U.S. Department of Transportation
Federal Highway Administration

National Bridge Inspection Program

Review Year PY21

FSM Summary Sheet

State Name: Pennsylvania

Metric Number	Prior Year	Assess. Level	Dec 31 Compl.	Mar 31 Compl.
01 - Bridge Inspection Organization	C	Int	C	C
02 - Qualifications of Personnel - Program Manager	C	Min	C	C
03 - Qualifications of Personnel - Team Leader(s)	C	Min	C	C
04 - Qualifications of Personnel - Load Rating Engineer	C	Min	C	C
05 - Qualifications of Personnel - UW Bridge Inspection Di	C	Min	C	C
06 - Inspection Frequency - Routine - Lower Risk Bridges	C	Min	C	C
07 - Inspection Frequency - Routine - Higher Risk Bridges	C	Min	C	C
08 - Inspection Frequency - Underwater - Lower Risk Bridg	C	Min	C	C
09 - Inspection Frequency - Underwater - Higher Risk Brid	C	Min	C	C
10 - Inspection Frequency - Fracture Critical Member	C	Min	C	C
11 - Inspection Frequency - Frequency Criteria	C	Min	C	C
12 - Inspection Procedures - Quality Inspections	SC	Min	SC	SC
13 - Inspection Procedures - Load Rating	C	Min	C	C
14 - Inspection Procedures - Post or Restrict	C	Min	C	C
15 - Inspection Procedures - Bridge Files	C	Min	C	C
16 - Inspection Procedures - Fracture Critical Members	SC	Min	SC	SC
17 - Inspection Procedures - Underwater	C	Min	C	C
18 - Inspection Procedures - Scour Critical Bridges	SC	Min	SC	SC
19 - Inspection Procedures - Complex Bridges	C	Min	C	C
20 - Inspection Procedures - QC/QA	C	Int	C	C
21 - Inspection Procedures - Critical Findings	C	Min	C	C
22 - Inventory - Prepare and Maintain	C	Min	C	C
23 - Inventory - Timely Updating of Data	SC	Min	SC	SC

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Int
Metric Name	01 - Bridge Inspection Organization			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the Intermediate-level review of Metric 1, the Divisionverified thatresponsibility for the NBIS was assigned to a PM, and thatdocumented organizational roles, responsibilities, and delegation procedures existed as applicable. The effectiveness of delegated functions, was assessed through interview of PM, and some individuals with delegated functions, as well asDivision bridge staff's knowledge and awareness of the bridge inspection program in the State of Pennsylvania, and the results of the current assessment of the other NBIP Metrics

Observations

OBSERVATIONS:

ORGANIZATION IN PLACE

• PennDOT is a geographically decentralized organization, with most the design, construction, and inspection level work done in the 11 geographic districts. PennDOT Central Office plays a more programmatic role. The state program manager, Richard Runyen, P.E., is based out of Central Office.

• Central Office staff includes Richard Runyen, P.E. Program Manager, Mike Winslow, P.E., the BMS2 manager; Scott Snyder, P.E., the bridge maintenance manager

• Central Office includes other staff under the managers as detailed in the attached Org chart for the bridge inspection section.

• The District organizational structures vary somewhat, but all have a District Executive-->Assistant DE for Design --> District Bridge Engineer. Under the District Bridge Engineer all have an Assistant Bridge Engineer for Design and an Assistant Bridge Engineer for Inspection. Ultimately the District Bridge Engineer and staff are responsible for carrying out the inspection, load rating, and posting program for bridges, local or state, located within that District.

PennDOT additionally utilizes several consultant agreements under direct supervision of Program Manager for QC/QA as well as a variety of policy updates.

ORGANIZATIONAL ROLES AND RESPONSIBILITIES

• In the case of bridge inspection, most the inspection work is coordinated and performed at the District-level for state owned bridges and many locals as well. The Districts are responsible for review and acceptance of state and local inspections, and execution of inspection QC procedures found in Publication 238. Further information about QC program is detailed under Metric 20.

• Central Office performs an independent QA program with policies and procedures detailed in the PennDOT Pub 240 Bridge Safety Inspection Quality Assurance Manual. QA program framework includes blind re-inspection of a sample of bridges per District annually and includes structures owned by other Agencies. Further information about the QA program is detailed under Metric 20.

• The roles and responsibilities at each level are detailed in the PennDOT Pub 238- Bridge Safety Inspection Manual IP 1.7. The bridge owner has the overall responsibility for inspection and safety of the bridge. The Department has a clearly defined safety

responsibility under federal regulations and state statute for the safety of bridges on public roadways as well as safety of non-NBI type bridges and other structures over State Routes. The Department has legal authority to inspect any bridge to ensure NBIS
compliance. The Districts have responsibility for the locals within their geographic areas.
• Department has the authority to post any bridge for safety reasons under state law.
• PennDOT uses an electronic Bridge Management System (BMS2) to prepare and maintain the bridge inventory. Policy and procedures regarding the bridge inventory data are defined in the PennDOT Pub 100A BMS2 Coding Manual. The BMS2 system also stores and maintains bridge inspection reports, scour evaluations, load ratings, and is a core element of individual bridge files.
Link to Current Publications from PennDOT:PennDOT Publications
DELEGATED RESPONSIBILITY:
• Functions delegated to other agencies, consultants, and other bureaus within the PennDOT are clearly defined in Publication 238. Authority to take require actions is included in that delegation but the policy also specifically reserves the right for PennDOT to take immediate action if the delegated agency or bureau is unable or unwilling to insure NBIS compliance.
• Publication 238 1.7 lists responsibilities, by owner, that may be carried out by that owner.
• Local government owners are responsible for performance of and management of safety inspections under the NBIS. They may contract their own inspection or utilize in-house inspectors, or they may utilize Department consultant agreements.
• The Pennsylvania Turnpike is similarly responsible for inventory and inspection, and for reporting inspections to the Department BMS2 for submission to FHWA. Turnpike follows Department guidance and requirements, and Department provides technical assistance as necessary.
• Other state agencies have similar responsibilities to the PTC.
• Federal Lands bridges are the responsibility of the Federal Agency.
• Other owners, such as railroads, are more complicated situations. Typically, the Pennsylvania Public Utility Commission has some authority over railroad bridges. The PUC may assign maintenance/inspection responsibility to a party in which case the PUC order is upheld.
• Department has the authority to work with the owner to cause inspection or to potentially inspect a railroad.
INTERVIEWS
Three interviews were conducted to document the function of the delegation of authority within the State. The following entities and agencies were interviewed
• PennDOT Program Manager (BOMO) – Richard Runyen
• District 9 District Bridge Engineer – Ralph DeStefano
• Pennsylvania Turnpike Commission (PTC) – James Stump
The interview questions, discussion notes, and BOMO Org Chart are attached to PY21 Metric 1
In all instances the delegation of authority was found to be clearly documented and communicated through formal publications, clearly understood by the delegates, and effective in practice. Though lacking formal written agreement, the working relationships between independent agencies with delegated responsibility for NBIS such as the Pennsylvania Turnpike and PennDOT are excellent; and PennDOT publications are used exclusively by all such agencies to execute delegated responsibilities.

Findings

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Final Summary of Metric

State Pennsylvania

Review Year PY21

None

Conclusions

Pennsylvania is compliant with Metric 1, because the bridge inspection organization is in place and effective as indicated by the assessment of the other 22 metrics, the organizational roles and responsibilities are clearly defined and documented, delegated functions are clearly defined with the necessary authority established, and overall responsibility for the NBIS is assigned to a PM.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

U.S. Department of Transportation
Federal Highway Administration

National Bridge Inspection Program

Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	02 - Qualifications of Personnel - Program Manager	Prior Year Compliance	C		

Metric Summary - Complete by December 31st

Extent of Review

For the Minimum-level review of Metric 2, the Division assessed based on previous review results and the Division bridge staff's knowledge and awareness of the Program Manager's (PM) qualifications.

Observations

The State's Program Manager is Richard Runyen, PE, who has held the position since April 2019. This Metric was previously assessed as Compliant following an Intermediate-level in PY20. Based on Division knowledge and awareness, there have been no changes to Mr. Runyen's qualifications during PY21.

PREVIOUS REVIEW RESULTS (PY20):

QUALIFICATIONS:

• The Division confirmed Richard Runyen's active Pennsylvania PE license status using the Pennsylvania Department of State public online professional license verification tool, as of 12/17/2020. Confirmation that his license is active is included in the metric documentation.

• Richard Runyen, PE has successfully completed the PennDOT FHWA-approved bridge inspection training as documented using the PennDOT training catalog. The PennDOT training catalog documents dates of attendance and pass/fail status for all attendees of the PennDOT bridge inspection comprehensive and refresher trainings. A copy of Richard Runyen's certificate of completion is included in the metric documentation under PY2020 Metric 2.

REFRESHER TRAINING:

The State requirement is to pass the PennDOT refresher trainingbiennially. As shown on the training certificate, Richard Runyen, PE, is current for his refresher training.

INTERVIEW:

In accordance with Metric requirements, a brief interview was conducted with Mr. Runyen. The interview questions were provided by BSE North, and responses are attached in the documents library under PY2020 Metric 2. He indicated a desire for additional training on scour and complex inspection techniques.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 2, because the State's PM has the required qualifications, and the State's PM has completed periodic bridge inspection refresher training according to State policy.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 03 - Qualifications of Personnel - Team Leader(s) | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 3, the Division assessed based on prior review results and on the Division bridge staff's knowledge and awareness of the State's process for monitoring Team Leader qualifications. Additionally, TL qualifications were reviewed under Metric 12 for all field review bridges, contributing to knowledge and awareness under Metric 3.

Observations

REQUIRED QUALIFICATIONS:

• All inspectors (Team Leaders as well as team members) in Pennsylvania are required to complete the FHWA-approved PennDOT bridge inspector training and the PennDOT refresher trainings. Under State policy, the NHI 130055 training and NHI refresher trainings are not suitable substitutes. Individuals who have successfully completed NHI 130055 and present evidence in the form of an official NHI certificate or transcript are able to sit for an abbreviated, 1-week version of the PennDOT bridge inspector training focusing on review and PennDOT specific policy and data item coding.

• The FHWA approval of the PennDOT bridge inspector training as both comprehensive and equivalent to NHI-130055 was provided on December 28, 2006. In further discussions with PennDOT's consultant that delivers the training, the Division has established that the first 2-weeks of the PennDOT training is virtually identical to NHI-130055 aside from some minor changes to item number references in sections 6.3d and 7.1. The third week of the training focuses on PennDOT-specific items and requirements. Successful completion (passing with 70% or greater score) of the course provides a state certification of Certified Bridge Safety Inspector (CBSI).

• For Inspectors who have successfully completed NHI-130055, PennDOT offers a 1-week "Policies and Practices" course that can qualify the individual as a CBSI without needing to sit for the full 3-week course.

• PennDOT maintains a catalog of all inspection training attendees, the dates of attendance, the pass or fail result of their exam, and the dates of all refresher trainings they have ever attended.

• Experience requirements for team leaders are the same as what is specified by NBIS regulation. Experience requirements are not tracked in the PennDOT training catalog and would be either tracked by PennDOT HR when hiring an individual into a Team Leader job classification (ie the NBIS requirements are requirements to be considered for the team leader job) or would be submitted by the consultant as a component of the qualifications based selection process per Publication 93.

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REQUIRED REFRESHER TRAINING:

PennDOT develops refresher trainings every 2 years, and delivers that training throughout the next biennial cycle. All inspectors are required to successfully complete the PennDOT refresher training every 2 years. The completion of the refresher training is tracked in the same PennDOT training catalog as for the comprehensive training.

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Final Summary of Metric

State Pennsylvania

Review Year PY21

See PY21 Metric 2 attachments for the training catalog used in the review

PREVIOUS INT-AL REVIEW RESULTS:
PY20 METRIC 12 REVIEW OF TEAM LEADER QUALIFICATIONS

• For the 19 field review bridges, the FHWA confirmed the qualifications of the TL listed on the inspection report, as documented under Metric 12. All TLs reviewed were qualified, as indicated by the inspection report and PennDOT training catalog, contributing to the knowledge and awareness. Under Metric 12, inspector experience requirements were checked either through PE license verification or estimated based on the date of their completion of the inspection training.

• One of the 19 TL listed on the inspection reports documented under Metric 12 was not listed in the training catalog as current on their refresher training. The PM was notified of the finding, but the PennDOT District in charge of the inspector was able to produce a training certificate showing the inspector was qualified as a TL at the time of the inspection. The District concluded that the consultant in charge of maintaining the training catalog filed the course completion certificate under the wrong inspector name (same first and last, different middle initial).

PREVIOUS REVIEW SUMMARY:

• The Division determined that PennDOT was fully compliant with Metric 3 after an In-Depth review in PY16, and the metric was assessed again at the Intermediate-AL in PY2020.

• Whether the team leader fulfilled the training and refresher training requirements was easily determined utilizing the training catalog. Whether the team leader had the necessary experience was determined either through verification of the status of their PE license, or through interview of the individual when relying on years of inspection experience.

PY21 METRIC 12 REVIEW OF TEAM LEADER QUALIFICATIONS

• For the 19 field review bridges, the FHWA confirmed the qualifications of the TL listed on the inspection report, as documented under Metric 12. All TLs reviewed were qualified, as indicated by the inspection report and PennDOT training catalog, contributing to the knowledge and awareness. Under Metric 12, inspector experience requirements were checked either through PE license verification or estimated based on the date of their completion of the inspection training.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 3, because all TLs have the required qualifications, and all TLs complete bridge inspection refresher training every other year according to state policy.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Recommendations

None

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 04 - Qualifications of Personnel - Load Rating Engineer | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 4, the Division assessed based on previous review results and the Division's knowledge and awareness of the Load Rating Engineer (LRE) qualifications and responsibilities,

Observations

This metric was previously reviewed at the Intermediate assessment level in PY20. Based on knowledge and awareness of the Division, there have been no changes to the qualifications of the State Load Rating Engineer during PY20.

PREVIOUS REVIEW RESULTS (PY20 INTERMEDIATE-LEVEL ASSESSMENT)

OVERALL RESPONSIBILITY FOR LOAD RATING:

• From an overall program and policy perspective, Richard Runyen, P.E., the state's Program Manager, is the LRE for the State of Pennsylvania. Central Office maintains overall responsibility for load rating, including performance but more importantly policy. Central Office also maintains several active data quality initiatives related to load rating data, stemming from FHWA program reviews and metric 13 reviews.

• PennDOT is geographically decentralized, and most load rating performance and quality management functions reside with the District staff. Each District has at least 1 District LRE, who is responsible for state and local owner load ratings in their respective District.

• The Division last assessed Metric 4 at the Intermediate-level in PY19. As a component of that review, the Division did look at each of the PennDOT District LREs' qualifications.

QUALIFICATION VERIFICATION:

• As also documented under Metric 2, the Division verified Richard Runyen's current PA PE licensure status as of Decmber 2020. See attached printout from the Pennsylvania's Professional Licensure Verification System in Metric 2

• An interview outlining the qualifications of Richard Runyen PE is also attached in Metric 2 of PY20

• Supplemental question added to this interview for Metric 4: Describe the responsibilities of the Load Rating Engineer position.

- Load rating engineer is responsible for Publication 238 policy and procedures related to load ratings. Much of the activities of the position cross over with the PM responsibilities for PennDOT. Load rating QA items related to 2009 FHWA load rating and posting process review continue out of central office.
- Much of the day-to-day responsibility for load rating is delegated to Districts; overall central office is more responsible for data quality and policy.
-

The district load rating engineer is required to be a PE. These qualifications were reviewed the last time Metric 4 was evaluated at the Intermediate-AL (PY19).

