PERFORMANCE AUDIT REPORT

Pennsylvania Department of Transportation

Bridge Inspections

July 2024

Commonwealth of Pennsylvania
Department of the Auditor General

Timothy L. DeFoor • Auditor General

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TIMOTHY L. DEFOOR
AUDITOR GENERAL

June 24, 2024

The Honorable Michael Carroll
Secretary of Transportation
Pennsylvania Department of Transportation
400 North Street, Fifth Floor
Harrisburg, PA 17120

Dear Secretary Carroll:

This report contains the results of the Department of the Auditor General's performance audit of the Pennsylvania Department of Transportation (PennDOT). Our audit period was July 1, 2020, through May 10, 2023, unless otherwise noted, with updates where applicable. This performance audit was conducted pursuant to Sections 402 and 403 of The Fiscal Code.[1]

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.[2] We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our audit included the following three objectives:

- Determine the process for inspecting state-owned bridges identified as having the **Overall Condition of Poor** (previously referred to as Structurally Deficient).

- Evaluate whether PennDOT complied with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in an **Overall Condition of Poor**.

[1] 72 P.S. §§ 402 and 403.
[2] U.S. Government Accountability Office. *Government Auditing Standards*. 2018 Revision. Technical Update April 2021.

- Determine and evaluate compliance with PennDOT's policies and procedures for responding to bridges identified as having the Condition Rating of **Critical, Imminent Failure, and Failed**.

Our methodology to satisfy these audit objectives, along with our evaluation of management's internal controls significant to these audit objectives, is included in *Appendix A* of this report. This report presents seven findings and 24 recommendations.

As discussed in *Finding 1,* we found PennDOT has an inspection process for state-owned bridges with an overall condition rating of Poor that includes more stringent requirements than the National Bridge Inspection Standards. However, we found improvements that we believe could help strengthen the bridge inspection program. These issues and recommendations are discussed in *Findings 2 through 7*.

In *Finding 2*, we reviewed documentation to determine whether the 65 individuals assigned the responsibility of a bridge inspection team leader for the 43 bridges selected in our review, met the minimum requirements. We found that two PennDOT staff did not have the minimum years of bridge inspection experience and PennDOT lacked supporting documentation that five consultants met the minimum requirements.

In *Finding 3*, we found PennDOT management did not ensure all inspection report documentation was properly prepared by PennDOT and consultant bridge inspectors and maintained as required. Additionally, we found different requirements in PennDOT policy for consultant bridge inspectors compared to PennDOT bridge inspectors which led to inconsistencies in how inspection reports were prepared. We also found inconsistencies with how each PennDOT district prepared the reports.

In *Finding 4*, we found PennDOT management failed to ensure that 16 critical (Priority 0) and high (Priority 1) priority maintenance item written notifications were provided, or provided timely by inspectors to District Bridge Engineers; District 4 staff did not prepare a Plan of Action (POA) for two Priority 0 maintenance items; 26 of the 49 POAs we reviewed lacked estimated costs of maintenance items; and PennDOT's process for documenting POAs was inconsistent.

In *Finding 5*, we found that 75 of the 217 inspection reports we reviewed were not approved/accepted in the Bridge Management System 2 (BMS2) within the 90-day requirement established by National Bridge Inspection Standards and an additional 10 inspection reports that were still under review had already exceeded the 90-day requirement.[3] Additionally, 85 of the 183 inspections included in our review of the period of July 1, 2020, through May 10, 2023, were not accepted by an individual authorized in PennDOT policies.

[3] Although the audit procedures described throughout the report refer to 183 inspections for the 43 bridges selected, this audit procedure was performed on 217 inspection reports. The difference is due to the fact that the BMS2 report being used was not generated by PennDOT until October 6, 2023, which included additional inspections performed for the 43 selected bridges after the date of May 10, 2023, used for our other audit procedures.

In *Finding 6*, for audit procedures performed on 17 bridges with the condition rating numbers of 0, 1, or 2, which were the focus of Audit Objective 3, we found that bridges identified with a condition rating number of 0 or 1 were closed, bridges identified with a condition rating number of 0, 1, or 2 had a critical or high priority maintenance item that targeted the cause of the low condition rating, district staff properly notified PennDOT Central Office staff of bridge closures, and PennDOT reduced or has plans to reduce the number of bridges with a condition rating number of 0, 1, or 2. However, we found that for one bridge that was closed in District 6 during the audit period, a Bridge Problem Report (BPR) was not completed and therefore not forwarded by management in the Central Office and District 6 to state and federal staff, as required.

In *Finding 7*, we found that although recommended by a bridge inspection consultant, PennDOT did not close a frequently traveled bridge in District 6 while awaiting additional analysis to be performed. Specifically, in March 2022, consultant bridge inspectors performed an interim inspection of the bridge and identified four Priority 0 maintenance items requiring immediate attention, as well as two Priority 1 maintenance items. The consultant recommended in emails and its report to PennDOT to: "1) Close the structure. 2) Load rate the structure…".[4] PennDOT, however, did not close the bridge and only performed a load rating of the structure. Four months later, after a problem-area inspection was performed on the bridge by PennDOT bridge inspectors, the decision was made to close the structure immediately. Further, following its decision, PennDOT issued a press release but failed to also prepare a Bridge Problem Report (BPR), as required by its policy.

In closing, we thank PennDOT for its cooperation and assistance during the audit. PennDOT management is in general agreement with *Findings 1 through 6,* however they disagreed with *Finding 7.* We conclude on PennDOT's responses in the *Auditor's Conclusion to the Pennsylvania Department of Transportation's Response* section later in this report. We reserve the right to follow up at an appropriate time to determine whether and to what extent our recommendations have been implemented.

Sincerely,

Timothy L. DeFoor

Timothy L. DeFoor
Auditor General

[4] In order to load rate a structure, an analysis is performed by a professional engineer to determine the safe weight limit capacity of the bridge.

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A Performance Audit

Pennsylvania Department of Transportation
Bridge Inspections

Executive Summary

This report presents the results of our performance audit of the Pennsylvania Department of Transportation's (PennDOT) bridge inspections. Our performance audit included the following three objectives:

- Determine the process for inspecting state-owned bridges identified as having the **Overall Condition of Poor** (previously referred to as Structurally Deficient).

- Evaluate whether PennDOT complied with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in an **Overall Condition of Poor**.

- Determine and evaluate compliance with PennDOT's policies and procedures for responding to bridges identified as having the Condition Rating of **Critical, Imminent Failure, and Failed**.

The audit period was July 1, 2020, through May 10, 2023, unless otherwise noted, with updates where applicable.

Our audit results are contained in seven findings with 24 recommendations. PennDOT management is in general agreement with *Findings 1* through *6* and either has already begun to implement or will consider implementing the majority of recommendations to strengthen its operations. PennDOT is not in agreement with *Finding 7*. For further detail, see *PennDOT's Response* and *Auditor's Conclusion to the Pennsylvania Department of Transportation's Response* sections of this report.

Finding 1 – PennDOT has an Inspection Process for State-Owned Bridges with an Overall Condition Rating of Poor that Includes More Stringent Requirements than the National Bridge Inspection Standards.

PennDOT is responsible for inspecting more than 25,000 state-owned bridges. Inspections are required to be conducted in accordance with standards established by the Federal Highway Administration. PennDOT implemented its own policies with more stringent bridge inspection guidelines than required by federal standards, including inspecting bridges of a shorter overall length, and performing inspections on a more frequent cycle. As part of our audit to determine PennDOT's process for inspecting bridges with an overall condition rating of Poor, we conducted interviews with PennDOT's Central Office and district management; observed on-site bridge inspections conducted by PennDOT personnel and consultants; reviewed federal and state policies and procedures; and reviewed inspection reports and other required inspection documentation.

While we commend PennDOT for adopting more stringent standards, the results of our audit procedures found improvements that we believe could further strengthen the bridge inspection program. These issues and subsequent recommendations are discussed in *Findings 2 through 7*.

Finding 2 – Certain PennDOT District Staff Assigned the Responsibility of a Bridge Inspection Team Leader Did Not Meet Minimum Requirements and PennDOT Lacked Documentation to Support Consultants Assigned as Team Leaders Met Minimum Requirements.

Each bridge inspection, whether conducted by PennDOT employees or contracted consultants, is required to be performed by a team of at least two certified inspectors, depending on the size of the bridge. Each team is to be supervised by a team leader who meets one of the five minimum qualifications established in federal guidelines. We reviewed documents that support the qualifications of the 65 team leaders assigned to the inspections conducted on 43 bridges selected for review. Our audit procedures found that PennDOT was unable to provide documentation to support that seven (two PennDOT employees and five consultants) of the team leaders assigned to bridge inspections selected for review met the minimum qualifications.

It is vital that PennDOT management take all necessary precautions and needed steps to ensure that only qualified individuals are listed as team leaders in the Bridge Management System 2 (BMS2) and that only those individuals are assigned to carry out the duties and responsibilities of a team leader on bridge inspections to help ensure the inspections are properly conducted and reviewed.

We offer three recommendations to PennDOT to ensure that only qualified individuals are assigned as team leaders.

Finding 3 – PennDOT Management Did Not Ensure Inspection Documentation Was Properly Prepared and/or Maintained Which Led to Inconsistencies Between Inspection Reports.

Our audit procedures involving the review of bridge inspection documents related to the 183 inspections performed on the 43 bridges selected for review, found that although inspections were performed within the required timeframes, PennDOT management did not ensure all inspection report documentation was properly prepared by PennDOT and consultant bridge inspectors and maintained as required. Additionally, different requirements in PennDOT policy for consultant bridge inspectors compared to PennDOT bridge inspectors led to inconsistencies in how inspection reports were prepared. We also found inconsistencies with how each PennDOT district prepared the reports, as well as finding that required items were missing from inspection reports that we reviewed.

Items missing include full bridge inspection reports, title pages, maps, D-491 Inventory Forms, load rating summary and posting evaluation, recommendations and comparison of current

findings with previous inspection findings, and Form A and Form M inspection documents. PennDOT was also unable to provide a scour Plan Of Action (POA) for 6 of the 80 inspections conducted on scour critical bridges. Finally, although PennDOT developed an Inspection Report Quality Control Verification Checklist which includes a comprehensive list of items that need to be addressed prior to the submission of the inspection report, as well as sections on load rating and the fatigue and fracture plan for fracture critical bridges, PennDOT does not require the checklist to be completed, and instead refers to it as an optional reference tool.

Due to the importance of maintaining complete, accurate, and up-to-date records for each bridge, we believe it would be prudent to require inspectors and PennDOT management to complete and sign-off on the checklist. Requiring the completion of this checklist would help ensure all of the inspection items are properly completed, documented, and maintained in the records and, as a result, will likely increase the consistency of the inspection reports completed by both consultants and PennDOT staff.

We offer five recommendations to PennDOT to remedy the inconsistencies and other issues identified by our audit work.

Finding 4 – PennDOT Management Failed to Ensure Critical and High Priority Maintenance Item Written Notifications were Provided, or Provided Timely, and to the Appropriate Staff, and Related Plan of Actions Were Properly and Consistently Prepared.

Based on our review of 183 inspections conducted on the 43 bridges selected for review, PennDOT staff and contracted consultants did not always follow policy pertaining to critical (Priority 0) and high (Priority 1) priority maintenance item notifications and documenting the POA for resolution. PennDOT policy defines Priority 0 and Priority 1 maintenance items as deficiencies that threaten either the structural integrity of the bridge, other structures, or public safety. PennDOT policy also requires District Bridge Engineers (DBE) to develop a POA for all recommended Priority 0 or Priority 1 maintenance items. The POA must include the scope of physical and/or design work, estimated costs, whether the work is to be performed by a contractor or PennDOT staff, and the timeframe for completion. PennDOT policy further requires Priority 0 deficiencies to be resolved or mitigated within seven days of identification and Priority 1 deficiencies to be resolved or mitigated within six months.

The results of our audit procedures performed on the 183 inspections include the following:

- Priority 0 and Priority 1 maintenance item written notifications were not provided for eight inspections and an additional eight inspections were not provided timely by inspectors to DBEs.
- District 4 staff did not prepare POAs for two Priority 0 maintenance items identified by consultant inspectors.
- 26 of the 49 POAs reviewed lacked estimated costs of maintenance items.
- PennDOT's process for documenting POAs was inconsistent.

We offer four recommendations to help PennDOT ensure all critical and high priority maintenance deficiencies are properly documented, tracked, and addressed timely in compliance with policy.

Finding 5 – Bridge Inspection Reports were not Approved/Accepted in the BMS2 System Timely and by the Authorized PennDOT Employees.

Federal standards require the data from most bridge inspections to be entered into state or federal inventory within 90 days of the date of the inspection, a process that PennDOT management stated corresponds with the inspection reports being accepted into its BMS2 system. Our audit procedures involving 217 inspection reports found 75 inspection reports that were not reviewed and accepted timely into BMS2.[5] An additional 10 inspection reports that were still under review had already exceeded the 90-day requirement. Additionally, we found that 85 of the 183 inspections conducted on the 43 bridges selected for review were not accepted by authorized PennDOT employees.

PennDOT management stated the main reasons inspection reports were not accepted timely into BMS2 were due to vacancies in their Office for Inspection Support, the improper classification of team leaders, problems with railroad flagger coordination on bridges over railroads, and significantly larger bridges that can take up to a month to inspect along with the additional time necessary for load rating if needed which leaves much less time to put together a report and perform quality control reviews.

Regarding inspection reports not being accepted in BMS2 by authorized employees, PennDOT management stated the staff required to approve inspection reports are not required to be the person who moves the inspection into accepted status within BMS2, only that the individuals need to be aware of the critical condition and is part of the review process so they can agree with the results. PennDOT policy, however as written, lists specifically as "Required Actions" for the specific staff to accept the report in BMS2. The policy does not allow for anyone else to perform the step in BMS2 to accept the report, which indicates approval.

We offer seven recommendations to PennDOT to ensure that staff are aware of and comply with requirements for accepting inspection reports, and to update the BMS2 system to ensure that only authorized staff have the ability to approve/accept inspection reports.

[5] Although the audit procedures described throughout the report refer to 183 inspections for the 43 bridges selected, the following information refers to 217 inspection reports. The difference is due to the fact that the BMS2 report being used was generated by PennDOT on October 6, 2023, which included additional inspections performed for these 43 bridges after the date of May 10, 2023, used for our other audit procedures.

Finding 6 – PennDOT Districts were Generally in Compliance with Inspection Requirements Specific to Bridges with the Lowest Condition Ratings; However, Management in One District Did Not Prepare a Required Bridge Problem Report Regarding the Closure of One Bridge.

PennDOT districts generally complied with requirements for inspections performed on the state-owned bridges with a condition rating number of 0 (Failed), 1 (Imminent Failure), and 2 (Critical). However, our audit procedures found that management in District 6 and Central Office did not prepare the required Bridge Problem Report (BPR) for one bridge that was closed during the audit period. PennDOT did, however, reduce or has plans to reduce the number of bridges with a condition rating number of 0, 1, or 2.

The results of our audit procedures performed on 17 of the 43 bridges selected for review (bridges with condition rating numbers of 0, 1, or 2) follow:

- Bridges identified with a condition rating number of 0 or 1 during inspections conducted during the audit period were closed.
- Bridges identified with a condition rating number of 0, 1, or 2 during inspections conducted during the audit period had a critical or high priority maintenance item that targeted the cause of the low condition rating.
- District staff properly notified PennDOT Central Office staff of bridge closures.
- The completion of and subsequent forwarding of a BPR to state and federal staff was not performed for one bridge closed in District 6 during the audit period.
- Long-term plans were in place for bridges with a condition rating number of 0, 1, or 2.
- Although recommended by a bridge inspection consultant, PennDOT did not close a bridge in District 6 while awaiting additional analysis to be performed (See *Finding 7*).

We offer two recommendations for PennDOT to prepare BPRs for all bridge emergencies identified, as required by policy; and to continue to evaluate and prioritize bridges for rehabilitation or replacement.

Finding 7 – Although Recommended by a Bridge Inspection Consultant, PennDOT Did Not Close a Bridge in District 6 While Awaiting Additional Analysis to be Performed.

Our audit procedures included reviewing inspections conducted and PennDOT's response to the inspection results on 17 state-owned bridges with an overall condition rating of Poor, and specifically, those with a condition rating number of 0, 1, or 2. One of the bridges reviewed was a frequently traveled bridge in District 6 on which consultant bridge inspectors performed an interim inspection in March 2022 and identified four Critical (Priority 0) maintenance items requiring immediate attention, as well as two High Priority (Priority 1) maintenance items.

The consultant recommended in emails and its report to PennDOT to: "1) Close the structure. 2) Load rate the structure…".[6] PennDOT, however, did not close the bridge and only performed a load rating of the structure. Four months later, after a problem-area inspection was performed on the bridge by PennDOT bridge inspectors, the decision was made to close the structure immediately. Further, following its decision, PennDOT issued a press release but failed to also prepare a Bridge Problem Report (BPR), as required by its policy.

We offer three recommendations for PennDOT to exercise additional caution in heeding closure recommendations made by inspection consultants, and to thoroughly document the reasoning and approval in cases where a consultant's recommendations are not followed.

[6] In order to load rate a structure, an analysis is performed by a professional engineer to determine the safe weight limit capacity of the bridge.

Introduction and Background

This report by the Department of the Auditor General presents the results of a performance audit of the Pennsylvania Department of Transportation (PennDOT). This audit is conducted under the authority of Sections 402 and 403 of The Fiscal Code.[7]

Our performance audit consisted of three objectives and included the audit period of July 1, 2020, through May 10, 2023, unless otherwise noted, with updates where applicable. Our objectives were as follows:

- Determine the process for inspecting state-owned bridges identified as having the **Overall Condition of Poor** (previously referred to as Structurally Deficient).

- Evaluate whether PennDOT complied with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in an **Overall Condition of Poor**.

- Determine and evaluate compliance with PennDOT's policies and procedures for responding to bridges identified as having the Condition Rating of **Critical, Imminent Failure, and Failed**.

See *Appendix A – Objectives, Scope, Methodology, and Data Reliability* for more information. In the sections that follow, we present background information about PennDOT, the bridge inspection program, and PennDOT's participation in the public-private partnership project to rehabilitate bridges.

PennDOT

Act 120 of 1970 established PennDOT from, among others, the former Departments of the Highways and Archives, which was founded in 1903 as one of the first state highway departments in the nation.[8] PennDOT oversees programs and policies affecting highways, urban and rural public transportation, airports, railroads, ports, and waterways. More than three-quarters of PennDOT's annual budget is invested in Pennsylvania's approximately 121,000 miles of state and local highways and 32,000 state and local bridges.[9] PennDOT is directly responsible

[7] 72 P.S. §§ 402 and 403.
[8] 71 P.S. § 511 *et seq.*, amended the Administrative Code of 1929. See also History | Pennsylvania Highways (pahighways.com) and https://www.phmc.pa.gov/Archives/Research-Online/Pages/Environmental-Resources-Records-RG-45-75.aspx (see RG-52) (accessed April 24, 2024).
[9] https://www.penndot.pa.gov/about-us/pages/default.aspx (accessed February 12, 2024).

for nearly 40,000 miles of highway and roughly 25,400 bridges, a system first established in 1911.[10]

Approximately 7,095 of PennDOT's 11,579 employees provide maintenance, restoration, and expansion of the state highway system. Its employees work in central headquarters in Harrisburg and 11 engineering districts (see later section for a map of the 11 districts) across all 67 counties.[11]

According to PennDOT, its mission is to enhance, connect and add value to our communities by providing a sustainable, equitable transportation system and quality services for all, with a vision of enhanced quality of life built on transportation excellence.[12]

Inspection Program for State-Owned Bridges

According to its website, PennDOT maintains its commitment to maintaining and improving bridges through bridge preservation activities, including painting, deck joint repair or replacement, rigid deck overlays, and the like.[13] PennDOT's Bridge Safety Inspection Program follows the guidelines and standards established by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO).[14]

Each of the 11 districts' Bridge Units manage and administer the inspection of state-owned bridges in its area.[15] PennDOT's Central Office, Bridge Inspection Section (BIS) in the Bridge Office, maintains responsibility for overall guidance and coordination of the Bridge Safety Inspection Program.[16] PennDOT's Central Office is generally staffed by a Bridge Inspection Chief, three Managers, two Engineers, and a Statistician.

PennDOT is responsible for inspecting more than 25,000 state-owned highway bridges and 6,600 locally owned bridges and conducts approximately 18,000 bridge inspections each year. However, the focus of our audit is the inspections of only state-owned bridges. Although National Bridge Inspection Standards (NBIS) require mandatory inspections of bridges more

[10] Ibid.
[11] The 11 districts are numbered 1 through 12; however, there is no District 7. https://www.penndot.pa.gov/about-us/pages/default.aspx (accessed February 12, 2024).
[12] PennDOT 2022 Annual Report. https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%20409.pdf (accessed February 12, 2024).
[13] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/pages/default.aspx (accessed February 12, 2024).
[14] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP, Chapter 1 – Administrative Considerations, Section 1.2 Scope of this Manual, 2022 Edition dated December 2022.
[15] Our audit objectives, and therefore the focus of our audit procedures, are specific to state-owned bridges in Pennsylvania.
[16] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP, Chapter 1 – Administrative Considerations, Section 1.2 Scope of this Manual, 2022 Edition dated December 2022.

than 20 feet in length, PennDOT sets its inspection standards for bridges that are eight feet or greater.[17] Also, while NBIS requires routine inspections every 24 months, PennDOT performs more frequent inspections of bridges, with some being inspected once a year or more frequently if it is identified as being in Poor condition (see later section for detail on condition ratings).[18] Bridge inspections include performing visual and physical evaluations of bridge components and all bridge elements, according to NBIS and PennDOT's *Bridge Safety Inspection Policy and Procedures Manual*.[19]

Bridge inspection teams enter inspection data and information into iForms, a data collection software, to document data collected during an inspection. Once the inspection is completed, the information is submitted to the PA Bridge Management System 2 (BMS2). BMS2 records and stores bridge inventory and inspection data and is utilized to support the bridge inspection data needs of PennDOT and the FHWA.[20]

As discussed throughout this report, BMS2 is used to generate reports utilized by PennDOT's Central Office and the districts. Additionally, information recorded in BMS2 is utilized by PennDOT management to make key decisions relating to bridge inspections, maintenance, preservation, rehabilitation, and replacement. BMS2 supports the federally mandated National Bridge Inspection Program, which enables Pennsylvania to receive its federal allocation of bridge funding.[21]

Within BMS2, each bridge is assigned a unique identification number known as a bridge key. Each bridge record contains information about the bridge separated into an inventory screen that includes information such as specifications, location, and ownership, and an inspection screen that includes information such as condition ratings, notes, and comments.

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[17] U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C - National Bridge Inspection Standards, Section 650.305 Definitions. With the enactment of the Federal Highway Act in 1968, the United States Congress required the U.S. Secretary of Transportation to develop the National Bridge Inspection Standards (NBIS) over the safety inspections of highway bridges on public roads throughout the United States. The federally mandated NBIS aim to ensure the proper inspection of the nation's bridges more than 20 feet in length on public roads. FHWA reviews the results of those programs for compliance with the Standards through its annual compliance review.

[18] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).

[19] Ibid.

[20] PennDOT Form D-494A (1-19) "PA Bridge Management System 2 and iForm User Agreement License, Confidentiality and Non-Disclosure Terms and Conditions", dated January 2019. https://www.dot.state.pa.us/public/PubsForms/Forms/D-494A.pdf (accessed March 11, 2024).

[21] PennDOT Publication 238 – Bridge Safety Inspection Manual*:* 1) 2010 2*nd* Edition Revised March 2010, Chapter 5 – PA's Bridge Management System 2, Section 5.1 General; 2) 2021 Edition dated April 2021 Chapter 5 – PA's Bridge Management System 2, Section 5.1 General; and 3) both 2022 Editions dated September 2022 and December 2022, Chapter 5 – PA's Bridge Management System 2, Section 5.1 General.

It is vital to note that Pennsylvania has the **third-largest number of bridges** in the nation, and the average age of state-owned bridges is **over 50 years old**.[22] Based on bridge data provided by PennDOT, as of December 31, 2022, the oldest state-owned bridge in Pennsylvania was built in 1697. According to management, the age of a bridge does not necessarily correlate to its condition. An older bridge that has undergone rehabilitation work can have an overall good condition rating.

The following table presents the dollar value of projects, pertaining to the rehabilitation and replacement of state-owned bridges, that had contractors selected for the construction phase during the fiscal years ended June 30, 2021, 2022, and 2023:

Dollar Value of Projects Related to the Rehabilitation and Replacement of State-Owned Bridges with Contractors Selected for the Construction Phase During the Fiscal Years Ended June 30, 2021, 2022, and 2023

Fiscal Year Ended June 30:	Bridge Project Costs[a/]
2021	$327,728,645
2022	$453,505,287
2023	$390,296,945
Total	**$1,171,530,877**

[a/] - Bridge project costs include all bridge work planned, as well as any miscellaneous work items critical to complete the project but not necessarily related to the bridge such as, but not limited to, maintenance and protection of traffic, utility work, adjacent roadway work, and old structure removal. These costs, however, were not necessarily spent during the respective fiscal year.

Source: Produced by staff of the Department of the Auditor General based on information provided by PennDOT management.

District management determines inspection team assignments, with consideration given to the location of the bridge, equipment necessary to conduct the inspection, such as a crane, and specialized training of the inspectors. Each bridge inspection, regardless of whether the inspection is being conducted by PennDOT employees or contracted consultants, is performed by a team of at least two bridge inspectors that must be certified.[23] Additional inspectors may be assigned depending on the size and type of the bridge.

To become a certified bridge inspector in Pennsylvania, PennDOT employees and consultants must complete PennDOT's Bridge Safety Inspector Training and Certification program. The program consists of an initial 15-day training course that addresses bridge engineering concepts, recognizing material deterioration, inspection techniques and procedures, and rating and documenting conditions of all components. A comprehensive final exam must be passed to

[22] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/pages/default.aspx (accessed February 12, 2024).
[23] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).

receive certification. Certified inspectors are required to attend a refresher training course every two years and pass a final examination.[24]

Each team is supervised by a team leader.[25] In addition to being a certified bridge inspector, the team leader must also meet ***one of the five*** following minimum qualifications established by NBIS:

1. Registered professional engineer.
2. Five years of bridge inspection experience.
3. Certified as a Level II or IV Bridge Safety Inspector under the National Society of Professional Engineers program for National Certification in Engineering Technologies.
4. Bachelor's degree in engineering from a college or university accredited by the Accreditation Board for Engineering and Technology, and successfully passed the National Council of Examiner for Engineering and Surveying Fundamentals of Engineering examination, and two years of bridge inspection experience.
5. Associate's degree in engineering or engineering technology from a college or university accredited by the Accreditation Board for Engineering and Technology and four years of bridge inspection experience.[26]

After inspections have been completed by either district staff or consultants, and the information submitted into BMS2, it is the responsibility of the District Bridge Engineer (DBE) or the Assistant District Bridge Engineer (ADBE), depending on the condition of the bridge, to review and approve the inspection reports and recommendations.

In general, the position of DBE is responsible for reviewing bridges in critical condition and handling emergency situations involving all structures within their district. Additionally, the DBE is responsible for ensuring staff meets NBIS and PennDOT requirements for certification, training and experience and that engineering consultants, bridge owners, and districts have the proper staff for the bridges assigned to them.[27]

The ADBE must be qualified to be the individual in charge of the NBIS inspection program and is responsible for managing the district's day-to-day inspection operations.[28] The ADBE is also responsible for reviewing bridge inspection reports.

[24] Ibid.
[25] Ibid.
[26] U.S. Department of Transportation Federal Highway Administration, 23 CFR 650.309, dated December 14, 2004 and https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).
[27] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP, Chapter 6 – Quality Measures for Safety Inspection, Section 6.2.1 Inspection Organization and Staffing, 2022 Edition dated December 2022.
[28] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP, Chapter 2 – Inspection Requirements, Section 2.2.1 Department Organization for Bridge Safety Inspection, 2022 Edition dated December 2022.

