate business processes that will improve the tracking and outcome reporting of changes to guardrails and traffic signs.

REVIEW OF HIGHWAY CONSTRUCTION DESIGN PLANS

BACKGROUND

The Section has three units that perform reviews of highway construction design plans for conformance with standards related to proper geometric features, pavement markings, and traffic signing. During our audit period, the three units reviewed a combined total of 1,053 construction design plans.

AUDIT OBJECTIVE

To assess the Section's efforts to appropriately review highway construction design plans for the proper geometric features, pavement markings and delineation, and traffic signing.

CONCLUSION

Effective.

FACTORS IMPACTING CONCLUSION

- The Section had three distinct and specialized units established for performing highway construction design plan reviews for appropriate geometric features, pavement markings and delineation, and traffic signing.
- MDOT's Michigan Road Design Manual provided staff with a guide for the preparation of design plans and the design plan review process.
- All 110 (100%) randomly selected design plan review files that we examined were complete and conducted in a timely manner, and the corresponding certification and acceptance form for each review was signed and dated by the plan reviewer.
- MDOT region and TSC safety engineers provided input into the design plans for highway construction projects and also certified that the design plans for geometric features, pavement markings and delineation, and traffic signing had been reviewed for adequacy.
- The MDOT Quality Assurance Section provided additional oversight of the design plan review process for all projects and had a process to help ensure that each design plan had been reviewed for compliance with all MDOT standards, policies, and procedures.

ACCURACY OF PERFORMANCE MEASUREMENTS

BACKGROUND

MDOT uses performance measures* to publicly report its progress toward meeting traffic and safety goals as reflected in the MDOT MiScorecard* and various other reports. In addition, MDOT submits an annual Highway Safety Improvement Program (HSIP) report to the Federal Highway Administration (FHWA) to describe its progress toward implementing highway safety improvement projects, the effectiveness of those improvements, and the extent to which the improvements have contributed to reducing fatalities and serious injuries on public roads.

AUDIT OBJECTIVE

To assess the Section's efforts to ensure the accuracy of performance measurements related to traffic and safety improvement activities.

CONCLUSION

Effective.

FACTORS IMPACTING CONCLUSION

- The performance measurement information that MDOT included in its 2013 and 2014 HSIP annual reports to FHWA reconciled with MSP's TCRS database information.
- MDOT's MiScorecard traffic and safety metrics reported for calendar years 2012, 2013, and 2014 accurately reflected MSP's TCRS database information for Statewide crash fatalities, serious injuries, and total crashes.
- The crash reduction and cost savings from safety improvement investments information that MDOT reported in its 2014 System Performance Measures Report agreed with data obtained from MSP's TCRS database.
- The time of return on investment information that MDOT reported for each region for safety improvement projects selected for funding in fiscal years 2015 through 2019 contained no significant errors.

** See glossary at end of report for definition.*

DESCRIPTION

The Section is part of MDOT's Design Division and is responsible for supporting MDOT in meeting its traffic and safety engineering responsibilities.

The Section consists of four main units that have different responsibilities:

1. Safety Programs Unit

    - Is responsible for the delivery of the HSIP.
    - Tracks and analyzes traffic crash trends to determine opportunities for improvement on the State trunkline and local road systems.
    - Supports development and delivery of the SHSP.
    - Develops, operates, and maintains safety related software programs.
    - Responds to Freedom of Information Act requests.

2. Geometric Design Unit

    - Reviews all 3R/4R* design plans prepared by MDOT and its consultants for geometric features.
    - Provides technical expertise in roadside safety, including training.
    - Assists Highway Field Services regarding field issues during construction.
    - Performs capacity and operational analyses on proposed roadway improvements.
    - Reviews traffic impact studies with respect to capacity analysis and access management.

3. Traffic Signing Unit

    - Develops and implements a five-year freeway and non-freeway sign upgrading program.
    - Reviews all 3R/4R design plans prepared by MDOT and its consultants for conformance to traffic signing standards.

** See glossary at end of report for definition.*

- Provides technical expertise concerning freeway and non-freeway signing.

- Reviews, establishes, or modifies speed limits, parking restrictions, and stop determinations.

- Provides technical expertise concerning traffic regulations, including traffic control orders.

4. Pavement Markings Unit

    - Coordinates the annual pavement markings program.

    - Reviews all 3R/4R design plans prepared by MDOT and its consultants for conformance to pavement markings and delineation standards.

    - Reviews existing pavement markings and delineation for adequacy.

