U.S. Department of Transportation
Federal Highway Administration

National Bridge Inspection Program

Review Year PY18

FSM Summary Sheet

State Name: Pennsylvania

Metric Number	Prior Year	Assess. Level	Dec 31 Compl.	Mar 31 Compl.
01 - Bridge Inspection Organization	C	Min	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	Int	C	C
07 - Inspection Frequency - Routine - Higher Risk Bridges	C	Int	C	C
08 - Inspection Frequency - Underwater - Lower Risk Bridg	SC	Int	C	C
09 - Inspection Frequency - Underwater - Higher Risk Brid	SC	Int	C	C
10 - Inspection Frequency - Fracture Critical Member	SC	Int	SC	SC
11 - Inspection Frequency - Frequency Criteria	SC	Int	C	C
12 - Inspection Procedures - Quality Inspections	C	Min	C	C
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	C	Min	C	C
17 - Inspection Procedures - Underwater	C	Min	C	C
18 - Inspection Procedures - Scour Critical Bridges	C	Min	C	C
19 - Inspection Procedures - Complex Bridges	C	Min	C	C
20 - Inspection Procedures - QC/QA	C	Min	C	C
21 - Inspection Procedures - Critical Findings	C	Int	CC	SC
22 - Inventory - Prepare and Maintain	C	Int	C	C
23 - Inventory - Timely Updating of Data	SC	Min	SC	SC

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Min
Metric Name	01 - Bridge Inspection Organization			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 1, the Division assessed based on previous review results, the Division 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

ORGANIZATION IN PLACE

-PennDOT is a geographically decentralized organization, with a majority of 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, James Long, P.E., is based out of Central Office.

-Central Office staff includes Mike Winslow, P.E., the BMS2 manager; Scott Snyder, P.E., the bridge maintenance manager; and a currently vacant QC/QA manager. The maintenance manager position had been vacant for several years and was filled in late 2016. The QC/QA manager position has been vacant for all of 2017, with the Program Manager filling in for those responsibilities.

-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.

ORGANIZATIONAL ROLES AND RESPONSIBILITIES

-In the case of bridge inspection, a majority of 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.

-Central Office performs independent QA/QC program with policies and procedures detailed in the PennDOT Pub 240 Bridge Safety Inspection Quality Assurance Manual. Further information about the QA/QC 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

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Department has a clearly defined safety responsibility under federal reg 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.

DELEGATED RESPONSIBILITY:

-Functions delegated to other agencies, consultants, and other bureaus within the PennDOT are clearly defined in PennDOT Pub 238 Bridge Safety Inspection Manual. 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 FHWA/the federal agency.
-Other owners such as railroads are more complicated situations. Typically the Pennsylvania 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 bridge.

PROGRAM MANAGER

-The State has a designated Program Manager, James Long, P.E., who is based out of Central Office.

ORGANIZATIONAL EFFECTIVENESS:

-Improvements continue and compliance issues are addressed proactively by PennDOT in the NBIS process. As of this performance year, 19 metrics are compliant, 2 are substantially compliant, and 1 is conditionally compliant with compliance issues being proactively addressed by the Department. This represents continued improvement over the last 5 years in metric compliance.

-PennDOT has been highly proactive in improving their program to satisfy the NBIP metric requirements. PennDOT has many organizational challenges in meeting the metrics, starting with the fact that each of the 11

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Review Year PY18

geographic Engineering Districts operates largely independently. PennDOT Central Office has established several practices to help keep the Districts in compliance, that the Division considers to be excellent practices for geographically de-centralized DOTs.

-PennDOT runs a monthly report for each District that functions similarly to the Metric Assessment Reports. The reports flags any overdue inspections, as well as any inspections due in that month. The District is expected to respond and provide a scheduled inspection date for all inspection due in that month. The underwater version of the report also attempts to identify whether bridges are scheduled for the proper interval of underwater inspection, by looking at PennDOT-specific data items pertaining to water depth and scour.

-Central Office tracks District performance through metrics for many areas of their overall program (design, construction, inspection, etc.). This effort now includes metrics that mirror some of the more challenging requirements like critical findings or frequency under the NBIP, ensuring that each District remains compliant so that PennDOT overall will remain compliant.

-Overall, the PennDOT has a strong structure and organizational policies to carry out the bridge safety inspection program.

-This Metric was last reviewed at the Intermediate-AL in PY2015, and is currently scheduled to be assessed at the Intermediate-AL in PY2020.

Findings

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

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Review Year PY18

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania
Review Year: PY18

State: Pennsylvania
Review Year: PY18
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 review of Metric 2, the Division performed the following tasks assessed based on previous review results and the Division bridge staff's knowledge and awareness of the PM's qualifications, and also reviewed the current qualifications of the State PM.

Observations

-The State's Program Manager is James Long, PE.

QUALIFICATIONS:
-The Division confirmed James Long's active Pennsylvania PE license status using the Pennsylvania Department of State public online professional license verification tool, as of 10/18/2017. A screenshot of the confirmation that his license is active is included in the metric documentation.

-James Long, 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 screenshot of this documentation is included in the metric documentation.

REFRESHER TRAINING:
-As shown in the PennDOT training catalog, James Long, PE, is current for his refresher training. The requirement is to pass the refresher training bi-annually. This is reflected in the screenshot of the PennDOT training catalog attached.

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

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Final Summary of Metric

State: Pennsylvania

Review Year: PY18

Recommendations

None.

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY18

State: Pennsylvania | Review Year: PY18 | 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.

Observations

REQUIRED QUALIFICATIONS:

-All inspectors 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 as well as the FHWA HQ, the Division has established that aside from some item number references, the first 2-weeks of the PennDOT training is virtually identical to NHI-130055 aside from some minor changes to sections 6.3d and 7.1. The third week of the training focuses on PennDOT-specific items and requirements. Successful completion 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 part of their RFQ package.

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

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training.

PREVIOUS REVIEW RESULTS:

-The Division determined that PennDOT was fully compliant with Metric 3 after an In-Depth review in PY16, and the metric is next scheduled to be assessed at the Intermediate-AL in PY2021.

-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.

-The Division did develop some minor recommendations to help PennDOT strengthen the experience requirements of consultant TLs on consultant agreements. PennDOT and the FHWA continue to work on updating consultant agreement policy in the 2016 update of the PennDOT Publication 238- Bridge Safety Inspection Manual.

-Although Metric 3 is only being assessed at the minimum level, Metric 12 is being assessed at the Intermediate-level. 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 TLSs complete bridge inspection refresher training every other year according to state policy.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

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No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	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 prior review results and on the Division bridge staff's knowledge and awareness of the designated State Load Rating Engineer's qualifications and responsibilities.

Observations

OVERALL RESPONSIBILITY FOR LOAD RATING:

-From an overall program and policy perspective, James Long, 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 PY16. 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 James Long's current PA PE licensure status as of October 2017. See attached screenshot from the Pennsylvania's Professional Licensure Verification System.

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

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State Pennsylvania

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Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania
Review Year: PY18

State: Pennsylvania
Review Year: PY18
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

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

-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.

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 5, because all inspection divers have successfully completed either the FHWA comprehensive bridge inspection training, the FHWA-approved PennDOT comprehensive bridge inspection training, or the FHWA-approved underwater bridge inspection diver training.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

None.

