CERTIFIED READY-MIX CONCRETE PLANTS (2009 version)

REVISED 3/5/09

Mn/DOT 2461.4D7 is hereby deleted and replaced with the following:

D7 Certified Ready-Mix Plant Program

Mn/DOT requires quality control of concrete production under a Certification program for readymix concrete plants. **The Prime Contractor is responsible to assure that all ready-mix concrete used on this Contract is produced by a certified ready-mix plant.**

To ensure that proper testing procedures and documentation are followed, the Ready-Mix Producer shall obtain and have on site a copy of the current Mn/DOT Concrete Manual. The manual is available via the Mn/DOT Concrete Engineering Unit website.

To facilitate communication between the Producer and the Engineer regarding quality control, the Producer shall equip the Certified Ready-Mix Plant with a working facsimile machine or a working email address.

D7a Certification Documents

The Contractor shall obtain all of the ready-mixed concrete used on this Contract from a Certified Concrete Plant meeting all of the pertinent requirements of Mn/DOT Standard Specifications 1604 and 2461 and the following.

It is the Prime Contractor's responsibility to ensure that the Ready-Mix Concrete Producer adheres to all of the requirements. At the time of delivery, a Certificate of Compliance shall accompany each truckload of ready-mixed concrete used by the Contractor or any sub-contractor on this Contract. **A computerized Certificate of Compliance is required when supplying any concrete for an Agency Contract.** Computerized means that the concrete mix design quantities batched are recorded from load cells and meters.

If the computer that generates the Certificate of Compliance malfunctions, the Producer may finish any pours that are in progress provided the plant issues handwritten Certificates of Compliance on the most current version of Mn/DOT form TP 00042. New pours shall not commence without a working computerized Certificate of Compliance.

If the distance of the Certified Plant to the point of placement does not allow delivering the concrete in compliance with 2461.4D6, the Contractor may supply concrete from a noncertified source provided less than 20 cubic meters (yards) of Agency concrete is produced each day and a handwritten Certificate of Compliance Form TP 00042 is provided.

The Certificate of Compliance shall label each item of information and shall include:

1) Name of the ready-mix concrete plant
2) Name of the Contractor
3) Date
4) State Project Number (SP) or (SAP)
5) Bridge Number (when applicable)
6) Time concrete was batched
7) Truck number
8) Quantity of concrete in this load
9) Running total of each type of concrete, each day for each project
10) Type of concrete (Mn/DOT Mix Designation Number)
11) Cementitious Materials (portland cement, ground granulated blast furnace slag, fly ash, silica fume, others) including brand, type and production mill and production power plant for fly ash using MN/DOT Standard Abbreviations available on the Concrete Engineering Unit website
12) Admixture brand and product name using MN/DOT Standard Abbreviations
13) Aggregate sources using State Pit Numbers

14) Admixture quantity per 100 wt. of cement or oz/cm(cy) for:
- air-entraining admixtures,
- water reducing admixtures,
- other admixtures

15) The Certificate of Compliance shall list the batch information for all materials and use Mn/DOT standardized labels to represent each column in the order listed below. It is preferable that all the information is presented across the page (a through k) but printing the information using two lines is satisfactory provided that the materials are identified in each line of information and is presented in the following order.

Metric Certificate of Compliance

CATEGORY	STANDARD LABEL
a) Ingredients (aggregate, cementitious, water, admixtures)	**Ingredient**
b) Product Source (Mn/DOT Standard Abbreviation)	**Source**
c) Total Moisture Factor (in decimals to 3 places)	**MCFac**
d) Absorption Factor (in decimals to 3 places)	**AbsFac**
e) Mn/DOT mix design oven dry (OD) weights (kg/m3)	**OD**
f) Absorbed moisture in the aggregates (kg/m3) (*e* x *d*)	**Abs**
g) Saturated surface dry (SSD) weights for aggregates (kg/m3) (*e* + *f*)	**SSD**
h) Free moisture (kg/m3) (*c* - *d*) x *e*	**Free Mst**
i) Target weights for one cubic meter of concrete (kg/m3) (*g* + *h*)	**CM Targ**
j) Target batch weights (kg) (CMs x *i*)	**Target**
k) Actual batch weights (kg)	**Actual**

