



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**CONTRACTOR QUALITY CONTROL PLANS
ITM No. 803-23**

1.0 SCOPE.

- 1.1 This procedure covers the preparation of a QCP by a Contractor. The QCP shall be provided, maintained, and followed to assure all materials furnished and placed for acceptance are in accordance with the contract requirements.
- 1.2 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and to determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

- 2.1 **Standards.** AASHTO, ASTM, ITM, SSPC, and other referenced standards shall be identified under each type of Contractor's QCP contained herein.

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101. Specific terms and abbreviations to a type of Contractor's QCP shall be defined within that type of QCP requirements, as necessary.

4.0 GENERAL REQUIREMENTS.

- 4.1 The QCP shall be contract specific and state how the Contractor proposes to control the materials, equipment, and operations on the contract.
- 4.2 The QCP shall be signed and dated by the Contractor's representative at the time the QCP is submitted to the Engineer. The QCP shall be submitted 15 days prior to Commencing earthwork operation.
- 4.3 The Department will review, sign, and date the QCP if the contents of the QCP are in compliance with the requirements as stated herein.
- 4.4 The QCP shall be maintained to reflect the current status of the operations, and revisions shall be provided in writing prior to initiating the change. The change shall not be implemented until the revision has been accepted.
- 4.5 The QCP shall contain the name, qualifications, telephone number, duties, and employer of all quality control personnel necessary to implement the QCP. The minimum number of quality control functions shall be as follows:

- 4.5.1 QCP Manager. The person responsible for the overall administration of the QCP
- 4.5.2 QCP Field Manager. The person responsible for the execution of the QCP and liaison with the Engineer. The QCP Field Manager for HMA Pavements shall be a Certified HMA Field Supervisor. The QCP Field Manager for Earthwork and Subgrade shall be a Certified Technician for Construction of Earthworks. **Field Manager is not required when embankment fill is between 10,000 and 40,000 CYD.**
- 4.5.3 Quality Control Technician. The person responsible for conducting quality control tests and inspection to implement the QCP. There may be more than one quality control technician.
- 4.5.4 One quality control person may perform the duties of any of the other functions listed in 4.5.1, 4.5.2, or 4.5.3.
- 4.6 The QCP shall contain, but not be limited to, the proposed methods of sampling, testing, calibration, construction control, monitoring, and anticipated frequencies.
- 4.7 Placement operations shall not begin before the QCP has been accepted.
- 4.8 As a minimum, the QCP shall contain the information as stated herein for the following operations:
 - 4.8.1 HMA Pavements -- 5.0
 - 4.8.2 Portland Cement Concrete Pavements -- 6.0
 - 4.8.3 Structural Concrete -- 7.0
 - 4.8.4 Field Painting of Steel Bridges -- 8.0
 - 4.8.5 Shop Painting of Steel for Bridges -- 9.0
 - 4.8.6 Seal Coat -- 10.0
 - 4.8.7 Micro-Surfacing -- 11.0
 - 4.8.8 Trenchless Pipe Installation -- 12.0
 - 4.8.9 Drilled Shaft Foundation – 13.0
 - 4.8.10 Soil Embankment and Subgrade – 14.0
 - 4.8.11 Stormwater – 15.0

5.0 HMA PAVEMENTS QCP.

5.1 References.

5.1.1 AASHTO Standards.

TP 68 Density of In-Place Hot Mix asphalt (HMA) Pavement by
Electronic Surface Contact Devices

5.1.2 ASTM Standards.

D2950 Density of Bituminous Concrete in Place by Nuclear Method

5.1.3 ITM Standards.

580 Sampling HMA
583 Certified Hot Mix Asphalt Producer Program
812 Macrotexture of Milled Pavement
917 Inertial Profilers

5.2 Quality Control Technician. The quality control technician shall be responsible for the following minimum functions.

5.2.1 Quality control tests for temperature, density, and smoothness

5.2.2 Pavement samples for Contractor's quality control and Department acceptance

5.3 Milling. The procedures for milling the existing material shall include as a minimum the following:

5.3.1 Milling Plan. The general procedures for asphalt milling, asphalt removal, PCCP milling, scarification and profile milling, and transition milling.

5.3.2 Equipment. A description of the equipment required to mill, cut, and remove the existing material.

5.3.3 Testing. The procedure for measuring the macrotexture of the milled surface in accordance with ITM 812. The minimum frequency of tests shall be one test per day.

The procedure, frequency, and equipment for measuring the cross-slope and longitudinal surface finish of the milled material shall be included.

5.4 Process Balance. The methodology for balancing the operation, to include plant production, transportation, placement, and compaction. The corrective action

procedure for keeping the total operation in balance shall be provided.

- 5.5 Transportation of Mixture.** The procedures for transportation of the HMA from the plant to the paver shall include as a minimum the following:
- 5.5.1 Truck Bed Cover.** The criteria for when waterproof covers shall be used and the person responsible for directing the use of the waterproof covers
 - 5.5.2 Unloading.** The procedures for truck unloading, and for removing the remaining mixture from the truck bed and bed apron
 - 5.5.3 Transfer Vehicles.** If used, the type and size of Materials Transfer Device or Windrow Elevator, and the plans for bridge crossings
- 5.6 Paving.** The procedures for placement of the HMA shall include as a minimum the following:
- 5.6.1 Equipment.** The manufacturer's make, model, serial number, manufactured year, and the manufacturer's literature with pictures of the paver(s) that shall be used
 - 5.6.2 Paving Plan.** The general sequence, the widths and depths of paving for each of the major courses, and the planned date for paving to begin and to be completed on the contract
 - 5.6.3 Material Feed System.** The procedure for processing the mixture through the paver
 - 5.6.4 Grade and Slope.** The procedure for controlling the grade and slope, including a description of placing wedge and level courses, if applicable
 - 5.6.5 Joints.** The procedure for the construction of the longitudinal and transverse joints. The starting and stopping procedures of the paver for transverse joints shall be included.
 - 5.6.6 Asphalt Materials.** The source, source numbers, type, and grade of materials that shall be used for the tack coat, prime coat, or seal coat.
- 5.7 Joint Compaction.** The procedures for compaction of the longitudinal and transverse joints
- 5.8 Materials Sampling and Testing.** The procedures for sampling and testing of the HMA and the frequency of tests shall be identified and include as a minimum the following:
- 5.8.1 Mixture Properties.** The plant, certified in accordance with ITM 583 that

shall supply the HMA mixture to the site including the location, owner, producer name, and plant number

- 5.8.2 **Mixture Temperature at Paver.** The procedure for measuring the temperature of the mixture at the paver. The temperature shall be taken immediately behind the paver prior to compaction. The minimum frequency of tests shall be one test for each 1 h of paving.
- 5.8.3 **Density.** The procedure for measuring the density of the mixture utilizing a non-destructive technique. Density tests shall be taken on the mainline and shoulders. The minimum frequency of tests shall be one test each 1000 yd². A nuclear test device, if used, shall be calibrated in accordance with ASTM D 2950 at a minimum frequency of once each 12 months.

The procedure for monitoring the temperature of the mix during compaction to optimize the rolling pattern shall be included.

Instead of a non-destructive testing device, an Intelligent Compaction (IC) roller meeting the Department requirements may be used to measure the stiffness and temperature of the mixture. A GPS radio and receiver unit shall be mounted on the IC roller to monitor the drum locations and track the number of passes of the roller. The IC roller shall include an integrated on-board documentation system that is capable of displaying real-time color-coded maps of IC measurement values including stiffness response values, location of roller passes, pavement surface temperatures, roller speeds, vibration frequencies, and amplitudes of the roller drums.

- 5.8.4 **Coring.** The plan for when cores shall be taken and procedure for refilling core holes
- 5.8.5 **Smoothness.** The procedure for measuring the smoothness of the pavement. The annual certification of the inertial profiler in accordance with ITM 917 shall be included.
- 5.9 **Response to Test Results.** The response to quality control tests shall include as a minimum the following.
 - 5.9.1 **Mixture.** The procedure for corrective action in response to mixture tests from the pavement
 - 5.9.2 **Temperature of Mixture.** The procedure for corrective action in response to temperature measurements
 - 5.9.3 **Density.** The procedure for corrective action in response to density tests
- 5.10 **Pavement Smoothness.** The procedure for correcting the profile of non-complying pavement. Areas outside of the allowable Standard Specification

tolerance shall be corrected.

5.11 Documentation. A statement that the test results for control and documentation of equipment shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documentation shall include the following:

5.11.1 Quality Control Tests. The results for the mixture, temperature, density or stiffness, and smoothness tests of the pavement

5.11.2 Equipment. Documentation of the manufacture, model, and type of paver and rollers used each day of paving. Modifications to this equipment shall be noted.

6.0 PORTLAND CEMENT CONCRETE PAVEMENT QCP.

6.1 References.

6.1.1 AASHTO Standards.

T 121 Mass per Cubic Meter (Cubic Foot), Yield, and Air Content (Gravimetric) of Concrete

T 152 Air Content of Freshly Mixed Concrete by the Pressure Method T 309 Temperature of Freshly Mixed Hydraulic Cement Concrete

6.1.2 ASTM Standards.

C173 Air Content of Freshly Mixed Concrete by the Volumetric Method

6.1.3 ITM Standards.

402 Strength of Portland Cement Concrete Pavement (PCCP) Using the Maturity Method

902 Verifying Sieves

909 Verifying Thermometers

910 Verifying Balances

911 Verifying Slump Cones

917 Inertial Profilers

6.1.4 Other.

ACI 306 Cold Weather Concreting

6.2 Quality Control Technician. The technician shall be an American Concrete Institute (ACI) certified concrete field testing technician, grade 1.

6.3 Testing Facility. The location of the testing facility and a list of test equipment. The testing facility shall be in accordance with 508.09. A statement of accessibility of the testing facility shall be included that allows Department personnel to witness quality control activities, and to review quality control tests.

6.3.1 Testing Equipment. A list of the testing equipment proposed for quality control testing, and the test methods and frequency of calibration or verification of the equipment. The equipment shall meet the requirements of the test methods identified in 508.09. The Contractor shall maintain a record of all equipment calibration or verification results at the testing facility. The minimum frequency and procedures shall be as follows:

| Equipment | Requirement | Minimum Frequency | Procedure |
|---------------------|--------------------------|-------------------|---------------------------|
| Air Meter | Calibration | 3 months | AASHTO T 152 or ASTM C173 |
| Balances | Verification | 12 months | ITM 910 |
| Sieves | Check Physical Condition | 12 months | ITM 902 |
| Slump Cones | Verify Dimensions | 12 months | ITM 911 |
| Thermometers | Verification | 12 months | ITM 909 |
| Unit Weight Measure | Calibration | 12 months | AASHTO T 121 |

6.4 Materials. The source, transportation, handling, and storage procedures, as applicable, for materials to be used in the PCCP.

6.4.1 Admixtures - type

6.4.2 Aggregates - size

6.4.3 Curing Materials

6.4.4 Dowel Bars - size

6.4.5 Dowel Bar Assemblies - size

6.4.6 Fly Ash - class

6.4.7 Ground Granulated Blast Furnace Slag - grade

6.4.8 Joint Fillers – type

6.4.9 Joint Materials – type

6.4.10 Portland Cement - type

6.4.11 Reinforcing Steel - size and type

6.4.12 Water - Potable or non potable. If non-potable, the sampling and testing procedures shall be included.

6.5 Process Control of Aggregates. A plan for control of the gradation and moisture in the aggregate stockpiles, identification of stockpiles by signing or other acceptable methods, techniques for construction of proper stockpiles, and loading procedures.

6.5.1 The gradation control band tolerances on each sieve for aggregates not in accordance with the gradations of 904.02 and 904.03 shall be included.

Gradation tests for each aggregate size shall be conducted daily when concrete paving operations exceed 200 yd² per day. The procedure for determination of the combined aggregate gradation shall be included. Gradation tests shall verify the maximum size of the aggregates and the mathematically combined amount passing the No. 200 sieve of fine and coarse aggregates which have been proportioned in accordance with the CMD. Gradation tests shall also verify compliance with intermediate sieves in accordance with 904.02 and 904.03 or with sieve band tolerances as stated herein.

6.5.2 The procedure for determination of the water absorption of the aggregate shall be included. The minimum frequency shall be two tests for each aggregate used during the concrete paving operations.

6.6 Trial Batch Demonstration. The procedures, location, and type of equipment to be utilized during the trial batch demonstration(s). The identification and intended use of each mixture shall be included.

6.7 Concrete Batching. The techniques and controls of the concrete batching operations. A description of the plant, including the capacity and intended batch size, and the methods and sequence by which the plant produces a batch shall be included. The minimum mixing time shall be stated.

The initial and routine equipment checks, including those conducted on mixers, scales, water meters, and admixture dispensers, shall be included. All material checks, including frequencies of testing, shall be identified. The methods to monitor ingredients used, and the record of each batch shall be included.