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State Pennsylvania

Review Year PY18

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	06 - Inspection Frequency - Routine - Lower Risk Bridg	Prior Year Compliance	C		

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 6, the Division performed the following tasks:
(1) Generated MAR6 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed and resolved all bridges that were flagged as potentially having overdue inspections.
(3) Reviewed MAR6 Summary for any indication of any new deficiencies.
(4) Reviewed MAR6 and resolved all data for inspections that were flagged as exceeding the required interval.
(5) Reviewed PennDOT policy and procedures to ensure there is a process to document unusual circumstances leading to an inspection delay, and that the process is being followed.
(6) Assessed based on the MAR6 snapshot, previous review results, and the Division bridge staff's knowledge and awareness of the inspection program in Pennsylvania.

Observations

MAR6 REVIEW:

-MAR6 initially flagged 41 bridges with apparent overdue inspections. Division review determined that all had been inspected at a frequency that did not exceed 24 months, and all apparent overdue inspections were resolved within 30 days of MAR generation.
Of the 41 bridges, 40 had been inspected on time, but the inspections did not make it onto the April 2017 NBI submittal. The other 1 bridge had the incorrect inspection date submitted on the previous April 2016 NBI submittal that had been corrected on the April 2017 submittal, had been receiving inspections at the correct 24 month frequency, and was not overdue.

-MAR6 initially flagged 15 bridges that appeared to be inspected at a frequency greater than 28 months. Division review determined that all had been inspected at a frequency that did not exceed 24 months. 9 of these bridges had received mid-interval inspections. 5 bridges had incorrect dates submitted in the April 2016 submittal, but had received inspections at the correct 24-month frequency. 1 bridge was a new bridge that had previously been closed.

-MAR6 initially flagged 6 bridges that appeared to be inspected at a frequency between 25 and 28 months. Division review determined that all 6 had received mid-interval inspections, and the frequency did not exceed 24 months.

-MAR6 initially flagged 5 bridges that appeared to be inspected at a frequency of 25 months. Of these, one had been inspected on time with an incorrect date submitted in April 2016 submittal. The other 4 bridges were inspected 1-month late with documented circumstances, indicating that the PennDOT process to document

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circumstances causing inspection delays is being followed.

-MAR6 snapshot indicates Compliance.

PENNDOT POLICY AND TRACKING REPORTS:

-PennDOT does not currently utilize extended inspection criteria, so there is no associated Intermediate-level sampling that needs to be performed. PennDOT is seeking to utilize 48-month inspection criteria, and the Division and HQ have reviewed and commented on a draft of 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.

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 6, because all bridges were inspected within the required NTE 24-month interval, with 4 bridges being inspected 1-month late due to documented unusual circumstances.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State: Pennsylvania | Review Year: PY18

State: Pennsylvania | Review Year: PY18 | Assessment Level: Int

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

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 7, the Division performed the following tasks:
(1) Generated MAR7 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed and resolved all bridges that were flagged as potentially having overdue inspections.
(3) Reviewed MAR7 Summary for any indication of any new deficiencies.
(4) Reviewed MAR7 and resolved all data for inspections that were flagged as exceeding the required interval.
(5) Reviewed PennDOT policy and procedures to ensure there is a process to document unusual circumstances leading to an inspection delay, and that the process is being followed.
(6) Assessed based on the MAR7 snapshot, previous review results, and the Division bridge staff's knowledge and awareness of the inspection program in Pennsylvania.

Observations

MAR7 REVIEW:

-MAR7 initially flagged 43 bridges that appeared to be overdue for inspection. Division review determined that none of the 43 had overdue inspections, and all flagged inspections were resolved by 6/30/2017. Of the 43 bridges that were flagged, 39 had received inspection on time in 2016, but the inspection did not make it onto the April 2017 NBI submittal. 3 bridges had inspection dates that were miscoded in the April 2016 NBI submittal and corrected on the April 2017 submittal, and were not overdue for inspection. 1 bridge was a duplicate structure number that PennDOT has now deleted from the inventory. (The inspection for other structure number for this bridge was not overdue.)

-MAR7 initially flagged 7 bridges that appeared to have been inspected at a frequency exceeding 28 months. Of these, 6 had been inspected on time with mid-interval inspections performed, and 1 was a bridge <20' which was removed from the inventory.

-MAR7 initially flagged 10 bridges that appeared to have been inspected at a frequency between 26 and 28 months. Of these, 5 had been closed for superstructure replacement when the inspection was due, but had received a routine inspection prior to re-opening. The other 5 had received mid-interval inspections.

-MAR7 initially flagged 2 bridges that appeared to have been inspected at a frequency of 25 months. 1 had an error in the date submitted on the April 2017 NBI submittal. The other had been closed for superstructure replacement when the inspection was due, but received a routine inspection prior to re-opening.

-MAR7 snapshot indicates compliance.

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PENNDOT POLICY AND MONTHLY 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.

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 7, because all bridges were inspected within the required 24-month interval.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	08 - Inspection Frequency - Underwater - Lower Risk B			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 8 the Division performed the following tasks:
(1) Generated MAR8 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed and resolved all bridges that were flagged as potentially having overdue inspections.
(3) Reviewed MAR8 Summary for any indication of any new deficiencies.
(4) Reviewed MAR8 and resolved all data for inspections that were flagged as exceeding the required interval.
(5) Reviewed PennDOT policy and procedures to ensure there is a process to document unusual circumstances leading to an inspection delay, and that the process is being followed.
(6) Assessed based on the MAR7 snapshot, previous review results, and the Division bridge staff's knowledge and awareness of the inspection program in Pennsylvania.

Observations

MAR8 REVIEW:

- MAR8 initially flagged 33 apparent overdue inspections. After review by the Division and PennDOT, all 33 were determined to have been inspected on time or conditions are such that UW inspection was not required as determined at the most recent inspection:
  - 6 were determined to have been inspected on time, with a frequency not exceeding 60 months.
  - 1 was a newly identified underwater need, and had received underwater inspection after the need was identified on the 12/15 routine inspection.
  - 2 were current but had errors in the date submitted on the Apr2016 NBI submittal.
  - 3 were new bridges that are current for their UW inspection.
  - The remaining 21 had previously received UW inspections with dates submitted on the April 2016 NBI submittal, but conditions at the most recent routine inspection had allowed for inspectors to wade, probe, and suitably inspect all substructure units as documented in the routine inspection reports, with 92A now coded as N.
- MAR8 intitially flagged 30 bridges that appeared to have inspections done at a frequency exceeding 64 months. After review by the Division and PennDOT the following was determined:
  - 13 were determined to have been inspected under a PCA in PY2016, and are current for their underwater inspection needs. (PennDOT cuts off their data for submittal on 12/31 annually, so bridges inspected in 1/2016 would not show up on the April 2016 submittal).
  - 10 were determined to have been inspected at a frequency no greater than 60 months for the most recent UW interval, with a date error on the April 2016 submittal.
  - 7 were newly identified for UW inspection, but had received UW inspection at some point in the past, which is why an older date may have been carried over and submitted on the April 2016 submittal. On previous

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State Pennsylvania | Review Year PY18

routine inspections, conditions had allowed inspectors to wade, probe, and suitably inspect all substructure units as documented in the routine inspection reports. Bridges had received UW in a reasonable timeframe after the need was identified on the most recent routine inspection.

• MAR8 initially identified 2 bridges as having been inspected at a frequency of 62 to 64 months. After review by the Division and PennDOT, both were determined to have been inspected under the PCA in PY2016, and are current for their underwater inspection needs. (PennDOT cuts off their data for submittal on 12/31 annually, so bridges inspected in 1/2016 would not show up on the April 2016 submittal).

• MAR8 initially identified 1 bridge as having been inspected at a frequency of 61 months. After review of the inspection documentation by the Division and PennDOT, it was determined that the submitted date, 10/16, had been coded incorrectly and date should have been submitted as 9/2016.

• After the above overrides were coded, the MAR8 snapshot shows as Compliant.

