

Office of the Auditor General
Performance Audit Report

**Trunkline Highway and Bridge
Construction Procurement**
Michigan Department of Transportation

January 2018

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

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Article IV, Section 53 of the Michigan Constitution



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Report Summary

*Performance Audit
Trunkline Highway and Bridge Construction
Procurement
Michigan Department of Transportation
(MDOT)*

Report Number:
591-0400-17

Released:
January 2018

The MDOT Design Division's Quality Assurance Section and the Contract Services Division administer highway and bridge construction procurement for the State trunkline system. From October 1, 2014 through January 31, 2017, MDOT awarded 642 trunkline highway and bridge construction projects totaling \$2.0 billion.

Audit Objective			Conclusion
Objective #1: To assess the sufficiency of MDOT's efforts to ensure the reliability of cost estimates prior to bid letting for trunkline highway and bridge construction projects.			Sufficient
Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
None reported.			Not applicable.

Audit Objective			Conclusion
Objective #2: To assess the effectiveness of MDOT's processes to ensure that contracts are appropriately and competitively awarded for trunkline highway and bridge construction projects.			Effective
Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
None reported.			Not applicable.

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January 12, 2018

Mr. Todd Wyett, Chair
State Transportation Commission
and
Kirk T. Steudle, PE, Director
Michigan Department of Transportation
Murray D. Van Wagoner Building
Lansing, Michigan

Dear Mr. Wyett and Mr. Steudle:

This is our performance audit report on Trunkline Highway and Bridge Construction Procurement, Michigan Department of Transportation.

As you are aware, when our preliminary survey does not identify significant concerns to warrant completing the audit, we issue a preliminary survey summary. For this project, we went forward with the audit because of the public's interest in highway and bridge construction and the expected increase in construction resulting from legislation in November 2015 that changed the funding mechanisms for highway and bridge construction in Michigan.

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

Sincerely,

Doug Ringler
Auditor General

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AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

RELIABILITY OF COST ESTIMATES PRIOR TO BID LETTING

BACKGROUND

The Michigan Department of Transportation's (MDOT's) region offices (see Exhibit #2) and Bridge Development Division submit final trunkline highway and bridge construction project plans to the Quality Assurance (QA) Section within MDOT's Design Division. The project plan includes the plan proposal, special provisions, and the engineer's estimate*. The QA Section is responsible for ensuring that the project plan is complete and accurate. The QA Section also assesses the reliability of the engineer's estimate through cost analysis and makes any needed revisions to achieve the final cost estimate prior to bid letting*. The QA Section uses historical cost data from the AASHTOWare Project Preconstruction information system* to prepare its cost analysis.

AUDIT OBJECTIVE

To assess the sufficiency of MDOT's efforts to ensure the reliability of cost estimates prior to bid letting for trunkline highway and bridge construction projects.

CONCLUSION

Sufficient.

FACTORS IMPACTING CONCLUSION

- The QA Section has established a framework for project plan and proposal processing.
- The QA Section prepared independent cost estimates and justified the final cost estimates used in the projects' bid lettings for all 43 projects reviewed.
- The selected AASHTOWare Project Preconstruction information system reports that we reviewed provided accurate and reliable data to aid the QA Section estimator in developing independent cost estimates.
- On average, the engineers' estimates met Federal Highway Administration (FHWA) guidelines for degree of estimate accuracy. Also, the engineers' estimates compared with final project construction costs confirmed that the estimates and the QA process were reliable.

* See glossary at end of report for definition.

APPROPRIATELY AND COMPETITIVELY AWARDED CONTRACTS

BACKGROUND

The Contract Services Division (CSD) is responsible for administering MDOT's contracting operations, which include:

- Prequalifying contractors seeking to bid and/or perform work on MDOT projects.
- Establishing work classification and contractor qualification requirements for projects.
- Advertising projects for bid letting.
- Verifying that contractors are eligible to bid on the type of work needed and the dollar value of the project.
- Assisting contractors with electronic bidding.
- Analyzing contractor-submitted bids using the AASHTOWare Project Preconstruction information system data and reports to confirm low bidders.
- Awarding contracts to confirmed low bidders.
- Obtaining required project and contract approvals.