English Certificate of Compliance

CATEGORY	STANDARD LABEL
a) Ingredients (aggregate, cementitious, water, admixtures)	**Ingredient**
b) Product Source (Mn/DOT Standard Abbreviation)	**Source**
c) Total Moisture Factor (in decimals to 3 places)	**MCFac**
d) Absorption Factor (in decimals to 3 places)	**AbsFac**
e) Mn/DOT mix design oven dry (OD) weights (lbs/cy)	**OD**
f) Absorbed moisture in the aggregates (lbs/cy) (*e* x *d*)	**Abs**
g) Saturated surface dry (SSD) weights for aggregates (lbs/cy) (*e* + *f*)	**SSD**
h) Free moisture (lbs/cy) (*c* - *d*) x *e*	**Free Mst**
i) Target weights for one cubic meter of concrete (lbs/cy) (*g* + *h*)	**CY Targ**
j) Target batch weights (lb) (CYs x *i*)	**Target**
k) Actual batch weights (lb)	**Actual**

Note: Actual cubic meters (cubic yards) batched may vary due to differences in: air content, weight tolerances, specific gravities of aggregates and other variables.

16) Total Water **(Batch Water + Free Moisture)** (kg/lbs)

17) The Certificate of Compliance shall compute the water available to add [(Mix Design Water)x (*Target CM (CY's)*) – Total water] (liters/gallons)
The Certificate of Compliance shall provide space for water adjustment information, including:
1. Water in liters (gallons) added to truck at plant (filled in by batchman or driver)
2. Water in liters (gallons) added to truck at the jobsite (filled in by driver)
3. Total actual water in kg (lbs) = **(Total Water from Certificate of Compliance + any additions)** (filled-in by Field Inspector)

Note: Drivers are required to fill-in spaces.

Enter Zero (0) if no water is added.

18) The ticket shall also include the following information printed with enough room beside each item to allow the field inspector to record the appropriate test results: air content, air temperature, concrete temperature, slump, cylinder number, location/part of structure, time discharged, and signature of Inspector.

19) Location for Producer's Representative signature.
A Mn/DOT Certified Plant I Technician representing the Producer shall review the first Certificate of Compliance for each mix type, each day, for accuracy and hand sign the Certificate at a location designated for signature. By signing the Certificate of Compliance the representative agrees to the terms of this policy and certifies that the materials itemized in this shipment comply with the applicable Minnesota Department of Transportation specifications and the Project Plans.

Definitions

Mix Design Water – The maximum allowable water content for one cubic meter (yard) of concrete as noted on Mn/DOT Estimated Composition of Concrete Mixes Form TP-02406

Total Moisture Factor - See 5-694.311 of Concrete Manual

Absorption Factor - See 5-694.311 of Concrete Manual

Free Moisture – The water that is carried on the surface of the aggregate that becomes part of the total water

Batch Water – Water actually batched into the truck by the batcher

Total Water = Batch Water + Free Moisture

Temper Water – Water added in mixer to adjust slump.

Total Actual Water - The water in the concrete mixture at the time of placement from any source other than the amount absorbed by the aggregate. It includes all batch water placed in the mixer, free moisture on the aggregate and any water added to the ready mix truck prior to placement

Ready-Mix Producer or "Producer" – Party that is producing the concrete for the Contract. It is understood that the Ready Mix Producer is the agent of the Prime Contractor

D7b Quality Control Testing and Sampling

The Prime Contractor/Producer, supplying concrete from a Ready-Mix Plant involved in the Certified Plant Program, will provide testing of the materials in the concrete as outlined below. A Plant Level II Technician Quality Control Supervisor, certified by Mn/DOT, shall oversee all testing and plant operations. The Quality Control Supervisor shall remain on site during concrete production or be accessible by cellular phone to assure their presence at the plant site within one hour. A Mn/DOT Certified Plant Technician will maintain or oversee the maintenance of a plant diary. The diary, kept at the plant site for 5 calendar years, will document yards produced each day, tests performed, material problems, breakdowns, weather, etc., all to the approval of the Engineer.