PENNDOT POLICY AND TRACKING:

• PennDOT does not currently utilize the up to 72 months extended underwater inspection frequency 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.

•

Findings

None.

Conclusions

Pennsylvania is **compliant** with Metric 8, because all UW inspections were done within the required NTE 60-month interval.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C | Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C | Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	09 - Inspection Frequency - Underwater - Higher Risk B	Prior Year Compliance	SC		

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 9, the Division performed the following tasks:
(1) Generated MAR9 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed and resolved all bridges that were flagged as potentially having overdue inspections.
(3) Reviewed MAR9 Summary for any indication of any new deficiencies.
(4) Reviewed MAR9 and resolved all data for inspections that were flagged as exceeding the required interval.
(5) Reviewed PennDOT policy and procedures to ensure there is a process to document unusual circumstances leading to an inspection delay, and that the process is being followed.
(6) Assessed based on the MAR9 snapshot, previous review results, and the Division bridge staff's knowledge and awareness of the inspection program in Pennsylvania.

Observations

MAR9 REVIEW:

- MAR9 initially flagged 19 apparent overdue inspections. After review by the Division and PennDOT, all 19 were determined to have been inspected on time or conditions are such that UW inspection was not required as determined at the most recent inspection:
  - 3 had an error in the date submitted on the April 2016 NBI submittal, that was corrected on the April 2017 submittal.
  - The remaining 16 had previously received UW inspections with dates submitted on the April 2016 NBI submittal, but conditions at the most recent routine inspection had allowed for inspectors to wade, probe, and suitably inspect all substructure units as documented in the routine inspection reports, with 92A now coded as N.
- MAR9 initially flagged 9 bridges that appeared to have inspections done at a frequency exceeding 64 months. After review by the Division and PennDOT the following was determined:
  - 1 was determined to have been inspected under a PCA in PY2016, and is current for underwater inspection needs. (PennDOT cuts off their data for submittal on 12/31 annually, so bridges inspected in 1/2016 would not show up on the April 2016 submittal).
  - 6 were newly identified for UW inspection, but had received UW inspection at some point in the past, which is why an older date may have been carried over and submitted on the April 2016 submittal. On previous routine inspections, conditions had allowed inspectors to wade, probe, and suitably inspect all substructure units as documented in the routine inspection reports. Bridges had received UW in a reasonable timeframe after the need was identified on the most recent routine inspection.
  - 2 bridges had errors in the date submitted on the April 2016 inspection and were current, having received UW inspections at the correct interval.

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Final Summary of Metric

State Pennsylvania

Review Year PY18

• After the above overrides were coded, the MAR9 snapshot shows as Compliant.

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.

Findings

Pennsylvania is compliant with Metric 9, because all UW inspections were done within the required NTE 60-month interval.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Conclusions

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	10 - Inspection Frequency - Fracture Critical Member			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 10, the Division performed the following tasks:
(1) Generated MAR10 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed and resolved all bridges that were flagged as potentially having overdue inspections.
(3) Reviewed MAR10 Summary for any indication of any new deficiencies.
(4) Reviewed MAR10 and resolved all data for inspections that were flagged as exceeding the required interval.
(5) Reviewed PennDOT policy and procedures to ensure there is a process to document unusual circumstances leading to an inspection delay, and that the process is being followed.
(6) Assessed based on the MAR10 snapshot, previous review results, and the Division bridge staff's knowledge and awareness of the inspection program in Pennsylvania.

Observations

MAR10 REVIEW:

- MAR10 initially flagged 21 apparent overdue FC inspections. After review by the Division and PennDOT, the following was determined:
  - 6 have been rehabbed or replaced such that they are no longer fracture critical.
  - 1 had an NBI length <20' and has been removed from the inventory.
  - 12 received FC inspection at an interval of 24 months or less, but the inspection was not accepted at the time of the 2017 NBI submittal.
  - 1 is a City of Philadelphia bridge had not been previously identified as having FC details, but once the identification was made, received FC inspection in 11/15. 11/17 FC inspection occurred on schedule.
- MAR10 initially flagged 3 inspections that appeared to have been performed at an interval of 28 months or greater. Of these, 1 was determined to have been inspected 2 months late, and1 was a border bridge with inspection responsibility with another state, and 1 was determined to have been inspected on time with an error in the date coded in the April 2017 submittal.
- MAR10 initially flagged 1 bridge that appeared to have been performed at an interval of 27 months. This was determined to be correct, with equipment availability cited as the reason for the delay. Given the delay was 3 months, the Division determined this was not an acceptable timeframe whereas a 1-month delay for equipment availability may be.
- MAR10 compliance snapshot shows Substantial Compliance.

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

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Final Summary of Metric

State Pennsylvania

Review Year PY18

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

•

Findings

-2 bridges out of 683 (0.29%) were inspected at an interval of 26 to 28 months.

Conclusions

Pennsylvania is **Substantially Compliant** with Metric 10, because 99.71% of FCM inspections were performed within the required NTE 24 month interval plus 1-month and 100% of FCM inspections were performed within the required interval plus 4 months.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

The Improvement Plan activities have brought down the number of late inspections. Given the success and small number of remaining findings (2 bridges out of 683 total), the Improvement Plan activity of continuing monthly "M1" report tracking of FC inspections will carry forward from last year. BSE was consulted on development of the IP and agreed.

Recommendations

The Division recommends that PennDOT continue their M1 report tracking for FC inspections and makes this standard practice. This reporting and tracking tool has brought Metrics 6-9 into compliance, and has cut down on the number of issues on Metric 10 as well. An IP plan is attached reflecting this recommendation.

Dec 31 Compliance SC

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination. IP IS ATTACHED IN IP DASHBOARD.

Mar 31 Compliance SC

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	11 - Inspection Frequency - Frequency Criteria			Prior Year Compliance	SC

Metric Summary - Complete by December 31st

Extent of Review

For the Review of Metric 11, the Division performed the following tasks:
(1) Generated MAR11 on 6/2/2017 (Note that all MARs were re-generated with the updated MARGen on 7/3/2017).
(2) Reviewed MAR11 Summary for any indication of any new deficiencies.
(3) Reviewed PennDOT policy that establishes level of inspection and frequency of each inspection type.
(4) Reviewed MAR11 and resolved all data for inspections that were flagged as exceeding the required interval. This included verifying that all bridges coded to receive inspections at a frequency of 6 months or less had received all proper mid-year inspections.
(5) Independently generated a list of all bridges that meet the approximate State criteria for reduced interval inspection frequencies. Resolved all bridges that were flagged as requiring a reduced interval inspection based on state criteria but were not coded in the NBI to receive a reduced interval inspection.
(6) Obtained from the State a list of all bridges that received Damage or In-Depth inspection types in the review year. Combined this list with the list of all bridges that meet the State criteria for reduced interval inspection frequencies or were coded to receive reduced interval inspection, removing any duplicates. Generated a random sample from this population and performed file reviews to determine if the bridge received all the proper inspection types at the proper inspection frequencies for the past review year, and if the level or intensity of the inspections was appropriate and in accordance with State criteria.
(7) Assessed based on previous review results, and the Division bridge staff knowledge and awareness of PennDOT's program and inspection criteria.

Observations

PREVIOUS REVIEW RESULTS:
-The Division reviewed Metric 11 at the Intermediate-level in PY2017. Pennsylvania was assessed as substantially compliant due to two primary issues, bridges that were not being coded with the proper reduced frequency in the NBI due to issues with coding specific state data items in the PennDOT bridge management system (BMS2), and a small group of temporary bridges that met the PennDOT policy for 6-month inspections but were not receiving them at the required frequency.