CSD reviews contractor applications and grants the contractor a prequalification financial rating and ratings for specific categories of work. The ratings are based on a contractor's experience with similar work, past performance on MDOT projects, availability of equipment, and financial capability.

AUDIT OBJECTIVE

To assess the effectiveness* of MDOT's processes to ensure that contracts are appropriately and competitively awarded for trunkline highway and bridge construction projects.

CONCLUSION

Effective.

FACTORS IMPACTING CONCLUSION

- CSD's analyst reviewed prequalification applications and other data submitted by contractors to establish prequalification ratings for prospective bidders.
- CSD's controls put in place to ensure that contractors bid only on proposals that they are prequalified for were effective.
- CSD awarded projects to confirmed low bidders in the 43 projects we tested.

* See glossary at end of report for definition.

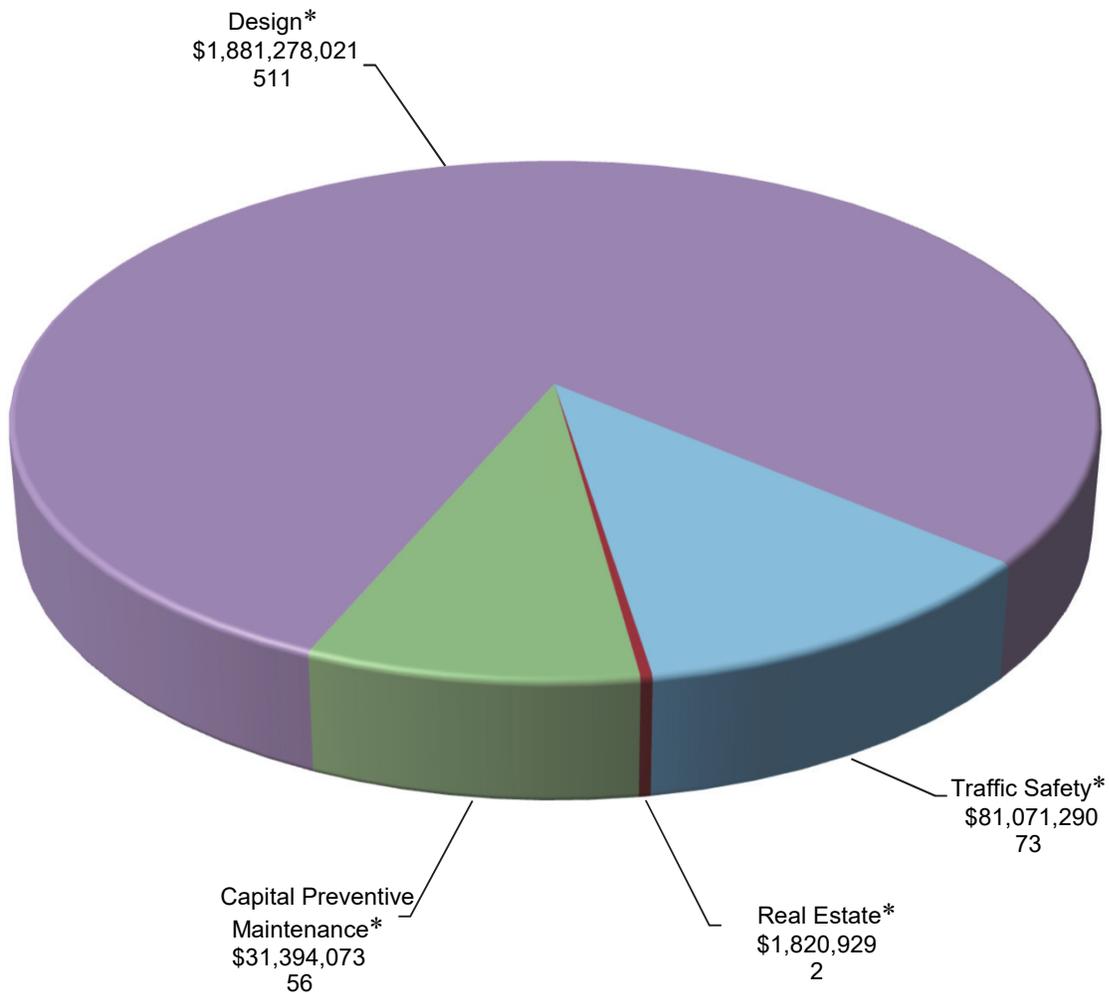
- CSD submitted justification memorandums when the low bid exceeded the engineer's estimate by 10% or more and received State Transportation Commission and State Administrative Board approvals when required for all 12 projects we tested.
- The selected AASHTOWare Project Preconstruction information system reports that we reviewed provided accurate and reliable data to aid CSD staff in processing contractor bids and selection of the low bidder.

