******THIS IS A NEW IM. – PLEASE READ CAREFULLY.******

MOBILE MIXER INSPECTION

GENERAL

The following instruction is to be used when inspecting the operation of a mobile mixer paving plant for bridge deck overlays, patching, and miscellaneous items less than 50 cubic yards (50 cubic meters).

GENERAL EQUIPMENT

Equipment shall meet the requirements of Article 2001.20, paragraph D.

EQUIPMENT USED FOR DECK OVERLAYS

Mobile mixers used for deck overlays as described in Article 2413. The following is a general policy regarding the calibration of units and other requirements for bridge deck overlays:

1. The contractor will perform the calibration. The contractor shall notify the District Materials Engineer at least 24 hours in advance of calibration, so that witnessing can be provided at the option of the District Materials Engineer. It is recommended that the contractor initially calibrate the unit prior to notification.

2. A unit will be completely calibrated upon its initial arrival in a District and prior to placement of any concrete.

3. It is not required to calibrate a unit fully if it moves to subsequent projects within a District. This will depend upon the unit's performance. Partial calibrations may be performed, or the calibration waived, at the discretion of the District Materials Engineer.

4. A unit will be recalibrated any time there is a change in source of any of the materials.

5. A unit may be recalibrated any time, if, in the opinion of the District Materials Engineer or Engineer, a problem or question relative to the proportioning of materials exists.

6. Copies of all calibrations shall be kept with the unit and be available for inspection at any time. These should be retained for a minimum of two (2) years.

7. It is recommended that all units be transported empty from job site to job site. If not transported empty, the unit shall be completely emptied and calibrated prior to job production.

8. The dilution of any admixture is to be witnessed and documented by the inspector. Documentation should include the date, dilution rate, admixture identification, etc.

9. Tolerance in proportioning shall be in accordance with ASTM C685.

    - Cement 0 to +4%
    - Fine Aggregate ±2%
    - Coarse Aggregate ±2%
    - Admixtures ±3%
    - Water ±1%

10. Reporting Forms #M115 (#E115), #M120 (# E120), #810180, #820917, and #820020 with continuous mobile mixer projects, are the documentation used.

EQUIPMENT USED FOR MISCELLANEOUS CONCRETE PLACEMENTS

In accordance with Article 2001.20, paragraph D, mobile mixers may be used on miscellaneous concrete placements less than 50 cubic yards (50 cubic meters) per day. The following is a list of allowable work types:

- Temporary Pavement
- Patching
- Curb and Gutter
- Guard Rail Anchorages
- Sidewalks and Drives
- Utility Access
- Sign and Fence Posts
- Signal and Light Bases.

Calibration of equipment used for miscellaneous concrete placements shall include the requirements for deck overlays with the following additions:

1. Partial cement calibrations will be performed once per month. The calibration may be waived at the discretion of the District Materials Engineer.

2. The unit will be calibrated for C-4 mix design for all miscellaneous concrete placements. The unit will be calibrated for M-4 mix design for pavement patching.

3. Unit shall be equipped with a batch ticket printer.

STORAGE & HANDLING OF MATERIALS

Aggregates

- Certified compliance
- Separation of materials
- Storage area floor shall be firm & clean or a minimum of 18” of similar material

Cementitious Material

- Approved certified sources
- No intermingling of products or sources
- Stored in suitable weather proof enclosures

Water

- Sample when required

Admixtures

- Verify acceptance of lot
- Circulate 5 min. per 100 gal. of solution
- Proper storage to prevent freezing

GENERAL CALIBRATION PROCEDURE

Calibration of a concrete mobile mixer as required by specification is performed to accurately proportion, by volume, materials for an intended concrete mix design. Proportioning of the rock and sand is based on the cement meter count determined for each concrete mobile mixer. Once the counts (revolutions) per each 94 pound bag of cement has been determined then delivery gates will be calibrated to proportion the correct amount of rock and sand.

Calibration form #820020 (Appendix A) is a step-by-step process to determine the correct settings for each material delivered for a specific concrete mix design.

- Complete the header information including each material source, specific gravities, and weights as determined for the applicable concrete mix design.