The following table presents the number of filled, vacant, and total positions responsible for conducting state-owned bridge inspections in total for all 11 districts, as of June 30, 2021, 2022, and 2023 (see *Appendix B* for a breakdown of positions in each of the 11 districts):

PennDOT District Bridge Inspection Filled and Vacant Positions as of June 30, 2021, 2022 and 2023

	June 20, 2021			June 30, 2022			June 30, 2023		
	Filled	**Vacant**	**Total**	**Filled**	**Vacant**	**Total**	**Filled**	**Vacant**	**Total**
DBE[a/]	11	0	11	11	0	11	11	0	11
ADBE[b/]	9	2	11	10	1	11	8	3	11
Team Leader	25	2	27	25	2	27	22	6	28
Bridge Inspector	26	6	32	29	4	33	29	5	34
Other[c/]	46	7	53	53	1	54	55	1	56
Total	117	17	134	128	8	136	125	15	140

[a/] - District Bridge Engineer
[b/] - Assistant District Bridge Engineer
[c/] - Includes positions such as BMS2 Coordinator, other types of coordinators, and Civil Engineers

Source: Produced by staff of the Department of the Auditor General based on information provided by PennDOT management.

In addition to PennDOT district staff conducting bridge inspections, according to PennDOT management, during the audit period, PennDOT also contracted with approximately 30 consulting firms to perform bridge inspections. The following table presents the number of state-owned bridge inspections conducted by both PennDOT employees and consultants during each of the fiscal years in the audit period:

State-Owned Bridge Inspections Conducted by PennDOT Staff and Consultants Fiscal Years Ended June 30, 2021, 2022 and 2023

	Bridge Inspections (PennDOT Staff)	**Bridge Inspections (Consultants)**	**Total Bridge Inspections**
June 30, 2021	8,782	3,895	12,677
June 30, 2022	8,599	4,430	13,029
June 30, 2023	9,334	4,915	14,249

Source: Produced by staff of the Department of the Auditor General based on bridge inspection information provided by PennDOT management.

Based on the results of bridge inspections performed, each bridge is assigned an overall bridge condition rating of Good, Fair, or Poor, which is determined by the lowest condition rating

number of the primary components (deck, superstructure, and substructure) of a bridge or culvert.[29] The following table describes condition ratings of bridges as established by NBIS:[30]

Bridge Condition Rating Description		
Overall Condition Rating[a/]	**Condition Rating Number**	**Condition Description**
Good	9	Excellent
	8	Very good
	7	Good, some minor problems noted
Fair	6	Satisfactory, structural elements showing minor deterioration
	5	Fair, primary structural elements are sound but showing minor cracks and signs of deterioration
Poor	4	Poor, deterioration of primary structural elements has advanced
	3	Serious, deterioration has seriously affected the primary structural components
	2	Critical, deterioration of primary structural components has advanced and bridge will be closely monitored, or closed, until corrective action can be taken
	1	Imminent failure, major deterioration in critical structural components. Bridge is closed but corrective action may put the bridge back into light service
	0	Failed, bridge is out of service and beyond corrective action

[a/] - According to PennDOT's website, a bridge's classification is used to generally categorize bridge conditions and to provide a global view for planning improvements. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).

The focus of this audit is state-owned bridges with an overall condition rating of Poor. PennDOT management provided us with bridge reports from the audit period that are generated quarterly from BMS2. The quarterly reports include information on each bridge such as the overall condition rating as of the most recent inspection. The following **map** presents the breakdown of

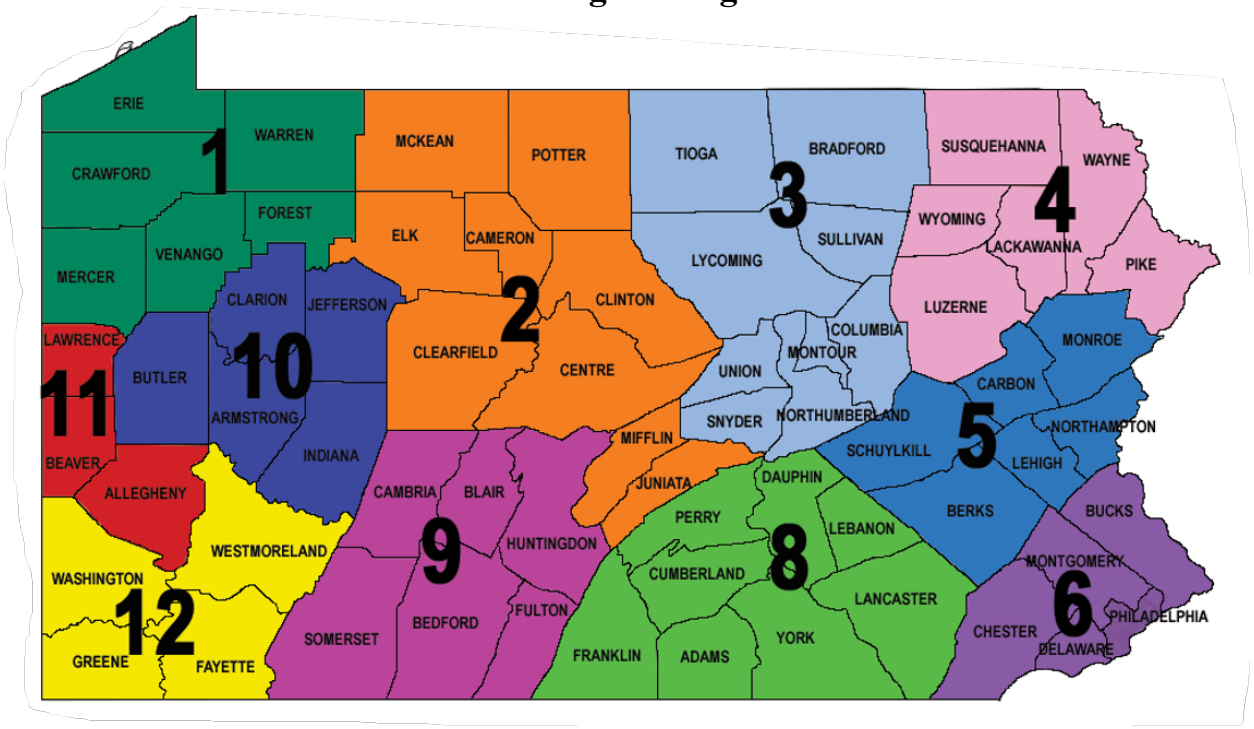
[29] The deck is the top surface of the bridge that carries traffic. The superstructure is the underlying or supporting part of the bridge, for example, steel members under the deck. The substructure is the part of the bridge that supports the superstructure, such as piers and abutments. A culvert is a curved or rectangular structure below the roadway surface used primarily for water flow. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Documents/PennDOT%20Bridge%20Inspection%20Terminology.pdf (accessed March 19, 2023).

[30] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).

each of the 11 districts by county.[31] The 11 districts are numbered 1 through 12, however, there is no District 7. The subsequent **graph** presents a comparison, by district, the number of bridges with an overall condition of Poor as of the quarters ended December 2020, 2021, 2022, and 2023. The subsequent **table** presents the change, by district, of the number of bridges with an overall condition of Poor as of the quarter ended December 2020, compared to December 2023:

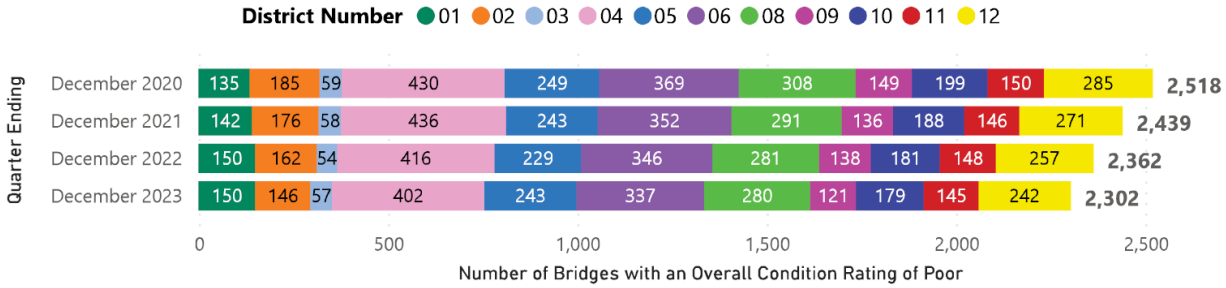
[31] Legislative Budget and Finance Committee, a Joint Committee of the Pennsylvania General Assembly, *A Study Pursuant to House Resolution 2022 – 130: PennDOT Comparative Performance Measures,* dated November 2023, Section II Background Information, Exhibit 1. https://lbfc.legis.state.pa.us/Resources/Documents/Reports/754.pdf (accessed January 12, 2024).

PennDOT Engineering Districts



Source: Produced by staff of the Department of the Auditor General based on information in the Legislative Budget and Finance Committee, a Joint Committee of the Pennsylvania General Assembly, A Study Pursuant to House Resolution 2022 – 130: PennDOT Comparative Performance Measures, dated November 2023.

Comparison of the Number of Bridges with an Overall Condition Rating of Poor as of the Quarters Ended December 2020, 2021, 2022, and 2023



Source: Produced by staff of the Department of the Auditor General based on BMS2 quarterly bridge reports provided by PennDOT management.

Comparison of the Number of Bridges with an Overall Condition Rating of Poor as of the Quarters Ended December 2020 and December 2023				
District Number	**Number of Poor Bridges as of the Quarter Ended December 2020**	**Number of Poor Bridges as of the Quarter Ended December 2023**	**Change in Total Number of Poor Bridges Increase/(Decrease)**	**Percentage Change in Total Number of Poor Bridges Increase/(Decrease)**
1	135	150	15	11%
2	185	146	(39)	(21%)
3	59	57	(2)	(3%)
4	430	402	(28)	(7%)
5	249	243	(6)	(2%)
6	369	337	(32)	(9%)
8	308	280	(28)	(9%)
9	149	121	(28)	(19%)
10	199	179	(20)	(10%)
11	150	145	(5)	(3%)
12	285	242	(43)	(15%)
Total	**2,518**	**2,302**	**(216)**	**(9%)**

Source: Produced by staff of the Department of the Auditor General based on BMS2 quarterly bridge reports provided by PennDOT management.

As noted in the above table, the number of bridges rated as Poor decreased from the quarter ended December 2020, to the quarter ended December 2023, in 10 of the 11 districts. PennDOT management stated that the net reduction was a result of PennDOT replacing and rehabilitating bridges at a faster rate. Additionally, PennDOT's participation in the Public-Private Partnership project also helped to reduce the number of Poor bridges, which is described in the following section.

Public-Private Partnership

A public-private partnership (P3) project is a contractual agreement between a public entity and a private entity in which the public entity transfers the responsibility for engineering, construction, operation, financing, and/or maintenance of a transportation project to the private sector for a defined period of time.[32] The "Public-private transportation partnerships" law, enacted in 2012,

[32] https://www.penndot.pa.gov/ProjectAndPrograms/p3forpa/Pages/About-P3.aspx (accessed February 12, 2024).

provided PennDOT the ability to quickly replace more bridges.[33] PennDOT's P3 program includes projects to reduce the number of bridges identified as being in a Poor condition and in November 2020, PennDOT's P3 board approved the Major Bridge P3 (MBP3) program to replace or rehabilitate nine major interstate bridges. Six bridges were identified for the first phase. See *Findings 3 and 4* for a review performed on bridge inspections, which included two bridges that are part of the first phase of the MBP3 program.

In March and June of 2023 (one bridge and two bridges, respectively), PennDOT terminated the pre-development agreements for the three remaining bridges in the second phase. For one bridge, the process to allocate funding on the 12-year program to allow the bridge project to advance through the environmental, design, and construction phases of the project has been initiated. To expedite the project, PennDOT continues to seek federal discretionary funding so the project can be delivered earlier. For the remaining two bridges, the project scopes and available funding are being reviewed as part of PennDOT's 2025 12-year Program Update to determine a path forward.

[33] 74 Pa.C.S. § 9101 *et seq.*, Chapter 91, Act 88 of 2012, effective September 4, 2012; under the law, the contractual agreement includes "[a] contract for a transportation project which transfers the rights for the use or control, in whole or in part, of a transportation facility by a public entity to a development entity for a definite term during which the development entity will provide the transportation project to the public entity in return for the right to receive all or a portion of the revenue generated from the use of the transportation facility, or other payment, such as transportation-related services." *See* 74 Pa.C.S. § 9102 (relating to Definitions), and https://www.penndot.pa.gov/ProjectAndPrograms/p3forpa/Documents/PennDOT%20Pathways%20Major%20Bridges%20P3%20FAQs.pdf#:~:text=The%20P3%20law%20was%20enacted%20by%20the%20PA,minimize%20impacts%20on%20the%20traveling%20public%20and%20economy (accessed February 12, 2024).

Overall Audit Procedures and Bridge Selection Methodology

As part of this performance audit of the Pennsylvania Department of Transportation (PennDOT) regarding bridge inspections, we performed audit procedures to achieve our **three audit objectives** that cover the period July 1, 2020, through May 10, 2023, unless otherwise noted, with updates where applicable through the end of our audit procedures.[34]

For **Audit Objective 1**, we performed audit procedures to determine the process for inspecting state-owned bridges identified as having an **Overall Condition of Poor** (previously referred to as Structurally Deficient). These procedures included, but were not limited to: 1) conducting interviews with PennDOT's Central Office Bridge Inspection Section staff members and district management; 2) observing two on-site bridge inspections conducted by PennDOT personnel and one on-site bridge inspection conducted by a consultant; 3) reviewing National Bridge Inspection Standards and PennDOT's Bridge Safety Inspection Manual and Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin; and 4) reviewing inspection reports and other data in the Bridge Management System 2 (BMS2), as well as other required inspection documentation. See *Finding 1* for PennDOT's inspection process for state-owned bridges with an overall condition rating of Poor that includes more stringent requirements than the National Bridge Inspection Standards.

For **Audit Objective 2,** we performed audit procedures to evaluate whether PennDOT complied with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in the **Overall Condition of Poor**.

As of December 31, 2022, PennDOT's bridge inventory report listed 2,362 state-owned bridges, within its 11 districts, with an overall condition rating of Poor. Poor bridges are those that have a condition rating number of 0 through 4.[35]

We judgmentally selected 4 of the 11 districts for review. The four districts (Districts 4, 6, 8, and 10) were selected to include coverage of the entire state in rural, suburban, and urban areas, as well as bridges that are part of the public-private partnership initiative (see *Introduction and Background* for further discussion regarding this initiative). Consideration was also given to the percentage of Poor bridges in each district.

As of December 31, 2022, there were 1,224 Poor bridges within the four selected districts. We judgmentally selected 43 of the 1,224 bridges to perform our audit procedures. Our selection of 43 bridges included 26 of 1,176 bridges with a condition rating number of 3 or 4 and 17 of 48

[34] See *Appendix A Objectives, Scope, Methodology, and Data Reliability* for more detail regarding our audit procedures.
[35] See *Introduction and Background* for further detail regarding condition rating numbers.

bridges with a condition rating number of 0, 1, or 2.[36] Bridges were selected with consideration given to the percentage of those bridges within each of the four districts. Additional consideration was given to ensure audit coverage of bridges of varying lengths, the type of bridge, bridges in close proximity to a railroad, and bridges that were either open, closed, or posted for weight limits.[37] The 43 selected bridges included 183 inspections completed between July 1, 2020, and May 10, 2023, of which 103 inspections were completed by consultants and 80 inspections were completed by PennDOT staff.

Audit procedures performed for the 183 inspections included the following:

- Interviewing PennDOT Central Office and district management, as well as consultant bridge inspection staff.

- Reviewing applicable federal and state laws, regulations, guidance, and policies and procedures.

- Reviewing inspection reports and related documents, as well as BMS2 data regarding inspections, to determine whether the inspections were performed within the required frequency and whether the inspection reports included information/data required by PennDOT and federal policy.

- Obtaining corroborative evidence from consultant bridge inspectors to confirm data collected on-site agrees with the data in the inspection report.

- Obtaining corroborative evidence from PennDOT staff responsible for approving bridge inspection reports to confirm they reviewed and accepted the inspection report in BMS2.

- Reviewing documents supporting the qualifications of inspection team leaders for compliance with PennDOT and federal policy established to ensure qualified team leaders perform bridge inspections.

- Determining the number of days it took for PennDOT management staff to accept inspection reports in BMS2 in order to determine compliance with timelines established by PennDOT and federal policy.

- Determining if inspection reports were accepted in BMS2 by PennDOT staff as authorized by PennDOT policy.

[36] See *Appendix C* for details regarding the locations of the 43 bridges as well as the overall condition rating as of the quarter ended December 31, 2023.
[37] See *Appendix A Objectives, Scope, Methodology, and Data Reliability* for further detail regarding this selection process.

Results of our audit procedures performed for the 183 inspections found that PennDOT did not always comply with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in an overall condition of Poor. Specifically, the results included:

- Certain PennDOT district staff assigned the responsibility of a bridge inspection team leader did not meet minimum requirements and PennDOT lacked documentation to support consultants assigned as team leaders met minimum requirements. See *Finding 2*

- PennDOT management did not ensure inspection documentation was properly prepared and/or maintained which led to inconsistencies between inspection reports. See *Finding 3*

- PennDOT management failed to ensure critical and high priority maintenance item written notifications were provided, or provided timely, and to the appropriate staff, and related plan of actions were properly and consistently prepared. See *Finding 4*

- Bridge inspection reports were not approved/accepted in the BMS2 system timely and by the authorized PennDOT employees. See *Finding 5*

For **Audit Objective 3,** we performed audit procedures to determine and evaluate compliance with PennDOT's policies and procedures for responding to bridges identified as having a **Condition Rating of Critical, Imminent Failure, and Failed**. The condition rating numbers associated with these three ratings are 2, 1, and 0, respectively.[38]

For the 17 bridges selected with condition rating numbers of 0, 1, or 2, described above for Audit Objective 2, we performed the following audit procedures based on criteria specific to bridges with condition rating numbers of 0, 1, and 2:

- Interviewing PennDOT Central Office and district management.

- Reviewing applicable federal and state laws, regulations, guidance, and policies and procedures.

- Reviewing inspection reports and related documents, as well as BMS2 data regarding inspections, to determine if appropriate notifications were sent and required action was taken based on inspection results and recommendations made by inspectors, and if the inspection reports included information/data required by PennDOT and federal policy.

Results of our audit procedures performed on the 17 bridges found that PennDOT did not always comply with its policies and procedures for responding to bridges identified as having the condition rating of Critical, Imminent Failure, and Failed. Specifically, we found:

[38] See *Introduction and Background* for further detail regarding condition rating numbers.

- PennDOT districts were generally in compliance with inspection requirements specific to bridges with the lowest condition ratings; however, management in one district did not prepare a required Bridge Problem Report regarding the closure of one bridge. See *Finding 6*

- Although recommended by a bridge inspection consultant, PennDOT did not close a bridge in District 6 while awaiting additional analysis to be performed. See *Finding 7*

Finding 1 – PennDOT has an Inspection Process for State-Owned Bridges with an Overall Condition Rating of Poor that Includes More Stringent Requirements than the National Bridge Inspection Standards.

Audit Objective 1 was to determine the Pennsylvania Department of Transportation's (PennDOT) process for inspecting state-owned bridges identified as having an overall condition of Poor (previously referred to as Structurally Deficient). In order to accomplish this objective, we conducted interviews with PennDOT's Central Office Bridge Inspection Section (BIS) staff members and district management; observed two on-site bridge inspections conducted by PennDOT personnel and one on-site bridge inspection conducted by a consultant; reviewed National Bridge Inspection Standards (NBIS) and PennDOT's Bridge Safety Inspection Manual and Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin; and reviewed inspection reports and other required inspection documentation. This process is described in the following sections of the finding:

- Bridge Inspection Process
- Inspection Report Quality Control Verification Checklist
- Inspection Report Review Process
- Responding to Bridges Identified in Poor Condition

Bridge Inspection Process

As described in the *Introduction and Background*, PennDOT is responsible for inspecting more than 25,000 state-owned bridges. These inspections are required to be conducted in accordance with NBIS established by the Federal Highway Administration. Additionally, PennDOT implemented its own policies with more stringent bridge inspection guidelines than the NBIS. Specifically, the NBIS require routine inspections of bridges more than 20 feet; however, PennDOT inspects all state-owned bridges greater than or equal to eight feet.[39] Further, NBIS require routine inspections every 24 months (or 48 months in cases of extended inspection intervals), but PennDOT performs more frequent inspections of bridges in Poor condition through the use of other special (interim) inspections.[40]

[39] U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C - National Bridge Inspection Standards, Section 650.305 Definitions, Section 650.311 Inspection Frequency (a) Routine Inspections, dated December 14, 2004, and Section 650.311 Inspection Interval (i) Regular Intervals dated May 6, 2022. See also PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 1 – Administrative Considerations, Section 1.5.7.4 Other Bridges (8'-20' Length), 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[40] U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C - National Bridge Inspection Standards, Section 650.311 Inspection Frequency (a) Routine Inspections dated December 14, 2004 and Section 650.311 Inspection Interval (i) Regular Intervals dated May 6, 2022.

According to PennDOT management, PennDOT implemented more stringent guidelines to focus on protecting and maintaining its assets and ensuring public safety. Additionally, while the NBIS apply to bridges throughout the United States, the freeze/thaw cycles experienced in Pennsylvania are more severe than those experienced in other regions. These variations can negatively affect the conditions of roadways and bridges. We noted the most recent update of the NBIS on May 6, 2022, made changes to inspection interval requirements and qualifications of personnel, including team leaders. Given that the changes pertinent to our audit objectives do not need to be implemented until June 6, 2024, after our audit period, these updates were not considered when performing our audit procedures.[41]

PennDOT utilizes the NBIS Compliance Report, otherwise known as the "M1 report," generated from Bridge Management System 2 (BMS2) as a scheduling tool to identify which bridges are due for inspection. PennDOT's BIS management runs the report, at the beginning of each month, to identify which bridges are due for inspection that month, as well as to preview the inspections due in three months. PennDOT sends it to each district by the 5th of the month. Each district receives a reminder of which inspections are still outstanding halfway through the month.[42]

PennDOT performs both routine and interim inspections on Pennsylvania's state-owned bridges, as mentioned above. A routine inspection includes a review of all components and updates to all bridge record documents in the BMS2.[43] BMS2 is used to record and store bridge data, such as field observations, measurements, and load ratings, which are documented during routine inspections. This data is utilized to accomplish the following:

- Determine the physical and functional condition of the structure.
- Identify changes from the previously recorded conditions.
- Determine the need for establishing or revising a weight restriction.
- Determine improvement or maintenance needs.
- Ensure the structure continues to satisfy present service and safety requirements.
- Identify trends and predict future life expectancy of components.[44]

[41] U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C - National Bridge Inspection Standards, Section 650.309 Qualifications of Personnel, (b) team leader providing in Subsection (5) that the requirements of this Paragraph (b) must be satisfied within 24 months from June 6, 2022, and Section 650.311 Inspection Interval (g) Implementation dated May 6, 2022.

[42] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.3.6.1 Responsibility for Compliance, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[43] There are seven general types of bridge inspections: Initial, Routine, Damage, In-Depth, Special, Underwater, and Fracture Critical per PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.3 General Types of Bridge Safety Inspections, 2022 Edition dated December 2022.

[44] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.3.2.2 Purpose of Routine Inspections; 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

Unlike routine inspections performed once every two years for all bridges eight feet or longer, interim inspections are performed for bridges with known or suspected deficiencies that require additional monitoring. These inspections monitor bridges with: 1) signage posted to indicate weight restrictions; 2) poor, serious and critical condition ratings [see further detail on condition ratings in the *Introduction and Background*]; 3) severe scour (erosion) issues; or 4) high priority maintenance recommendations.[45] PennDOT also refers to these types of inspections as reduced interval inspections, since they would be conducted either every six or twelve months, depending on the condition. Reduced interval inspections generally focus on the bridge component driving the low rating.[46]

A team of at least two certified inspectors collect bridge information at the inspection site and document that information in the iForms application, a data collection software program, used to submit information into BMS2. District management determines inspection team assignments with consideration given to the location of the bridge, equipment necessary to conduct the inspection, such as a crane, and specialized training of the inspectors. For example, some inspectors are specifically trained to inspect fracture-critical bridges.[47] A team leader supervises the team conducting the inspection.[48] In addition to being a certified bridge inspector, the team leader must also meet one of the five minimum qualifications established by the NBIS.[49] *Finding 2* includes the results of our audit procedures relating to team leader qualifications.

We also inquired whether PennDOT utilizes any type of Non-Destructive testing (NDT). PennDOT Central Office management stated NDT is a critical part of bridge inspection and evaluation used to supplement the visual inspection by providing information regarding the condition of bridge components that are not detectable by a visual inspection alone without compromising structural integrity. To ensure accurate NDT results and resulting programming decisions, properly trained individuals should carefully perform the tests.

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[45] Bridge scour is the removal of streambed material caused by swiftly moving water from around bridge abutments or piers. Scour can become so deep that streambed material is removed from beneath the abutment or pier footings (known as undermining), compromising the integrity and stability of a bridge structure. Bridge scour is the most common cause of bridge failure. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Local-Scour-Critical-Bridge-Information.aspx (accessed March 11, 2024).

[46] PennDOT Publication 238 – Bridge Safety Inspection Manual: 1) Part IP Chapter 2 – Inspection Requirements, Section 2.3.5.1 Description of Special Inspections, 2010 2*nd* Edition Revised March 2010; 2) Part IP Chapter 2 – Inspection Requirements, Section 2.3.5.1 Description of Other Special (Interim) Inspections, 2021 Edition dated April 2021; and 3) Part IP Chapter 2 – Inspection Requirements, Section 2.3.5.1 Purpose of Other Special (Interim) Inspections, both 2022 Editions dated September 2022 and December 2022.

[47] A fracture critical bridge is a bridge that possesses a component that is considered to be a fracture critical member (FCM), which is a steel member in tension or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse per PennDOT Publication 238 – Bridge Safety Inspection Manual Part IP Chapter 2 – Inspection Requirements, Section 2.4 Fracture Critical Inspections, Section 2.4.1 General, 2022 Edition dated December 2022.

[48] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed January 26, 2024).

[49] See *Introduction and Background* for details on the five minimum qualifications.

According to PennDOT Central Office management, NDT needs may be determined based on the results of prior inspections or issues found while conducting inspections, industry concerns, or planning for rehabilitation projects. An example of NDT's use includes dye penetrant testing to locate cracks in the bridge. Needs determined in advance are typically discussed between district staff during inspection planning.

We also attended three bridge inspections during our audit procedures in order to observe the inspection process. These three bridges are included as part of the audit procedures performed on inspections of the 43 bridges discussed in *Findings 2 through 7*. The details of the inspections we observed are described in the following sections:

- Routine Bridge Inspection Conducted by PennDOT District Inspectors
- Interim Bridge Inspection Conducted by PennDOT District Inspectors
- Routine Bridge Inspection Conducted by Consultant Inspectors

Routine Bridge Inspection Conducted by PennDOT District Inspectors

The first bridge inspection we observed was a routine inspection of a bridge with a condition rating number of 4 conducted by PennDOT inspectors within District 8.[50] The inspection team, which included a team leader and a bridge inspector (i.e., at least two "inspectors"), began with a site overview that included taking photographs of the roadway, bridge surface, and signage. The team then took measurements and completed inspection procedures performed from the surface of the bridge. Following those procedures, the inspectors entered the creek waters to inspect the underside and foundation of the bridge. Throughout the inspection process, the team obtained measurements and took photographs. The team used hardcopies of the prior inspection report to handwrite notes. PennDOT management explained that this is common practice since inspectors do not always have internet access in the field, and an electronic tablet can sometimes be difficult to hold onto while wading through the water and conducting the inspection.

During the inspection, one of the key tools the inspectors used was a scour pole, a four-foot-long metal pole marked in one-foot increments of alternating white and orange color. We observed the inspectors positioning the scour pole in order to add a quick visual frame of reference to their photographs. The inspectors also used the scour pole to check for scour/erosion under the bridge's foundation by probing the soil under the foundation and taking measurements on how far the pole went under the foundation.

Scour-critical bridges require a scour plan of action (POA).[51] A scour POA serves as a comprehensive document that provides a single source of information pertaining to scour

[50] As reported in the *Introduction and Background*, a rating number of 4 is within the overall condition rating of Poor and indicates deterioration of primary structural elements has advanced.

[51] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.6.4 Scour Plan of Actions, 2010 2*nd* Edition Revised March 2010; 2021 Edition dated April 2021; and both 2022 Editions dated September 2022 and December 2022.

inspection, flood monitoring, and a schedule of countermeasures that have been recommended by bridge inspectors to protect a bridge from scour and stream stability problems.[52]

Fracture-critical bridges require the completion of a Fatigue and Fracture Plan, which must be updated during every routine inspection.[53] This is a key step in performing a thorough and complete investigation of the threat of fatigue and/or fracture to the bridge. The Fatigue and Fracture Plan provides information regarding the component(s) that cause the bridge to be considered fracture critical.[54] *Finding 3* includes the results of our audit procedures relating to scour POA and Fatigue and Fracture Plan requirements.