SUPPLEMENTAL INFORMATION

UNAUDITED
Exhibit #1

TRUNKLINE HIGHWAY AND BRIDGE CONSTRUCTION PROCUREMENT Michigan Department of Transportation

Types of Trunkline Projects Awarded
From October 1, 2014 Through January 31, 2017

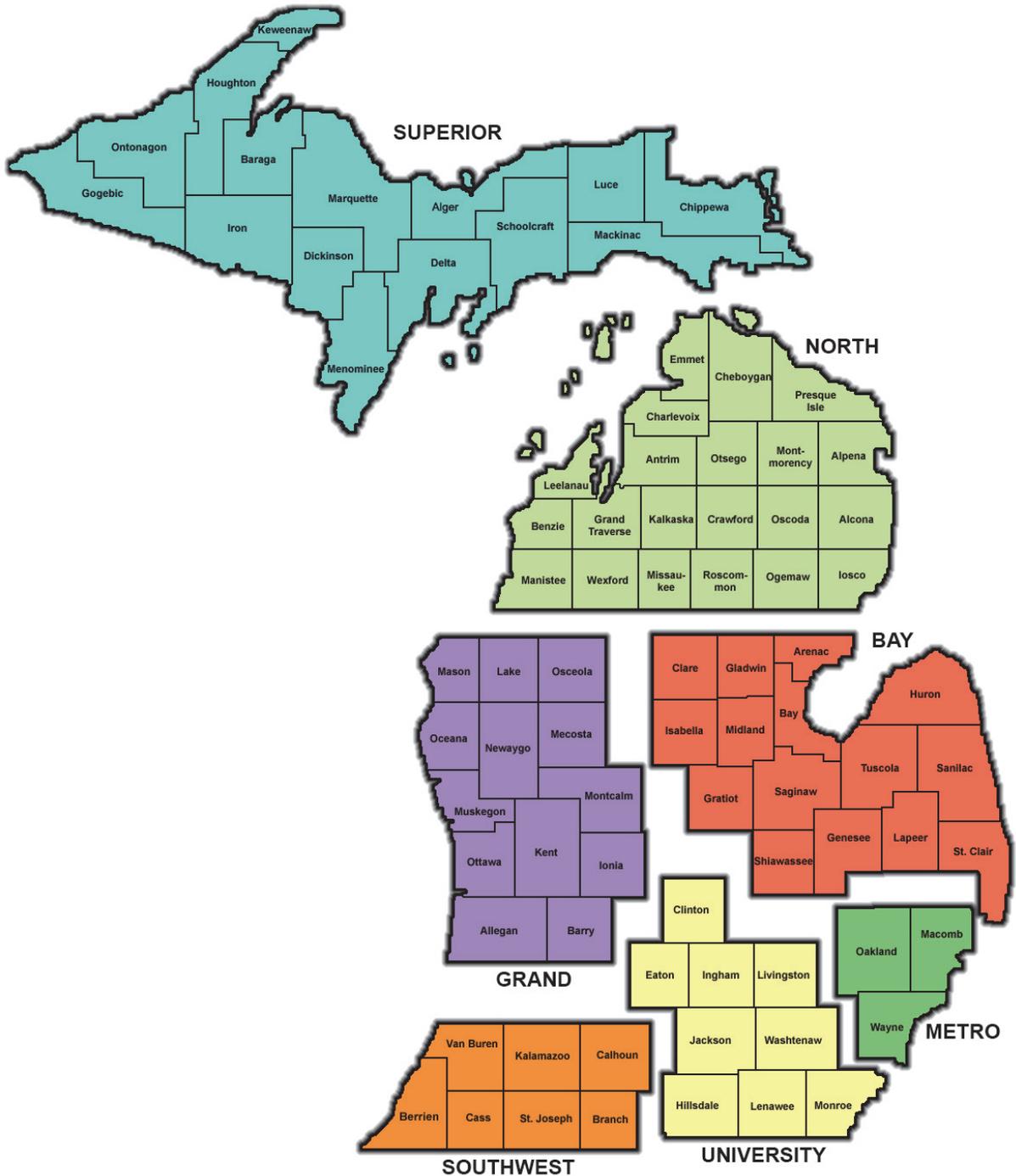


Source: The OAG prepared this exhibit based on data provided by MDOT.