Load rating policy often requires coordination with the Chief Bridge Engineer, who is part of a different

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Final Summary of Metric

State Pennsylvania

Review Year PY21

directorate at PennDOT, the Bridge Design and Technology Division. This is because some load rating policy is provided in Publication 15m Design Manual Part 4- Bridges and Structures (DM4), such as definition of design and load rating vehicles, development and maintenance of load rating and permit rating software, and technical issues such as distribution factors, load factors, etc. Bridge Inspection Section coordinates appropriately with Bridge Design and Technology Division.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 4, because the State Load Rating Engineer is a registered professional engineer, and the State Load Rating Engineer has overall and programmatic responsibility for the load rating of all bridges.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 05 - Qualifications of Personnel - UW Bridge Inspection | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 5, the Division assessed based on prior review results and on the Division bridge staff's knowledge and awareness of the State process for monitoring underwater bridge inspection diver qualifications.

Observations

PREVIOUS FINDINGS:

• The Division last assessed Metric 5 at the Intermediate-level in PY2016. During that review, the Division reviewed the qualifications for all dive inspectors currently on contract in the state, including the PennDOT personnel and consultants, and found no issues.

• The population of dive inspectors is known overall based on the two statewide consultant agreements and only one Departmental dive team. The qualifications of these inspectors were last verified in PY2016, with no findings at that time.

• In PY2019, a file review for Metric 17 (Underwater Inspection Procedures) at the Intermediate Assessment Level added to the reviewer's knowledge and awareness, forming the basis for all findings in Metric 5, and a determination of Substantial Compliance for Metric 5.

- The reviewer found no record of the participating divers present in the bridge file, or inspection reports for all files reviewed under Metric 17. Although every signed/sealed UW inspection report included a statement certifying the qualifications of all inspection divers by the Engineer of Record, no list of the participating divers was present.
- To address the PY2019 findings, an improvement plan was written to require all UW inspection reports to list the names of every diver present, and clearly identify the team leader. A review of recent UW inspections confirmed the new practice of identifying divers was effective.
-

Another Int-AL review is scheduled to be performed in PY2022

CURRENT REVIEW:

• Per state policy, the dive inspectors may be certified by any of the available NHI or PennDOT training courses. Unlike with team leaders, the NHI course is an acceptable alternative to the PennDOT training course.

• There have been no changes to the PennDOT process for monitoring underwater bridge inspection divers since the previous review. As a part of the general scope of work for underwater inspection consultant agreements, the consultant must submit resumes for each team member to PennDOT for approval, and the consultant must submit resumes for approval if they add team members later in the contract.

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Findings

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National Bridge Inspection Program

Final Summary of Metric

State Pennsylvania

Review Year PY21

None

Conclusions

Pennsylvania is compliant with Metric 5, because all inspection divers have successfully completed FHWA approved comprehensive bridge inspection training or FHWA approved underwater bridge inspection diver training.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	06 - Inspection Frequency - Routine - Lower Risk Bridg	Prior Year Compliance	C		

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 6, as described in the "NBIP Compliance Review Manual." The Division review included:

- generating MAR6 within 30-days of NBI acceptance;
- reviewing of MAR6 to resolve any apparent overdue inspections and documenting on MAR6;
- reviewing MAR6 summary for indication of any new deficienices;
- assessing based on MAR6 snapshot, previous review results, and the Divisions' knowledge and awareness of the State's policies and practices for routine inspection intervals.
-

Observations

The following observations pertain to Pennsylvania's program, based on the National Bridge Inspection Standards and the Metric 6 criteria and commentary provided in the “NBIP Compliance Review Manual." Metric 6 was last assessed at the Intermediate-level in PY2018, concluding Pennsylvania was Compliant.

MAR6 GENERATION:

HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. MARGEN program was made available 5/28/2020. The Division generated MAR6 on 5/28/2020. The Division completed review by 5/29/2020.

MAR6 MINIMUM-AL REVIEW:

MAR6 Minimum-AL initially flagged 3 bridges as potentially overdue for inspection.

- 1 of the 3 Bridges had an inspection due 6/2019, which was initiated and inspection work began on time. The inspection date is recorded as 6/2019. The inspection was for a bridge over several railroad lines, and due to coordination for flaggers and access, inspectors had to return to the bridge in 9/2019 to complete crane work over rail lines. The inspection was not accepted before the 12/15/19 cutoff date, and so it did not get recorded on the submittal. Because the inspection was initiated on time and completed to the extent possible in 6/2019, this is within policy and not a Metric 6 compliance issue.
- 1 of the 3 bridges had a 12/2018 routine inspection reported on the 2019 submittal, which was then changed to 6/2018 for the 2020 submittal. The 6/2018 routine date is correct; the 12/2018 inspection was not a routine inspection (other/special).
- 1 of the 3 bridges had an inspection due in 6/2019. The inspection was completed on time, but the inspection was not accepted before the 12/15/2019 cutoff date.

MAR6 TRENDS REVIEW:

The Division last reviewed Metric 6 at the Intermediate-AL in PY2018. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.

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In accordance with Metric 6 guidance, the MAR6 assessment level was toggled to Intermediate and compared to the last Intermediate-level assessment in PY2018, to determine if there was any appreciable trend of increases in apparent >28month or overdue inspections. A noticeable upward trend would justify further spot checks or review.
The PY2021 MAR6 showed 3 apparent overdue bridges (resolved) and 21 bridges inspected at an apparent interval of >28 months. The PY2018 MAR6 had 41 bridges that were apparently overdue and 15 bridges that had apparent inspection intervals >28 months. Because all of these were resolved in PY2018, and the overall trend is reasonably consistent in PY2021, no further review is warranted.

MAR6 SNAPSHOT:

After resolution of the 3 apparent overdue bridges as described above, MAR6 snapshot indicates Compliance.

PENNDOT POLICY AND TRACKING REPORTS:

-PennDOT submitted 48-month extended interval inspection criteria per TA 5410.21 to FHWA on 11/27/2018. After coordination with and concurrence from FHWA HQ Senior Bridge and Tunnel Safety Engineer, Division approved the PennDOT criteria. The 48-month policy was implemented on 3/31/2020, and Districts are currently beginning to utilize. Because it was not implemented prior to the 2020 submittal, compliance with the policy will be reviewed for the first time in PY2022. For quality purposes, checks have been coded in the BMS2 system to ensure adherence to the approved policy.

-PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.
01.) Move Bridge Routine inspection to Summer Months. MJS 5-15-17.
02.) STRUCTURE IS NOW MOVED TO SEPTEMBER (ODD YEAR INSPECTION) DUE TO WATER DEPTH SURROUNDING PIER. 9-22-17
Example from another District from BRKEY 47519:
11/4/2016- Regular inspection performed. Structure is on 2 yr inspection cycle, but next inspection will be 11/2017 to keep structure in cycle w/ surrounding structures-TS
PY2018 MAR6 initially flagged 6 bridges with an apparent inspection interval between 25 and 28 months and 5 bridges with an apparent interval of 25 months. All were resolved or had documented justification for 1-month delay. PY2019 MAR6 indicated 13 bridges with an apparent inspection interval between 25 and 28 months and 7 bridges with apparent interval of 25 months. Although this is an increase, spot checks performed on the 41 bridges that initially flagged as appearing to have an inspection interval exceeding 28 months lead to knowledge and awareness of no significant trend here that would warrant further review.
2020 SHUTDOWN
Due to conditions in the state, most PennDOT activities including most routine inspections were shut down for a period in March-April 2020. PennDOT worked to continue higher-risk bridge inspections for the shutdown period, completing approximately 140 inspections in this time. Approximately 500 inspections were carried over from

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Final Summary of Metric

State Pennsylvania

Review Year PY21

March to April, and a smaller number due in May were carried over into June. By June, they caught up inspection schedules. No inspection intervals were reported to have exceeded 25 months, and the delays were documented. A list has been provided to FHWA of all effected bridges, which will be used in the PY22 compliance assessment.

Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the "NBIP Compliance Review Manual."
PennDOT is compliant with Metric 6, because:

- All bridges were inspected within the required NTE 24-month interval.
- NTE 48-month criteria had not been fully implemented as of 2020 NBI submittal, but will be reviewed in PY22 based on 2021 submittal.

Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 07 - Inspection Frequency - Routine - Higher Risk Bridg | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 7, as described in the "NBIP Compliance Review Manual." The Division review included:

- generating MAR7 within 30-days of NBI acceptance;
- reviewing of MAR7 to resolve any apparent overdue inspections and documenting on MAR6;
- reviewing MAR7 summary for indication of any new deficiencies;
- assessing based on MAR7 snapshot, previous review results, and the Divisions' knowledge and awareness of the State's policies and practices for routine inspection intervals.
-

Observations

The following observations pertain to Pennsylvania's program, based on the National Bridge Inspection Standards and the Metric 7 criteria and commentary provided in the “NBIP Compliance Review Manual." Metric 7 was last assessed at the Intermediate-level in PY2018, concluding Pennsylvania was Compliant.

MAR7 MINIMUM-AL REVIEW:

MAR7 Minimum-AL initially flagged 3 bridges as potentially overdue for inspection.

2 of the 3 had incorrect routine dates submitted in 2019 (should have been submitted as Other/Special). Both received routine inspection at correct interval.

1 of the 3 was not in accepted status at the time of the 2020 submittal cut off date (12/31/2019). This was because the bridge had serious coordination issues with CSX RR it overpasses for right of entry for crane inspection above the CSX tracks. The routine inspection was due in 3/2019 and inspectors initiated the inspection on time, performing the maximum scope of work achievable without right of entry. The inspection was not able to be fully completed until 12/2019, and was therefore not in accepted status at the time of the submittal. While this is within policy, the 9 month timeframe to complete the inspection is unusual. Discussions were held with PennDOT regarding this, and they feel that the coordination issues seen here were unusual and hopefully can be avoided in the future by starting with CSX earlier.

MAR7 TRENDS REVIEW:

The Division last reviewed Metric 7 as the Intermediate-AL in PY2018. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.

In accordance with Metric 7 guidance, the MAR7 assessment level was toggled to Intermediate and compared to the last Intermediate-level assessment in PY2018, to determine if any noticeable trend of increases in apparent >28month or overdue inspections. A noticeable upward trend would justify further spot checks or review.

The PY2020 MAR7 showed 3 bridges as apparently overdue and 27 bridges inspected at an apparent interval

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of >28 months. The PY2018 MAR7 had 43 bridges that were apparently overdue and 7 bridges that had apparent inspection intervals >28 months. Although there is significant improvement to the trend of apparent overdue bridges, the Division determined spot checks were warranted for those inspected at an apparent interval >28 months.
The Division performed 10 spot checks. The results of these were not documented using an override code, but are documented in the MAR7 comment field, highlighted with the heading "SPOT CHECK." For all 10 bridges spot checked, routine inspections were performed at the NTE 24 month interval. In 10/10 cases, 2 routines were performed in 2019. In 5 cases, the second routine was a post-rehab condition and inventory inspection. In the other 5 cases, the second routine was performed to move the bridge to a different month on the inspection schedule. Given adequate resolution of these 10 cases, the Division is satisfied that there are no new trends emerging in MAR7 compliance from the previous intermediate-level assessment in PY2018.

MAR7 SNAPSHOT:

After override of the 3 bridges, MAR7 snapshot indicates Compliance.
PENNDOT POLICY AND TRACKING REPORTS:
-PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.

An example of how one District documents in inspection notes the use of mid-interval to move inspection date is provided below from BRKEY 33467:
01.) Move Bridge Routine inspection to Summer Months. MJS 5-15-17.
02.) STRUCTURE IS NOW MOVED TO SEPTEMBER (ODD YEAR INSPECTION) DUE TO WATER DEPTH SURROUNDING PIER. 9-22-17
Example from another District from BRKEY 47519:
11/4/2016- Regular inspection performed. Structure is on 2 yr inspection cycle, but next inspection will be 11/2017 to keep structure in cycle w/ surrounding structures-TS
2020 SHUTDOWN
Due to conditions in the state, most PennDOT activities including most routine inspections were shut down for a period in March-April 2020. PennDOT worked to continue higher-risk bridge inspections for the shutdown period, completing approximately 140 inspections in this time. Approximately 500 inspections were carried over from March to April, and a smaller number due in May were carried over into June. By June, they caught up inspection schedules. No inspection intervals were reported to have exceeded 25 months, and the delays were documented. A list has been provided to FHWA of all effected bridges, which will be used in the PY22 compliance assessment.

Findings

None.

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State: Pennsylvania

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Conclusions

Compliance levels are assessed based on the language provided in the "NBIP Compliance Review Manual."
PennDOT is compliant with Metric 7, because all bridges were inspected within the required NTE 24-month interval.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	08 - Inspection Frequency - Underwater - Lower Risk B			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 8, as described in the "NBIP Compliance Review Manual." The Division review included:

- generating MAR8 within 30-days of NBI acceptance;
- reviewing of MAR8 to resolve any apparent overdue inspections and documenting on MAR6;
- reviewing MAR8 summary for indication of any new deficiencies;
- assessing based on MAR8 snapshot, previous review results, and the Divisions' knowledge and awareness of the State's policies and practices for underwater inspection intervals.
-

Observations

The following observations pertain to Pennsylvania's program, based on the National Bridge Inspection Standards and the Metric 8 criteria and commentary provided in the “NBIP Compliance Review Manual." Metric 8 was last assessed at the Intermediate-level in PY2018, concluding Pennsylvania was Compliant.

MAR8 GENERATION:

HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. MARGEN program was made available 5/28/2020. The Division generated MAR68 on 5/28/2020. The Division completed review by 5/29/2020.

MAR8 MINIMUM-AL REVIEW:

MAR8 Minimum-AL initially flagged 25 bridges as potentially overdue for inspection. The Division reviewed the bridge file for these 24 bridges and determined all were current with UW inspection intervals of 60 months or less.

- Of these, 11 bridges had data errors with the dates submitted on the 2020 or 2019 submittal, but were not overdue for inspection based on 60-month UW frequency.
- 1 bridge had an inspection completed on time, but was not in accepted status at the time of the 2020 submittal.
- 2 bridges were newly constructed and not due for UW inspection.
- The remaining 11 had required an UW inspection on a previous cycle due to unusually high water levels, but inspectors were able to inspect the substructure units under lower water conditions on the most recent routine. In these cases the UW "inspection required" tab would be unchecked at the time of routine and the UW need would be re-evaluated after future routine inspections.

MAR8 SNAPSHOT:

After resolution and override of the 18 bridges, MAR8 snapshot indicates Compliance.

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State Pennsylvania

Review Year PY21

PREVIOUS REVIEW RESULTS AND TRENDS:

The Division last reviewed Metric 8 as the Intermediate-AL in PY2018. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.
To identify any potential trends to the previous Intermediate-AL review, the PY2020 MAR Assessment Level was toggled to Intermediate-AL and then compared to the PY2018 MAR.

PY2018 MAR8 initially flagged 33 bridge records as possibly being overdue for inspection. All 33 were resolved, and similar to this year the most prevalent issue was that the bridge had required an UW inspection on a previous cycle due to water levels, but inspectors were able to inspect the substructure units under lower water conditions on the most recent routine. For comparison, the PY2020 MAR8 flagged 18 bridges as possibly being overdue for inspection.

PY2018 MAR8 initially flagged 33 bridges as having an apparent inspection interval exceeding 64 months. After review of the bridge file, the Division resolved all 33 bridges, with the most prevalent issue (13 occurences) being a group of bridges that received UW inspection under PCA in PY2016 but were now current and would not require inspection again for 2 or more years. The second most prevalent issue (10 instances) were data errors with the submitted date. For comparison, PY2021 MAR8 flagged 6 bridges with an apparent inspection interval exceeding 64 months. Because of the downward trend, no spot checks are considered warranted here for this Minimum-AL review.