PENNDOT POLICY REVIEW- 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.

CACULATION OF FREQUENCY FOR ALL BRIDGES IN THE INVENTORY:
1) Based on the maximum frequency criteria from above, the Division utilized the following logic to flag the interval of inspection and what characteristics of the bridge led to that interval.

For 12 month inspection frequencies:

a. Weight Restriction: {**if** ITEM_41=("P" **or** "R" **or** D" **or** "E" **or** "B") **then** "flag"}

b. Condition rating of 3 or less for super, sub or culvert: {**if** ITEM_59<4 **or** ITEM_60<4 **or** ITEM_62<4 **then** "flag"}

c. Condition rating of 4 or less for super with FCMs: {**if** ITEM_59=4 **and** ITEM 92A="Y " **then "**flag"}

d. Any SD masonry arch: {**if** ITEM_43A=8 **and** ITEM_43B=11 **and** [ITEM_58<5 **or** ITEM_59<5 **or** ITEM_60<5] **then** "flag"}

e. Scour rating of 2 or less: {**if** ITEM_113<3 **then** "flag"}

For 6 month inspection frequencies:

a. Condition rating of 3 or less for a super with FCMs: {**if** ITEM_59<3 **and** ITEM_92A="Y " **then** "flag"}

b. Any temporary structure: {**if** ITEM_103="T" **or** ITEM_41=("D" **or** "E") **then** "flag"}

For reduced frequency UW inspections:

a. For a 24 month UW frequency: {**if** ITEM_92B="Y " **and** [ITEM_113=(6 **or** 4 **or** 3)] **then** "flag"}

b. For a 12 month UW frequency: {**if** ITEM_92B="Y " **and** ITEM 113<3 **then** "flag"}

2) Once the criteria were flagged for all bridges in the inventory, the calculated maximum inspection intervals for reduced routine (coded as other/special per PennDOT policy), reduced UW, and reduced FC were then compared to the coded frequencies in Item 92A, Item 92B, and Item 92C. Bridges coded to receive inspection at a frequency less than calculated were not individually resolved.

3) Any bridges coded to receive a reduced frequency inspection (UW, routine, Other/Special, or FC) were added to the population as well, regardless of whether they were calculated to require reduced frequency inspection. PennDOT policy, like the NBIS, specifies a maximum inspection interval, not a minimum. Therefore, owners may put a bridge on a reduced frequency for reasons other than the policy reasons included in the calculation. For informational purposes, these bridges are flagged with the yellow triangle on the results file included in the document library.

4) The entire inventory was reviewed in this way and 3,018 bridges met the population.

a. From these 3018, 35 bridges flagged with a calculated frequency less than the coded frequency for any of the inspection types. These 35 bridge files were reviewed to determine if the state had been following their frequency policy. This resolution, with review comments, is on the summary uploaded to the document library.

-Of these, 4 had been replaced or demolished and 5 had received rehab/repairs to raise the condition of any components above the state policy thresholds detailed above.

-5 were situations where the superstructure was rated a 4 and the superstructure has FCMs; however, in state policy, it is permissible not to go to a 12-month frequency when the FCMs do not

control the component rating. These cases were reviewed and found that the overall component rating was controlled by approach spans that did not have FCMs.
-2 bridges flagged as requiring reduced frequency inspection because it had been coded as temporary (item 103=Y). This coding was determined to be an error and corrected.
-The remaining 19 bridges were determined to have been receiving inspections at the correct interval, but had errors in the "inspection required" check box on the previous inspection. These errors had since been resolved.

RANDOM INTERMEDIATE-LEVEL SAMPLE AND FILE REVIEW
-Since the entire bridge inventory is checked for the calculated and coded frequencies as described above, the primary focus of the File Review is whether the bridge is receiving the proper intensity of inspection. This is important since PennDOT utilizes risk based reduced frequency inspections. On the 6 or 12 month inspection, policy allows performing a reduced scope of inspection, focusing on the controlling deteriorated components. One common reduced frequency inspection scope is to inspect all structural components for condition rating, but the inventory items might not assessed. Another common scope for posted bridges would be to inspect the superstructure and posting signage, but if the substructure was in good condition, not inspect the substructure on the 6 or 12 month inspection.

-The population was determined by combining all bridges from the above frequency review that meet the reduced frequency criteria (3,018 bridges) with a list queried by the state of all in-depth or damage inspections performed in the review year. The resulting total population was 3,243 bridges once duplicates were removed. This corresponds to an Intermediate-level sample (LOC 80%/MOE15%) of 19 bridges. Random numbers were assigned for the population and the lowest 19 were selected for the file review, in line with sampling methodology from other metrics.

-See attached for a summary of the file review. Overall, 19/19 bridges were determined to have been receiving all inspections required under state policy. This included 3 bridges that were required to receive reduced frequency FCM inspections and 3 bridges that were required to receive 24-month UW inspections. No damage or in-depth inspection types came up in the random sample. For all 19 bridges the scope/intensity of the Interim inspection was appropriate to the condition and risk factors of each bridge. Any areas not assessed under the Interim inspection were clearly identified in the inspection notes.

MAR11 RESOLUTION:

Routine:
MAR11 initially flagged 5 routine inspections that were previously coded for 12 month frequency. Of these, 4 had received the correct inspection frequency, now utilizing "other special" for the interim inspection per PennDOT policy. One had been rehabbed and no longer required a reduced frequency routine. Detailed results are in the attached MAR11.

FCM:
MAR 11 initially flagged 90 FCM inspections. Of these, 14 were determined to be closed, replaced, or not require a reduced interval inspection. The other 76 were determined to have the correct FC inspection frequency based

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on review of the bridge in BSM2. Detailed results are in the attached MAR11.

Underwater:
MAR11 initially flagged 63 UW inspections. Of these, 30 were determined to not require UW inspection (all substructure units able to be waded and probed on the most recent inspection). 2 were current, having not required UW inspections in the past (all substructure units were previously able to be waded and probed, but water levels on the most recent inspection prevented this). 31 were determined to be compliant, having received UW inspection at the correct frequency based on review of the bridge in BMS2. Most of these 31 had incorrect dates submitted on the 2016 submittal, that have now been corrected. Detailed results are in the attached MAR11.

Other/Special:
MAR11 initially flagged 754 other/special inspections. Of these, 158 were determined to no longer require a reduced interval inspection, either having been replaced, rehabbed, or permanently closed to traffic. The remaining 596 were reviewed in BMS2 and determined to have received inspection at the correct frequency. (Many of these were 6mo inspections that flagged for verification, where compliance simply cannot be determined based on annual NBI submittal.) See detailed results in attached MAR11.

Findings

None.

Conclusions

Pennsylvania is **compliant** with Metric 11, because all levels of inspection and frequency criteria are established, and all bridges indicated the appropriate level of inspection and frequency in accordance with the established criteria.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

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Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Min
Metric Name	12 - Inspection Procedures - Quality Inspections			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 12, the Division performed field reviews of a random sample of bridges, sampled using the Headquarters NBIP Sampling Tool (LOC80%, MOE15% sample size). The Division compared inspection reports for all appropriate inspection types with actual field bridge conditions to evaluate the accuracy of component condition rating codes; use by the inspection team of the appropriate AASHTO Manual for Bridge Evaluation procedures; adequacy of documentation and appropriate justification of component condition ratings; whether there is an indication that a qualified Team Leader was present at each inspection; and whether there is an indication that qualified underwater dive inspectors performed any underwater inspections. The Division assessed based on the results of the field reviews.

