



Construction Monitoring Program

DISCLAIMER: Except for the statutes and regulations cited, the contents of this document do not have the force and effect of law and are not meant to bind the States or the public in any way. This document is intended only to provide information regarding existing requirements under the law or agency policies.

1. Purpose

The purpose of the Construction Monitoring Program is to assist FHWA Division Offices to establish and maintain a consistent approach to identify, assess, and prioritize Construction Program threats and opportunities to improve the Federal-aid Highway Program (FAHP) and meet FHWA's strategic goals and objectives. The Construction Monitoring Program provides an oversight framework for the Construction Program based on FHWA's program oversight responsibilities.

The Construction Monitoring Program provides a framework to Division Offices that supplements FHWA's Risk-based Stewardship & Oversight (RBSO) policies and procedures for construction projects. The Construction Monitoring Program outlines FHWA's Construction Program oversight methodology and clarifies the oversight role and expectations of Division Offices in assessing construction quality and workmanship risks.

Division Offices may choose to adopt this Program, modify the Program to meet the needs of their State, or maintain their own processes for assessing Construction Program risks.

2. Definitions

- a. Assumed Action: Statutory and regulatory required project approvals and related responsibilities that the State Department of Transportation (DOT) assumes and carries out on behalf of FHWA on a program-wide basis pursuant to 23 U.S.C. §106(c) and other legal authorities.
- b. Assumption Review: A short, focused review that evaluates the outcomes of a specific assumed authority by the State DOT as granted by the S&O Agreement, Attachment A.
- c. Core Elements: These are the fundamental subcomponents that collectively form a program. The suggested Core Elements for Construction are listed in paragraph D of this document.¹
- d. Internal Control: A structured process implemented by an entity's oversight body, management, and personnel to provide reasonable assurance that the entity's objectives will be attained.²
- e. Project Material Certification: A required document under 23 CFR §637.207(a)(3) that verifies the materials' compliance with project plans and specifications.
- f. Material Frequency Guide: This document serves as a guide for the frequency of verification sampling and testing, in accordance with 23 CFR §637.207(a)(1)(i)(A). It is also referred to as the Material Control Schedule or Schedule of Materials Control (SMC).
- g. Performance Indicator: A measurable data point that offers insights into the overall health of the program.
- h. Process Review: An evaluation tool used to assess and document the compliance, efficiency, and effectiveness of a program element or process, utilizing data and information.

¹ This is not an exhaustive list; Division may alter or add to meet their specific needs.

² *Standards for Internal Control in the Federal Government*, Government Accountability Office, September 2014.

- i. Program Management: Involves the administration of interconnected technical areas and projects with the aim of optimizing effectiveness and benefits while ensuring alignment with organizational goals and strategic objectives.³
- j. Quality Assurance: Quality assurance encompasses two key aspects: (1) deliberate, planned, and systematic actions to instill confidence in a product or facility's satisfactory performance in service, and (2) the process of ensuring that a product meets its prescribed quality standards.⁴
- k. Quality Control: This is the agency-specified process for contractors to monitor, evaluate, and adjust their production or placement processes to guarantee that the final product meets the specified quality levels.⁵

3. Risk-Based Approach to Construction Monitoring

This Program is intended to follow and expand on FHWA's RBSO policies and procedures, including:

- FHWA Division and State Stewardship and Oversight (S&O) Agreements, which document the extent to which a State assumes the responsibilities of FHWA under Title 23 in accordance with 23 U.S.C. 106(c) to carry out project responsibilities traditionally handled by FHWA, and describe FHWA oversight activities;
- Required project and program actions administered by FHWA, including project-level actions that FHWA determines cannot, or should not, be assumed by States;
- Risk-based project and program involvement, which is a FHWA response to elevated risks or meaningful opportunities to inform and improve programs and meet FHWA objectives; and
- Data-driven compliance assurance checks, through the Compliance Assessment Program, Validation Program, and the Financial Integrity Review and Evaluation Program, are used by FHWA to sample projects and inform program compliance.