6.8 Process Control of Concrete. The procedures for sampling and testing the concrete mix for flexural strength, air content, unit weight, water/cementitious ratio, and temperature. The frequency of tests shall be included and as a minimum

shall meet the following:

- 6.8.1 Flexural Strength.** The minimum frequency of tests shall be one set of two beams for each subplot.
 - 6.8.2 Air Content.** The minimum frequency of tests shall be one air content for each subplot.
 - 6.8.3 Unit Weight.** The minimum frequency of tests shall be one unit weight for each subplot.
 - 6.8.4 Water/Cementitious Ratio.** The minimum frequency shall be one per week or one for every five lots, whichever is more restrictive by frequency.
 - 6.8.5 Concrete Temperature at Paver.** The minimum frequency of tests shall be one concrete temperature test for each 2h of paving.
- 6.9 Process Control of Pavement.** The procedures for determining the pavement depth, surface profile, and surface smoothness shall be as follows:
- 6.9.1 Pavement Depth.** The procedure for monitoring the depth of the concrete pavement
 - 6.9.2 Surface Profile.** The procedure for measuring the surface profile and correcting profile non-compliance of the concrete pavement
 - 6.9.3 Surface Smoothness.** The procedure for measuring the smoothness and correcting smoothness non-compliance of the concrete pavement. The certification of the inertial profiler in accordance with ITM 917 shall be included.
- 6.10 Control Charts.** The procedures for charting quality control results for tests for flexural strength, unit weight, and air content of the concrete. The control charts shall indicate process control limits for each subplot and lot, 100 percent payment limits, and have a legend. The charts shall be maintained at a readily accessible location at the common testing facility. The control chart legend shall be as follows:
- 6.10.1** The target value, if applicable, shall be the center of the chart and shall be represented by a heavy long dash followed by a short dash line.
 - 6.10.2** Control limits shall be represented by heavy solid lines.
 - 6.10.3** One hundred percent payment limits shall be indicated by short dashed lines.
 - 6.10.4** The horizontal lines on the chart indicating the 100 percent payment limits,

control limits, and target value, if applicable, shall be numerically identified in the left margin.

- 6.10.5 The vertical distance between upper and lower control limits shall be no less than 2 in..
- 6.10.6 The plot point for the test results shall be surrounded by a small circle, and each consecutive point shall be connected by a solid straight line.
- 6.10.7 Test results shall be plotted left to right in chronological order, and dates corresponding to each test shall be shown along the horizontal axis.

Any proposed deviation from these procedures shall be identified in the QCP.

- 6.11 **Response to Test Results.** The response to process control tests shall include as a minimum the following:
 - 6.11.1 **Water Absorption.** The procedure for corrective action when the absorption test results for a particular size of aggregate differs from the design mix value by more than 0.5 percent. A statement that production shall be discontinued when this tolerance is exceeded shall be included.
 - 6.11.2 **Other Quality Control Tests.** The procedure for corrective action for results outside of satisfactory limits for each type of test.
- 6.12 **Concrete Hauling.** The equipment and methods for delivery to the paver. The description or plan drawing of the traffic patterns in the vicinity of the plant and for delivery of the concrete mix to the site of work shall be stated. Information concerning temporary adjustments to traffic flow shall be included. When using transit mixers, the procedures for adding water to the PCC and the required mixing time to increase workability shall be included.
- 6.13 **Concrete Paving.** The procedures for placement of the concrete shall include as a minimum the following.
 - 6.13.1 **Paving Plan.** The general sequence of construction, the widths and methods of placement for all areas, and the planned date for paving to begin and to be completed on each phase of the contract
 - 6.13.2 **Cold Weather Paving.** The procedures to be utilized when ambient temperature is below 35°F. Procedures shall address protection of subgrade, treatment of concrete components, and protection of the PCCP. ACI 306 may be used for additional guidance.
 - 6.13.3 **Night Paving.** The procedures to be utilized for artificial lighting when natural light is insufficient. The procedures shall include the number and type of units with respect to the paving operations.

- 6.13.4 Paving.** The techniques used to place concrete throughout the project with specific details pertaining to difficult locations, such as joining existing pavement, gaps, headers, crossovers, approaches, or tapers
 - 6.13.5 Equipment.** Identification of the equipment used in the paving operations on each phase of the contract
 - 6.13.6 Alignment and Profile.** The methods of controlling the alignment and profile
 - 6.13.7 Placement and Consolidation.** Methods of depositing plastic concrete from the hauling equipment to the grade. The proposed methods of spreading and consolidating shall be included.
- 6.14 Joints.** The type of sealant to be used and the manufacturers recommended installation procedure for each type of joint construction. The measures to be taken to prevent the flow of cementitious material into previously placed and sawn joints, when placing adjacent concrete pavement shall be included.
- 6.14.1 D-1 Contraction.** The procedure for identifying the contract conditions so that the joints are continuous from edge of pavement to edge of pavement. Methods of installation, alignment, timing of sawing, and protection shall be included.
 - 6.14.2 Longitudinal.** The method of construction, which shall include details of how the reinforcing steel is to be placed and when the joints are to be saw cut, at identified planned locations
 - 6.14.3 Transverse Construction.** The method of construction, which shall include details of the type of header and reinforcing used, when paving operations are suspended
 - 6.14.4 Longitudinal Construction.** The method of construction and proposed spacing if other than shown on the plans
- 6.15 Finishing, Texturing, and Curing.** The methods for finishing, texturing, and curing the PCCP. The equipment to be used shall be identified.
- 6.16 Documentation.** A statement that the test results for control shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documentation shall include results for the aggregate tests, mixture tests, and the profile, smoothness, and depth of pavement tests.

7.0 STRUCTURAL CONCRETE QCP.

7.1 References.

7.1.1 AASHTO Standards.

- T 67 Standard Practices for Force Verification of Testing Machines
- T 121 Mass per Cubic Meter (Cubic Foot), Yield, and Air Content (Gravimetric) of Concrete
- T 152 Air Content of Freshly Mixed Concrete by the Pressure Method

7.1.2 ASTM Standards.

- C173 Air Content of Freshly Mixed Concrete by the Volumetric Method

7.1.3 ITM Standards.

- 902 Verifying Sieves
- 909 Verifying Thermometers
- 910 Verifying Balances
- 911 Verifying Slump Cones

7.2 Quality Control Technician. The technician shall be a Certified Concrete Technician. The technician shall be at the plant for the trial batch demonstration, and be at the plant or at the site of work at the point of placement until placement and finishing are complete. The technician shall supervise all sampling and testing for process control. An American Concrete Institute (ACI) certified concrete field testing technician, grade I, shall perform all sampling and testing for process control.

7.3 Testing Facility. The location of the testing facility to be used for determination of the compressive strength of concrete

7.4 Testing Equipment. A list of the testing equipment proposed for process control testing, and the test methods and frequency of calibration or verification of the equipment. The equipment shall meet the requirements of the test methods identified, except as such requirements may be modified in the Standard Specifications. A record of all equipment calibration or verification results shall be maintained. The minimum frequency and procedures shall be as follows:

| Equipment | Requirement | Minimum Frequency | Procedure |
|----------------------|--------------------------|-------------------|-----------------------------|
| Air Meter | Calibration | 3 months | AASHTO T 152 or ASTM C73 |
| Balances | Verification | 12 months | ITM 910 |
| Sieves | Check Physical Condition | 12 months | ITM 902 |
| Slump Cones | Verifying Dimensions | 12 months | ITM 911 |
| Testing Machine | Verification | 12 months | AASHTO T 67 |
| Thermometers | Verification | 12 months | ITM 909 |
| Unit Weight Measures | Calibration | 12 months | AASHTO T 121 |

7.5 Materials. The source, transportation, handling, and storage procedures, if applicable, for materials to be used in the Superstructure Concrete.

7.5.1 Admixtures - type

7.5.2 Aggregates – size

7.5.3 Curing Materials

7.5.4 Reinforcing Steel - size and type

7.5.5 Evaporation Retardants

7.5.6 Fly Ash - class

7.5.7 Ground Granulated Blast Furnace Slag - grade

7.5.8 Silica Fume

7.5.9 Portland Cement - type

7.5.10 Water - potable or non potable. If non-potable, the sampling and testing procedures shall be included.

7.6 Process Control of Aggregates. The procedure for monitoring aggregate gradation, water absorption, and Saturated Surface Dry (SSD) Bulk Specific Gravity to verify compliance with the properties of the aggregates used at the time of the trial batch demonstration.

7.6.1 The gradation control band tolerances on each sieve for aggregates not in accordance with the gradations of 904.02 and 904.03 shall be included.

A statement that a copy of the control charts shall be obtained from the Certified Aggregate Producer (CAP) shall be included. The charts shall represent production and load-out test results for gradation since the CAP was certified, not to exceed the 30 most recent results, and shall be obtained within seven days of concrete placement operations. In lieu of obtaining control charts from the CAP, gradation tests of the aggregates stockpiled at the plant may be performed within seven days of concrete placement operations. If the gradation tests are conducted, the sampling and testing procedures shall be included.

The procedure for determination of the combined gradation shall be included. Gradation test results shall verify the maximum size of the aggregate and the mathematically combined amount passing the No. 200 sieve of fine and coarse aggregates which have been proportioned in accordance with the concrete mix design.

- 7.6.2** The procedures for determination of the water absorption and the SSD Bulk Specific Gravity shall be included. The minimum frequency of each test procedure shall be one test for each aggregate. The sampling and testing shall be conducted within 10 days prior to concrete placement operations. The 10 day period may be waived if the test results for the aggregate are from a captive stockpile.

- 7.7 Trial Batch Demonstration.** The procedures, location, and type of equipment to be utilized during the trial batch demonstration(s)

- 7.8 Concrete Batching.** The techniques and controls of the concrete batching operations. A description of the plant, including the capacity and intended batch size, and the methods and sequence by which the plant produces a batch shall be included.

The initial and routine equipment checks, including those performed on scales, water meters, admixture dispensers, mixing equipment, and agitators, if applicable, shall be included. All material checks, including frequencies of testing, shall be identified. The methods to monitor ingredients used, and the record of each batch shall be included.

- 7.9 Process Control or Concrete.** The location and procedures for sampling and testing the concrete mix for slump, air content and unit weight, water/cementitious ratio, and compressive strength. The process control samples shall be obtained from the site of work at the point of placement. The frequency of tests shall be included and as a minimum meet the following.

- 7.9.1 Slump.** The minimum frequency shall be one slump test for each subplot; however, the slump shall be determined on the concrete mix from the first concrete truck for each day of production.

- 7.9.2 Air Content and Unit Weight.** The minimum frequency of tests shall be one air content and one unit weight for each subplot; however, the air content and unit weight shall be determined on the concrete mix from the first concrete truck for each day of production. An additional air content and unit weight determination shall be made if there is a change in production, delivery, or placement.
- 7.9.3 Water/Cementitious Ratio.** The minimum frequency shall be one determination for each day of concrete placement operations.
- 7.9.4 Compressive Strength.** The minimum frequency of tests shall be one set of two cylinders tested at 28 days for each subplot.
- 7.10 Process Control of Reinforcing Steel.** The frequency and procedure for monitoring the depth of concrete over the uppermost bar of the top mat of reinforcing steel. A statement that measurements shall be obtained as soon as the concrete is placed and struck off, and while still plastic, shall be included.
- 7.11 Response to Test Results.** The response to process control tests shall include as a minimum the following:
- 7.11.1 Water Absorption.** The procedure for corrective action when the absorption test results for a particular size of aggregate differs from the mixture design value by more than 0.5 percent. A statement that the absorption value for the source shall be investigated and an absorption percent determined shall be included.
- 7.11.2 Bulk Specific Gravity (SSD).** The procedure of corrective action when the bulk specific gravity (SSD) of fine aggregate differs from the mixture design value by more than 0.056 or the bulk specific gravity (SSD) of coarse aggregate differs from the mixture design value by more than 0.032. A statement that the bulk specific gravity (SSD) value for the source shall be investigated and a bulk specific gravity (SSD) value determined shall be included.
- 7.11.3 Unit Weight.** The procedure for corrective action when the measured unit weight is not within process control limits from the value established by the measured air content and the linear equation representing the CMD. The process control limits shall not exceed $\pm 1.0 \text{ lb/ft}^3$ from the predicted value based on the measured air content and shall ensure that the concrete has a unit weight above the threshold limit representing a water/cementitious ratio of 0.420 at the point of placement.
- 7.11.4 Slump.** The procedure for corrective action when the slump is not within process control limits. The process control limits shall be established from a target slump, the limits of which shall ensure that the concrete is within

the concrete mix criteria at the point of placement.

7.11.5 Air Content. The procedure for corrective action when the air content is not within process control limits. The process control limits shall be established from the 6.5 % target value, and shall ensure that the concrete produced is within the specification limits.

7.11.6 Other Quality Control Tests. The procedure for corrective action for test results outside of satisfactory limits established for each type of test

7.12 Concrete Hauling. The equipment and methods for delivery of the concrete. The description or plan drawing of the traffic patterns for delivery of the concrete mix to the site of work shall be included. The patterns may be adjusted for unanticipated conditions without an addendum to the QCP.

7.13 Concrete Placement. The procedures for placement of the concrete to include as a minimum the placing sequence, identification of the placing equipment, and a description of the pumping procedures, if applicable.

7.14 Concrete Finishing, Texturing and Curing. The methods for finishing, texturing, and curing concrete. The description and identification of equipment shall be included.