PY2018 MAR8 initially flagged 2 bridges with an apparent inspection interval of 62 to 64 months, both of which were inspected under PCA in PY2016 and were current and not requiring inspection for 2 or more years. PY2018 MAR8 identified 1 bridge with an apparent inspection interval of 61 months, which was determined to be due to a coding error with the submitted date.
PY2020 MAR8 did not flag any bridges with 62 to 64 month or 61 month apparent inspection intervals, so no further review is warranted and no overall negative trend is seen here.

PENNDOT POLICY AND TRACKING:

PennDOT does not currently utilize the up to 72 months extended underwater inspection interval criteria. While they have submitted 48-month extended interval criteria, they are not currently pursuing extended interval UW inspections criteria.
PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.

The UW version of the M1 additional does many validations to catch bridges which were not previously identified for UW inspection but may need it. Some of these checks include verification of water depth (Item IN18) when it is inventoried as >4ft for any given substructure unit; verification of the 60 mo or reduced interval based on sub

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and scour coding; and check of IN16 UW Inspection type. IN 16 is coded E for no UW required" if water levels allowed, but codes C or D would indicate UW elements could not be inspected on the routine inspection; codes A and B indicate an UW dive inspection or probing/inspection done with divers but not requiring an actual dive.

Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the “NBIP Compliance Review Manual.”
PennDOT is compliant with Metric 8, because:

- all bridges were inspected within the required NTE 60-month interval.
- PennDOT does not currently have extended UW interval policy.

Division leadership were briefed on 12/18/2020
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 09 - Inspection Frequency - Underwater - Higher Risk B | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 9, as described in the "NBIP Compliance Review Manual." The Division review included:

- generating MAR9 within 30-days of NBI acceptance or MARGEN availability;
- reviewing of MAR9 to resolve any apparent overdue inspections within 30-days of NBI acceptance or MARGEN availability and documenting on MAR9;
- reviewing MAR9 summary for indication of any new deficiencies;
- assessing based on MAR9 snapshot, previous review results, and the Divisions' knowledge and awareness of the State's policies and practices for underwater inspection intervals.
-

Observations

The following observations pertain to Pennsylvania's program, based on the National Bridge Inspection Standards and the Metric 9 criteria and commentary provided in the “NBIP Compliance Review Manual." Metric 9 was last assessed at the Intermediate-level in PY2018, concluding Pennsylvania was Compliant.

MAR9 GENERATION:

HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. MARGEN program was made available 5/28/2020. The Division generated MAR9 on 5/28/2020. The Division completed review by 5/29/2020.

MAR9 MINIMUM-AL REVIEW:

MAR9 Minimum-AL initially flagged 15 bridge records as potentially overdue for inspection. The Division reviewed the bridge file for these 15 bridges and determined all were current with UW inspection intervals of 60 months or less.

- Of these, 2 bridges had received scour countermeasure projects which filled in a scour hole and made all sub units accessible for wading and probing;
- 9 bridges had date errors on the 2020 or 2019 submittals;
- 1 bridge had an inspection that was not accepted in time for the 2020 submittal, but the inspection was not overdue
- The remaining 3 had required an UW inspection on a previous cycle due to unusually water levels, but inspectors were able to inspect the substructure units under lower water conditions on the most recent routine. In these cases the UW "inspection required" tab would be unchecked at the time of routine and the UW need would be re-evaluated after future routine inspections.

MAR9 SNAPSHOT:

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After resolution and override of the 15 bridges, MAR9 snapshot indicates Compliance.

PREVIOUS REVIEW RESULTS AND TRENDS:

The Division last reviewed Metric 9 at the Intermediate-AL in PY2018. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.
To identify any potential trends to the previous Intermediate-AL review, the PY2021 MAR Assessment Level was toggled to Intermediate-AL and then compared to the PY2018 MAR.

PY2018 MAR9 initially flagged 19 bridge records as possibly being overdue for inspection. All 19 were resolved, and similar to this year the most prevalent issue was that the bridge had required an UW inspection on a previous cycle due to water levels, but inspectors were able to inspect the substructure units under lower water conditions on the most recent routine. For comparison, the PY2021 MAR9 flagged 15 bridges as possibly being overdue for inspection.

PY2018 MAR9 initially flagged 9 bridges as having an apparent inspection interval exceeding 64 months. After review of the bridge file, the Division resolved all 9 bridges as having been inspected with a frequency of 60 months or less, with the most prevalent issue being bridges that were newly identified for UW inspection on the most recent routine, and received inspection in a timely manner from the time the need was identified. For comparison, PY2021 MAR9 shows 0 bridges having been inspected at an apparent interval exceeding 64 months.

PY2018 MAR9 initially flagged 0 bridges with an apparent inspection intervals of 62 to 64 months or 61 months. PY2021 MAR9 similarly did not flag any bridges with 62 to 64 month or 61 month apparent inspection intervals. Because there are no noticeable downward trend between PY2018 and PY2021 MAR9, no further review on PY2021 MAR9 is warranted and no negative trend is noted.

PENNDOT POLICY AND TRACKING:

PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.

The UW version of the M1 additional does many validations to catch bridges which were not previously identified for UW inspection but may need it. Some of these checks include verification of water depth (Item IN18) when it is inventoried as >4ft for any given substructure unit; verification of the 60 mo or reduced interval based on sub and scour coding; and check of IN16 UW Inspection type. IN 16 is coded E for no UW required" if water levels allowed, but codes C or D would indicate UW elements could not be inspected on the routine inspection; codes A and B indicate an UW dive inspection or probing/inspection done with divers but not requiring an actual dive.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the "NBIP Compliance Review Manual."
PennDOT is compliant with Metric 9, because all bridges were inspected within the required NTE 60-month interval.
Division leadership were briefed on 12/18/2020
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None.

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	10 - Inspection Frequency - Fracture Critical Member			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 10, as described in the "NBIP Compliance Review Manual." The Division review included:

- generating MAR10 within 30-days of NBI acceptance or MARGEN availability;
- reviewing of MAR10 to resolve any apparent overdue inspections within 30-days of NBI acceptance or MARGEN availability and documenting on MAR10;
- reviewing MAR10 summary for indication of any new deficiencies;
- assessing based on MAR10 snapshot, previous review results, and the Divisions' knowledge and awareness of the State's policies and practices for underwater inspection intervals.
-

Observations

MAR10 GENERATION:

HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. MARGEN program was made available 5/28/2020. The Division generated MAR10 on 5/28/2020. The Division completed review by 5/29/2020.

MAR10 MINMUM-AL REVIEW:

MAR10 Minimum-AL initially flagged 8 bridge records as potentially overdue for inspection. The Division reviewed the bridge file for these 8 bridges and determined the following:

- 4 bridges were closed subsequent to last FCM inspection. These bridges were not overdue, but due to closed status, FCM inspection required is no longer checked.
- 1 bridge had a timely inspection, but the inspection was not in accepted status at the time of the 2020 NBI submittal so the updated date was not reported.
- 1 bridge is a border bridge inspected by NYSDOT, where the previous submission had an error in the date. This was cleaned up on the 2020 submittal as border bridge procedures have been improved.
- 1 bridge is a privately owned structure on the border with NJ. Coordination with NJ Division indicated the 12 mo frequency submitted by PennDOT was not correct, and the bridge was not overdue for FCM inspection.
- 1 bridge had a rehab (super replacement) and no longer has any FCMs.

MAR10 SNAPSHOT:

After resolution and override of the 8 bridges, MAR10 snapshot indicates Compliance.

PREVIOUS REVIEW RESULTS AND TRENDS:

The Division last reviewed Metric 10 at the Intermediate-AL in PY2019. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.

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To identify any potential trends to the previous Intermediate-AL review, the PY2021 MAR Assessment Level was toggled to Intermediate-AL and then compared to the PY2019 MAR.
PY2019 MAR10 Intermediate-AL initially flagged 11 bridge records as potentially overdue for inspection. The Division reviewed the bridge file for these 11 bridges and determined the following: 4 of these bridges are permanently closed to traffic and no longer require routine FCM inspection; likely continue to be carried on the inventory in anticipation of future rehabilitation/replacement work. 5 bridges were rehabbed or replaced such that they no longer have FCMs. 2 bridges had errors in the inspection date submitted on the 2017 submittal, but are current and not overdue for inspection. Review of bridge file determined bridge was not overdue. For comparison, the PY2020 MAR10 flagged 8 bridges as possible being overdue for inspection, so no negative trend is apparent here.

PY2019 MAR10 Intermediate-AL initially flagged 7 bridge records with apparent FCM inspection intervals exceeding 28 months. Because of the upward trend from PY2018 MAR10, further review was performed. After review of these bridge files, the Division determined all had received a mid-interval FCM inspection, and did not have an FCM inspection interval exceeding 24 months. This is the allowable method per PennDOT policy to move inspections between seasons/years for inspection planning and efficiency purposes. This may also occur if the FCM inspection interval is lowered to 12 months and an inspection had not been accepted at the time of the 2017 submittal. For comparison, PY2021 MAR10 flagged 4 bridges, so no downward trend is apparent.

PY2019 MAR10 initially flagged 4 bridge records with an apparent FCM inspection interval of 26-28 months. After review of these bridge files, the Division determined all had received FCM inspected at an interval of 24 months or less. 2 had received a mid-interval FCM inspection, and 2 had issues with the dates submitted on the 2018 or 2017 submittals. For comparison, PY2021 MAR10 flagged 0 bridges.

PY2019 MAR10 initially flagged 3 bridges as having an apparent FCM inspection interval of 25 months. The Division determined this data was correct. For 1 bridge, the inspection with RR flagging had been performed 2 days early (pushing it into October in 2014) on a previous cycle due to availability. The following inspection with RR flagging occurred in November 2016. The Division verified that the 2018 inspection was completed on time (11/2018). For 1 bridge, there was a delay for equipment access. For 1 bridge, there was a delay for AMTRAK outage/flagging. For comparison, PY2021 MAR10 flagged 1 bridge, so no negative trend is apparent.
After resolution and override of the 26 bridges as described above, PY2019 MAR10 snapshot indicated Compliance.
Because no downward trend was apparent between PY2019 and PY2021, no further review of PY2021 MAR10 is warranted at the minimum assessment level.

PENNDOT POLICY AND TRACKING:

PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the "NBIP Compliance Review Manual."
PennDOT is compliant with Metric 10, because all bridges with FCMs received an FCM inspection at the NTE 24-month interval.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None.

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	11 - Inspection Frequency - Frequency Criteria			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed a Minimum-level assessment of Metric 11, as described in the "NBIP Compliance Review Manual." The Division review included:

- reviewing MAR11 Summary for indication of any new deficiencies and compared trends to previous year MAR11;
- assessing based on previous review results and on the reviewer's knowledge and awareness of inspection interval policies, procedures, and program.
-

Observations

MAR11 GENERATION:

HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. MARGEN program was made available 5/28/2020. The Division generated MAR11 on 5/28/2020.

MAR11 MINIMUM-AL REVIEW:

For the Minimum-AL review of MAR11, the Division reviewed the results and compared to PY2019, the last time MAR11 was fully resolved, to establish trends.

PY2019 MAR11 initially flagged 10 Other/Special inspections as overdue. All 10 had been properly inspected per PennDOT policy, with one of the following explanations for the apparent overdue inspection: bridge had been rehabbed and no longer required reduced interval inspection per policy; bridge had received proper inspection with an error in the submitted date; bridge had received mid-interval inspection to move inspection date between seasons; an inspection wasn't accepted at the time of the last submittal. For comparison, PY2021 MAR11 flagged 3 bridges, so no negative trend is apparent.

PY2019 MAR11 initially flagged 70 FCM inspection intervals that appeared to exceed the coded reduced interval inspection frequency or were overdue. All of these were reviewed and resolved, and all had been inspected per PennDOT policy with one of the following explanations for the apparent late inspection: bridge is closed and out of service (12 occurrences); bridge has been rehabbed or replaced and no longer requires reduced interval FCM inspection per policy (9 occurrences); bridge has had reduced interval FCM performed on time, with an error in the submitted date field (10 occurrences); bridge had reduced interval FCM performed on time but a previous inspection wasn't accepted at the time of the 2017 submittal (39 occurrences). For comparison, PY2021 MAR11 flagged 9 FCM inspections with an apparent interval exceeding the coded reduced interval, and 0 FCM inspections that appeared to be overdue, so no negative trend is apparent.

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PY19 MAR11 initially flagged 38 UW inspection intervals that appeared to exceed the coded reduced interval or were overdue. All of these were reviewed and resolved, and all had been inspected per PennDOT policy with one of the following explanations for the apparent late inspection: error in coding inspection as an UW inspection (2 occurrences); error in date submitted (1 occurrence); error in coding UW frequency (6 occurrence); rehab such that the bridge no longer requires reduced interval UW inspection (1 occurrence); all substructure units were able to be waded/probed/fully inspected due to water level on previous routine without dive (28 occurrences). For comparison, PY2021 MAR11 flagged 8 bridges that appeared overdue or to exceed the coded reduced interval, so no negative trend is apparent.

PREVIOUS REVIEW RESULTS AND TRENDS:

The Division assessed PennDOT as Substantially Compliant with Metric 6 for the review years prior to PY2018. The primary issue identified in the PY2017 inspection were bridges that required reduced interval inspection but were not coded to receive them. The Division last reviewed Metric 11 at the Intermediate-AL in PY2018. Based on full MAR resolution during that review, the Division assessed PennDOT as Compliant.

As a component of the Intermediate-AL review in PY18, the Division also performed supplemental analysis on all bridges in the inventory to identify any bridges that met the reduced interval criteria but were not coded to receive; all bridges were determined to have received the proper inspection interval, with some minor errors in coding inspection frequency for the NBI submittal. This analysis was not performed for the minimum level assessment in PY2020. The Division additionally developed a random sample from the Metric 11 population (including Damage and In-Depth inspection types as well as reduced interval FCM, UW, routine, and Other Special) to perform a file review to determine if each bridge received the proper intensity of inspection, as well as the correct interval.

PENNDOT POLICY- LEVEL OF INSPECTION AND FREQUENCY CRITERIA:
The following is the PennDOT policy pertaining to maximum inspection frequency intervals:

1. Publication 238, Table IP 2.3.2.4-1 indicates the maximum interval of inspections. Reduced interval of 12 months is required for any of the following reasons: weight restriction (load posted, 1 truck at a time, etc); Condition Rating of 3 or less for a superstructure without FCMs, substructure, or culvert component; or Condition Rating of 4 or less for a superstructure with FCMs; any SD masonry arch; or any bridge with a scour rating less than 3 (likely duplicative requirement here since Item 113 of 1 or 2 necessitates Item 60 to be a 1 or 2 respectively). Reduced interval of 6 months is required for any of the following reasons: Condition Rating of 3 or less for a superstructure with FCMs; any temporary structure; or any structure with temporary supports, falsework, or cribbing.

When a reduced routine interval is required, PennDOT current practice is to continue to code Item 91 as 24 months, and to capture the mid-interval inspection as an Other/Special inspection under Item 92C. This makes sense for routines because many times the scope of the mid-interval inspection is reduced. For example if the substructure is in good or fair condition and the superstructure is in poor condition, the 12-month inspection might only look at the superstructure. Reduced FCM inspection frequency is indicated in the coding of Item 92A. PennDOT policy requires qualified Team Leaders for reduced frequency inspections, even when coded using the

Other/Special inspection type. This is different than what is required under the NBIS, where Other/Special inspections are not required to have a qualified Team Leader present.