Division Offices should refer to and follow these policies and procedures when establishing a Construction Monitoring Program.

The Construction Monitoring Program provides an optional framework for Division Offices to execute a data-driven, performance-based approach to monitor the Construction Program. A routine monitoring of Federal actions assumed by the State, assures FHWA that project decisions are being made in accordance with the Federal laws, regulations, policies, Executive Orders, and procedures that would apply if the responsibilities were carried out by FHWA. Routine process reviews in different areas of construction will aid Division Offices and State DOTs in identifying performance indicators, potential process improvements, or areas where additional guidance or training is needed to improve execution and consistency.

The Construction Monitoring Program should:

- Ensure that approved State processes and Federal requirements are followed to construct the project in reasonably close conformance with the approved plans and specifications.

³ Project Management Institute, 2017

⁴ This definition is included for informational purposes only and is not intended to be applied over the specifically applicable definition in 23 CFR §637.203.

⁵ TRB's E-Circular 235, Glossary of Transportation Construction Quality Assurance Terms, 2018

- Ensure that the State DOT quality assurance measures are being implemented to achieve the level of quality desired and if appropriate, assist the State DOT with enhancements to their program.
- Ensure that decisions made for any assumed actions conform with Federal laws and regulations.
- Assure consistency in acceptance and verification of product and material certifications.

The Construction Monitoring Program can be broken down into components that support risk-based program and project involvement by FHWA. The components described in this section work together to provide a comprehensive data-driven assessment of the Construction Program. The completion of the actions should either identify risks to the program, threats, or opportunities, or reassure the Division that the program is being administered soundly.

Effective management of the Construction Program may require several additional Division Office activities. These include:

- Engagement with the appropriate FHWA discipline(s) to maintain technical expertise,
- Participation in State DOT construction-related committees,
- Review and approval of appropriate State DOT manuals, and
- Participation in improper payment reviews.

A. DATA-DRIVEN COMPLIANCE ASSURANCE

The execution of required actions and risk-based involvement, at both the project and program level, provide insight and document how the program is functioning. The following elements are included to further ensure the program is compliant and meeting performance expectations:

- **Program Indicators:** provide overall health assessments of the program. They answer the following question: is the program moving in the right direction or the wrong direction?
- **Internal Control:** helps an entity run its operations efficiently, report reliable information about its operations and comply with applicable laws and regulations.

B. RISK-BASED PROJECT AND PROGRAM INVOLVEMENT

The Division Office will undertake the following activities to support the FHWA risk-based approach to project and program involvement. It is expected that project involvement (as outlined in the FHWA Risk-based Project Involvement Guide⁶) will be for the purpose of determining if the approved State DOT process is being followed and implemented correctly. When there is a project that will have a unique element or process or that has an identified risk, the Division Office should view that as a Special Emphasis Area. The Construction Monitoring Program consists of the following risk-based reviews:

- **Assumption Reviews:** A review of the authorities assumed by the State DOT in Attachment A of the S&O Agreement on a multi-year cycle, depending on the level of risk. They ensure that the State DOT is making decisions with the same considerations FHWA would have applied. The reviews answer the question: is the State DOT properly applying the Federal laws and regulations when making their decisions?

⁶ https://www.fhwa.dot.gov/federalaid/stewardship/risk_based_proj_involvement.pdf

- **Core Element Reviews:** Each program has a limited number of major components or activities. The reviews ensure that the State DOT is following the processes and procedures that were approved by FHWA and deemed to be federally compliant. The reviews answer the questions: are the State DOT staff aware of the procedures and are they applying them correctly?
- **Special Emphasis Areas:** These may be new innovations the State DOT is trying or construction activities that are unique and complex. FHWA actions should be focused on helping the State DOT address threat risks. Special Emphasis Areas may also address opportunity risks by considering such activities as training, peer exchanges, or focused reviews (e.g., a review of precast procedures or drilled shaft procedures to assist the State DOT with their quality control early in the project).