For PY18, the review used a geographically filtered population, reviewing PennDOT Districts 4, 5, and 6 (Eastern PA and Philadelphia area). The current plan for review is as follows (see document library for a map of the PennDOT Districts, it is associated with Metric 1 FSM):
PY18: Districts 4, 5, 6
PY19: Districts 8, 9, 10
PY20: Districts 1, 2, 3
PY21: Districts 11 and 12
PY22: Entire state.

2 bridges were manually removed from the random field review sample with BSE concurrence. 1 was permanently closed and being replaced. This bridge was selected because it was in the Metric 21 population, so it was replaced with another bridge from the Metric 21 population (BRKEY 10089).

The other was over electrified SEPTA tracks in Philadelphia with very limited access. Because of the catenary cables, the bridge had solid high barriers running along the deck on top. It was determined that the underside should not be accessed without track outage, and because of the barriers one could not look over the side. Therefore field verification of the inspection would be very difficult. Bridge was not due for inspection in PY18, so we could not coordinate inspection with previously planned outages and access. Bridge was selected because it is in overall good condition (condition 7-9), so it was replaced with a bridge in good condition (condition 7-9), BRKEY 15497.

Observations

FIELD REVIEW TEAM:
PennDOT was asked to participate in the field site visit and in the review of the inspection reports. The field review team was composed of one participant from the State Highway Department, Michael J. Winslow P.E. BMS2 Manager; as well as the PA Division Bridge Engineer and the Assistant PA Division Bridge Engineer. Michael

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Winslow was not a member of the teams that conducted the recorded inspections under review. The field review team participants provided their input on the inspection condition ratings, the condition rating justification, and narrative comments reviewed.
Subsequent to the field review, all Team Leaders indicated on the most recent report were reviewed to ensure they were current PennDOT Certified Bridge Safety Inspector (CBSI).
RANDOM SAMPLING:

-The Division geographically filtered the population of bridge as described in Extent of Review. For PY2018, the eastern part of the state was reviewed, PennDOT Districts 4, 5, and 6.

-From this filtered population of 2915 bridges, the Division ran the NBIP Sampling Tool v18.1.1 to select a 19 bridge field review sample. 2 bridges were substituted with BSE concurrence as described in Extent of Review.

FIELD REVIEW RESULTS:

-For 18/19 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. The remaining bridge had been extensively rehabbed in 2016. The review team ratings were within tolerance of the inspection report ratings, but the report had not been accepted to upload the updated condition ratings at the time of the NBI submittal. Therefore, 19/19 bridges are considered within tolerance 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.

Findings

None. There were no significant issues observed.

Conclusions

Pennsylvania is **compliant** with Metric 12 because 100% of the inspection reports reviewed met the criteria for quality assessments, ratings, and documentation. Also a qualified Team Leader was on site for 100% of the inspections, as indicated by the inspection report.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

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Recommendations

None.

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	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:
(1) Generated MAR13 on 6/2/17 (Note all MARs were regenerated on 7/3/17 using the updated MARGen program).
(2) Reviewed MAR13 for any indication of new compliance deficiencies, and resolved any flagged compliance deficiencies.
(3) Assessed based on prior review results, the status of any new compliance deficiencies, the MAR13 snapshot, and the Division bridge staff's knowledge and awareness of State load rating practices.

Observations

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 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.

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

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call the TK-527. The parametric study was reviewed and accepted by Lubin Gao and the Division. The parametric study is attached along with an addendum addressing Lubin/Division comments.

FAST Act Emergency Vehicles:
PennDOT 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, and has narrowed down the population of bridges requiring further analysis to fewer than 100, all of which should be completed by the end of 2018. It is likely that no Interstate bridges will need to be posted for EVs. The POA was reviewed by the Division as well as Lubin 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.

MAR RESOLUTION:
-MAR13 initially flagged 174 potential load rating compliance issues.
-MAR13 Report 3 looks at whether each bridge is load rated, based on Item 63 =/= 5. Report 3 flagged 1 bridge. This bridge was closed and had been rehabbed in CY2016, and the pre-opening inspection (including load rating) had been performed but not accepted by December 31st. The bridge was load rated previous to rehab, and has valid load rating data now in state BMS2.
-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 92 bridges. Of these, 1 was a bridge where OR is slightly higher than IR but truncates to the same value, due to IR controlled by a truss member and OR controlled by gusset analysis. 1 is a stone masonry arch that is only evaluated at inventory per MBE 6B5.2.6. The remaining are cases where the OR and IR are both >99T, but there is a known metric conversion issue with the state submittal where sometimes the stored 99 T gets converted (to 89.8 mT). Sometimes it doesn't do this conversion.
-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 81 bridges, all of these were recently rehabbed or new and were designed to full HL-93. The issue is that Item 31 doesn't get updated when the new load rating is coded into BMS2. PennDOT has made this an error now, so this issue should not be as prevalent in the future. All 81 bridges had Item 31 updated.

-After resolving the 174 bridges with compliance issues, the MAR13 snapshot indicates compliance.

Findings

None.

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State: Pennsylvania

Review Year: PY18

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance: C

Dec 31 Summary Complete: ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance: C

Mar 31 Resolution Complete: ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	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 tasks:
(1) Worked with the State thru the NBI submittal process, and there were no posting deficiencies identified on the NBI submittal this year.
(2) Generated MAR14 on 6/2/2017 (Note: All MARs were re-generated on 7/3/2017 using the updated MARGen).
(3) Resolved all flagged compliance deficienicies on MAR14.
(4) Assessed based on prior review results, the status of current posting deficiencies, the MAR14 compliance snapshot, and the Division bridge staff's knowledge and awareness of State load posting policy and practice.

Observations

PREVIOUS REVIEW RESULTS:
Metric 14 was assessed at the Intermediate level in PY2017, and Pennsylvania was determined to be compliant. For all bridges in the file review sample, the Division was able to find 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:
No load capacity/posting errors were generated by the 2017 NBI Submittal.

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MAR14 REVIEW AND RESOLUTION:
REPORTS 1, 4, and 6:
-MAR14 Reports 1, 4, and 6 each flagged 0 bridges.

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. Of these, 5 bridges had revised load ratings that show an operating rating greater than the state's maximum legal load; 2 bridge had a posting implemented; 2 were closed/replaced; 3 were new bridges where the load rating data was not updated in time for the submittal; and the remaining 39 had errors in the coding of Item 70, as described above.

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 20 bridges. 18 of these 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. The other 2 bridges were both coding errors. One had Item 60 coded as N, but this has been corrected to a condition rating of 3. The other was a new bridge where item 59 was coded as an N, this has been corrected to an 8.

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 5 bridges. Of these, 1 had a posting implemented and item 41 updated. 2 were closed/replaced. 2 had load rating data updated, with IR and OR greater than 32.4 mT.

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, 607. 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 PY2018 since it is not required on minimum level assessments. Report A was analyzed in some detail 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

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load ratings. The Division did not identify any bridges of concern among the 189.

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	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). 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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

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State Pennsylvania

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Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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State: Pennsylvania | Review Year: PY18

State: Pennsylvania | Review Year: PY18 | Assessment Level: Min

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

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

PREVIOUS REVIEW RESULTS:

-This metric was assessed at the Intermediate level in PY2016. Based on field and file reviews conducted in that year, 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.

-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 insure that the inspector uses appropriate test methods.

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

- A F&F Inspection Plan shall include the following:
  - 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 detai
    - Identify retrofits previously installed
    - Table can be organized by Span or type of detail
  - Specific instructions if the Interrim 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 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 takes into account the fracture toughness, steel grade, and type of member. 6A48 is the ADTT for the bridge.

-For knowledge and awareness, 1 bridge with FCMs was reviewed on the PY2018 field reviews. The procedures were available and adequate for an FCM inspection to be performed. Equipment needs were limited (pony truss with a reachable top chord). It appeared the inspection 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.