7.15 Forms, Falsework, and Centering. The procedure for determining when the forms, falsework, and centering may be removed. The minimum sample size shall be two cylinders or one beam for each structural element and construction activity under evaluation. All samples shall be field cured.

7.16 Application of Loads. The procedure for determining when loads may be applied to the concrete. The minimum sample size shall be two cylinders or one beam for each structural element and construction activity under evaluation. All samples shall be field cured.

7.17 Documentation. The report format used to convey process control test results, and other pertinent information. Documentation of corrective actions shall be given to the Engineer within 24 h of such action. A statement that the test results for control shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. Documentation shall include results for the aggregate tests, mixture tests, and depth of cover of concrete over reinforcing steel measurements.

8.0 FIELD PAINTING OF STEEL BRIDGE QCP.

8.1 REFERENCES. The Contractor's certification and quality control inspections for cleaning, coating applications and curing of coatings shall be in accordance with

the current standards.

8.1.1 ASTM Standards.

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| D4285 | Clean Compressed Air |
| D4417 | Field Measurement of Surface Profile of Blast Cleaned Steel |
| D4752 | Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc- Rich Primers by Solvent Rub |
| E337 | Relative Humidity by Wet and Dry Bulb Psychrometer |

8.1.2 SSPC Standards.

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| AB 1 | Mineral and Slag Abrasives |
| AB 2 | Cleanliness of Recycled Ferrous Metallic Abrasives |
| AB 3 | Ferrous Metallic Abrasive |
| Guide 6 | Guide for Containing Debris Generated During Paint Operations |
| Guide 7 | Disposal of Lead-Contaminated Surface Preparation Debris |
| Guide 15 | Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates |
| PA 2 | Measurement of Dry Paint Thickness with Magnetic Gages |
| QP 1 | Standard Procedures for Evaluating the Qualifications of Painting Contractors: Field Application to Complex Structures |
| QP 2 | Standard Procedures for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint |
| SP 1 | Solvent Cleaning |
| SP 2 | Hand Tool Cleaning |
| SP 3 | Power Tool Cleaning |
| SP 5 | White Metal Blast Cleaning |
| SP 6 | Commercial Blast Cleaning |
| SP 7 | Brush-Off Blast Cleaning |
| SP 10 | Near-White Blast Cleaning |
| SP 11 | Power Tool Cleaning to Bare Metal |
| SP 15 | Commercial Grade Power Tool Cleaning |
| Vis 1 | Visual Standard for Abrasive Blast Cleaned Steel |
| Vis 3 | Visual Standard for Power and Hand Tool Cleaned Steel |

8.1.3 Procedures to Provide Standards. The proposed method to provide and maintain at the project site the current versions of all referenced standards shall be included in the QCP.

8.2 General. The QCP shall contain information specific to each bridge in the contract and shall be well organized. The QCP shall be submitted for approval a minimum of 15 work days prior to commencing work.

8.3 Quality Control Manager. The Quality Control Manger shall be in accordance

with 4.5 and shall be a NACE or SSPC certified coatings inspector. Documentation of the NACE or SSPC coating inspector certification shall be provided.

- 8.4 Quality Control Technician.** The Quality Control Technician shall be in accordance with 4.5 and shall be a NACE or SSPC certified coatings inspector. Documentation of the NACE or SSPC coating inspector certification shall be provided.
- 8.5 Quality Control Inspection.** The proposed methodology providing the specific inspections, equipment and documentation of inspections by the NACE or SSPC certified quality control technician shall be described in the following areas.
- 8.5.1 Quality Control Inspection Instrumentation.** The methods, identification, and calibration of quality control instrumentation shall be provided.
- 8.5.2 Quality Control Inspection Points.** The quality control inspection shall include the following inspection points for each lot of each structure, as applicable.
- a) Solvent cleaning
 - b) Abrasive contamination
 - c) Air compressor output contamination
 - d) Hand tool cleaning
 - e) Brush-off blast cleaning
 - f) Commercial blast cleaning
 - g) Near-white blast cleaning
 - h) White metal blast cleaning
 - i) Power tool cleaning
 - j) Commercial grade power tool cleaning
 - k) Power tool cleaning to bare metal
 - l) Surface Profile
 - m) Primer coat application, cure, and recoatability
 - n) Intermediate coat application, cure, and recoatability
 - o) Finish coat application and cure
 - p) Overspray removal
- 8.5.3 Quality Control Inspection Frequency.** As a minimum the quality control inspection frequency shall be in accordance with the specifications.
- 8.6 SSPC Painting Contractor Certification Program.** The painting Contractor shall provide evidence of current certification to either SSPC-QP 1 or SSPC-QP 2.
- 8.7 Traffic Maintenance Plan.** The traffic maintenance plan shall provide the proposed method and procedures to be used to protect against blasting or painting of vehicles or pedestrians, to eliminate abrasive materials and debris from falling onto the traveled portion of pavement, and the prevention of traffic hazards created by material being used by the Contractor, the Contractor's equipment, or other debris. The plan shall be in accordance with 801 and shall be structure specific for

each affected lane of pavement, day and time of lane closure, and shall include the proposed protective devices to be used for the maintenance of traffic.

- 8.8 Work Sequence Schedule.** When the contract contains more than one bridge, the scheduled sequence of work shall be provided.
- 8.9 Pollution Control Plan.** The pollution control plan shall include the specific methods, procedures, equipment and training in the following areas.
- 8.9.1 Containment Procedure.** The specific procedure which shall be used to prevent environmental pollution of the air, water, and soil and to contain all blasting materials, scrapings, wire brushings, and paint particles. The containment procedure shall include the description of the equipment, including enclosures and ventilation systems such as dust collectors. Specific explanations about how each piece of equipment will be used to prevent the various forms of pollution and the daily schedule of inspection shall be provided. If the bridge is over water, a boom or flotation device shall be used as a backup containment device and shall be described. An alternate method of containment to the booms may be used provided it can be proven to be effective.
- 8.9.2 Waste Contingency Plan.** The waste contingency plan shall address how a spill of waste shall be contained and cleaned. It shall contain the name of the emergency coordinator along with a telephone number at which the coordinator and the IDEM Emergency Response Branch can be reached 24 hours per day in case of a spill. When cleaning and painting over water, the contingency plan shall provide the telephone numbers for the local health department and all water intake users within 500 ft.
- 8.9.3 Waste Training Program.** The written description of the type and amount of both introductory and continuing training given each employee handling waste as required by 40 CFR 265.16. Records, which document proof of employee training and job experience in handling waste, shall be included.
- 8.9.4 Waste Container, Storage, Labeling, Testing, and Disposal.** The procedure for storage, type of storage container, labeling, sampling, testing, and disposal of all hazardous and non-hazardous waste materials shall be provided. These shall comply with all applicable Federal, State, and local requirements. The disposal site shall be identified.
- 8.10 Health and Safety Plan.** The health and safety plan shall provide documentation of training for each employee, contain safety data sheets for all materials, describe personnel protective equipment, explain monitoring of air during removal of hazardous-based paint, and contain all other health and safety requirements specified by State and Federal regulations.
- 8.11 Origin and Storage of Materials.** The documentation which furnishes the origin, procedures and methods of storage of all coatings, thinners, and abrasives shall be

provided.

- 8.12 Surface Preparation of Structural Steel.** The techniques, methods, equipment, and controls of the surface preparation operations shall be described. The type of abrasive chosen shall be described.

The waste residue samples are required to be tested for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver by the TCLP in accordance with 40 CFR 261.24. If any of these contaminants are present in a concentration which exceeds the respective regulatory level indicated in Table 1 of 40 CFR 261.24, the waste residue shall be considered hazardous and is required to be handled accordingly.

- 8.13 Inspection Access Equipment.** All equipment used to provide access to the work area shall be maintained in safe working order. A list of the access equipment and the maintenance records of the equipment shall be provided.

- 8.14 Painting.** The techniques, equipment, and controls of the paint mixing, thinning and application of each coating shall be described. The Contractor shall contact IDEM and the local air pollution board for information concerning any volatile organic compound regulations or restrictions. Proof of contact to these agencies shall be provided. A description which contains the methods and sequence of all painting related activities and includes measurement of the surface temperature of the steel, dew point, temperature, humidity, curing of paints, removal of overspray, and manufacturer's application instructions and technical data sheets shall be provided.

If the Contractor selects coating materials that in accordance with the manufacturer's recommendations may be used outside the temperature or humidity limits stated in 619.10(a), the coating materials shall be listed. The manufacturer's application instructions and technical data sheets shall be provided.

The techniques and type of caulk used and documentation of the compatibility of the caulk with the coating material shall be provided.

8.15 Acceptance Testing

8.15.1 Definitions

- a) **Lot.** A lot will be a series of tests performed on each phase for each 100 sq ft of surface area, or portion thereof, to be measured.
- b) **Series.** A series will be 5 random spot measurements in a lot.
- c) **Spot Measurement.** A spot measurement will be the average of 3 gage readings obtained within a spot.

- d) **Spot.** A spot will be a 1-1/2 in. diameter circular area randomly selected within the lot.
- e) **Phase.** A phase shall be painting operations consisting of either the cleaning of steel or the application of each coat of paint.

8.15.2 Procedure. Surface profile and film thickness measurements will be based on the results of random testing within a lot. Random locations will include flanges, webs, cross frames, and diaphragms. The test results will be compared to the specified requirements for that phase. The series of spot measurements will meet the following requirements:

- a) If the average of the 5 spot measurements for each lot is less than the specified requirements, the lot will be considered as non-conforming.
- b) If a single spot measurement in a lot is less than 80% of the specified requirement, the lot will be considered as non-conforming; however, if there are no visual defects in the lot, the lot will be considered acceptable.
- c) If there are 2 spot measurements less than the specified requirement, a second series of tests will be obtained. If the first and second series of tests have a total of 4 or less spot measurements less than the specified requirement, the lot will be considered acceptable. If the first and second series of tests have a total of 5 or more spot measurements less than the specified requirement, the lot will be considered as non-conforming.
- d) If there are 3 or more spot measurements less than the specified requirement in a lot, the lot will be considered as non-conforming.

8.15.3 Frequency. Spot measurements will be taken at the following frequency:

- a) For all shop painted steel, regardless of the size, one lot within each 300 ft² of surface area will be randomly selected and measured.
- b) For field painted steel structures with a surface area of less than 300 ft², each lot will be randomly selected and measured.
- c) For field painted steel structures with a surface area greater than 300 ft² and less than 1000 ft², 3 lots will be randomly selected and measured.
- d) For field painted steel structures with a surface area greater than 1000 ft² the first 1000 ft² area will be measured in accordance with 8.15.3c, and for each additional 1000 ft² surface area, or portion

thereof, one lot will be randomly selected and measured.

- e) If the dry film thickness for any lot measured in 8.15.3c or 8.15.3d is not acceptable, then each 100 ft² surface area painted will be measured.

At the discretion of the Engineer, additional lots in excess of the requirements stated above may be measured for compliance.

8.16 Documentation. The report format used to convey quality control instrument identification, calibrations, test results, visual inspections, temperature, humidity and dew point measurements and other pertinent information shall be described. Documentation of non-conforming lots and corrective actions shall be given to the Engineer before the next phase of work begins. A statement that the records for quality control shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time.

9.0 SHOP PAINTING OF STEEL FOR BRIDGES QCP.

9.1 REFERENCES.

9.1.1 ASTM Standards.

D4285 Clean Compressed Air
 D4417 Field Measurement of Surface Profile of Blast Cleaned Steel
 D4752 Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
 E337 Relative Humidity by Wet and Dry Bulb Psychrometer

9.1.2 SSPC Standards.

PA 2 Measurement of Dry Paint Thickness with Magnetic Gages
 SP 10 Near-White Blast Cleaning
 Vis 1 Visual Standard for Abrasive Blast Cleaned Steel

9.1.3 Procedure to Provide Standards. The method to provide and maintain current versions of all referenced standards

9.2 General. The QCP shall contain information specific to each bridge in the contract and shall be well organized. The QCP shall be submitted for approval a minimum of 15 work days prior to commencing work.

9.3 Quality Control Manager. The Quality Control Manger shall be in accordance with 4.5 and shall be a NACE or SSPC certified coatings inspector. Documentation of the NACE or SSPC coating inspector certification shall be provided.