4. Construction Monitoring Plan

Division Offices should develop a Construction Monitoring Plan that consists of the activities planned for the current year and a summary of the previous year's actions and findings. The Construction Monitoring Plan assists the Division Offices as they conduct their risk assessment process, develop their unit plans, and allocate resources. *Attachment A* of the S&O Agreement contains an example of a Construction Monitoring Plan for informational purposes only.

5. Required Project Actions

Division Offices apply a risk-based approach when completing required project actions, as outlined in the Risk-based Project Involvement S&O Plans. Division office staff should make note of any issues identified during project involvement to include in the Construction Monitoring Plan.

Project Actions: As reflected in the table below, Attachment A of the S&O Agreement lists all project actions that may be assumed by a State DOT. There are currently no actions in the Construction Program that must be retained by the Division Office. Should Attachment A of the S&O Agreement require that an action be retained by FHWA, there would be no requirement to review the action since FHWA is performing the work. However, periodic review on State-assumed actions is a good practice for Division Office staff assurance that the State DOT is carrying out the responsibilities adequately on the Division's behalf. The review findings may result in confirmation of good practices, process improvements, reporting requirements on the State's part, or to support the adjustment of assumed responsibilities.

ACTION	AGENCY RESPONSIBLE NHS	AGENCY RESPONSIBLE Non-NHS
Approve contract changes and extra work [23 CFR 635.120]	FHWA or STATE	STATE
Approve contract time extensions [23 CFR 635.120, 635.121(b)]	FHWA or STATE	STATE
Concur in use of mandatory borrow/disposal sites [23 CFR 635.407]	FHWA or STATE	STATE
Approval of administrative settlements and contract claim awards and settlements [23 CFR 140.505, 635.124]	FHWA or STATE	STATE
Concur in termination of construction contracts [23 CFR 635.125(b)]	FHWA or STATE	STATE
Approve a time extension of an ID/IQ contract [23 CFR 635.604(a)(6)(i)]	FHWA or STATE	STATE

6. Construction Program Components

A. Program Indicators

The use of indicators to track the performance of the Construction Program can be a useful tool to provide insight into the health of the program. Indicators ideally would be “leading” meaning they would indicate the direction of the program. By identifying and tracking key indicators, Divisions can identify trends that lead to increased program risk. This will allow Division Offices to focus resources in areas with greater risk. The table below provides illustrative examples of the program indicators. Divisions may opt for more or different indicators.

Indicator	Source	Submission	Remarks
Material not meeting specification incorporated	Project Material Certification	Upon project completion	
Failing material tests	Project Material Certification	Upon project completion	Focus on Pavement, structural concrete, and aggregate base
Test required but not taken	Project Material Certification	Upon project completion	Focus on Pavement, structural concrete, and aggregate base
Cost increase/decrease percentage	Low bid plus contract changes	Upon project completion	
Contract claims	Settlement agreement	Annually	Group by issue and value to identify themes
NPDES violations	Violation citations	Annually	

B. Internal Controls

The purpose of internal controls testing is to see if the controls are properly detecting or preventing material errors or purposeful misstatement in financial reports. Although control audits cannot completely detect all potential sources of fraud or non-compliance, auditors can

use controls testing to test operational controls for gaps, which can significantly reduce risk. Testing reveals what situation the organization is in:

- If controls are found to be effective, control risk is low.
- If controls are identified as vulnerable or ineffective, control risk is high. Auditors may need to perform additional tests or take further actions, as specified by the relevant regulation or compliance standard.

There are several types of internal control tests, each one progressively more comprehensive:

