

## 506 Ready-Mix Concrete Quality Management Plan

### 506.1 Introduction

The purpose of the Ready-Mix Concrete Quality Management Plan (QMP) is to establish procedures for becoming pre-qualified as a supplier of ready-mix concrete. The QMP is to assure the Utah Department of Transportation (UDOT) that permanent and portable ready-mix concrete batch plants are capable of producing a quality ready-mix concrete product. Only pre-qualified batch plants will be allowed to supply to UDOT projects.

### 506.2 Pre-qualifications for Ready-Mix Suppliers

Applicants will request in writing to be designated as a pre-qualified supplier. Request will be addressed to:

**UDOT Concrete Engineer  
4501 South 2700 West  
Salt Lake City, Utah 84119  
Phone Number: 801-965-3814  
Fax: 801-965-3843**

Request will include:

- Copy of Certification from National Ready Mixed Concrete Association (NRMCA) batch plant certification program.
  - Name and phone number of the Quality Control Manager (QCM) who may be contacted for scheduling of inspections and general information.
  - Signature of a representative having legal authority to bind the company.
- Notification of pre-qualification as a Ready-Mix Concrete supplier will be made in writing by the Concrete Engineer.

### 506.3 Ready-Mix Supplier agrees to:

- Meet or exceed UDOT's Standard Specifications, including all applicable AASHTO and ASTM specifications.
- Make available to the Concrete Engineer, or representative, all records required by this QMP when requested.
- Submit to a minimum of one Concrete Unit batch plant inspection per year in order to maintain qualification.

### 506.4 Concrete Unit Plant Inspection Program

- Suppliers will pass an inspection performed by the Central Materials Concrete unit, prior to acceptance as a pre-qualified batch plant. Each pre-qualified plant will be subject to a minimum of one Concrete Unit inspection per year.
- Portable batch plants must be inspected each time they are moved.
- Failure to meet one or more of the requirements listed in this QMP may result in an accelerated inspection program. Any additional failures to meet these minimum requirements will result in the suspension of the plant as a pre-qualified supplier until all documented deficiencies are corrected. The supplier may be reinstated as a pre-qualified supplier after a mandatory Concrete Unit review of the supplier's QC program.

**506.4.1 Concrete Unit Inspector Guidelines:**

Initial pre-qualification inspection is scheduled at the request of the supplier. Subsequent inspections are coordinated with the Concrete Unit inspector and supplier. Upon completion of the inspection the Concrete Engineer will recommend one of the following:

- a) **Qualification** as a pre-qualified Ready-Mix concrete plant.
- b) **Not qualified** as a pre-qualified plant. The Concrete Unit inspector will submit a written report to the supplier outlining all deficiencies observed during the plant inspection process. The supplier is required to address all deficiencies noted in the Concrete Unit inspector's report, at which time the supplier may request another pre-qualification inspection.

**506.4.2 Concrete Unit Inspector Check List:**

- a) Verify current NRMCA batch plant certification.
- b) Verify aggregate source suitability.
- c) Examine and review the distribution of the plants QC Policy Statement and Manual.
- d) Review QC training records.
- e) Review the plant records to confirm that a Quality Inspector (QI) has been assigned to each work shift and has signed the inspection checklist.
- f) Interview the person(s) responsible for QC policies and procedures.
- g) Verify the QI lines of authority.
- h) Examine the plant's equipment certification records.
- i) Examine the plant's agitating ready-mix truck inspection records.
- j) Inspect testing equipment for damage and ensure all equipment is in good repair.
- k) Verify UDOT TTQP Qualification of supplier or contract laboratory.
- l) Verify production QC testing records are being maintained.

**506.5 Batch Plant Quality Control Policies and Procedures**

The supplier will provide adequate training for all QC personnel in the company's QC procedures and supply each Quality Inspector (QI) with a copy of the company QC Policy Statement, and QC Manual which includes, at a minimum, the plant certification technical criteria set forth in this document. The supplier will have a designated QI present on every work shift. The QI will have the authority to fully enforce the procedures.