* See glossary at end of report for definition.

TRUNKLINE HIGHWAY AND BRIDGE CONSTRUCTION PROCUREMENT
Michigan Department of Transportation

Map of Regional Service Areas
As of January 31, 2017



Source: The OAG prepared this exhibit based on data provided by MDOT.

TRUNKLINE HIGHWAY AND BRIDGE CONSTRUCTION PROCUREMENT
Michigan Department of Transportation

Number of Bids by Project and Region
From October 1, 2014 Through January 31, 2017

Region	Number of Projects With										Number of Projects by Region
	1 Bid	2 Bids	3 Bids	4 Bids	5 Bids	6 Bids	7 Bids	8 Bids	9 Bids	≥10 Bids	
Bay	2	25	29	20	16	6	2	4	4		108
Grand	3	41	23	8	10	5	1	1	2		94
Metro	5	29	40	24	17	4	2	1			122
North	4	25	18	9	2	3					61
Southwest	1	45	22	16	6	4				2	96
Superior	6	35	18	15	1	2	1		1		79
University	4	24	17	19	9	3	3	1	2		82
Total	<u>25</u>	<u>224</u>	<u>167</u>	<u>111</u>	<u>61</u>	<u>27</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>2</u>	<u>642</u>

Source: The OAG prepared this exhibit based on data provided by MDOT.

TRUNKLINE HIGHWAY AND BRIDGE CONSTRUCTION PROCUREMENT
Michigan Department of Transportation

Total Project Awards by Region and Type
From October 1, 2014 Through January 31, 2017

Region	Project Type				Total Awards	Percent
	Design	Capital Preventive Maintenance	Real Estate	Traffic Safety		
Bay	\$ 261,017,064	\$ 6,048,344	\$	\$ 8,582,736	\$ 275,648,144	14%
Grand	206,678,128	178,614		11,521,518	218,378,260	11%
Metro	612,475,299	11,702,450	1,820,929	17,770,765	643,769,443	32%
North	124,152,709	1,167,106		4,131,114	129,450,929	6%
Southwest	192,906,135	7,120,606		20,825,657	220,852,398	11%
Superior	124,277,994	1,001,973		2,812,302	128,092,269	6%
University	359,770,691	4,174,981		15,427,199	379,372,871	19%
Total	<u>\$1,881,278,021</u>	<u>\$31,394,073</u>	<u>\$1,820,929</u>	<u>\$81,071,290</u>	<u>\$1,995,564,313</u>	<u>100%</u>

Source: The OAG prepared this exhibit based on data provided by MDOT.

DESCRIPTION

MDOT was organized under Public Act 380 of 1965 (Sections 16.450 - 16.458 of the *Michigan Compiled Laws*). MDOT is governed by the State Transportation Commission, which is made up of six members who are appointed by the Governor with the advice and consent of the Senate.

Public Act 51 of 1951 declared MDOT responsible for maintaining the State highway system, commonly known as the State trunkline system, and for allocating and distributing federal aid to local road agencies. MDOT has direct jurisdiction over Michigan's 9,668-mile trunkline system, which is composed of all Interstate, U.S.-numbered, and M-numbered highways.

The MDOT Design Division's QA Section and CSD administer highway and bridge construction procurement for the State trunkline system. MDOT awards design, capital preventive maintenance, real estate, and traffic safety contracts to provide cost-effective, integrated, and sustainable transportation solutions for the State trunkline system. MDOT awarded 642 trunkline highway and bridge construction projects totaling \$2.0 billion from October 1, 2014 through January 31, 2017 (see Exhibits #1, #3, and #4).

For fiscal years 2015 and 2016, the QA Section expended \$1.7 million and \$2.0 million, respectively, plus costs charged to special projects. For fiscal years 2015 and 2016, CSD expended \$4.9 million in each year. The QA Section and CSD employed 24 and 40 full-time employees, respectively, as of January 31, 2017.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the records and processes related to MDOT's trunkline highway and bridge construction procurement. 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 conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our conclusions based on our audit objectives.

