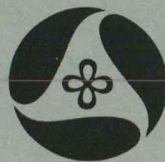


# **Concrete Plant Inspection Supplement**

**1991**



**Iowa Department  
of Transportation**

# CONCRETE PLANT INSPECTION SUPPLEMENT 1991

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OTE: 1991 Construction Manual Revisions will be available in March, 1991.



## Iowa Department of Transportation

### SUPPLEMENTAL SPECIFICATION for CERTIFIED PLANT INSPECTION

February 23, 1988

THE STANDARD SPECIFICATIONS, SERIES OF 1984, ARE AMENDED BY THE FOLLOWING ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS, AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

**1057.01 GENERAL.** This specification describes certified plant inspection for construction projects. This specification is intended for primary projects; it will apply to nonprimary projects only when specifically designated. Where this specification applies, the Contractor shall furnish or be responsible for certified plant inspection for his work, as specified herein, whether the inspection is by his own personnel or by his producers, suppliers, or consultants.

**1057.02 REQUIREMENTS.** Certified plant inspection shall be in accord with Materials IM 213 and 214, utilizing personnel certified for the type of inspection to be accomplished and utilizing prescribed test equipment furnished by the Contractor. The equipment shall also be available for use by the Engineer for monitoring purposes.

When a field laboratory is furnished, as provided in Section 2520, joint use by the Contractor and the Engineer for inspection purposes is intended.

Delivery of samples to the district materials laboratory may also be required. The provisions for this are detailed in a separate specification. If this delivery is to be required, that specification will be noted on the proposal.

**1057.03 APPLICATION.** This specification applies generally to mixtures furnished according to Sections 2114 (PCC or ACC), 2122, 2201, 2202, 2203, 2205 (using AC), 2212, 2213, 2215, 2301, 2302, 2303, 2304, 2305, 2306, 2309, 2310, 2503, 2507, 2511, 2512, 2515, 2516, 2517, 2403, and other sections requiring structural concrete.

Certified plant inspection will be required as follows:

**A. PCC Pavement.** Certified plant inspection is required for PCC mixtures for pavement work, including pavement, bridge approaches, overlays, medians, paved shoulders, bases, subbases, pavement widening, pavement repair, and base repair, except when excluded by a note on the proposal.

When required for these projects, certified plant inspection is also required for miscellaneous PCC mixtures and miscellaneous structural concrete required by the contract.

Certain types or quantities of mixture will be excluded according to Paragraph D.

**B. ACC Pavement.** Certified plant inspection is required for ACC mixtures for pavement work, including courses for pavement, overlays, resurfacing, medians, paved shoulders, bases, subbases, base widening, pavement repair, and base repair, except when excluded by a note on the proposal.

When required for these projects, certified plant inspection is also required for miscellaneous PCC mixtures and miscellaneous structural concrete required by the contract.

Certain types or quantities of mixture will be excluded according to Paragraph D.

**C. Structures.** Certified plant inspection is required for all structural concrete for bridge or other structure projects when the total quantity of structural concrete for the project or projects tied by the Contracting Authority is 200 cubic yards or more.

Certain types or quantities of mixture will be excluded according to Paragraph D.

**D. Exclusions.** Certified plant inspection will not be required for the following work.

1. PCC base, PCC pavement widening, PCC curb and gutter, pavement repair, base repair, temporary pavement, and structural concrete associated with pavement projects are excluded, when the quantity of each is less than 200 cubic yards of PCC or 500 tons of ACC for the project or for the total for projects tied by the Contracting Authority.

2. When certified plant inspection is required for the project, incidental concrete for the following purposes is excluded when furnished at a maximum rate of 25 cubic yards per day, whether from one or more sources.

- (a) Sign, signal, and lighting bases;
- (b) Slope protection;
- (c) Building floors;
- (d) Catch basins, intakes, and manholes;
- (e) Sidewalks and driveways;
- (f) Guardrail anchorages;
- (g) Similar items, as designated by the Engineer.

These exclusions may be based on quantities planned by the Contractor several days ahead of placement, in which case the certified plant inspection may be as planned.

3. Slurry seal work and other cold-mixed asphaltic mixtures.

4. Flowable mortar.

For mixture so excluded, the Engineer will provide plant inspection he deems appropriate.

**1057.04 PAYMENT.** Payment for required certified plant inspection shall be included in the contract price for the item for which this inspection is required, and it will not be paid for separately.

**1057.05 ADDITIONAL INSPECTION.** If the Contractor is prepared to furnish certified plant inspection for a primary project for which this inspection was excluded because of the size of the project, 1057.03 A, B, and C, the Engineer will consider the Contractor's request for an extra work order to provide for certified plant inspection.

For similar nonprimary projects, consideration of such an extra work order will be an option of the Engineer.



## Iowa Department of Transportation

### SUPPLEMENTAL SPECIFICATION For DELIVERY OF SAMPLES

February 23, 1988

THE STANDARD SPECIFICATIONS, SERIES OF 1984, ARE AMENDED BY THE FOLLOWING ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS WHICH SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

**1059.01 DESCRIPTION.** This specification covers the delivery of project samples for testing purposes. This requirement is intended to apply to primary projects for which certified plant inspection is required or authorized. (Primary projects include interstate projects, in accord with definitions in 1101.03.) The provisions of this specification shall not apply to nonprimary projects for which certified plant inspection is required or authorized, unless specifically indicated in the contract documents.

**1059.02 SAMPLE DELIVERY.** The Contractor shall deliver to the Engineer samples for the purposes of acceptance, monitoring, and verification testing. Materials will include aggregates and asphaltic mixtures and may include samples of other materials. The samples shall be properly identified. Delivery shall be to the district materials laboratory for the district having jurisdiction over the contract, unless otherwise directed by the Engineer. The Contractor shall deliver the samples promptly, as determined by the Engineer.

**1059.03 SAMPLE RECEIVING.** The District Materials Engineer will take reasonable actions to cooperate in receiving and testing these samples, especially for work being done under an accelerated work schedule.

Not all samples are to be tested. The selection of samples to be tested will be made by the District Materials Engineer, based on Construction Office and Materials Office instructions. Samples initially identified for testing will normally be tested at least by the end of the working day following delivery. These test results will be available to the Contractor as soon as testing is completed.

**1059.04 PAYMENT.** The cost of preparing, identifying, and delivering samples shall be considered incidental to the cost of the material sampled, and no separate payment will be made therefore.

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3.09 REQUIREMENTS FOR MONITORING THE CERTIFIED PLANT INSPECTION PROGRAM

A. General

The monitoring requirements listed are intended to be the minimum for normal plant operation. Field problems may necessitate increased monitoring. All monitoring requirements will be performed by Construction personnel except for plant calibration which remains a Materials Office responsibility. See 3.20 for responsibilities of project acceptance sampling and testing. The plant monitor must be a certified plant inspector.

