

Section 9.2 Volume I

CONCRETE PRODUCTION

9.2.1 PURPOSE

This document provides guidance to those Florida Department of Transportation (Department) personnel who are involved in activities related to concrete production. The purpose of these guidelines is to standardize the activities associated with the concrete production facilities used for Department projects statewide.

9.2.2 AUTHORITY

Sections 334.048(3) and 20.23(3)(a) Florida Statutes

9.2.3 REFERENCES

Sections 334.044(2) and 334.044(10) (a) Florida Statutes

Code of Federal Regulations (CFR); Federal-Aid Policy Guide (FAPG); Subchapter G – Engineering and Traffic Operations, Part 637 – Construction Inspection and Approval, Subpart B – Quality Assurance Procedures for Construction

American Society for Testing and Materials (ASTM) Standard Test Methods and Specifications, Philadelphia, Pennsylvania

American Association of State Highway and Transportation Officials (AASHTO), Part II Tests, Washington, D.C.

Florida Department of Transportation Standard Specifications for Road and Bridge Construction

Florida Department of Transportation Approved Products List

9.2.4 SCOPE

The principal users of this document include the District Materials and Research Offices (DMRO) and the State Materials Office (SMO).

9.2.5 FLORIDA DEPARTMENT OF TRANSPORTATION FIELD SAMPLING AND TESTING MANUAL GENERAL INFORMATION

This document outlines the Department's requirements for the inspection of a concrete production facility, the sampling of raw materials, and the activities associated with concrete production. These guidelines have been provided to ensure that a concrete production facility's Quality Control Plan (QCP) produces a product that meets the specified quality standards. All concrete production facilities, hereinafter called plants, are required to be on the Department's Production Facility Listing. The plants are required to submit a proposed QCP for acceptance by the Department in accordance with the **Specifications Section 105**. Upon the acceptance of a plant's QCP; a satisfactory initial quality assurance inspection; and being added to the Production Facility Listing; a plant will be permitted to begin the production of concrete for Department projects.

The Department will inspect the plants at a minimum frequency of once every three (3) months, or as described in this document. The guide list found in the Department's Materials Acceptance and Certification system (MAC) shall be used to perform this inspection, with the results of these inspections entered into MAC. These inspections will help to ensure that a plant continues to produce a material that is in accordance with the accepted QCP, **and the Contract Documents**.

9.2.6 STATE MATERIALS OFFICE ROLES AND RESPONSIBILITIES

The SMO will provide concrete related technical support for all Districts. The technical support may be provided by performing a review of the plant's proposed QCP, a quality assurance inspection; or by a review of the plant's inspection and testing records or other concrete related information that may be needed by the Districts' quality assurance personnel. When requested by the DMRO, an SMO representative will accompany District personnel during the inspection.

The SMO will also conduct the required Resolution, when the DMRO conducts Verification and requests the SMO's assistance. The **Resolution Procedure Guide, Appendix "B"**, may be used to assist in performing the Resolution.

The SMO will provide the results from the tests performed on those materials collected during the inspection process. In addition, the SMO will provide information and training to DMRO personnel regarding current **SPECIFICATIONS** and inspection procedures.

The Director, Office of Materials and staff will coordinate with the concrete producers and DMRO personnel to resolve issues related to the

production of concrete.

The SMO will maintain a current list of facilities with accepted QCP. Concrete Design Mixes -- The SMO will approve concrete design mixes for MAC Specs requiring a mix design at sample login. The SMO will also provide technical support for the design mixes and any required testing.

Chloride Testing -- The SMO will provide timely and accurate test results following the latest testing methods.

9.2.7 DISTRICT MATERIALS AND RESEARCH OFFICE ROLES AND RESPONSIBILITIES

The DMRO will accept or reject a proposed QCP; perform the initial and periodic inspections; perform sampling and testing; assign a unique plant number; including QCP status, identify a Concrete Production Facility Manager of Quality Control; and maintain a copy of the Producer's QCP in accordance with the requirements of **Materials Manual 5.6, Volume I**.

The DMRO is responsible for providing the inspection and sampling functions at all plants that are located within the District. The inspection of plants located out of state is the responsibility of the DMRO with QCP acceptance authority. The sampling frequency for cementitious material and water shall be one sample per six months. Sample frequency may be increased at the direction of the District Materials and Research Engineer (DMRE).