- Cement meter count is determined by averaging five different timed delivery weights to determine the pounds of cement representing each meter count.

- Because the contractor normally uses 94# bags of cement, the counts are determined per each bag of cement delivered.

- The rock and sand weight delivered for each bag of cement is determined by dividing the wet weight of each aggregate by the number of 94# bags of cement in each cubic yard of that concrete mix design.

    - 8.78 represents a mix design (M-4 & O-4WR Mix) requiring 825 pounds of Type I cement.
    - 6.64 represent a mix design (C-4 Mix) requiring 624 pounds of Type I cement.

- The aggregate weight per each bag of cement then needs to be divided by the cement meter counts per bag. The result will determine the target pounds per count of each aggregate.

- A couple trial runs may be necessary to get the gate set for delivery with in the 2% tolerance. Once the gate is set, run a couple check runs and average to determine compliance.

- Admixture is introduced into the mix by measuring the flow time per bag. The time per bag is determined by using data from the cement meter count calibration.

    - Divide the total seconds of the five runs by the total counts of the five runs.
    - Multiply the result by the count per bag to determine the seconds per bag.
    - Seconds per bag is the time needed to introduce the specified admixture for 94 pounds of cement.
    - Each specific admixture will give a specified quantity, usually ounces, per 100 pounds of cement.
    - Verify that the correct amount is delivered for each 94 pounds of cement with in the determined time in seconds per bag.

Appendix A contains a blank form #820020 and a working example.

PROPORTIONS

For deck overlays, an O-4WR mix design in accordance with Materials IM 529 shall be used. Aggregate moisture content will be assumed at 0.5% for coarse aggregate and 3.0% for fine aggregate.

For miscellaneous concrete placements, a C-4 mix design in accordance with Materials IM 529 shall be used, except pavement patching where M-4 shall be used. If aggregates are stored inside, moisture content will be assumed at 0.5% for coarse aggregate and 3.0% for fine aggregate. If aggregates are stored outside, the District Materials Engineer may require periodic moisture testing.

Aggregate specific gravities are found in Table T203 which is revised annually, and care must be taken to use the current table.

MISCELLANEOUS PLACEMENTS QUALITY CONTROL AND DOCUMENTATION

1. The company shall have at least one Certified Plant Inspector (CPI). The CPI requires a Level II PCC Certification. The CPI shall be responsible for maintaining calibrations, certifications, batch tickets, stockpile management, and mix adjustments.
2. Gradations shall be performed once per month, when work is being conducted, and for change of material source.
3. The CPI shall maintain materials certifications of cement, coarse aggregate, fine aggregate, and admixtures for a period of two years at a central location.
4. The CPI shall maintain mobile mixer ticket printouts for each placement organized by project by date for two years.

SAMPLING AND TESTING

Sampling and testing for deck overlays shall be in accordance with Materials IM 204. Miscellaneous concrete placements shall be in accordance with Materials IM 204 with the following additions:

1. Air content shall be tested once per placement by the RCE. Slump shall be tested at least once per day.
2. For signal and light bases, a set of three cylinders shall be cast by a Level I PCC certified technician.
3. Cylinders shall be cast, cured, and tested by and approved testing laboratory at an age of 28 days in accordance with Materials IM 315.
4. The average compressive strength of three cylinders shall be a minimum of 3,500 psi (24 MPa).
5. The CPI shall submit the 28 day strength test data to the Resident Construction Engineer (RCE) and District Materials Engineer (DME) weekly.
6. CPI shall maintain a copy of the compressive strength test results for a period of two years at a central location.

REPORTS & REPORTING

1. Mobile mixer batch tickets submitted to the Resident Construction Engineer (RCE) and District Materials Engineer (DME) weekly.
2. Use forms #M115 (#E115) for air and slump testing. Use form #M120 (# E120) for documentation of mix data.

NOTIFICATION

The CPI shall provide notice to the RCE and DME within seven days of the anticipated miscellaneous placements.

IMs & SPECIFICATIONS

A list of the IMs and Specifications used in PCC Plant Inspection are located in IM 527.