It is imperative that the Residencies maintain an adequate staff of trained, experienced certified plant monitors. This can be accomplished by having employees participate in the certified plant inspection training program and successfully passing the examination. The experience requirement for certification can be satisfied by performing plant monitoring duties under the direct supervision of a certified plant monitor. It will be important to be selective for projects on which monitors obtain their experience. For instance, the contractor's certified plant inspector must be experienced and certified. Also, a project on which the plant is in close proximity to the project is important so that the certified plant monitor is readily available for consultation with the inexperienced monitor.

Refer to current specification on certified plant inspection for work excluded from the certified plant inspector program.

The project proposal will indicate if the certified plant inspector requirements apply to the project. The requirements for certified plant inspection can be added by extra work order if the contractor requests and an acceptable cost can be negotiated.

The contractor may have a certified aggregate technician run gradation analysis for the plant inspector.

3. Portland Cement Concrete Paving Plant Monitoring

Exhibit A lists the monitoring requirements. A plant monitor will normally be assigned to each project with duties split between plant and grade inspection. The plant monitor should schedule work so that the plant can be visited daily during production. The amount of time spent at the plant will depend on the overall quality control at the production plant.

Test beams for determining flexural strengths are to be transported from the grade to the plant site by contracting agency personnel.

Structural Concrete Plant Monitoring

Exhibit B lists the monitoring requirements. Incidental concrete usually furnished in quantities less than 25 c.y. per day will not require contractor's certified plant inspection. The uses of incidental concrete excluded from inspection are listed in the specification for certified plant inspection. The engineer and the contractor should agree upon the anticipated quantities to be furnished before hand to determine if certified inspection will be required.

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If it is agreed that certified inspection is not required, the engineer will furnish the necessary plant inspection in accordance with IM 528.

Ready mix tickets may be filled out by a non-certified person if directly supervised by the certified plant inspector.

Test beams for determining flexural strengths are to be transported from the grade to the plant site by contracting agency personnel. The certified plant inspector is responsible for curing and storage of the beams. Contracting agency personnel are responsible for testing and reporting results.

Asphaltic Concrete Paving Plant Inspection

Exhibit C lists the monitoring requirements. A plant monitor will normally be assigned to each project with duties split between plant and grade inspection. The plant monitor should schedule work so that the plant can be visited daily during production. The amount of time spent at the plant will depend on the overall quality control at the production plant. The project inspector will be providing production and placement information to be entered on the daily plant report. Visits of the project inspector to the plant laboratory for exchange of information and book work will normally be done daily. The plant monitor will be responsible for witnessing core sampling and performing density tests.

Plant Reports

The project engineer should make arrangements with the certified plant inspector for timely receipt of the plant reports. The original and all copies of the plant report shall be kept at the plant until all documentation is completed. Normally this will be the day following the end of the reporting period. Review and distribution of the reports will be made by the Resident Office. This distribution will include a copy to be returned to the certified plant inspector. Prompt consultation with the certified plant inspector and monitor shall follow any significant error or omission.

Documentation

A documentation sample for the plant monitor is contained in Exhibit D. A separate field book should be set up on each project to document plant inspection. Some flexibility in the suggested format may be necessary depending on the project size and type of plant. The important item is to document discrepancies, and corrective action taken by the contractor.

A copy of this documentation must be furnished to the District Materials Engineer at the time of project acceptance. Also include the certified plant inspector's name, certificate number, and statement from the monitor regarding the work performance of certified inspector. A sample format for providing this documentation is contained in Exhibit E.

All improper procedures, unresolved test discrepancies, or failure to perform inspection duties will be considered by the District Materials Engineer for possible decertification or other appropriate corrective action.

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The role of the plant monitor is vital in assuring the District Materials Engineer is aware of any deficient or otherwise unsatisfactory work of the certified plant inspector.

Specification Violations

Failing test results are to be recorded on the daily plant report by the plant inspector. Verbal notification of such failing results shall precede completion of paper work to assure timely changes.

The plant monitor will convey to the responsible project inspector all specification violations, discrepancies in results with the plant inspector, and improper procedures and equipment used by the plant inspector. The project inspector will issue non-compliance notices for failing test results and inadequate testing procedure or equipment.

Testing discrepancies between the plant inspector and the monitor will need to be resolved on an individual basis. The District Materials Engineer should be advised of unresolved discrepancies or other problems of a serious or repetitive nature. They will investigate and take appropriate action.

Testing Equipment & Supplies

The Department has agreed to make available for purchase certain testing equipment from DOT stock. Producers should refer to ACC and PCC Plant Inspection Manuals for specific information and Central Materials Lab contacts. A list of equipment suppliers is included in the plant manuals.

The necessary plant inspection forms will be furnished to the producer at no cost. The producer can request these through the District Materials or Resident Offices. It is a good idea for the plant monitor to carry a supply of forms and make these available to the producers as needed.

The plant monitor can utilize the contractor furnished equipment for testing required at the plant site. However, the plant monitor should carry a set of sieves to use for gradation analysis run at the contractor's laboratory.

Samples

The plant inspector should be requested to indicate on the sample submittal form the telephone and hours that he can be reached for result information.

Section 3.22 includes requirements of construction inspection/monitor personnel for project acceptance sampling and testing for gradation. These responsibilities include witnessing of sampling and splitting of at least one of the first three samples of each aggregate or, in the case of ACC plants, each aggregate combination tested and a minimum of 10 percent of the remaining samples. All samples that have been witnessed shall be split and one-half of the sample forwarded to the District Materials Lab. The construction inspector/monitor that witnessed the sampling and splitting shall place his/her name on the Form 820193 and a large prominent "W" to indicate the sample was witnessed. This person is intended to be a certified aggregate inspector unless prior approval of the RCE is obtained.

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Samples that are obtained by the certified plant inspector, but not tested, should not be split unless needed for further evaluation. They shall be retained at the plant until the lot has been accepted.

If required by the contract documents, transportation of the split sample to the District Materials Lab will be performed by the contractor.