We also observed the process of the inspection team entering the data collected at the field site into iForms. The bridge inspector worked on one computer to upload and caption the photographs, while the team leader completed the inspection report and updated all the measurements. However, before updating the inspection report, the team leader emailed the District Inspection Supervisor photos showing a large amount of debris stuck under the bridge and also notified him via phone. Although the inspection report would contain details and notes about the debris, the team leader stated it was necessary to notify his supervisor immediately since this would be considered a high priority (Priority 1) maintenance item. PennDOT's Bridge Safety Inspection Manual requires immediate notification to the District Bridge Engineer (DBE) if a potentially perilous or hazardous condition is observed.[55]

Priority 1 maintenance items must be resolved within six months in accordance with PennDOT's Bridge Safety Inspection Manual, and the team leader explained an inspection team would return at that time (unless coordinated sooner in conjunction with the PennDOT maintenance team) to ensure that the debris was removed. PennDOT's Bridge Safety Inspection Manual also states critical (Priority 0) activities are to be resolved or mitigated within 7 days of identification.[56] Additionally, because of the threat to public safety, district management must complete a POA to identify the action(s) to repair or mitigate the deficiency.[57] *Finding 4* includes the results of our audit procedures relating to Priority 0 and 1 maintenance items. Inspection data must then be

[52] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Local-Scour-Critical-Bridge-Information.aspx (accessed March 11, 2024).
[53] PennDOT Publication 238 – Bridge Safety Inspection Manual Part IP Chapter 2 – Inspection Requirements, Section 2.4.5.1 Fatigue and Fracture Inspection Plan, 2010 2*nd* Edition Revised March 2010; and Part IP Chapter 2 – Inspection Requirements, Section 2.4.5.1 Fatigue and Fracture Plan, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[54] Ibid.
[55] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframe for POAs, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[56] Ibid.
[57] PennDOT Publication 238 – Bridge Safety Inspection Manual Part IP Chapter 2 – Inspection Requirements: Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, 2010 2*nd* Edition Revised March 2010 and Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

submitted from iForms to BMS2 by the team leader within 10 days of the completion of the field inspection.[58]

During our observation, we inquired as to what would occur if inspectors found major issues with the main components of the bridge during an inspection. PennDOT management stated the on-site inspection team would ultimately make the call to close the bridge and would post emergency signage, which aligns with the process outlined in the Bridge Safety Inspection Manual.[59] Additionally, district management would notify BIS and complete a "Bridge Problem Report" (BPR) in BMS2, which is a formal report to document the closure. The BPR serves as a standard method of documenting bridge and structure problems and presents a concise report to PennDOT's Deputy Secretary for Highway Administration and key executive staff on a bridge incident.[60] *Findings 6 and 7* includes the results of our audit procedures relating to bridge closures and BPRs.

Interim Bridge Inspection Conducted by PennDOT District Inspectors

We then observed the same PennDOT inspection team conduct an interim six-month inspection of another bridge in District 8 identified with a condition rating number of 2.[61] The bridge's condition rating was due to issues with its substructure.[62] This inspection differed from our observation of the routine inspection in that inspectors primarily focused on the issue area(s), rather than performing a full inspection of the entire structure. The inspectors, however, performed similar procedures, such as taking photographs and measurements and monitoring for scour. The inspection team's measurements and observations were in line with what had been recorded during the prior inspection, and they found no change in the condition of the bridge. Following the inspection, the inspection team entered data into iForms, and the reporting process for interim inspections is the same as it would be for a routine inspection.

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[58] PennDOT Publication 238 – Bridge Safety Inspection Manual Appendix IP-01-G General Scope of Work – Safety Inspection of State and Local Bridges, PennDOT Bureau of Design Bridge, QA Division, Scope Deliverables: III Submissions C. Field Inspection Data, 2010 2*nd* Edition Revised March 2010 and Appendix IP-01-F General Scope of Work – Safety Inspection of State and Local Bridges Scope Deliverables: III Submissions C. Field Inspection Data, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[59] PennDOT Publication 238 – Bridge Safety Inspection Manual Part IP Chapter 2 – Inspection Requirements, Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, 2010 2*nd* Edition Revised March 2010 and Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[60] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.9.1 Reporting Bridge and Structure Emergencies, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[61] As reported in the *Introduction and Background*, a rating number of 2 (Critical) is within the overall condition rating of Poor and indicates deterioration of primary structural components has advanced and the bridge should be closely monitored, or closed, until corrective action is taken.

[62] A substructure is the part of the bridge that supports the superstructure, such as piers and abutments. The superstructure is the underlying or supporting part of the bridge.

Routine Bridge Inspection Conducted by Consultant Inspectors

PennDOT also utilizes consultants to conduct bridge inspections; therefore, as part of our audit procedures, we also observed a consultant inspection team conduct a routine inspection of a bridge with a culvert design and a condition rating number of 4 within District 4.[63] We observed the consultant inspectors performing many of the same tasks that we previously observed the PennDOT inspectors conducting.

After the conclusion of the inspection, one of the consultants explained that prior to beginning an inspection, they print out the prior inspection report and review the field notes and inspection photos. While taking photos during the inspection, they try to take them at the same angles as shown in the prior report so that the reviewers at the district level can clearly see any changes. Unlike the inspections we had previously observed conducted by PennDOT, the consultants typically will conduct all of their scheduled inspections and then complete the write-ups at a later date once they return to the office.

The consultant also noted that administrative staff assist in completing the iForms inspection report based on the field notes from the inspectors. Once the report is completed, it goes to the consultant project manager for review, and within 10 days, the inspection report is submitted via BMS2 to the PennDOT district for a final review. As a result, the inspections performed by consultants have an extra layer of review due to the consultant project manager's review prior to the inspection report's submission to BMS2.

Inspection Report Quality Control Verification Checklist

Although we did not observe any of the inspection teams utilizing the Inspection Report Quality Control Verification Checklist (checklist) during our audit procedures, we found that in November 2022, personnel from PennDOT's BIS developed this checklist in order to establish a standardized method of demonstrating that key inspection items have been completed or considered in the preparation of safety inspection reports. While the checklist serves as a reference/tool to ensure that all items listed are addressed prior to submittal of the report, the checklist is not a required document for completion/consideration for the required inspection steps.

As noted in PennDOT's Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin, inspection reports contain an abundance of important information about bridges, often information that is critical to understanding the condition and other aspects of the bridge and its surroundings. Quality control of this information is important to ensure the reported information

[63] A culvert is a curved or rectangular structure below the roadway surface used primarily for water flow.

is complete and meets the requirements for the bridge safety inspection.[64] Given the critical nature of the information included in inspection reports, we believe the checklists should be completed for all bridge inspections conducted by both PennDOT staff and consultants and maintained within the BMS2 system. See *Finding 3* for further discussion of the use of the checklist.

Inspection Report Review Process

NBIS requires the data from bridge inspections to be entered into the State or Federal inventory within 90 days of the date of the inspection.[65] PennDOT management stated that the process of entering the information into inventory corresponds with the inspection reports being accepted into the BMS2 system. PennDOT's BIS sends out a "non-accepted inspection report" to each district, which contains a list of which inspections still need to be accepted (approved).

PennDOT policy establishes requirements as to the level of employee who must review and accept the inspections based on the condition rating number of the bridge. Inspections prior to April 2021 and after December 2022 were required to be accepted by a DBE if the condition rating number was a 3 or less. Also, prior to April 2021, those with a condition rating number of 4 could also be accepted by an Assistant District Bridge Engineer (ADBE). After April 2021 and through December 2022, the inspection reports could be accepted by a DBE, ADBE, or a delegate who is a licensed Professional Engineer (PE).[66] See *Finding 5* for details regarding issues with inspection reports being accepted in BMS2.

In addition to conducting on-site bridge inspection observations, we also conducted interviews regarding the inspection report review process with District 8 management regarding inspections performed by PennDOT inspectors and District 4 management regarding the inspection performed by consultants. District 8 management explained that in the field we observed the inspectors prepare three items for the report: photos, sketches, and inspection data for iForms. Team leaders download their PDFs and photos into a Dropbox folder, which they refer to as a "ready folder." District 8 developed a program that takes all the information from the ready folder and builds the reports for approximately 10 or 12 inspections per batch one to two times per week. The program generates a table of contents, as well as an "Inspection Change Summary," which is a summary page comparing data from the current inspection to the previous inspection. The reports also include photos, sketches, a print-out of the D-450 series in iForms,

[64] PennDOT Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin issued November 14, 2022.
[65] U.S. Department of Transportation, Federal Highway Administration National Bridge Inspection Standards, 23 CFR 650.315 Inventory dated December 14, 2004.
[66] PennDOT management stated the person responsible for the review as outlined in PennDOT Publication 238 Part IP, Chapter 6 - Quality Measures for Safety Inspection, Section 6.2.2 QC Review of Field Inspections and Final Reports would be the one to select the delegate for themselves.

and the D-491 inventory form which contains a snapshot of all inventory items for reference. [67] See *Finding 3* for issues found with iForms and D-491 inventory forms.

Once the reports are generated, the reviewer performs a cursory review of the reports to identify any missing sections without altering the information. The reviewer begins by completing a general overview of the report and then reviews the inspection change summary page to determine if there were any condition rating changes from the prior inspection. The reviewer also verifies the location of the bridge in Google Maps and checks the measurement references within the photos. While looking through the photos, the reviewer will compare the information in the inspection report to BMS2 to verify the information in the photos matches the inspection notes entered in BMS2. Within BMS2, the reviewer typically refers to the previous report to verify that there were no significant changes from the prior inspection. If the reviewer does not agree with inspection information submitted or has additional questions, the reviewer calls the inspectors to discuss and may make changes, if necessary.

Regarding priority maintenance items, the reviewer adds notes in the Proposed Maintenance Detail screen in BMS2 in order to update the priority maintenance status and also to send a work order/maintenance request to the county. District management also noted that an automated process, known as validations, is built into iForms and BMS2 to ensure accuracy of entered inspection information. There are four validation levels (failure, error, warning, and information) that trigger an alert to the user if issues are detected and that follow-up is required.

As part of our audit procedures, we interviewed District 4 management to gain an understanding of the review process for inspections completed by consultants. District 4 management stated that the review process for inspection reports completed by consultants is similar to those inspections conducted by PennDOT inspectors. Consultants have access to BMS2 to upload the report directly and send an email to district management informing them of which reports are ready for review. The District 4 reviewer's first step is to review the field comparison within BMS2 to identify any major changes since the last accepted inspection. The reviewer then focuses on reviewing the photos, narrative, and inspection summary.

If a reviewer does not agree with inspection information, such as a rating from the consultant, the reviewer would call the consultant and have a discussion before changing any information. The ADBE also stated that in the rare case that they cannot agree, the reviewer makes the final decision. Although the interview was with District 4 management, see *Findings 4 and 7* for further discussion regarding circumstances when District 4 and District 6 management did not follow the decision/recommendation made by a consultant.

[67] The Department developed the D-450 field inspection forms to record condition/appraisal ratings of bridge components with narrative comments to support those ratings, element-level data and major improvement/maintenance needs in a uniform manner statewide. See PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 – Inspection Records and Files, Section 8.5.2 Field Inspection Forms for Bridges – iForms, 2022 Edition dated December 2022.

Responding to Bridges Identified in Poor Condition

During our audit procedures, we were informed that in order to stay apprised of bridges that have been identified as being in Poor condition and of new and continuing bridge issues identified during an inspection, PennDOT management is able to subscribe to receive email notifications directly from BMS2. The emails alert the individual of items of concern applicable to their position, such as bridges in Poor condition and inspections ready for acceptance. As noted, in order to receive the emails, staff need to subscribe to the emails rather than emails automatically being generated to notify PennDOT staff of bridge concerns or required action. See *Finding 5* for discussion of this issue. PennDOT management also stated that the 11 districts may operate differently with their approaches to responding to bridges with an overall condition rating of Poor.

We met with management from Districts 9 and 12 to obtain a general understanding of their processes. District 9 management noted that every two years, the district reviews Poor bridges, as well as bridges with a Good and Fair overall condition, as part of the Transportation Improvement Plan (TIP) update in order to prioritize the best use of funds. For instance, in some cases it might be more important to repair a high-volume interstate bridge in Good condition in order to maintain a Good overall condition rating rather than a Poor bridge in a residential area that has a comparatively low volume of traffic. In addition, Poor bridges can still function adequately and safely for the purpose they serve.

The TIP consists of 23 planning organizations and the 11 engineering districts within Pennsylvania. Capital money comes into those planning organizations and then is distributed across the districts. The TIP is on a 4-year cycle based on the federal fiscal cycle; however, it is updated every 2 years. Along with the coordination between the planning organizations and the districts, the districts also coordinate with county governments. There are boards associated with the planning organizations which hold meetings to review/approve which projects are incorporated into a comprehensive state TIP that is submitted to the Federal Highway Administration for final approval.

An additional challenge with the TIP process is that money from each county must stay in that county. It is not permissible to combine funding from multiple counties and redistribute it throughout the district. As a result, there is significant coordination work between the districts, planning organizations, and the counties to schedule and complete the projects. There are also some districts which have planning organizations with split districts, resulting in scenarios where districts compete against each other for funding and prioritization.

During our meeting with District 12, we gained additional insight specific to their planning process to prepare for the TIP. District 12 fits entirely within the Southwestern Pennsylvania Commission, which is the planning organization for the region. This makes it somewhat simpler for District 12 as compared to other districts which may be spread out across multiple planning organizations. Ahead of the TIP update, District 12 management creates a ranked listing of 100

bridges for consideration. Management also stated that political stakeholders can influence projects chosen for improvement versus what the district identified.

Overall Conclusion

As described in this finding, PennDOT has developed bridge inspection policies and procedures regarding state-owned bridges identified as Poor which are more stringent than NBIS requirements. For example, the increased frequency of inspecting bridges. While we commend PennDOT for establishing more stringent requirements, the results of our audit procedures found improvements that we believe could help strengthen the bridge inspection program. These issues and subsequent recommendations are discussed in *Findings 2 through 7*.

Finding 2 – Certain PennDOT District Staff Assigned the Responsibility of a Bridge Inspection Team Leader Did Not Meet Minimum Requirements and PennDOT Lacked Documentation to Support Consultants Assigned as Team Leaders Met Minimum Requirements.

Each bridge inspection, regardless of whether the inspection is being conducted by PennDOT employees or contracted consultants, is performed by a team of at least two certified inspectors, depending on the size of the bridge. Each team is supervised by a team leader. It is critical that the inspection team be qualified to perform bridge inspections. Both PennDOT and the U.S. Department of Transportation's Federal Highway Administration (FHWA) issued minimum requirements for bridge inspectors and team leaders with PennDOT's requirements meeting and exceeding FHWA's National Bridge Inspection Standards (NBIS).[68] However, PennDOT was unable to provide documentation to support that seven of the team leaders assigned to bridge inspections selected for review met the minimum requirements.

For those inspections being performed by consultants, PennDOT requires the consulting firm to submit a list of the names and qualifications of inspection personnel to the District Bridge Engineer 30 days prior to beginning work on each bridge inspection.[69] PennDOT management stated that consultants provide this information in writing to PennDOT on a "Statement of Interest" form within the contracted bridge inspection agreement. This statement would be provided to PennDOT a significant amount of time prior to the beginning of work, which would satisfy the 30 days requirement.

Although consultants are only required to provide a list of names and qualifications of team leaders, our audit procedures focused on reviewing the documents that support the qualifications of all 65 team leaders assigned to the inspections conducted on 43 bridges selected for review.[70] Team leaders are required to maintain a valid certification as a Bridge Safety Inspector issued by

[68] PennDOT Publication 238– Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements: 1) Section 2.1.3 Qualifications for Safety Inspectors, 2010 2*nd* Edition Revised March 2010; 2) Section 2.1.3 Qualifications for Program Manager and Safety Inspectors, 2021 Edition dated April 2021, and both of the 2022 Editions dated September 2022 and December 2022; and 3) Section 2.1.3.2 Bridge/Culvert Safety Inspectors, 2021 Edition dated April 2021, and both of the 2022 Editions dated September 2022 and December 2022.
See also U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650 dated December 14, 2004. See also National Bridge Inspection Standards, Subpart C – National Bridge Inspection Standards, Section 650.309 Qualifications of personnel.

[69] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables Section III Submissions Part B, 2010 2*nd* Edition Revised March 2010, and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables Section III Submissions Part B, 2021 Edition dated April 2021, and both of the 2022 Editions dated September 2022 and December 2022.

[70] *See Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A* for details regarding the population of Poor bridges in the four districts selected for review as well as details regarding the selection of the 43 bridges from those four districts.

PennDOT and meet one of the five minimum qualifications established by NBIS.[71] All five options require completion of a FHWA approved comprehensive bridge inspection training course and some combination of college degree, engineer related license, and specified years of bridge inspection experience.[72]

Our audit procedures determined that 58 of the 65 team leaders met one of the five options of qualifications required by NBIS; however, we found issues with the remaining seven team leaders (related to 18 inspections of 12 bridges).[73] The seven team leaders included two PennDOT employees and five consultants. The following issues were found with the two PennDOT employees:

- One PennDOT employee did not have the minimum five years of bridge inspection experience. The time frame of the lack of minimum experience at the time of the 5 inspections ranged from 3 months to 1 year and 9 months. (5 inspections of 4 bridges)

- One PennDOT employee did not have the minimum four years of bridge inspection experience.[74] As of the date of the inspection, the individual only had 3 years and 10 months of bridge inspection experience or 2 months less than the required amount of experience. (1 inspection on 1 bridge)

We inquired of PennDOT management as to how and why the two PennDOT employees were permitted to perform the duties of a team leader. The following details PennDOT management's responses and our concerns with the responses provided:

- The five inspections for the first employee were interim/special inspections that, at the time per federal regulation, did not require a team leader to be present. (PennDOT policy, however, did require a team leader with the minimum five years of experience to be present.) Management further stated the district was "operating under the assumption that [they] were following federal regulation… and did not know that a properly qualified team leader should be present on interim/special inspections per PennDOT standards."

[71] U.S. Department of Transportation, Federal Highway Administration, 23 CFR 650.309 dated December 14, 2004. A newer version of this criteria dated April 21, 2023, changed team leader requirements; however, team leaders were given until June 6, 2024, to meet the new requirements. All of the bridge inspections selected for testing were performed prior to this date; therefore, the criteria used was from the 2004 version. See the *Introduction and Background* for details regarding the minimum qualifications.
[72] The years of bridge inspection experience required is lower for those individuals that have college degrees or engineer-related certifications.
[73] Inspections conducted by two different team leaders were for the same bridge.
[74] The employee was only required to have four years of experience, because they also had an Associate's degree.

Although the district was compliant with federal regulations, PennDOT policies are required to be followed as well. It is vital that district staff be aware of and be compliant with both federal and PennDOT criteria in place to help ensure all necessary procedures of a bridge inspection occur. Without the proper qualifications, the risk increases that an inspection will not be adequately performed, and potentially items of concern will be missed.

- Although the second employee was listed in the BMS2 tracking system as the team leader, management stated this employee was only a team leader in training and another individual was the official team leader for the inspection.

  We confirmed the other individual, who met the requirements for a team leader, was also listed in BMS2 as being on the team for the respective inspection; however, management should ensure that only confirmed qualified individuals are included in the BMS2 system as options for selection as a team leader.

The following issues were found with the five consultants:

- Four consultants – PennDOT was unable to obtain from the respective consulting firms, the documentation needed to support that the individuals actually met the qualifications required of a team leader due to the individuals no longer being employed by the firms. (11 inspections on 7 bridges)

- One consultant – PennDOT was unable to obtain from the consulting firm the documentation needed to support that the individual had the minimum 5 years bridge inspection experience. PennDOT contacted the consulting firm which responded that the individual joined their firm in 2020 (bridge inspection date was August 31, 2021). Prior to joining the firm, they were employed by another consulting firm that conducted NBIS inspections, but no dates were provided to confirm the years of experience requirement was met. Note, the individual obtained their bridge safety inspector certification in 2009. (1 inspection on 1 bridge)

According to management, documents to support that the 42 consultants met the minimum requirements of a team leader were obtained from the respective consulting firms after we requested them as part of our audit procedures. For the five consultants PennDOT was unable to obtain documents to support the individuals met the minimum requirements of team leader, management provided us the Statement of Interest documents to support they received the list of names and qualifications of the individuals to meet the 30-day requirement.

Although PennDOT's policy only requires the consulting firm to submit a list of the names and qualifications of the inspectors to PennDOT, it is PennDOT's responsibility to ensure the inspectors possess the required qualifications to conduct and oversee the mandated bridge

inspections, rather than relying solely on a written statement from consulting firms. It is critical, especially for bridges identified in Poor condition, that qualified individuals perform each of the required inspections which includes steps of a highly technical nature and whose results have a critical impact on ensuring the safety of those utilizing the bridges.

Regarding the above team leader issues, we asked management as to the possible repercussions from the FHWA when team leaders do not meet the minimum qualifications. Management responded that there is the potential for an improvement plan to be developed for them to implement.[75] Management further stated they implemented additional measures in March 2022 to ensure only qualified team leaders are inspecting bridges including a focus on checking credentials in its own quality assurance program. However, one of the inspections in question occurred in May 2022, after the March 2022 implementation date. At that time the individual's work experience was three months less than the required five years.

It is vital that PennDOT management take all necessary precautions and needed steps to ensure that only qualified individuals from both PennDOT staff and consultants are listed as team leaders in BMS2 and that only those individuals are assigned to carry out the duties and responsibilities of a team leader on bridge inspections to help ensure the inspections are properly conducted and reviewed.

Recommendations for Finding 2

We recommend that PennDOT management:

1. Ensure only PennDOT employees that meet the minimum requirements of a team leader are listed in BMS2 as eligible for selection as an inspection team leader.

2. Ensure district PennDOT management are aware of and comply with both PennDOT and federal qualification requirements when assigning team leaders to bridge inspections.

3. Obtain documentation to support consultants assigned to the team leader position possess the minimum requirements.

[75] Confirmed through review of FHWA reviews of PennDOT that improvement plans are generally what is required for deficiencies noted.

Finding 3 – PennDOT Management Did Not Ensure Inspection Documentation Was Properly Prepared and/or Maintained Which Led to Inconsistencies Between Inspection Reports.

Our audit procedures relating to the review of state-owned bridge inspection documents found that Pennsylvania Department of Transportation (PennDOT) management did not ensure all inspection report documentation was properly prepared by PennDOT and consultant bridge inspectors and maintained as required.[76] Additionally, we found different requirements in PennDOT policy for consultant bridge inspectors compared to PennDOT bridge inspectors which led to inconsistencies in how inspection reports were prepared. We also found inconsistencies with how each PennDOT district prepared the reports.

Of the 183 inspections performed on the 43 bridges selected for review, 80 were completed by PennDOT bridge inspectors (inspectors) and 103 were completed by consultant inspectors.[77] We reviewed the 183 inspection reports to determine if the inspections were performed within the required frequency, which is dependent upon the overall condition rating of the bridge, and if the inspection reports included the items listed in the outline from the scope of work (explained below). We also reviewed additional documents provided by PennDOT management that supported required inspection work was performed but was not included in the inspection report. The results of our audit procedures found inspections were performed within the required timeframes; however, we found that required items were missing and inconsistencies were identified between inspection reports completed by consultants compared to PennDOT inspectors.

PennDOT policy outlines a scope of work (a general outline of the inspection report format) for consultants to use when conducting inspections of state-owned bridges to ensure statewide compliance with PennDOT and federal policy.[78] This outline includes documenting the

[76] In addition to PennDOT district staff conducting bridge inspections, PennDOT management stated they contracted with approximately 30 consulting firms to perform bridge inspections during the audit period of July 1, 2020, through May 10, 2023. As described in *Finding 1*, both district and consultant inspectors collect bridge inspection information and document that information in the iForms application which is then later submitted to the Bridge Management System 2 (BMS2) for record retention.

[77] See *Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A* for further details regarding the selection of the 43 bridges.

[78] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 1 – Administrative Considerations, Section 1.10.4 Preparation of Safety Inspection Agreements, 2010 2*nd* Edition Revised March 2010 and Section 1.10.4.1 Standard Scopes of Work for Safety Inspection Agreements, 2021 Edition dated April 2021, and both of the 2022 Editions dated September 2022 and December 2022. See also U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C - National Bridge Inspection Standards dated December 14, 2004, and May 6, 2022.

inspection results in an inspection report with information such as the bridge condition rating, the structural analysis, load rating and posting evaluation, and recommendations.[79]

PennDOT management stated the inspection report guidelines in the scope of work does not apply to bridge inspections completed by PennDOT inspectors. The scope of work, however, is included in PennDOT policy to ensure consultant's compliance with reporting requirements. We inquired of PennDOT management as to why PennDOT inspectors do not need to follow the scope of work established for consultants. PennDOT management stated, "[t]here are no specific requirements that say otherwise." Additionally, the information required to be obtained and documented during the inspections is "covered by the data reported in iForms."

Although PennDOT management stated the scope of work only applies to consultant inspectors, we performed audit procedures to determine if these items, which provide information relevant to the bridges, were present in all inspection reports since it stands to reason that if consultant inspectors should be documenting this information, then PennDOT inspectors should be as well. However, as noted in later sections of this finding, our audit procedures found that the required information was not always found in either the iForms or BMS2 systems for inspections conducted by PennDOT district inspectors.

Issues based on the results of our audit procedures performed for the 183 inspections are discussed in the following sections:

- Bridge inspection report contents
- Scour Plan of Action
- Inspection Report Quality Control Verification Checklist

Bridge Inspection Report Contents

Audit procedures performed found no or minimal issues with inspection report items, such as, sketches and/or photographs, inspection findings, and a general description of the condition of

[79] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, 2010 2*nd* Edition Revised March 2010, and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022. In order to load rate a structure, an analysis is performed by a professional engineer to determine the safe weight limit capacity of the bridge. A structural analysis and load rating determine the structure's ability to carry Pennsylvania's legal loads. A bridge is posted when signs have been placed stating a weight limit that can travel across the bridge. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-Inspection-Terminology.aspx (accessed March 19, 2024).

the structure, as well as the required Fatigue and Fracture plans on file for applicable fracture critical bridges.[80] We commend PennDOT management for ensuring those items were present.

However, for the 183 inspection reports reviewed, we found various missing items which are detailed in the table that follows. In some cases, multiple items were missing from a given inspection report. Given that PennDOT policy states the bridge inspection file is an integral part of an effective bridge inspection and management system and bridge files are kept current through bridge inspections, we believe it is important to ensure that the items outlined in the scope of work are accurately maintained regardless of whether the inspection is completed by a consultant or a PennDOT bridge inspection team.[81]

Items Missing from 183 Inspection Reports Prepared by Consultants and PennDOT District Inspectors July 1, 2020, through May 10, 2023

Inspection Report Items	Number of Inspections Completed by Consultants Missing Required Item	Number of Inspections Completed by PennDOT Staff Missing Required Item	Total Number of Inspections Missing Required Items
Bridge Inspection Report	0	11[a/]	11
Title page[b/]	9	14	23
Map	38	14	52
D-491 Inventory Forms[c/]	90	41	131
Load Rating Summary and Posting Evaluation[d/]	22	6	28
Recommendations[e/]	3	7	10
Comparison of current findings with previous inspection findings[f/]	20	14	34

[80] Of the 183 inspection reports reviewed, we found one report missing sketches and/or photographs and four reports missing the general description of the structure. PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.4.5.1 Fatigue and Fracture Inspection Plan, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[81] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 - Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

Items Missing from 183 Inspection Reports Prepared by Consultants and PennDOT District Inspectors July 1, 2020, through May 10, 2023			
Inspection Report Items	**Number of Inspections Completed by Consultants Missing Required Item**	**Number of Inspections Completed by PennDOT Staff Missing Required Item**	**Total Number of Inspections Missing Required Items**
Form A (general inspection, bridge, and safety feature information)[g/]	13	1	14
Form M (proposed and completed maintenance items)[g/]	3	2	5

[a/] - Although the Bridge Inspection Report was missing, PennDOT provided us with photographs and/or information or notes recorded in the Bridge Management System 2 (BMS2), to support that an inspection was conducted.
[b/] - Identifies in one location key bridge information such as the bridge key/identification number, bridge name, location, inspection date, inspector names, Pennsylvania Professional Engineer seal, and whether the bridge is fracture critical or posted with a sign to indicate a weight limit for vehicles that can travel across the bridge.
[c/] - Document that lists bridge inventory information contained in BMS2.
[d/] - A structural analysis and load rating determine the structure's ability to carry Pennsylvania's legal loads.
[e/] - Specify what maintenance needs the bridge requires.
[f/] - Summary of the condition ratings of the bridge components, such as the deck, substructure, superstructure, or culvert, at the current inspection in comparison to the previous inspection.
[g/] - Inspection documents within the iForms system.