- 9.4 Quality Control Technician.** The Quality Control Technician shall be in accordance with 4.5 and shall be a NACE or SSPC certified coatings inspector. Documentation of the NACE or SSPC coating inspector certification shall be provided.
- 9.5 Surface Preparation of Structural Steel.** The techniques, equipment, materials, and controls of the surface preparations shall be described.
- 9.6 Painting.** The techniques, equipment, and controls of the paint mixing, thinning, application and curing of each coating shall be described. A description of the methods and sequence of all painting related activities shall be provided and shall include the measurement of the surface temperature of the steel, dew point, temperature, humidity, curing of paints, and manufacturer's application instructions and technical data sheets.
- 9.7 Quality Control Inspection.** The proposed methodology providing the specific inspections, equipment and documentation of inspections by the NACE or SSPC certified quality control technician shall be described in the following areas.
- 9.7.1 Quality Control Instrumentation.** The methods, identification, and calibration of quality control instrumentation shall be provided.
- 9.7.2 Quality Control Inspection Frequency.** The QCP shall contain the quality control inspection frequency. As a minimum the frequency of quality control inspections for cleaning of the steel, surface profile, dry film thickness and solvent resistance of the inorganic zinc primers shall be equal to or more frequent than the measurement frequency contained in 8.15.3.
- 9.7.3 Quality Control Documentation.** The report format used to convey quality control test results, visual inspections, and other pertinent information shall be described. Documentation of non-conforming work and corrective actions shall be given to the Engineer before the next phase begins. A statement that the test results for control shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time.
- 10.0 SEAL COAT QCP.**
- 10.1 References.**
- 10.1.1 INDOT Specification Section 404**
- 10.1.2 AASHTO Standards.**

T 19 Bulk Density (“Unit Weight”) and Voids in Coarse Aggregate

T 27 Sieve Analysis of Fine and Coarse Aggregate

T 85 Specific Gravity and Absorption of Coarse Aggregate

10.1.3 ASTM Standards.

D5624 Determining the Transverse-Aggregate Spread Rate for Surface Treatment Applications

10.1.4 ITM Standards.

579 Quantity Determination of Bituminous Materials and Aggregates for Seal Coats

10.2 Quality Control Technician. The quality control technician shall be responsible for the following minimum functions:

10.2.1 Seal Coat operations and joint construction

10.2.2 Quality control tests for temperature and coarse aggregate, and determination of the application rate

10.3 Process Balance. The methodology for balancing the operation, to include transportation, placement, and rolling. The corrective action procedure for keeping the total operation in balance shall be provided.

10.4 Sealing. The procedures for placement of the seal coat shall include as a minimum the following:

10.4.1 Equipment. The manufacturer’s make, model and type of aggregate spreaders, distributors, brooms and rollers that shall be used

10.4.2 Seal Coat Plan. The general sequence, widths of seal coat for each pass, and the planned date for sealing to begin and to be completed on the contract. Also, the method of placing multiple course seal coats (types 5, 6, 7) shall be included.

10.4.3 Joints. The procedure for the construction of the longitudinal and transverse joints. The starting and stopping procedures of the distributor and aggregate spreader for transverse joints shall be included.

10.4.4 Application Rate. The target application rates for aggregate and asphalt material, actual application rate, and method for making adjustments

- 10.4.5** Rolling. The method and number of rollers to be used to ensure proper application, and the procedure to assure rolling without dislodging the aggregates
- 10.4.6** Brooming. The procedure and schedule for sweeping loose aggregate, including initial and final brooming
- 10.4.7** Stop Controlled Intersections. The method of construction up to or through stop controlled intersections to minimize damage to the newly applied seal coat
- 10.4.8** Traffic Control. The method of controlling traffic on newly applied sealed surface, and the plan for opening to traffic without damage to seal coat
- 10.5** **Materials Sampling and Testing.** The procedures for sampling and testing of the aggregate and asphalt material and the frequency of tests shall be identified and include as a minimum the following:
- 10.5.1** Aggregates. The source, source number, source location, approval number, and the type of coarse aggregate used for the seal coat. **The following information shall also be supplied:**
1. Gradation
 2. Bulk Specific Gravity
 3. Absorption
 4. Loose Unit Weight
- 10.5.2** Asphalt Material. The source, source number, type, and grade of material that shall be used for the seal coat
- 10.5.3** Temperature. The method of measuring the temperature of the asphalt material, and the appropriate temperature range as specified by the manufacturer
- 10.6** **Response to Test Results.** The response to quality control tests shall include as a minimum the following:
- 10.6.1** Coarse Aggregate. The procedure for corrective action in response to tests on the coarse aggregate
- 10.6.2** Application Rate. The procedure for corrective action in response to applied application rates differing from the target rates
- 10.6.3** Temperature. The procedure for corrective action in response to temperature measurements
- 10.7** **Documentation.** A statement that the test results for control and documentation of equipment shall be maintained for a period of three years upon completion of

the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documentation shall include the following:

- 10.7.1** Quality Control Tests. The test results for the coarse aggregate and temperature tests, and application rates
- 10.7.2** Equipment. Documentation of the manufacture, model, and type of aggregate spreader, distributor, rollers, and brooms used each day of sealing. Modifications to this equipment shall be noted.
- 10.7.3** Daily report. The following shall be recorded for each day of constructing seal coat application:
 - 1. Route
 - 2. Date
 - 3. Air temperature at beginning of work, midday, and end of work
 - 4. Beginning and ending references
 - 5. Counter readings (beginning, ending, and total)
 - 6. Length, width, total area, aggregate quantity, emulsion quantity
 - 7. Contractor's authorized signature
 - 8. Aggregate gradations
 - 9. Aggregate delivery tickets
 - 10. Asphalt bill of lading
 - 11. Target application rate
 - 12. Applied application rate

11.0 MICRO-SURFACING QCP.

11.1 References.

11.1.1 AASHTO Standards.

- M 208 Polymer Modified Asphalt Emulsion
- T 53 Softening Point of Bitumen (Ring and Ball Apparatus)
- T 59 Testing Emulsified Asphalts
- T 176 Plastic Fines in Graded Aggregates and Soils by Use of the sand Equivalent Test
- T 202 Viscosity of Asphalts by Vacuum Capillary Viscometer
- T 301 Elastic Recovery Test of Bituminous Materials by Means of a Ductilometer
- T 304 Uncompacted Void Content of Fine Aggregate

11.1.2 ASTM Standards.

- D5821 Course Aggregate Angularity
- E274 Skid Resistance/Friction Number Measurement

E524 Skid Resistance/Friction Number Measurement

11.2 Quality Control Technician. The quality control technician shall be responsible for the following minimum functions:

11.2.1 Micro-surfacing operations and joint construction

11.2.2 Quality control tests for temperature, aggregates, and application rate

11.3 Design Mix Formula (DMF). A mixture shall be produced that is in compliance with the DMF and the quality control tolerances. The methods described in this section shall be used to measure compliance. Quality control documentation shall be maintained and made available to the Engineer upon request or at the completion of the contract.

11.3.1 Fine Aggregate. The fine aggregate shall be sampled from the project stockpile and test the aggregate for gradation at a rate of one test for each 500 t of aggregate used, or a minimum of one test for each day of mixture production. The quality control tolerances from the DMF shall be as follows:

| Sieve Size | Tolerance |
|------------|-----------|
| No. 4 | ± 5.0% |
| No. 8 | ± 5.0% |
| No. 16 | ± 5.0% |
| No. 30 | ± 5.0% |
| No. 50 | ± 4.0% |
| No. 100 | ± 3.0% |
| No. 200 | ± 3.0% |

11.3.2 Sand Equivalent Test. The sand equivalent test in accordance with AASHTO T 176 shall be conducted for each applied aggregate gradation. The quality control tolerance shall be ± 7% from the DMF.

11.3.3 Asphalt Content. The percent asphalt content of the mixture shall be calculated from the equipment counter readings obtained randomly a minimum of three times a day. The single test asphalt content tolerance shall be ± 0.5% from the DMF and the average daily asphalt content shall be ± 0.2% from the DMF.

11.4 Process Balance. The methodology for balancing the operation, to include transportation and placement. The corrective action procedure for keeping the total operation in balance shall be provided.

11.5 Placement. The procedures for placement of the micro-surfacing shall include as a minimum the following:

- 11.5.1** Equipment. The manufacturer's make and model of the equipment that shall be used (Micro-Surfacing Placement Machine, Material Transfer Equipment, Drag Box, Sweepers, etc.)
- 11.5.2** Surface Preparation. The procedure to provide a clean and sound surface on which the micro-surfacing is to be applied
- 11.5.3** Placement Plan. The general sequence, the widths and depths of placement for each course, and the planned date for placement to begin and to be completed on the contract
- 11.5.4** Application Rate. The application rate of the micro-surfacing. The yield of the course being placed shall be calculated from the equipment counter readings obtained randomly a minimum of three times a day.
- 11.5.5** Material Feed System. The procedure for processing the mixture through the Micro-Surfacing Placement Machine
- 11.5.6** Grade and Slope. The procedure for controlling the grade and slope, including a description of placing rut fill and level courses, if applicable
- 11.5.7** Joints. The procedure for the construction of the longitudinal and transverse joints. The starting and stopping procedures of the Placement Machine for transverse joints shall be included.
- 11.5.8** Asphalt Materials. The source, source numbers, type, and grade of materials that shall be used
- 11.5.9** Traffic Control. The method of controlling the traffic on the newly applied micro-surfacing, and the plan for opening to traffic without damage to the micro-surfacing
- 11.6** **Materials Sampling and Testing.** The procedures for sampling and testing of the aggregate and micro-surfacing materials and the frequency of tests shall be identified and include as a minimum the following:
 - 11.6.1** Aggregates. The source, source number, source location, approval number, and type of aggregates used for the micro-surfacing
 - 11.6.2** Asphalt Material. The source, source number, type, and grade of material that shall be used for the micro-surfacing
 - 11.6.3** Temperature. The method of measuring the temperature of the asphalt material, and the appropriate temperature range as specified by the manufacturer

- 11.6.4 Surface Quality.** The procedure for measuring the smoothness and ride quality of the finished micro-surfacing
- 11.7 Response to Test Results.** The response to quality control tests shall include as a minimum the following:
- 11.7.1 Mixture.** The procedure for corrective action in response to mixture tests from the pavement
- 11.7.2 Aggregates.** The procedure for corrective action in response to tests on the aggregates
- 11.7.3 Application Rate.** The procedure for corrective action in response to applied application rates differing from the target rates
- 11.7.4 Temperature.** The procedure for corrective action in response to temperature measurements
- 11.8 Pavement Smoothness.** The procedure for correcting the profile of non-complying pavement. Areas outside of the allowable Standard Specification tolerance shall be corrected.
- 11.9 Documentation.** A statement that the test results for control and documentation of equipment shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documentation shall include the following:
- 11.9.1 Quality Control Tests.** The results for the mixture, temperature, and smoothness tests of the pavement
- 11.9.2 Equipment.** Documentation of the manufacture, model, and type of equipment used each day of placement. Modifications to this equipment shall be noted.
- 11.9.3 Daily Report.** The following shall be recorded for each day of micro-surfacing application:
1. Control section
 2. Job number
 3. Route
 4. Date
 5. Air temperature
 6. Control settings (calibration values, unit weight of emulsion, percent residue of emulsion)
 7. Beginning and ending intervals

8. Counter readings (beginning, ending, and total)
9. Length, width, total area, aggregate quantity, emulsion quantity
10. Percent of each material, percent of asphalt cement, application rate, combined application rate
11. Contractor's authorized signature
12. Aggregate gradations
13. Aggregate delivery tickets
14. Asphalt emulsion bill of lading
15. Sand equivalent value
16. Theoretical application rate (not applicable to rut fill course)
17. Yield

A statement that all material certifications, production test reports, quality control charts, test equipment certifications and calibrations, and all other material and/or design or production related records shall be maintained for a period to include the terms of the warranty. Upon completion of the placement, and the opening of the warranted micro-surfacing to traffic, a copy of all records shall be provided to the District Construction Engineer and the Office of Pavement Engineering

12.0 TRENCHLESS PIPE INSTALLATION QCP.

12.1 References.

12.1.1 INDOT Specification Section 716

12.2 General. The QCP shall contain information specific to the pipe structures to be placed by means of trenchless installation. The QCP shall be submitted a minimum of 15 days prior to commencing work.

12.3 Managers. The name, position and trenchless pipe installation work experience for each superintendent, foreman or other manager that will be on-site and directly in charge of the daily operations.

12.4 Calculations. Design calculations and detail drawings of the pipe to be installed by jacking. The calculations shall demonstrate that the pipe is of sufficient strength to resist the maximum jacking forces without damage to the pipe.

12.5 Installation Plans. Plan sheets on 11 in. x 17 in. or larger paper showing the location, dimensions and elevations of jacking or boring pits and pertinent site features, including right-of-way lines, edge of pavement, existing pipe structures, existing utilities and any known potential obstructions.

12.6 Methods. A detailed description of the trenchless pipe installation method to be used for each pipe structure, including:

1. A description of the methods for controlling the line and grade

2. A description of the method to be used for grouting the annular space between the bored hole and the carrier pipe or the casing pipe and the carrier pipe, as applicable
3. The plan for penetrating, removing or otherwise managing obstructions, if encountered
4. The plan for dewatering, if required, including the method of controlling erosion and sediment from dewatering operations
5. The plan for ensuring that all voids created by trenchless pipe installation operations are filled in a timely manner
6. The plan for monitoring surface settlement or heave, including the response plan for unacceptable settlement or heave

12.7 Materials. A list of all materials and their sources to be used for each pipe structure including, but not limited to, the following:

1. Casing pipe (if separate from the carrier pipe)
2. Carrier pipe
3. Grout
4. Bentonite or other lubricants
5. Slurry mixes

12.8 Equipment. A list of each piece of equipment to be used for each pipe structure. The equipment manufacturer's operation manuals shall be provided upon request.

13.0 DRILLED SHAFT FOUNDATIONS QCP.

13.1 References.

13.1.1 INDOT Specification Section 728.07

13.2 General. The QCP shall contain information specific to the plan for construction of the drilled shafts. The QCP shall be submitted a minimum of 45 days prior to commencing work. The drilled shaft construction shall not begin until the QCP is approved in writing by the Engineer.