DOT Monitoring Program  
for  
Portland Cement Concrete Paving Plant Inspection

Paving Plant Inspection Duties per IM 214 & 527	Minimum Monitoring Requirements by Construction Personnel
<p>A. Stockpiles</p> <ol style="list-style-type: none"> <li>1. Proper stockpiling procedures</li> <li>2. Prevention of intermingling of aggregates</li> <li>3. Prevention of contamination</li> <li>4. Prevention of segregation</li> </ol>	<p>Inspect before production starts and weekly thereafter</p>
<p>B. Plant Facilities</p> <ol style="list-style-type: none"> <li>1. Assures plant safety</li> <li>2. Check for equipment compliance</li> <li>3. Proper laboratory location and facilities</li> </ol>	<p>Inspect once before calibration (Check that the plant inspector has the proper batch weight tables, current manuals, instructions &amp; specifications. Also inspect transit mixers for requirements of Section 2001.21C.)</p>
<p>C. Calibration</p> <ol style="list-style-type: none"> <li>1. Be present during calibration</li> <li>2. Have appropriate batch weights</li> </ol>	<p>Plant calibration observed by District Materials and plant monitor when possible</p>
<p>D. Cement (Fly Ash) &amp; Aggregate Delivery &amp; Admixtures (#1 only)</p> <ol style="list-style-type: none"> <li>1. Check for proper source and certification</li> <li>2. Document quantities delivered</li> <li>3. Monitor condition of shipments</li> </ol>	<p>Audit once before production starts and weekly thereafter</p>
<p>E. Plant Sampling</p> <ol style="list-style-type: none"> <li>1. Check aggregate gradations</li> <li>2. Check aggregate moisture</li> <li>3. Check aggregate specific gravity</li> </ol>	<ol style="list-style-type: none"> <li>1. Witness the sampling and splitting of at least 1 of the first 3 samples of each aggregate and a <u>minimum</u> of 10% of the remaining samples. Provide documentation of these witnessed samples on Form 820193. Also verify that the sampling and testing plan is in accordance with Section 3.22.</li> <li>2&amp;3. Witness once during first week of production. If problems develop, run one test to verify plant inspector's results.</li> </ol>
<p>F. Proportion Control</p> <ol style="list-style-type: none"> <li>1. Check scale weights &amp; scale operation</li> <li>2. Check admixture dispensers</li> <li>3. Check mixing time &amp; revolutions</li> <li>4. Check cement yield</li> </ol>	<p>Audit and/or observe weekly</p>

DOT Monitoring Program  
for

Portland Cement Concrete Paving Plant Inspection (Continued)

Paving Plant Inspection Duties  
per IM 214 & 527

Minimum Monitoring Requirements  
by Construction Personnel

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G. Concrete Tests

1. Cure flexural test specimens
2. Test flexural specimens

1. Observe curing facility weekly
2. Observe one beam break/week

H. Test Equipment

1. Clean and maintain scales, screens, pycnometers, beam molds & laboratory facility

Examine weekly

I. Documentation

1. Prepare daily plant reports
2. Document all checks & test results in field book
3. Maintain daily diary of work activity

1. Audit daily
  - 2&3. Audit weekly
- Separate diary to be maintained on items monitored.

DOT Monitoring Program  
for  
Structural Concrete Plant Inspection

Paving Plant Inspection Duties per IM 214 & 528	Minimum Monitoring Requirements by Construction Personnel
A. Stockpiles	Inspect weekly during production
1. Proper stockpiling procedures	
2. Prevention of intermingling of aggregates	
3. Prevention of contamination	
4. Prevention of segregation	
B. Plant Facilities	Inspect once during first week of production (Check that the plant inspector has current manuals, instructions & specifications. Also inspect transit mixers for requirements of Section 2001.21C.)
1. Assures plant safety	
2. Check for equipment compliance	
3. Proper laboratory location and facilities	
C. Calibration	Plant calibration monitored by District Materials
1. Have appropriate batch weights	
2. Check plant calibration	
D. Cement (Fly Ash) & Aggregate Delivery & Admixtures (#1 only)	Audit weekly during production
1. Check for proper source and certification	
2. Document quantities delivered	
3. Monitor condition of shipments	
E. Plant Sampling	1. Witness the sampling and splitting of at least 1 of the first 3 samples of each aggregate and a <u>minimum</u> of 10% of the remaining samples. Provide documentation of these witnessed samples on Form 820193. Also verify that the sampling and testing plan is in accordance with Section 3.22.
1. Check aggregate gradations	
2. Check aggregate moisture	
3. Check aggregate specific gravity	
	2&3. Witness once during first week of production. If problems develop, run one test to verify plant inspector's results.
F. Proportion Control	Audit weekly during production (Check batch weights during initial inspection.)
1. Check scale weights & scale operation	
2. Check admixture dispensers	
3. Check mixing time & revolutions	

DOT Monitoring Program  
for  
Structural Concrete Plant Inspection (Continued)

Paving Plant Inspection Duties  
per IM 214 & 528

Minimum Monitoring Requirements  
by Construction Personnel

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G. Concrete Tests

1. Cure flexural test specimens

1. Observe facility weekly
2. Test flexural specimens

H. Test Equipment

1. Clean and maintain scales, screens, pycnometers, beam molds & laboratory facility

Inspect during first week of production

I. Documentation

1. Prepare weekly 211B reports
2. Document all checks & test results in field book
3. Maintain daily diary of work activity

Audit weekly during production. Maintain a separate diary of items monitored.

DOT Monitoring Program for Asphaltic Concrete Paving Plant Inspection

The attached A.C. Plant Inspector's Guide provides an overview of the duties and responsibilities of A.C. Plant Inspectors. It is intended to provide a general outline of inspection activities. IT IS ESSENTIAL THAT ANYONE USING THIS GUIDE REFER TO THE SPECIFICATIONS, IM'S, AND CONSTRUCTION MANUAL SECTIONS FOR A COMPLETE DESCRIPTION OF REQUIREMENTS.

Before production begins, the contractor's certified plant inspector and the residency plant monitor should discuss these duties, documentation, sampling and testing plans to ensure compliance with Supplemental Specification 1057 and IM 214. Effective communications must be established and maintained throughout the project. While it is not explicitly stated for each responsibility, it shall be understood that any noncompliance or workmanship deficiency be immediately reported to the contractor's superintendent and the resident construction engineer. The contractor shall be required to take corrective action. The monitoring requirements are minimum and should be increased if deficiencies occur until the problems are resolved.

<u>Certified Plant Inspection</u>	<u>Minimum Monitoring Requirement</u>	<u>References</u>
<p><u>Stockpiles</u> Observe construction of stockpiles to prevent segregation, contamination, &amp; intermingling.</p>	<p>Inspect before construction begins &amp; once week thereafter.</p>	<p>Article 2303.05 " 2305.02 " 2205.04 IM 508</p>
<p><u>Plant Erection</u> Inspect material bin foundations. Assure sampling locations are safe &amp; convenient.</p>	<p>Inspect for evidence of settlement. Inspect prior to calibration.</p>	<p>Article 2001.06 " 1107.07</p>
<p><u>Plant Equipment</u> Check interlocks on aggregate feeders &amp; AC delivery systems, screens for removal of oversize material, AC storage tank, tank stick, &amp; general condition of all plant equipment.</p>	<p>Inspect all plant &amp; testing equipment prior to calibration (including lab trailer).</p>	<p>Article 2001.22 " 2305.02 " 2520 SS 1057 IM 508, App A</p>
<p>Check scales for sensitivity &amp; accuracy daily.</p>	<p>Check first day &amp; once a week thereafter.</p>	<p>Const. Man. 3.42 Article 2001.07 IM 508</p>

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EXHIBIT C  
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DOT Monitoring Program for Asphaltic Concrete Paving Plant Inspection (Continued)