2. Publication 238 Table IP 2.6.2.4.1 indicates the maximum interval of underwater inspections, based on what PennDOT calls the Scour Critical Bridge Indicator Rating (SCBI), which corresponds to the NBI Item 113. UW reduced frequency interval of 24 months is currently required when SCBI is a 6, 4, or 3, and a frequency interval of 12 months is required when the SCBI is a 2, 1, or 0. This table and guidance in Publication 238 is currently being updated. Per Publication 238, an UW inspection is also required to be performed for bridges with a SCBI of 6 or <5 after high water events.

3. Publication 238 Section 2.3.3 establishes the scope, intensity and frequency of Damage Inspections. PennDOT policy requires that the scope be "sufficient to determine the need for emergency load restrictions or closure of the bridge...and to estimate the level of effort necessary to accomplish repairs." This should be done in such a manner that the documentation can be used later, if necessary, to re-coup costs of inspection or repair from the party responsible for the damage. Frequency is as-needed.

4. Publication 238 Section 2.3.4 establishes the scope, intensity, and frequency of In-Depth Inspections. PennDOT policy speaks in broad terms about what constitutes In-Depth inspection, and when one should be conducted. Policy is broad to allow for bridge-specific In-Depth inspections to be scheduled on a risk-based, individual basis. Key language under frequency is that an In-Depth "...[does] not reduce the level of intensity for Routine [NBI] Inspections..." Frequency is on an as-needed basis, but Publication 238 urges for complex and for bridges representing large capital investment, that In-Depth Inspections be scheduled routinely.

PennDOT codes bridge inspections as follows: There is a check box for "inspection required" for the various inspection types (Routine, UW, FCM, and Interim/other). The box is automatically checked for Routine on all bridges. When checked for FCM, UW, or Interim/other, this will code "Y" to the first digit of Item 92A, B, or C as appropriate. There is a field for "required frequency" for each inspection type. If "inspection required" is checked, they will code the corresponding "required frequency" to the second and third digit of 92A, B, or C as appropriate. There is a check box for "inspection performed" on each inspection. When checked for FCM, UW, or Interim/other, this will code the date of that inspection to Item 93 A, B, or C as appropriate.
Previously the"inspection required" and "required frequency" check boxes were left up to the inspector to check on each inspection. This led to errors as inspectors may have misinterpreted policy. PennDOT is currently providing some level of automation to these fields, with override possible by the inspection reviewer.

Inspectors are still expected to check"inspection performed" accurately, reflecting what inspection was performed in the field.
Refer to PY2018 Metric 11 Attachments, document numbers 11510 and 11511 for the referenced chapters of PennDOT policy (Publication 238) and most recent policy memorandum updating the Pub.
Internal Tracking:

PennDOT documents reasons for delay in the inspection notes section of the bridge inspection. PennDOT Central Office will also document any delays in inspection in their monthly "M1" report process. The M1 report is a monthly report run on production data that flags any overdue inspections and provides districts with a list of all

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upcoming inspections. The M1 report also serves other purposes, such as verifying that the correct inspection frequency is coded.

Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the "NBIP Compliance Review Manual."
PennDOT is compliant with Metric 11, because:

- all levels of inspection and interval criteria are established;
- all bridges indicate the appropriate level and interval of inspection in accordance with the established criteria.

Division leadership were briefed on 12/18/2020
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	12 - Inspection Procedures - Quality Inspections			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division completed a Minimum-level assessment of Metric 12, as described in the "NBIP Compliance Review Manual." The Division review included:

- monitoring of Metric 12 Improvement Plan implementation;
- performing field reviews of bridges sampled at a LOC 80%/MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to evaluate:
    - accuracy of component condition codes,
    - use of MBE procedures,
    - adequacy of documentation and appropriate justification of component condition ratings;
    - indication that a qualified team leader was present at each applicable inspection.
    -
- A pilot field review of National Bridge Element condition state assignment in accordance with the procedures developed by FHWA HQ/RC (reference materials presented at 5/28/2020 PY21 NBIP/NTIP kick-off meeting).
-

Due to ongoing travel restrictions, during the review timeframe of PY21, the Division was unable to conduct on-site field reviews. Reference FHWA HIBS Director 5/27/2020 email "INFORMATION: Annual Requirements for the Reviews of the National Bridge and Tunnel Inspection Programs and Critical Findings Reporting 2020" and materials presented during 5/28/2020 PY21 NBIP/NTIP kick-off webinar.

Due to travel restrictions, the review team limited the scope of the review to only that information which could be gathered from the bridge file. As such, the sample population was not limited to any district and pulled from the entire Statewide inventory. The updated plan for review is as follows (see document library for a map of the PennDOT Districts, it is associated with PY2018 Metric 1 FSM):

PY18: Districts 4, 5, 6
PY19:Districts 8, 10
PY20:Districts 2, 3, 9
PY21: All Districts
PY22:Districts 1 and 12
PY23:11

Observations

Field Review Team:

Due to travel restrictions imposed by agency policy, the PY2021 field review portion of Metric 12 was limited to a file review. The review team consisted of the PA Division Bridge Engineer and the Assistant PA Division Bridge Engineer. The field review team participants provided their input on the inspection condition ratings, the condition rating justification, and narrative comments reviewed.

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All Team Leaders indicated on the most recent reports, were reviewed to ensure they were current PennDOT Certified Bridge Safety Inspector (CBSI) at time of inspection.

RANDOM SAMPLING:

• The Division did not geographically filter the population of bridge. For PY2021, the entire State inventory reviewed.

• From the metric applicable population of 10716 bridges, the Division ran the NBIP Sampling Tool v21.1 to select a 19-bridge field review sample. No substitutions were necessary.

- Sample tool included in PY21 Metric 12 attachments
-

FILE REVIEW RESULTS:

• For 19/19 bridges reviewed, the recorded NBI ratings and Inspection Report ratings for Items 58, 59, 60, and 62 were within the acceptable tolerance (+/-1 rating) of the FHWA field review rating and compliant.

• For 19/19 bridges reviewed, all notable deficiencies were identified and quantified, and the narrative under the items supported the item rating.

• For 19/19 bridges reviewed, there was a qualified Team Leader performing the most recent inspection, as indicated by the inspection report. All Team Leaders were cross checked in the PennDOT Bridge Inspector Training Catalog and determined to meet the PennDOT training qualifications. For PE Team Leaders, PE licenses were verified. For non-PE Team Leaders, no interviews were conducted to determine if they had 5 years of experience; however, all had received their CBSI certification more than 5 years ago, or 4 years ago for EITs.

• 2/19 Bridges (BRKEY: 32961 & 40254) failed to follow MBE procedures. The bridge inspection report for 32961 noted significant deterioration in the superstructure, and included load ratings for reduced rebar section, but lacked photographs and beam sketches that could be used to verify, map, or track the history of deterioration. The inspection report for 40254 showed a plan view stream sketch, but no channel cross section or soundings with significant detail to track scour over time.

• See field review summary, and field review reports in PY21 Metric 12 attachments

PY21 PILOT ELEMENT LEVEL FILE REVIEW RESULTS:

Two bridges from the field sample were reviewed for the accuracy of the Element-Level Data (BRKEY 6877 and 22612). This review was not considered in the assessment of the Metric, and is provided for informational purposes only.

BRKEY 6877: All elements with CS3/CS4 defects were noted in the element data. The total number of required NBEs was correct, but there were 2/6 missing BMEs. The data identified in the inspection report was correctly reported to FHWA.

BRKEY 22612: The inspection report did <u>not</u> meet criteria as not all elements with CS3/CS4 defects were noted in the element data. For Element 331 (RC Rail) Span 2 did not have any quantity noted as CS4, but photo 13 of the inspection report (Span 2 Left parapet) showed detached and/or missing rebar for several feet. From photos, the reviewer believes some sections on the left side of span 2 belong in CS4. The total number of required NBEs was correct, as was the total number of BMEs. The data identified in the inspection report was correctly reported to FHWA.

See Element-Level field review forms in PY21 Metric 12 attachments

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Findings

2/19 bridges were found to have deficiencies in following MBE procedures which does not meet the 90% threshold for compliance. There were no additional findings from the file review.
The pilot element-level data review yielded one inspection report that did not meet criteria for failing to identify all elements in CS3/CS4. The pilot review was for informational purpose only, and does not contribute to the compliance determination in PY21.

Conclusions

Pennsylvania will remain at substantially compliant for Metric 12, based on knowledge and awareness, and the findings in the field review.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.
There is currently an active improvement plan for this metric, which should address the deficiencies noted in the PY2021 findings, and should begin to show up in the metric assessments following another inspection cycle.

Recommendations

Continue implementation of recommendations as laid out in the current improvement plan

Dec 31 Compliance: SC

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.
PennDOT developed an Improvement Plan addressing the above findings and recommendations which was accepted and executed **3/31/20**. Refer to attachments and IP library.

Mar 31 Compliance: SC

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	13 - Inspection Procedures - Load Rating			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 13, the Division performed the following tasks:

- Generated MAR13 on 5/28/20.
- Reviewed MAR13 for any indication of new compliance deficiencies
- Assessed based on prior review results, the trend of any new apparent compliance deficiencies, the MAR13 snapshot, and the Division bridge staff's knowledge and awareness of State load rating practices.
-

Observations

MAR13 GENERATION:
HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. The Division generated MAR13 on 5/28/2020. The Division completed the review of apparent load rating compliance deficiencies by 6/29/2020

PREVIOUS REVIEW RESULTS:
This metric was reviewed at the Intermediate level in PY17, including some extra review of local owner load ratings and some additional field reviews. Of the 38 bridges reviewed, all had load rating SI&A data submitted to the NBI; all had documentation of assumptions, calculations, and methodology in either the online electronic bridge file (linked from the PennDOT bridge management system) or in a hard copy file in the District office; and all were rated utilizing the appropriate PennDOT procedures, either utilizing PennDOT analysis software or using the appropriate engineering judgment procedures for concrete bridges with unknown bar layouts documented and accepted in Publication 238.

For state owned bridges as well as some other agency bridges on state routes, PennDOT utilizes an in-house automated permit routing analysis software (APRAS). This includes an analytical automated bridge analysis software (ABAS), which can run HS-20 equivalent moment comparisons based on HS-20 moment comparison factors as well as being able to utilize PennDOT load rating software data files (BAR7 and the LRFD programs). For bridges on state routes previously reviewed in PY17, all either had software models and/or moment comparison factors that are reasonably close to the most recent load rating and SI&A data. It doesn't necessarily need to be identical, since the SI&A data is based on LRFR/LFR whereas other rating methods are acceptable for permit evaluation.

Review of the load rating is in the scope of all PennDOT inspections. Re-rating is recommended as necessary. Load ratings are QA'd as a part of the state inspection QC/QA program, by having the state QC/QA consultant perform blind ratings on the QC/QA sample bridges. Additionally, Central Office runs quarterly data quality checks as recommended in the process reviews, to which the Districts respond and make changes.

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SHVs:
PennDOT submitted a parametric study that demonstrated all AASHTO SU vehicles are enveloped for simple and continuous bridges of any given length by the PennDOT load rating vehicles. PennDOT had identified many years ago that SHV-type vehicles were legal under their motor vehicle code and developed a load rating vehicle they call the TK-527. The parametric study was reviewed and accepted by Lubin Gao and the Division. The parametric study is attached to PY2020 FSMs along with an addendum addressing Lubin/Division comments.

FAST Act Emergency Vehicles:
PennDOT previously submitted a POA in March 2017, in accordance with the HQ memo, to load rate bridges for the EV vehicle types that were exempted under the FAST Act. PennDOT has done significant analysis/screening on the Interstate system for the EVs utilizing ABAS (permitting evaluation software), and has narrowed down the Group 1 population of bridges requiring further analysis to fewer than 100, all of which were completed by the end of 2018. No Interstate bridges need to be posted for EVs. The POA was reviewed by the Division as well as Lubin Gao and the BSE.

Pennsylvania is one of the states where the EVs are likely exempted under state motor vehicle code, and therefore likely will need to rate the entire inventory by 2022. The POA reflects an action for rating of the entire inventory by this date. The latest POA update is attached to PY2020 FSMs. A parametric study of the load effects of the EVs was completed in PY21 comparing the EVs to PennDOT rating and design vehicle for load effects and posting. The study, reviewed by Division and Lubin Gao, determined there is no change needed to PennDOT policy related to moment/shear effects of the EVs and current PennDOT posting line does envelope them when utilizing reduced load factors from NCHRP research. However, the 40k axle load is of concern for decks. PennDOT standard deck design does rate for 40k axle load, but PennDOT should give some consideration of deck condition and non-standard deck designs as EV load ratings are filled in for Group 2 non-Interstate bridges.

MAR RESOLUTION:

- PY2021 MAR13 initially flagged 32 potential load rating compliance issues.
  - MAR13 Report 3 looks at whether each bridge is load rated, based on Item 63 =/= 5. Report 3 flagged 3 bridges.
    - 1 of 3 bridges was accepted with 5 (No rating analysis performed) but should be a 0 (Engineering judgement)
    - 1 of 3 bridges was submitted with missing IR/OR data but was rated per AASHOT MBE.
    - 1 of 3 Bridges had item errors and were updated with corrected rating sets.
    - For comparison PY2020 MAR13 Report 3 flagged 3 bridges. Based on previous year review results, and the trend, the 3 PY2021 errors were not reviewed for the minimum level assessment.
    -
  - MAR13 Report 3a looks at whether the LR in the NBI are reasonable. If inventory rating is the same as operating rating, this would flag as unreasonable. Report 3a initially flagged 2 bridges.
    - Of these, 1 was a concrete arch that appears to be rated using AS, but it is unclear why IR=OR. 1 is a stone masonry arch that is only evaluated at inventory per MBE 6B5.2.6.
    - For comparison PY2020 MAR13 Report 3a flagged 92 bridges. Based on previous year review results, and the decreasing trend, the 3 PY2021 errors were not reviewed for the minimum level assessment.

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-
- MAR13 Report 3b looks at whether an assigned load rating is allowed (design is HS-20 or greater and LFD/LRFD). Report 3b initially flagged 27 bridges
  - 1 of these wasa recently rehabbed and were designed to full HL-93. 18 bridges had an inventory rating error corrected.
  - 10 bridges an item 31/37 data error corrected.
  - For comparison PY2020 MAR13 Report 3b flagged 74 bridges. Based on previous year review results, and the falling trend, the 27 PY2021 errors were not reviewed for the minimum level assessment.
  -
  -

After resolution and overrides as described above, the PY2021 MAR13 snapshot indicates compliance.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 13, because all higher and lower risk bridges have a load rating in accordance with the AASHTO MBE, and all reviewed higher and lower risk bridge load ratings were accurate for the current conditions.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	14 - Inspection Procedures - Post or Restrict			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 14, the Division performed the following review activities:
• Generated MAR14 on 5/28/20
• Reviewed MAR14 for any indication of new compliance deficiencies, and resolved any flagged compliance deficiencies.
• Assessed based on prior review results, the status of any new compliance deficiencies, the MAR14 snapshot, and the Division bridge staff's knowledge and awareness of State load rating practices.

Observations

MAR14 GENERATION:
HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. The Division generated MAR14 on 5/28/2020. The Division completed the review of apparent posting compliance deficiencies within 30 days.