Within the scope of this audit, we reviewed engineer and contractor plans and engineers' estimates for highway and bridge construction projects. Because we do not possess expertise in the engineering field, we did not assess or conclude on the appropriateness of the schedule of items and materials planned, including the cost estimates, for the projects we reviewed. Instead, we evaluated MDOT's processes for ensuring the appropriateness of materials and cost estimates.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, and quality assurance, generally covered October 1, 2014 through January 31, 2017.

METHODOLOGY

We conducted a preliminary survey to gain an understanding of MDOT's trunkline highway and bridge construction procurement processes to establish our audit objectives and methodology. During our preliminary survey, we:

- Interviewed MDOT staff and analyzed applicable information to obtain an understanding of the QA Section's and CSD's responsibilities and processes for construction procurement.
- Reviewed applicable laws, regulations, rules, policies, and procedures.
- Performed a walk-through and preliminary testing of selected project files and related contractor prequalification documentation to assess MDOT's procurement process and identify potential risk areas for review. We judgmentally selected the project files by dollar amount and project type. Therefore, we could not project our results to the entire population.
- Reviewed system documentation to obtain an understanding of the AASHTOWare Project Preconstruction information system.

* See glossary at end of report for definition.

OBJECTIVE #1

To assess the sufficiency of MDOT's efforts to ensure the reliability of cost estimates prior to bid letting for trunkline highway and bridge construction projects.

To accomplish this objective, we:

- Tested 43 project files to determine if the QA Section:
 - Included all required provisions and certifications.
 - Ensured the accuracy, completeness, and reasonableness of project information.
 - Prepared an independent cost analysis and compared it to the engineer's estimate.
 - Recommended and made necessary cost adjustments.

We randomly and judgmentally selected 40 of the 642 projects that MDOT awarded from October 1, 2014 through January 31, 2017 and judgmentally selected 3 additional projects with high dollar amounts. Because each project has unique scope and cost components, we could not project our test results to the entire population.

We used this selection of 43 projects for the majority of our testing when the projects contained the applicable attributes for our planned tests. We will refer to these projects as the "overall projects selected" in this report's methodology.

- Assessed the accuracy and data reliability of 15 AASHTOWare Project Preconstruction information system reports used by the QA Section during its cost analysis. We verified the source of the report data and recalculated the cost for selected line items within the reports. We randomly selected the 15 reports from the 43 overall projects selected and judgmentally selected significant line items within the 15 reports for review.
- Analyzed users with access to the AASHTOWare Project Preconstruction information system to determine if the users and their level of access were appropriate.
- Compared the engineers' estimates for all projects that were started and completed during the audit period to the confirmed low bids to determine the degree of the estimates' accuracy and whether the estimates met FHWA guidelines. We also compared the estimates to final project costs to determine the overall extent and reasonableness of any variances for all trunkline projects for which the contractor completed construction during our audit period.

OBJECTIVE #2

To assess the effectiveness of MDOT's processes to ensure that contracts are appropriately and competitively awarded for trunkline highway and bridge construction projects.

To accomplish this objective, we:

- Tested the 43 overall projects selected to assess CSD's contracting processes and to ensure that CSD awarded the project to the low bidder. Because each project has unique scope and cost components, we could not project the results to the entire population.
- Examined 74 contractor prequalification applications to determine the appropriateness of CSD's calculation of the contractor's overall financial rating and to verify that CSD supported the work classification ratings it granted. We reviewed all 56 contractors that bid on the 43 overall projects selected and judgmentally selected an additional 18 contractors with high dollar overall financial ratings. Because the ratings are unique to each contractor, we could not project the results to the entire population.
- Reviewed 10 contractors performing non-MDOT work to determine that CSD ensured that the contractors had sufficient financial resources to also bid on trunkline projects. We judgmentally selected the only contractor from the 43 overall projects selected and randomly selected an additional 9 contractors performing non-MDOT work. Because contractors do not always perform work in addition to MDOT projects, we could not project the results to the entire population.
- Reviewed 12 of 120 projects for which the low bid exceeded the engineer's estimate by 10% or more to determine that CSD submitted justification memorandums and received required approvals from the State Transportation Commission and the State Administrative Board. We randomly sampled the 12 projects to enable us to project the results to the entire population.
- Reviewed all 44 projects with specific line items that exceeded MDOT's thresholds from a random sample of 50 project bids awarded during the audit period to determine that CSD evaluated the projects and line items and made appropriate changes to the contractors' bids when necessary. Because all of the 50 project bids did not include specific line items exceeding MDOT's thresholds, we could not project our results to the entire population.
- Examined 31 unbalanced bid reviews* of specific line-item cost variances to determine that CSD analyzed low bid