Certified Plant Inspection	Minimum Monitoring Requirement	References
<u>Plant Calibration</u>		
Observe calibration & obtain copy of all calibration data.	Observe calibration & review calibration data.	IM 508
Obtain copy of job mix formula & Form 955, Proportions and Production Limits.		
Check cold feed bins for method of adjustment.	Inspect method for securing bin gate settings.	
Discuss mix designs & plant controls with District Materials.	Participate in discussion.	
<u>Mix Control</u>		
Monitor coating of aggregates & mixing time.	Observe each day of production.	Article 2303.05 IM 508
Monitor & record air, AC, & mix temperatures on 2-hour intervals.	Check once each day of production.	Article 2303.05 " 2303.10
Monitor truck loading procedures, amount of mix maintained in silo, & operation of hopper/silo gates to avoid segregation.	Observe each day.	Article 2303.10 IM 508
Check aggregate proportions, interlocks, & cold feed bin gate settings daily.	Check first day & weekly thereafter.	IM 508 IM 511
Inspect trucks for proper/improper use of cleaning fluids.	Monitor daily.	Article 2303.10
Prepare 3 boxes & Form 193 (Samples Submitted) & send to road for hot samples.		
<u>Asphalt Delivery</u>		
Determine quantities on hand & calculate AC added by tank stick or weighing. Compare with brodie meter daily.	Monitor once per day.	IM 509 Article 2303.27

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DOT Monitoring Program for Asphaltic Concrete Paving Plant Inspection (Continued)

Certified Plant Inspection	Minimum Monitoring Requirement	References
<p><u>Plant Sampling &amp; Testing</u>                      Obtain 3 aggregate samples per lot, split only the sample(s) to be tested, determine &amp; record process control gradation. Forward split samples to District Materials with Form 193.                       Determine moisture content of all aggregates, including RAP.                       Obtain AC samples &amp; forward to District Materials Lab.                       Monitor condition of density cores &amp; core thickness.</p>	<p>Witness at least 1 of first 3 samples of each mix design &amp; minimum of 10% of remaining samples. Split samples for acceptance test. Audit first day &amp; once per week thereafter.                      Observe first day &amp; weekly thereafter. Submit monitor sample to District Materials. Identify random core locations, observe core cutting, transport to field lab, determine &amp; record core densities, and Q.I. Issue non-compliance if necessary. Forward cores to District Lab with Form 193.</p>	<p>Const. Man. 3.20 thru 3.22                      SS 1059                       IM 508                       IM 204                       Article 2303.14</p>
<p><u>Documentation</u>                      Prepare daily plant report (820007).                      Document all checks, tests, &amp; quantities in field book in format provided by residency.                      Complete tank stick sheet.                      Maintain &amp; monitor control charts.                      Check for approved sources &amp; certifications for all materials (including material transferred from other projects) &amp; document deliveries.                      Assure total certified quantities are sufficient for tons produced.                      Maintain file of all certified material tickets, worksheets, &amp; forms submitted.</p>	<p>Audit entries daily.                      Audit entries daily.                       Audit daily.                      Monitor daily.                      Audit once per week.                       Audit once per week.                       Obtain file at end of project.</p>	<p>IM 508                      Const. Man.                       IM 509                      IM 508                       SS 1057</p>

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PLANT MONITOR DOCUMENTATION

3.09  
EXHIBIT E

PLANT INSPECTOR \_\_\_\_\_ CERTIFICATE # \_\_\_\_\_

ACC PLANT \_\_\_\_\_ PCC PLANT \_\_\_\_\_

COUNTY \_\_\_\_\_ PROJECT NUMBER \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

PLANT LOCATION \_\_\_\_\_

DATES OF PLANT INSPECTION

FROM \_\_\_\_\_ TO \_\_\_\_\_  
TOTAL DAYS \_\_\_\_\_

DISCREPANCIES (Improper procedures, unresolved test discrepancies, or failure to perform inspection duties):

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Corrective action taken by contractor for discrepancies:

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\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Plant Monitor

\_\_\_\_\_  
date

\* If there are no comments above, plant inspection will be considered acceptable.

1 copy - District Materials

20 FIELD TESTS

21 FIELD TESTING ON CONSTRUCTION PROJECTS

A. General - I.M. 204

All sampling, measuring and testing for construction project control shall be performed as prescribed in the current Materials Department Instructional Memorandum I.M. 204, Inspection of Construction Projects - Sampling and Testing.

B. Project Acceptance Sampling and Testing

Construction inspection personnel are responsible for the field sampling and testing portion of Project Acceptance Tests. All gradation testing for aggregates shall be performed by certified aggregate inspectors. This will require that every construction office Resident Engineer keep a close check on proper inspector assignments and maintain a program of continuing recertification for present personnel and certification for additional employees if required. Samples taken by inspectors and submitted to district or central laboratories must be properly and completely identified on Form 820193 or other appropriate forms as required.

For projects that certified plant inspection is required, the certified inspector will be obtaining three gradation samples per lot (unless operations are prematurely shut down). All samples that are to be tested for gradation shall be split in accord with I.M. 336 prior to testing. One-half of the sample shall be bagged, tagged, and identified on Form 820193. The tag shall have, as a minimum, the following information: contractor's name, project number, county, date of sample, and the "W" if it represents a witnessed sample. This sample shall be transported to the District Lab not later than the next working day.

These samples will normally be tested by District Materials personnel unless the District Materials Engineer and Resident Construction Engineer approve other arrangements. Other arrangements may include having the plant monitor perform gradation testing at the plant or resident construction engineer office when gradation problems warrant more timely results or District Lab workload becomes excessive.

I.M. 204 shows the minimum required frequency of tests for various types of work.

Additional tests should be made as necessary for adequate project control.

All tests should be recorded in field books. Reports showing test results must include all tests made.

• Non-Compliance Notice - Form 830245

Project Acceptance test results and workmanship of material which is incorporated in the work that fall outside the specification limits shall be reported by the project inspector on a Non-Compliance Notice (Form 830245).

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CONSTRUCTION MANUAL

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1. The original copy shall be immediately delivered to the contractor with the carbon copy retained by the inspector for the project files.
2. The inspector should also immediately advise the Resident Construction or County Engineer when tests on work indicate non-compliance with the specifications.

When non-complying tests occur before a material is placed, the material shall be rejected and a Form 830245 is not needed.

A Form 830245 is issued when non-complying tests occur for work that is in progress or where material is being placed. Subsequent loads of material shall not be placed until it is determined to be complying.

Where lot sampling and testing represent acceptance, such as in aggregate gradation, the Form 830245 is to be issued when a sample test result is non-complying. The material may continue to be placed until the remainder of the tests in the lot are completed. When the lot is non-complying, subsequent material shall not be placed until corrective action has been taken and it is complying.

D. Assurance Sampling and Testing

Materials Office I.M. 204 describes the responsibilities involved with this program, most of which lie with the Materials Office. Occasionally in the past, taking of assurance samples has not occurred on some projects because timely notification of ongoing work was not made. This seems particularly common in the case of test cylinders from bridge deck pours as well as culvert projects.

While the actual taking of assurance samples remains the responsibility of Materials personnel, it is of equal importance that Construction personnel provide timely notification regarding available dates for testing. Acceptance of this mutual responsibility will help make this program successful.