The testing rates stated in the Schedule of Materials Control are minimums. **All samples shall be taken in a random manner using an appropriate number generator.** Changes in the material require taking additional tests. Changes include but are not limited to: variable gradation results, new aggregates arriving on site, moisture conditions changing due to weather, or any other condition that warrants additional testing in the opinion of the Engineer. **The Agency may determine when additional testing is necessary.**

Mechanical shakers are required for sieve analysis of fine and coarse aggregates. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing discuss the equipment and calibration necessary for performing the required tests. The following is a list of the applicable tests and standards.

AASHTO T-27..... Sieve Analysis of Fine and Coarse Aggregates
AASHTO T-255..... Total Moisture Content of Aggregate by Drying
AASHTO M-92..... Wire-Cloth Sieves for Testing Purposes. The sieves shall comply with the requirements of 5-693.420B of the Department's Bituminous Manual "Equipment Calibration and Verification Policies and

Procedures for Laboratory certification".

AASHTO M-231..... Weighing Devices Used in the Testing of Materials. The scales shall comply with the requirements of 5-693.820 of the Department's Bituminous Manual "Calibration of weigh scales".

The provisions of 2461.4D3 apply regarding requirements to notify the Engineer of intent to pour concrete. If the Ready-Mix Producer needs to change plants for an unexpected reason, it is allowable on an infrequent basis if the Quality Control Supervisor obtains approval from the Project Engineer or Metro Inspection (for the Metro District) before the plant change is made.

The Agency Plant Monitor shall watch the material sampling process whenever possible.

D7c Moisture Content

All moisture tests are run by a Plant Level I Technician certified by Mn/DOT.

The Ready-Mix Producer shall determine the moisture content in all fractions of the aggregate according to the Schedule of Materials Control. Changes in the material may require additional testing. The Producer is responsible for all costs associated with determining the moisture content, including equipment, labor, and materials.

The Ready-Mix Producer will provide the Agency with all documentation for each moisture test, which is kept on file at the plant site for 5 calendar years. The moisture content of each aggregate is charted and available at the plant. The Producer must allow Agency personnel to observe the batching process to verify weights shown on the Certificate of Compliance.

D7c1 Moisture Content Determination by Oven Dry Method

The moisture content of the aggregate is determined by the oven dry method as outlined in the Mn/DOT Concrete Manual.

D7c2 Moisture Content Determination by Moisture Probe

In lieu of performing oven dry moisture contents on fine aggregate, the Producer may use a moisture probe. This method is acceptable if an Agency Representative has approved use of the moisture probe. To obtain approval for the use of a moisture probe, the Producer must calibrate the moisture probe before each construction season using the method described in 5-694.142 of the Mn/DOT Concrete Manual. The written permission of the Engineer is required to use other methods.

The Producer must complete an oven dry moisture comparison on the fine aggregate and chart both the probe moisture content and the oven dry method results at a minimum rate of once per week.

D7d Gradations

All gradation testing is performed by a Plant Level I Technician certified by Mn/DOT. Testing rates shall be determined according to the Schedule of Materials Control.

The Ready-Mix Producer shall determine the gradation of the fine aggregate to insure conformity to Mn/DOT Specification 3126 and the coarse aggregates to insure conformity to Mn/DOT Specification 3137 or as otherwise required or permitted in the Special Provisions of the contract. The Producer is responsible for all costs associated with running gradations including equipment, labor and materials. The Producer shall perform all testing at the plant site to assure immediate re-sampling and testing of failing material.

The Producer shall run gradations and perform calculations as outlined in the Mn/DOT Concrete Manual. The Producer shall split and bag all Quality Control samples and clearly identify them (Date, Test No., Time, Type of Material, Plant, Sampling Location) and retain them for a period of two weeks for companion sampling by the Agency.