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 16, because all bridges with FCMs have documented inspection procedures

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for the FCMs, and all bridges with FCMs are inspected according to those procedures.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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State: Pennsylvania
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State: Pennsylvania
Review Year: PY18
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 assessed based on prior review results and the Division bridge staff knowledge and awareness of the State's underwater inspection policy and practices.

Observations

-The PennDOT Publication 238 Section 2.6 contains the policy and guidance on the general requirements pertaining to all underwater inspection.

-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.

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• 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
o rapid stream flows- stream flow qualitatively described by item IN11 as low medium or high. IU10 describes
o 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.
o 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.
o meandering channels- Lateral stream migration is best captured by item IN10 which describes the stream alignment at or near the structure per substructure unit.
• 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

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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 Metric 18.

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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State: Pennsylvania | Review Year: PY18

State: Pennsylvania | Review Year: PY18 | Assessment Level: Min

Metric Name: 18 - Inspection Procedures - Scour Critical Bridges | Prior Year Compliance: C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 18, the Division performed the following tasks:
(1) Generated MAR18. Reviewed the Summary and resolved all previously identified unevaluated bridges. Also verified scour POA is in the file for all newly identified scour critical bridges.
(2) Assessed based on prior review results, the status of any new compliance deficiencies, and the Division bridge staff's knowledge and awareness of the State's scour evaluation and plan of action policies, processes, and practices.

Observations

METRIC CHANGES

FHWA made modifications to the metrics prior to PY18. Most changes were minor in nature; however, the changes in population to metric 18 were more substantive. In the past, metric 18 looked at whether all scour critical bridges (as determined by item 113) had adequate scour plans of action (POAs) in the bridge file and whether the bridge was monitored in accordance with the POA during flood events.

Now, the metric looks at all bridges over water. On top of the scour POA review, the metric also reviews if each bridge over water has a documented scour assessment in the bridge file. Scour assessment is defined in the commentary as "a report with calculations, a documented assessment, or a documented screening process explaining how Item 113 value was determined."

This metric was last reviewed at the Intermediate level in PY2014, and is planned to be reviewed at the Intermediate level in PY2019. Because of the metric changes, some additional documentation pertaining to the PennDOT methodology for determining Item 113 is provided in this year's review. Policy excerpts are attached in SMART.

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.

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:

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• 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.
This documented process for observed scour analysis is per policy the only acceptable means of coding Item 113 aside from an H&H theoretical scour analysis. Therefore, the Division finds it likely--although not confirmed by random sample for PY2018--that PennDOT's policy would meet Compliance criteria.
The Intermediate-level review in PY2019 will focus on whether this is being utilized as standard practice for all owners in the state. The Division may also request Resource Center assistance in looking at whether the coding cases for the scour calculator are appropriate, or whether there may be some tweaks that could allow a more accurate Item 113 characterization. Another way we could look at that is to do a larger field sample to confirm whether the calculated Item 113 accurately reflects the field condition as assessed by observed scour.
Documentation of policy/procedures described above is attached in the documents library, excerpts from Publication 100A and Publication 238 pertaining to Scour evaluation and PennDOT data item coding.
<u>Scour Plans of Action:</u>
Publication 238 IP 2.6.4 lays out requirements of scour POAs. PennDOT prioritizes scour based on Items 4A08 (NBI Item 113) and Item IN03 (an observed scour assessment, somewhat analogous to Item 113, but coded per

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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 requirments 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.

MAR18 RESOLUTION:
MAR18 did not flag any Item 113=6, U, or T bridges. MAR18 flagged 133 newly identified bridges. PennDOT reviewed all 133 bridges to determine if Scour POAs were created and on file. 3/133 had been demo'd. 4 are no longer scour critical and do not require a POA. 123 had Scour POAs created and uploaded. The remaining 3 bridges are locally owned, and PennDOT is coordinating with the local owner to create a POA or update an existing POA.

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 18, because all bridges over water have a scour evaluation as indicated by NBI scour coding; all bridges have documented scour evaluation assessing scour vulnerability; all scour critical bridges have a scour POA; and all bridges are monitored according to the POA.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

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Federal Highway Administration

National Bridge Inspection Program

Final Summary of Metric

State: Pennsylvania

Review Year: PY18

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: PY18

State: Pennsylvania | Review Year: PY18 | 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.

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.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance: C | Dec 31 Summary Complete: ☑

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Final Summary of Metric

State Pennsylvania

Review Year PY18

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Min
Metric Name	20 - Inspection Procedures - QC/QA			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 20, the Division assessed based on prior review results and the Division bridge staff knowledge and awareness of the State's QC/QA policies, procedures, and practices.

Observations

PREVIOUS REVIEW RESULTS:

This metric was last assessed at the Intermediate level in PY2014.

-PennDOT has an active QA/QC program for their bridge inspection program. The policies and procedures for QA/QC of inspections are detailed in the PennDOT Publication 240, Bridge Safety Inspection Quality Assurance Manual.

-QA/QC Program Manager position is currently being covered by State Program Manager James Long, P.E. and Michael Winslow, P.E., pending hiring a new QA/QC engineer. The position has been vacant for approximately 1 year.

-The QA/QC program samples bridges in each of the PennDOT Districts on a monthly basis to check for quality of inspections, documentation, etc. A consultant performs an inspection and load rating of each sampled bridge without seeing the previous inspection reports or ratings. Any discrepancies are noted in a close-out meeting with the District. The program also reviews and evaluates the consultant inspection firms.

-The manager of the electronic bridge management system, BMS2, is Michael Winslow, P.E. PennDOT conducts a large amount of QA/QC of their NBI data as a part of several initiatives: for the annual NBI tape submittal, for the MARs, as well as for internal data quality reports they have developed.

-PennDOT is currently conducting a large scale IT project to improve data integrity in BMS2. This includes many quality initiatives, but probably the most important is that hundreds of data validation errors, warnings, and some fatal errors have been coded into BMS2. This includes all of the NBI error checks and validations.

-PennDOT also maintains an open-end consultant agreement to provide independent inspections and reviews. These consultants are utilized to, among other things, perform blind inspections of a sample of bridges, to provide the PennDOT with a comparison to the NBI inspection reports for evaluation of consultant inspection firms.

-PennDOT has dedicated staff and resources specifically to the tasks associated with QA/QC of inspections, and continues to refine policies and procedures in response to issues and findings from the FHWA NBIP reviews.

-Issues and critical findings discovered in the QA/QC process are used to update the bridge inspection refresher training that is required for all inspectors by PennDOT policy every two years. Any newly developed policies, procedures, and techniques can be added to the refresher training.

-FHWA HQ recognizes PennDOT as being a national leader in QA/QC program policies and procedures. They are recognized as having commendable state practices, and that "in general, QC/QA procedures are comprehensive

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Final Summary of Metric

State Pennsylvania

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and an excellent example." https://www.fhwa.dot.gov/bridge/nbis/nbisframework.cfm

Findings

None.