13.3 Contractor. The name of the Contractor that will perform the drilled shaft construction

13.4 Quality Control Technicians. The names and qualifications of the Technicians that shall perform the slurry and concrete testing

13.5 Equipment. A list of equipment to be used including, but not limited to, the following:

1. Augers
2. Bailing buckets

3. Concrete pumps
4. Core sampling equipment
5. Cranes
6. De-sanding equipment
7. Drills
8. Final cleaning equipment
9. Slurry pumps
10. Temporary casings
11. Tremies

13.6 Testing Facility. The location of the testing facility to be used for determination of the compressive strength of concrete

13.7 Testing Equipment. A list of the testing equipment proposed for trial batch and process control testing, and the test methods and frequency of calibration of verification of the equipment. The equipment shall meet the requirements of the test methods identified, except as such requirements may be modified in the Standard Specifications. A record of all equipment calibration or verification results shall be maintained. The minimum frequency and procedures shall be as follows:

| Equipment | Requirement | Minimum Frequency | Procedure |
|----------------------|--------------------------|-------------------|---------------------------|
| Air Meter | Calibration | 3 months | AASHTO T 152 or ASTM C173 |
| Balances | Verification | 12 months | ITM 910 |
| Sieves | Check Physical Condition | 12 months | ITM 902 |
| Slump Cones | Verifying Dimensions | 12 months | ITM 911 |
| Testing Machine | Verification | 12 months | AASHTO T 67 |
| Thermometers | Verification | 12 months | ITM 909 |
| Unit Weight Measures | Calibration | 12 months | AASHTO T 121 |

13.8 Materials. A list of proposed materials and suppliers including, but not limited to, the following:

1. Concrete
2. Permanent casings
3. Reinforcement bars
4. Slurry

13.9 Trial Batch Demonstration. The procedures, location, and type of equipment to be utilized during the trial batch demonstration(s)

13.10 Materials Sampling and Testing. The procedures for sampling and testing of the

slurry and concrete and the frequency of tests shall be identified and include as a minimum the following:

13.10.1 Trial Batch. The procedure for measuring the aggregate correction factor, air content, slump, temperature, compressive strength, unit weight, and water cementitious ratio of the concrete during the trial batch. The minimum frequency for determination of the compressive strength shall be four 6 in. by 12 in. cylinders.

13.10.2 Slurry. The procedure for measuring the density, viscosity, pH, and sand content of the slurry. The minimum frequency for density, viscosity and pH shall be four sets of tests during the first eight hours of slurry use. The testing frequency shall be reduced to one set of tests for every four hours of slurry use if the tests indicate consistent, acceptable results.

13.11 Construction. A detailed description of the proposed sequence of construction through the contract at each structure and at each bent and pier of each structure. A detailed explanation of the methods and procedures for construction including, but not limited to, the following:

1. The method of construction proposed for each drill shaft
2. The procedures for ensuring correct horizontal and vertical alignment of each drilled shaft
3. The procedures for removing or excavating through subsurface obstructions, whether natural or man-made
4. The procedures for advancing casing, as applicable
5. The details regarding the lengths, sizes, and locations of the temporary casings and details regarding the methods to install and extract the temporary casing, as applicable
6. The methods of mixing, circulating and de-sanding slurry. A copy of the slurry manufacturer's recommendations shall be included.
7. The procedures for dewatering and cleaning drilled shaft excavations
8. The methods for placing and supporting reinforcement bars in the correct locations
9. The materials and methods for installing, protecting and grouting crosshole sonic logging testing access tubes
10. The procedures for concrete placement

11. The procedures and materials for pressure grouting voids when using permanent casing
12. Detailed procedures for how construction problems will be addressed

13.12 Documentation. A statement that the test results for control shall be maintained for a period of three years upon completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documentation shall include results for the aggregate tests, concrete tests, and the slurry tests.

14.0 SOIL EMBANKMENT and SUBGRADE, QCP.

14.1 REFERENCES

14.1.1 AASHTO Standards.

- T 89 Determining the Liquid Limit of Soils
- T 90 Determining the Plastic Limit and Plasticity Index of Soils
- T 99 Moisture-Density Relations of Soils Using a 2.5-kg(5.5-lb) Rammer and a 305-mm (12-in.) Drop
- T 180 Moisture-Density Relations of Soils Using a 4.5-kg(10-lb) Rammer and a 305-mm (12-in.) Drop**
- T 208 Unconfined Compressive Strength of Cohesive Soil

14.1.2 ITM Standards.

- 506 Field Determination of Moisture Content of Soils
- 508 Field Determination of Deflection using Light Weight Deflectometer
- 509 Field Determination of Strength using Dynamic Cone Penetrometer
- 510 Determining Sulfate Content in Soils by Colorimetric Method
- 512 Field Determination of Maximum Dry Density and Optimum Moisture Content of Soil
- 513 Determination of Soil Target Values
- 514 Test Sections for Recycled Materials
- 516 Spreading, Mixing and Identification of Chemical Modifiers in Soil Stabilization Construction
- 902 Verifying Sieves
- 910 Verifying Balances
- 914 Verifying Soils Test Molds
- 915 Verifying Soils Compaction Rammers

14.2 QCP Field Manager. The QCP Field Manager shall be in accordance with 4.5.

14.3 Quality Control Technician. The Quality Control Technician shall be in accordance with 4.5. One person may perform the duties of the QCP Field Manager and the Quality Control Technician. The Quality Control Technician shall be responsible for the following minimum functions:

14.3.1 Test Section construction in accordance with ITM 513. This includes establishing target values for the optimum moisture content in accordance with ITM 512, production moisture content, **comparison testing between QA and QC technicians,** and target DCP value in accordance with ITM 509. AASHTO T 99 shall be performed on soils 35 % or less passing the No. 200 sieve in lieu of ITM 512. **The Engineer may waive the test section requirement for fill when the quantity is less than 40000 CYD.**

14.3.2 Monitoring of the compaction operations

14.3.3 Quality control testing for stiffness or strength and moisture content

14.3.4 Maintenance, completion, and submittal of the Daily Diary, related QC test reports, and deficiency analysis in either electronic and/or hard copies.

14.3.5 The Technician shall be Qualified in accordance with Directive 107 for ITM 506, ITM 508, ITM 509, and ITM 512. In addition to the requirements of Directive 107, comparison testing is required for each of these test methods. Comparison testing results between the Independent Assurance Technician and the QC/QA Soils Technician shall be within $\pm 10.0\%$ for ITM 508 and ITM 509 when the tests are performed two feet or less apart. Comparison testing results shall be within $\pm 1.0\%$ for ITM 506 when the tests are performed two feet or less apart.

14.4 Testing Facility. The location of the testing facility and a list of test equipment shall be included in the QCP. **The location of the testing facility should be waived when the fill is less than 40000 CYD.** The testing facility shall be located on site so that Quality Control test results are provided to the contract in a timely manner.

14.4.1 Testing Equipment. A list of the testing equipment proposed for Quality Control testing and the test methods and frequency of calibration or verification of the equipment shall be included in the QCP. The Contractor shall maintain a record of all equipment calibration or verification results at the testing facility. The minimum frequency and procedures shall be as follows:

| Equipment | Requirement | Minimum Frequency | Procedure |
|-----------|-------------|-------------------|-----------|
|-----------|-------------|-------------------|-----------|

| | | | |
|----------|--------------------------|-----------|---------|
| Sieves | Check Physical Condition | 12 months | ITM 902 |
| Balances | Verification | 12 months | ITM 910 |
| Molds | Check Dimensions | 12 months | ITM 914 |
| Rammers | Check Dimensions | 12 months | ITM 915 |

- 14.5 Soil Management.** The procedures for management of the borrow pit and soil cut sections to assure uniform soil material shall be included in the QCP. This includes the procedures that shall be followed for the necessary adjustments in compaction because of a change in soil type, and procedures used to assure that the same soil type is used transversely for any lift.
- 14.6 Materials Sampling and Testing for Embankment and Non-Chemically Modified Soils.** The procedures for sampling and testing of embankment and non-chemically modified soils and the frequency of tests shall be identified and include as a minimum the following:
- 14.6.1 Moisture Content.** The procedure for determining the moisture content of the soil shall be in accordance with 203.23, except the frequency shall be a minimum of 4 moisture tests per day, unless directed by the Engineer.
- 14.6.2 Strength or Stiffness.** The procedure for determining the in-place strength of the soil or stiffness of the aggregate shall be in accordance with 203.23, except the frequency shall be a minimum of one test per 500 yd³.
- 14.6.3 Maximum Dry Density and Optimum Moisture Content.** The procedure for determining the maximum dry density and optimum moisture content of the soil for the test sections and when there is a change in the soil type. One Point Proctor testing in accordance with ITM 512 shall be performed at beginning of the workday, or anytime the soil type from borrow or common excavation changes.
- 14.7 Materials Sampling and Testing for Chemically Modified Soils.** The procedures for sampling and testing of chemically modified soils and the frequency of tests shall be identified and include as a minimum the following:
- 14.7.1 Mix Design.** The procedure for collecting soil samples for mix design shall be included. The mix design shall be performed in accordance with 215.03
- 14.7.2 Moisture Content.** The procedure for determining the moisture content during production compaction shall be in accordance with 215.09.
- 14.7.3 Strength.** The procedure for determining the in-place strength of the soil shall be in accordance with 215.09, except the frequency shall be a minimum of one test per 500 yd³.

- 14.7.4 Gradation.** The procedure for determining gradation of the soil shall be in accordance with 215.09.
- 14.7.5 Spreading.** The procedure to verify the spreading rate of chemicals during the chemical modification process shall be in accordance with ITM 516.
- 14.7.6 Adjustment of Chemical Modification.** The procedures for adjusting the chemical modification of soils when different soil types are encountered.
- 14.8 Test Sections.** The procedures for constructing test sections is for determination of the number of passes of the roller(s) of the DCP blow counts. Test sections are not required for chemically modified soils
- 14.9 Proofrolling.** Proofrolling prior to placement of the first lift of embankment will be required to identify weak locations in accordance with 203.26. The procedure for proofrolling shall be included in the QCP.
- 14.10 Response to Test Results.** The response to quality control tests for the test sections and during production compaction shall include as a minimum the following:
- 14.10.1 Moisture Content.** The procedure for corrective action when moisture content of embankment and non-chemically modified soils is not within the range specified in 203.23. The procedure for corrective action when moisture content of chemically modified soils is not in accordance with 215.10.
- 14.10.2 Strength.** The procedure for corrective action when the blow counts of DCP tests are less than the required blow counts determined based on laboratory tests for each soil type.
- 14.10.3 Stiffness.** The procedure for corrective action when the stiffness criteria of compacted aggregate is not in accordance with 203.24(b).
- 14.10.4 Maximum Dry Density and Optimum Moisture Content.** The procedure for corrective action when the maximum dry density and optimum moisture content test results indicate that there is a change in the soil type.
- 14.10.5 Deficient Areas.** The procedures for reworking deficient areas when identified by QC or QA testing.
- 14.11 Documentation.** A statement that the Quality Control tests, documentation of roller equipment, and daily diary shall be maintained for a period of three years upon the completion of the contract shall be included. The records, either electronic and/or hard copies, shall be maintained at a readily accessible location for review by the Department at any time. The documents shall be **provided weekly** to the

Department. QC test results shall be provided to Department prior to QA testing. The documents shall include the following:

14.11.1 Quality Control Tests. The results from the moisture, strength, and maximum dry density and optimum moisture content tests. All tests shall be clearly documented on hard copies and/or electronically and shall be identifiably related to the test results in the diary.

14.11.2 Roller Equipment. Documentation of the manufacture, model, and type of rollers used each day of soil compaction.

14.11.3 Diary. The Quality Control Technician shall maintain a diary, either electronic and/or hard copy. The diary shall be an open format book with at least one page designated for each day of embankment construction and testing. Entries in the diary shall as a minimum include: (note: not all items are applicable to each contract or day of work)

1. General weather conditions including the amount of rain received on the contract each day,
2. Location of common or borrow pit excavation,
3. Location (including identification of lifts) of embankment placement and compaction,
4. Proofrolling location prior to embankment construction test section
5. Estimated quantity of embankment placed,
6. Time test samples were obtained and tests completed,
7. Nonconforming tests and the resulting appropriate action taken,
8. Changes in key personnel
9. Significant changes in equipment or operations which may affect the placement or compaction of the embankment,
10. A statement that the mix design was performed by a qualified geotechnical consultant in accordance with 215.
11. A statement of complete coverage of subgrade by proofrolling
12. Deficient areas and response to test results
13. Any significant event or problem

The Quality Control Technician or QCP Field Manager shall sign the entry in the diary. On occasion, the diary may be signed by another person; however, the diary is required to be counter-signed by the Quality Control Technician or QCP Field Manager.