- **Inquiry**—reviewers engage with managers and employees to discuss the controls in place. However, reliance on inquiry alone is discouraged; it should be complemented with more robust testing methods.
- **Observation**—reviewers directly witness the implementation of controls, which proves valuable when there's limited documentation. For instance, if formal procedures for installing silt fences are absent, reviewers can visually verify their presence on the project or timely placement of curing covers on materials.
- **Examination or Inspection**—reviewers assess the functionality of controls by scrutinizing existing documentation and logs. For instance, a test of controls might entail an on-site visit to ensure that Buy America certifications align with the heat numbers on project steel or an examination of change orders to verify their correct categorization as either federally eligible or not.
- **Re-performance**—recognizing that the prior methods may not provide absolute assurance, re-performance involves auditors actively executing controls to validate their effectiveness. For instance, reviewers may physically measure layer thickness or guardrail height or perform manual financial calculations to confirm their accuracy.
- **Computer-aided audit tools (CAAT)**—reviewers harness technology to automatically analyze substantial data volumes. While a basic CAAT could be a spreadsheet, specialized tools exist for testing various internal controls. Most CAAT solutions concentrate on export-based, point-in-time sampling across an entire transaction inventory.

When reviewing and approving manuals or procedures submitted by the State DOT, the Division Office should ensure that the document contains appropriate internal controls. The list below represents some of the most common types of internal controls:

- Physical control over vulnerable assets
- Establishment and review of performance measures and indicators
- Segregation of duties
- Proper execution of transactions
- Accurate and timely recording of transactions
- Appropriate documentation of transactions

C. Assumption Reviews

Most State DOTs assume the construction actions outlined in Attachment A of the S&O Agreement. Division Offices should periodically review these assumed actions to ensure compliance with Federal requirements. Division Offices should consider simplifying the standard program review format to assist with these reviews. Review cycles should be based on risk.

Assumed Action	Review Cycle	Items to be Reviewed	# Of Projects Reviewed
Approve changes and extra work [23 CFR 635.120]	Approximately once every 3 years	SDOT cost analysis and work eligibility	Consider utilizing CAP sample for review year
Approve contract time extensions [23 CFR 635.120]	Approximately once every 3 years	SDOT time analysis	Consider utilizing CAP sample for review year
Concur in use of mandatory borrow/disposal sites [23 CFR 635.407]	Approximately once every 5 years	Ensure NEPA clearance for each site and documentation of public interest	Consider reviewing all sites since the last review, but not more than 10
Concur in settlement of contract claims [23 CFR 635.124]	Approximately once every 3 years	Review claim settlement for eligibility	Consider reviewing all claims settled in the year prior to review year, but not more than 20
Concur in termination of construction contracts [23 CFR 635.125(b)]	Approximately once every 5 years	Justification for termination	Consider reviewing all terminations since the last review, but not more than 10
Approve a time extension of an ID/IQ contract [23 CFR 635.604(a)(6)(i)]	Approximately once every 5 years	Review SDOT time analysis and justification	Consider reviewing all approvals since the last review, but not more than 10

D. Core Element Reviews

The core elements of the Construction Program include those listed in the table below.⁷ A schedule for conducting a core element review of a component on a multi-year cycle is listed alongside the element. Sub-elements are provided to aid in identifying potential areas for review. *Attachment B* includes a listing of activities for each sub-element that aligns with the Guidebook for Risk-Based Construction Inspections.

Core Element	Sub-Element	Review Cycle	Remarks
EEO Contract Compliance	DBE Commercially Useful Function, OJT Participation	A	May be done with Civil Rights Program Manager
Material Quality Assurance	Asphalt Concrete, Portland Cement Concrete, Aggregate Base, Structural Backfill	B	Coordinate with Pavement & Materials Engineer for material quality assurance coverage. Refer to Materials manual for additional guidance.
Work Zone Management	Devices, Management Plans	C	May be done with Safety Engineer
Contract Administration	Prompt Pay, Required Contract Provisions, Buy America, Claims, Environmental Commitments &	D	May be done with the Environmental Program Manager or

⁷ This is not an exhaustive list; Divisions may alter or add to meet their specific needs.

	Permit Compliance, Construction Billings		Finance Program Manager
Construction Delivery	Earthwork & Embankment, Subbase/Base Course, Pavement (PCCP, HMA), Structural Concrete (Cast-in-Place, Precast), Bridge Deck and Girder, Miscellaneous	E	Meets temperature specs, curing, lift thickness, rebar spacing, etc. *

* Ensuring Manual Compliance: To verify that field procedures align with manuals, it is crucial to provide supplemental or additional information that enables the verification of adherence to manual guidelines.