The Ready-Mix Producer shall document the results of all gradations on the Weekly Concrete Aggregate Report (Mn/DOT Form 2449) utilizing every other column to provide room for Agency

companion results. The Ready-Mix Producer will chart all sieves of the coarse aggregate and the 2.36 mm (**#8**), 600 µm (**#30**), and 300 µm (**#50**) sieves of the fine aggregate quality control samples using procedures outlined in the Concrete Plant I Certification Course. In addition, the Producer shall plot the results of the Agency verification samples on the same chart. Supporting documentation for all gradations and charts is kept on file at the plant site for 5 calendar years.

Agency Plant Monitors will take verification samples for quality assurance according to the Schedule of Materials Control. **(NOTE: Where problems with compliance with the Certified Ready Mix Program occur, plant inspections and testing rates shall increase).**

Agency Plant Monitors shall observe the actual water batched on a minimum of one load of concrete each time a verification gradation is collected. This observation includes: watching the ready-mix truck reverse the drum after washing to remove all wash water, checking to verify that an accurate moisture test is utilized during batching, confirming that the water measuring device is providing accurate data, and verifying that any additional water added to adjust the slump is recorded. It is extremely important that the actual water is verified since the durability of the concrete depends on maintaining a low water-cement ratio. The Agency Plant Monitor shall document the actual water batched on the Weekly Certified Ready-Mix Plant Report (Mn/DOT Form 24143) and submit a copy to the Concrete Engineering Unit with a copy of the Weekly Concrete Report (Mn/DOT Form 2448).

If the gradation tests on split samples from quality control or verification samples result in a variation between the Producer and the Agency greater than that set forth below, the two parties will cooperatively take and split a new sample. The Producer's representative shall test the sample while witnessed by the Agency Plant Monitor. This will serve as a check on the process to correct deviations from the standard testing procedure. If this problem continues, the Project Engineer, the District Materials Engineer and the Concrete Engineer will make a total review of this plant.

If the results still do not agree, the parties shall resolve the dispute by Third Party Resolution according to procedures described in the Mn/DOT Contract Administration Manual.

Allowable variations on percent passing any sieve:

Sieve	% Allowed
50 mm - 9.5 mm (**2" - 3/8"**)	+ or - 6
4.75 mm - 600 µm (**#4 - #30**)	+ or - 4
300 µm (**#50**)	+ or - 3
150 µm (**#100**)	+ or - 2
75 µm (**#200**)	+ or - 0.6

The Ready-Mix Producer, after an acceptable time period, may request a reduction in testing rates if past results warrant. Such a request is subject to approval by the Mn/DOT Concrete Engineer. This approval is based on extraordinary procedures performed by the Aggregate Supplier and Ready-Mix Producer to insure consistency and quality control. Extra fractions and bins are an example of such a procedure.

D7e Concrete Plant Contact Report

Prior to the production of Agency concrete each construction season, an Agency Plant Monitor shall perform a thorough on-site inspection of the concrete plant and complete a Concrete Plant Contact Report (Mn/DOT Form 2163). This Contact Report contains the information necessary to assure that the plant can produce concrete meeting specifications. The Producer signs the report thereby certifying compliance with the Certified Ready Mix requirements and continual maintenance of the plant as reviewed.

D7f Non-Compliance

If a proposed plant cannot produce concrete, perform testing, or report information as required during completion of the Concrete Plant Contact Report, concrete from this plant is not acceptable.

After completing the Concrete Plant Contact Report and starting the Project, any procedural

changes that cause non-compliance with this program will result in decertification of the plant and cessation of further production of concrete for this Project. Decertification will also occur at any plant that continually produces concrete that is in noncompliance as detailed above. Complete disregard of this specification or fraudulent test reports are grounds for immediate Decertification. Decertification could include any or all, but is not limited to, the following actions:

1) Revocation of Plant Certification.
2) Revocation of Technician Certification for individual(s) involved.
3) Loss of bidding privileges as determined by the State Construction Engineer.
4) Criminal prosecution for fraud as determined by the Attorney General.

Decertification actions are determined by the Mn/DOT Concrete Engineer.