AGGREGATE GRADATION TESTING, SAMPLING & EVALUATION

General

The Standard Specifications require the engineer to determine if all construction is acceptable and within reasonably close conformity with the plans and specification. If the work is not in reasonably close conformity, the engineer is permitted to allow the work to remain in place if it is reasonably acceptable and to provide for an adjustment in the contract unit price for such work that is deficient.

However, the contractor may elect to remove the deficient work with no extra payment and replace it with construction that complies.

When certified plant inspection is required, the gradation test results shown on the plant report will be from process control samples, advisory only. Gradation acceptance test results will be documented on Form 821283. If the acceptance test fails, it will be necessary to split and test the backup samples. The project engineer should compare the process control and acceptance test results and investigate differences that could be the result of improper splitting techniques, test procedures, or accuracy of equipment. IM 216 is a guide that provides reasonable tolerances of split sample test results. The engineer may use the tolerances as a basis for investigating discrepancies.

The certified plant inspector should also be aware that test results may vary and investigate the cause of differences. The primary responsibility for assuring that process control and acceptance samples are representative of the material incorporated in the project lies with the certified plant inspector.

Unless otherwise specified, the gradation of aggregates for Portland Cement Concrete, Asphalt Concrete, Asphalt Treated Base, Bituminous Treated Aggregate Base, Cement Treated Granular Base, Granular Subbase, Crushed Stone Base, and Graded Stone Base shall be evaluated in accordance with Sec. 2.53.

Whenever deviations from the specifications limits or tolerances occur, whether the deviation is to the extent that payment adjustments will be made or not, the contractor shall take immediate corrective action that will insure subsequent compliance. If immediate corrective action is not taken, the inspector shall stop the work.

When test results are within the specifications but continuously near the limits or tolerances on any sieve, the inspector shall plainly inform the contractor that corrective action would be advisable and shall document this advice in the project diary. However, work shall not be stopped, pending such corrective action, unless non-compliance has occurred.

For small quantities of structural concrete (less than 5 cu. yd.), tests (slump and air) are not required if the same mix and plant has been used earlier in the week. A note in the project file shall be entered stating this fact.

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B. Sampling

Obtain three samples, one from each one third of each lot. For construction operations that are carried on continuously, a lot is defined as a day's run or major portion of a day's run. Intermittent construction operations involving small quantities shall be grouped to establish a lot; the time period shall normally not be longer than one week or working days. For structural concrete operations, a lot should be a day's run or approximately 250 cubic yards, whichever is greater. If less than approximately 250 cubic yards are produced in one calendar week, that week's work shall be considered a lot.

C. Testing

1. ACC & PCC Aggregates

The first sample secured each day shall be tested for gradation. In addition, the following procedures are to be followed to select samples for testing: A die shall be cast for each lot and if the number showing matches the working day of that week, as counted starting with Monday, an additional sample shall be tested. A die shall be cast again to determine which additional sample is to be tested. The even numbers on the die shall designate the second sample and the odd numbers shall designate the third sample from the lot. If the test results on any of the foregoing samples do not comply, the remaining sample(s) for that lot shall be tested.

The certified plant inspector shall use this testing plan for all process control samples.

The contracting authority shall test the first 3 samples tested of each aggregate or ACC mix design and a minimum of 10% of the remaining samples. Preference should be given to witnessed samples and companion samples to failing process control samples for testing. If a test fails, the contracting authority shall require the certified plant inspector to split the remaining samples for that lot and forward to the District Lab. These samples shall be tested and averaged for compliance.

When small intermittent quantities are grouped to form a lot, the first day's operation shall be tested for gradation. In addition, the following procedure shall be used to select possible additional samples for testing: A die shall be cast for the lot and if the number showing matches the first working day of the group as counted starting with Monday (one in six probability) an additional sample shall be tested. A die shall be cast again to determine which additional sample is to be tested. The even numbers on the die shall designate the second sample and the odd numbers shall designate the third sample. If the test results on any sample (1st, 2nd or 3rd) do not comply, the remaining sample(s) for that lot shall be tested.

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Even if the first process control sample tested indicates compliance, the other two samples in that lot should be taken and retained until the lot is accepted. A lot is accepted when an acceptance test result is determined to be in compliance. If an acceptance test is not performed on a lot, that lot will be evaluated on the basis of the next acceptance test results.

2. Other Aggregate Samples

Aggregate samples other than for A.C. and P.C. Concrete shall be selected for testing by casting a die for each lot. The numbers one and two on the die are designated to represent the first sample secured, three and four the second sample, and five and six the third sample. The die may be cast when the first sample is secured. If the test results on the sample selected do not comply, the other two samples for that lot shall be tested.

3. Partial Lots

In the case when construction operations are prematurely shut down or otherwise constrained and only one (1) sample is secured, it shall be tested. If two (2) samples are secured, a die shall be cast to determine which sample shall be tested. If the sample so selected does not comply, the remaining sample shall be tested.

D. Evaluation and Acceptance

When two or three test results are obtained, they are to be averaged. Partial lots represented by one test will be evaluated on the basis of the individual test result.

In the event the engineer finds the material or the finished product in which the material is used or the work performed is not in reasonable close conformity with the plans and specification and has resulted in an unsatisfactory product, the work or material shall be removed and replaced or otherwise corrected by and at the expense of the contractor.

23 WEEKLY REPORT OF DAILY TESTS

The "Weekly Report of Daily Tests of subbases, crushed stone bases and moisture density embankments" (Form 830255) is no longer required.

The information on this report is still needed in the Construction Office and Central Filing, therefore, copies of the field book pages should be made on a weekly basis and forwarded to the Construction Office and Central Filing.

Page 18 of the "Construction Records Guide," dated April of 1982, is an example of the field book set up for these tests.

Form 830255 will not be reprinted since it is no longer required.

53 PRICE ADJUSTMENT GUIDE FOR REASONABLY ACCEPTABLE OR DEFICIENT WORK

A. General

The specifications require the Engineer to determine if construction work is acceptable and within reasonably close conformity with the plans and specifications. Every effort should be made to prevent sub-standard work from being done or non-complying material from being incorporated into the project. However, when the work is deficient or the incorporated material is non-complying, the engineer must make a decision as to whether to require the deficient work to be removed and replaced or leave in place with a price adjustment. It should be kept in mind that a price adjustment is no substitute for specification compliance and good engineering judgment must be exercised in determining what is acceptable. Unacceptable work shall always be removed and replaced with acceptable work. The contractor does have the option of removing deficient work and replacing with acceptable work in lieu of a price adjustment.

A price adjustment usually will not be made when the total price adjustment incurred under this guide is \$100 or less. This applies to the sum of all items included in any one contract subject to adjustment.

B. Guide Schedules for Price Adjustments

1. Gradation

Unless otherwise specified, the price adjustments for gradation of aggregates for Portland Cement Concrete, Asphalt Concrete, Asphalt Treated Base, Bituminous Treated Aggregate Base, Cement Treated Granular Base, Granular Subbase, Crushed Stone Base, and Graded Stone Base for reasonably acceptable work shall be determined as prescribed in the following table.