The approval of a nonstructural plant may include the inspection of the plant utilizing **Appendix "A"** of this section.

The DMRO that provides the inspection function may perform the inspection and sampling process using their own personnel, consultant personnel, contract personnel or by personnel from other DMROs through a mutual agreement between Districts.

Personnel from the DMRO will inspect any plant to confirm that the plant's potential for supplying concrete is in compliance with the **Contract Documents**. The accepted QCP shall include the minimum criteria required for the production of concrete within the contract documents on all Department projects. The detailed functions of the personnel performing the initial plant qualification process are described in this section.

The DMRO will perform routine quality assurance inspections of those

plants that continue to furnish concrete for Department projects.

The DMRO will also support, educate, and monitor concrete quality assurance inspection personnel. The detailed functions of the quality assurance inspectors are described in this section.

9.2.7.1 PLANT QUALIFICATION PROCESS

A plant must submit a proposed QCP to the DMRO in accordance with the **SPECIFICATIONS**. Upon the plant's submittal of a QCP, the DMRO will review it and make the necessary arrangements for the initial plant qualification review and inspection. The QCP of any plant must meet the requirements of **Specifications Section 105** and shall be reviewed in accordance with the **Materials Manual Section 5.6 Volume I**. The DMRO may contact the SMO to request a review of the proposed QCP and assistance with the initial quality assurance inspection.

The DMRO personnel will perform an initial inspection of the plant. Upon completion of the inspection, the inspector shall make recommendations to the DMRE or their representative, regarding the QCP acceptance status and the plant's qualifications based on the results of the inspection. The DMRE or their representative will investigate the plant and its quality control procedures related to areas of non-compliance and/or unacceptable materials.

The DMRE or their representative will accept or reject the Producer's QCP based on a review of the Producer's QCP and the initial plant inspection recommendation. A concrete plant number will be assigned and the required information will be entered into MAC, in accordance with **Materials Manual Section 5.6 Volume I**. The plant and/or its QC procedures may be inspected at any time.

9.2.7.2 ROUTINE QUALITY ASSURANCE INSPECTIONS

The DMRO monitors the plant's QC operations to ensure conformity with the **Contract Documents** and the QCP. The DMRO performs the inspection and sampling of the materials at the plant to verify the effectiveness of the QCP. Department quality assurance inspectors will not issue instructions to a plant's representatives on how to run their operations. However, the Department's quality assurance inspectors should question or advise the plant's representatives against continuing any operation or sequence of operations observed, that may result in unsatisfactory compliance with **Contract Document** requirements.

(A) Reduced Inspection Frequency

The reduced scheduling frequency of the routine plant inspections shall be based on the plant coefficient of variation ($Cv=(\sigma/\mu)\times 100$: σ =standard deviation; μ =mean); prior plant inspections; correction of any deficiencies noted; failing samples attributed to the plant; and a request from the producer. New plants coming on line shall be inspected four times, based on a three-month inspection frequency, prior to becoming eligible for a reduced inspection frequency. Upon meeting, all of the criteria a plant may be changed to a reduced inspection frequency. If approved by the DMRO, the inspection frequency and sampling of the materials at the plant shall be at a minimum frequency of once every six months or less.

Suspension of a QCP for a plant on a reduced inspection frequency shall result in the plant returning to a minimum inspection frequency of once every three months for a minimum of six months.

The plant data for a period of 12 months prior to the date of the request for the reduced frequency will be reviewed by the DMRO. The plant must be actively producing structural concrete for the Department. The minimum number of samples used to determine the coefficient of variation is five. However, the recommended minimum number of samples is at least 15. The following guidelines shall be used to establish a new schedule for the inspection frequency of plants.

- (1) The coefficient of variation shall be based on a Class IV or higher concrete design mix and shall use the compressive strength. The data used to develop the coefficient of variation shall be taken from MAC. When approved by the DMRE or their representative, QC data from the plant may be used, when requested by the producer.
- (2) Plants with a coefficient of variation less than 0.3, less than two (2) suspensions, and have less than three (3) sample failures attributed to the plant will be considered for the reduced inspection frequency. The reduced inspection frequency shall be approved by the DMRE or their representative in the District where the plant is located. Plants located out of state will be approved by the DMRE or their representative in the District with QCP acceptance authority.