15.0 STORMWATER QCP.

15.1 References

15.1.1 IDEM Indiana Stormwater Manual

15.1.2 Construction Stormwater General Permit

15.1.3 Chapter 205 of the Department Design Manual

15.2 General. The Contractor's accepted Stormwater Quality Control Plan, SWQCP, shall interrelate with the Department's Design Stormwater Pollution Prevention Plan, SWP³, to satisfy the requirements of the Construction Stormwater General Permit. The SWQCP shall be developed by a Professional Engineer who holds a current Certified Professional in Erosion and Sediment Control, CPESC, certification or approved equivalent. The Contractor may elect to submit the SWQCP in phases. Any individual phase of the SWQCP shall be submitted to the Engineer a minimum of 14 calendar days prior to the beginning of land-disturbing activities for that phase.

15.3 Stormwater Quality Manager, SWQM. The Contractor shall designate one person as the contract SWQM. Depending on the required level of training in accordance with 205.03(c), the SWQM shall have successfully passed and shall hold a valid training document for the Department's Construction Stormwater Training course and may be required to be certified as a Certified Erosion Sediment and Stormwater Inspector, CESSWI, or Certified Inspector of Sediment and Erosion Control, CISEC, or Certified Professional in Erosion and Sediment Control, CPESC, or an approved equal. The SWQM's training documents shall be included in the SWQCP. If the SWQM is replaced during the contract, the replacement shall be designated and notification shall be given to the Engineer within 24 hours. The SWQM shall be in responsible charge for the following functions:

15.3.1 Ensuring the submittal of the SWQCP in a timely manner, prior to implementation.

15.3.2 Providing all the necessary permits information including the wetland inspection delineation and archaeological record check, the field survey in accordance with 203.08, and environmental inspections for off-site borrow locations.

15.3.3 Installation, inspection, maintenance, and removal of all BMPs to include those necessary or required by permits at off-site locations such as borrow and disposal areas, field office sites, batch plants, locations where the Contractor's vehicles enter and leave public roads, and other locations where work pertaining to the contract is occurring.

15.3.4 Attending the pre-disturbance meeting and at least one scheduled meeting per calendar month in any month in which inspections are being completed and work is ongoing.

15.3.5 Accompanying personnel from IDEM, regulatory agencies, or other

governmental agencies, as required, during site visits by those agencies.

15.3.6 Completion of all inspection reports.

15.4 SWQCP Developer. The Contractor's SWQCP shall be developed by a professional engineer who holds a current CPESC or approved equivalent. The SWQCP shall be stamped by the SWQCP developer as defined above. The SWQCP Developer shall be in responsible charge for the following functions:

15.4.1 Familiarity with the project site, permits, commitments, and relevant environmental regulations to develop the SWQCP in accordance with site conditions. In the event of conflict between permit requirements, pollution control laws, rules, or regulations of other Federal, State or local agencies, the SWQCP shall adhere to the more restrictive laws, rules, or regulations.

15.4.2 Attend the pre-disturbance meeting.

15.4.3 Issue clarifications, correct errors and omissions, and revise the SWQCP as required throughout the life of the contract. The SWQCP developer shall provide all revisions for items that are hydraulically sized or calculated, such as sediment basins and sediment traps.

15.5 Stormwater Quality Control Plan, SWQCP. The Contractor's SWQCP shall include the following:

1. Description of the site.
2. Locations of all proposed top soil stockpiles.
3. Locations of all proposed equipment storage areas, fueling locations, construction trailers, batch plants, and designated concrete truck washout areas.
4. Proposed construction sequence and phasing of BMPs including plans for the installation, inspection, maintenance and removal of BMPs. The total number of proposed construction phases shall also be specified.
5. Locations of offsite areas that drain onto project limits. The SWQCP design shall include BMPs properly sized and placed to accommodate runoff from outside of the project limits and from within the project limits.
6. Location of all construction entrances where vehicles and equipment will enter and exit the site.
7. An updated stormwater management budget including a complete list of all proposed BMPs with price calculations based upon the established unit

prices or contract prices. Proposed BMPs and costs will be reviewed by the Engineer. If accepted, the changes shall be included into the SWQCP.

8. Material handling and spill prevention plan meeting the requirements in 327 IAC 2-6.1, including contact information for local emergency personnel and the IDEM Emergency Spill Line (888) 233-7745 or (317) 233-7745. A plan for the collection, storage, and disposal of construction products and wastes. Concrete washout wastewater shall be in accordance with 205.03(e).
9. Statements that the BMPs for the project shall, at a minimum, be inspected each calendar week and also twenty-four (24) hours prior to a 1/2 inch or greater or by the end of the next work day following a rain event. Statement on how recorded rainfall will be measured for the project.
10. Provisions to ensure that pollutants such as fuels, lubricants, asphalt, sewage, wash water, wastewater, or waste from concrete mixing operations, and other harmful materials, shall not be discharged into existing bodies of water.
11. Provisions to ensure that all applicable regulations and statutes relating to the prevention and abatement of pollution shall be in compliance during the performance of the contract.
12. Statement that all appropriate erosion control items shall be in place prior to land-disturbing activity.
13. Statement that a pre-disturbance meeting has been or will be held on-site prior to beginning land-disturbing activities. If this requirement has been waived, verification to that effect shall be provided in writing.

When jurisdictional waterways, wetlands, karsts features, or other protected resources are identified in the plans as within or adjacent to the project limits the following shall also be addressed in the SWQCP and shown in the plan sheets:

1. The location of protected resource fencing, or protected resource signs. These measures shall be used to provide a clear delineation for protected resources that have the potential to be impacted by construction operations.
2. A method for conducting work located in or adjacent to bodies of water and protected resources. The method shall indicate how the work in these locations shall be conducted to comply with all conditions of the project permits.

- 15.6 Temporary Entrances.** Provisions for providing a stable construction entrance at the points where construction traffic shall enter onto an existing road shall be included.
- 15.7 Concrete Washout Facilities.** Provisions for providing concrete washout facilities shall be included in accordance with the following:
1. An estimation of how many gallons of washout waste water that will be produced on the project each day, and how many gallons will be produced on the total project. The following equation can be used for estimation purposes:

$$\begin{aligned} & (\text{Cubic yd of concrete}) / (10) \times (7 \text{ gal. per truck}) \\ & = (\text{gal. of washout water per truck chute}) \end{aligned}$$

If a concrete pump truck is used,
add 50 gal. to this number for the truck's hopper.
 2. A description of the kind of containment that will be used, including how many gallons the containment will hold. The containment shall not be constructed with straw bales.
 3. A description of where the containment will be located. The containment shall be in a location sufficient to minimize the risk of stormwater contamination.
 4. For below grade systems, a statement shall be provided on how stormwater will be prevented from entering the containment from sheet flow.
 5. A statement on free board allowance shall be provided. The free board in the containment shall be a minimum of 12 inches.
 6. A description of the washout wastewater removal procedure shall be provided. Wastewater shall be disposed of in accordance with 202.
 7. A description of the emergency spill procedure, to include secondary containment or emergency washout procedures in the case of accidental overflow or damage to the washout containment shall be provided.
 8. Signage shall be provided which will direct contractors and suppliers to the designated washout location.
- 15.8 Dust Control Measures.** Provisions for providing dust control measures in accordance with 107.08(b) shall be included.
- 15.9 Environmental Compliance.** Provisions to comply with Indiana Bat tree clearing,

fish spawning, and other environmental compliance requirements shall be included.

15.10 Response to Inspection Deficiencies. Statements of how the Contractor intends to repair or provide maintenance of any noted deficiencies shall be included.

15.11 Revisions to the SWQCP. Revisions and adjustments shall be made to the SWQCP to reflect field conditions and the stormwater management needs of the site. Revisions shall not be implemented until adjustments to the SWQCP have been submitted to the Engineer for review and acceptance.

An updated field copy of the SWQCP shall be retained in the office of the Engineer or at a mutually agreed upon location. Revisions that are accepted shall be annotated in the field copy of the SWQCP and initialed and dated by the SWQM and Engineer.

Revisions shall be submitted and stamped by the SWQCP developer for items that are hydraulically sized or calculated such as sediment basins and sediment traps. The SWQM shall submit revisions for items that are not hydraulically sized or calculated. Adjustments of the BMPs shall be subject to the Engineer's acceptance.

On contracts operating under a Construction Stormwater General Permit directions to the updated field copy of the SWQCP shall be posted alongside the Notice of Intent and Notice of Sufficiency **or the Construction Stormwater Posting Project Information (CSPPI).**

APPENDIX A

**HOT MIX ASPHALT
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to paving
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (INDOT Qualified Technician)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

* Only if applicable

MILLING

General Procedure

- Asphalt milling
- Asphalt removal
- PCCP milling
- Scarification and profile milling
- Transition milling

Equipment

- Milling machine
- Power saw
- Rotary power broom

Macrotexture

- Procedure for measuring macrotexture
- Test method
- Frequency

Smoothness

- Procedure for measuring cross-slope and longitudinal surface finish
- Frequency

PROCESS BALANCE

- Plant production established
- Approximate number of trucks procedure
- Paver speed procedure
- Compaction production rate procedure
- Corrective action procedure

TRANSPORTATION OF MIXTURE

- Criteria for truck bed covers and person directing use
- Truck unloading procedure
- Procedure for removal of mixture remaining in truck bed and on bed apron
- * Transfer vehicles
 - Type
 - Size
 - Plan for bridge crossings

PAVING

Paver(s)

- Manufacturer
- Make
- Model
- Serial number
- Manufactured year
- Literature with pictures

* Only if applicable

Paving Plan

- General sequence of paving
- Widths and depths of paving for each of major courses
- Planned date for paving to begin on contract
- Planned date for paving to be completed on contract

Material Feed System

- Procedure for processing mixture through paver

Grade and Slope

- Procedure for controlling grade and slope
- * Procedure for placing wedge and level

Joints

- Procedure for construction of longitudinal joints
- Procedure for construction of transverse joints
- Procedure for starting and stopping the paver for transverse joints

Asphalt Materials

- Tack coat
 - Source
 - Source number
 - Type
 - Grade
- * Prime coat
 - Source
 - Source number
 - Type
 - Grade
- * Seal coat
 - Source
 - Source number
 - Type
 - Grade

JOINT COMPACTION

- Procedure for compaction of longitudinal joints
- Procedure for compaction of transverse joints

MATERIALS SAMPLING AND TESTING

Certified HMA Plant

- Producer name
- Plant location
- Plant number
- Certified Producer

* Only if applicable

Mix Temperature at Paver

ITM 803-23 Appendix A

- Procedure
- Location (behind paver prior to compaction)
- Testing frequency (min. 1/h of paving)

Density

- Procedure for measuring density
- Test method
- Location
- Testing frequency for mainline mixture (min. 1/1000 yd²)

Density

- Testing frequency for shoulder mixture (min. 1/1000 yd)
- Calibration documentation for non-destructive density device (min. 1/12 mo.)
- Procedure for monitoring temperature of mix during compaction to optimize rolling pattern

Stiffness

- IC compaction procedure

Coring

- Plan for when cores are taken
- Procedure for refilling core holes

Smoothness

- Procedure for measuring smoothness
- * Inertial Profiler
 - Manufacturer
 - Serial Number
 - Certification included

RESPONSE TO TEST RESULTS

Mixture

- Procedure for corrective action temperature
- Procedure for correction action

Density

- Procedure for corrective action

Smoothness

- Procedure for correcting profile on non-complying pavement

* Only if applicable

DOCUMENTATION

- Statement that Quality Control tests and documentation of equipment used on contract shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

Quality Control Tests

- Mixture
- Temperature
- Density
- Smoothness

Equipment

- Paver(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Roller(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification

* Only if applicable

**PORTLAND CEMENT CONCRETE PAVEMENT
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to paving
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (ACI Cert Concrete Field Testing Tech, Grade 1)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

TESTING FACILITY

- Location
- List of test equipment
- Access statement
- Test methods and frequency of calibration/verification

* Only if applicable

MATERIALS -- Source, Transportation, Handling, and Storage Procedures

- * Admixtures - type
- Aggregates - size
- Curing materials
- Dowel bars - size
- Dowel bar assemblies, size
- * Fly ash - class
- * Ground granulated blast furnace slag - grade
- Joint fillers - type
- Joint materials - type
- Portland cement - type
- Reinforcing steel, size and type
- Water - if non-potable, the sampling and testing procedures

PROCESS CONTROL OF AGGREGATES

Gradation

- * Control band tolerances on each sieve for aggregates not in accordance with 904.02(g) and 904.03(e)
- Sampling procedure
- Sample reduction procedure
- Test method
- Procedure for determination of combined aggregate gradation
- Testing frequency for each aggregate size (minimum - one test for each day of concrete paving operations)

Water Absorption

- Test methods
- Testing frequency (minimum two tests for each aggregate used during concrete paving operations)

Aggregate Stockpiles

- Stockpiling procedure
- Procedure for identification of stockpiles
- Loading procedures

TRIAL BATCH DEMONSTRATION

- Location
- Type of equipment
- Procedures
- Identification and intended use of each mixture

* Only if applicable

CONCRETE BATCHING

- Description of plant, including capacity and intended batch size
- Method and sequence of batching
- Minimum mixing time
- Initial and routine equipment checks (e.g., mixers, scales, water meters, and admixture dispensers) Material checks and frequency of testing
- Methods of monitoring ingredients
- Method of recording each batch