**506.6 Batch Plant QC Procedure Requirements:**

The Supplier will:

- Develop, review, and update as necessary, a company QC policy statement and manual. The QC Manual must be approved by the Concrete Engineer prior to acceptance as a pre-qualified supplier. The QC Manual shall contain, at a minimum, all requirements listed in the NRMCA's "Ready Mixed Concrete Quality Control Guide."
- Designate a QI for every work shift. The QI must be TTQP Concrete Field Technician certified and have a minimum of six (6) months experience working in a ready-mix concrete batch plant. The QI must be present while the batch plant is producing concrete for UDOT projects.
- Conduct meetings with the QCM and designated QI's, a minimum of once every three months to review the company's QC procedures, discuss possible changes and implement any procedural changes.
- The QCM or designated representative will review and evaluate the QC techniques of all QI's once every six months to assure compliance with QA Section guidelines and certification procedures.
- Submit to a minimum of one plant inspection, each year, by a Concrete Unit Inspector.

- Address and document each deficiency noted in the Concrete Unit inspection reports and conduct monthly follow-up meetings for a period of three (3) months to assure compliance.

#### 506.7 Required QC Records:

Supplier will keep records of the following:

- QC testing performed at a frequency consistent with approved Quality Control Plan.
- Approved mix designs, trial batch test results and aggregate source suitability, updated yearly. Aggregate source suitability shall be consistent with UDOT Standard Specification 03055 Portland Cement Concrete. Aggregate source suitability will include an evaluation of aggregate reactivity in accordance with AASHTO M 6 and AASHTO M 80, with the exception that ASTM C 289 is not an acceptable evaluation of aggregate reactivity. If an aggregate source has been shown through previous testing to be reactive submit test results verifying mitigation through approved AASHTO/ASTM test methods.
- Manufacturer's Certificate of Compliance for all admixtures.
- QCM and QI current TTQP Qualifications, verification of experience, and QC training records.
- Submit to a minimum of one plant inspection, each year, by a Concrete Unit Inspector.
- A written "new employee" training and/or orientation policy in the company files.
- Copies of the plant's QC Policy Statement and QC Manual on file.
- Proof of current NRMCA certification.
- Complete inspection checklist, signed by the QI, for each work shift.
- Minutes of meetings of the QCM and QC personnel.
- QCM evaluation of the QI performance.
- Comprehensive reports signed by the QCM that detail the plants response and follow-up to each specified deficiency documented during a Concrete Unit Inspection.

#### 506.8 Equipment Certification Requirements:

- Maintain certification of beams, scales, water meters, moisture probes, and admixture dispensers as per UDOT Standard Specifications.
- Maintain certification of concrete testing equipment as per AASHTO Specifications.
- Any broken or malfunctioning equipment must be removed from service immediately and replaced with new or repaired/recertified equipment.
- Use only UDOT qualified laboratories for concrete compressive strength tests.
- QCM shall conduct yearly inspection of all ready-mix trucks in accordance with NRMCA guidelines and maintain a file of current ready-mix truck inspection documents.
- Required Records:
  - i. Comprehensive reports signed by the QCM that detail the plants response and follow-up to each specified deficiency documented during a Concrete Unit Inspection.

**506.9 Production Delivery Requirements:**

Each truck load of ready-mix concrete delivered to a state project shall be accompanied by the following information printed on an appropriate form. Hand written forms will not be accepted:

- Target water/cement ratio (w/c).
- Quantity of cementitious material used (lb).
- Target quantity of water based on w/c (lb or gal).
- Quantity of water actually used (lb or gal).
- Aggregate source.
- Weights of coarse and fine aggregates (lb).
- Moisture content (as batched) of coarse and fine aggregates (%).
- Time the load was batched.