Source: Produced by staff of the Department of Auditor General based on results from audit procedures performed on the 43 state-owned bridges selected for review.

While PennDOT policy does not specifically require PennDOT inspectors to adhere to the scope of work established for consultants, in order to maintain consistency, we believe it would be prudent for both PennDOT staff and consultants to follow the scope of work. In addition, PennDOT policy states that bridge owners are to maintain complete, accurate, and up-to-date records for each of their bridges.[82] The policy notes that these records, typically generated through the routine safety inspection, include a location map, D-491 Inventory Forms, iForms inspection documents, photos, sketches, load rating summary, and posting evaluation, all of which are required in the scope of work and some of which we found to be missing from inspection reports reviewed during our audit procedures.[83]

[82] Ibid.
[83] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 – Inspection Records and Files, Section 8.3.1 Inventory Information and Field Inspection Reports, Section 8.3.2 Load Rating Analysis, and Section 8.3.3 Posting Evaluation, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

As noted in the above table, we found deficiencies relating to the following items discussed in detail in the sections to follow:

- Bridge Inspection Reports
- Title Pages, Maps and D-491 Inventory Forms
- Load Rating Summary and Posting Evaluation
- Recommendations and Comparison of Current Findings with Previous Inspection Findings
- Form A and Form M Inspection Documents

Bridge Inspection Reports

As noted in the above table, we found bridge inspection reports were not prepared for 11 inspections completed by PennDOT staff. Ten of these inspections occurred within District 6 and one occurred within District 4. When we inquired why the inspection reports were not prepared, PennDOT management provided the following responses:

- Two inspections in District 6 were post-flood inspections and documentation was not required at that time if there were no significant changes. Additionally, management stated inspection report requirements for scour monitoring inspections are currently being updated. No further specific detail was provided.[84]

- Three inspections in District 6 – the district was operating under the assumption that a report was not needed if there were no significant changes found during the inspection and assumed the information entered into BMS2 would be sufficient. PennDOT management added that the district has since changed its perspective and stated that as of December 2022, "iForms is to be used for all highway bridge inspections and data submitted to BMS2."

- One inspection in District 6 was for a bridge under significant rehabilitation at the time of the inspection and only photos were maintained.

- Four inspections in District 6 – formal inspection reports were not completed following the inspections and were therefore not available. No further information was provided as to why they were not completed.

[84] Bridge scour is the removal of streambed material caused by swiftly moving water from around bridge abutments or piers. Scour can become so deep that streambed material is removed from beneath the abutment or pier footings (known as undermining), compromising the integrity and stability of a bridge structure. Bridge scour is the most common cause of bridge failure. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Local-Scour-Critical-Bridge-Information.aspx (accessed March 11, 2024).

- One inspection in District 4 – the district performed the inspection but could not find a report for this inspection and no additional information was provided.

PennDOT's change in perspective to require, as of December 2022, that iForms be used for all highway bridge inspections and data submitted to BMS2, reinforces the point that it is imperative that bridge inspection reports are consistently prepared and maintained to document the results of all inspections. Bridge files are needed to document the condition of the structure and justification for any bridge restrictions to ensure public safety, identify improvement and maintenance needs for planning, document bridge improvements performed, meet documentation requirements performed using state and federal funding, and provide a historical record of the bridge.[85] Additionally, inspection reports must be approved by authorized district management, and therefore, all documentation should be available to perform a thorough review.

Title Pages, Maps and D-491 Inventory Forms

Our audit procedures also found that both consultants and PennDOT staff did not include a title page for 23 inspection reports, a map for 52 inspection reports and D-491 Inventory Forms for 131 inspection reports. According to PennDOT policy, the title page provides key bridge information such as the bridge key/identification number, bridge name, location, inspection date, inspector names, Pennsylvania Professional Engineer seal, and whether the bridge is fracture critical or posted with a sign to indicate a weight limit for vehicles that can travel across the bridge structure.[86] Additionally, PennDOT policy states the D-491 series of forms are to be used to document the inventory information contained in BMS2 and might be the only place certain items are documented outside of BMS2.[87] Therefore, a complete set of forms should be maintained for each structure to verify the BMS2 data. Due to the significant amount of inspection reports that did not contain a title page, map, and/or D-491 Inventory Forms during our review, we inquired as to why this would occur since all three items are required by PennDOT policy.[88]

[85] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 - Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[86] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[87] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 - Inspection Records and Files, Section 8.5.1 Structure Inventory Forms for BMS2 – D-491 Series, 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[88] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

As noted previously, PennDOT management informed us that the scope of work does not apply to inspections performed by PennDOT staff, and as a result, title pages, maps, and D-941 Inventory Forms may not be included with those reports.

Through inquiry with District 4 management regarding consultants failing to include multiple items listed in the scope of work, including title pages, maps, and D-491 Inventory Forms, District 4 management stated that those items were not relevant to the scope of the interim inspections in question. Additionally, regarding the inspection reports that had been completed by consultants in District 6, PennDOT management informed us there had been a scope modification and the standard inspection template being used by the district did not include a requirement for maps and D-491 Inventory Forms. PennDOT management added that District 6 developed this scope modification to meet their needs and budget.

When we inquired further to determine whether other districts had similar scope modifications, PennDOT management informed us that it would be on a case-by-case basis for each specific bridge. We are unsure why including these items in the inspection report would negatively impact the district's budget considering the information is already available within BMS2. Additionally, if scope modifications are permitted on a case-by-case basis, not only are there inconsistencies from district to district, but there may also be inconsistencies between bridges within the same district. To add to the issue of inconsistencies, in a separate inquiry with District 4, we were informed that the requirement to include D-491 forms is an outdated procedure since inspectors have access to update the information directly in BMS2. If PennDOT management has determined the D-491 forms to no longer be necessary, then consideration should be given to updating its policy to reflect that change.

We further inquired regarding the lack of maps included with the inspection reports. PennDOT management stated that the purpose of some inspections including a location map is to confirm location of the structure for future inspections. PennDOT management also explained that a map is not necessarily needed stating that several other inventory items may identify location of the bridge. While we understand that the location might be identified in a different inventory item, PennDOT policy requires a map and during interviews with District 8 and District 4 management, we learned that reviewers of inspection reports ensure the accuracy of the maps included with the reports prior to approving and accepting the reports.

Load Rating Summary and Posting Evaluation

Load rating is the determination of the load carrying capacity of an existing bridge. In accordance with National Bridge Inspection Standards, PennDOT's scope of work requires structural analysis and load ratings to be completed or updated during bridge inspections and the findings documented in a summary table in the bridge inspection reports.[89] PennDOT's scope of

[89] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, II. Inspection Requirements, E. Bridge Load Rating, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges,

work also outlines general documentation required in an inspection report which includes a load rating summary and posting evaluation.[90]

Our audit procedures found that 28 inspection reports were missing the load rating summary and posting evaluation. We inquired as to why the load rating summary and posting evaluation were not included in the inspection reports and PennDOT management provided responses indicating again that 1) the scope of work does not apply to bridge inspections completed by PennDOT inspectors and, therefore, the requirements do not exist, 2) the consultants' inspection focused on a limited scope and the load rating was not relevant; or 3) the load rating was not completed. These are further examples of inconsistencies between PennDOT and the consultants as well as among inspections.

Recommendations and Comparison of Current Findings with Previous Inspection Findings

We found consultants and PennDOT inspectors did not complete 10 Recommendations sections and 34 Comparisons of current findings with previous inspection findings. The Recommendations section clearly specifies what maintenance needs the bridge requires and the summary of the condition ratings of the main bridge components, such as the deck, substructure, superstructure, or culvert, at the time of the current inspection provides a clear comparison to the condition ratings in the previous inspection. Both items are presented at the beginning of the report in a concise, organized manner and required by the scope of work.[91]

Again, PennDOT management informed us that the scope of work does not apply to inspections performed by PennDOT inspectors, therefore, these items were not required to be completed by PennDOT inspectors. District 4 management explained that maintenance item recommendations are also included in Form M. However, of the three reports completed by consultants missing the Recommendations sections, two were also missing Form M. This reinforces the importance of ensuring that Recommendations sections are included with the reports. With regard to missing comparisons for reports completed by consultants, PennDOT management noted the report format for an interim inspection may vary from district to district and/or consultant to consultant. We understand an interim inspection focuses on the deficiencies with the bridge, however,

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II. Inspection Requirements, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022. See also U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, Subpart C – National Bridge Inspection Standards, Section 650.313(c) dated December 14, 2004, and Section 650.313 (k) Inspection procedures dated May 6, 2022.

[90] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables, I. Inspection Report, B. A general outline of the report, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F General Scope of Work, Scope Deliverables, B. A general outline of the report, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[91] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

PennDOT should consider updating the scope of work in the policy, if management determines the comparisons for interim inspections are unnecessary.

Form A and Form M Inspection Documents

Consultants and PennDOT inspectors did not complete and submit 14 Form A and five Form M inspection documents within the iForms data collection software system to BMS2 as required by the scope of work and PennDOT policy.[92] Form A details general inspection and bridge information, such as the type of inspection, team leader, who performed the inspection, structure description which includes its location, structure type, and sign information. Furthermore, PennDOT management stated that Form A contains safety feature information, therefore, Form A should be included in the report even if the information was documented elsewhere. Form M details both proposed and completed maintenance items and identifies the status, priority level, initial recommended date, target year for completion, who the work has been assigned to, as well as reference notes indicating any changes or additional details relevant to each maintenance item.[93]

Of the 19 inspections which did not have the appropriate iForms inspection documents, 16 inspections were completed by consultants, and 3 were completed by PennDOT staff. However, PennDOT district management is ultimately responsible for approving the inspection reports and should have ensured that the required iForms inspection documents were included with the report. When we inquired, PennDOT Central Office management stated the lack of these forms does not mean the work and documentation were not performed; however, they acknowledged that even if the information was documented elsewhere in the report, the iForms inspection document still should have been included.

Scour Plan of Action

PennDOT policy, in accordance with National Bridge Inspection Standards, require the development of a scour Plan of Action (POA) for bridges identified as scour critical. PennDOT also requires a scour POA for non-scour critical bridges which have been identified as either requiring action to protect exposed foundations or protection has been placed and requires monitoring.[94] The scour POA identifies the process of monitoring and closing bridges during a

[92] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 8 - Inspection Records and Files, Section 8.5.2 Field Inspection Forms for Bridges – iForms, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[93] During our audit procedures, we reviewed copies of Form A and M included in the bridge files received from PennDOT in order to determine the information included on each form.
[94] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP, Chapter 2 Inspection Requirements, Section 2.6.4 Scour Plans of Action, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

significant flood event, along with criteria for re-opening afterwards, and it also assists in the prioritization of countermeasures to protect scour critical bridges from flood damage.[95]
Our audit procedures included determining if scour critical bridges had an appropriate scour POA in place for 80 of the 183 inspections we reviewed that required one. PennDOT was unable to provide a scour POA for 6 of the 80 inspections conducted on scour critical bridges. PennDOT management stated for one inspection, the scour POA was prepared, however, it is unavailable, and therefore, they were unable to provide it to us and for the remaining five inspections, the scour POAs were not saved in BMS2 at the time the inspection occurred which was prior to the scour POA process becoming automated within BMS2 in February 2021. PennDOT management explained that the automated scour POA process allows for easy creation of the POA. Based on our review, it appears that although there were instances of missing Scour POA's, PennDOT has since established an automated Scour POA process within BMS2 to correct this issue.

Inspection Report Quality Control Verification Checklist

In response to the collapse of the Pittsburgh-owned Fern Hollow Bridge in January 2022, PennDOT conducted an in-depth review of its bridge safety inspection and bridge maintenance programs to determine if systematic changes and improvements to PennDOT's bridge safety inspection and bridge maintenance programs should be implemented. One result of the review included the development of an Inspection Report Quality Control Verification Checklist (checklist) as discussed in *Finding 1*.

According to PennDOT management, in November 2022, personnel from PennDOT's Bridge Inspection Section developed the checklist in order to establish a standardized method of ensuring that key inspection items have been completed or considered in the preparation of bridge safety inspection reports. PennDOT policy, however, does not require the checklist to be completed, and instead refers to it as an optional reference tool to ensure that all items listed are addressed prior to submission of the report. As noted in PennDOT's Bridge Safety Inspection and Bridge Maintenace Programs' Technical Bulletin, quality control of the inspection information is important to ensure the reported information is complete and meets the requirements for the bridge safety inspection.[96] The checklist includes a comprehensive list of items that need to be addressed prior to the submission of the inspection report, as well as sections on load rating and the fatigue and fracture plan for fracture critical bridges. The items include, but are not limited to, a report file, map, photos, iForms inspection documents, and scour POAs, which reinforces the importance of ensuring that inspection reports include all of the items specifically required in the scope of work.

[95] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Local-Scour-Critical-Bridge-Information.aspx (accessed March 11, 2024).
[96] PennDOT Bridge Safety Inspection and Bridge Maintenace Programs' Technical Bulletin issued November 14, 2022.

Due to the importance of maintaining complete, accurate, and up-to-date records for each bridge, we believe it would be prudent to require inspectors and PennDOT management to complete and sign-off on the checklist. Requiring the completion of this checklist would help ensure all of the inspection items are properly completed, documented, and maintained in the records and, as a result, likely increase the consistency of the inspection reports completed by both consultants and PennDOT staff.

Recommendations for Finding 3

We recommend that PennDOT management:

1. Amend PennDOT policy to require not only consultant inspectors but also PennDOT inspectors to adhere to the inspection report requirements outlined in the scope of work.

2. Ensure all inspection reports, whether completed by PennDOT or consultant inspectors, follow the scope of work.

3. Limit the approval of scope modifications for deliverables required in the scope of work in PennDOT policy to avoid inconsistencies between inspections performed by consultants throughout PennDOT's 11 districts.

4. Determine if the D-491 forms, required according to PennDOT policy, are needed as part of the current inspection documentation process, and if so, ensure districts are instructed to prepare them. If it is determined that they are no longer necessary, amend PennDOT policy to remove the requirement of the forms.

5. Update PennDOT policy to require the Inspection Report Quality Control Verification Checklist to be completed and maintained within the BMS2 system.

Finding 4 – PennDOT Management Failed to Ensure Critical and High Priority Maintenance Item Written Notifications were Provided, or Provided Timely, and to the Appropriate Staff, and Related Plan of Actions Were Properly and Consistently Prepared.

Pennsylvania Department of Transportation (PennDOT) staff and contracted consultants did not always follow policy pertaining to critical (Priority 0) and high (Priority 1) priority maintenance item written notifications and documenting the Plan of Action (POA) for resolution.[97] PennDOT policy defines Priority 0 and Priority 1 maintenance items as deficiencies that threaten either the structural integrity of the bridge, other structures, or public safety.[98] PennDOT policy requires both immediate and written notification within 24 hours to the District Bridge Engineer (DBE) whenever a potentially perilous or hazardous condition is observed during a bridge inspection, which includes the identification of Priority 0 or Priority 1 maintenance items.[99]

PennDOT policy also requires DBEs to develop a POA for all recommended Priority 0 or Priority 1 maintenance items.[100] The POA must include the scope of physical and/or design work, estimated costs, whether the work is to be performed by a contractor or PennDOT staff, and timeframe to completion.[101] PennDOT policy further requires Priority 0 deficiencies to be

[97] As described in detail in *Finding 1*, depending on availability of bridge inspectors within each district, inspections will be performed by either PennDOT employed bridge inspectors or contracted consultant bridge inspectors.
[98] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 - Inspection Requirements, Section 2.13.2 Critical and High Priority Maintenance Items, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[99] PennDOT Publication 238 Bridge Safety Inspection Manual, Appendix IP 01-G, General Scope of Work Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F, General Scope of Work Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022. Note that PennDOT policy lists the DBE notification requirements in the scope of work section, which according to PennDOT management, is only applicable to consultant bridge inspectors. However, during a bridge inspection observation in District 8, conducted by PennDOT bridge inspectors, the bridge inspector stated he needed to notify his supervisor immediately with a phone call and email of the Priority 1 maintenance item found during their inspection. The need for PennDOT staff to immediately notify the Assistant DBE (ADBE) of Priority 0 and Priority 1 maintenance items is required in PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP Chapter 6 Quality Measures for Safety Inspection Section 6.2.2 QC Review of Field Inspections and Final Reports, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022. Additionally, for purposes of our audit, we focused on the documentation available to support written notifications.
[100] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 Inspection Requirements, Section 2.14, Plan of Action for Critical and High Priority Maintenance Items, 2010 2*nd* Edition Revised March 2010 and Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[101] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 - Inspection Requirements, Figure IP 2.14.3-2 Critical and High Priority Bridge Maintenance Items Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items, 2010 2*nd* Edition Revised March 2010 and Plan of Action

resolved or mitigated within seven days of identification and Priority 1 deficiencies to be resolved or mitigated within six months.[102]

The 43 bridges selected for review had a total of 183 inspections conducted by either PennDOT bridge inspectors (inspectors) or consultant inspectors and occurred between July 1, 2020, and May 10, 2023.[103] The results of our audit procedures performed on the 183 inspections are discussed in detail in the following finding sections:

- Priority 0 and Priority 1 maintenance item written notifications were either not provided, or not provided timely, by inspectors to DBEs.
- District 4 staff did not prepare POAs for two Priority 0 maintenance items identified by consultant inspectors.
- POAs lacked estimated costs of maintenance items.
- PennDOT's process for documenting POAs was inconsistent.

Priority 0 and Priority 1 maintenance item written notifications were either not provided, or not provided timely, by inspectors to DBEs

During our audit procedures, we found the requirements in place for the timely communication to the DBE of Priority 0 and Priority 1 maintenance items identified by inspectors during bridge inspections were not always followed by PennDOT staff and consultants. Specifically, we found issues relating to 16 of the 183 bridge inspections that identified Priority 0 or Priority 1 maintenance deficiencies.[104]

We found the written notifications from consultant inspectors to DBEs for eight inspections regarding Priority 0 and Priority 1 maintenance items were sent 3 to 18 days after the inspection, instead of within the required 24 hours.[105] In addition, PennDOT was unable to provide written

Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[102] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframe for POAs, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[103] See *Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A* for further details regarding the selection of the 43 bridges.

[104] The remaining 167 inspections either did not have issues regarding the notification of Priority 0 or Priority 1 maintenance items identified during the inspection (37 inspections) or the inspections did not note any new Priority 0 or Priority 1 maintenance items (130 inspections).

[105] PennDOT Publication 238 Bridge Safety Inspection Manual, Appendix IP 01-G, General Scope of Work Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2010 2*nd* Edition Revised March 2010 and Appendix IP 01-F, General Scope of Work Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

notifications related to the remaining eight inspections, seven of which were performed by PennDOT inspectors.

Priority 0 maintenance items were identified during 5 of the 16 inspections and pursuant to its policy, required PennDOT to resolve or mitigate the items within seven days. However, two written notifications were sent 14 to 18 days after the inspections, potentially impeding PennDOT's ability to correct the Priority 0 maintenance item timely, and three written notifications were not available for review.[106] Regarding all 16 written notifications that were either sent late or possibly not sent at all, according to PennDOT management, the inspection teams verbally contacted the district offices to inform them of the maintenance items, but PennDOT does not have records of these phone calls. Specifically, for the eight inspections that PennDOT was unable to provide written documentation for, management stated that the documentation was either not available or may have been done in person and not documented. Furthermore, PennDOT management stated that written notifications are "just" an "official" record of the priority maintenance findings.

However, as an official record, the written notification serves to document the issues found by inspectors by describing the extent of the deficiencies, as well as providing for photographs, sketches, other support, and recommendations for the repairs. This notification is important to ensure appropriate action is taken to prevent safety hazards to pedestrians and motorists and/or correct structural deficiencies that could lead to potential structural failure. As we found during our audit procedures, without written notification, there is no record to verify that inspectors did indeed contact the district. Further, it is evident that photographs or other support for observed deficiencies cannot be shared verbally over the phone. Therefore, it is critical that PennDOT ensures that both consultants and PennDOT inspectors provide written notification to the respective DBE or ADBE of Priority 0 and Priority 1 maintenance items within 24 hours, as required.

District 4 Staff Did Not Prepare POAs for Two Priority 0 Maintenance Items Identified by Consultant Inspectors

As previously reported, the district is required to prepare a POA for all Priority 0 and Priority 1 maintenance items. We determined, however, through our audit procedures that the DBE did not prepare POAs for two Priority 0 maintenance items identified by consultant inspectors during multiple inspections of a bridge in District 4. Each of the inspections were led by different individuals from the same consulting firm.

[106] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 – Requirements, Section 2.14.1 Timeframe for POAs, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

The first Priority 0 maintenance item was identified during each of the 2020, 2021, 2022, and 2023 inspections.[107] The consultant inspectors recommended replacing the vertical clearance sign to lower the clearance by four inches. The other Priority 0 maintenance item was identified during the 2021 and 2022, inspections to remove vegetation covering a clearance sign. The two items were recorded in the Bridge Maintenance System 2 (BMS2) as Priority 0 maintenance items but remained unaddressed for multiple years – well beyond the required seven-day timeframe for a Priority 0 maintenance item, as both items were noted as still being unresolved in the 2022 inspection report. The two maintenance items regarding changes to clearance height signage posted at the bridge and vegetation obstructing signage at the bridge are further discussed in the next sections.

PennDOT Did Not Make Bridge Clearance Signage Changes Recommended by Consultants

Regarding the vertical clearance signs, PennDOT management stated that the consultant measured the overhead bridge clearance from the wrong location and the current signage for the bridge reflects the structure height where the traffic lanes are located. In addition, PennDOT management stated the history of this bridge shows collision damage has only occurred near the center of the travel lanes and not at the location measured by the consultant and, therefore, decided to maintain the existing signage.

In a 2020 email from the consultant to PennDOT management, however, the consultant stated they measured the structure height at the centerline and the edge of the roadway. The consultant noted there is collision damage to the bridge and recommended PennDOT update clearance postings and advanced warning signs to the suggested lower height.

PennDOT management stated that rather than lower the clearance height, they updated the permitting system to only allow a vehicle of the lower maximum height to cross the bridge as a measure of precaution for routing permitted loads.[108] Upon further inquiry, PennDOT management stated that the date of the change to the permitting system is not recorded in BMS2. Interestingly, while the district updated the permitting system to lower the maximum vehicle height, district management did not change the posting at the centerline nor did the district address the consultant's recommendation to update clearance postings and advanced warning signs to the lower height at the edge of the roadway. PennDOT management stated the vertical

[107] The Priority 0 maintenance item to reduce the height clearance on the bridge's signage is no longer listed as a recommendation in the documents for the 2023 inspection and there is no indication in BMS2 that the work was completed. The consultant did, however, include the issue in the "Signage" section of the inspection report and in an email to district staff as still outstanding.

[108] There are some cases where a vehicle may exceed the size, weight, and load restrictions of a bridge and for these cases, the vehicles require a hauling permit in order for the vehicle to legally travel on the bridge. PennDOT's philosophy regarding oversize/overweight permit vehicles is to review every bridge on every route for every permit application. PennDOT's permitting system allows for bridge checks to be made automatically. The accuracy and safety of the results of these reviews is heavily dependent upon the quality of bridge inspections and ratings. See PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 10 - Hauling Permits and APRAS, Section 10.1 General, 2022 Edition dated December 2022.

clearance was changed in the permitting system to be conservative and the signage is sufficient to remain in place.

Although there is no reference to the Priority 0 maintenance item recommendation to lower the height restriction in the 2023 inspection in BMS2, the consultants noted the update made by PennDOT to the permitting system to the lowered vertical clearance height. The consultant, however, in an email sent to district management offered to discuss the issue regarding the signage, stating that it "was initially submitted in 2019 and no work has been completed to date."

Since the consultant inspectors included the recommendation to lower the clearance height on the signage in four consecutive inspections and specifically mentioned the issue in a 2023 email to district management, we believe district management should address their recommendations or document in writing as to the reason they do not feel the need to implement the consultant's recommendations.

Vegetation Obstructing Signage at the Bridge

Regarding vegetation overgrowth covering a clearance sign at the same bridge in District 4 discussed in the prior section, which had been identified by the consultant inspectors as a Priority 0 maintenance item during the 2021 inspection, PennDOT management stated that the vegetation overgrowth was covering a supplemental sign, and the item should have been coded as a Priority 2 maintenance item in BMS2. A Priority 2 maintenance item does not require a POA and instead of corrective action needed within seven days, the required timeframe is dependent on the routine bridge inspection interval.[109] Although PennDOT's current policy requires deficiencies found on supplemental signs to be coded as Priority 2 maintenance items, this policy did not take effect until nine months after the 2021 inspection.[110] The item was, therefore, coded correctly as a Priority 0 maintenance item at the time of the 2021 inspection, and should have been resolved within seven days. In addition, the DBE should have completed a POA for this item.

PennDOT management stated that they are taking steps to ensure maintenance items are addressed in a timely manner and signs, in particular, have been a discussion point at the last several DBE meetings as something that needs to be addressed sooner.

Of particular interest is the timing of our initial inquiry with PennDOT management regarding these items which began on September 13, 2023. At that time, PennDOT management stated the maintenance item for vegetation covering the clearance sign noted in both the 2021 and 2022 inspections was not yet addressed. The Priority 0 recommendation, however, concerning the removal of the vegetation, was noted by the consultants as completed in the inspection report

[109] PennDOT Publication 100A Bridge Management System 2 (BMS2) Coding Manual, 3.0 BMS2 Field Groups, IM Inspection-Maintenance, IM-05 Priority-Maintenance Priority, Priority Code Guidelines: Coding, 2022 Edition.
[110] PennDOT Publication 100A Bridge Management System 2 (BMS2) Coding Manual, 3.0 BMS2 Field Groups, IM Inspection-Maintenance, IM-05 Priority-Maintenance Priority, Priority Code Guidelines: Bridge Signing Examples, 0-1 Deficient Legal Signing, 2022 Edition.

dated September 22, 2023. We cannot be certain, but it appears that our inquiry may have prompted the district to finally address this important issue.

Conclusion

As previously reported, Priority 0 maintenance items are noted to address issues that threaten either the structural integrity of the bridge, other structures, or public safety and must be resolved or mitigated within seven days of identification.[111] Regardless of whether PennDOT agreed with the consultant's recommendations, the items were recorded in BMS2 as Priority 0 and should have been addressed timely. Instead, the vegetation obstructing the bridge signage went unaddressed for two years and the issue with the height clearance signage has been noted by consultant inspectors each year since 2019. Additionally, in cases where PennDOT does not agree with a consultant's recommendation, it should be documented, in detail, their reasoning with approval. See *Finding 7* for an additional case where PennDOT did not implement a recommendation made by a consultant.

POAs lacked estimated costs of maintenance items

We determined through audit procedures that of the 183 bridge inspections we reviewed, 32 inspections included at least one maintenance item requiring a POA. These 32 inspections resulted in a total of 49 POAs from three (Districts 4, 6, and 8) of the four districts. Our review of these 49 POAs found that 26 POAs were missing estimated costs. PennDOT management indicated that in some instances missing costs could be found in the construction contract, or the work had been performed by PennDOT and therefore it was not necessary to record an estimate on the POA. Estimated costs, however, pursuant to PennDOT policy, are a required component of a POA. Additionally, estimated costs are essential for districts in planning and prioritizing repairs. Estimated construction costs and agency costs were recorded on the remaining 23 POAs reviewed.[112]

PennDOT's process for documenting POAs was inconsistent

During our audit procedures, we found inconsistencies related to how each of the districts selected for review document its POAs. The 49 POAs provided by the three districts were

[111] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframe for POAs, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[112] PennDOT Publication 238 Bridge Safety Inspection Manual, Part IP, Chapter 2 – Inspection Requirements, Figure IP 2.14.3-2, Critical and High Priority Bridge Maintenance Items Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items, March 2010 2*nd* Edition and Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

comprised of various forms of documentation and communication, such as BMS2 screenshots, and emails. District 6, however, also created a formal POA letter which, according to PennDOT management, are occasionally used to route information to additional district staff. The formal POA letter includes sections to record all required elements which helps to ensure that all information required by PennDOT policy is included in the POA.

PennDOT management stated a formal POA letter is not required and has not been issued by the Central Office for districts to utilize. PennDOT management further stated that a POA can be in any format useful for communicating the planned actions to individuals involved. This could include BMS2 maintenance item notes, emails, phone calls, etc. PennDOT management also stated that districts can maintain much of this information in BMS2.