    - Provides technical expertise concerning pavement markings and delineation.

Direct expenditures for the Section totaled $2.7 million for fiscal year 2014. As of June 30, 2015, the Section had 28 full-time equated employees.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the program and other records of the MDOT Traffic and Safety Section. We conducted this performance audit* in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our audit was not directed toward reaching a conclusion regarding the accuracy of information in MSP's TCRS database and, accordingly, we provide no such conclusion.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, analysis of agency responses, and quality assurance, generally covered the period October 1, 2012 through June 30, 2015.

METHODOLOGY

We conducted a preliminary survey to gain an understanding of the Section's activities to establish our audit objectives and methodology. During our preliminary survey, we:

- Conducted interviews and analyzed applicable information to obtain an understanding of the Section's operations, activities, and internal control*.
- Performed a site visit to a region office and conducted interviews with several staff members regarding regional office traffic and safety activities.
- Reviewed selected safety improvement project files and design plan review files.
- Reviewed examples of performance measurement information reported by the Section related to traffic and safety improvement activities.

OBJECTIVE #1

To assess the Section's efforts to ensure that it appropriately selected priority traffic and safety improvement projects.

To accomplish our first objective, we:

- Interviewed Section staff to obtain an understanding of the processes used for selecting traffic and safety improvement projects.

** See glossary at end of report for definition.*

- Judgmentally selected and performed site visits to 4 of MDOT's 22 TSCs. Our selection included TSCs from 4 (57%) of MDOT's 7 regions. We selected 3 (75%) of the 4 TSCs from regions with the highest numbers of high crash locations during fiscal year 2012 and the highest numbers of safety improvement projects approved during fiscal years 2013 and 2014. We then selected 1 (25%) TSC based on location to provide greater Statewide geographic distribution of selected sites.

- Judgmentally and randomly selected 10 of the 32 approved traffic and safety improvement projects from the fiscal year 2013 and 2014 CFP processes and reviewed the project files to determine if each project met all the established selection criteria for approval.

- Randomly selected and reviewed 68 of 678 high crash location analyses conducted during the most recently completed high crash analysis process from 4 judgmentally selected TSCs to determine if the regions' analyses accurately and completely assessed each high crash location and utilized the appropriate TCRS traffic crash data.

- Identified 17 proposed traffic and safety improvement projects from the fiscal year 2011 and 2012 award periods that required an RSA during our audit period and examined the project files to determine whether the Section completed the RSA for each project.

- Obtained an understanding of the Section's use and maintenance of the guardrail inventory database and MTSIS for project selection.

- Reviewed MDOT's five-year traffic signing plans for all 7 regions to determine if MDOT updated each plan annually and identified roadways that needed traffic sign replacements and upgrades in each region.

- Verified that MDOT had contracts established in all 7 regions during each year of the audit period for pavement marking projects.

OBJECTIVE #2

To assess the Section's efforts to appropriately review highway construction design plans for the proper geometric features, pavement markings and delineation, and traffic signing.

To accomplish our second objective, we:

- Interviewed staff to gain an understanding of the Section's design plan review processes.

- Reviewed MDOT's Michigan Road Design Manual for the requirements necessary for the preparation and review of design plans.

- Reviewed a random sample of 110 design plan review files from the 1,053 design plans completed during the audit period by the Geometric Design, Traffic Signing, and Pavement Markings Units for completeness, timeliness, and proper approval.

- Obtained an understanding of how MDOT's region and TSC safety engineers and MDOT's Quality Assurance Section participate in the highway construction project design plan review process. In addition, we reviewed 10 of the 110 randomly selected design plan review files for approval by the region or TSC safety engineer and the Quality Assurance Section.

- Reviewed the July 2011 National Cooperative Highway Research Program Project 20-68A Scan 09-01, *Best Practices In Quality Control and Assurance In Design,* publication to obtain an understanding of common practices in states with successful quality control and assurance programs for design.

OBJECTIVE #3

To assess the Section's efforts to ensure the accuracy of performance measurements related to traffic and safety improvement activities.

To accomplish our third objective, we:

- Interviewed the Section manager to obtain an understanding of the Section's traffic and safety performance measurement reporting processes and requirements.

- Observed MDOT staff replicate an extraction of traffic crash data from MSP's TCRS database and compared the steps taken during the reperformance with MDOT's documented procedures for obtaining traffic crash data from TCRS for consistency.

- Reconciled the information that MDOT reported in its 2013 and 2014 HSIP annual reports submitted to the FHWA for traffic fatalities and serious injuries with source data from MSP's TCRS database.