**506.10 Volumetric Concrete Mixer Certification:**

**NOTE: The following section outlines the certification process for volumetric concrete mixers. It does not imply that this equipment is acceptable for all uses. Volumetric concrete mixers may not be used without the approval of the Region Materials Engineer and the Resident Engineer.**

Volumetric concrete mixers supplying UDOT projects require an annual inspection and certification. A UDOT inspector or representative will verify compliance with the following (See Appendix A checklist for tolerances):

- Verify VMMB rating plate 100-1 affixed to the mixer or comparable calibration and uniformity testing records.
- Verify certification of the scale used for equipment calibrations. Certification must be conducted by an independent qualified expert.
- Verify bin condition and accuracy of cementitious delivery system. Verification of the delivery system must be by an independent calibration company.
- Verify through an independent calibration company the accuracy of the aggregate delivery system.
- Verify through an independent calibration company the accuracy of the water delivery system.
- Verify that admixture storage tanks are protected from freezing and contamination. Verify through an independent calibration company the accuracy of the admixture delivery system.
- Perform Uniformity of Batching tests according to Appendix A and provide results from an independent laboratory meeting the requirements of Appendix A, Table 1.
- Each mobile unit shall maintain and provide records of material delivered as described in Appendix A.

The UDOT inspector or representative will sign and affix a sticker with an expiration date certifying the mixer for use when approved.

## APPENDIX A

**Volumetric Concrete Mixer Inspection Checklist**

Is VMMB rating plate 100-1 affixed to mixer ?	Yes	No
Is the scale used for calibrations of equipment certified to be accurate to 2lbs $\pm$ 0.20% throughout its range of use. (This must be done by a qualified expert independent of the company being inspected.)	Yes	No

**Cementitious Materials**

Are the bins free of damage and preventing intermingling with other materials ?	Yes	No
Are the cementitious feed pipes designated ?	Yes	No
Has the cementitious delivery system been verified accurate to within -0% to +4% for a sample mass not greater than 300lbs. Annual verification must be by an independent calibration company.	Yes	No

**Aggregates**

Has each type of aggregate been provided its own storage bin with no intermingling between bins ?	Yes	No
Has the aggregate delivery system been verified accurate to within $\pm$ 2% by mass for a sample not less than 700lbs. Annual verification must be by an independent calibration company.	Yes	No

**Mix Water**

Has the water delivery system been verified accurate to within $\pm$ 1% by mass or volume. Annual verification must be by an independent calibration company.	Yes	No
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**Admixtures**

Are the storage tanks and dispensers protected from freezing and contamination?	Yes	No
Has the admixture delivery system been verified accurate to within $\pm$ 3% by mass or volume. Annual verification must be by an independent calibration company or admixture representative.	Yes	No

### Uniformity of Batching

Obtain samples of concrete at 15% and 85% of load discharge. Recommended mix has 460 lb/yd cementitious content, slump of 4" ± 1.5" and 1" nominal maximum size of aggregate. Test for slump, air content, unit weight, and cast 3 cylinders from each sample. In addition, using the concrete of a known mass from the unit weight test, wash the sample over a #4 sieve removing the cement and most of the sand. Dry to a constant mass and determine the mass of the dry coarse aggregate as a percent of the original sample using the following equation.

$$P = (C/B) \times 100 \text{ when}$$

P= % mass of coarse aggregate

C= dry mass of aggregate retained on #4 sieve

B= mass of sample of concrete

Tests must be performed by ACI/TTQP certified technician

Tests must meet the requirement of table 1

**Table 1: Requirements for Uniformity of Concrete**

<u>TEST</u>	<u>Range of 2 Samples</u>
Air Content %	<u>1.0</u>
<u>Unit Weight</u>	<u>3 lbs.</u>
<u>Slump</u>	<u>1.5 in.</u>
<u>Coarse Aggregate % by mass</u>	<u>6.0</u>
<u>7 day compressive strength %</u>	<u>7.5</u>

### Records

Each concrete mobile unit shall be provided with a chart unique to that vehicle derived from gate opening calibrations correlated to meter counts for each mix design. The recording system must permanently record meter counts in such a manner that both the quantity and quality of concrete delivered may be determined.

Delivery tickets must include:

- Name of producer
- Date and serial # of ticket
- Truck #
- Volume of concrete in cubic yards
- Concrete mix ID#