PREVIOUS REVIEW RESULTS:
• Metric 14 was last assessed at the Intermediate level in PY2017, and Pennsylvania was determined to be compliant. For all bridges in the file review sample, the Division found pictures of the posting in the bridge file, in at least the most recent inspection report; the Division determined the posting was consistent or more conservative than the most recent load rating; the Division determined Item 41 was correctly coded on the most recent NBI submittal. 15 bridges from the file review sample were included in PY17 field reviews, and no issues were noted with the posting signage or advanced posting signage in the field.
• For many years PennDOT had issues with consistently coding Item 70 correctly. The state has now automated the calculation of Item 70 based on the load rating data stored in BMS2 compared to the state legal loads. This solved a majority of the issues with Item 70, but did introduce one known error.
• The PennDOT ML-80 load rating vehicle has a gross weight of 36.64 Tons. The PennDOT bridge management system BMS2 inventories the IR and OR tonnages (not rating factors) without decimals. Following good practice, one would not round anything less than 37 up to 37. Therefore a bridge may rate for 36.8 Tons for the ML-80, but the operating rating would be truncated in BMS2 to 36 T. This would trigger Item 70 to automatically code as a 4, since 36 T is less than 100% of that maximum legal load. PennDOT is looking at ways to implement a work around for this, but this remains an issue that shows up on the MAR. The Division has recommended looking at storing at least one decimal, since the NBI items are coded to the tenth, but this may not be feasible with the current database.
• Enforcement of posting continues to be a risk area for Pennsylvania, as also identified by NBIPOT.

NBI ERROR/SAFETY CHECKS:

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• No load capacity/posting errors were generated by the 2021 NBI Submittal. All issues on the MAR were resolved (see below).

MAR14 REVIEW AND RESOLUTION:

REPORT 1:

-MAR14 report 1 determines whether the operating rating is less then 20 mT while the bridge remains open without restriction (Item 41 = A. An Operating Rating (Item 64) less than (<) 20mT is a reasonable indicator that posting is required. The low 20mT threshold used allows for variances between HS/MS/HL-93 ratings and the many State legal load configuration ratings. This report flagged 2 bridges. 1 bridges had missing item 64 information. 1 bridge was replaced. The data was corrected to reflect the most current rating set.

REPORT 2:

-MAR14 Report 2 determines whether bridges with a posting evaluation (Item 70) is less than 5, meaning the operating rating is below the state's maximum legal load, are posted as indicated by Item 41. This report flagged 51 bridges. 2 were missing information and were also flagged in report 1; 4 had a data error but did not require posting; 2 were properly posted; 12 structures were rehabbed or replaced, but were submitted with the legacy posting; 31 had errors in the coding of Item 70, as described above.

REPORT 4:

-MAR14 Report 4 flagged 2 bridges. All 2 bridges were confirmed as being properly posted at the completion of the review.

REPORT 5:

-MAR14 Report 5 determines whether bridges with a super, sub or culvert rating of 1 or less, as indicated by Items 59, 60, and 62, are closed as required, as indicated by Item 41. This report flagged 16 bridges. All 16 of 16 bridges were PennDOT hybrid bridge/culvert structures, for which PennDOT submits a deck, super, sub, and culvert rating. Most often these are bridge structures widened using a culvert, or vice versa, and PennDOT has used the practice of submitting the deck, super, sub, and culvert rating for many years. None of these had a condition rating of 1 or less for Item 59, 60, or 62, so these flagged erroneously due to the report logic not knowing what to output when a structure has a condition rating submitted for 59, 60 and 62, which is uncommon (arguably not correct, but again long standing PennDOT practice). These also flag on the NBI submittal error check, and the FHWA has considered these exceptions for the purposes of error resolution.

REPORT 6:

-MAR14 Report 6 determines if a bridge is closed as required by looking for an operating rating less than 2.7 mT. An Operating Rating (Item 64) less than (<) 2.7mT requires closure. Temporary conditions (Item 103) are considered. This report flagged 1 bridge that were also flagged for Report 1 due to missing IR and OR data. The data was corrected to reflect the most current rating set.

REPORT 1a:

-MAR14 Report 1a determines whether a bridge with an operating rating between 20 and 32.4 metric Tons is posted, as indicated by Item 41. This report flagged 7 bridges in PY2021. Of these, 3 were properly posted. 3 were rehabbed or replaced and had legacy data submitted; 1 had the rating set revised and does not require

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posting.

REPORT A:
-MAR14 Report A looks at whether bridges with the design vehicle reported as H10 or H15, as indicated by Item 31, are posted. Report A flagged a large number of Pennsylvania bridges, 530. The Division has the knowledge and awareness, from review of MAR13, that there have been issues in incorrectly inventorying Item 31 in the past. Report A was not resolved in PY2021 since it is not required on minimum level assessments. Report A was analyzed in some detail in PY2017.

In PY2017, the Division broke down the construction date range, under the assumption for anything designed post-1950, it would be highly unlikely to be H10/15. For bridges designed post-1950, especially the >100 built post-2000, the Division found it highly likely these are Item 31 errors (which is a documented issue under Metric 13). For pre-1950 designs, the Division reviewed 189 bridges, determining that all had reasonably recent documented load ratings. The Division did not identify any bridges of concern among the 189.
After the resolution and overrides as described above, the MAR14 snapshot indicates Compliance.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 14, because all bridges are properly posted or restricted, and all identified posting/closing compliance deficiencies are promptly resolved.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	15 - Inspection Procedures - Bridge Files			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 15, the Division assessed based on prior review results and the Division bridge staff's knowledge and awareness of State bridge file policy and practices.

Observations

PREVIOUS REVIEW RESULTS:

- This metric was assessed at the Intermediate-level in PY2016. Prior to PY2016, this metric had been assessed substantially compliant, with an IP in place, due to some bridges missing channel cross sections in the previous reviews. The PY2016 review included Intermediate-AL random sampling, and for the random sample all applicable significant bridge file components described in metric commentary were present either in the Electronic Document Management System (EDMS, which links to BMS2), or readily available in the District for files.
- PennDOT is currently finalizing a new addition to Publication 238, which will cover the measurement and documentation of scour. The Division performed a program review of the PennDOT Hydraulics and Hydrology program in 2015. A recommendation out of this review was for PennDOT to perform more frequent channel cross sections. To address this recommendation, PennDOT intends to set a risk-based frequency for updating channel cross sections, based on the Item 113 and Item 61 ratings, which will not exceed 60 months.
- For additional knowledge and awareness, the Division had no issues locating all applicable file components that are field verified for the field review sample this year (reports, waterway information, procedures, load rating, posting, critical findings, scour assessment and POA where applicable). All file components were available in EDMS for state/local bridges. File components for the Turnpike bridge reviewed were provided by the PTC upon request.
-

Findings

None

Conclusions

Pennsylvania is compliant with Metric 15, because all sampled bridges had files, and all files had the applicable significant components.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Recommendations

None

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 16 - Inspection Procedures - Fracture Critical Members | Prior Year Compliance: SC

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 16, the Division assessed based on prior review results and Division bridge staff's knowledge and awareness of the State's fracture critical member inspection policy and practices

Observations

This metric was last assessed at the Intermediate level in PY2020. Based on knowledge and awareness gained through tracking of improvement plan and other metric reviews, there have been no changes to the compliance status for PY21. PennDOT continues to implement the PY20 IP activities. A new fatigue and fracture inspection plan (F&F plan) standardized form was developed during PY21 and is ready to be implemented in 2021. A refresh cycle for F&F plans is proposed addition to the 2021 edition of Publication 238.

PREVIOUS REVIEW RESULTS:

- Based on field and file reviews conducted at the last Int-AL, the Division determined that all the reviewed FCMs had the locations of all FCMs identified, inspection frequency outlined, and adequate procedures for the FCM inspection.
  - All reviewed bridge files had FCM inspection plans, but not all documented special access needs within the plan as outlined in PUB 238. Although access needs could be determined from a review of the bridge file within BMS2, or from the previous inspection findings, it does not serve the same purpose as the inspection procedures. This finding does not adversely affect the effectiveness of the FCM inspection and is therefore considered minor.
  - One inspection found a FCM not identified in the procedures, but failed to update the procedures in the following inspection cycle.
  -
- For knowledge and awareness, 4 bridge with FCMs were reviewed on the PY2020 field reviews. The procedures were available and adequate for an FCM inspection to be performed. It appeared the inspections had been hands on and took fatigue prone weld details into account. Condition rating of the bridge took the FCM inspection into account, but this is not usually an issue since PennDOT typically does routine and FCM inspection at the same time.

- PennDOT Publication 238 (Bridge Safety Inspection Manual) Section 2.4.5.1 provides details and guidance in the preparation of FC inspection plans, and contains many methods of conducting non-destructive testing of FC details and FC members. PennDOT does not require specific non-destructive test methods as a part of the FC inspection plans, but Pub 238 does specify what data is to be measured and recorded, and gives guidance on how the data will be used to assess the overall condition of bridge to ensure that the inspector uses appropriate test methods.

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Per 2.4.5.1, the following is required for all FC plans:

- A F&F Inspection Plan shall include the following:
  - List of access equipment
  - Sketch (es) of superstructure with locations of all fatigue and fracture prone details identified.
  - Use grid diagram (framing plan) with detail locations labeled by letters or numbers and a legend explaining the number or letter schemes
  - Use an elevation view for truss
  - Classify similar fatigue/fracture prone details as “types” (e.g. end of partial cover plate)
  - A table of fatigue/fracture prone details indicating
    - Type of detail (e.g. end of partial cover plate, short web gap, etc.)
    - Location of each occurrence of detail
    - AASHTO Fatigue Category of detail
    - Identify retrofits previously installed
    - Table can be organized by Span or type of detail
    -
  - Specific instructions if the Interim inspection is of any scope less than a full hands on FCM inspection.\
  -

Concrete encased FCMs have additional inspection plan requirements and require Central Office approval:

- Identify portions of encased FCMs of higher susceptibility to fracture or fatigue
  - Where encasement is fully intact, visual observation alone may be used on a frequency not to exceed 24 months when it will sufficiently ascertain the FCM condition.
  - Where encasement is not intact, hands-on inspection is warranted.
  -
- Identify portions of encased FCMS with lesser susceptibility to fracture or fatigue.
  - Visual observation alone may be used on a frequency not to exceed 24 months if it will sufficiently ascertain the FCM condition. Otherwise, hands-on inspection is required.
  -
- Identify portions of encased FCMs that do not warrant hands-on inspection.
- Provide photos to document condition of concrete encasement, especially at fatigue or fracture-prone details, for F&F Plan.
- Update photos during subsequent inspections.
- Provide for testing (via sounding, etc.) of encasement integrity in critical locations on an on-going basis.

Per Pub 100 A (BMS2 Coding Manual), PennDOT BMS2 inventories certain FC information directly into the system, pertaining to location and condition of each FCM. Item IF01 inventories which span/pier the FCM detail is located in as appropriate (for an FC super/sub respectively). IF02 inventories the type of FCM- Girder or beam, truss bottom chord, truss diagonal, cable, cross girder, etc. IF03 is a 50 character field to provide a description of the member (ex. L3-L4 LT TRUSS). IF04 is a 50 character field to describe the detail that is FC, for example BOTTOM CHORD EYEBAR, or WELDED STIFF. IF05 is the AASHTO fatigue category of the detail. IF06 is a notes

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field to provide detailed FCM condition information.

Additionally, PennDOT inventories a Critical Ranking Factor (CRF) for bridges with FCMs. This item is essentially a risk prioritization of bridges with FCMs, recognizing some factors may make some FCMs more critical than others. Item 6A44 is the main span group type (for example, most critical would be group 1 bridges, 1-girder, 2-girder simple or suspended spans, simple or suspended span trusses, tied arches, suspension, and cross girder pier caps. Group 2 bridges are 2-girder continuous end spans and tension zones, continuous truss tension members, or rigid frame pier tension zones. 6A45 is the type of member detail that is FC: hanger assembly, intersecting welds, etc. 6A46 is the fatigue susceptibility based on member type and AASHTO fatigue category. 6A47 is a material factor that considers the fracture toughness, steel grade, and type of member. 6A48 is the ADTT for the bridge.

Findings

None

Conclusions

Bases on knowledge and awareness, and in accordance with the ongoing IP activities, Pennsylvania is substantially compliant with Metric 16.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

Continue implementing the recommendations as outlined in the PY2020 IP

Dec 31 Compliance SC

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.
PennDOT developed an Improvement Plan addressing the above findings and recommendations which was accepted and executed **3/31/20**. Refer to attachments and IP library.

Mar 31 Compliance SC

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	17 - Inspection Procedures - Underwater			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 17, the Division performed the following review activities:
- Assessed based on prior review results and the Division bridge staff knowledge and awareness of the State's underwater inspection policy and practices
-

Observations

Metric 17 was last assessed at the Int-AL in PY2019
PENNDOT POLICY/PROCEDURES
-The PennDOT Publication 238 Section 2.6 contains the policy and guidance on the general requirements pertaining to all underwater inspection. See attached in documents library under PY2019 Metric 17. Updates are being made to this section as a broader "Scour Practices" update, for more consistent documentation and measurement of scour and channel changes. Draft updates are also attached in the documents library under PY2019 Metric 17.

-Individual bridges have a significant amount of information about underwater bridge elements stored in data items in the State's BMS2 system.

-The substructure units are individually inventoried, providing information about the substructure unit type, whether UW inspection is necessary for that specific sub unit, the alignment of the sub unit to the channel, the stream velocity, sediment deposits, what material the foundation bears on, the streambed material, observed scour depth, water depth, any scour-induced movement of the sub unit, any scour/undermining indicated, and the presence of scour countermeasures at that individual sub unit. Again, all of this information is inventoried per substructure unit. There are also fields for 100yr and 500yr scour depth, where a quantitative analysis has been performed.

-The past and current determination by the Division is that these inventory items constitute written UW procedures since they contain all information necessary for an UW inspector to plan and execute a consistent quality inspection. This determination was made in PY2013 along with the BSE at the time. The last INT-AL assessment was completed in PY13, and the next INT-AL is scheduled for next year.

-Per the Metric 17 commentary paragraphs 2-4, the following are the items that are necessary to communicate on inspection procedures, and how this is accomplished in BMS2 inventorying:
- identified underwater elements- accomplished by individually inventorying each sub unit. Each unit has a drop down for routine inspections that identifies what level of inspection was able to be completed on that sub unit. For example, it could be coded as "no UW inspection required, normal inspection performed (including probing)"

indicating an UW inspection of that sub unit would not be necessary. However it could also be coded as "inspection not completed- UW inspection by divers is required" indicating that the sub needs UW inspection. On an UW inspection, it would then be coded as "UW inspection performed by divers" or "probing performed by divers."

• physical scour countermeasures- identified thru Item IN21, which is a yes/no check box per sub unit, as well as identified on a "countermeasures installed" screen. Additionally may be identified on IN15/IU06- streambed material, where the countermeasure is across the channel.

• inspection equipment- equipment identified on inspection planning screen (boat, ladder, etc)

• structural details- plans in file, also each sub unit is inventoried providing whatever information is known about the unit's design. Item IN12- Pier/abut type (e.g. stub, cantilever, gravity, spill-thru, unknown, piles/bents, MSE, etc). IN13- foundation type- (e.g. spread on competent bedrock, cast in place piles, h-piles, timber piles, spread on soil, unknown, etc) Wingwalls are identified in IU13, 14, 15 and 16. IU15 for example is "Upstream right wingwall presence."

• hydraulic features and characteristics- items include those pertaining to streambed material and characteristics, water depths per sub unit, scourability of the streambed at the sub units, scour hole presence and scour hole depth, and streamflows

• inspection methods and frequencies- established by policy

• qualifications of personnel- established by policy.

• Permits or special contracting procedures- if required, there is a screen in BMS2 under "Inspection Planning" that can detail the requirement for any permits/other special actions that must be completed prior to inspection. This would include multiple fields that provide notes and contact information for POCs.