In the case where aggregates are mixed with asphaltic materials, the price adjustment shall apply to both the mix and the asphaltic material.

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Adjustment of Contract Bid Item Unit Price  
For Aggregate Gradation Test Deviations

Specified Sieve Size		Number of Tests		
		1	2	3
		Percent Contract Unit Price Adjustment		
3/4", 1", 1-1/2"	0.1-5.0	0	1	2
	5.1+	1	2	4
No. 4, 3/8", 1/2"	0.1-4.0	0	1	2
	4.1-7.0	1	2	4
	7.1+	2	4	6
No. 8 thru 100	0.1-3.0	0	1	2
	3.1-5.0	1	2	4
	5.1-7.0	2	4	6
	7.1+	4	6	8
No. 200	0.1-0.5	0	1	2
	0.6-1.0	0	2	4
	1.1-2.0	2	4	6
	2.1-4.0	4	6	10

Average Deviation % = Average gradation plus or minus the specified bank limits except when job mix tolerances are specified on certain sieve sizes. In those cases the job mix tolerances shall be applied to the target gradations in lieu of the specified bank limits.

An example price adjustment calculation:

The gradation requirements for D57 concrete coarse aggregate are as follows:

Sieve Size	1-1/2"	1"	1/2"	4	8	200
Percent Passing	100	95-100	25-60	0-10	0-5	0-1.5

The results of three gradation test for a lot of class D structural concrete are as follows:

Sieve Size	1-1/2"	1"	1/2"	4	8	200
Test 1	100	98	21	8.7	4.2	1.4
Test 2	100	97	25	11.0	4.8	1.8
Test 3	100	98	19	8.2	3.8	1.5
*Average	100	98	22	9.3	4.3	1.6
Price Adjustment	0	0	2%	0	0	2%

\*All percent passing and average percent passing to be calculated to two significant figures.

A total of 4% price adjustment is to be assessed to concrete in this lot.



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2. Portland Cement Concrete

a. Slump

	Minimum	Maximum	Maximum Specified		
			2"	3"	4"
			Percent Payment		
	-	2½	100	100	100
	Over 2½	3½	80	100	100
	Over 3½	4½	70	80	100
	Over 4½	5	60	70	80
	Over 5	5½	50	60	60
	Over 5½		0	0	0

b. Air Content

Minimum	Maximum		Air Content Specified			
			6% ± 1.0	6% ± 1.5	6.5% ± 1.0	6.5% ± 1.5
			Percent Payment			
Less than 4.0	4.0	0	0	0	0	0
4.0	4.4	50	50	0	0	0
4.5	4.9	75	100	50	50	50
5.0	5.4	100	100	75	100	100
5.5	7.0	100	100	100	100	100
7.1	7.5	100	100	100	100	100
7.6	8.0	90	100	90	100	100
8.1	8.5	75	75	75	75	75
8.6	9.0	60	60	60	60	60
Over 9.0		0	0	0	0	0

Example: The total concrete placed on a project is 300 c.y. and 18 c.y. of Class D structural concrete placed have been found to be non-complying. Three loads were involved in which the following tests were out:

Quantity - c.y.	Slump	Air	Percent Payment
6	4"	7.7	90
6	5"	6.9	80
6	4½"	7.8	70*

\*Indicates adjustment for both slump and air.

c. Rain Damage Pavement

When rain damage occurs to the pavement such that the pavement finish required by Article 2301.19 is not obtained, the slab sections so damaged may be required to be removed and replaced as defective work in accordance with 2301.23. An adjustment in contract price may be made for deficient work as stated in Article 1109.04C for the cases described in the following schedule.

The adjustments in contract price are to be applied to the entire slab between transverse joints.

ADJUSTMENT SCHEDULE

<u>Damage</u>	<u>% Payment</u>
Case I	95%
<p>The texture striations are absent from practically all of the surface area. The surface appearance may be similar to sand paper or may be pock marked from the rain droplets. An occasional edge repair may be required due to excess slumping or from rounding of the edge, and limited areas along the edge may have coarse particles of the fine aggregate exposed. Pavement that is finished in the rain or is reworked following a rain (or snow) is also included in Case I. This adjustment is applied even though visible damage is not evident, because of the reduced service life caused by water being worked into the pavement surface during finishing.</p>	

Case II	90%
<p>The texture is totally absent from the pavement surface and the mortar has been washed from the surface of the pavement to the extent that the coarse particles of the fine aggregate are exposed. Some slight troughs or depressions have been washed in the surface exposing the coarse aggregate but confined to a limited area or spread intermittently throughout the area under review. Some edge repairs may be required to restore the eroded edges.</p>	

Case III	85%
<p>The surface mortar has been practically all removed to the extent that the coarse particles of the coarse aggregate are visible on the pavement surface. Considerable erosion of the edges has occurred, but not to the extent that the width is narrowed adversely. Intermittent edge repair may be required as well as some surface patching of slight troughs or depressions that may have formed in the pavement surface by the action of flowing water.</p>	

More severe rain damage may require repair by bridge deck repair methods of areas less than full length and width of the slab, but rather conforming to the shape and extent of the damage, or may require full depth removal and replacement especially if edge damage is severe. In addition to the above described penalties, pavement surfaces with transverse grooving required shall have such grooving re-established prior to acceptance.

- d. "L" Join Tie Steel Deficiencies  
 Areas of pavement with missing "L" joint tie-steel should be corrected according to procedures discussed in Section 9.36 of the Construction Manual.

An adjustment in contract price should be made for missing "L" joint tie steel. This price adjustment should be 10% of the contract price for the pay item. The adjustment will be for all areas missing tie-steel regardless of whether retrofit correction is needed or not.

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3. Price Adjustment Schedules for Bridge Floor Resurfacing & Overlay Projects

a. Density

<u>Density</u>	<u>Percent Payment</u>
97.5% and over	100%
97.4% - 97.0%	50%
96.9% and below	Remove and replace

b. Slump

Target 3/4"

<u>Slump</u>	<u>Percent Payment</u>
0 - 1"	100%
1 1/4" - 1 1/2"	50%
Over 1 1/2"	Remove and replace

c. Air Content

Target 6.5%

<u>Percent Air</u>	<u>Percent Payment</u>
Less than 4.0%	Remove and replace
4.0% - 4.4%	0%
4.5% - 4.9%	50%
5.0% - 5.4%	75%
5.5% - 7.5%	100%
7.6% - 8.0%	75%
8.1% - 8.5%	50%
8.6% - 9.0%	0%
9.1% and over	Remove and replace

Determining Deficient Area

A density test of the deck overlay will be representative of the width of overlay placed and for a distance extending one-half the distance to the next density test location measured along centerline or in the case of an initial or final test location, the distance will extend to the end of the overlay section.

Areas involving air and slump will be determined by the engineer based on the assumption that the concrete mix placed since the last previous complying test is in compliance until the non-complying test occurs.