PROCESS CONTROL OF CONCRETE

Flexural Strength

- Sampling procedure
- Test method
- Testing frequency (minimum one set of two beams/sublot)

Air Content

- Sampling procedure
- Test method
- Testing frequency (minimum one test/sublot)

Unit Weight

- Sampling procedure
- Test method
- Testing frequency (minimum one test/sublot)

Water/Cementitious Ratio

- Frequency of determination (minimum of one/week or one/5 lots whichever is more restrictive)

Temperature at Paver

- Test method
- Testing frequency (minimum 2/h of paving)

PROCESS CONTROL OF PAVEMENT

- Procedure for monitoring depth
- Procedure for measuring surface profile
- Procedure for correcting profile non-compliance
- Procedure for measuring smoothness
- Procedure for correcting smoothness non-compliance
- Inertial Profiler certification included

CONTROL CHARTS

- Procedure for charting quality control test results for flexural strength, unit weight, and air content
- * Deviations from standard control chart legend

* Only if applicable

RESPONSE TO TEST RESULTS

Water Absorption

- Procedure for corrective action when test results differs from design mix value by more than 0.5 percent
- Statement that production shall be discontinued when tolerance is exceeded

Other Quality Control Tests

- Procedure for corrective action
 - Flexural Strength
 - Unit Weight
 - Air Content

CONCRETE HAULING

- Equipment and methods for delivery to paver
- Traffic pattern at plant vicinity and to the site of work
- * Temporary adjustments to traffic flow
- * Procedure for adding water to PCC and required mixing time when using transit mixers

CONCRETE PAVING

Paving Plan

- General sequence of construction
- Widths and methods of placement for all areas
- Planned date for paving to begin and to be completed on each phase of the contract

Cold Weather Paving (Below 35°F)

- Protection of subgrade
- Treatment of concrete components
- Protection of PCCP

Night Paving

- * Procedure for utilizing artificial lighting when natural light is insufficient
- * Number and type of units

Paving

- Technique of concrete placement throughout project (includes joining existing pavement, caps, headers, crossovers, approaches, or tapers)

Equipment

- List of paving equipment on each phase of project

Alignment and Profile

- Methods of controlling alignment and profile

Placement and Consolidation

- Methods of depositing plastic concrete from hauling equipment to grade
- Methods of spreading and consolidating

* Only if applicable

JOINTS

- Type of sealant and manufacturers recommendation of installation for each type of joint construction
- Preventive measures for flow of cementious material into previously placed and sawn joints

D-1 Contraction

- Procedure for identifying project conditions so that joints are continuous from edge of pavement to edge of pavement
- Method of installation
- Method of alignment
- Timing of sawing
- Method of protection

Longitudinal

- Method of construction to include reinforcing steel placement and timing of saw cuts

Transverse

- Method of construction to include details of type of header and reinforcing steel when paving operations are suspended

Longitudinal Construction

- Method of construction and proposed spacing if other than shown on plans

FINISHING, TEXTURING, AND CURING

- Methods for finishing, texturing, and curing PCCP
- List of equipment

DOCUMENTATION

- Statement that aggregate and mixture tests, and profile, smoothness, and depth of pavement measurements shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

* Only if applicable

**SUPERSTRUCTURE CONCRETE
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to paving
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (Cert Concrete Tech)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

TESTING FACILITY

- Location
- List of test equipment
- Test methods and frequency of calibration/verification

* Only if applicable

MATERIALS -- Source, Transportation, Handling, and Storage Procedures

- * Admixtures - type
- Aggregates - size
- Curing materials
- * Evaporation retardants
- * Fly ash - class
- * Ground granulated blast furnace slag - grade
- Portland cement - type
- Reinforcing steel, - size and type
- Water - if non-potable, the sampling and testing procedures

PROCESS CONTROL OF AGGREGATES

Gradation

- * Control band tolerances on each sieve for aggregates not in accordance with 904.02(g) and 904.03(e)
- Statement that control charts shall be obtained from Certified Aggregate Producer for production and load-Out tests of each aggregate, within 7 days of concrete placement operations
- Gradation Tests
 - Sample procedures
 - Sample reduction procedure
 - Test method
 - Testing frequency (within 7 days of concrete placement operations)
- Procedure for determination of combined aggregate gradation

Water Absorption

- Test Methods
- Testing frequency (minimum of one test for each aggregate used during concrete paving operations)

SSD Bulk Specific Gravity

- Test methods
- Testing Frequency (minimum of one test for each aggregate used during concrete paving operations)

TRIAL BATCH DEMONSTRATION

- Location
- Type of equipment
- Procedures

CONCRETE BATCHING

- Description of plant, including capacity and intended batch size
- Initial and routine equipment checks (e.g., mixers, scales, water meters, admixture dispensers, mixing equipment, and agitators, if applicable)
- Material checks and frequency of testing
- Methods of monitoring ingredients
- Method of recording each batch

* Only if applicable

PROCESS CONTROL OF CONCRETE

Slump

- Sampling procedure
- Test method
- Testing frequency (minimum of one test/sublot, and first truck for each day of production)

Air Content and Unit Weight

- Sampling procedure
- Test method
- Testing frequency (minimum of one test/sublot, first truck for each day of production, and when there is a change in production, delivery, or placement)

Water/Cementitious Ratio

- Frequency of determination (minimum of one for each day of concrete operations)

Compressive Strength

- Sampling procedure
- Test method
- Testing frequency (minimum of one set of two cylinders at 28 days for each sublot)

PROCESS CONTROL OF REINFORCING STEEL

- Procedure for monitoring depth of concrete over uppermost bar of top mat
- Frequency of depth measurements
- Statement that measurements shall be taken as soon as concrete is placed and struck off and while still plastic

RESPONSE TO TEST RESULTS

Water Absorption

- Procedure for corrective action when test results differ from design mix value by more than 0.5 percent
- Statement that source shall be investigated and an absorption percent determined

Bulk Specific Gravity (SSD)

- Procedure for corrective action when test results differ by more than 0.056 for fine aggregate or 0.32 for coarse aggregates from the design mix value
- Statement that source shall be investigated and Bulk Specific Gravity (SSD) determined

Unit Weight

- Procedure for corrective action when test results differ by more than $\pm 1.0 \text{ lb/ft}^3$ (16 kg/m^3) from predicted value for air content measurements (not to exceed unit weight representing w/c of 0.420)

* Only if applicable

Slump

- Procedure for corrective action when test results exceed process control limits from the target slump

Air Content

- Procedure for corrective action when test results exceed process control limits from the 6.5% target value

Other Quality Control Tests

- Procedure for corrective action
 - Compressive strength
 - * Other tests

CONCRETE HAULING

- Equipment and methods for delivery
- Traffic pattern to the site of work

CONCRETE PLACEMENT

- Placing sequence
- Identification of placing equipment
- Description of pumping procedures

FINISHING, TEXTURING, AND CURING

- Method for finishing, texturing, and curing concrete
- Description and identification of equipment

FORMS, FALSEWORK, AND CENTERING

- Procedure for determining when forms, falsework, and centering may be removed
- Frequency of samples for determination of removal (minimum of two cylinders or one beam that are field cured)

APPLICATION OF LOADS

- Procedure for determining when loads may be applied to concrete
- Frequency of samples for determination of application of loads (minimum of two cylinders or one beam that are field cured)

DOCUMENTATION

- Statement that aggregate and mixture tests, and depth of cover of concrete over reinforcing steel measurements shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

* Only if applicable

**SEAL COAT
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to paving
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (INDOT Qualified Technician)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

* Only if applicable

PROCESS BALANCE

- Aggregate production established
- Approximate number of trucks procedure
- Distributor and Aggregate Spreader speed procedure
- Roller production rate procedure
- Corrective action procedure

SEALING

Aggregate Spreader(s)

- Manufacturer
- Make
- Model
- Manufactured year

Distributor(s)

- Manufacturer
- Make
- Model
- Manufactured year

Roller(s)

- Manufacturer
- Make
- Model
- Manufactured year

Sealing Plan

- General sequence of sealing
- Widths of sealing for each pass
- Planned date for sealing to begin on contract
- Planned date for sealing to be completed on contract

Joints

- Procedure for construction of longitudinal joints
- Procedure for construction of transverse joints
- Procedure for starting and stopping the distributor and aggregate spreader for transverse joints

Application Rate

- Procedure for determining target application rates
- Procedure for measuring actual application rates
- Procedure for making adjustments to application rates

Rolling

- Number of rollers to be used
- Rolling procedure to assure adequate coverage
- Procedure to assure proper rolling without dislodging stone

Brooming

- Number of brooms to be used
- Procedure to clean surface prior to sealing
- Procedure to sweep surface after sealing, including initial, followup, and final brooming operations

Stop Controlled Intersections

- Procedure for controlling traffic at stop controlled intersections to minimize damage to seal.

Opening to Traffic

- Procedure for allowing traffic on freshly sealed surface without damage

MATERIALS SAMPLING AND TESTING

Aggregate Properties

- Producer name
- Producer location
- Producer approval number
- Type of material
- Procedure for sampling

Asphalt Material

- Producer name
- Producer location
- Producer approval number
- Type of material
- Procedure for sampling

Temperature

- Procedure for measuring temperature of asphalt material

RESPONSE TO TEST RESULTS

Aggregate

- Procedure for corrective action

Asphalt Material

- Procedure for corrective action

Temperature

- Procedure for corrective action

DOCUMENTATION

- Statement that Quality Control tests and documentation of equipment used on contract shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

Quality Control Tests

- Aggregate
- Temperature
- Application Rates

Equipment

- Aggregate Spreader(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Distributor(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Roller(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification

Daily Report

- Route
- Date
- Air temperature at beginning of work, midday, and end of work
- Beginning and ending references
- Counter readings (beginning, ending, and total)
- Length, width, total area, aggregate quantity, emulsion quantity
- Contractor's authorized signature
- Aggregate gradations
- Aggregate delivery tickets
- Asphalt emulsion bill of lading
- Target application rate
- Applied application rate

**MICRO-SURFACING
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to placement
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Qualifications
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (INDOT Qualified Technician)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

* Only if applicable

PROCESS BALANCE

- Material production established
- Appropriate support equipment
- Sufficient stockpiles/staging area
- Placement Machine speed procedure
- Placement Machine calibration procedure
- Corrective action procedure

EQUIPMENT

Placement Machine

Continuous Run Placement Machine *

- Manufacturer
- Make
- Model
- * Self-Propelled

Truck Mounted Placement Machine *

- Manufacturer
- Make
- Model

Spreading Equipment

Spreader Box

- Manufacturer
- Make
- Model

Rut Filling Box

- Manufacturer
- Make
- Model

Strike-Offs

- Manufacturer
- Make
- Model

Drags

- Type of Drag

Support Equipment

Feeder Trucks

- Manufacturer
- Make
- Model

Sweepers (Rotary Broom)

- Manufacturer
- Make
- Model

* Only if applicable

Ancillary Equipment

Front End Loader

- Manufacturer
- Make
- Model

Screens

- Manufacturer
- Make
- Model

PLACEMENT

Surface Preparation

- Procedure to provide a clean and sound surface prior to placement
 - Crack Repairs
 - Full-depth repairs
 - Pavement Markings and RPM Removal
 - Sweeping/Cleaning (Number of brooms to be used)
 - Structure / Casting protection

Placement Plan

- General sequence of placement
- Widths and depths of placement for each course
- Planned date for placement to begin on contract
- Planned date for placement to be completed on contract
- Method of placing multiple courses (if applicable)

Application Rate

- Procedure for determining target application rates
- Procedure for measuring actual application rates
- Procedure for making adjustments to application rates

Material Feed System

- Procedure for processing mixture through placement machine

Grade and Slope

- Procedure for controlling grade and slope
- Procedure for placing rut-fill and level courses, if applicable

Joints

- Procedure for construction of longitudinal joints
- Procedure for construction of transverse joints
- Procedure for starting and stopping the machine for transverse joints

Materials

- Polymer Modified Asphalt Emulsion
 - Source
 - Source number
 - Type
 - Grade
- Water
 - Source

- Aggregates
 - Source
 - Source number
 - Type
 - Grade
- Portland Cement
 - Source
 - Source number
 - Type
 - Grade
- Additives
 - Source
 - Source number
 - Type
 - Grade

Traffic Control

- Procedure for controlling traffic at stop controlled intersections to minimize damage to new micro-surfacing
- Procedure for allowing traffic on new micro-surfacing without damage

MATERIALS SAMPLING AND TESTING

Aggregates

- Producer name
- Producer location
- Producer approval number
- Type of material
- Procedure for sampling and testing
- Testing frequency

Asphalt Material

- Producer name
- Producer location
- Producer approval number
- Type of material
- Procedure for sampling and testing
- Testing frequency

Temperature

- Procedure for measuring temperature of asphalt material
- Manufacturer's recommended temperature range

Surface Quality

- Procedure for measuring the smoothness and ride quality of the finished micro-surfacing

RESPONSE TO TEST RESULTS

Micro-surfacing Mixture

Procedure for correction action

Aggregates

Procedure for corrective action

Application Rate

Procedure for corrective action

Temperature

Procedure for corrective action

DOCUMENTATION

Statement that Quality Control tests and documentation of equipment used on contract shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