• Risk factors

  • rapid stream flows- stream flow qualitatively described by item IN11 as low medium or high. IU10 describes debris accumulation- described qualitatively by IN06- debris potential described as none, minor, medium, high, or present. This is item is per substructure unit. Additionally identified for the entire bridge utilizing items IU08- debris potential and IU09- trapping potential, rating these as low, medium or high. IU17, 18, 19, and 20 describe the presence of debris for the entire bridge. This is accomplished as a percentage where the left abutment is considered 0 and right abutment is considered 100. IU17 is the beginning point of horizontal blockage, 0 being at the left and 100 being at the right abutment. IU18 is the end point of horizontal blockage. IU19 is beginning point of vertical blockage, and IU20 is the end point of vertical blockage. For IU19 and IU20, 0 is considered the streambed and the bottom of the beam is considered 100. soft or unstable stream beds- IU06 is an overall channel streambed material. Additionally this is coded per sub unit as IN15. Some examples of streambed material would include "A6- stable alluvium with large native cobbles and boulders, small amounts of fine material filling voids" or "A3-highly erodible alluvium predominantly very small particles: clays, silts, fine sands. High scour potential." IU07 -stream bed material description, is a comment field where the inspector can describe the stream bed material further, beyond the general classification in IU06. Presence of sediment/unstable material coded per sub unit as IN09. Sediment accumulation in IN09 is described qualitatively as none, minor, medium, or high. meandering channels- Lateral stream migration is best captured by item IN10 which describes the stream alignment at or near the structure per substructure unit.

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• Typically, based on knowledge and awareness, UW inspection reports include an introductory section that

detail the procedures and policies under which the inspection is performed, which is also an acceptable practice for communicating UW inspection procedures/needs.
-PennDOT utilizes two consultant agreements for a majority of their underwater inspections, with the PennDOT District 3-0 having the only State dive team. The policies and procedures for conducting underwater inspections are included in the consultant agreement contract documents as well as PennDOT Publication 238. PennDOT reviews a sample of underwater inspections as a part of their ongoing QA/QC program.

-As additionally documented under Metric 15, PennDOT is adding an appendix to Publication 238 that is a standard practices manual for measuring and documenting scour. This includes some refined information about the type of documentation expected for underwater and probing inspections.

-Documentation of PennDOT policies/procedures related to UW data item coding, as described above, is attached in the documents library. The document is an excerpt from Publication 100A (BMS2 coding guide) and is associated with PY2018 Metric 18.

PREVIOUS FILE REVIEW RESULTS:

18 Bridge files were selected by the Headquarters-provided sampling tool for review. All bridge files were considered complete. Where the most recent inspection reports were missing from the BMS2 database, PENNDOT was able to promptly acquire them from PTC. All reviewed UW inspection procedures were properly documented in BMS2 as outlined above.

One finding pertaining to the assessment of Metric arose from the knowledge and awareness gained by the reviewer from the Metric 17 file review. All UW inspections were performed by qualified inspectors, but there was no identification of the individual UW inspectors in the reports. All 18 inspection reports exhibited the same finding. All UW inspections are performed either by one of two statewide open end consultant agreements, or, in the case of PennDOT District 3, by an in-house dive inspector. Therefore, review can confirm who all the divers are, either internal or by the staff identified on the consultant agreement; however, information as to the individual divers (if not the inspection TL) is not readily available in the bridge file or inspection report.

PREVIOUS FIELD REVIEW RESULTS:

1 bridges from the intermediate-level file review was included in the field review sample by the Headquarters-provided sampling tool. Additionally, there were 16 bridges in the field review sample over water, to add to reviewer knowledge and awareness. 4 of these 16 had UW dive inspections.

There were no findings pertaining to underwater inspection reports from the field review. It appeared from review of the UW inspections that they had been properly performed when applicable, and the results of the UW inspection had been incorporated into the routine inspection condition ratings as appropriate. For the 1 bridge from the intermediate-level file review sample, no issues were found with coding of Items 38, 111, 39, 40, or 116.

PY2021 FIELD REVIEW:

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There were no bridges with underwater inspection reports selected in the PY2021 field review random sample.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 17 because all bridges requiring UW inspection have procedures, and all bridges requiring UW inspections are inspected according to these procedures.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	18 - Inspection Procedures - Scour Critical Bridges			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 18, the Division performed the following tasks:

- Review MAR18Summaryand resolve previously identified unevaluated bridges.
- Assess based on previous review results, the status of any new compliance deficiencies, and from the reviewer's knowledge and awareness of the State's processes and practices.
-

Observations

MAR18 GENERATION:
HIBS National Bridge Inventory Engineer accepted the PennDOT data submittal on 4/22/2020. The Division generated MAR18 on 5/28/2020. The Division completed the review of apparent compliance deficiencies by 12/22/2020

MAR18 RESOLUTION:
PY2021 MAR18 flagged 2 bridge records with Item 113= 6, U, or T. In both cases the PENNDOT Scour Calculator function of BMS2 needed to be rerun.
After resolution and overrides as described above, the PY2021 MAR18 snapshot indicates compliance

PREVIOUS REVIEW RESULTS:
This metric was last reviewed at the Intermediate-AL level in PY2019. The Division generated the Intermediate-AL file review sample utilizing the Headquarters-provided sampling tool. The following items were reviewed and documented on the field review forms provided by Headquarters:

- Whether a scour evaluation is in the bridge file, and if that evaluation is appropriate (ie state bridges designed after 1991 have scour calculations/H&H report; others may have an observed assessment in accordance with the above described procedure; if a 7, should have some type of H&H performed). Observed assessment input data was reviewed for reasonableness.
- Whether Item 113 coding matches the assessment.
- For scour critical bridges, whether the POA has been developed and implemented.
- For scour critical bridges, attempted to determine if a triggering event has occurred within the last 2 years (as review was conducted in October 2018, this was taken as CY 2018, 2017, and 2016), and if there was documentation of intra-flood and post-flood monitoring.
    - For the 3 scour critical bridges in the sample, potential triggering events were identified for Summer 2018, but not for 2017 or 2016.
    - This determination was conducted by asking the responsible state personnel, but also the Division attempted to independently identify/confirm using the information on the POA, Stream Stats, and Weather Underground historical data.
    -

Refer to the file review summary, attached in the document library under PY2019 Metric 18, and the file review

forms, attached in the document library under PY2019 Metric 17.
Generally speaking, the Division determined all bridges had scour evaluations per state requirements. The Division found minor issues with 1 observed scour evaluation from the sample, which had recently had changes to the streambed material (IN15) for one abutment, resulting in the change in Item 113 coding from a 5 to a 3. This bridge spans a lake controlled by a reservoir, so water level is essentially constant. Inspection notes indicate presence of a large amount of fine silt at one abutment, through which the underwater inspector concluded they were probing the footing. Without pictures of the stream bed material and without performing a field review ,it is difficult to say definitively whether the 5 or 3 is a more accurate coding; however, this is indicative of one possible weakness in the PennDOT observed scour assessment process. The scour coding generated is very sensitive to changes in the streambed material item (IN15), which may be difficult in some cases for the inspector to code accurately.
All 3 scour critical bridges in the sample had POAs in place. The POAs generally met PennDOT policy. 2 of the 3 bridges did not have triggering events in 2016, 2017, or summer 2018. As described above, one is over a lake and does not see much variation in flow. 1 (BRKEY 21467) had been demo'd by summer 2018 when most parts of the state saw triggering events. The third, BRKEY 32727 is a locally owned bridge that the Division is reasonably sure had a triggering event in summer 2018. There is documentation in the bridge file that the bridge received post-flood inspections after 2 events; however, there is not documentation of the monitoring that occurred during the flood event. Per the POA, the bridge is to receive monitoring during any flood events in the watershed at a frequency of 12 hours. Based on discussions with the state personnel responsible for oversight, and their discussions with the local owner, it is likely that monitoring occurred and that the road was closed due to flooding of approaches/other locations during some or all of the event. The bridge and roadway are considered very low risk, local low-volume.
FIELD REVIEW:
In total, 16 bridges field reviewed were part of the PY2019 Metric 18 population, including 2 from the Intermediate-AL file review sample. Field review forms may be found in the attachment library under PY2019 Metric 12. A summary of the Metric 18 field review results may be found attached under PY2019 Metric 18.
In summary, for BRKEY 14642, Item 113 was coded as a 3 but appeared to be founded on rock (coded alluvium). The bridge had recently been overtopped and did not appear to have any additional scour. While the 3 was correct by PennDOT coding based on the items coded by the inspectors, we felt a 5 could have been appropriate. For BRKEY 22902, Item 113 was coded 7, but the bridge had a paved channel as part of the original design, with no distress to the channel paving. Therefore we felt 8 would be the more appropriate coding since the paved channel countermeasure was part of the original design not to address an existing scour problem. For the remaining bridges in the PY2019 Metric 18 population, the Division agreed with the Item 113 coding as observed. For the 2 field review bridges in the Intermediate-AL sample, the Division concurred with the Item 71 and 61 coding.

REVIEW OF PENNDOT POLICY:
Scour Evaluation and Assessment:

Publication 238 IP 2.6.3 lays out requirements for the scour assessment of bridges. 2.6.3.1 specifies that there are two acceptable methods of performing scour assessments, theoretical scour calculations (H&H analysis) or an observed scour analysis utilizing PennDOT Observed Scour Assessment for Bridges (OSAB) methodology.

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Per Publication 100A, PennDOT collects information at the substructure-unit level for substructure condition and waterway condition. Waterway information collected pertinent to the scour assessment includes:

- Changes since Last Assessment (Item IN04)- qualitatively characterizes any changes in streambed/scour since last inspection. Negative changes characterized as none, minor, medium and high. Improvements carry coding from 9 (resolved all problems), 8 to 5 (improvements solved some issues), 4 (inadequate repairs), or 3 (repairs failed or worsened issue).
- Scour Hole (IN05)- characterizes the presence of scour found through visual and probing as none, minor, advanced or serious.
- Abutment Type (IN12)- numerical coding corresponding to the abutment type (stub, cantilever, masonry, etc) or pier type (timber, steel, concrete, masonry, other) for the sub unit.
- Foundation Type (IN13 and IN14)- coding corresponding to footing type for the sub unit (spread, steel h-piles, etc).
- Streambed Material (IN15)- coding describing the natural or improved streambed at the sub unit. Coding is broken into countermeasure/paved, bedrock, or alluvium. Examples of two available alluvium codings, see attached Pub 100A for remaining coding options:
    - A6- stable alluvium predominantly larger native cobbles and boulders (not riprap) with small ammts of fine material filling voids. Deeper holes may exist mid-chanel. Only minor scour near sub unit.
    - A3- Highly erodible alluvium, predominantly very small particles: clays, silts, fine sands. High scour potential at all water velocities. Advanced scour may be present or have occurred in the past.
    -
- Movement Indicator (IN19)- a checkbox (yes/no) indicating whether the sub unit displays any movement (ie rotation, settlement).

These items are coded by the inspector, per substructure unit, at each inspection. Each substructure unit is then assigned a Scour Critical Bridge Indicator (SCBI) (IU27) code, based on the Item 113 coding language. For example, one case that returns an 8 would be:

- Minor or no scour changes (IN04)
- Minor or no scour hole (IN05)
- For any substructure type (IN12)
- Founded on piles (IN14)
- with stable streambed material (IN15)

Another example is that any time the movement indicator is checked (IN19) this automatically will return a 2, since the movement, if due to scour, could be indicative of instability.

Refer to attachment "Scour Calculator Codes" under PY2019 Metric 18 for the full input/output for all scour cases.

This documented process for observed scour analysis is per policy the only acceptable means of coding Item 113 aside from an H&H/HEC18 scour analysis. Therefore, for purposes of this review, the Division considers this to be a documented process for observed scour assessment and fulfills the Metric requirements.

Documentation of policy/procedures described above is attached in the documents library under PY2018 Metric 18, excerpts from Publication 100A and Publication 238 pertaining to Scour evaluation and PennDOT data item coding.

Scour Plans of Action:

Publication 238 IP 2.6.4 lays out requirements of scour POAs. PennDOT prioritizes scour based on Items 4A08

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(NBI Item 113) and Item IN03 (an observed scour assessment, somewhat analogous to Item 113, but coded per substructure unit). Scour Category A bridges include 4A08=2 or IN03<4. Scour Category B bridges include 4A08=3 and IN03=4. Scour Category C bridges include 4A08=3 and IN03 of 5-7. Scour Category D bridges would be anything with a 4A08>3 (non-scour critical). Category A-C are all considered scour critical per NBIS and require a scour POA.
2.6.4.1 lists resources available to aid in monitoring during storm events, including GIS maps, a separate field manual for scour monitoring/inspection (appendix to Pub 238), and weather resources. PennDOT is continuing to implement Bridge Watch as well.
2.6.4.2 lists monitoring requirements and recommendations. Scour monitoring for department force is also covered under Publication 23 (Bridge Maintenance Manual) chapter 9-Emergency Operations, laying out requirements for monitoring before, during and after flood events. 2.6.4.3 contains requirements for post flood inspections, and 2.6.4.4 contains reporting requirements.
These sections of Publication 238 are attached in the documents library under PY2018 Metric 18.

Findings

None

Conclusions

Bases on knowledge and awareness, and in accordance with the ongoing IP activities, Pennsylvania will remain substantially compliant with Metric 18

Division leadership were briefed on 12/18/2019.

Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

PENNDOT should continue implementing the recommendations as outlined in the active IP

Dec 31 Compliance SC

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.
PennDOT developed an Improvement Plan addressing the above findings and recommendations which was accepted and executed **3/31/20**. Refer to attachments and IP library.

Mar 31 Compliance SC

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	19 - Inspection Procedures - Complex Bridges			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 19, the Division assessed based on prior review results and the Division bridge staff's knowledge and awareness of the State's complex bridge inspection policy, procedures, and practices.

Observations

PREVIOUS REVIEW RESULTS:
This metric was last reviewed at the Intermediate level in PY16. The review in PY16 included field review of two complex bridges during their routine inspection. Pennsylvania does not have a large population of complex bridges, with 9 identified on the sampling tool. All field and file reviewed bridges had adequate complex bridge inspection procedures, typically most easily found in the scope of work for the consultant inspection agreements. Procedures addressed inspection procedures, traffic control, access, and hands-on inspection. None of the reviewed bridges required NDT in the inspection, but Publication 238 requires any NDT techniques should be identified in the complex procedures where applicable. None of the reviewed bridges required specialized inspector training or experience.
PennDOT policy for complex bridge inspection procedures is found in Publication 238 IP 2.3.
No changes have been made to this policy since the previous Intermediate-level review.
The next Int-AL review was originally scheduled for PY21, but due to travel restrictions in place during PY21, our assessment schedule has been adjusted. Per HQ guidance, the current 5-year assessment period will be extended for an additional year to accommodate such schedule adjustments, and Metric 19 will be performed at the Int-AL in PY23.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 19, because all complex bridges have inspection procedures for the complex features and detail the additional inspector requirements as necessary, and all bridges are inspected in accordance with the established procedures
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

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None

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Int

Metric Name: 20 - Inspection Procedures - QC/QA | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division performed an Intermediate-level assessment of Metric 20, as described in the "NBIP Compliance Review Manual." The Division review included:

- assessing based on previous review results and the Division's knowledge and awareness of QC/QA procedures;
- reviewing written procedures to verify that the key components of the QC/QA procedures meet the requirements of the NBIS;
- verifying that a process exists to document the bridges that have received QC or QA;
- reviewing documentation of QA reviews for number of reviews, types of reviews, and findings, verifying that any measurable review requirements have been achieved;
- assessing whether the procedures are effective in improving program accuracy and consistency, by determining if actions resulting from the QA findings are being taken;
- performing interviews of personnel responsible for QC and/or QA reviews to verify that procedures are used.
-

Observations

The following observations pertain to Pennsylvania's program, based on the National Bridge Inspection Standards and the Metric 20 criteria and commentary provided in the “NBIP Compliance Review Manual." This metric was last assessed at the Intermediate-level in PY15, finding Pennsylvania to be Compliant. The following observations document a review of the written QC and QA procedures, review of QA documentation, interview of PennDOT staff to gauge effectiveness of delegation procedures, and Division knowledge and awareness of programmatic improvements made thru the QC/QA program.