(3) All plants that do not meet the specified criteria shall be on a schedule for an inspection at a minimum frequency of once every three (3) months. The District may revoke the reduced inspection frequency at any time and return to the inspection schedule of a minimum frequency of once every three (3) months.

(B) Materials Verification Review

The quality assurance inspector performs a review of the plant's records for materials received at the plant; verifies that the scales, meters, and calcium nitrite dispensing equipment are calibrated; and admixture/water dispensers are accurate. The inspector ensures that the records are adequate to verify that all materials meet the requirements of the **Contract Documents** and are in compliance with the QCP. The quality assurance inspector will review the batching sequence, mixing devices and method of delivery to ensure a high level of quality.

(C) Inspection

The quality assurance inspector checks the handling and storage processes for each of the materials to ensure compliance with the **Specifications**. For miscellaneous materials, such as admixtures for concrete, the quality assurance inspector will ensure that the plant has used products listed on the **Approved Products List (APL)** and applicable material certifications to verify compliance with **Contract Document** requirements are on file. The quality assurance inspector should document the inspection process and include this information as part of the project's records, where possible. The quality assurance inspector may sample any material and submit the sample to the SMO as needed for testing to ensure compliance with the **Contract Documents**.

The Department's quality assurance inspection should be of sufficient depth to ensure that the plant's Manager of Quality Control (MOQC) is performing the required duties and to ensure that the plant is in compliance with the QCP.

(D) Production or Quality Control Deficiencies

The quality assurance inspector evaluates the plant's compliance with the accepted QCP and **Contract Document** requirements. The quality assurance inspector documents and

notifies the plant's MOQC, during the inspection, of any deficiencies noted during the quality assurance inspections. Once the MOQC has been notified, the inspector should follow up on each issue to ensure that corrective action has been taken by the plant to resolve the deficiency, as appropriate.

When evidence shows that the plant has failed to sample for chlorides within the required frequency, an increased sampling frequency shall be implemented. The producer shall sample chlorides once per week during production, until the approval to return to the normal sampling frequency is given by the DMRE or their representative in the District which has QCP acceptance responsibility. Failure to comply with the sampling frequency shall be cause for suspension of the QCP.

If necessary, the MOQC and Project Administrator (PA) should be notified in writing that the QCP will be suspended in accordance with the **Materials Manual Section 5.6 Volume I**. If a plant does not correct noted deficiencies, the DMRE or their representative shall suspend the QCP. The plant's QCP re-qualification status will be reinstated upon satisfactory resolution of deficiencies found by the Department.

9.2.7.3 CONCRETE DESIGN MIXES

The DMRE or their representative will monitor or otherwise review the proportioning, mixing and testing of class IV, V and VI mixes at their discretion and as resources permit. Class III and lower-class mixes may not require monitoring but shall be reviewed. When the mix properties and components have been verified, the DMRO will advise the SMO. The SMO will approve concrete design mixes for MAC specifications requiring a mix design at sample login. The DMRE or their representative will approve any other concrete design mixes. Those mix designs with final properties or components that cannot be verified will be returned to the producer as unacceptable for use on Department projects.

Aggregate or Fly Ash Substitution for Design Mixes -- The producer will forward the proposed substitution to the appropriate DMRE or their representative for verification. The DMRE or their representative will review the proposed substitution in accordance with **Materials Manual Section 9.2 Volume II**. Approval must be obtained by the appropriate office for any material substitution.

Mix designs requiring additional transit time and/or additional revolutions exceeding those found in **Specifications Section 346** will

require an approved specification change.

The DMRO will acknowledge the suitability of concrete design mixes per project and plant in MAC on the Contractor QCP.

9.2.7.4 CONCRETE MIXER DESIGN

The DMRE or their representative will review and approve the use of concrete mixers that have been altered from the original design with respect to blade design and arrangement, or drum volume, with mixer manufacturer concurrence.

Truck Mixers -- Upon request from the Producer, the DMRE or their representative will issue a mixer identification card for truck mixers meeting the requirements of the *Materials Manual Section 9.2 Volume II* and the *Specifications Section 346*.

9.2.7.5 CHLORIDE TESTING -- MONITORING

The Department will monitor the chloride content through comparison samples at a minimum frequency of one sample for each plant every 12 months. District Materials personnel will obtain split samples for testing by an approved DMRO laboratory or the SMO laboratory.