4. Transverse Grooves in Portland Cement Concrete Pavement, Bridge Decks, and Overlays

Refer to Construction Manual Section 10.43. Texture depths less than 1/16" shall be corrected by sawing in the transverse grooving. Texture depth exceeding 1/4" may require correction or price adjustment as directed by the engineer. Adjustments will be determined by the engineer on a case by case basis depending on the severity and surface area involved.

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Suggested price adjustments for overdepth transverse grooving are found in the following table:

<u>Texture Depth (Average)</u>	<u>% Payment</u>
1/4" to 5/16"	98
5/16" to 3/8"	95
3/8" to 1/2"	90
Over 1/2"	75

**5. Traffic Control**

The lump sum item for traffic control may be adjusted for failure to comply with the plans and specifications. Adjustments will be determined by the engineer based on the magnitude and frequency of the violation. It is recommended the minimum adjustment be \$100.00. Repeated violations of traffic control requirements are grounds for increased adjustments to the traffic control bid item. A suggested sliding scale of \$100.00 for the first violation, \$250.00 for the second, \$500.00 for the third, \$1,000.00 for the fourth, etc.

Examples of situations where a price adjustment would be appropriate include:

- a. Failure to maintain traffic control devices (costs incurred by the contracting authority may be recovered against this item)
- b. Intentionally working without the proper traffic control setup
- c. Unauthorized crossing of the interstate median
- d. Use of non-specification items such as sign sheeting or floodlights
- e. Violations of specified construction activity, limitations of operations, such as opening the roadway to traffic 30 minutes before sunset for full-depth patches on two-lane primary roadways.

It is not intended that minor deficiencies be price adjusted if corrected in a timely manner. In addition to a price adjustment, the engineer may suspend work for irresponsible and/or repeated failure to construct the project using proper traffic control procedures.

**6. Asphalt**

a. Liquid Asphalt

(1) Viscosity or Penetration

When non-complying tests occur, determine the quantity affected. Average all of the tests on the quantity affected and use the average in the following tables to determine the adjustment in payment, if any.

MC-70 AND RC-70 GRADE		<u>% Payment</u>
<u>Kinematic Viscosity (Cs)</u>		
58.2	- 64.0	80
64.1	- 69.9	90
70	- 140	100
141	- 164	90
165	- 188	80
189	- 212	70

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CHAPTER 9

PORTLAND CEMENT CONCRETE PAVEMENT

.00 GENERAL

.10 PRE-CONCRETING CONFERENCE

On all projects involving Portland Cement Concrete Pavement the Office of Construction strongly recommends that the Resident Construction Engineer and the inspectors get together with the appropriate contractor's personnel, before placing any of these materials, to discuss the various items involved in their formulation and production. When ready-mix concrete is used, the producer should also attend.

For the various types of work the following items should be covered:

Approvals and required quantities of aggregate and cement, class of mix, time and rate of delivery, percent of air, slump, batch weights, volume per truck, total quantity required, preparation of delivery tickets, testing arrangements, procedures in case of rejection of a load (can the air be increased or a wet load dried by adding cement and aggregate) responsibility for setting batch weights and amounts of admixtures, placing, finishing and curing arrangements, and personnel assignments for the work.

Also the settings and condition of paving equipment, dust control, subgrade treatment, procedure for checking steel placement, utility and street return boxouts, heading-up equipment, bridge joint forming, contraction joint sawing, rain damage prevention and cold weather protection.

Although only one such conference is considered necessary for thoroughly organizing the work, the responsibilities and duties of the ready-mix producer, the contractor and the inspectors should be reviewed informally prior to placement of concrete especially on urban projects. On small projects it may be possible to include the pre-concreting conference with the pre-construction conference.

.11 COMBINED DAILY INSPECTION REPORT OF PORTLAND CEMENT CONCRETE PAVEMENT - FORM 830224

The daily inspection report on paving work is a daily and hourly record of the progress, the working conditions, the weather and all the other happenings during the paving and plant operations which may affect the results obtained. It is intended to accomplish two purposes, first, to keep the district and central offices advised of the status of the job, and second, to serve as a detailed permanent record of the paving project.

At the end of each day on which any pavement was laid, this report is to be compiled by the paving and plant inspectors from information recorded in the inspector's field books during the day's paving operations.

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To aid the inspectors in preparing the report in a way that will supply the desired information, each entry required on Form 830224 is discussed in some detail in the following paragraphs.

See sample copy of paving report.

Contract Number

This is the number that is assigned to a specific contract and it appears on the contract for the project.

Contractor

Use the official name of the firm. Abbreviations are acceptable if they are the usually recognized abbreviations for commonly used words. Initials alone are unsatisfactory.

Examples:

<u>Official Name of Firm</u>	<u>Abbreviations</u> (Satisfactory)	<u>Initials</u> (Unsatisfactory)
Western Contracting Corp.	West. Contr. Corp.	W. C. C.
Central Engineering Company	Cent. Engr. Co.	C. E. C.

Resident Engineer/County Engineer

This does not necessarily have to be the resident construction or county engineer's signature. When the inspector is located miles from the office and is living on the job, it may be necessary to send these reports forward before seeing the resident construction or county engineer in order to get them in promptly. In such a case, write the engineer's name in the blank space.

County

This entry is self-explanatory. In the case of a project which includes work on a county line, the names of the counties should be listed in the order in which they appear on the contract.

Project

Enter the complete project number.

Report No.

The plan is to start numbering the reports at the beginning of the season, serially. The first report for a given crew on a given project in a given year is number 1, etc. ending when that crew quits the project with number 99 or some other number. If this same crew starts again on a different project or a different contract, start again with number 1. This is true even though the new start be in the same year, in the same county or on the same highway. If the same crew laid part of this same project last year, do not carry forward the numbering from where it stopped last year. Start over at the beginning of each season with number 1.

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These reports must be filed for each day that pavement is laid. They need not be filed on days when no pavement is laid but the reason for the shutdown must be shown on the next report. For example, "No work yesterday - Sunday," "No work Tuesday and Wednesday, May 20 and 21, because of rain." The numbers will be kept serially, with no omissions on days for which no reports are made.

When a contractor has several projects in the same residency and suspends one project to work on another, the last report on the project temporarily suspended should be marked "suspended" and a statement made as to the project to which the contractor is moving. If this is done, no reports need be made on the project suspended as long as it remains inactive and reports are sent in on the active project. When a project is shut down indefinitely for any reason, state this fact on last report and tell why. No reports need then be submitted until operations are resumed. Upon completion of the project mark last report "Final."

Date

Date on which pavement was placed.

Date of Last Report

Enter date of last report.

Plant Owner and Location

Enter company name of plant owner and plant location, i.e. Manatt's - Ames, Carlson - job site, etc.

Square Yards (Contract Quantity)

Enter contract quantity of square yards of pavement. If the contract has two or more items listed for different pavement thickness, enter the total sum of the various pavement thicknesses.

Weather

Use descriptive terms that really describe the weather not merely "good" or "bad." Examples: "clear and dry," "hot and humid," "cloudy and cold," "foggy," "windy," etc.