<u>QC Procedures and Process:</u>

- Written QC procedures are documented in Publication 238 and are delegated to District or owner level. The QC procedures from Publication 238 are attached to this review in the attachments library, associated with PY21 Metric 20.
    - Publication 238 defines QC as "...enforcement, by a supervisor, of procedures intended to maintain the quality of a product at or above a specified level. QC is a daily operational function performed in each organization performing safety inspection, including owners, consultants, and District Bridge Units."
    - The District Bridge Engineer ensures qualifications of personnel (experience, training, and refresher) for all consultants, owners, and District staff.
    - Bridge Inspection Team Leader:
        - reviews and submits all data and notes in the iForms (inspection reporting input software that links to BMS2 database).
        - Provides written notification to owner of record and copies Department.
        - Contacts owner within 24 hours and coordinates with District on critical or high-priority maintenance

recommendations for state owned bridges.

• If consultant, performs internal QC/QA procedures as required by the consultant agreement. All Department consultant agreements include a QC/QA control component as required by engineering services agreement regulation. This is included in the standard scope found in Publication 93.

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- District Reviewer
  - • Reviews all reports after submittal by Team Leader, for accuracy and completeness. Once review is complete, Reviewer will approve the report in BMS2. This changes the status of the report from "submitted" to "approved." Only "approved" data is submitted to the NBI and put into production.
  - • Informs District Bridge Engineer when reports include critical or high priority maintenance recommendations.
  - • Must be a P.E. for review of overall Poor condition (previously SD) bridges.
  - • Periodically performs site visits to review bridges inspected in the last quarter. This is not a requirement, but listed as a best practice and per interview with district and owner personnel, is completed periodically.
  - • Routine meetings with inspection staff and communication of findings.
  - • Periodically reviews bridge files for completeness.
  - •
- District Bridge Engineer
  - • Reviews inspections for bridges with critical or high priority maintenance items, or those with overall condition rating of 3 or less prior to acceptance.
  - • Develops plan of action for each critical or high priority maintenance item.
  - • Conduct annual meetings with bridge staff.
  - •
  - •

• Central Office Data Quality:

• PennDOT Central Office maintains the BMS2 database, consolidates data into NBI submittals, and maintains iForms. Through these tools, they perform a variety of data quality QC.

• BMS2 data validation, in the form of failure, errors, warnings, and check messages: This process was implemented in order to create cleaner NBI submittals and reduce the workload that went into cleaning up the "tape" or submittal. All of the FHWA NBI data checks, and other checks based on findings from QC/QA reviews, are performed automatically by BMS2 when the report is placed into submitted status. The validation process is described in Publication 100A. The pertinent section of Pub 100A is uploaded to the attachments library, associated with PY21 Metric 20.

• Critical errors (failures) will prevent acceptance of the report, typically missing or invalid entry.

• Error validations will not prevent acceptance, but must be addressed by owner or district. Typically an entered value outside of the acceptable range.

• Warnings are a lesser issue, meant to alert the reviewer to a potential issue similar to the checks performed by FHWA. In some cases this data may be valid.

• Information/check messages are potential issues that are not necessary to address by the District reviewer, but may be informational to Central Office staff about potential issues with an automated

calculation field.

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• Central Office staff additionally performs QC on timeliness of inspections through monthly reporting, and tracks information on load ratings, postings, and scour evaluations. This has lead to significant improvements to the timeliness of inspections over the last 5+ years, back to the beginning of the NBIP metric-based reviews. All interval/frequency metrics have improved to fully compliant and maintained compliance for at least three review cycles.

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• Key components of QC procedures (source: FHWA NBIS QC/QA Framework)

• 1. Define and document QC roles and responsibilities- roles and responsibilities are clearly defined in Publication 238 IP Chapter 6.

• 2. Document Qualifications for PM, TL, inspection team member, and load rater- personnel qualifications are clearly documented in Publication 238 IP Chapter 2 for inspection personnel, and load raters in IE chapter 3.

• 3. Document process for tracking of qualifications: Documented in Publication 238 IP Chapter 2. PennDOT requires all inspection personnel to attend the PennDOT comprehensive course and hold a CBSI (certified bridge safety inspector) qualification, not just Team Leaders. Training completion log is maintained by the PennDOT training coordinators and available to review. Experience qualifications are tracked by resume or licensure. For Departmental personnel, it is a requirement to even apply for the position by the position description. For consultants, resume reviewed as a part of the qualifications based selection process.

• 4. Document required refresher trainings: clearly documented in Publication 238 IP Chapter 2 and Chapter 7. PennDOT develops and delivers a 3-day refresher training, required biennially to maintain CBSI qualification. Refresher training completion is tracked in in the training log similarly to comprehensive.

• 5. Documentation of special skills, training, and equipment needs for specific types of inspection- clearly documented requirements in Publication 238 IP Chapter 7 highlights several courses including Underwater, FCM inspection, load rating, and stream stability/scour.

• 6. Documented procedures for review and validation of inspection reports and data- refer to above. Based on interviews and discussion with Districts, many utilize specific check lists developed at the District level for QC acceptance reviews.

• 7. Documented procedures for identification and resolution of data errors, omissions, and/or changes- refer to above. Primarily a central office-led activity through BMS2 system checks.

•

• Based on interviews with staff, knowledge and awareness of the program, and review of the other metrics, the Division finds that the QC reviews are being carried out as required by the Districts. The QC review process, particularly the data checks implemented in BMS2, have led to significant improvements in the NBI data quality over the past several years.

• Interviews were conducted with the Program Manager, PennDOT District 9 staff, and the Pennsylvania Turnpike. Discussion included QC procedures for the Districts and Turnpike, as well as QA procedures overall. The interviews are uploaded and associated with PY21 Metric 1, although additional questions focusing on the QC/QA program are included.

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-

- Based on interview of Pennsylvania Turnpike, and discussion with other owners, owners are aware and execute QC procedures, and work well with the District bridge units.

QA Procedures and Process:

- PennDOT has extensive QA procedures, which are summarized in Publication 238, as well as detailed procedures found in Publication 240- Bridge QA Manual. Publication 238 QC/QA sections and Publication 240 in its entirety have been uploaded to the attachments library associated with PY21 Metric 20.
- QA is primarily a Central Office function, and is performed under consultant agreement.
- The purpose of the QA process is stated as "...to measure the accuracy and consistency of Pennsylvania's bridge safety inspection. The findings....are used to enhance or emphasize training needs....and to address any statewide inspection anomalies."
- The QA consultant is selected through a qualifications based process.
- The QA consultant independently and blindly re-inspects 20 bridges in each District (local and State) and 10 bridges owned by other agencies on an annual basis. The bridges are randomly selected.
- The ratings from 10 inspection items as well as the condition ratings are compared to the original, and assigned typical tolerances. Load ratings are included in this. Any out of tolerance items are noted and discussed with the District.
- Results are provided in District Summary Reports annually, and a close-out meeting is held with the District.
- Key Components of QA procedures (source: FHWA NBIS QC/QA Framework):
  - 1. Clearly document roles and responsibilities: Roles and responsibilities are clearly defined in Publication 238 and Publication 240.
  - 2. Document procedures for office and field QA reviews, including:
    - a. Procedures for documentation and sharing results, including annual report: PennDOT QA consultant documents findings per District and prepares District close-out reports and an overall close out report. These results are shared well within the District, but recent discussion with PennDOT has recommended providing more review findings to all Districts, as what is found in one may be replicated in others. PennDOT is planning to modify their QA process slightly and include webinars sharing findings across Districts. Additionally, findings feed into refresher training development.
    - b. Establish frequency parameters, including review frequency and recommended numbers of bridges: Publication 238 and 240 clearly document that all Districts have 20 bridges reviewed annually, as well as 10 bridges from other owners statewide.
    - c. Procedures and sampling parameters: PennDOT sampling parameters are discussed in Publication 238 and laid out in detail in Publication 240. A random sample ensuring representative of condition, programming, etc is prepared for each District, similar to the process FHWA uses for Metric 12 and 22 sampling.
    - d. Procedures for reviewing current inspection report, bridge file, and load rating- as clearly documented in Publication 238 and 240, a file content checklist is reviewed, past inspections, and load rating analysis for all bridges among other file review requirements. In addition, an independent load rating analysis is preformed. In addition, a full blind re-inspection of the bridge focusing on a set of data items is performed to validate the field conditions with the inspection report.
    - e. Procedures to validate qualifications of inspector and load rater- while qualifications of the QA team

members are clearly defined, the process does not currently include validation of inspection or load rater qualifications. PennDOT considers that to be a QC activity and has not had many problems with this due to training documentation being done centrally by the Department. However, this will be provided as a recommendation for the Department to consider adding to the QA procedures as Publication 240 is updated.

- f. Define out of tolerance: publication 240 clearly defines tolerance for data items reviewed.
- g. Checklists covering typical items: Publication 240 includes checklists utilized to document QA reviews.
-

- 3/4. Document disqualification procedures for TLs and consultant inspection firms that have a record of poor performance: for Departmental personnel, this is primarily considered a job performance and rating consideration and would be handled through proper HR procedures. For consultant firms, it would be handled through Publication 93/consultant agreement procedures. The Division is aware of several cases where poor performing firms were put on plans of corrective action, with performance being discussed at very high level.
-

- Per the NBIS QC/QA Framework, PennDOT procedures are considered a "commendable" practice by the FHWA, and are cited as comprehensive and an excellent example.
- Because PennDOT handles their own refresher training, there is a good crossover between the refresher, the QA findings, and even the NBIP process findings. The refresher training is developed on a 2-year cycle and is required biennially, so every time an inspector attends it should be updated materials. A good portion of the course is dedicated to "hot topics," which are either policy changes or issues found in QA/NBIP process that can reach a broad audience. The Division considers this to be a commendable and best practice nationally. In addition, QA findings are given consideration when determining what courses to offer or develop. Most recently a PennDOT scour practices course was developed to coincide with significant changes to scour documentation and evaluation procedures in Publication 238. This indicates that findings from QC/QA are being utilized at a programmatic level to drive training and improvements to the overall program.
- Documentation of the QA reviews, in the form of close-out reports, were reviewed for PY21 (CY2020). In discussion with PennDOT, FHWA will be included on the distribution of close out reports in the future as this is of interest to the broader program and will allow further communication of findings. Documentation of the QA reviews is extensive, and demonstrates that the reviews are conducted in compliance with state policy and procedures. An example QA close out report is uploaded to the attachments library associated with PY21 Metric 20.
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Findings

None.

Conclusions

Compliance levels are assessed based on the language provided in the “NBIP Compliance Review Manual.” PennDOT is compliant with Metric 20, because:

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• QC/QA procedures are established, documented, implemented, and effective;
• QC/QA procedures include periodic field review of inspection teams, periodic refresher training requirements, and independent review of inspection reports and computations.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

The following recommendation represents an observation and potential area of improvement. After discussion with BSE, it was determined that it would not presently be appropriate to consider QA of element-level inspection data in the assessment of Metric 20. However, it is noted that Publication 240 does not currently address element-level data QA during the file or field review component of QA procedures. Therefore, the Division recommends as PennDOT updates Publication 240 in CY2021, that procedures be developed for QA of element level data. Note- as QC procedures are done on report-basis, they do include review of all data including element-level data, and QC data checks in BMS2 are performed on element data.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	21 - Inspection Procedures - Critical Findings			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the Minimum Assessment (Min-AL) of Metric 21, the Division performed the following review activities.

- Monitor the periodic notifications toconfirm that criticalfindingsare being addressed.
- Verify the status of any critical findings during field reviews of bridges for Metrics 12 and 22.

Assess based onprevious review results andthe reviewer's knowledge and awareness of the State's process for addressing critical findings.

Observations

PY2021 Field Review:
Field review was limited to a file review as described in Metric 12.

PREVIOUS REVIEW RESULTS:
This metric was last assessed at the Intermediate level in PY2019. The results of that review are listed below.
REVIEW OF PENNDOT POLICY
PennDOT policy has undergone revisions subsequent to PY2018 review and PY2018 PCA. The definition of a critical finding is consistent with the NBIS: any structural or safety issue that requires immediate follow-up action. In terms of existing PennDOT policy, this would consistent of 3 things: anything that would be a Priority 0 maintenance item (critical) for a structural component; an issue that would lead to closure of the bridge, reported on Bridge Problem Reports; or, any bridge with a structural component (deck, super, sub or scour) condition rating of 2 or less. These 3 categories are described in more detail below.
Please note that all policy was uploaded under Metric 21 in PY2018 and was not re-uploaded under PY2019. Please refer to PY2018 Metric 21 whenever a policy manual or Strike-Off Letter is referenced as uploaded.
<u>Definition of Priority 0 Maintenance Item:</u>
PennDOT Publication 100A (BMS2 Coding Manual) and PennDOT Publication 238 (Bridge Inspection) together lay out the definitions and policies associated with Priority Maintenance Items. Maintenance items are coded and prioritized by the inspector on each inspection, and are broken into categories of Priority 0 (critical) through Priority 5 (routine maintenance).
Per Publication 100A, a Priority 0 indicates a Critical maintenance item, where immediate response is required. Typical timeframe for action is no more than 7 days, but sufficient immediate action should take place to ensure safety of the traveling public.
The definition as it currently stands is:
If not addressed immediately, such deficiencies could directly or indirectly cause partial or total structure collapse resulting from component instability and/or localized element failure; or result in loss of vehicle operator control; or failure to contain errant vehicles on the bridge deck. Emergency Flexaction work (e.g. repair, replacement, posting/closing) is necessary to immediately mitigate the structural safety deficiencies with the required

timeframe.Publication 100A then provides specific examples of Priority 0 maintenance items, broken down into the following bridge categories: Bridge Signing, Deck, Superstructure, Substructure, and Waterway. This excerpt from Publication 100A is attached.

Addressing Priority 0 Maintenance Items:

Per Publication 238 IP 2-14, updated through Strike Off Letter (PennDOT policy memorandum), Priority 0 maintenance items also require the development of a Plan of Action (POA) for addressing the critical deficiencies, to be reviewed and approved by the District Bridge Engineer. The following guidance applies to the development of the POA, defining the timeframes and emphasizing the potential need for immediate action/closure:

- Priority 0 activities are to be resolved or mitigated within 7 days of identification.
- For Priority 0 items, physical action must be taken to resolve the critical deficiency. By definition, this work cannot be deferred. By definition, monitoring alone for Priority 0 items will not suffice.
- The immediate actions taken may not resolve the deficiency, but must restore or mitigate the safety problem to an acceptable level, even if level of service must be reduced. Such an example may be to close the bridge immediately until repairs can commence.
- Additional work at a later time may be needed to restore bridge to full service and safety. This additional work may be needed at a Priority 1 level.
- Development and acceptance of Priority 0 POA should be complete within 2 days and not more than 3 days, with the timeframe beginning on the day when the deficiency is discovered.