9.2.7.6 RESOLUTION

The DMRO will conduct the required resolution investigation when advised of the requirement by the PA. The *Resolution Procedure Guide, Appendix "B"* may be used to assist in performing the Resolution Investigation. When the DMRO is providing verification support to the PA, and requests assistance, other DMROs through a mutual agreement between Districts, or the SMO will perform the resolution investigation responsibilities.

9.2.7.7 SLUMP LOSS TEST

The DMRO shall witness all Slump Loss Tests. The Slump Loss Test shall be conducted using the procedures in *Materials Manual Section 9.2 Volume II. The Slump Loss Test Guide, Appendix "C"* may be used to assist in performing the Slump Loss Test. The Slump Loss Test data may be used for lower temperature placements without any admixture adjustments.

9.2.7.8 HIGH SLUMP CONCRETE WITH LUMPS AND BALLS

When lumps and balls are found on the project, the District Materials

Office will be advised so that the issue can be addressed with the plant through the Producer's QCP.

The District Materials Office shall use the following guidelines to evaluate and take action on concrete not in compliance with the **specifications** covering concrete with lumps and ball in high slump concrete:

- a. The District Materials Office will note for future plant inspections, when lumps and balls are present in one truck of high slump concrete.
- b. If another truck(s) exhibits lumps and balls, DMRE or their representative will inspect the plant to ensure compliance with the Producer's QCP, especially that portion of the Producer's QCP that addresses the batching of high slump concrete.
- c. Should subsequent truck(s) exhibit lumps and balls, the DMRE or their representative will notify the producer that the Department will not accept high slump concrete until the plant demonstrates its ability to batch a full-size load as defined by the QCP of high slump concrete free of lumps and balls. In addition, the plant will revise that portion of the QCP that addresses the batching of high slump concrete to reflect QC improvements.

9.2.8 TRAINING

Department personnel performing as quality assurance inspectors are required to pass the **Concrete Batch Plant Operator's** written examination.

9.2.9 FORMS

Nonstructural Concrete Production Facility Inspection Guide, Appendix A
Resolution Procedure Guide, Appendix B
Slump Loss Test Guide, Appendix C

Appendix A

Nonstructural Concrete Production Facility Inspection Guide

PLANT NUMBER: _____		INSPECTION DATE: ____ / ____ / ____	
Today's Inspection: Initial _____ Routine _____ Re-inspection _____			
Concrete Producer: _____		Plant Inspected By: _____	
PLANT PERSONNEL			
1	Concrete Production Facility Manager of Quality Control:	Telephone Number: _____	
2	Batch Plant Operator:	Telephone Number: _____	
AREA		SUMMARY OF REMARKS OR DEFICIENCY	
CEMENTITIOUS MATERIALS			
ADMIXTURES			
COARSE/FINE AGGREGATE			
WATER			
PLANT RECORDS			
SCALES/MIXERS			
The plant inspector discussed today's inspection with the plant representative?			
Based on today's inspection, this plant is recommended to be placed in the following status:			

FDOT PLANT INSPECTOR (PRINT)	PLANT REPRESENTATIVE (PRINT)

CEMENTITIOUS MATERIALS				
No.	Item	Y	N	N/A
1	The delivery ticket and mill certificate for cementitious materials comply with the specifications.			
2	Each type or class of cementitious materials is stored in a separate weatherproof facility that is clearly labeled.			
3	For the cementitious materials, there is a suitable, safe and convenient means of collecting samples.			

Material	Type	Brand	Source	Delivery Date	Mill Cert. Date

REMARKS OR DEFICIENCY:

ADMIXTURES				
No.	Item	Y	N	N/A
1	The delivery ticket for admixtures complies with the specifications.			
2	If used, the admixtures were added at the admixture manufacturer's recommended dosage rate.			
3	The admixture dispensing equipment was certified.			
4	A certificate of conformance was on file.			