* See glossary at end of report for definition.

line-item amounts for reasonable conformance with the project's final cost estimate. We reviewed the 19 required unbalanced bid reviews applicable to the 43 overall projects selected and judgmentally selected 12 additional unbalanced bid reviews for projects with high dollar amounts. We also reviewed whether CSD followed its process to select projects for unbalanced bid reviews. Because all projects did not require an unbalanced bid review, we could not project our results to the entire population.

- Assessed the accuracy and reliability of the AASHTOWare Project Preconstruction information system data and reports used by CSD. We performed the following audit procedures:
 - Verified that contractor bid letting data for 5 randomly selected project proposals appropriately uploaded into the system.
 - Recalculated judgmentally selected line items from 5 randomly selected system bid tabulation reports.
 - Verified that all required bid line items exceeding MDOT's minimum and maximum thresholds were appropriately included for 5 bid reports.

We randomly selected the bid data and reports from the 43 overall projects selected. We then judgmentally selected report line items for verification and recalculation. We could not project our results to the entire population because of the judgmental selection.

- Reviewed 9 disadvantaged business enterprise waiver applications and outcomes for completeness and reasonableness. We randomly selected 5 approved applications and judgmentally selected 4 denied applications. Therefore, we could not project our results to the entire population.
- Obtained an understanding of Michigan Civil Service Commission and MDOT requirements regarding ethical conduct, including disclosures of potential conflict of interest and supplemental employment. We reviewed all conflict of interest disclosures and requests to engage in supplemental employment submitted by employees within the QA Section and CSD during our audit period.

CONCLUSIONS

We base our conclusions on our audit efforts and any resulting material conditions* or 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**

Not applicable.

**SUPPLEMENTAL
INFORMATION**

Our audit report includes unaudited supplemental information that relates to our audit objectives (Exhibits #1 through #4). Our audit was not directed toward expressing a conclusion on this information.

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

GLOSSARY OF ABBREVIATIONS AND TERMS

AASHTOWare Project Preconstruction information system	A software application owned by the American Association of State Highway and Transportation Officials (AASHTO) that is used by MDOT to track and manage cost information throughout its procurement processes.
bid letting	The process of advertising projects open for bids, contractors submitting bids, and MDOT reviewing contractors' submitted bids for trunkline projects.
capital preventive maintenance (CPM)	Projects that are cost-effective treatments to existing roads and bridges that preserve or improve the condition without significantly increasing structural capacity. Road CPM projects include treatments such as crack sealing, surface seals, thin asphalt overlays, concrete patching, and joint repair and replacement. Bridge CPM projects include joint replacement, pin and hanger replacement, deck patching, beam painting, and hot mix asphalt caps.
CSD	Contract Services Division.
design	Roadway reconstruction, bridge replacement, and roadway and bridge rehabilitation projects that include multiple course resurfacing or concrete pavement repair that improves the roadway or overlaying a bridge deck and superstructure repair to improve a bridge.
effectiveness	Success in achieving mission and goals.
engineer's estimate	MDOT's estimate of what a project will cost to construct. This estimate is prepared using the final plan and proposal. It is compared with the bids received to determine if the project should be awarded.
FHWA	Federal Highway Administration.
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.
OAG	Office of the Auditor General.
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.
QA Section	Quality Assurance Section.
real estate	Demolition and clearance projects associated with MDOT's right of way.
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.
traffic safety	MDOT's Safety Program projects that include safety improvements, median barriers, rumble strips, traffic signals, pavement markings, and signs.
unbalanced bid review	Analysis of line-item costs for low bids to assess mathematical and/or material variances and ensure reasonable conformance with the engineers' estimates.



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