- Verified that calendar year 2012, 2013, and 2014 data reported in the MDOT MiScorecard for traffic and safety metrics agreed with MSP's TCRS database information.

- Verified that the traffic and safety elements that MDOT reported in its 2014 System Performance Measures Report related to crash reduction and cost savings from safety improvement investments agreed with MSP's TCRS database source data.

- Recalculated the overall time of return on investment that MDOT reported for each of the 7 regions for the safety improvement projects approved and funded for fiscal years 2015 through 2019.

CONCLUSIONS

We base our conclusions on our audit efforts and the resulting material conditions* and reportable conditions.

When selecting activities or programs for audit, we direct our efforts based on risk and opportunities to improve State government operations. Consequently, we prepare our performance audit reports on an exception basis.

AGENCY RESPONSES

Our audit report contains 2 findings and 2 corresponding recommendations. MDOT's preliminary response indicates that it agrees with both recommendations.

The agency preliminary response that follows each recommendation in our report was taken from the agency's written comments and oral discussion at the end of our audit fieldwork. Section 18.1462 of the *Michigan Compiled Laws* and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100) require an audited agency to develop a plan to comply with the recommendations and submit it within 60 days after release of the audit report to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

PRIOR AUDIT FOLLOW-UP

We released our prior performance audit of the Traffic and Safety Support Area, Bureau of Highway Delivery, Michigan Department of Transportation (59-162-04), in January 2005. MDOT complied with 3 of the 4 prior audit recommendations. We rewrote 1 prior audit recommendation in Finding #2 of this audit report.

** See glossary at end of report for definition.*

GLOSSARY OF ABBREVIATIONS AND TERMS

3R/4R	Freeway resurfacing, restoration, rehabilitation, and reconstruction and new construction projects.
Call for Projects (CFP)	The process by which highway projects are identified, selected, and approved.
database	A collection of information that is organized so that it can be easily accessed, managed, and updated.
FHWA	Federal Highway Administration.
goal	An intended outcome of a program or an entity to accomplish its mission.
HSIP	Highway Safety Improvement Program.
internal control	The plan, policies, methods, and procedures adopted by management to meet its mission, goals, and objectives. Internal control includes the processes for planning, organizing, directing, and controlling program operations. It also includes the systems for measuring, reporting, and monitoring program performance. Internal control serves as a defense in safeguarding assets and in preventing and detecting errors; fraud; violations of laws, regulations, and provisions of contracts and grant agreements; or abuse.
material condition	A matter that, in the auditor's judgment, is more severe than a reportable condition and could impair the ability of management to operate a program in an effective and efficient manner and/or could adversely affect the judgment of an interested person concerning the effectiveness and efficiency of the program.
MDOT	Michigan Department of Transportation.
MiScorecard	Part of the State of Michigan's goal to increase accountability and transparency. The monthly MiScorecard reports current performance levels for certain areas within the various departments and serves as an internal management tool for decision-makers.

MSP	Michigan Department of State Police.
MTSIS	Michigan Traffic Sign Inventory System.
performance audit	An audit that provides findings or conclusions based on an evaluation of sufficient, appropriate evidence against criteria. Performance audits provide objective analysis to assist management and those charged with governance and oversight in using the information to improve program performance and operations, reduce costs, facilitate decision making by parties with responsibility to oversee or initiate corrective action, and contribute to public accountability.
performance measure	A composite of key indicators of a program's or an activity's inputs, outputs, outcomes, productivity, timeliness, and/or quality. Performance measures are a means of evaluating policies and programs by measuring results against agreed upon program goals or standards.
reportable condition	A matter that, in the auditor's judgment, is less severe than a material condition and falls within any of the following categories: an opportunity for improvement within the context of the audit objectives; a deficiency in internal control that is significant within the context of the audit objectives; all instances of fraud; illegal acts unless they are inconsequential within the context of the audit objectives; significant violations of provisions of contracts or grant agreements; and significant abuse that has occurred or is likely to have occurred.
RSA	road safety audit.
SHSP	Strategic Highway Safety Plan.
State trunkline system	Michigan's State highway system, which is composed of all Interstate, U.S.-numbered, and M-numbered routes.
TCRS	Traffic Crash Reporting System.
TSC	transportation service center.

This Page Left Intentionally Blank

This Page Left Intentionally Blank

This Page Left Intentionally Blank

This Page Left Intentionally Blank


OAG
Office of the Auditor General
Independent
Objective
Transparent