Conclusions

Pennsylvania is compliant with Metric 20 because QC/QA procedures have been established and implemented. These procedures include periodic field reviews of inspection teams, periodic refresher training requirements, and independent review of inspection reports, computations, and NBI data.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	21 - Inspection Procedures - Critical Findings			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

For the review of Metric 21, the Division performed the following tasks:
(1) Monitored periodic notifications of critical findings to confirm that all critical findings are being addressed within the State's prescribed timeframes.
(2) Verified the status of any critical findings during field reviews for Metrics 12 and 22.
(3) Assessed based on prior review results and the Division bridge staff's knowledge and awareness of the State's process for addressing critical findings.
(4) Verified whether the State's established critical finding policy and procedures meet the requirements of the NBIS.
(5) Determined that no critical findings were still active from the last (PY16) assessment list based on last year's review. Obtained a list of all critical findings for the past review year (PY17) from the State, and randomly sampled bridges from this population utilizing the NBIP Sampling Tool. Performed file reviews on this random samples to determine that appropriate and timely actions to address the critical finding were taken in accordance with state policies and procedures, that all actions taken to address the critical finding were properly documented in the bridge file, and that proper notification of the critical findings were provided in accordance with state policies and procedures.
(6) Some bridges from this population were included in the Metric 12 and 22 field reviews, as determined by the NBIP Sampling Tool.

Observations

REVIEW OF PENNDOT POLICY

Current PennDOT policy does not explicitly state what constitutes a critical finding in terms of the NBIS. Past reviews have documented that PennDOT Priority 0 (critical) Maintenance Items meet the definition of critical finding.

Definition:

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.

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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.

There is no current definition related to NBI component condition ratings that trigger critical findings. The 1992 non-regulatory supplement to the NBIS, for example, recommended that a critical finding be considered any condition rating of 3 or less, and many states use this threshold.

Addressing Critical 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.

Responsibilities:

Responsibilities at all levels are outlined in Publicaiton 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.

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.
Periodic FHWA Notifications of Critical Findings:

-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.

FILE REVIEW:

Intermediate Level Sample:

The Intermediate level random sample was developed using the HQ-provided NBIP sampling tool. The Division compiled a list of all Priority 0 maintenance items from the review period (4/1/16 to 3/31/17). From the list Priority 0 maintenance items tracked in the previous review year (4/1/15 to 3/31/16), there were no active critical findings at the time of last assessment. The sampling tool automatically combines this list of identified critical findings with any bridges with a condition rating of 2 or less, to develop the overall Metric 21 population. This population was sampled automatically by the sampling tool. The overall population was 108 bridges, leading to an Intermediate-level sample size of 16 bridges.

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.

One note here- the sampling tool does not utilize Item 41 status (open/posted vs closed) when looking at bridges with a condition rating of 2 or less. For the 16 bridge sample, 4 bridges had closures that occurred prior to the current review year. These bridges were reviewed to make sure the closure had been documented when it did occur, even though those actions happened outside of the current review period.

File Review Results:

File review results are summarized in the attached summary spreadsheet. Overall,

The main concern raised by the file review was the clear critical finding on a locally owned stone masonry arch (BRKEY 38117). This bridge was also in the FHWA HQ required Review of Locally Owned Bridges in Critical Condition, having had a condition rating of 2 for the superstructure for at least 4 years. The bridge had a substantial bulge in top of one arch barrel and several spans had significant bulges in the spandrel wall. The bulge in the arch barrel itself was the primary concern, as it appeared the stones had lost contact or had substantially reduced contact. When the Division field reviewed the bridge, the gap was several feet deep when probed, indicating potential loss of fill as well although fill was not actively being lost. The Division and PennDOT agreed this was a critical finding that should have led to closure of the bridge. The inspector had classified the issue as a Priority 2 maintenance item, indicating the inspector did not consider this a critical or high priority.

While the Review of Locally Owned Bridges did not in and of itself contribute to the compliance determination, it did provide knowledge and awareness that the issue may not be totally isolated. There were 2 additional closures out of 16 bridges included on that review list.

Field Review Result:

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.

MONITORING OF CRITICAL FINDING REPORTS:

FHWA received Bridge Problem Reports (BPRs) for 43 incidences that required bridge/roadway closure. These were issued within a timely manner to FHWA, not exceeding a week. As a component of the PCA due to other findings, the process for notifying FHWA of critical findings of a Priority 0 maintenance item or a finding where a component condition rating is a 2 or less is being tweaked such that FHWA will receive automatic notifications of these events from the state's BMS2 system. FHWA will be able to follow up on these findings utilizing BMS2

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documentation.

Findings

FINDING 1: The Division finds that the current PennDOT policy does not adequately capture all issues that would be considered critical findings under the letter or spirit of the NBIS. This is based on several bridge closures due to advanced deterioration or scour on local bridges, where the inspector had not recommended any high or critical maintenance items.
RECOMMENDATION 1: PennDOT should refine their definition of Critical Findings to include some condition threshold. Many states utilize component condition rating of 3 or less to be part of their definition of Critical Finding, although this is based on guidance which has been rescinded.
RESOLUTION 1: PennDOT will utilize a component rating of 2 or less as a part of their definition of Critical Finding. See PCA Action Item 1.

FINDING 2: The Division notes that the issues were all on locally owned bridges inspected by consultants.
RECOMMENDATION 2: For local bridges with serious or critical component condition ratings, there should be automatic review by PennDOT District, Central Office, and FHWA.
RESOLUTION 2: PennDOT will require a plan of action (POA) for all Critical Findings on local bridges. See PCA Action Item 2.

FINDING 3: The Division finds that current PennDOT policy does not explicitly define Critical Finding, in terms of what meets the NBIS definition.
RECOMMENDATION 3: PennDOT should update policy to clarify what meets the NBIS definition of Critical Findings.
RESOLUTION 3: PennDOT will update policy. See PCA Action Item 3.

FINDING 4: The Division finds that there is not currently, in policy, a process for all Critical Finding notifications to automatically go to FHWA. In the past, the Division has asked for queries of all Priority 0 maintenance items, which is a more complete list than what is in the Bridge Problem Reports. BPRs tend to be for closures, damage events, etc, whereas Priority 0 maintenance items are broader.
RECOMMENDATION 4: PennDOT should provide periodic notification to FHWA of Critical Findings and any actions taken.
RESOLUTION: PennDOT has already been setting up automatic email notifications from BMS2 for certain events. PennDOT will add FHWA to these automatic email notifications for all Priority 0s and any condition rating 2 or less critical findings. See PCA Action Items 4 and 5.

The PCA will also include an Action Item 6, which is to make Critical Findings and the new Critical Finding policies an item in the PennDOT refresher training.

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The PCA was developed along with PennDOT and the BSE. The PCA activities were finalized and received BSE concurrence December 20th. Division leadership was briefed about the need for the PCA and outline of the PCA activities November 27th.

Conclusions

Pennsylvania is conditionally compliant with Metric 21, because their current policy had deficiencies and did not capture all of what should be considered critical findings under the NBIS. Because the policy/procedure had deficiencies, state policy did not meet SC criteria. The State and FHWA developed a PCA and State is adhering to the FHWA-approved PCA.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017, including specific discussion about the PCA. PCA was developed with PennDOT and BSE coordination, and received BSE concurrence.

Recommendations

See above "Findings" section for all recommendations related to compliance findings. See attached PCA for all Action Items that came out of these recommendations.