In addition to the Core Elements listed above, many construction program activities are closely related to materials quality assurance. Division Offices should maintain strong communication between the staff assigned to oversee the Construction Program and the staff assigned to oversee materials quality assurance to facilitate collaboration and share any findings and recommendations from stewardship and oversight activities between the two program areas.

E. Special Emphasis Areas

Division Offices should be aware of any new process or materials being utilized by the State DOT on a project that could pose risk, threat, or opportunity, where FHWA’s expertise might be beneficial for mitigating the risk. Providing training, workshops, peer exchanges, and peer reviews are appropriate risk mitigation strategies for State DOT staff before construction so State DOT staff can learn from others.

Awareness of any Office of Inspector General (OIG), Government Accountability Office (GAO), State government, or other audit findings could also trigger the need for in-depth reviews.

7. Conclusion

Division Offices should submit the reviews conducted as part of the Construction Monitoring Program to the Program Review Library. This will help other Division Offices as they take steps to mature their Construction Monitoring Program. In addition, Division Offices should consider sending their Construction Monitoring Plans to the Construction Program Office (HICP-20) to gather data to support nationwide risks and drive national activities.

Attachment A

Annual Construction Program Monitoring Plan Example

Data presented herein has been fabricated for illustrative purposes only.

DIVISION: Your Division

PERFORMANCE YEAR: 2022

PREVIOUS YEAR ACTIVITIES AND FINDINGS

For PY 2021 a Core Element Review was conducted on the Quality Assurance Testing process. While the review identified a number of strengths in the process, four areas were cited for improvement, they were:

1. The inclusion of test results that did not meet the tolerances. This practice should be discontinued.
2. Random numbers for test locations were not being consistently utilized. Staff should be retrained on the approved process contained in the DOT manual.
3. Chain of custody for samples was not being consistently maintained. Staff should be retrained on the approved process contained in the DOT manual.

The Division also completed Assumptions Reviews on Final Inspection & Final Acceptance and EEO Contract Compliance.

For the Final Inspection and Final Acceptance Review we determined the State DOT to be in Substantial Compliance. It is recommended that they revise the Certificate of Final Acceptance, the current form does not include Federal project numbers or the standard statement required for Federal-aid projects. We also found one project that had Final Acceptance before the Final Inspection had been completed. The State DOT should emphasize their Finals process in future trainings.

The EEO Contract Compliance Review determined that the State DOT was Fully Compliant. The State DOT has templates for each step in the process and the templates were used consistently.

The only Program Required Action taken in PY 2021 was the review of the Independent Assurance Annual Report. The report showed no areas of concern with the following results:

- Projects Reviewed 98.9%,
- Testers Reviewed 99.3%
- Satisfactory Tester Reviews 98.7%

ACTIVITIES FOR PERFORMANCE YEAR 2022

The only required Program Action for the upcoming performance year is the AASHTO Accreditation Program on-site assessment of the Central Laboratory. The Materials Engineer will be participating in the assessment process.

Assumptions reviews to be completed in the coming year will include:

- Approve Contract Changes and Extra Work [23 CFR 635.120]
- Concur in use of mandatory borrow/disposal sites [23 CFR 635.407]

The contract changes and extra work review will utilize the projects from the CAP sample and the mandatory borrow/disposal site review will use all sites from the previous 5 years not to exceed 10 sites.

Construction Program Indicators

All indicators are based upon a sample of 20 projects per year. For each year 10 projects are selected that are administered by the State DOT and 10 project that are administered by an LPA.

NPDES Violations		
Year	# Of Projects	# Of Violations
2016	20	2
2017	20	0
2018	20	3
2019	20	3
2020	20	4
2021	20	1

For the past six years the number of NPDES violations has been reasonably constant. Most violations have been the result of significant storm events and not for a failure to implement required best management practices. We view this area of environmental compliance as low risk. However, there may be an opportunity here to improve or enhance the BMP's the State DOT is utilizing or the hydraulic models being employed.