Material Identification (Brand)	Delivery Date	Dispenser Calibration Date

REMARKS OR DEFICIENCY:

COARSE/FINE AGGREGATE				
No.	Item	Y	N	N/A
1	The delivery ticket for aggregates complies with the specifications.			
2	The bins, stockpiles, or silos were properly identified.			
3	Aggregates are handled in a manner that minimizes segregation, contamination, and mixing of other aggregates.			
4	Aggregates are in a well-drained condition to minimize free water content.			
5	The coarse aggregate is continuously and uniformly sprinkled with any source of water 24 hours immediately preceding introduction into the concrete mix.			
6	The free moisture on the aggregate is being determined within 2 hours of batching and if batching exceeds 3 hours additional moistures are being performed.			

Pit No.	Grade	FDOT Code	Delivery Date

REMARKS OR DEFICIENCY:

WATER				
No.	Item	Y	N	N/A
1	The source of batch water is from the city and approved by a public health department (no testing needed).			
2	The source of batch water is from a well and meets the testing requirements of the specification.			
3	The source of batch water is from an open body of water and meets the testing requirements of the specification.			
4	The source of water used for batching and/or sprinkling is from reclaimed or recycled water and meets the testing requirements of the specification.			

REMARKS OR DEFICIENCY:

PLANT RECORDS				
No.	Item	Y	N	N/A
1	Approved concrete mix designs were on file.			
2	Materials source (delivery tickets, certifications, miscellaneous test reports) were on file.			
3	A copy of the scale company or the testing agency report showing the observed deviations from quantities checked during calibration of the scales and meters were on file.			
4	A copy of the documentation certifying the admixture weighing/measuring device was on file.			
5	Most recent Department inspection records certifying the plant can produce concrete and documentation showing that action has been taken to correct deficiencies noted during the inspection			

REMARKS OR DEFICIENCY:

SCALES/MIXERS

No.	Item	Y	N	N/A
1	A scale company registered with the Bureau of Weights and Measures of the Department of Agriculture checked the scales and water meters for accuracy at least quarterly.			
2	The mixers are capable of combining the components of the concrete into a thoroughly mixed and uniform mass, free from balls or lumps of cementitious materials and capable of discharging the concrete uniformly.			
3	The mixers are being operated at speeds recommended by the mixer manufacturer's design?			
4	The mixer manufacturer's rated mixer capacity is not being exceeded.			

REMARKS OR DEFICIENCY:

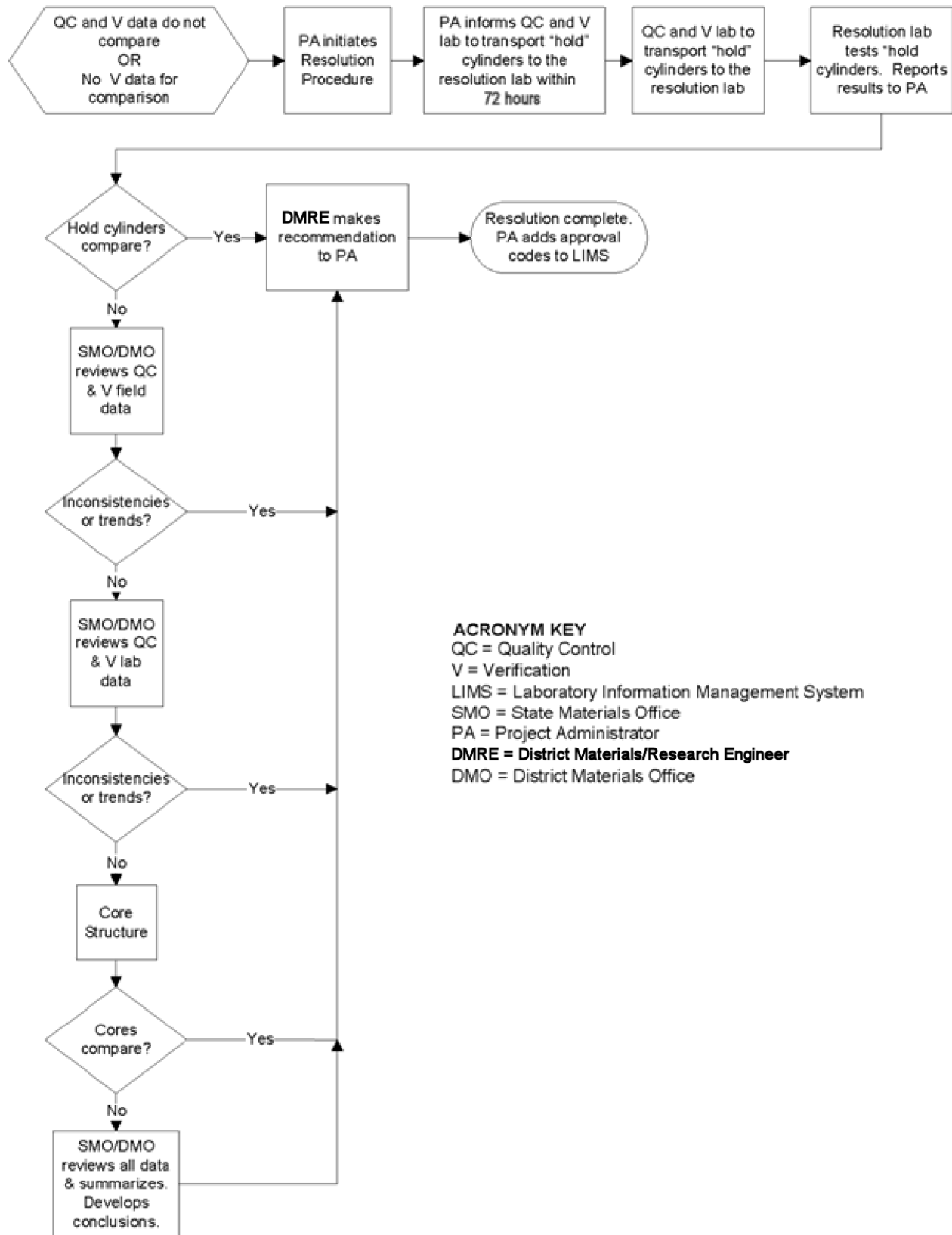
Appendix B

Resolution Procedure Guide

SAMPLE INFORMATION				
1	Financial Number:			
2	Quality Control (QC) Sample Number:	Verification (V) Sample Number:		
3	QC Sample Number in MAC :			
4	V Sample Number in MAC:			
5	Design Mix Number:	Required Strength:		
Remarks				
VERIFICATION		Yes	No	N/A
1	QC and V data meets Comparison Criteria (Specification Section 346)			
2	No Verification Data for Comparison with QC (Specification Section 346)			

3	Engineer initiates Resolution Procedure (Specification Section 346)			
Remarks				
RESOLUTION PROCEDURE				
		Compare		
		Yes	No	N/A
1	QC and V labs delivers hold cylinders to resolution lab within 72 hours of being notified of resolution requirement (Specification Section 346 and ASTM C31)			
2	Hold cylinders are tested within fourteen days of the 28 day compressive strengths (Specification Section 346 , ASTM C39 and ASTM C511)			
3	Reviewed QC and V hold cylinder test data (data compares with the QC and V test data?)			
4	Reviewed QC and V field data for trends and inconsistencies			
5	Reviewed QC and V lab data for trends and inconsistencies			
6	Implement a Field review:			
	Has IA been conducted with technician, if yes review IA data (ASTM C31, C143, C173 or C231) Follow up review may be required			
	Has IA been conducted with technician, if no implement IA procedures			
	Reviewed Initial Curing facility (Specification Section 346) (ASTM C31)			
	Reviewed transportation procedure and equipment (ASTM C31)			

RESOLUTION PROCEDURE CONT'D		COMPARE		
		Yes	No	N/A
7	Summarized Field review			
8	Implement a Lab review:			
	Has IA been conducted with QC Lab, if yes review IA data (ASTM C39, C511, C617 or C1231) Follow up review may be required			
	Has IA been conducted with V Lab, if yes review IA data (ASTM C39, C511, C617 or C1231) Follow up review may be required			
	Has IA been conducted with QC Lab, if no implement IA procedures			
	Cylinder end preparation was the same and in accordance with C39			
	Loading rate when testing cylinders was in accordance with C39			
	Has IA been conducted with V Lab, if no implement IA procedures			
	Reviewed Final Curing facility (ASTM C31 and ASTM C511)			



ACRONYM KEY
 QC = Quality Control
 V = Verification
 LIMS = Laboratory Information Management System
 SMO = State Materials Office
 PA = Project Administrator
DMRE = District Materials/Research Engineer
 DMO = District Materials Office

NOTE: The SMO will perform duties of the DMO, should the DMO act as the verification lab.