Dec 31 Compliance CC

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

The improvements discussed on the PCA have been put into place as of 3/31/2018. Many of these improvements actually stemmed from the earlier Local Bridges in Critical Condition review, and work on these improvements had been ongoing since August/September.
-All PennDOT policy changes became effective by March 2018, distributed to all stake-holders via Strike Off Letter. Webinars were held for District and other stakeholders, with FHWA participation, to introduce the changes and answer questions.
-Automated email critical finding notifications are in effect for FHWA. These notifications are issued when there is a priority 0 maintenance item or an inspection of a bridge where the is a component in critical condition (rating of 2 or less for 58, 59, 60/113, 62). FHWA has received notifications of 35 critical findings in the period between January and March 31st. 12 of these were issues where we received an automated email notification after an inspection (either a priority 0 maintenance recommendation or an inspection where a component was rated a 2 for 58, 59, 60/113, or 62). The other 23 were closure actions or damage inspections based on vehicular impact. For these critical findings, FHWA determined that policy was adequately followed.
-3 bridges in critical condition were inspected in the period after the policy took effect, and the follow-up by the

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District and local owner was compliant with PennDOT policy within the established timeframes.
-PennDOT Districts reviewed all bridges currently in Critical condition (condition rating 2 or less for 58, 59, 60, 62 or 113). This activity was not on the PCA but was completed by 3/30. This provides us with a baseline moving forward for bridges in critical condition, for the Districts to continue monitoring. All these bridges would be receiving inspection at no more than 6 months. Therefore they will come up for review twice per year.
-There were 58 bridges currently with a condition rating 2 or less. PennDOT Districts reviewed all bridges, load ratings and scour as appropriate, and priority maintenance recommendations. Any bridges without at least a priority 1 (6 month) maintenance action had recommendations re-prioritized. Review determined 34 of these bridges had already been addressed, were closed, or had construction projects let for 2018. The remaining 24 were had maintenance recommendations revisited and POAs are under development with the local owners.
-In this review and tracking of critical findings, there was two instances where repair was determined to have occurred but was not clear from BMS2 tracking. As a result we cannot find full compliance.
-Pennsylvania is determined to be substantially compliant with Metric 21, due to isolated deficiencies in repair tracking.
-The plan moving forward is for Division to review all critical findings over the next year to ensure PennDOT is following current policy. Division will also perform an Intermediate-level inspection in PY2019.

Mar 31 Compliance SC

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	Assessment Level	Int
Metric Name	22 - Inventory - Prepare and Maintain			Prior Year Compliance	C

Metric Summary - Complete by December 31st

Extent of Review

1) In accordance with the planned NBIP Metrics Assessment Schedule, a continuation intermediate level assessment was performed for PY18

2) FHWA performed field reviews for a LOC of 80%, MOE of 15% sample of bridges to verify NBI SI&A items with information in the bridge file and actual field conditions for the SI&A items identified on the Field Review Form. 19 bridges were selected from a field population of 2915 bridges identified in the NBI sampling tool v18.1.1. clustered around district 4, 5 and 6

3) FHWA worked with the State to resolve all error checks, validation checks, and persistent error reports generated during the NBI submittal process.

4) Noted NBI data errors found during review of other metrics when resolving MARs and other data, for knowledge and awareness.

5) Verified NBI 14 Min-AL SI&A items with information in the bridge file and actual field conditions for an additional 10 Int-Al group of SI&A items selected during generation of the Field Review Forms provided by Headquarters.

Observations

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.

-One new error was identified, with a frequency of 1 bridge, involving the coded routine frequency. It was determined that this bridge, a new structure, should not have been submitted on the NBI this year. The

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inventorying inspection (which does not necessarily include condition information) had occurred, but the first time inspection (which must include the pre-opening condition information) had not been completed yet. Therefore, there had not been a frequency assigned to the bridge yet, so Item 91 was blank. This error has a very low frequency, and in previous years had not been present on the error checks.

PennDOT had run the error check on the public-facing website and shared results with FHWA, which did not flag this error. There had been some confusion with the Division and PennDOT regarding the two NBI error checks, and we did not run the one behind UPACS on the 2017 submittal. However, as a part of the Metric 23 IP, the UPACs error check will be run on all future submittals.

Given prior review results, reviewer knowledge and awareness of the improvements made to the error check processing for the 2018 submittal, and the confusion about the different NBI error checks, the Division determined not to hold to substantial compliance for this single error.

FIELD REVIEWS:

-The following additional 10 SI&A items were selected: 2, 22, 26, 42A, 42B, 44A, 44B, 49, 52, 108A. This was based on Division knowledge and awareness of items that had a higher likelihood of miscoding or are important items. Additionally 108A (wearing surface) is significant for load rating purposes; 49 (length) and 52 (out to out) are significant for SF deck area determinations; 22 (owner) is significant to the Division for data and reporting purposes; 26 (functional class) is significant for aiding in determinations of funding eligibility utilizing NBI data.

-Overall, out of the 456 data items reviewed for the full 19 bridge sample, the Division found during field review that the SI&A coding for 7 items (1.5% of items reviewed) was out of the acceptable tolerance. These errors were corrected for the 2018 submittal.

-The two most common errors in coding Item were 17 (Longitude) and 28a (Lanes on Structure) which occurred twice each.

Findings

-None.

Conclusions

Pennsylvania is compliant with Metric 22 because 98.5% 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.

Recommendations

Dec 31 Compliance C

Dec 31 Summary Complete ☑

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Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination. Data error checks behind UPACs were verified to have been run by PennDOT prior to 3/15 submittal. NBE and NBI were submitted by 3/15 and did not have any errors flag on the UPACS error check.

Mar 31 Compliance C

Mar 31 Resolution Complete ☑

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Final Summary of Metric

State	Pennsylvania	Review Year	PY18

State	Pennsylvania	Review Year	PY18	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:
(1) Verified the state submittal of SI&A data to the NBI, and verified that any issues identified were resolved in the specified timeframe.
(2) Assessed based on prior review results and the Division bridge staff's knowledge and awareness of the State's program.
(3) Assessed how the State is able to determine if bridge SI&A data is updated in the specified timeframe.

Observations

SUBMITTAL OF 2017 NBI DATA:
PennDOT submitted NBI data on March 27th, with no fatal errors or issues preventing acceptance.

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.)

PAST PEFORMANCE AND CURRENT PERFORMANCE:
PennDOT does not get 100% of inspections accepted within the 90/180 day timeframe. PennDOT data shows the following performance for timely acceptance of data (within the required 90/180 days as appropriate to the owner): PennDOT- 96.2%, Local Public Agency- 99.6%, Other (other state agency, Turnpike, railroad)- 86.9%, Total- 96.6%.

Review of the MARs indicated the following number of bridges that did not have inspections accepted within the required 90/180 days as appropriate by Item 22 owner coding, for the 2017 submittal: 79 routine inspections, 6 underwater inspections, 12 fracture critical inspections. This is documented on the resolved MARs 6, 7, 8, 9, and

U.S. Department of Transportation
Federal Highway Administration

National Bridge Inspection Program

Final Summary of Metric

State Pennsylvania

Review Year PY18

10, which are attached to their respective metrics.

Findings

-PennDOT does not accept 100% of inspections within the required 90/180 day timeframe. This is indicated by PennDOT tracking data showing 96.6% of inspections are accepted on time for the calendar year. This is further indicated by the MAR reports, which showed 79 routine inspections, 6 underwater inspections, and 12 fracture critical inspections that appeared overdue in the data but had been inspected but not accepted for the 2017 submittal.

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. SI&A data was submitted by the requested date with no errors preventing acceptance, and the State does have a process to verify if the data is updated within the 90/180 days as required.

Compliance determinations were discussed with the State Program Manager on 11/6/2017. Division leadership were briefed on 11/27/2017. Because the metric is in substantial compliance, an improvement plan is under development with PennDOT and the Division. The IP will be attached to the 3/31 final summary.

Recommendations

PennDOT should continue tracking acceptance of data for all owners. As BMS2 refinements continue, opportunitites may exist to provide automated emails to owners on many different actions (critical findings, upcoming inspections, etc). One possibility may be to provide automated daily email notifications of inspections that need to be reviewed/accepted.

Dec 31 Compliance SC

Dec 31 Summary Complete ☑

Metric Resolution and Corrective Actions - Complete by March 31st

Final Resolution

No changes from December 31st determination.

Mar 31 Compliance SC

Mar 31 Resolution Complete ☑