Quality Control Tests

Mixture

Temperature

Smoothness

Equipment

Placement Machine(s) used each day

Manufacturer

Model

Type

Modification

Spreader Box used each day

Manufacturer

Model

Type

Modification

Rut-Fill Box used each day

Manufacturer

Model

Type

Modification

Strike-Offs used each day

Manufacturer

Model

Type

Modification

Drags used each day

Manufacturer

Type

Modification

- Feeder Truck(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Sweeper(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Front End Loader(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification
- Screen(s) used each day
 - Manufacturer
 - Model
 - Type
 - Modification

Daily Report

- Control section
- Job number
- Route
- Date
- Air temperature
- Control settings (calibration values, unit weight of emulsion, and percent residue of emulsion)
- Beginning and ending intervals
- Counter readings (beginning, ending, and total)
- Length, width, total area, aggregate quantity, emulsion quantity
- Percent of each material, percent of asphalt cement, application rate, combined application rate
- Contractor's authorized signature
- Aggregate gradations
- Aggregate delivery tickets
- Asphalt emulsion bill of lading
- Sand equivalent value
- Theoretical application rate (not applicable to rut fill course)
- Yield

**TRENCHLESS PIPE INSTALLATION
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to commencing work
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Trenchless pipe installation work experience
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Trenchless pipe installation work experience
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

CALCULATIONS

- Design calculations of pipe to be installed by jacking
- Calculations demonstrate that pipe is of sufficient strength to resist maximum jacking forces without damage to pipe
- Detail drawings of pipe to be installed by jacking

INSTALLATION PLANS

- 11in. x 17in. or larger paper
- Location of jacking or boring pits
- Dimensions of jacking or boring pits
- Elevations of jacking or boring pits
- Right-of-way lines shown
- Edge of pavement shown
- Existing pipe structures shown
- * Existing utilities shown
- * Potential obstructions shown

* Only if applicable

METHODS

- Description of methods for controlling the line and grade
- * Description of method for grouting annular space between bored hole and carrier pipe
- * Description of method for grouting annular space between casing pipe and carrier pipe
- * Plan for penetrating, removing, or otherwise managing obstructions
- * Plan for dewatering, including the method of controlling erosion and sediment from dewatering operations
- Plan for ensuring that all voids created by installation operations are filled in a timely manner
- Plan for monitoring surface settlement or heave, including the response plan for unacceptable settlement or heave

MATERIALS – Sources of materials for each pipe structure

- Casing pipe (if separate from carrier pipe)
- Carrier pipe
- Grout
- Bentonite or other lubricants
- Slurry mixes

EQUIPMENT

- Each piece of equipment used for each pipe structure
- Statement that the equipment manufacturer’s operation manuals shall be provided upon request

* Only if applicable

**DRILLED SHAFT FOUNDATIONS
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

PRIME CONTRACTOR _____

DRILLED SHAFT CONTRACTOR _____

SIGNATURE PAGE

- Submitted 45 days prior to commencing work
- QCP signed and dated by QCP Manager

QUALITY CONTROL PERSONNEL

QCP Manager

- Name
- Telephone number
- Duties
- Employer

QCP Field Manager

- Name
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

Quality Control Technicians

- Name
- Qualifications (ACI Cert Concrete Field Testing Tech, Grade 1)
- Qualifications (Slurry Testing)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager
- * Same person as QCP Field Manager

EQUIPMENT

Augers

- Manufacturer
- Make
- Model

* Only if applicable

- Bailing Buckets
 - Manufacturer
 - Make
 - Model
- Concrete Pumps
 - Manufacturer
 - Make
 - Model
- Core Sampling Equipment
 - Manufacturer
 - Make
 - Model
- Cranes
 - Manufacturer
 - Make
 - Model
- Drills
 - Manufacturer
 - Make
 - Model
- Final Cleaning Equipment
 - Manufacturer
 - Make
 - Model
- Slurry Pumps
 - Manufacturer
 - Make
 - Model
- Temporary Casings
 - Manufacturer
 - Make
 - Model
- Tremies
 - Manufacturer
 - Make
 - Model

MATERIALS – Materials and Suppliers

- Concrete
- Crosshole logging testing access tubes
- Permanent casings
- Reinforcement casings
- Slurry
- Pressure grouting void material for permanent casings

* Only if applicable

TRIAL BATCH DEMONSTRATION

- Location
- Type of equipment
- Sampling and testing procedures
- Identification and intended use of each mixture

MATERIALS SAMPLING AND TESTING

- Slurry
 - Sampling procedure
 - Test methods
 - Testing frequency
- Plastic Concrete
 - Sampling procedure
 - Test methods
 - Testing frequency
- Hardened Concrete
 - Sampling procedure
 - Test methods
 - Testing frequency
- Statement that all test results shall be provided to Engineer within 5 business days after tests are completed

CONSTRUCTION

Construction Method

- Dry Construction
- Wet Construction
- Casing Construction
 - Temporary Casing
 - Permanent Casing

Construction Procedures

- Horizontal and vertical alignment of each drilled shaft
- Removing or excavating through subsurface natural or man-made obstructions
- Casings
 - Advancing procedures for all casings
 - Length of temporary casings
 - Size of temporary casings
 - Locations of temporary casings
 - Method of installation of temporary casings
 - Method of extraction of temporary casings
- Slurry
 - Method of dewatering
 - Method of circulating
 - Method of de-sanding
 - Manufacturer recommendations

- Methods for dewatering and cleaning drilled shaft excavations
- Methods for placing and supporting reinforcement bars
- Methods for installing, protecting, and grouting crosshole sonic logging testing access tubes
- Procedure for concrete placement
- Procedure for pressure grouting voids when using permanent casings
- Procedures for addressing construction problems

DOCUMENTATION

- Statement that Quality Control tests and documentation of equipment used on contract shall be maintained for a period of three years after completion of contract and that the location shall be readily accessible for review by the Department.

**SOIL EMBANKMENT
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 15 days prior to paving
- QCP signed and dated by QCP Field Manager

QUALITY CONTROL PERSONNEL

QCP Field Manager

- Name
- Qualifications (Certified Technician for Construction Earthworks)
- Telephone number
- Duties
- Employer

Quality Control Technicians

- Name
- Qualifications (INDOT Qualified Technician for ITM 506, ITM 509, and ITM 512)
- Telephone number
- Duties
- Employer
- * Same person as QCP Manager

TESTING FACILITY

Location

- Located so that QC test results are provided to contract in timely manner
- Sufficient size to conduct QC tests
- Satisfactory base to conduct compaction of soil in accordance with AASHTO T 99 (Method A)
- Statement of accessibility that allows Department personnel to witness QC activities and to review QC tests

* Only if applicable

Testing Equipment

- List of test equipment
- Test methods used for calibration or verification of equipment
- Frequency of calibration or verification
- Records of all equipment calibration or verification results maintained at testing facility

MATERIALS SAMPLING AND TESTING

Moisture

- Procedure for measuring moisture content during production
- Testing frequency (min. 1/1400yd³ of each lift except for soils with a density less than 112 lb/ft³ which shall be one test for each 4h production)

Strength

- Procedure for measuring in-place strength of soil
- Testing frequency

Maximum Dry Density and Optimum Moisture Content

- Procedure for determining maximum dry density and optimum moisture content
- Testing frequency (each test section and when there is a change in soil type)

GPS CHECK TESTING

- Procedures for checking the proper setup of the GPS and rover

TEST SECTIONS

- Procedure for constructing test sections

PROOFROLLING

- Procedure for proofrolling

SOIL MANAGEMENT

- Procedures for management of borrow pit and soil cut sections
- Procedures for necessary adjustments in compaction because of change in soil type
- Procedures for assurance that the same type of soil shall be used transversely on each lift

CHEMICAL MODIFICATION

- Procedures for adjusting the chemical modification of the soil when different soil types are encountered

Moisture

- Procedure for measuring moisture content during production
- Testing frequency (min. 1/1400yd³)

Strength

- Procedure for measuring in-place strength of soil
- Testing frequency

RESPONSE TO TEST RESULTS

Moisture

- Procedure for corrective action when test results are not within -3 and +2 percentage points of optimum moisture content for silt-clay soils
- Procedure for corrective action when test results are not within -2 and +1 percentage points of optimum moisture content for clay soils with a density greater than 105 lb/ft³
- Procedure for corrective action when test results are not within -2 and +2 percentage points of optimum moisture content for clay soils with a density ≤ 105 lb/ft³
- Procedure for corrective action when test results are not within -6 percentage points of optimum moisture content for granular soils

Strength

- Procedure for corrective action when blow counts of DCP are less than required blow counts determined from lab tests for each soil type

Maximum Dry Density and Optimum Moisture Content

- Procedure for corrective action when maximum dry density and optimum moisture content test results indicate there is a change in the soil type

DOCUMENTATION

- Statement that quality control tests, documentation of roller equipment, and diary shall be provided to the Department as follows:

Quality Control Tests

- Moisture
- Strength
- Maximum dry density
- Optimum moisture content

Roller Equipment

- Manufacturer
- Model
- Type

Diary

Statement that the diary shall have the following:

- Electronic and/or hard copy
- One page for each day of embankment construction and testing
- General weather conditions including the amount of rain received on the contract each day
- Location of common or borrow pit excavation
- Location (including identification of lifts) of embankment placement and compaction
- Proofrolling location prior to embankment construction test section
- Estimated quantity of embankment placed
- Time samples were obtained and tests completed
- Nonconforming tests and the resulting appropriate action taken
- Changes in key personnel
- Significant changes in equipment or operations which may affect the placement or compaction of the embankment
- Deficient areas and response to test results
- Any significant event or problem

**STORMWATER
QUALITY CONTROL PLAN CHECKLIST**

CONTRACT NO. _____ **SUBMITTAL DATE** _____

CONTRACTOR _____

SIGNATURE PAGE

- Submitted 14 calendar days prior to beginning land-disturbing activities
- Stormwater Quality Control Plan, SWQCP signed and dated by the Stormwater Quality Manager, SWQM, and stamped by SWQCP Developer

QUALITY CONTROL PERSONNEL

- Identification and contact information for the SWQCP Developer and SWQM, including employer
- Successful completion and current course verification of INDOT Construction Stormwater Training for SWQM
- CESSWI, CISEC, CPESC, or approved equal verification for SWQM for **CSGP SWQM** Contract Requirement
- CPESC verification or approved equal for Contractor's SWQCP Developer requirement

QUALITY CONTROL PLAN

- Location of all proposed stockpiles, equipment storage areas, fueling locations, construction trailers, batch plants, and designated concrete truck washout areas
- Proposed construction sequence and phasing of stormwater control and BMPs
- Locations of offsite areas that drain onto project limits
- Location of all construction entrances where vehicles and equipment will enter and exit site
- An updated stormwater management budget including a complete list of all proposed BMPs with price calculations based upon the established unit prices or contract prices
- Material handling and spill prevention plan
- Statement that stormwater control measures shall be inspected on a weekly basis and within 24 h of every 1/2 in. rain event for contracts operating under a Construction **Stormwater** General Permit.
- Provisions to ensure pollutants shall not be discharged into existing bodies of water

- [] Provisions to ensure that all applicable regulations and statutes relating to prevention and abatement of pollution shall be complied with
- [] Statements that all appropriate erosion control items shall be in place prior to disturbing the project site
- []* Protected resource fence or protected resource signs locations
- []* Methods of work for locations in or adjacent to the Waters of the United States to ensure compliance with all conditions included in the 401 and 404 permits
- [] Statement that a pre-disturbance meeting between the Contractor, Engineer, SWQM and SWQCP Developer has been held or will be held on-site prior to beginning land-disturbing activities, or verification that this requirement has been waived in writing by the engineer.

CONCRETE WASHOUT FACILITIES

- [] Estimation of how many gallons of washout waste water will be produced on the project each day and how many gallons for the total project
- [] Description of the kind of containment that will be used, including how many gallons the containment will hold. The containment shall not be constructed with straw bales
- [] Description of where the containment will be located. The containment shall be in a location sufficient to minimize the risk of stormwater contamination
- [] For below grade systems, a statement on how stormwater will be prevented from entering the containment from sheet flow
- [] Statement on free board allowance. The free board in the containment shall be a minimum of 12 inches
- [] Description of the washout waste water removal procedure shall be provided. Waste water shall be disposed of in accordance with 202
- [] Description of the emergency spill procedure, to include secondary containment or emergency washout procedures in the case of accidental overflow or damage to the washout containment
- [] Description of signage to be provided directing contractors and suppliers to the designated washout location
- [] Description and location of emergency concrete washout that is of sufficient size to handle concrete washout wastewater from a minimum of one truck

DUST CONTROL MEASURES

- [] Provisions for providing dust control measures in accordance with 107.08(b)

ENVIRONMENTAL COMPLIANCE

- []* Provisions to comply with Indiana Bat tree clearing, fish spawning, and other environmental compliance requirements

RESPONSE TO INSPECTION DEFICIENCIES

- Statement of how Contractor intends to repair or provide maintenance of any noted deficiencies

REVISIONS TO SWQCP

- Procedure for submitting adjustments to the erosion and sediment control measures to reflect the current status of field conditions

REVIEW DATE: _____ REVIEWED BY: _____

* If applicable