Project Cost Increase or Decrease	
Year	Percentage
2016	2.7%
2017	3.3%
2018	7.2%
2019	4.7%
2020	4.1%
2021	4.5%

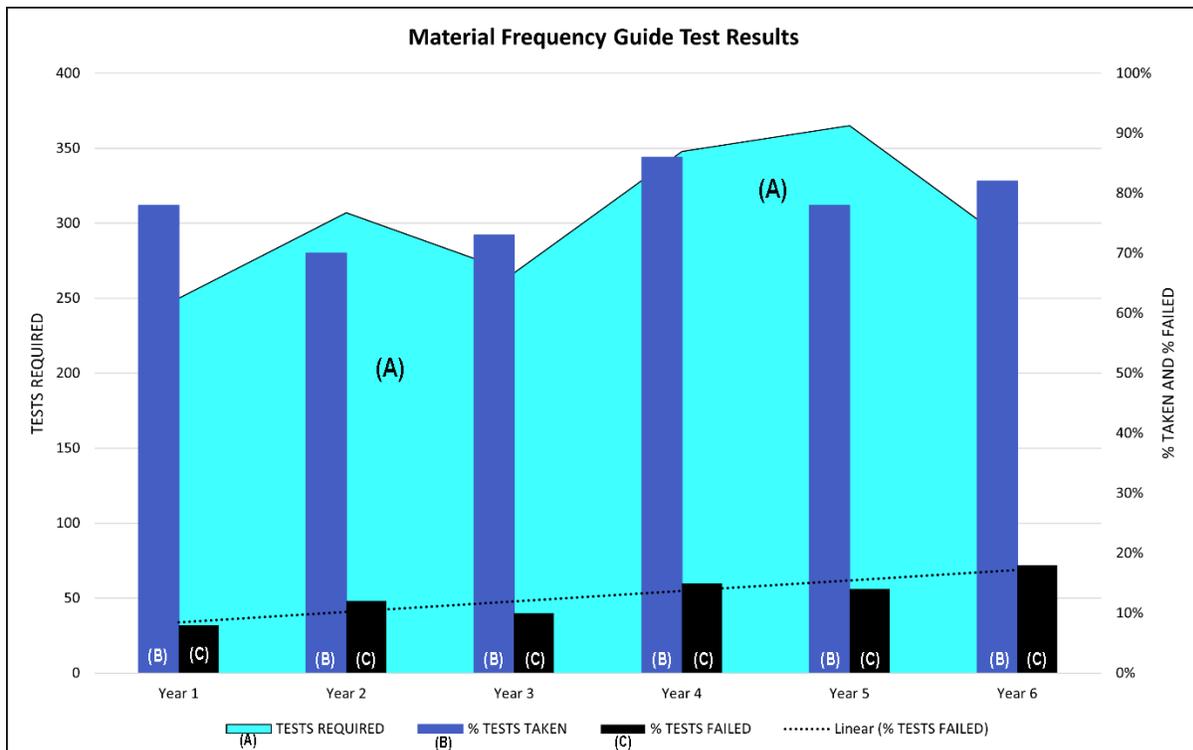
The project cost Increase/Decrease indicator are based upon the total value of the 20 contracts at time of award and the total value of the change orders for all 20 contracts.

The cost increase for projects as a result of the change orders has remained relatively constant at below 5%, this suggest it is a low-risk area.

(Note: State DOT and LPA contracts could be split out for a more detailed look.)