Although the formal POA letter is not required by PennDOT policy, its use could serve as a tool for PennDOT staff to ensure that all required components of a POA are included in one document; and therefore, would make it easier to manage deficiencies to ensure ongoing safety and resolution of concerns noted during an inspection. Additionally, it would assist with consistency between all districts, which would allow PennDOT Central Office greater ability to track and respond to deficiencies across the state.

Recommendations for Finding 4

We recommend that PennDOT management:

1. Ensure both PennDOT and consultant inspectors are aware of and comply with PennDOT policy to provide immediate and written notification within 24 hours to the appropriate district staff pertaining to Priority 0 and Priority 1 maintenance items.

2. Ensure that a Plan of Action is developed, and that timely corrective action is taken to remediate issues identified for all Priority 0 and Priority 1 maintenance items found in bridge inspections.

3. Implement recommendations made by consultant inspectors or document, in detail, the reasons and approval by PennDOT management when they do not implement a consultant's recommendation.

4. Consider requiring all districts to utilize a formal POA letter containing all the required components, including estimated costs, to ensure all critical and high priority maintenance deficiencies are documented and tracked effectively.

Finding 5 – Bridge Inspection Reports were not Approved/Accepted in the BMS2 System Timely and by the Authorized PennDOT Employees.

National Bridge Inspection Standards (NBIS) requires the data from most bridge inspections to be entered into State or Federal inventory within 90 days of the date of the inspection.[113] PennDOT management stated that entering the information into inventory corresponds with the inspection reports being accepted into the BMS2 system (discussed in detail in the *Introduction and Background*) by the District Bridge Engineer (DBE).[114] Audit procedures performed on state-owned bridge inspection reports (referred to as inspection reports throughout the finding) and data maintained in the BMS2 system found the following two issues regarding PennDOT review and approval/acceptance of inspection reports within the BMS2 system:

- Inspection reports were not reviewed and accepted timely in the BMS2 system.
- Inspection reports were not accepted in the BMS2 System by PennDOT employees authorized according to PennDOT policy.

The following sections discuss these issues in detail.

Inspection Reports Were Not Reviewed and Accepted Timely in the BMS2 System

As noted in *Finding 1*, inspection reports document items such as bridge condition, observations, and recommendations from the bridge inspections performed by PennDOT employees and consultants. These reports serve as the documentation to support the inspections were conducted in compliance with NBIS and PennDOT requirements. For bridges, especially those found to be in Poor condition, the inspection report documents the recommendations on what repairs or other necessary actions are needed to ensure the integrity of the bridge and the safety of travelers.

Although the audit procedures described throughout the report refer to 183 inspections for the 43 bridges selected, the following information refers to 217 inspection reports. The difference is due to the BMS2 report used being generated by PennDOT on October 6, 2023, which includes

[113] U.S. Department of Transportation, Federal Highway Administration, National Bridge Inspection Standards, 23 CFR § 650.315 Inventory dated December 14, 2004.

[114] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections ad Final Reports 2010 2*nd* Edition Revised March 2010, required inspection data for bridges with a condition rating of 3 or less to be reviewed by a District Bridge Engineer (DBE) before the report could be accepted in BMS2. If the rating was a 4 then inspection data could also be accepted by an Assistant District Bridge Engineer (ADBE) but the DBE still needed to be notified immediately of the issues. Revisions in April 2021 to that section of the publication added approval authority for a Delegate. Subsequently, however, further revisions made in December 2022 to that section of the publication removed the ability for an ADBE or a Delegate to accept inspection data for bridges with an overall condition rating of 3 or less.

additional inspections performed for these 43 bridges after the May 10, 2023, date used for our other audit procedures. The following table summarizes the timeliness of the 217 bridge inspection reports that were either accepted or in process of being reviewed in the BMS2 system between the period of July 1, 2020, through October 6, 2023:

Timeliness of Inspection Reports Accepted in the BMS2 System for Bridge Inspections that Occurred Between July 1, 2020, and October 6, 2023	
Timeframe	**Total**
Accepted within the required 90 days	115
Not accepted within the required 90 days	75[a/]
Inspection reports still under review	27[b/]
Total bridge inspections	**217**[c/]

[a/] - The time-period ranged from 92 to 300 days from the date of the inspection to the date the report was generated on October 6, 2023.
[b/] - 10 of the 27 inspection reports still under review had already exceeded the 90-day requirement. The time-period ranged from 108 to 200 days.
[c/] - Includes all 183 of the bridge inspections performed by PennDOT and consultants for the 43 bridges selected during the period of July 1, 2020, through May 10, 2023, in which we performed audit procedures and with the results discussed throughout the report as well as 34 inspections of these same bridges that occurred after May 10, 2023, that were approved by the October 6, 2023, PennDOT report preparation date.

Source: BMS2 system data regarding bridge inspection report acceptance dates of bridge inspections that occurred between July 1, 2020, through October 6, 2023, provided by PennDOT management. Acceptance date data is of undetermined reliability as noted in Appendix A. However, the data appears to be the best data available. Although this determination may affect the precision of the numbers we present, there is sufficient evidence in total to support our finding and conclusions.

As reported in the preceding table, only 115, or approximately 53 percent, of the 217 inspection reports were accepted within the required 90 days. Regarding the 75 bridge inspections that were not accepted within 90 days, we inquired of management the reasons why they were not accepted timely. Management generally stated the main reasons were due to vacancies in their Office for Inspection Support, the improper classification of team leaders (discussed in detail later), problems with railroad flagger coordination (discussed in detail later) on bridges over railroads, and significantly larger bridges that can take up to a month to inspect and more additional time for load rating if needed which leaves much less time to put together a report and perform quality control reviews.

Due to our concern with some of the inspection reports acceptances being significantly over the allowable 90 days, we asked PennDOT to explain the specific causes of the 11 of the 75 bridge inspections with acceptance dates greater than 180 days. District level management responded that five were due to issues related to the bridge being located over a railroad, one was a larger bridge, four were a miscommunication between the district project manager and the district personnel required to review the report, and one was reviewed when time allowed (specifically, district staff responded, that they were very backed up and had been trying to catch up but "things are missed").

PennDOT management stated its bridge inspection section staff in the central office sends out monthly non-accepted inspection reports to inform districts of inspection reports that are approaching the 90-day acceptance window. However, these 75 bridge inspections, and in particular the 11 that were over more than twice the allowable 90 days were still not followed up timely to ensure acceptance once they exceeded the 90-day limit.

PennDOT management stated they are aware of the issue and are tracking it since new federal regulations have placed an emphasis on this timing requirement (i.e., 90-day acceptance requirement) and it will be something that is reviewed during the annual National Bridge Inspection Program compliance reviews performed by the U.S. Department of Transportation Federal Highway Administration (FHWA).[115] Anything less than 100 percent will require an improvement plan from PennDOT, and anything less than 90 percent will require a corrective action plan.

Although PennDOT management may not have placed an emphasis on the review of the timeliness of accepting the reports during the time period of inspections for which we performed audit procedures, it was still a requirement that PennDOT management should have ensured was being complied with, especially for these bridges which were identified as having a condition rating of Poor. The timeliness of follow-up and approval of the reports is critical to help ensure the necessary steps are put into action to ensure the safety of those utilizing the bridges.

PennDOT Management stated that district management will need to devote more resources to bridge inspection report review and acceptance to comply with the federal regulations that will receive more focus in future reviews by FHWA. Numerous districts, however, have voiced concerns with accomplishing this due to having vacancies in bridge inspection positions. This issue is discussed further in the following section.

Issue with Team Leader Position Classification

PennDOT district-level management stated they are concerned with the number of vacancies in bridge inspection positions and not being able to hire proper personnel due in part to improper classification for team leaders by the Commonwealth's Office of Administration (OA). Although it is currently the responsibility of DBEs (not team leaders) to accept bridge inspection reports for bridges with a condition rating number of 3 or less, PennDOT management stated the issue with the number of team leader vacancies has an indirect negative effect in the hiring of inspection staff with the ability to accept inspection reports. If the team leader position was properly classified, it would provide a career path for field personnel to transition and be promoted to staff with the ability to accept inspection reports.

[115] U.S. Department of Transportation, Federal Highway Administration, National Bridge Inspection Standards, 23 CFR 650.315 Inventory dated May 6, 2022.

Management stated that the position OA classifies for a team leader does not reflect the minimum requirements (both minimum years of experience and training) of a team leader position required by federal regulations. Therefore, applicants that qualify for the position as designed by OA cannot lead an inspection team and it has become increasingly difficult to properly fill the team leader positions.

PennDOT management stated DBEs corresponded with OA regarding the team leader issue in 2012; however, the position requirements were not changed, and the issue was not resolved. Due to the increased emphasis on the timely acceptance of inspection reports, districts are once again corresponding with OA in the form of a work group that began in September 2023. As of May 8, 2024, PennDOT management stated the change in classification is still going through the approval process.

Issue with Railroad Coordination for Bridge Inspections

If portions of a bridge located over or under a railroad need to be inspected within the railroad's right-of-way, then the railroad must be notified, and coordination must be made to ensure railroad flaggers are present during an inspection. Generally, the railroad, when applicable, will issue a right-of-entry permit as well as provide a railroad flagger to be present during the inspection.[116] PennDOT management stated they frequently encounter railroad coordination issues regarding the railroad mishandling Right of Entry requests, unresponsive railroad management when trying to obtain Right of Entry/schedule track outage and railroad flaggers, and railroad flaggers not showing up to preapproved inspection dates and times. In these cases, the inspection will be initiated, but full access to all portions cannot be completed with the coordination issues. PennDOT management further stated that when a railroad flagger fails to show up at the appointed time for the inspection, this leads to multiple visits to the bridge to complete the inspection and additional costs for traffic control and access equipment. Management stated such issues with railroads affect between 30 to 50 bridges per year.

Inspection Reports Were Not Accepted in the BMS2 System by Employees Authorized According to PennDOT Policy

In addition to the issue of inspection reports not being approved and accepted in the BMS2 system within the required 90 days, we found that the inspection reports were not accepted in BMS2 by authorized PennDOT staff. PennDOT policy establishes requirements as to the level of employee that must review and accept the inspections based on the overall condition rating. According to PennDOT policy, inspections prior to April 2021 and after December 2022 were

[116] PennDOT Publication 238 Part IP, Chapter 2 – Inspection Requirements, Section 2.8.1 Railroad Notification and Section 2.8.3 Railroad Flagmen or Watchmen Requirements, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

required to be accepted by a DBE if the overall condition rating was a 3 or less.[117] Also prior to April 2021, those with a condition rating of 4 could also be accepted by an ADBE.[118] After April 2021 and through December 2022, the inspection reports could be accepted by a DBE, ADBE, or a Delegate who is a licensed Professional Engineer (PE).[119]

Our audit procedures performed on the individuals that accepted the inspection reports in the BMS2 system found that 85 of the 183 bridge inspections included in our review of the period of July 1, 2020, through May 10, 2023, were not accepted by an individual authorized in the aforementioned PennDOT policies. Of these 85 inspection reports, 43 were inspections of bridges with an overall condition rating of 3 or less which are bridges that have some portion of the bridge rated as serious, critical, or imminent failure.

Due to the nature of the information contained in inspection reports such as the condition of bridges and any action deemed necessary to maintain the safety and structural integrity of the bridge, it is imperative that a qualified staff member is approving the inspection. We inquired of PennDOT management as to why individuals that did not meet the qualifications required by PennDOT policy were permitted to accept the inspection reports in BMS2. PennDOT management stated the DBE is not required to be the person who moves the inspection into accepted status within BMS2, only that the DBE needs to be aware of the critical condition and is part of the review process so they can agree with the results.[120]

PennDOT policy, however as written, lists specifically as "Required Actions" for the DBE, ADBE, or Delegate to accept the report in BMS2. It does not reference/allow for anyone else to perform the step in BMS2 to accept the report, which indicates approval. We inquired of PennDOT management as to whether for those inspections not accepted in the BMS2 system by a DBE, ADBE, or Delegate, if there were other documents maintained to support that the appropriate level of employee had reviewed and approved the inspection. PennDOT management stated there are automated emails that send out a list of all bridges in Poor condition which help to ensure the necessary staff like DBEs are made aware of the status of the bridges. Currently, however, DBEs do not automatically receive the emails, staff must submit a request to receive the emails. Moving forward, as they update the BMS2 system, the intent is to make it more of an automated process rather than an email.

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[117] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections and Final Reports, 2010 2*nd* Edition Revised March 2010 and 2022 Edition dated December 2022.

[118] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections and Final Reports, 2010 2*nd* Edition Revised March 2010.

[119] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections and Final Reports, 2021 Edition dated April 2021, and 2022 Edition dated September 2022. PennDOT management stated the person responsible for the review as outlined in Publication 238 Section 6.2.2 would be the one to select the delegate for themselves.

[120] Although PennDOT management's response only referred to the DBE, there were inspection reports reviewed that based on their overall condition rating and the applicable policy in place at the time, were eligible to be accepted by an ADBE or Delegate as well.

Management further stated that the discussion and approval with the DBE occurs in multiple ways. They can be advised of issues through phone calls, emails and during weekly meetings, however, documentation confirming these discussions are not maintained. Therefore, following PennDOT policy (requiring the DBE to be the individual that accepts the report in BMS2) would provide documentation to support the DBE's awareness of, and agreement with, the plans developed for bridges identified as being in Poor condition. One DBE indicated that now that the issue of documentation has been questioned, they will now more thoroughly document the decision-making process; however, we did not confirm this as part of our audit procedures.

Although PennDOT management stated that the appropriate level of employee would have been involved in the review and decision making regarding the bridge issues, documents are not maintained to support this process.

PennDOT's awareness of the importance of who reviews and approves inspection reports is evident based on edits to its own policy. As previously indicated, during the audit period, their inspection report approval policy added authorization for a delegate to approve the inspection reports for bridges with a condition rating of 3 or less.[121] However, less than two years later, the policy was revised to not only remove a delegate as an authorized approver but also to remove the ADBE as well.[122] Therefore, only a DBE can approve inspection reports of bridges with a condition rating of 3 or less. PennDOT management stated this change was made to ensure that the DBE is aware of the critical condition and is part of the review process so they can agree with the results of the inspection.

Recommendations for Finding 5

We recommend that PennDOT management:

1. Implement additional procedures to follow-up on inspection reports that are nearing the 90-day acceptance requirement to ensure they are accepted within the required timeframe.

2. Ensure all PennDOT district staff are aware of and comply with the mandated time requirements for accepting inspection reports.

3. Continue to work with OA to amend the team leader job position minimum qualifications to ensure they meet the federal requirements of a team leader.

[121] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections and Final Reports, 2021 Edition dated April 2021.
[122] PennDOT Publication 238 Part IP, Chapter 6 – Quality Measures for Safety Inspections, Section 6.2.2 QC Review of Field Inspections and Final Reports, 2022 Edition dated December 2022.

4. Continue to work with railroad staff to provide railroad flaggers necessary to timely complete all applicable bridge inspections.

5. Instruct the individuals that have been identified as the appropriate person for reviewing and approving inspection reports for bridges with overall condition ratings of 4 or less to perform the procedure of accepting inspection reports in the BMS2 system.

6. Update the BMS2 system to ensure that only PennDOT staff authorized by policy have the ability to approve/accept inspection reports.

7. Update the BMS2 system to ensure appropriate staff, such as DBE, automatically receive important reports, such as a list of bridges identified as being in Poor condition, rather than staff having to request they be included in the distribution of the reports.

Finding 6 – PennDOT Districts were Generally in Compliance with Inspection Requirements Specific to Bridges with the Lowest Condition Ratings; However, Management in One District Did Not Prepare a Required Bridge Problem Report Regarding the Closure of One Bridge.

Pennsylvania Department of Transportation (PennDOT) districts generally complied with requirements for inspections performed on the state-owned bridges with a condition rating number of 0 (Failed), 1 (Imminent Failure), and 2 (Critical) which were the focus of Audit Objective 3 and reviewed during our audit procedures. Management in District 6 and Central Office, however, did not prepare the required Bridge Problem Report (BPR) for one bridge that was closed during the audit period. PennDOT did, however, reduce or has plans to reduce the number of bridges with a condition rating number of 0, 1, or 2.

As described in detail in the *Introduction and Background*, bridges identified with the condition rating number of 0, 1, and 2 are the lowest categories within the overall condition rating of Poor.[123] In compliance with National Bridge Inspection Standards (NBIS), PennDOT established criteria specific for bridges with these lower ratings.[124] Depending on the condition rating, requirements include the bridge inspectors and district staff notifying additional district and Central Office management of critical findings, preparing and distributing to key state and federal staff a BPR that documents bridge and structure problems, and establishing critical or high priority maintenance items that target the cause of the low condition rating of a bridge.

The results of our audit procedures performed on 17 of the 48 bridges within the four districts selected with condition rating numbers of 0, 1, or 2 follow:[125]

- Bridges identified with a condition rating number of 0 or 1 during inspections conducted during the audit period were closed.
- Bridges identified with a condition rating number of 0, 1, or 2 during inspections conducted during the audit period had a critical or high priority maintenance item that targeted the cause of the low condition rating.
- District staff properly notified PennDOT Central Office staff of bridge closures.

[123] https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/Pages/Bridge-FAQs.aspx (accessed February 14, 2024).

[124] U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 650, December 14, 2004, Section 650.313 Inspection Procedures (h) *Follow-up on critical findings* requires state agencies to establish procedures to assure that critical findings are addressed in a timely manner and 23 CFR Part 650, May 6, 2022, Section 650.313 Inspection Procedures (q) *Critical Findings* (ii) requires agencies to develop and document timeframes to address critical findings. For purposes of this report, federal criteria regarding critical findings for bridges was used as the basis for criteria for audit procedures performed on bridges within our audit objective. PennDOT Publication 238 – Bridge Safety Inspection Manual, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[125] See the *Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A* for details regarding the bridge population and selection of bridges from the population to perform audit procedures.

- The completion of and subsequent forwarding of a BPR to state and federal staff was not performed for one bridge closed in District 6 during the audit period.
- Long-term plans were in place for bridges with a condition rating number of 0, 1, or 2.
- Although recommended by a bridge inspection consultant, PennDOT did not close a bridge in District 6 while awaiting additional analysis to be performed (See *Finding 7*).

The following sections provide details regarding results of audit procedures performed on documentation for the 82 inspections conducted on the 17 bridges selected for review. Note that some of the bridges' condition ratings changed during the audit period based on the results of each of the inspections that occurred during the audit period. A bridge, therefore, may fall into more than one of the bullets listed in each of the areas.

Bridges Identified with a Condition Rating Number of 0 or 1 During Inspections Conducted During the Audit Period Were Closed

PennDOT policy indicates that bridges with a condition rating number of 0 or 1 should be closed.[126] The results from our audit procedures, as described below, found no exceptions to this policy:

- 76 of 82 inspections, which accounted for 15 bridges, identified the bridge condition rating higher than 1, and therefore, the bridges were not required to be closed. However, findings in 8 of the 76 inspections (applicable to three bridges) resulted in PennDOT closing the bridge, based on a specific area of concern noted in the inspection, until corrective action could be taken to allow for the bridge to be reopened or replaced. See *Finding 7* for discussion of one bridge that was not immediately closed following a recommendation by consultant inspectors.

- 3 of 82 inspections, which accounted for two bridges, had a condition rating of 1 and were closed as required.

- 3 of 82 inspections, which accounted for one bridge, had a condition rating of 1 and the bridge was open; however, the bridge inspected was a temporary structure that had been constructed following the closure of the original bridge. The recorded condition rating of 1 was from the original bridge no longer in service; therefore, no issues were noted.

[126] PennDOT Pub 100A Bureau of Maintenance and Operations, Bridge Management System 2 (BMS2) Coding Manual, Section 3.0 BMS2 Field Groups, 1A Inspection Condition, Rating Codes, 2019 Edition dated September 3, 2019, and 2022 Edition dated June 20, 2022. There are instances, however, where corrective action may allow bridges with a condition rating of 1 to be put into light service.

Bridges Identified with a Condition Rating Number of 0, 1, or 2 During Inspections Conducted During the Audit Period had a Critical or High Priority Maintenance Item that Targeted the Cause of the Low Condition Rating

The condition rating number of a bridge is dependent on the severity of the deficiencies identified in an inspection. PennDOT policy requires bridges with a condition rating number of 0, 1 or 2 to have a critical or high priority maintenance item established to address the deficiencies that caused the low condition rating.[127] The following results of our audit procedures for the 82 inspections conducted on the 17 bridges selected for review found no exceptions to this policy:

- 31 of 82 inspections were not applicable due to either the bridges having a condition rating higher than 2 or alternate plans were in place to address the deficiencies, which in two instances was the closure of the bridge.[128]

- 51 of 82 inspections had critical or high priority maintenance items in place, as required.

District Staff Properly Notified PennDOT Central Office Staff of Bridge Closures

PennDOT policy requires district staff to notify PennDOT Central Office staff of an emergency issue requiring a bridge closure as soon as possible.[129] Our audit procedures included the review of documents available to support that districts notified Central Office staff of bridge closures as a result of an inspection in a timely manner. Documents reviewed included district notes found in inspection reports and copies of notification emails provided by PennDOT management. Our audit procedures found that district staff notified Central Office staff as described in the following:

- 80 of 82 inspections, which accounted for 17 bridges, were not applicable due to the bridge not closing as a result of an inspection during the audit period (2 of the 17 bridges

[127] Critical and high priority maintenance items are also referred to as Priority 0 and 1, respectively. Priority 0 items are to be resolved or mitigated within seven days of identification. Priority 1 items are to be resolved or mitigated within six months. PennDOT Pub 238 Part IP, Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframes for POAs, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[128] Three of the 31 inspections, which accounted for one bridge, pertained to a temporary structure that had been constructed following a bridge closure, and all prior ratings (condition rating number 1) were carried forward to the temporary structure.
[129] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 02-B Instructions for Bridge Problem Reports (BPR), 2021 Edition dated April 2021.

were closed by PennDOT prior to the beginning of our audit period and remained closed throughout the audit period).[130]

- 2 of 82 inspections, which accounted for two bridges, Central Office was notified timely as required.

The Completion of and Subsequent Forwarding of a BPR to State and Federal Staff was Not Performed for One Bridge Closed in District 6 During the Audit Period

PennDOT policy requires bridge and structure problems, which require the bridge to be closed, be documented and sent to state and federal staff, including the PennDOT Deputy Secretary for Highway Administration, Central Office management staff, and the Federal Highway Administration (FHWA) Bridge Section to keep them apprised of the situation.[131] The standard method of notification, as indicated within PennDOT policy, is a BPR, with the purpose to present a concise "news" report to executive staff and other critical responders on a bridge incident as it unfolds.[132]

The BPR is jointly prepared by district and Central Office staff and is saved as a historical record in the bridge's file to, among other purposes, facilitate follow-up reviews on a particular problem, to review trends in similar problems, and to study serious bridge incidents.[133] PennDOT policy further outlines specific steps to be taken for emergency bridge closures, which includes the development of a BPR.

[130] Note: the number of inspections and bridges discussed in this section regarding notifications made when bridges close is different from those reported in the section above regarding bridges closed based on their condition rating numbers due to this section reporting on inspections regardless of the bridge's condition rating number.
[131] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 02-B BPR Form and Guidelines for Completing the BPR, Instructions for Bridge Problem Reports, 2010 2*nd* Edition Revised March 2010 and the 2021 Edition dated April 2021; and Part IP Chapter 2 – Inspection Requirements, Section 2.9.1 Reporting Bridge and Structure Emergencies, both 2022 Editions dated September 2022 and December 2022.
[132] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP 02-F Action Plan for Emergency Bridge Closure, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[133] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.9.1 Reporting Bridge and Structure Emergencies, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022. PennDOT Publication 238 – Bridge Safety Inspection Manual Appendix IP 02-B Instructions for Bridge Problem Reports (BPR), 2021 Edition dated April 2021.

The following summarizes the results of our audit procedures:

- 80 of 82 inspections, which accounted for 17 bridges, were not applicable due to the bridge not being closed as the result of an inspection during the audit period (2 of the 17 bridges that were closed by PennDOT prior to the beginning of our audit period had a BPR on file along with documentation to support that a copy was emailed to the Deputy Secretary for Highway Administration and the FHWA, as required).

- 1 of the 82 inspections, which accounted for one bridge, had a BPR on file and documentation to support that a copy was emailed to the Deputy Secretary for Highway Administration and the FHWA, as required.

- 1 of the 82 inspections, which accounted for one bridge, PennDOT Central Office management staff stated that a BPR was not prepared (therefore a copy was not emailed to the Deputy Secretary for Highway Administration and the FHWA). (See *Finding 7* for further details regarding this issue.)

Long-Term Plans were in Place for Bridges with a Condition Rating Number of 0, 1, or 2

As part of our audit procedures, we reviewed the bridge files and corresponded with PennDOT Central Office management regarding long-term plans in place for the 17 of the 48 bridges selected for review, with the lowest condition rating numbers of 0, 1, or 2. PennDOT identifies maintenance items to address bridge issues; however, in some cases, these repairs may be deferred if the bridge is scheduled for replacement. The availability of funds in the district is also a factor in determining corrective action taken on the bridge.

We found that based on correspondence obtained from PennDOT Central Office management on April 5, 2024, PennDOT has plans to replace 10 of the 17 bridges.[134] These plans are in various stages, with 7 of the 10 bridges having bid opening dates scheduled to review bids submitted by contractors (one bridge was replaced with a temporary structure until completion of the new bridge). The remaining three bridges had contracts awarded and are in various stages of planning and preliminary construction progress. Additionally, of the 10 bridges scheduled for replacement, 4 bridges are currently closed until their replacement structure is completed.

Of the seven bridges currently not scheduled to be replaced, one bridge, with a condition rating number of 2, was closed for construction on April 5, 2024, and is expected to reopen in November 2024. For the remaining six bridges, PennDOT made repairs that addressed priority

[134] PennDOT Central Office management stated estimated opening dates range from October 2024, through December 2031.

maintenance items and improved the overall condition rating of 5 bridges from Poor to Fair, and 1 bridge improved from Poor to Good. Of the 6 bridges, we found the following:

- The condition rating number for 2 bridges improved from 2 to 5 (Fair).
- The condition rating number for 3 bridges improved from 2 to 6 (Fair).
- The condition rating number for 1 bridge improved from 2 to 7 (Good).

Overall Conclusion

As evidenced by our review of the 17 bridges above, it appears PennDOT is working to reduce the number of Poor bridges in Pennsylvania by replacing or repairing them as time and funds allow. There are many factors to be considered when prioritizing work to be performed on bridges in the Commonwealth. PennDOT district management stated that a Poor bridge is not necessarily unsafe and can function adequately and safely for the purpose it serves. PennDOT district management also informed us that in some cases it may be more advantageous to utilize resources to keep a large bridge with a substantial amount of daily traffic in Fair or Good condition rather than repairing or replacing a small bridge that sees little traffic. As Pennsylvania's infrastructure continues to age, and with the average age of Pennsylvania's bridges exceeding 50 years old, it is imperative for PennDOT to reduce the population of Poor bridges by continuing its replacement and rehabilitation efforts.[135]

Recommendations for Finding 6

We recommend that PennDOT management:

1. Prepare BPRs for all bridge emergencies identified, as required by policy.

2. Continue to evaluate and prioritize bridges for rehabilitation or replacement.

[135] Pennsylvania has the third-largest number of bridges in the nation, with an average age of over 50 years old. https://www.penndot.pa.gov/ProjectAndPrograms/Bridges/pages/default.aspx (accessed February 12, 2024).

Finding 7 – Although Recommended by a Bridge Inspection Consultant, PennDOT Did Not Close a Bridge in District 6 While Awaiting Additional Analysis to be Performed.

As discussed in *Finding 6*, our audit procedures performed for Audit Objective 3 included reviewing inspections conducted and the Pennsylvania Department of Transportation's (PennDOT) response to the inspection results on 17 state-owned bridges with an overall condition rating of Poor, and specifically, those with a condition rating number of 0, 1, or 2 as of December 31, 2022.[136]

One of the 17 bridges reviewed was a frequently traveled District 6 bridge in the Philadelphia area.[137] In March 2022, consultant bridge inspectors performed an interim inspection of the bridge and identified four Critical (Priority 0) maintenance items requiring immediate attention, as well as two High Priority (Priority 1) maintenance items.[138] These maintenance items had also been identified by inspectors from the same consulting firm, and brought to PennDOT's attention in prior inspections.[139] The consultant recommended in emails and its report to PennDOT to "1) Close the structure. 2) Load rate the structure…".[140] PennDOT, however, did not close the bridge and only performed a load rating of the structure. Four months later, after a problem-area inspection was performed on the bridge by PennDOT bridge inspectors, the decision was made

[136] See *Introduction and Background* for details regarding bridge condition rating numbers of 0, 1, and 2 which are the lowest ratings of bridges considered to be in the overall condition rating category of Poor. See *Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A* for details regarding the test selection methodology of the 17 bridges.