Appendix C

Slump Loss Test Guide

SUMMARY INFORMATION			
1	Financial Number:	Date:	
2	Concrete Producer:	Concrete Plant Number:	
3	Design Mix Number:		
4	Batch Size:	Batch Time:	
5	Weather:		
6	Slump Range:	Air Range:	Max Water Cementitious Materials Ratio (W/CM):
7	Original Elapsed Time:		Slump Loss Test Elapsed Time:
Admixture dosage rate for Slump Loss Test:			
Average concrete temperature:			
Average ambient temperature:			
Maximum elapsed time reported to nearest 0.25 hours:			
Witnessed By:			

VERIFICATION		Yes	No
1	Concrete Design Mix contains Slump Loss Test data which meets project requirements.		
2	The District Materials Office will approve test temperatures.		
3	The concrete elapsed time is equal to or greater than the concrete elapsed time as defined in the drilled shaft installation plan.		

REMARKS:

SLUMP LOSS TEST		Yes	No
1	Begin all elapsed times when water is initially introduced into the mixer		
2	The slump loss test is performed at a temperature consistent with the definition of summer or normal field conditions or summer or normal laboratory conditions		
3	Field Slump Loss Test, Summer Condition		
	1. The concrete temperature was 90°F or greater		
	2. The mix was at least 3 cubic yards and is mixed in a truck mixer.		
	3. After initial mixing, the slump, ambient and concrete temperatures, and air content were determined. The concrete properties were within the required limits as specified in Specification Section 346 .		
	4. The W/CM was verified and the delivery ticket met design mix requirements.		
	5. When the concrete is not being mixed, the mixer was agitated at the midrange of the mixer manufacturer's recommended agitating speed. The batch was remixed for one minute at the mixing speed of the mixer before determining slump, ambient and concrete temperatures.		
	6. Slump, ambient and concrete temperatures were determined at 30 minute intervals until the slump is 5 inches or less.		
	7. Submit slump loss test results to the DMRE for obtaining the concrete design mix approval.		
4	Field Slump Loss Test, Normal Condition		
	1 The concrete temperature was below 85°F		
	2 The mix was at least 3 cubic yards and is mixed in a truck mixer.		
	3 After initial mixing, the slump, ambient and concrete temperatures, and air content were determined. The concrete properties were within the required limits as specified in Specification Section 346		
	4 The W/CM was verified and the delivery ticket meets design mix requirements.		
	5 When the concrete is not being mixed, the mixer was agitated at the midrange of the mixer manufacturer's recommended agitating speed. Remixed the batch for one minute at the mixing speed of the mixer before determining slump, ambient and concrete temperatures.		
	6 The slump, ambient and concrete temperatures were determined at 30-minute intervals until the slump is 5 inches or less		
5	Laboratory Slump Loss Test, Summer Condition		

	1. Followed the procedure for Concrete Trial Mix Temperature of 94°F (hot weather mix)		
	2. At the end of the concrete trial mix temperature of 94°F (hot weather mixes). Turned the drum intermittently for 30 seconds every five minutes. Covered the drum with wet burlap or an impermeable cover material during the rest periods.		
	3. After initial mixing, the slump, ambient and concrete temperatures and air content were determined. The concrete properties were within the required limits as specified in Specifications Section 346.		
	4. Remixed the batch for one minute before determining slump, ambient and concrete temperatures at 15-minute intervals until the slump is 5 inches or less.		
6	Laboratory Slump Loss Test, Normal Conditions		
	1 The preparation and testing of the trial mix was performed in accordance with ASTM C192		
	2 The concrete remained in the temperature range of 68°F to 86°F		
	3 At the end of the mix procedure, turned the drum intermittently for 30 seconds every five minutes. Covered the drum with wet burlap or an impermeable cover material during the rest periods.		
	4 After initial mixing, the slump, ambient and concrete temperatures and air content were determined. Ensured that the concrete properties are within the required limits as specified in Specifications Section 346.		
	5 Remixed the batch for one minute before determining slump, ambient and concrete temperatures at 15-minute intervals until the slump is 5 inches or less.		

REMARKS:

SLUMP LOSS TEST WORKSHEET (CONTINUED)

SLUMP LOSS TEST WORKSHEET (CONTINUED)				REMARKS
TIME TESTED	AMBIENT TEMP (°)	CONCRETE TEMP (°)	SLUMP (INCHES)	