Contract Claims (All values in \$1,000's)			
Year	Value of Contracts	Value of Claims	% Of Contract Value
2016	\$ 65,000	\$ 2,145	3.3%
2017	\$ 72,000	\$ 4,032	5.6%
2018	\$ 68,000	\$ 4,896	7.2%
2019	\$ 56,000	\$ 4,648	8.3%
2020	\$ 83,000	\$ 6,557	7.9%
2021	\$ 61,000	\$ 5,185	8.5%

The value of claims paid by the State DOT has seen a steady increase over the past 6 years. **This is a potential risk that should be explored further via a review.**



The sample for the Material Frequency Guide test results is the total number of tests on the 20 projects sampled for the four project cost drivers identified:

1. Asphalt Pavement
2. Portland Cement Pavement
3. Aggregate Base
4. Structural Concrete

The number of tests taken versus those required generally falls in the range of 70% to 80%. This could be a potential risk, with the concern being why aren't all the prescribed tests being completed? It is significant that the number of failing tests has been on the rise for the past 6 years. **This suggests a risk that should be explored via a focused review.**

Non-Conforming Material Incorporated into the Projects	
Year	Value of Item(s) in \$1,000's
2016	\$ 253
2017	\$ 247
2018	\$ 245
2019	\$ 296
2020	\$ 301
2021	\$ 335

The value of the non-conforming material placed on all projects in the 20-project sample has seen a slight increase over the past 6 years. This slight increase may be connected to the number of failing materials tests or may be just normal fluctuation. **No action is recommended on this indicator at this time. The Division Office will continue to monitor.**

Core Element Reviews

Based upon the information provided by the Construction Performance Indicators and staff knowledge of program functions, it is recommended that two reviews be conducted. One that is focused on the reasons that the testing required by the Material Frequency Guide is not being completed, and a second review on Concrete Curing procedures for bridge decks. The Division Bridge Engineer has reported that there have been extensive discussions at the bridge design meetings about premature cracking. Some of the design and materials engineers have speculated that the curing is not being handled properly in the field. This review represents an excellent opportunity to partner with the state.

EXAMPLE

Attachment B

Workmanship Sub-element Activities

Sub-Element	Earthwork and Embankment	Subbase/Base Course
Foundation Preparation	X	
Embankment Stability	X	
Compaction Control	X	X
Drainage Work	X	
Geotextile Placement	X	
Lift Thickness	X	X
Erosion Control	X	
Excavation	X	
Embankment Fine Grade Line	X	
Placement Inspection	X	X
Slope Rounding/Shaping	X	
Drainage Layer and Pipe Installation		X
Base Patching		X
Surface Smoothness/Tolerance		X

Sub-Element	Bridge Deck and Girder	Bridge Foundation, Pile, Abutment, Column and Pier	Cast-in-Place Structural Concrete	Cast-in-Place Structural Concrete
Assembly, Erection, and Testing of Steel Girders	X			
Rebar Placement/Concrete Cover	X	X	X	X
Precast Concrete Deck and Girder Placement	X			
Fresh Concrete Testing	X	X	X	X
Vibration/Placement of Concrete	X	X	X	X
Formwork/False Work	X	X	X	X
Curing	X		X	X
Expansion Joint Inspection	X			
Monitoring Concrete Placement Duration	X	X	X	X
Waterproofing Membrane	X			
Finish/Texture/Skid Resistance	X	X		
Surface Smoothness/Tolerance	X			
Piles and Drilled Shafts Operations		X		

Sub-Element	Bridge Deck and Girder (cont.)	Bridge Foundation, Pile, Abutment, Column and Pier (cont.)	Cast-in-Place Structural Concrete (cont.)	Cast-in-Place Structural Concrete (cont.)
Pile Load Testing		X		
Dimension Thickness and Grades		X	X	X
Survey Checking		X		

Sub-Element	Rigid Pavement (PCCP)	Flexible Pavement (HMA)
Rebar Placement/Cover/Dowels	X	
Fresh Concrete testing	X	
Curing	X	
Joint Inspection	X	
Vibration/Placement of Concrete	X	
Surface Smoothness/Tolerance	X	X
Dimensions, Thickness and Grades	X	X
Finish/Texture/Skid Resistance	X	X
Laydown Inspection		
Segregation		
Density		
Coat and Surface Preparation		
Longitudinal Joint Inspection		

Sub-Element	Miscellaneous
Temporary Traffic Control	X
Guardrail/Guiderail and Fencing	X
Traffic Signals, Electrical and Lighting	X
Pavement Marking	X
Traffic Signing	X
Coatings and Penetrating Sealants	X