[137] According to a PennDOT press release in July 2022, the bridge carried approximately 3,404 vehicles a day.

[138] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframe for POAs, 2010 2*nd* Edition Revised March 2010; 2021 Edition dated April 2021; and both 2022 Editions dated September 2022 and December 2022. Note that Priority 0 maintenance items must be resolved or mitigated within 7 days, and Priority 1 maintenance items must be resolved or mitigated within 6 months. Priority 1 maintenance items may be deferred if future rehabilitation is scheduled and increased monitoring shows the condition is stable. Deferred work must also be fully justified and documented within a Plan of Action (POA). Priority 0 maintenance items cannot be deferred.

[139] Regarding the four Priority 0 maintenance items, two had been identified in prior inspections as Priority 1 maintenance items, and two were newly identified in the March 2022 inspection. The Priority 1 maintenance items had been identified in prior inspections but had been deferred due to plans to replace the bridge.

[140] In order to load rate a structure, an analysis is performed by a professional engineer to determine the safe weight limit capacity of the bridge.

to close the structure immediately.[141] Further, following its decision, PennDOT issued a press release but failed to also prepare a Bridge Problem Report (BPR), as required by its policy.[142]

The following sections provide details relating to the bridge inspections and ultimate bridge closure:[143]

- March 2022 Consultant Inspection – Results and Recommendations
- PennDOT's Response to the Consultant's Recommendations and Subsequent July 2022 Inspection

March 2022 Consultant Inspection – Results and Recommendations

In March 2022, a 6-month interim inspection was completed by consultant bridge inspectors on two separate days: March 13, 2022, and March 21, 2022. The need for two inspection days was due to the coordination required since the bridge is located above multiple AMTRAK lines. The March 13, 2022, inspection was performed overnight below the bridge to inspect the lower part of the superstructure, which was the area of the bridge with issues that lead to the bridge's condition rating of Poor.[144] The inspection on March 21, 2022, took place during the day and consisted of inspecting the upper part of the superstructure above the deck of the bridge. As described in *Finding 1*, since this was an interim inspection, the inspectors did not perform a full inspection of the entire bridge, and instead, were only inspecting the areas with known issues to monitor their condition and ensure the bridge was safe to remain open.

During both days of the inspection, the inspectors noted several components of the superstructure above and below the deck exhibited critical section loss due to heavy rust and corrosion. These deficiencies had been identified in prior inspections, dating back prior to the beginning of our audit period, as Priority 1 maintenance items. The repairs were deferred, and the district was monitoring the issues through interim inspections since the bridge was already scheduled for

[141] Interestingly, and as further discussed later in this finding, a Federal Highway Administration (FHWA) engineer emailed PennDOT just one week prior to its problem-area inspection to inquire if the bridge could be closed until construction begins on a replacement bridge, which could have helped trigger this inspection. Problem-area inspections are performed on an as-needed basis when PennDOT has reason to believe the bridge's condition has worsened and needs to be looked at sooner than the next scheduled interim or routine inspection.
[142] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 02-B BPR Form and Guidelines for Completing the BPR Instructions for Bridge Problem Reports, 2010 2*nd* Edition Revised March 2010 and the 2021 Edition dated April 2021.
[143] According to the press release issued at the time the bridge was closed, the bridge (located within the suburbs of Philadelphia) was built in 1904 and reconstructed in 1952. It is a two lane, single-span, steel girder bridge that is 71 feet long and carries approximately 3,404 vehicles a day.
[144] The superstructure is the underlying or supporting part of the bridge.

replacement. However, due to worsening conditions, the consultant escalated the deficiencies to Priority 0 maintenance items.[145]

In accordance with PennDOT policy, the consultant notified the district, via email within 24 hours of the inspection, of the Priority 0 and 1 maintenance items observed.[146] Within both of their notification emails (consultant sent PennDOT emails after both of the March 2022 inspection dates), the consultant included details regarding the issues discovered, and recommended in memos accompanying both emails that PennDOT: "1) Close the structure. 2) Load rate the structure to include the new areas of section loss… and adjust the load posting as required." These memos and their recommendations were also included as part of the formal inspection report completed by the consultant.

PennDOT's Response to the Consultant's Recommendations and Subsequent July 2022 Inspection

Although the consultant notified PennDOT after its first day of the inspection, on March 13, 2022, of its recommendations to: 1) Close the structure. 2) Load rate the structure…, PennDOT Central Office management stated, and documentation provided from PennDOT's Bridge Management System 2 (BMS2) confirmed, that on March 22, 2022 (one day after the consultant bridge inspectors completed the second and final day of their inspection), PennDOT district inspectors performed a load rating analysis. This analysis determined that a 3-ton bridge posting was required, and signage was posted on March 25, 2022.[147] Although the consultant recommended closing the bridge, it remained open during the 12-day time lapse (the time from when the consultant first notified PennDOT of its recommendations) until the weight restriction signage was put into place.[148] Additionally, it was another four months until PennDOT finally made the decision to close the bridge.

Inspection records did not indicate why PennDOT did not close the bridge following the March 2022 inspection. Therefore, we inquired, and PennDOT Central Office management responded

[145] The inspection procedures performed on March 21, 2022, also identified two new Priority 0 maintenance items related to missing signage and the need to adjust fencing to restrict access to a hole that had developed in the sidewalk, which was already closed to pedestrians; however, these maintenance items were correctly addressed by PennDOT in a timely manner and are not part of this finding.

[146] PennDOT Publication 238 – Bridge Safety Inspection Manual, Appendix IP 01-G, General Scope of Work-Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2010 2nd Edition Revised March 2010, and Appendix IP 01-F, General Scope of Work-Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.

[147] Prior to this, the only restriction for the bridge was the limit to one truck at a time. It did not include a weight limit for the trucks utilizing the bridge.

[148] PennDOT Publication 238 – Bridge Safety Inspection Manual: 2021 Edition dated April 2021, Part IP Chapter 4 – Bridge Size and Weight Restrictions, Section 4.6.4 Implementation of Posting requires districts to post signage in the field within 30 calendar days once the need for posting is identified.

that a meeting was held on March 15, 2022, between the consultant and the district to discuss the inspection findings and determine if a closure was needed. Additionally, PennDOT management stated: "[t]he bridge had a revised load rating analysis performed, option #2 was chosen." During our review of the inspection report, we interpreted the consultant's recommendations differently. The consultant presented two straightforward recommendations with no language indicating they intended them to be an either/or option.

This is not the first time PennDOT did not follow recommendations made by the consultant regarding this bridge. In the prior inspection, in September 2021, the consultant identified two Priority 0 maintenance items, which would have required corrective action within seven days; however, after PennDOT's review, the deficiencies were entered into BMS2 as Priority 1 maintenance items, which enabled repairs to be deferred due to the future bridge replacement.[149]

Four months after the previously discussed March 2022 inspection, on July 20, 2022, PennDOT district inspectors performed a problem-area inspection of the bridge. As noted in the inspection report, bridge inspectors found "minor additional" deterioration to one component of the superstructure. Following the inspection, PennDOT district management, with central office management agreement, made the decision to close the bridge for an indefinite period of time.[150] An additional area of concern regarding this bridge inspection pertains to PennDOT policy that requires bridge and structure problems to be documented and sent to various state and federal staff, including the PennDOT Deputy Secretary for Highway Administration, Central Office management staff, and the Federal Highway Administration (FHWA) Bridge Section to keep them apprised of the situation.[151]

The standard method of notification, as indicated within PennDOT policy, is a BPR, for which the purpose is to present a concise "news" report to executive staff and other critical responders on a bridge incident as it unfolds.[152] The BPR is also saved as a historical record in the bridge's file to facilitate follow-up reviews on a particular problem, to review trends in similar problems, and to study serious bridge incidents.[153] PennDOT policy further outlines specific steps to be

[149] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP Chapter 2 – Inspection Requirements, Section 2.14.1 Timeframe for POAs, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[150] According to PennDOT's website, as of September 12, 2023, the bridge was in the process of being replaced, with the new bridge opening Summer of 2026 and a full project completion estimated to be the Summer of 2027. https://www.penndot.pa.gov/RegionalOffices/district-6/ConstructionsProjectsAndRoadwork/DelawareCounty/Pages/Sellers-Avenue-over-AMTRAK-Bridge-Reconstruction.aspx (accessed April 3, 2024).
[151] PennDOT Publication 238 – Bridge Safety Inspection Manual Appendix IP 02-B BPR Form and Guidelines for Completing the BPR Instructions for Bridge Problem Reports, 2010 2*nd* Edition Revised March 2010 and the 2021 Edition dated April 2021.
[152] PennDOT Publication 238 – Bridge Safety Inspection Manual, Part IP 02-F Action Plan for Emergency Bridge Closure, 2010 2*nd* Edition Revised March 2010, 2021 Edition dated April 2021, and both 2022 Editions dated September 2022 and December 2022.
[153] PennDOT Publication 238 – Bridge Safety Inspection Manual: 1) Part IP Chapter 2 – Inspection Requirements, Section 2.9.1 Reporting Bridge and Structure Emergencies, 2010 2*nd* Edition Revised March 2010, 2021 Edition

taken for emergency bridge closures, which includes the development of a BPR. In this case, when we inquired about the BPR, PennDOT central office management responded that this was an expedited closure, so they did not prepare a BPR. Instead, PennDOT issued a press release.

PennDOT policy requires a BPR in the case of an emergency bridge closure, and therefore, one should have been completed and added to the bridge file. The closing of the bridge and the issuance of the press release in lieu of a BPR, indicates the critical condition of the bridge. Four months earlier, however, when the consultant recommended to close the bridge and perform additional analysis, PennDOT dismissed the closure recommendation. However, once PennDOT performed the problem inspection four months later, it closed the bridge immediately.

Of additional interest is that during our review of inspection report documentation, we found that prior to the inspection and bridge closure on July 20, 2022, a FHWA engineer emailed PennDOT on July 13, 2022, and inquired if the bridge could be closed until construction begins on a replacement bridge. One week later, PennDOT performed their problem-area inspection and closed the bridge. If the FHWA had not sent the email to PennDOT, it is possible that an inspection would not have occurred for another two months since the next scheduled inspection for the bridge was not until September 2022. Additionally, the result may or may not have been a bridge closure, which was one of the original recommendations made in March 2022 by the consultant, along with performing additional analysis on the bridge to determine its status.

Disaster often strikes without warning, but sometimes there are warning signs. In this case, the bridge had been in Poor condition since prior to the beginning of our audit period. Based on audit procedures performed on prior inspection reports, we found inspection notes indicated the bridge showed signs of severe deterioration that continued to worsen. As a result, the consultant recommended to close and load rate the bridge; however, PennDOT did not follow the first part of the recommendation to close the bridge, and it remained open to vehicular and pedestrian traffic for an additional four months (March 2022 until July 2022).

In discussion with PennDOT Central Office and district management, we were informed that they have the authority to make the final decision regarding follow-up on bridges. However, in light of the devastating Fern Hollow bridge collapse in Pittsburgh just a few months earlier on January 28, 2022, we would have expected PennDOT to err on the side of caution. PennDOT did reduce the load rating of the bridge following the March 2022 inspection to 3 tons (6,000 pounds); however, when you consider that the average vehicle weighs over 4,000 pounds, two cars would already exceed that load rating.[154] Although nothing happened to the bridge during the additional four months it remained open following the consultant's March 2022 inspection, based on the severity of the bridge condition and potential for disaster, it would have been

dated April 2021, and both 2022 Editions dated September 2022 and December 2022; and 2) Appendix IP 02-B Instructions for Bridge Problem Reports (BPR), 2021 Edition dated April 2021.

[154] The 2023 EPA Automotive Trends Report https://www.epa.gov/system/files/documents/2023-12/420r23033.pdf, (accessed March 20, 2024).

prudent for PennDOT to exercise further caution by immediately closing the bridge rather than only restricting its weight limit.

Recommendations for Finding 7

We recommend that PennDOT management:

1. Exercise additional caution and not discount recommendations by consultants conducting the bridge inspections, in particular, recommendations made regarding closing a bridge.

2. Document in detail the reasoning and approval in cases where a consultant's recommendations are not followed.

3. Similar to our recommendation in *Finding 6,* ensure all required documents, such as the Bridge Problem Report, are prepared and maintained in its files.

Pennsylvania Department of Transportation's Response and Auditor's Conclusion

We provided copies of our draft audit findings and related recommendations to the Pennsylvania Department of Transportation (PennDOT) for its review. On the pages that follow, we included PennDOT's response in its entirety. Following the agency's response is our auditor's conclusion.

Audit Response from the Pennsylvania Department of Transportation

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT
OF TRANSPORTATION HARRISBURG, PENNSYLVANIA
17120

June 12, 2024

Scott D. King, CPA, Director
Bureau of Performance Audits

Director King:

On May 29, 2024, the Pennsylvania Department of Transportation (PennDOT) received draft findings and recommendations from you resulting from the Department of Auditor General's performance audit of PennDOT's bridge inspection program. The following is PennDOT's response to the findings detailed in the proposed report.

PennDOT is responsible for the inspection of the third largest number of state-owned bridges in the United States. Pennsylvania's bridges are aging—often over fifty years old, yet the number of poor bridges have year-over-year decreased in the last decade and historical levels of federal infrastructure investment will continue to improve the overall condition of Pennsylvania's bridges. PennDOT's bridge inspection program is more stringent than federal requirements.

PennDOT's responses to the seven findings are outlined below, with additional detail in the enclosed spreadsheet. There are some findings with which we agree, some that we have already proactively addressed and some with which we respectfully disagree and believe warrant reconsideration. We request to discuss these topics at an exit conference with audit staff on June 13, 2024.

Auditor General Finding 1: PennDOT's bridge inspection process is more stringent than federal requirements

PennDOT Response: PennDOT agrees with this finding. PennDOT inspects state-owned bridges from 8 feet to 20 feet in length (as compared to federal requirements set at 20 feet) and PennDOT's criteria for certain inspection intervals (6 months) is more frequent than federal requirements.)

Auditor General Finding 2: PennDOT regional offices and consultants could not provide documentation that certain Team Leaders required to be present during inspections met minimum experience requirements.

PennDOT Response: While this finding was accurate at the time of the audit, PennDOT has made system changes to remedy it. In January 2022, prior to commencement of this audit, the Bridge Management System was updated to require inspection credentials to be entered so that the Team Leader list only allows qualified personnel to be selected.

Auditor General Finding 3: PennDOT Management did not ensure inspection documentation was properly prepared and/or maintained which led to inconsistencies between inspection reports.

PennDOT Response: While PennDOT agrees that inspection data is collected and reported in various formats depending on a project's specific scope of work, and whether the inspection was conducted in-house or by a private contractor. However, PennDOT disagrees with the significance of these differences as the key data elements that are required to be collected and reported in our Bridge Management System database are consistent.

Office of the Secretary of Transportation
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Auditor General Finding 4: PennDOT Management did not ensure critical and high priority maintenance item written notifications were provided, or provided timely, to the appropriate staff, and related plan of actions were not properly and consistently prepared.

PennDOT Response: While PennDOT agrees that documentation was not timely prepared during the audit period, it disagrees that critical findings were not timely conveyed. Critical findings were conveyed verbally to ensure that appropriate, immediate action was taken. PennDOT policy in Publication 238 will be modified in our next scheduled update to occur in calendar year 2024 to place timelines on the conveyance of written materials and this point will be reinforced in on-going trainings.

Auditor General Finding 5: Bridge Inspection reports were not approved/accepted in the Bridge Management System timely and by the authorized PennDOT employees.

PennDOT Response: New federal requirements render the timeliness aspect of this finding moot, as we have already modified processes. Ongoing workflow modifications to our Bridge Management System will ensure that only authorized PennDOT employees can accept certain inspection reports and these modifications should be fully implemented by the summer of 2025.

Auditor General Finding 6: PennDOT Districts were generally in compliance with inspection requirements specific to bridges with the lowest condition ratings; however, management in one district did not prepare a required bridge problem report regarding closure of one bridge.

PennDOT Response: PennDOT agrees, however, there is limited impact of not creating a bridge problem report. It is simply a notification piece of the process and does not impact the actual closing of the bridge.

Auditor General Finding 7: Although recommended by a bridge inspection consultant, PennDOT did not close the same bridge that is the subject of Finding 6 while awaiting additional analysis to be performed.

PennDOT Response: PennDOT disagrees with this finding. It is our determination that consultant recommendations were followed and a plan was developed with heavy input from the consultant inspectors.

Bridge inspections, along with applicable law and policies, have evolved over time. PennDOT has significant and varied responsibilities and a difficult task due to the many thousands of bridges it owns and the bridges it inspects. We look forward to the continued dialogue with your office to accurately reflect PennDOT's bridge inspection program and remain hopeful that this report will draw attention to the staggering responsibility and ongoing need to invest in these assets and determine viable sources of sustainable transportation funding to meet the needs of PennDOT and the Commonwealth. Safe, reliable transportation is central to quality of life, connecting people to opportunity and each other. Since day one, the Shapiro Administration has been focused on ensuring that Pennsylvania's transportation network is safe and reliable.

Should you have any questions or require additional information, please contact Richard Runyen, P.E., Director for Bureau of Bridges, at 717.783.5006.

Sincerely,

Michael B. Carroll, Secretary
Pennsylvania Department of Transportation

Enclosure

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Finding 1	PennDOT response
PennDOT has an Inspection process for State-Owned Bridges with an overall condition rating of poor that includes more stringent requirements than the National Bridge Inspection Standards	Agree. PennDOT's inspection process covers all National Bridge Inspection Standards (NBIS) length bridges regardless of owner or condition as compared to the federal minimum of 20 feet and PennDOT's inspection intervals for certain bridges (at 6 months) is more frequent than federal requirements.
Finding 2	PennDOT response
Certain PennDOT District staff assigned the responsibility of a bridge inspection team leader did not meet the minimum requirements and PennDOT lacked documentation to support consultants assigned as team leaders met minimum requirements	Agree. This area of need was previously identified by PennDOT independent of this audit. PennDOT has made updates to the Pennsylvania Bridge Management System 2 (BMS2) described in detail below in January 2022 (prior to commencement of the audit) so that the Team Leader list in BMS2 only allows qualified personnel to be selected.
Finding 2 Recommendations:	PennDOT response
Ensure only PennDOT employees that meet the minimum requirements of a team leader are listed in BMS2 as eligible for selection as an inspection team leader.	PennDOT has implemented a certification screen within BMS2 for all users to enter qualifications for team leader status. These qualifications limit the team leader list within BMS2 for bridge inspections to only those with the proper certifications and experience. PennDOT's Bridge Inspection Quality Assurance (QA) program randomly selects team leaders each year to provide specific documentation for bridge inspection experience and training certifications.
Ensure district PennDOT management are aware of and comply with both PennDOT and federal qualification requirements when assigning team leaders to bridge inspections.	PennDOT outlines team leader qualifications in our Publication 238, Bridge Safety Inspection Manual in the following sections: IP 2.1.3, IP 2.3. PennDOT will highlight this specific information to the Districts during upcoming District Bridge Engineer meetings in 2024.
Obtain documentation to support consultants assigned to the team leader position possess the minimum requirements.	PennDOT has implemented a certification screen within BMS2 for all users to enter qualifications for team leader status. These qualifications limit the team leader list within BMS2 for bridge inspections to only those with the proper certifications and experience. PennDOT's Bridge Inspection QA program randomly selects team leaders each year to provide specific documentation for bridge inspection experience and training certifications. Additionally, each inspector is now assigned an Inspector ID number which will follow them from employer to employer. This will ensure PennDOT has up to date information on how to contact individuals for their bridge inspection experience and training certifications.

Finding 3	PennDOT response
PennDOT Management did not ensure inspection documentation was properly prepared and/or maintained which led to inconsistencies between inspection reports. Bridge Inspection Report Contents Scour Plan of Action Inspection Report QC Verification Checklist	PennDOT agrees that inspection data is collected and reported in various formats depending on a project's specific scope of work, and whether the inspection was conducted in-house or by a private contractor. However, PennDOT disagrees with the significance of these differences as the key data elements that are required to be collected and reported in our BMS2 database are consistent.
Finding 3 Recommendations:	PennDOT response
Amend PennDOT policy to require not only consultant inspectors but also PennDOT inspectors to adhere to the inspection report requirements outlined in the scope of work.	While the information entered into BMS2 is most critical to an inspection, PennDOT is going to revisit Publication 238 (Pub 238) at the next scheduled update to occur in calendar year 2024 and revise language as needed for what is to be included in an inspection report for both PennDOT and consultant inspections. The Scope of Work (SOW) is language in a legal agreement between PennDOT and a hired consultant. PENNDOT does not have nor does it need a legal agreement with its own staff. Therefore, the SOW does not affect in-house inspections. PennDOT will leverage the inspection report generator within BMS2 that was implemented in December 2020 to reduce the effort required to create a new inspection report for each inspection and establish the minimum required components of an inspection report.
Ensure all inspection reports, whether completed by PennDOT or consultant inspectors, follow the scope of work.	See answer to Finding 3 Recommendation 1 above.
Limit the approval of scope modifications for deliverables required in the scope of work in PennDOT policy to avoid inconsistencies between inspections performed by consultants throughout PennDOT's 11 districts.	See answer to Finding 3 Recommendation 1 above.
Determine if the D-491 forms, required according to PennDOT policy, are needed as part of the current inspection documentation process, and if so, ensure districts are instructed to prepare them. If it is determined that they are no longer necessary, amend PennDOT policy to remove the requirement of the forms.	See answer to Finding 3 Recommendation 1 above.

Update PennDOT policy to require the Inspection Report Quality Control Verification Checklist to be completed and maintained within the BMS2 system.	PennDOT does not agree that the Quality Control (QC) checklist form needs to be filled out on every inspection. By submitting an inspection, inspectors are already verifying that all items on the QC checklist were completed. Including a filled out QC document is an unnecessary duplication of the inspection report. Pub 238 Part IP 6.2.2 states requirements for team leaders, which includes the language, "As part of this review, team leaders are to ensure that all items listed in the Inspection Report Quality Control Verification Checklist in Appendix IP 06-A are addressed prior to submittal of the report."
Finding 4	PennDOT response
PennDOT Management failed to ensure critical and priority maintenance item notifications were provided, or provided timely, and to the appropriate staff, and related plan of actions were properly and consistently prepared.	Disagree that timely notice was not provided. Instead, documentation of notice was lacking in certain instances. Critical findings were conveyed verbally to ensure that appropriate, immediate action was taken. PennDOT policy in Publication 238 will be modified in our next scheduled update to take place in calendar year 2024 so as to place timelines on the conveyance of written materials and this point will be reinforced in on-going trainings.
Finding 4 Recommendations:	PennDOT response
Ensure both PennDOT and consultant inspectors are aware of and comply with PennDOT policy to provide immediate and written notification within 24 hours to the appropriate district staff pertaining to Priority 0 and Priority 1 maintenance items.	Most communication is via phone call from the field to the district and an official email notification is drafted afterwards. PennDOT will provide clarification in Pub 238 in the next update to occur in calendar year 2024 that verbal communication is acceptable as long as the verbal communication is subsequently documented.
Ensure that a Plan of Action is developed, and that timely corrective action is taken to remediate issues identified for all Priority 0 and Priority 1 maintenance items found in bridge inspections.	PennDOT will revisit the Plan of Action policy in Pub 238 in the next scheduled update to occur in calendar year 2024. PennDOT will capture the information required for a Plan of Action on the proposed maintenance screen in BMS2. PennDOT runs Priority 0 and Priority 1 reports bimonthly and the Statewide Maintenance Manager follows up with Districts on newly identified Priority 0 maintenance items. Users can also receive email notifications on newly identified and outstanding Priority 0 and Priority 1 maintenance items.
Implement recommendations made by consultant inspectors or document, in detail, the reasons and approval by PennDOT management when they do not implement a consultant's recommendation.	PennDOT will ensure that documentation of decisions is better tracked through inspection reports and the proposed maintenance screen notes in BMS2.
Consider requiring all districts to utilize a formal POA letter containing all the required components, including estimate costs, to ensure all critical and high priority maintenance deficiencies are documented and tracked effectively.	PennDOT is currently working on the software update to BMS2, which will include updates to ensure that system functionality is robust and will replace some of the manual work mentioned throughout these findings. A new Bridge Management System is planned for full implementation by the summer of 2025. Currently, we do not have a formal letter, but we meticulously track these items in the system in conformity with the federal requirement. PennDOT does not agree that a formal letter is required. The proposed maintenance screen should be used to track the plan of action (POA) information. We will update language in Pub 238 to reflect this.

Finding 5	PennDOT response
Bridge Inspection Reports were not approved/accepted in the BMS2 system timely and by the authorized PennDOT employees.	New federal requirements render the timeliness aspect of this finding moot, as we have already modified processes. Ongoing workflow modifications to BMS2 will ensure that only authorized PennDOT employees can accept certain inspection reports and these modifications should be fully implemented by the summer of 2025.
Finding 5 Recommendations:	PennDOT response
Implement additional procedures to follow-up on inspection reports that are nearing the 90-day acceptance requirement to ensure they are accepted within the required timeframe.	PennDOT has historically sent out a non-accepted inspection report on a monthly basis to notify the Districts of bridges that have outstanding inspections requiring acceptance. PennDOT has updated this report to reflect the new inspection times outlined in the new federal NBIS. The report specifies the date by which each inspection must be accepted and the days elapsed since it was created.
Ensure all PennDOT district staff are aware of and comply with the mandated time requirements for accepting inspection reports.	In addition to the non-accepted inspection report mentioned above, PennDOT has routinely reviewed the mandated time requirements for inspection acceptance at District Bridge Engineers meetings. PennDOT also plans to implement a workflow process in its new BMS3 system (currently in development as detailed above) providing users workflow to identify tasks assigned to them, including accepting certain inspections.
Continue to work with OA to amend the team leader job position minimum qualifications to ensure they meet the federal requirements of a team leader.	PennDOT will continue to work with OA on hiring state bridge inspectors.
Continue to work with railroad staff to provide railroad flaggers necessary to timely complete all applicable bridge inspections.	Railroad flagging is a challenging part of inspection and construction. PennDOT has proposed a new program to FHWA through which flagging workers will be trained to ensure that there are an adequate number of flaggers available to resolve some of these challenges.
Instruct the individuals that have been identified as the appropriate person for reviewing and approving inspection reports for bridge with overall condition ratings of 4 or less to perform the procedure of accepting inspection reports in the BMS2 system.	Guidance in Pub 238 is clearly laid out. It will be reviewed at the upcoming District Bridge Engineers meetings in 2024. This will also be addressed by a workflow process in the new BMS3 system to ensure that the guidance must be followed. PennDOT's Bridge Inspection Section (BIS) will audit the districts annually to ensure the policy is being followed.
Update the BMS2 system to ensure that only PennDOT staff authorized by policy have the ability to approve/accept inspection reports.	The new BMS3 workflow process to be implemented by the summer of 2025 will ensure that only PennDOT staff authorized by policy have the ability to approve/accept inspection reports.
Update the BMS2 system to ensure appropriate staff, such as DBE, automatically receive important reports, such as a list of bridges identified as being in poor condition, rather than staff having to request they be included in the distribution of reports.	PennDOT is implementing a workflow process in BMS3, the replacement for BMS2, to address this issue.