Priority 0 Maintenance Item Responsibilities:

Responsibilities at all levels are outlined in Publication 238 IP 2.14.2, with some of these responsibilities highlighted here. The responsibilities for review and development of POAs falls with the District Bridge Engineer and staff. District Bridge Engineer is also responsible for design of repair, status reports to PennDOT Central Office, and ultimately inspecting and accepting the repair when completed. District Maintenance personnel may be responsible for completing and tracking work, or the District may be responsible for contracting the work. PennDOT Central Office provides technical assistance and provides status reports. The pertinent sections of Publication 238 and associated memoranda updates are also attached in SMART, under the PY2018 Metric 21. For local owners, a POA is also required. The POA is developed in coordination with the District, and should occur along similar timeframes. The onus is on the inspector to inform the District and Owner, to begin the process.

Priority 0 Maintenance Item Documentation and Tracking:

The priority 0 recommendation is documented in BMS2 on the Maintenance Item screen. The POA is also documented here with approvals. Documentation of the actions taken to address Priority 0 maintenance items occurs in BMS2 on the completed maintenance item screen including date work was completed and scope of repair. Typically a limited-scope inspection will also occur post repair, documented as a Problem Area inspection in BMS2. The maintenance item functionality on BMS2 serves other purposes as well; for work completed by Department forces it links to their financial transaction system (SAP) to create a work ticket to bill the work to, acquire materials, track and bill worker time, etc.

Priority 0 maintenance items are tracked by PennDOT Central Office in their internal metrics. Central Office staff (Bridge Maintenance Engineer Scott Snyder, P.E.) track the status of open Priority 0 maintenance items weekly, and follow-up with the Districts to ensure that issues are being addressed and in a timely manner.

FHWA Notification of Priority 0 Maintenance Items:

FHWA receives automated notification of any Priority 0 maintenance items from PennDOT BMS2, when the inspection is saved in iForms (inspection software). This means, generally, the Division receives automated notification within 1 day to 1 week from the finding.

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The Division tracks these findings in a spreadsheet by Performance Year. Please reference the PY2019 Metric 21 attachments for all critical findings tracked for the time period of January 2018 to December 2018.
From previous reviews, the Division and PennDOT determined that the PennDOT Bridge Problem Reports (BPRs), which are prepared in accordance with PennDOT Publication 238 Appendix IP-02B and any associated updates in active Strike-off Letters, serve as FHWA notification of critical findings. The Division receives these notifications, and feel they provide a valuable service to both Division and PennDOT management. The Division is satisfied with the current level and speed of communication of these type of closure critical findings by email or by phone.

Bridges in Critical Condition:

Similar to the Priority 0 notifications, the Division receives automated notifications of bridges that receive a component condition rating of 2 or less on an inspection. Notification is generally received within 1 week, often as soon as 1 day from the inspection finding. Notification is generated after the iForms (inspection software) inspection is saved into BMS2, which, as a best practice, should be done daily so information is not lost. The Division tracks these findings in a spreadsheet by Performance Year. Please reference the PY2019 Metric 21 attachments for all critical findings tracked for the time period of January 2018 to December 2018.
Bridges in critical condition for scour are required to have at least a Priority 1 maintenance item (6 month follow-up timeframe) for underpinning repair/scour countermeasures. The District works with local owners to complete a plan of action for completion of the priority repairs. The District is also responsible to review scour or superstructure deterioration to ensure the extent of the scour/deterioration has not increased from the previous inspection. Any bridges with a 2 or less rating for scour will receive a 6-month interval inspection. No bridge with any 2 or less component condition rating would receive inspection at an interval exceeding 12 months.

Bridge Problem Reports:

For more immediate incidents and those requiring closure of bridges, FHWA receives notification through Bridge Problem Report process. PennDOT Bridge Problem Reports (BPRs) are prepared in accordance with PennDOT Publication 238 Appendix IP-02B and any associated updates in active Strike-off Letters, serve as the third type of FHWA notification of critical findings. A BPR is essentially a short summary of an incident that has caused a short or permanent closure of a bridge, typically received within a day to week. Some BPRs deal with inspection findings, while many are follow-ups from damage incidents (over height vehicle collisions, fires, etc).

FILE REVIEW:

Intermediate Level Sample:

The Intermediate level random sample was developed using the HQ-provided NBIP sampling tool. No critical findings remained open at the time of last assessment, which, for purposes of this review was considered to begin after December 2017. With the scrutiny and review of critical findings conducted in PY2018, the Division wanted to sample critical findings made subsequent to the new policy (taken as January 2018). Additionally, as discussed above, all critical findings in PY2019 received some level of review to determine if the new policy was effected, as tracked in the attached Critical Finding Tracking spreadsheet.

Scope of File Review:

Each bridge file was reviewed to determine if the critical finding was addressed (actions were taken to protect the public safety including closure, repair or replacement) in a timely manner (within the timeframes established in PennDOT policy), that the critical finding and any actions taken have adequate documentation in the bridge file, and that notification of the critical finding was provided to FHWA.

File Review Results:

File review results are summarized in the attached summary spreadsheet.

Field Review Result:

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The field review sample included 6 bridges from the Metric 21 population, including 1 bridge from the Metric 21 intermediate-level file review sample. 1 of these bridges (BRKEY7582) had been closed then had major rehabilitation work done on the super and substructure, such that the bridge is now in overall fair condition. 1 local bridge (BRKEY7558) had a critical finding that had been documented as addressed, for the repair of several partially cracked welds where the crack was in the weld material. From documentation it was not clear what method for repair had been used (work completed by local owner maintenance crews), but it was documented as occurring within the correct timeframe (3 days after inspection finding). 1 state bridge (BRKEY10089) had a critical finding for loose/spalled haunch concrete on the underside that was determined to have the potential to fall onto underpassing traffic. The process for development of a POA to address (remove concrete at haunches, specified which beam lines and which bays) was followed, and the work was documented when completed. Work was completed within 4 days of the inspection finding.
Two local bridges from the field review sample (BRKEY 27944 and 27955, which were also on the Review of Locally Owned Bridges list) were closed subsequent to FHWA review due to excessive scour and undermining of masonry abutments. One other local bridge (BRKEY had a potential critical finding with regards to a section of deck that had a hole through it. Steel plates had been placed over the area, spanning from beyond the first adjacent beam on either side of the hole. The plates had shifted from the previous inspection and needed to be reset.

PY21 MONITORING OF CRITICAL FINDING REPORTS:
Critical findings for PY2021, through 9/31/2020, are attached with FHWA review comments, in the documents library associated with PY2021 Metric 21. 73 critical findings were tracked in the period from 3/31/2020 to 9/31/2020.
FHWA implemented a national Critical Finding Database that that launched within PY21. Of the 73 CFs reported to the Division, 33 were added for tracking in the national CFD.

Findings

None

Conclusions

Pennsylvania is compliant with Metric 21, because a documented procedure has been established and implemented to assure critical findings are addressed in a timely manner; all critical findings reviewed were addressed and documented in accordance with the procedure; and the period for notifying the FHWA of critical findings is established and followed.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY21

State: Pennsylvania | Review Year: PY21 | Assessment Level: Min

Metric Name: 22 - Inventory - Prepare and Maintain | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For PY21, the Division completed a Minimum-level assessment of Metric 22, as described in the "NBIP Compliance Review Manual." The Division review included:

- performing field reviews of bridges sampled at a LOC 80%/MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to verify NBI SI&A items with information in the bridge file and field conditions for the SI&A items identified on the HQ-provided Field Review Form.
- resolving any safety-related checks and persistent error reports generated during the NBI submittal process;
- noting any other NBI data errors found during review of other metrics, for knowledge and awareness;
- performing a pilot review of National Bridge Element inventorying in accordance with process and procedures developed by FHWA HQ/RC (reference materials presented during 5/28/2020 PY21 NBIP/NTIP kick-off webinar).

Due to ongoing travel restrictions during the review timeframe of PY21, the Division was unable to conduct on-site field reviews. Reference FHWA HIBS Director 5/27/2020 email "INFORMATION: Annual Requirements for the Reviews of the National Bridge and Tunnel Inspection Programs and Critical Findings Reporting 2020" and materials presented during 5/28/2020 PY21 NBIP/NTIP kick-off webinar.

Due to travel restrictions, the review team limited the scope of the review to only that information which could be gathered from the bridge file. As such, the sample population was not limited to any district and pulled from the entire Statewide inventory. The updated plan for review is as follows (see document library for a map of the PennDOT Districts, it is associated with PY2018 Metric 1 FSM):

PY18: Districts 4, 5, 6
PY19:Districts 8, 10
PY20:Districts 2, 3, 9
PY21: All Districts
PY22:Districts 1 and 12
PY23:11

Observations

Metric 22 was last assessed at the Int-AL in PY2020

FIELD REVIEW METHODOLOGY:

Due to ongoing pandemic travel restrictions during PY21, the following methodology was utilized for review of the SI&A data items identified on the Field Review Forms:

- Item 70 - reviewed the posting status and photos of posting signage. Reviewed load rating in cases where Item 70=4 and Item 41 =/= P.
- Item 41 - confirmed in BMS2 and inspection report/photos.
- Item 113 - confirmed in BMS2 and inspection report. If the scour assessment was an observed scour

assessment, reviewed inspection report notes and other available documentation (channel sections, etc) to determine if it makes reasonable sense. If 113=7, confirmed that countermeasures are noted as installed.

- Item 112 - confirmed using field sketch or plans.
- Item 104 - confirmed using PennDOT NHS maps or FHWA HEPGIS NHS maps.
- Item 101 - confirmed using google maps/inspection report.
- Item 26 - confirmed using PennDOT functional classification maps.
- Item 100 - confirmed using PennDOT STRAHNET maps or FHWA HEPGIS.
- Item 101, 102 and 103 - confirmed using Aerial Maps and photos
- Item 105 - confirmed using knowledge and awareness of FLH.
- Item 110 – confirmed using FHWA
- Item 20 - confirmed using knowledge and awareness of toll roads.
- Item 21 and 22 - confirmed using PennDOT BMS2.
- Item 37 - confirmed using engineering judgement and PA SHPO CRGIS system (cultural resources GIS system including any bridges assessed for national register eligibility).

Overall, out of the 304 data items reviewed for the full 19 bridge sample, the Division found during field review that the SI&A coding for 6 items (2.0% of items reviewed) was out of the acceptable tolerance.
The most common error in coding was Item 100 (Defense Highway Designation) with 3 occurrences, with items 70, 113, and 102 all having a single occurrence in the sample. The item 100 coding error was found to be due to a default setting within PENNDOT's system that automatically designated NHS Bridges as also part of the STRAHNET.

NBI SUBMITTAL CHECKS:

-The Division reviewed the HQ data checks with PennDOT. All bridges identified on the persistent errors were identified as exceptions rather than true errors. These persistent errors are largely from a long standing PennDOT practice of coding bridges with culvert extensions as a bridge (Item 43b=/=19), but reporting an Item 62 culvert rating along with Item 58, 59, and 60. The other common exceptions pertained to a null deck width for filled masonry arches and bridges under fill, and again has been PennDOT practice for some time. A list of exceptions for the persistent errors has been developed and is uploaded and attached in the documents library for future use.

-No safety check issues were identified on the submittal checks.

- PennDOT received final acceptance of theirNBI data onApril 22, 2020

PY21 PILOT ELEMENT LEVEL FILE REVIEW RESULTS:

Two bridges from the field sample were reviewed for the accuracy of the Element-Level Data (BRKEY 6877 and 22612).
BRKEY 6877: All elements with CS3/CS4 defects were noted in the element data.
For the purposes of Metric 22, the total number of required NBEs was correct, but there were 2/6 missing BMEs. The data identified in the inspection report was correctly reported to FHWA.
BRKEY 22612: The inspection report did <u>not</u> meet criteria as not all elements with CS3/CS4 defects were noted in the element data. For Element 331 (RC Rail) Span 2 did not have any quantity noted as CS4, but photo 13 of the inspection report (Span 2 Left parapet) showed detached and/or missing rebar for several feet. From photos, the reviewer believes some sections on the left side of span 2 belong in CS4.
For the purposes of Metric 22, the total number of required NBEs was correct, as was the total number of BMEs.

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State: Pennsylvania

Review Year: PY21

The data identified in the inspection report was correctly reported to FHWA.
See Element-Level field review forms in PY21 Metric 22 attachments

Findings

NHS bridges wereautomatically receiving a STRAHNET designation for Item 100, but the incidence of the error was not enough to affect overall compliance. The issue is being corrected for future data submittals. There were no additional findings.
The pilot element-level data review yielded 2/6 missing NBEs for one report, for a total of 2/15 missing elements from both inspection reports. The pilot review was for informational purpose only, and does not contribute to the compliance determination in PY21.

Conclusions

Pennsylvania is compliant with Metric 22 because 98.0% of the inventory items reviewed are within the acceptable tolerances, all identified items not within the acceptable tolerances were corrected, and FHWA data checks did not find any true errors.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

None

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY21

State	Pennsylvania	Review Year	PY21	Assessment Level	Min
Metric Name	23 - Inventory - Timely Updating of Data			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 23, the Division performed the following tasks:
• Verified the state submittal of SI&A data to the NBI, and verified that any issues identified were resolved in the specified timeframe.
• Assessed based on prior review results and the Division bridge staff's knowledge and awareness of the State's program.
•

Observations

Metric 23 was last assessed at the Int-AL in PY2015
SUBMITTAL OF 2021 NBI DATA:
PennDOT made the 2020 submission by March 15 as verified by NBI administrator (see attached correspondence in documents library under PY2021 Metric 23. Data was given final acceptance on April 22, 2020
VERIFICATION OF UPDATE OF SI&A DATA:
PennDOT records Item 90 (inspection date) using MM/DD/YY format in BMS2, and by policy this is supposed to be the date the inspection began and was created in their iForms inspection form program. PennDOT BMS2 also records when the inspection is accepted by the reviewer, which uploads most of the SI&A data into the database. For most inspections, they can then use these two dates to determine if the data was updated in the 90/180 day format. If the inspection lasts longer than 1 day, then there is technically less than 90/180 days to update the data. This may be a bigger issue on large, complex inspections that take longer than a day to perform, or cases where an inspector may begin and complete a majority of the inspection but must return at a later date to complete the work (ie, inspection of spans directly over railroad where flaggers were not available).
PennDOT tracks this information on their internal metrics, as acceptance of data is also important for them to be able to do effective tracking of inspection timeliness. (For example, on the frequency metrics, padding the inspection date by 90 days pushes them into at best substantial compliance if an inspection were to be missed.)
One improvement is to the actual NBI data. PennDOT central office now puts out a notice ahead of their data submittal cut off (usually 12/31), asking all districts to review any backlog of inspections and get them accepted ahead of 12/31. This noticeably cuts down on the number of overdue bridges tat show up as overdue in the MARS.

Findings

PennDOT does not accept 100% of inspections within the required 90/180 day timeframe. This is indicated by PennDOT tracking data showing less than 100% of inspections accepted within the required timeframe, however, significant improvement has been made over the last several years towards 100% acceptance.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY21

Conclusions

Pennsylvania is substantially compliant with Metric 23, because less than 100% of inspections are updated in the State inventory within the required 90/180 days.
Division leadership were briefed on 12/18/2020.
Compliance determinations were discussed with the State Program Manager on 12/23/2020.

Recommendations

Please see the active IP uploaded to the Dashboard for recommendations related to PY2021 Metric 23

Dec 31 Compliance: SC

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

There were no changes in compliance status from the 12/31/20 preliminary determination. Final compliance determinations were shared with the State on 3/31/21 and Division leadership were briefed.
PennDOT developed an Improvement Plan addressing the above findings and recommendations which was accepted and executed **3/31/20**. Refer to attachments and IP library.

Mar 31 Compliance: SC

Mar 31 Resolution Complete: ☑