Finding 6	PennDOT response
PennDOT Districts were generally in compliance with inspection requirements specific to bridges with the lowest condition ratings; however, management in one district did not prepare a required bridge problem report regarding the closure of one bridge.	Agree; however, the impact of not creating a bridge problem report (BPR) is limited. This is simply a notification piece of the process and has no role in the actual act of closing the bridge or impact on public safety.
Finding 6 Recommendations:	PennDOT response
Prepare BPR's for all bridge emergencies identified, as required by policy.	PennDOT will ensure that BPRs are created in accordance with our policy. PennDOT Central Office monitors BMS2 email notifications on bridge closures to make sure BPR's are created.
Continue to evaluate and prioritize bridges for rehabilitation or replacement.	PennDOT will continue to evaluate and prioritize bridges for rehabilitation or replacement based on lowest lifecycle cost and utilizing BridgeCare software for planning bridge projects. BridgeCare is a system developed and managed by PennDOT's asset management section for use by the Districts when planning bridge projects. It is part of PennDOT's overarching Transporation Asset Management Plan required to be completed by FHWA. Those recommendations will be entered into the overall Transportation Improvement Plan (TIP) process, which involves the municipal and regional planning organizations (MPOs and RPOs) to ultimately determine projects.
Finding 7	PennDOT response
PennDOT disregarded a bridge inspection consultant's recommendations to close a bridge in district 6 until additional analysis could be performed.	Disagree. District 6 provided additional details (email added to the RFI #53 folder on 6/7/2024) as to the course of events that took place from 3/14/22 through 7/21/2022. They did not disregard a recommendation of closure, but followed the recommendation to further analyze the bridge for any changes in posting. The District evaluated all of the information, had a meeting with the inspection consultant, and decided on an appropriate course of action with input from the consultant inspector. Consultant recommendations were followed and a plan was developed with significant input from the consultant inspectors.
Finding 7 Recommendations:	PennDOT response
Exercise additional caution and not discount recommendations by consultants conducting the bridge inspections, in particular, recommendations made regarding closing a bridge.	We disagree with the finding. PennDOT does not disregard consultant inspector recommendations to close bridges. We will continue to ensure that closure recommendations are always given serious thought and implemented promptly.
Document in detail the reasoning and approval in cases where a consultant's recommendations are not followed.	Better documentation of the course of events was needed. PennDOT will provide direction to districts through annual training courses and District Bridge Engineers meetings that this information be included in a report, especially when closure or priority maintenance items are involved.
Similar to our recommendation in Finding 6, ensure all required documents, such as the Bridge Problem Report, are prepared and maintained in its files.	PennDOT will ensure that Bridge Problem Reports are created per our policy. PennDOT Central Office monitors BMS2 email notifications on bridge closures to make sure BPR's are created.

Auditor's Conclusion to the Pennsylvania Department of Transportation's Response

The Pennsylvania Department of Transportation (PennDOT) management is generally in agreement with our recommendations for *Findings 1 through 6* and stated they have already proactively addressed some of the recommendations made in the report. However, management disagreed with *Finding 7*. Below we address PennDOT's response to the audit report and findings along with certain areas we believe warrant further comment based on PennDOT's response.

Finding 1

We are pleased PennDOT agrees with the information provided in the finding.

Finding 2

We are pleased PennDOT agrees with this finding and PennDOT has indicated that it has made updates to the Pennsylvania Bridge Management System 2 (BMS2) and plans to highlight the issues noted in its upcoming district meetings. In their response, PennDOT indicated that updates were made in BMS2 in January 2022 to correct the issue reported regarding BMS2 only allowing qualified personnel to be selected as the team leader. However, during our review, the issues noted with two of the PennDOT staff were for inspections that took place after January 2022, in March 2022 and May 2022. Therefore, we stand by our recommendation for PennDOT to ensure that only individuals that meet the minimum requirements of a team leader be listed in BMS2 as eligible for selection as an inspection team leader.

Finding 3

We are pleased PennDOT agrees with this finding and intends to revisit the language in its policy regarding what is to be included in an inspection report for both PennDOT and consultant inspections. It is important to ensure its policy includes the key data elements that are required to be collected and reported. Also, it is critical that all inspections are being conducted and documented consistently regardless of whether they are performed by PennDOT staff or consultants.

In response to PennDOT's disagreement with the recommendation that the policy be updated to require a Quality Control (QC) checklist be filled out on every inspection, such a policy would improve management control to ensure all inspection requirements have been met. The completed checklist would assist with accountability for inspection staff to complete the required steps or provide explanation as to why something did not occur. The checklist is a control to assist inspectors in identifying any steps that were missed or documentation that was not included in the inspection report. Although PennDOT stated inspectors are already verifying that

all items on the QC checklist were completed by submitting an inspection, as noted in the finding, inspection documents that are required according to PennDOT policy were missing from inspection reports we reviewed. We therefore stand by our recommendations.

Finding 4

We are pleased PennDOT agrees with this finding and intends to update its policy to require documentation of verbal communications made regarding inspection results and are encouraged that this will be reinforced in ongoing trainings. During our review, PennDOT management indicated that much of the required communication was in the form of phone calls, however, without written documentation to support this communication, there is no means to ensure the notification occurred. Additionally, we are pleased that PennDOT agrees that the decision-making process needs to be better tracked.

We are also pleased that PennDOT intends to revisit the Plan of Action (POA) policy and ensure that information is included in BMS2 and updates to the system are in progress to ensure functionality is robust and that some of the manual work reported in the findings will be replaced.

Regarding PennDOT's disagreement that a formal POA letter is required, our review was based on the language and requirements in the PennDOT policy which included references to a POA. A formal letter would document and help ensure that all necessary bridge inspection follow-up actions occur. We therefore stand by our recommendation.

Finding 5

We are pleased PennDOT agrees with this finding and has indicated that it has already modified its process and will modify workflows in BMS2 to ensure that, as recommended, only authorized PennDOT employees will be able to accept certain inspection reports when the modifications are fully implemented in the summer of 2025. As PennDOT stated in correspondence to us during the audit, they intend to track acceptance dates more closely due to new federal regulations placing an emphasis on this requirement of 100 percent acceptance within a three-month period for full compliance. Therefore, it is critical that PennDOT ensure the timely acceptance of inspection reports. We are further encouraged by PennDOT's response that it has updated reports and they plan to implement an additional workflow process in its new BMS3 system (currently in development) to ensure policy is followed regarding the timelines and that only authorized individuals accept inspection reports in its system, along with the intent to annually audit districts to ensure compliance.

We are pleased PennDOT intends to continue to work with the Office of Administration regarding hiring bridge inspectors and commend them for its proposal to the Federal Highway Administration regarding a new program to train railroad flagging workers to ensure there are an adequate number of flaggers available to resolve challenges noted.

Finding 6

We are pleased PennDOT agrees with this finding and intends to ensure that Bridge Problem Reports (BPR) are created in accordance with its policy. Although PennDOT stated the impact of not creating a BPR is limited, the BPR serves as a historical record in the bridge's file to facilitate follow-up reviews on a particular problem, to review trends in similar problems, and to study serious bridge incidents. Additionally, its policy states the BPR is the standard method of documenting bridge and structure problems, and it presents a concise report to PennDOT's Deputy Secretary for Highway Administration and key executive staff in a timely manner.

We commend PennDOT for its efforts to continue to evaluate and prioritize bridges for rehabilitation or replacement.

Finding 7

Although PennDOT disagrees with this finding, we are pleased PennDOT agreed with the need to document in detail the reasoning and approval in cases where a consultant's recommendations are not followed as well as ensuring BPRs are created when necessary.

As indicated in its response, PennDOT provided additional information regarding the course of events that took place which included a meeting with the consultant on March 15, 2022, after it received the first email and recommendation from the consultant to: "1) Close the structure. 2) Load rate the structure to include the new areas of section loss… and adjust the load posting as required." In a March 18, 2022, email from the consultant to the district acknowledging the meeting that occurred, the consultant wrote, "As discussed in our call we anticipate issuing another P0 memo to reflect the lack of load posting signs in place **as we await the District's decision to close the bridge**." [emphasis added] This email supports there was discussion regarding the possibility of closing the bridge. After completing its second day of the inspection, the consultant sent another email to the district on March 22, 2022, with the same two recommendations to close the bridge and to perform a load rate analysis. We therefore stand by our recommendation for PennDOT to exercise additional caution and not discount recommendations by consultants conducting bridge inspections, in particular when it involves recommendations regarding the closure of a bridge.

Appendix A Objectives, Scope, Methodology, and Data Reliability

The Department of the Auditor General conducted this performance audit of the Pennsylvania Department of Transportation (PennDOT) pursuant to Sections 402 and 403 of The Fiscal Code.[155]

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. [156] We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Objectives

Our performance audit objectives were as follows:

1. Determine the process for inspecting state-owned bridges identified as having the **Overall Condition of Poor** (previously referred to as Structurally Deficient). [See *Finding 1*]

2. Evaluate whether PennDOT complied with applicable laws, regulations, standards, policies and procedures, and guidelines regarding inspecting bridges identified as being in an **Overall Condition of Poor**. [See *Findings 2, 3, 4, 5*]

3. Determine and evaluate compliance with PennDOT's policies and procedures for responding to bridges identified as having the Condition Rating of **Critical, Imminent Failure, and Failed**. [See *Findings 6, 7*]

Scope

This performance audit included the period July 1, 2020, through May 10, 2023, unless otherwise noted, with updates where applicable.

PennDOT management is responsible for establishing and maintaining effective internal controls to provide reasonable assurance of compliance with applicable laws and regulations, contracts, grant agreements, and administrative policies and procedures. In conducting our audit, we

[155] 72 P.S. §§ 402 and 403.
[156] U.S. Government Accountability Office. *Government Auditing Standards*. 2018 Revision. Technical Update April 2021.

obtained an understanding of PennDOT's internal controls, including information systems controls.

Standards for Internal Control in the Federal Government (also known as and hereafter referred to as the Green Book), issued by the Comptroller General of the United States, provides a framework for management to establish and maintain an effective internal control system.[157] We used the framework included in the Green Book when assessing PennDOT's internal control systems.

The Green Book's standards are organized into five components of internal control. In an effective system of internal control, these five components work together in an integrated manner to help an entity achieve its objectives. The five components contain 17 related principles, listed in the table below, which are the requirements an entity should follow in establishing an effective system of internal control.

We determined all of the internal control components are significant to the audit objectives. The table below represents a summary of the level of the internal control assessment for effectiveness of design (D); implementation (I); or operating effectiveness (OE) that we performed for each principle, along with a conclusion regarding whether issues were found with the principles and if those issues are included in a finding.[158]

Component		Principle	Level of Assessment	Objective	Conclusion
Control Environment	1	The oversight body and management should demonstrate a commitment to integrity and ethical values.	D	1, 2, 3	No issues noted
	2	The oversight body should oversee the entity's internal control system.	D	1, 2, 3	No issues noted
	3	Management should establish an organizational structure, assign	D	1, 2, 3	No issues noted

[157] Even though the Green Book was written for the federal government, it explicitly states that it may also be adopted by state, local, and quasi-government entities, as well as not-for-profit organizations, as a framework for establishing and maintaining an effective internal control system.

[158] The Green Book, Sections OV3.05 and 3.06, states the following regarding the level of assessment of internal controls. Evaluating the design of internal control includes determining if controls individually and in combination with other controls are capable of achieving an objective and addressing related risks. Evaluating implementation includes determining if the control exists and if the entity has placed the control into operation. Evaluating operating effectiveness includes determining if controls were applied at relevant times during the audit period, the consistency with which they were applied, and by whom or by what means they were applied.

Component		Principle	Level of Assessment	Objective	Conclusion
		responsibility, and delegate authority to achieve the entity's objectives.			
	4	Management should demonstrate a commitment to recruit, develop, and retain competent individuals.	D, I D, I	1, 3 2	No issues noted Finding 5
	5	Management should evaluate performance and hold individuals accountable for their internal control responsibilities.	D	1, 2, 3	No issues noted
Risk Assessment	6	Management should define objectives clearly to enable the identification of risks and define risk tolerances.	D D, I	1 2, 3	No issues noted No issues noted
	7	Management should identify, analyze, and respond to risks related to achieving the defined objectives.	D D, I, OE D, I, OE	1 2 3	No issues noted Findings 2, 3, 4, 5 Findings 6, 7
	8	Management should consider the potential for fraud when identifying, analyzing, and responding to risks.	D	1, 2, 3	No issues noted
	9	Management should identify, analyze, and respond to significant changes that could impact the internal control system.	D	1, 2, 3	No issues noted
Control Activities	10	Management should design control activities to achieve objectives and respond to risks.	D D, I, OE D, I, OE	1 2 3	No issues noted Findings 2, 3, 4, 5 Findings 6, 7
	11	Management should design the entity's information system and related control activities to achieve	D D, I, OE	1, 3 2	No issues noted Findings 2, 5

Component		Principle	Level of Assessment	Objective	Conclusion
		objectives and respond to risks.			
	12	Management should implement control activities through policies.	D D, I, OE D, I, OE	1 2 3	No issues noted Findings 3, 4, 5 No issues noted
Information and Communication	13	Management should use quality information to achieve the entity's objectives.	D D, I, OE D, I, OE	1 2, 3	No issues noted Findings 3, 4, 5 Findings 6,7
	14	Management should internally communicate the necessary quality information to achieve the entity's objectives.	D D, I, OE D, I, OE	1 2 3	No issues noted Findings 3, 4 Findings 6, 7
	15	Management should externally communicate the necessary quality information to achieve the entity's objectives	D D, I, OE	1 2, 3	No issues noted No issues noted
Monitoring	16	Management should establish and operate monitoring activities to monitor the internal control system and evaluate results.	D D, I, OE D, I, OE	1 2 3	No issues noted Findings 2, 3, 4, 5 Findings 6, 7
	17	Management should remediate identified internal control deficiencies on a timely basis.	D D, I	1 2, 3	No issues noted No issues noted

Government Auditing Standards require that we consider information systems controls "…to obtain sufficient, appropriate evidence to support the audit findings and conclusions."[159] This process further involves determining whether the data that supports the audit objectives is reliable. In addition, Publication GAO-20-283G, *Assessing Data Reliability*, provides guidance for evaluating data using various tests of sufficiency and appropriateness when the data are integral to the audit objective(s).[160] See our assessment in the *Data Reliability* section that follows.

[159] U.S. Government Accountability Office. *Government Auditing Standards*. 2018 Revision. Technical Update April 2021. Paragraph 8.59 through 8.67.
[160] U.S. Government Accountability Office. *Assessing Data Reliability*. December 2019.

Our procedures to assess the design, implementation, and/or operating effectiveness accordingly are discussed in the *Methodology* section that follows. Deficiencies in internal controls which we identified during the conduct of our audit and determined to be significant within the context of our audit objectives are summarized in the conclusion section below and described in detail within the respective audit findings in this report. See the table above for descriptions of each of the principle numbers included in the conclusions below.

Conclusion for Objective 1:

Our assessment of management's internal controls did not find issues associated with the 17 Principles as to design, implementation, and/or operating effectiveness as noted in the table above.

Conclusion for Objective 2:

Our assessment of management's internal controls did not find issues associated with Principles 1 through 3, 5, 6, 8, 9, 15, and 17. We found, however, issues with management's controls regarding Principles 4, 7, 10 through 14, and 16. These areas include issues with 1) ensuring the documentation of inspection work performed and the decisions made regarding bridge inspection results, 2) ensuring only qualified individuals are assigned the team leader position on the bridge inspection team, 3) ensuring inspection reports are accepted/approved timely and by authorized staff, 4) ensuring that the Bridge Management System 2 only lists the names of staff eligible for team leader positions and authorized to accept/approve inspection reports, 5) ensuring the preparation and distribution of internal communications and notifications regarding bridge inspection results, and 6) ensuring policies are in place requiring both consultant inspectors and PennDOT inspectors to perform and document bridge inspections consistently in compliance with the policies. These issues are described in detail in *Findings 2, 3, 4, and 5* of this report.

Conclusion for Objective 3:

Our assessment of management's internal controls did not find issues associated with the Principles 1 through 6, 8, 9, 11, 12, 15, and 17. We found, however, issues with management's controls regarding Principles 7, 10 ,13, 14, and 16. These areas include issues with ensuring receipt and retention of the documentation of inspection work performed, the decisions made regarding bridge inspection results, and documentation of internal communication regarding inspection results. These issues are described in detail in *Findings 6 and 7* of this report.

Methodology

The following procedures were performed to address all three of our audit objectives, unless otherwise noted.

- Obtained an understanding of PennDOT's Central Office, Bridge Inspection Section (BIS) and district offices' overall organizational structure and purpose from our review of PennDOT's organizational chart, information published on its website, responses to our fraud and information technology questions, and from interviews with Central Office and district management. [All Principles]

- Obtained an understanding of the process for inspecting state-owned bridges identified as having an overall condition of Poor from interviews with PennDOT's BIS staff members and district management, and consultant bridge inspectors; observed two on-site bridge inspections conducted by PennDOT personnel and one on-site bridge inspection conducted by a consultant; reviewed National Bridge Inspection Standards (NBIS), American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation, and PennDOT's Bridge Safety Inspection Manual and Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin (listed in the next section); and reviewed inspection reports and other required inspection documentation. [All Principles]

- Reviewed PennDOT's: 1) Green Book Internal Control Self-Assessment for the fiscal year ended June 30, 2021; 2) Bridge Safety Inspection Manual; and 3) Bridge Safety Inspection and Bridge Maintenance Programs Technical Bulletin; interviewed PennDOT's BIS staff members and district management, and consultant bridge inspectors; reviewed documentation that support bridge inspections performed; and reviewed internal control related work performed by the Bureau of Audits, Pennsylvania Office of the Budget, Office of Comptroller Operations on PennDOT bridge inspections conducted January 1, 2020, through October 28, 2022,[161] to gain an understanding of what controls were in place regarding each of the 17 principles within the five components of internal control in order to establish an effective system of internal control. [All Principles]

- Compared PennDOT policies regarding bridge inspection requirements to federal policies (NBIS and AASHTO) to ensure PennDOT policies in place met the minimum federal requirements. [Principles 9, 10, 12, 17]

- Obtained an understanding from PennDOT as to the information technology (IT) systems used to process information specific to bridge inspections and the general IT controls over those systems applicable to our three audit objectives. [Principle 11]

- Performed an Information Technology General Controls (ITGC) assessment of BMS2 that included gaining an understanding about the design of selected ITGC in the areas of: 1) access management; 2) change management; 3) system development life cycle; and 4)

[161] Our review of the work performed by the Bureau of Audits was for understanding purposes only. We did not place reliance on their work performed.

service delivery. Additionally, we reviewed work performed on provisioning and deprovisioning access to the Engineering and Construction Management System (ECMS), which shares a control system with BMS2, during the Audits of the Commonwealth's Annual Comprehensive Financial Report (ACFR) (also known as the "GAAP" audits) for the fiscal years ended June 30, 2021, 2022, and 2023. [Principle 11]

- Reviewed laws, regulations, and PennDOT written policies and procedures to determine legislative and regulatory requirements related to the audit objective, including the following:

  - U.S. Department of Transportation Federal Highway Administration National Bridge Inspection Standards, 2004, 2009 and 2022 editions, unless otherwise noted, as found in the Code of Federal Regulations (23 CFR 650 Subpart C):
    - Section 630.305 Definitions (Audit Objective 1)
    - Section 650.309 Qualifications of Personnel, (b) Team Leader providing in Subsection (5), dated May 6, 2022 (Audit Objectives 1, 2)
    - Section 650.311 Inspection Frequency (a) Routine Inspections, dated December 14, 2004 (Audit Objective 1)
    - Section 650.311 Inspection Interval (g), dated May 6, 2022 (Audit Objective 1)
    - Section 650.311 Inspection Interval (i) Regular Intervals, dated May 6, 2022 (Audit Objective 1)
    - Section 650.313 Inspection procedures (c) dated December 14, 2004 (Audit Objective 2)
    - Section 650.313 Inspection Procedures (h) Follow-up on critical findings, dated December 14, 2004 (Audit Objective 3)
    - Section 650.313 (k) Inspection procedures dated May 6, 2022 (Audit Objective 2)
    - Section 650.313 Inspection Procedures (q) (ii) Critical findings, dated May 6, 2022 (Audit Objective 3)
    - Section 650.315 Inventory (Audit Objectives 1, 2)
  - American Association of State Highway and Transportation Officials (AASHTO) The Manual for Bridge Evaluation, 3rd Edition 2018, Section 4 Inspection Procedures.
  - PennDOT Publication 100A Bureau of Maintenance and Operations, Bridge Management System 2 (BMS2) Coding Manual: 2019 Edition dated September 3, 2019, 3.0 BMS2 Field Groups:
    - IA Inspection Condition, Rating Codes (Audit Objective 3)
    - IM Inspection - Maintenance, IM-05 Priority, Coding (Audit Objective 2)
  - PennDOT Publication 100A Bureau of Maintenance and Operations, Bridge Management System 2 (BMS2) Coding Manual: 2022 Edition dated June 20, 2022, 3.0 BMS2 Field Groups:
    - IA Inspection Condition, Rating Codes (Audit Objective 3)

- IM Inspection - Maintenance, IM-05 Priority-Maintenance Priority: (Audit Objective 2)
  - Coding
  - Priority Code Guidelines: Bridge Signing Examples, 0-1 Deficient Legal Signing

- PennDOT Publication 238 - Bridge Safety Inspection Manual March 2010 2nd Edition:
  - Part IP Chapter 1 – Administrative Considerations:
    - Section 1.5.7.4 Other Bridges (8'-20' Length) (Audit Objective 1)
    - Section 1.10.4.1 Standard Scopes of Work for Safety Inspection Agreements (Audit Objective 2)
  - Part IP Chapter 2 – Inspection Requirements:
    - Section 2.1.3 Qualifications for Safety Inspectors (Audit Objective 2)
    - Section 2.3.2.2 Purpose of Routine Inspections (Audit Objective 1)
    - Section 2.3.5.1 Description of Special Inspections (Audit Objective 1)
    - Section 2.4.5.1 Fatigue and Fracture Inspection Plan (Audit Objectives 1, 2)
    - Section 2.6.4 Scour Plans of Action (Audit Objectives 1, 2)
    - Section 2.8.1 Railroad Notification (Audit Objective 2)
    - Section 2.8.3 Railroad Flagmen or Watchmen Requirements (Audit Objective 2)
    - Section 2.9.1 Reporting Bridge and Structure Emergencies (Audit Objectives 1, 3)
    - Section 2.13.2 Critical and High Priority Maintenance Items (Audit Objective 2)
    - Section 2.14 Plan of Action for Critical and High Priority Maintenance Items
      - ✓ Section 2.14.1 Timeframe for POAs
      - ✓ Figure IP 2.14.3-2 Critical and High Priority Bridge Maintenance Items Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items (Audit Objective 2)
  - Part IP Chapter 6 – Quality Measures for Safety Inspection, Section 6.2.2 QC Review of Field Inspections and Final Reports (Audit Objectives 1, 2)
  - Part IP Chapter 8 - Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files: (Audit Objective 2)
    - Section 8.3.1 Inventory Information and Field Inspection Reports
    - Section 8.3.2 Load Rating Analysis
    - Section 8.3.3 Posting Evaluation
    - Section 8.5.1 Structure Inventory Forms for BMS2 – D-491 Series
    - Section 8.5.2 Field Inspection Forms for Bridges - iForms
  - Appendix IP 01-G General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables Section III Submissions:
    - Part B Personnel Qualifications (Audit Objective 2)

- C. Field Inspection Date (Audit Objective 1)
- Part IP 02-F Action Plan for Emergency Bridge Closure. (Audit Objective 3)
- Appendix IP 01-G, General Scope of Work-Safety Inspection of State and Local Bridges, Scope Deliverables, Section II Emergency Reporting (Audit Objective 3)
- Appendix IP 02-B Instructions for Bridge Problem Reports (BPR) (Audit Objective 3)

- PennDOT Publication 238 - Bridge Safety Inspection 2021 Edition dated April 2021
  - Part IP Chapter 1 – Administrative Considerations, Section 1.5.7.4 Other Bridges (8'-20' Length) (Audit Objective 1)
  - Part IP Chapter 1 – Administrative Considerations, Section 1.10.4.1 Standard Scopes of Work for Safety Inspection Agreements (Audit Objective 2)
  - Part IP Chapter 2 – Inspection Requirements:
    - Section 2.1.3.2 Bridge/Culvert Safety Inspectors (Audit Objective 2)
    - Section 2.3.2.2 Purpose of Routine Inspections (Audit Objective 1)
    - Section 2.3.5.1 Description of Other Special (Interim) Inspections (Audit Objective 1)
    - Section 2.3.6.1 Responsibility for Compliance (Audit Objective 1)
    - Section 2.4.5.1 Fatigue and Fracture Inspection Plan (Audit Objectives 1, 2)
    - Section 2.6.4 Scour Plans of Action (Audit Objectives 1, 2)
    - Section 2.8.1 Railroad Notification (Audit Objective 2)
    - Section 2.8.3 Railroad Flagmen or Watchmen Requirements (Audit Objective 2)
    - Section 2.9.1 Reporting Bridge and Structure Emergencies (Audit Objectives 1, 3)
    - Section 2.13.2 Critical and High Priority Maintenance Items (Audit Objective 2)
    - Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings: (Audit Objectives 1, 2)
      - ✓ Section 2.14.1 Timeframe for POAs (Audit Objectives 1, 2, 3)
      - ✓ Figure IP 2.14.3-2 Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items (Audit Objective 2)
  - Part IP Chapter 4 – Bridge Size and Weight Restrictions, Section 4.6.4 Implementation of Posting (Audit Objective 3)
  - Part IP Chapter 6 – Quality Measures for Safety Inspection, Section 6.2.2 QC Review of Field Inspections and Final Reports (Audit Objectives 1, 2)
  - Part IP Chapter 8 Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files. (Audit Objective 2)
    - Section 8.3.1 Inventory Information and Field Inspection Reports

- Section 8.3.2 Load Rating Analysis
- Section 8.3.3 Posting Evaluation
- Section 8.5.1 Structure Inventory Forms for BMS2 – D-491 Series
- Section 8.5.2 Field Inspection Forms for Bridges - iForms

- Part IP 02-F Action Plan for Emergency Bridge Closures (Audit Objective 3)
- Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables:
  - Section II Emergency Reporting (Audit Objective 3)
  - Section III Submissions
    - ✓ Part B Personnel Qualifications (Audit Objective 2)
    - ✓ C. Field Inspection Data (Audit Objective 1)
- Appendix IP 02-B Instructions for Bridge Problem Reports (BPR) (Audit Objective 3)

➢ PennDOT Publication 238 - Bridge Safety Inspection 2022 Edition dated September 2022

- Part IP Chapter 1 – Administrative Considerations:
  - Section 1.5.7.4 Other Bridges (8'-20' Length) (Audit Objective 1)
  - Section 1.10.4.1 Standard Scopes of Work for Safety Inspection Agreements (Audit Objective 2)
- Part IP Chapter 2 – Inspection Requirements:
  - Section 2.1.3.2, Bridge/Culvert Safety Inspectors (Audit Objective 2)
  - Section 2.3.2.2 Purpose of Routine Inspections (Audit Objective 1)
  - Section 2.3.5.1 Purpose of Other Special (Interim) Inspections (Audit Objective 1)
  - Section 2.3.6.1 Responsibility for Compliance (Audit Objective 1)
  - Section 2.4.5.1 Fatigue and Fracture Inspection Plan (Audit Objectives 1, 2)
  - Section 2.6.4 Scour Plans of Action (Audit Objectives 1, 2)
  - Section 2.8.1 Railroad Notification (Audit Objective 2)
  - Section 2.8.3 Railroad Flagmen or Watchmen Requirements (Audit Objective 2)
  - Section 2.9.1 Reporting Bridge and Structure Emergencies (Audit Objectives 1, 3)
  - Section 2.13.2 Critical and High Priority Maintenance Items (Audit Objective 2)
  - Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings (Audit Objectives 1, 2)
    - ✓ Section 2.14.1 Timeframe for POAs
    - ✓ Figure IP 2.14.3-2 Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items (Audit Objective 2)

- Part IP Chapter 6 – Quality Measures for Safety Inspection, Section 6.2.2 QC Review of Field Inspections and Final Reports (Audit Objectives 1, 2)
- Part IP Chapter 8 Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files. (Audit Objective 2)
  - Section 8.3.1 Inventory Information and Field Inspection Reports
  - Section 8.3.2 Load Rating Analysis
  - Section 8.3.3 Posting Evaluation
  - Section 8.5.1 Structure Inventory Forms for BMS2 – D-491 Series
  - Section 8.5.2 Field Inspection Forms for Bridges - iForms
- Part IP 02-F Action Plan for Emergency Bridge Closure (Audit Objective 3)
- Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables:
  - Section II Emergency Reporting (Audit Objective 3)
  - Section III Submissions:
    - ✓ Part B Personnel Qualifications (Audit Objective 2)
    - ✓ C. Field Inspection Data (Audit Objective 1)

- PennDOT Publication 238 - Bridge Safety Inspection 2022 Edition dated December 2022:
  - Part IP, Chapter 1 – Administrative Considerations:
    - Section 1.2 Scope of this Manual (Audit Objectives 1, 2)
    - Section 1.5.7.4 Other Bridges (8'-20' Length) (Audit Objective 1)
    - Section 1.10.4.1 Standard Scopes of Work for Safety Inspection Agreements (Audit Objective 2)
  - Part IP Chapter 2 – Inspection Requirements:
    - Section 2.1.3.2 Bridge/Culvert Safety Inspectors (Audit Objective 2)
    - Section 2.3 General Types of Bridge Safety Inspections (Audit Objective 1)
    - Section 2.3.2.2 Purpose of Routine Inspections (Audit Objective 1)
    - Section 2.3.6.1 Responsibility for Compliance (Audit Objective 1)
    - Section 2.4.1 General (Audit Objective 1)
    - Section 2.4.5.1 Fatigue and Fracture Plan (Audit Objectives 1, 2)
    - Section 2.6.4 Scour Plans of Action (Audit Objectives 1, 2)
    - Section 2.8.1 Railroad Notification (Audit Objective 2)
    - Section 2.8.3 Railroad Flagmen or Watchmen Requirements (Audit Objective 2)
    - Section 2.9.1 Reporting Bridge and Structure Emergencies (Audit Objectives 1, 2)
    - Section 2.13.2 Critical and High Priority Maintenance Items (Audit Objective 2)
    - Section 2.14 Plan of Action for Critical and High Priority Maintenance Items, Bridges in Critical Condition and Tunnels with Critical Findings (Audit Objectives 1, 2)
      - ✓ Section 2.14.1 Timeframe for POAs

- ✓ Figure IP 2.14.3-2 Plan of Action Flow Chart – Steps, Step 60 Develop the POA for Critical and High Priority Items (Audit Objective 2)
  - Part IP Chapter 6 – Quality Measures for Safety Inspection, Section 6.2.2 QC Review of Field Inspections and Final Reports (Audit Objectives 1, 2)
  - Part IP Chapter 8 - Inspection Records and Files, Section 8.1 Purpose of Inspection Records and Files.
    - Section 8.3.1 Inventory Information and Field Inspection Reports (Audit Objective 2)
    - Section 8.3.2 Load Rating Analysis (Audit Objective 2)
    - Section 8.3.3 Posting Evaluation (Audit Objective 2)
    - Section 8.5.1 Structure Inventory Forms for BMS2 – D-491 Series (Audit Objective 2)
    - Section 8.5.2 Field Inspection Forms for Bridges – iForms (Audit Objectives 1, 2)
  - Part IP Chapter 10 - Hauling Permits and APRAS, Section 10.1 General (Audit Objective 2)
  - Part IP 02-F Action Plan for Emergency Bridge Closure (Audit Objective 3)
  - Appendix IP 01-F General Scope of Work – Safety Inspection of State and Local Bridges, Scope Deliverables:
    - Section II Emergency Reporting (Audit Objective 3)
    - Section III Submissions:
      - ✓ Part B Personnel Qualifications (Audit Objective 2)
      - ✓ C. Field Inspection Data (Audit Objective 1)
- PennDOT Bridge Safety Inspection and Bridge Maintenance Programs' Technical Bulletin issued November 14, 2022. (Audit Objectives 1, 2)

- Obtained information for the background of the report regarding PennDOT Central Office and districts including:
  - The dollar value of projects related to the rehabilitation and replacement of state-owned bridges with contractors selected for the construction phase during the fiscal years ended June 30, 2021, 2022, and 2023.
  - The minimum qualifications established by NBIS to be a certified bridge inspector and a team leader.
  - The number of PennDOT district bridge inspection filled and vacant positions as of June 30, 2021, 2022, and 2023.
  - The number of state-owned bridge inspections conducted by PennDOT staff and consultants during the fiscal years ended June 30, 2021, 2022, and 2023.
  - Descriptions of overall condition ratings and condition rating numbers as established by NBIS.
  - The Pennsylvania counties included in each of the 11 PennDOT districts.
  - The number of bridges, by district, with an overall condition rating of Poor as of the quarters ended December 2020, 2021, 2022, and 2023.

The following procedures were performed to address Audit Objective 2, unless otherwise noted. Items selected for review within this audit were based on auditor's professional judgment and not through statistical selection. The results of our review, therefore, cannot be projected to, and are not representative of, the corresponding populations.

- Reviewed National Bridge Inspection Program compliance reviews performed on PennDOT by the U.S. Department of Transportation Federal Highway Administration for the performance years 2018 through 2022 to determine deficiencies found, recommendations made, and improvement plans put into place. [Principles 6, 7]

- Reviewed each PennDOT district's 2020 and 2021 Bridge Inspection Quality Assurance Summary Report, completed by consultants, to determine if each district is operating in compliance with NBIS and if recommendations were made. [Principles 6, 7]

- Obtained from District management a list from BMS2 of all state-owned bridges (including their overall condition rating) within the 11 districts in the Commonwealth as of the quarter ended December 31, 2022. We then isolated from the list, the 2,362 bridges with an Overall Condition Rating of Poor. Due to differences in the bridge inspection review process between the 11 districts, we narrowed our selection process by judgmentally selecting 4 of the 11 districts (Districts 4, 6, 8, and 10). These four districts were selected to ensure coverage of the entire state (West, Central and East); to include rural, suburban, and urban areas; as well as bridges that are part of the public-private partnership initiative (District 10), and with consideration given to the percentages of Poor bridges in each district. The four districts had a total of 1,224 Poor bridges. We judgmentally selected 43 of the 1,224 bridges to perform our audit procedures. Our selection of 43 bridges included 26 of 1,176 bridges with a condition rating number of 3 or 4 and 17 of 48 bridges with a condition rating number of 0, 1, or 2 (additional review performed on these 17 bridges is described in the Audit Objective 3 section). Bridges were selected with consideration given to the percentage of those bridges within each of the four districts. Additional consideration was given to ensure audit coverage of bridges of varying lengths, the type of bridge, bridges in close proximity to a railroad, and bridges that were either open, closed, or posted for weight limits. The 43 selected bridges included 183 inspections completed between July 1, 2020, and May 10, 2023, of which 103 inspections were completed by consultants and 80 inspections were completed by PennDOT staff.

- Obtained from PennDOT management the following documents from BMS2 and iForms to determine if the bridge inspections were conducted according to applicable federal and state policy and documentation was present to support the inspections conducted: [Principles 7, 10 through 16]
    - Inspection reports which include a title page, maps, D-491 Inventory forms, load rating summary and posting evaluations, recommendations, comparison of current findings with previous inspection findings, Form A, Form M, sketches and/or

photographs, inspection findings, and a general description of the condition of the structure.
  - Priority maintenance item notifications related to critical (priority 0) and high (priority 1) priority maintenance items.
  - Proposed Maintenance screens.
  - Plans of Action (POA) related to critical (priority 0) and high (priority 1) priority maintenance items which threaten either the structural integrity of the bridge, other structures, or public safety.
  - Scour POA for each NBI scour critical bridge over 20 feet, each state-owned bridge 8 feet to 20 feet found to be scour critical and bridges that were not scour critical but required a Scour POA to protect or monitor foundations.
  - Fatigue and Fracture Plans associated with routine inspections on bridges found to be fracture critical.
  - Inspection Report Quality Control Verification Checklists.
  - Inspection report approval date and the name of the PennDOT staff member that approved the inspection report to determine if inspection reports were approved timely and by an authorized individual.

- Obtained from PennDOT management the following emails and documents to determine if the bridge inspections were conducted according to applicable federal and state policy and documentation was present to support the inspections conducted: [Principles 7, 10 through 16]
  - Written notifications to District Bridge Engineers (if not included as part of the bridge inspection reports) from bridge inspection teams to determine if serious bridge conditions discovered during bridge inspections were reported and if reported in a timely manner.
  - Emails from bridge inspection consultants to PennDOT management regarding bridge inspection results and recommendations.

- Obtained corroborative evidence from consultant bridge inspectors in the form of hand-written inspection notes to confirm that data collected on-site agrees with inspection data included in the accepted inspection reports. [Principle 11]

- Reviewed documentation including Statement of Interest forms that lists qualifications of consultant inspectors as well as copies of engineering degrees, licenses, resumes, and training records to determine if PennDOT and consultant inspectors that were assigned the responsibility of team leader on the inspection team met the minimum qualifications according to federal and state requirements. [Principles 13, 16]

- Obtained and reviewed communications between PennDOT management and the Commonwealth's Office of Administration (OA) regarding the improper classification of Team Leaders. [Principle 4]

- Obtained and reviewed BMS2 system data pertaining to the acceptance dates of the inspection reports for the 217 bridge inspections performed between the period July 1, 2020, through October 6, 2023, on the 43 bridges selected for review to determine if bridge inspection reports were reviewed and accepted by authorized PennDOT management and within the required 90 days. [Principles 10, 11, 16]

- Obtained from PennDOT's website information regarding bridge inspection terminology and scour critical bridges.

The following procedures were performed to address Audit Objective 3. Items selected for review within this audit were based on auditor's professional judgment and not through statistical selection. The results of our review, therefore, cannot be projected to, and are not representative of, the corresponding populations.

- For the 82 bridge inspections conducted on the 17 bridges selected for review (see prior details regarding the selection process for the 17 bridges), we obtained from PennDOT management the following correspondence and documents from BMS2 and iForms to determine if the bridge inspections were conducted according to applicable federal and state policy and to determine if documentation was present to support the inspections conducted: [Principles 7, and 10 through 16]
    - Emails and correspondence from PennDOT management to the PennDOT Deputy Secretary for Highway Administration, Central Office management staff, and FHWA Bridge Section staff.
    - Emails from FHWA to PennDOT management regarding the possibility of closing a bridge.
    - Bridge Problem Reports, when applicable, to ensure documents were prepared pursuant to PennDOT policy.
    - Inspection reports and Form M - Maintenance Needs Data and confirmed that bridges with a condition rating number of 0, 1, or 2 had a critical or high priority maintenance item(s) that targeted the cause of the low condition rating.
    - Bridge inspection reports and verified bridges with condition rating numbers of 0 or 1 were closed in accordance with PennDOT policy.
    - Bridge inspection reports and applicable correspondence to determine the timeliness of closing a bridge as the result of a determination made during a bridge inspection.
    - Updates from PennDOT management regarding any changes in the status of the 17 bridges from the quarter ended December 31, 2022, to April 5, 2024.

Data Reliability

Government Auditing Standards requires us to assess the sufficiency and appropriateness of computer-processed information that we used to support our findings, conclusions, and recommendations. The assessment of the sufficiency and appropriateness of computer-processed information includes considerations regarding the completeness and accuracy of the data for the intended purposes.[162]

In addition to the procedures described in the remainder of this section, as part of our overall process in obtaining assurance of the reliability of computer-processed information and data files, we obtained a management representation letter from PennDOT. This letter, signed by PennDOT management, included a confirmation statement indicating that the information provided to us had not been altered and was a complete and accurate duplication of the information from its original source.

For Audit Objectives 2 and 3, regarding state-owned bridges with an overall condition rating of Poor, PennDOT management provided a list from the Bridge Maintenance System 2 (BMS2) of all state-owned bridges as of the quarter ended December 31, 2022. In order to confirm the completeness and accuracy of the list, we performed the following:

- Performed an Information Technology General Controls (ITGC) assessment of BMS2 that included gaining an understanding about the design of selected ITGC in the areas of: 1) access management; 2) change management; 3) system development life cycle; and 4) service delivery. Additionally, we reviewed work performed on provisioning and deprovisioning access to the Engineering and Construction Management System (ECMS), which shares a control system with BMS2, during the Audits of the Commonwealth's Annual Comprehensive Financial Report (ACFR) (also known as the "GAAP" audits) for the fiscal years ended June 30, 2021, 2022, and 2023.
- Reviewed the most recent peer review report for the auditors that perform the audit of the ACFR. Independence and competence statements of the engagement staff are included within the respective GAAP audit working papers.
- Compared the total number of bridges to a data file and record count of PennDOT bridges found on the Federal Highway Administration's (FHWA) website and found insignificant differences. The difference appears to be due to timing differences of report dates.
- Compared the total number of bridges to a bridge listing published on PennDOT's website and again only found insignificant differences that appears to be due to timing differences of report dates.

[162] U.S. Government Accountability Office. *Government Auditing Standards*. 2018 Revision. Technical Update April 2021. Paragraph 8.98.

- Performed a search for key words in the inspection report comments associated with the bridges identified as being in Fair or Good condition in the four districts selected for review (Districts 4, 6, 8, and 10).[163] The key words used in the search were words that might identify a bridge in Poor condition. The review of comments that contained the key words did not identify any bridges that appeared to have been assigned an inappropriate condition rating of Fair or Good.
- Performed tests for accuracy by confirming information in the bridge list, such as location and overall condition rating, for the 43 bridges selected for review to inspection reports and other support documentation maintained in BMS2.
- Obtained copies of hand-written notes from consultants that performed bridge inspections and confirmed inspection results and condition ratings included in the bridge listing.

Based on the results from the above procedures, we found no limitations with using the bridge list from BMS2 for our intended purposes. In accordance with Government Auditing Standards, we concluded the list of state-owned bridges as of the quarter ended December 31, 2022, was sufficiently reliable regarding completeness and accuracy for the purposes of this engagement.

For Audit Objective 2, as noted in Finding 5, PennDOT management provided from BMS2 the inspection report acceptance dates of the 217 bridge inspections performed during the period of July 1, 2020, through October 6, 2023, on the 43 bridges selected for review. We did not perform procedures to validate the completeness of the inspection reports listed; however, to determine the accuracy of the information, we obtained confirmation from the individuals that accepted/approved the inspection reports in BMS2 regarding bridge inspection information for the inspections performed. The report of acceptance dates was determined to be the best data available. As a result, we have deemed the information to be of undetermined reliability. Although this determination may affect the precision of the numbers we present, there is sufficient evidence in total to support our findings, conclusions, and recommendations.

[163] See *Introduction and Background* for information regarding overall condition ratings assigned to bridges based on inspection results.

Appendix B | PennDOT District Filled and Vacant Positions

The following table provides complement information, by District, to support the District complement totals included in the *Introduction and Background* of our report:

PennDOT Bridge Inspection Filled and Vacant Positions by District as of June 30, 2021, 2022 and 2023

	June 30, 2021			June 30, 2022			June 30, 2023		
	Filled	**Vacant**	**Total**	**Filled**	**Vacant**	**Total**	**Filled**	**Vacant**	**Total**
District 1									
DBE[a/]	1	0	1	1	0	1	1	0	1
ADBE[b/]	1	0	1	1	0	1	0	1	1
Team Leader	1	0	1	1	0	1	1	0	1
Bridge Inspector	1	1	2	2	0	2	1	1	2
Other[c/]	3	0	3	3	0	3	3	0	3
Total	7	1	8	8	0	8	6	2	8
District 2									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	3	0	3	3	0	3	3	0	3
Bridge Inspector	3	0	3	3	0	3	3	0	3
Other	6	0	6	6	0	6	6	0	6
Total	14	0	14	14	0	14	14	0	14
District 3									
DBE	1	0	1	1	0	1	1	0	1
ADBE	0	1	1	1	0	1	1	0	1
Team Leader	4	0	4	4	0	4	3	1	4
Bridge Inspector	3	1	4	4	0	4	5	0	5
Other	4	1	5	6	0	6	6	0	6
Total	12	3	15	16	0	16	16	1	17

PennDOT Bridge Inspection Filled and Vacant Positions by District as of June 30, 2021, 2022 and 2023									
	June 30, 2021			June 30, 2022			June 30, 2023		
	Filled	Vacant	Total	Filled	Vacant	Total	Filled	Vacant	Total
District 4									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	0	0	0	0	0	0	0	0	0
Bridge Inspector	2	0	2	1	1	2	1	1	2
Other	5	1	6	6	0	6	7	0	7
Total	9	1	10	9	1	10	10	1	11
District 5									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	0	1	1
Team Leader	0	2	2	0	2	2	0	3	3
Bridge Inspector	1	1	2	3	0	3	3	0	3
Other	6	1	7	6	1	7	6	1	7
Total	9	4	13	11	3	14	10	5	15
District 6									
DBE	1	0	1	1	0	1	1	0	1
ADBE	0	1	1	0	1	1	0	1	1
Team Leader	0	0	0	0	0	0	0	0	0
Bridge Inspector	0	0	0	0	0	0	0	0	0
Other	4	0	4	4	0	4	4	0	4
Total	5	1	6	5	1	6	5	1	6

PennDOT Bridge Inspection Filled and Vacant Positions by District as of June 30, 2021, 2022 and 2023									
	June 30, 2021			June 30, 2022			June 30, 2023		
	Filled	Vacant	Total	Filled	Vacant	Total	Filled	Vacant	Total
District 8									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	4	0	4	4	0	4	4	0	4
Bridge Inspector	4	2	6	4	2	6	4	2	6
Other	4	1	5	5	0	5	5	0	5
Total	14	3	17	15	2	17	15	2	17
District 9									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	2	0	2	2	0	2	2	0	2
Bridge Inspector	2	0	2	2	0	2	2	0	2
Other	3	0	3	3	0	3	4	0	4
Total	9	0	9	9	0	9	10	0	10
District 10									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	4	0	4	4	0	4	3	1	4
Bridge Inspector	3	1	4	3	1	4	3	1	4
Other	4	0	4	4	0	4	4	0	4
Total	13	1	14	13	1	14	12	2	14

PennDOT Bridge Inspection Filled and Vacant Positions by District as of June 30, 2021, 2022 and 2023									
	June 30, 2021			June 30, 2022			June 30, 2023		
	Filled	Vacant	Total	Filled	Vacant	Total	Filled	Vacant	Total
District 11									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	3	0	3	3	0	3	3	0	3
Bridge Inspector	3	0	3	3	0	3	3	0	3
Other	4	0	4	4	0	4	4	0	4
Total	12	0	12	12	0	12	12	0	12
District 12									
DBE	1	0	1	1	0	1	1	0	1
ADBE	1	0	1	1	0	1	1	0	1
Team Leader	4	0	4	4	0	4	3	1	4
Bridge Inspector	4	0	4	4	0	4	4	0	4
Other	3	3	6	6	0	6	6	0	6
Total	13	3	16	16	0	16	15	1	16

[a/] - District Bridge Engineer
[b/] - Assistant District Bridge Engineer
[c/] - Includes positions such as PA Bridge Management System 2 Coordinator, other types of Coordinators, and Civil Engineers

Source: Produced by staff of the Department of the Auditor General based on information provided by PennDOT management. This information is being presented for background purposes only.

Appendix C 43 PennDOT Bridges Selected for Evaluation of PennDOT's Inspection Process

The below table provides information regarding the 43 state-owned bridges selected for review as well as each bridges' overall condition rating as of the quarters ended December 31, 2022, and December 31, 2023. See *Overall Audit Procedures and Bridge Selection Methodology* and *Appendix A Objectives, Scope, Methodology and Data Reliability* for further detail regarding the selection process of the 43 bridges.

Information for the selected bridges with an overall rating of Poor is being provided as of the quarter ended December 31, 2022, the date of the PennDOT inventory report used to make our bridge selections. For informational purposes only, we also provide unaudited condition ratings for the quarter that ended December 31, 2023, to provide a general status update.

43 PennDOT Bridges Selected for Evaluation of PennDOT's Inspection Process						
					Overall Bridge Condition Rating[a/] as of the Quarter Ended	
Bridge Key	**County**	**Location/Structure Name**	**Feature Carried**	**Feature Intersected**	**December 31, 2022**	**December 31, 2023**
District 4						
20501	Lackawanna	ROARING BROOK .3M E TR435	SR 0084 I-84 WB	LACK CO RR & ROARING BR	Poor	N/A[b/]
20562	Lackawanna	ROAR BR TP 2.5M N SR 2010	SR 0307 TR 307	WILLIAMS BRIDGE RESERVOI	Poor	Poor
23633	Luzerne	PLYMOUTH TWP .2M S SR4001	SR 0029 TR 29	SLUICEWAY WATER COMPANY	Poor	Poor
23967	Luzerne	WILKES BARRE OVER SUSQ RV	SR 1009 MARKET ST	SUSQUEHANNA RIVER	Poor	Poor
24026	Luzerne	KINGSTON TP 1 M E SR 1029	SR 1044	ABRAHAMS CREEK	Poor	Poor
24077	Luzerne	WILKES BARRE JCT SR 2012	SR 2007 SOUTH ST	RR AND LOCAL STREETS	Poor	Poor

43 PennDOT Bridges Selected for Evaluation of PennDOT's Inspection Process						
					Overall Bridge Condition Rating[a/] as of the Quarter Ended	
Bridge Key	**County**	**Location/Structure Name**	**Feature Carried**	**Feature Intersected**	**December 31, 2022**	**December 31, 2023**
29810	Pike	MATAMORAS BORO @ JCT 1017	SR 0006 TR 6	DELAWARE RIVER	Poor	Poor
32280	Susquehanna	LANESBORO BO 193'S SR1009	SR 0171 TR 171	CANAWACTA CREEK	Poor	Poor
32334	Susquehanna	HERRICK TWP .4M W SR 2042	SR 0374 TR 374	LOWE LAKE OUTLET	Poor	Poor
32408	Susquehanna	LANSBORO BO .6M E SR 1015	SR 1009	STARRUCCA CREEK	Poor	N/A[c/]
32483	Susquehanna	BRDGEWATR TP 1M S SR 2059	SR 2011	TRIB MESHOPPEN CREEK	Poor	Poor
35479	Wayne	MANCHSTR TP 3.1M N SR1018	SR 0191 TR 191	SALT RIVER BROOK	Poor	Poor
35588	Wayne	DAMASCUS TP SKINNERS FLLS	SR 1002	DELAWARE RIVER	Poor	Poor
37162	Wyoming	MESHOPPEN BO 181' N TR 6	SR 0267 TR 267	MESHOPPEN CREEK	Poor	Poor
37279	Wyoming	NOXEN TWP 2.2 M W TR 29	SR 3002	STONE RUN	Poor	Poor
District 6						
6957	Bucks	PENNS PARK 31A05/3037-A6	SECOND STREET PIKE	BRANCH MILL CREEK	Poor	Good
7127	Bucks	2MI.POINT PLEASANT 17E04	STUMP ROAD	IRISH RUN	Poor	Poor
7348	Bucks	BUCKMANVILLE 25E11/2925F10	LURGAN ROAD	BRANCH PIDCOCK CREEK	Poor	Poor
10045	Chester	AT TOWNSHIP LINE 37H1	DOE RUN ROAD	BUCK RUN	Poor	Poor

43 PennDOT Bridges Selected for Evaluation of PennDOT's Inspection Process						
					Overall Bridge Condition Rating[a/] as of the Quarter Ended	
Bridge Key	**County**	**Location/Structure Name**	**Feature Carried**	**Feature Intersected**	**December 31, 2022**	**December 31, 2023**
10604	Chester	NEAR LR-612 19G6/3470G3	GUTHRIESVILLE ROAD	CULBERTSON RUN	Poor	Fair
14941	Delaware	S2MI.S.CHADDS FORD 40B04 (3803-E4)	SOUTH CREEK ROAD	BRANDYWINE CR,OCTORARO R	Poor	Poor
15287	Delaware	4MILES NORTH US-13 35C12 (3697J10)	SELLERS AVENUE	AMTRAK MAIN LINE	Poor	Poor
27212	Montgomery	EAST OF PENNA 309 3369-H02	CHURCH ROAD	BRANCH WISSAHICKON CREEK	Poor	Fair
27556	Montgomery	1 MI. S. BUCKS CO LN. 2917J07	SWAMP CREEK RD	UNAMI CREEK	Poor	Fair
28226	Montgomery	Markley/Elm Streets	MARKLEY/ELM STREET	STONY CREEK	Poor	Poor
38326	Philadelphia	WAYNE JUNCTION VIA.17F13/3480-D8	ROOSEVELT BLVD EXT	ROBERTS AVE;SEPTA;CSX	Poor	Poor
38616	Philadelphia	NR.FRANKFORD CREEK 29H04/3591-G1	INTERSTATE 95	EARTH FILL & SEWER ACCES	Poor	Poor
38677	Philadelphia	CENTER CITY 28F11	BROAD STREET	READING RAILROAD;ROAD	Poor	Good
District 8						
201	Adams	2.75 MI.N. OF HUNTERSTOWN	SR 1017	CONEWAGO CREEK	Poor	Poor
14176	Dauphin	FARM SHOW BUILDING	US 22; SR 0022	PEDESTRIAN UNDERPASS	Poor	Poor
14375	Dauphin	2.5 MI NW OF DAUPHIN	PA 325; SR 0325	TRIB TO CLARKS CREEK	Poor	Fair

43 PennDOT Bridges Selected for Evaluation of PennDOT's Inspection Process						
					Overall Bridge Condition Rating[a/] as of the Quarter Ended	
Bridge Key	**County**	**Location/Structure Name**	**Feature Carried**	**Feature Intersected**	**December 31, 2022**	**December 31, 2023**
14440	Dauphin	3 MI. E. GRATZ	SR 1017 HONEYMOON	TRIB TO PINE CREEK	Poor	Poor
14529	Dauphin	Market Street Bridge, West Spans	SR 3012,WEST SPANS	SUSQUEHANNA RIVER (WEST)	Poor	Poor
17293	Franklin	SHIPPENSBURG	US 11; SR 0011	Norfolk Southern RR	Poor	Poor
21414	Lancaster	1.5 MI.E. OF BRUNNERVILLE	SR 1024 Lincoln rd	MIDDLE CREEK	Poor	Poor
21565	Lancaster	1.5 MILE E.OF MARTINSVILL	SR 2024	TRIB.LITTLE BEAVER CREEK	Poor	Fair
21753	Lancaster	2 MI.S. OF MASTERSONVILLE	SR 4003 Meadow vw	BRUBAKERS RUN	Poor	Fair
37714	York	LUCKY	SR 2018	OTTER CREEK	Poor	Poor
District 10						
7939	Butler	SHAWOOD PIPE	SR 0422 EB&WB	TRIB TO MUDDY CREEK	Poor	Poor
8116	Butler	CHRISTLEYS MILLS	SR4004	WOLF CREEK	Poor	Poor
10945	Clarion	CANOE CREEK WB	SR 0080 WB	SR 4005 & CANOE CREEK	Poor	Poor
19081	Indiana	First Sergeant Alexander Kelly Memorial Bridge	SR0286	KISKIMINETAS RIVER	Poor	Poor
19565	Jefferson	NORTH FORK EB	SR0080 EB	NORTH FORK & WAT PLNT RD	Poor	Poor

[a/] - As described in the *Introduction and Background*, bridges are assigned an overall condition rating of either Good, Fair, or Poor, depending upon the results of inspections performed. All 43 bridges selected for review had an overall condition rating of Poor as of the quarter ended December 31, 2022.
[b/] - According to PennDOT management, bridge was demolished in December 2023.
[c/] - According to PennDOT management, bridge was demolished in November 2023.

Source: Produced by staff of the Department of the Auditor General based on Bridge Management System 2 quarterly bridge reports and additional information provided by PennDOT management. This information is being presented for background purposes only.

Appendix D | Distribution List

This report was distributed to the following individuals:

The Honorable Josh Shapiro
Governor

The Honorable Michael Carroll
Secretary of Transportation
Pennsylvania Department of Transportation

Mr. Richard W. Runyen
Director, Bureau of Bridges
Pennsylvania Department of Transportation

Mr. Christopher Thompson
Bridge Management System Manager
Pennsylvania Department of Transportation

The Honorable Scott Martin
Senate Majority Appropriations Chairman
Pennsylvania Senate

The Honorable Vincent Hughes
Senate Minority Appropriations Chairman
Pennsylvania Senate

The Honorable Jordan Harris
House Majority Appropriations Chairman
Pennsylvania House of Representatives

The Honorable Seth Grove
House Minority Appropriations Chairman
Pennsylvania House of Representatives

The Honorable Kim Ward
President Pro-Tempore
Pennsylvania Senate

The Honorable Joanna McClinton
Speaker of the House
Pennsylvania House of Representatives

The Honorable Matt Bradford
House Majority Leader
Pennsylvania House of Representatives

The Honorable Bryan Cutler
House Minority Leader
Pennsylvania House of Representatives

The Honorable Joe Pittman
Senate Majority Leader
Pennsylvania Senate

The Honorable Jay Costa
Senate Minority Leader
Pennsylvania Senate

The Honorable Ed Neilson
House Transportation Majority Chair
Pennsylvania House of Representatives

The Honorable Kerry A. Benninghoff
House Transportation Minority Chair
Pennsylvania House of Representatives

The Honorable Wayne Langerholc
Senate Transportation Majority Chair
Pennsylvania Senate

The Honorable Marty Flynn
Senate Transportation Minority Chair
Pennsylvania Senate

The Honorable Uri Monson
Secretary of the Budget
Office of the Budget

A Performance Audit

Pennsylvania Department of Transportation
Bridge Inspections

The Honorable Stacy Garrity
State Treasurer
Pennsylvania Treasury Department

The Honorable Michelle A. Henry
Attorney General
Office of the Attorney General

The Honorable Neil Weaver
Secretary of Administration
Office of Administration

Mr. William Canfield
Director
Bureau of Audits
Office of Comptroller Operations

Ms. Mary Spila
Collections/Cataloging
State Library of Pennsylvania

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