Day's Temperature, Maximum - Minimum

The thermometer should be read morning and evening for the minimum and around midafternoon for the maximum. Readings should be taken in the shade or they will be meaningless. Telegraph poles, fence posts or the shady side of a parked automobile will usually be available for this purpose.

Minimum Temperature Following Night

This entry is of special significance in early spring and late fall when temperatures sometimes fall to the freezing point during the night, thus endangering pavement laid during daylight hours when temperatures are safe. It is of less importance in midsummer, though even there a sudden cooling of the concrete may cause more frequent cross cracks.

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Since recording thermometers are seldom available, the information is usually obtained from someone around the job who was on duty during the night or very early in the morning. A reading at 6 or 7 a.m. is ordinarily not far from the daily minimum.

Plant Inspector

Enter name of plant inspector. Do not use initials.

Certification Number

Enter certified plant inspector's certification number if certified plant inspection is required on the project.

Item/Lane

Enter here the contract item number and which part of the slab is being placed. If paving in lanes, show lane at Rt. 12'. Lt. 12', Center 24'. If laid full width such as county paving, show as F.W. 24'.

Station, From-To

The intention is that a record of the work shall be kept by even stations, that is, by the stations shown on the plans and staked on the ground. This gives a method of tying in the record of the work as shown by the report with the stationing as shown by the plans and the station numbers marked on the edge of the pavement. For example, if a crew starts at station 50+55 and lays 845 feet that day, the record for the day's work would be as follows:

	<u>Station</u>		<u>Length</u>
<u>From</u>		<u>To</u>	<u>Feet</u>
50+55		54+00	345
54+00		59+00	500
			845

Length-Feet

Enter as shown above. Do not leave blank for all station entries will not be an even hundred feet long. Show stationing omitted for bridges or other short gaps.

Square Yards

Calculate this to the nearest full square yard.

Time

Show the time at which concrete placing began and the clock reading at the end of each batch counting cutoff period in the spaces provided. Normally the grade operations will be continuous and the time at the end of one batch counting period will be the same as the beginning time for the period following. If the paving operation is not continuous, show the beginning time on a separate line with the other items left blank. Follow the blank line with the necessary information as described above.

Cubic Yards - Estimated, Batched and Used

Enter the number of cubic yards estimated, batched, and actually used.



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Percentage of Estimated Cement Used

Enter here the percentage figure obtained by dividing the number of cubic yards used by the number estimated. Calculate to the nearest one tenth percent.

Mix No.

Enter here the mix number given at the left of the table of proportions show in the specifications.

Dry Batch Weights

Enter the dry batch weights in pounds, corrected for specific gravity of the fine and coarse aggregate. The dry batch weights for aggregate of different specific gravities are listed in the Plant Inspection Manual for each concrete mix numbers.

Moisture Content

Enter the percent of moisture of the fine and coarse aggregate.

Actual Quantities Used Per Cubic Yard

Enter the quantities of the individual materials per cubic yard including aggregate weights adjusted for the amount of moisture as determined by moisture tests.

Total water is sum of water in materials, water added at plant, and water added at grade. If central mix is used, leave water added at grade blank. The total pounds of water divided by the pounds of cement per cubic yard should not exceed the water-cement ratio permitted by the specifications. If more water seems necessary, something is wrong and an investigation of all possible sources of error should be begun immediately.

Slump

Enter here the slump of the concrete mix as determined by the slump cone. Record to the nearest 1/4 inch.

Air

Enter here the percent air in the concrete as determined by the air meter.

Hand Finished

Place a check mark in this column when an area is placed and finished by hand methods.

Normal paving operations will use one mix throughout most of the day. It is this mix and the total quantities used in it alone that should be included in the entries for Total Cement Batched, Total Fly Ash Batched, Total Water, Maximum Allowable Water, Average Water/Cement, and Maximum Water/Cement. If other mixes are used for a small number of batches, the material used in those batches should not be included in these entries. The intent is to be able to check proportions for the majority of material used during a day and this will only be meaningful if only one mix is considered.

Total Cement Batched

Enter the total quantity of cement (in pounds) used in all the batches of the mix described above.

Total Fly Ash Batched

Enter the total quantity of fly ash (in pounds) used in all the batches of the mix described above.

Total Water

Enter the total quantity of water (in pounds) used in all the batches of the mix described above.

Maximum Allowable Water

Show the maximum amount of water (in pounds) that is allowed in one cubic yard of concrete for the mix described above. This is based on the maximum water/cement ratio and is used by the plant inspector as the basis for determining the maximum amount of water that can be used in batching.

Average Water/Cement

This is the ratio of the total water divided by the sum of the total cementitious materials (cement plus fly ash) expressed as a decimal fraction. This number should never be larger than the maximum water/cement ratio shown below.

Maximum Water/Cement

This is the maximum water/cement ratio listed in the specifications for the mix described above.

Air Entraining Admixture

Record brand of air entraining admixture used.

Source and Specific Gravity of Fly Ash

Refer to Materials Instructional Memorandum 491.17.

Source of Aggregate

Enter name of quarry or gravel or sand pit.

Specific Gravity

Record specific gravity of coarse and fine aggregate as listed in Materials I.M. T-203, "General Aggregate Source Information."

Plant Test

Enter specific gravity of coarse and fine aggregate as determined by the pycnometer test method.

Coarse Aggregate Durability

List the durability of the coarse aggregate whether Class 1, 2 or 3. Class 2 or 3 durability is often specified on certain projects, so check the contract documents for this requirement.

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CONSTRUCTION MANUAL

9.11

Water Reducer

Check appropriate square. Show brand name if used.

Calcium Chloride

Check appropriate square.

Cement and Fly Ash

Report the brand and type of cement and fly ash, delivery ticket numbers, and quantity in tons used for the day's production run. Recording the ticket numbers is to identify the location that it was placed on the grade.

Certified Aggregate Verification

Enter tons of certified aggregate delivered to the plant site.

Time Lost and Causes

Make short, explicit entries on this line, such as "Preparing subgrade - 1 hour," "shortage of trucks - 2 hours," "mixer broke down - 30 minutes," etc. This information tells a lot to anyone scanning the reports to see how the crew was functioning.

Type of Subgrade

Use here descriptive terms that actually describe, not merely "good" or "bad." The following terms and similar ones really convey some information as to the shape the subgrade is in. "Smooth and compact," "dry and hard," granular subbase," "A.C. base," and "P.C.C. base."

Beams Made

Beam data.

Beam Tested

Record beam data.

Aggregate Sieve Analysis

Record sieve analysis data. "Yes" or "no" in compliance column.

Method of Mixing

Check the appropriate box.

Method of Covering Subgrade

Check the appropriate square.

Method of Paving

Check the appropriate square.

Method of Curing

Show here the method of curing used, burlap, plastic, or liquid.

Cold Weather Protection

Check the appropriate box.

Texture Method

Grooving or Astro drag.

Signature

Enter surname in full, preceded by Christian name or initials, whichever is your customary practice for signature on letters or other documents. Surname alone is insufficient. There might be several Smiths who were inspectors on the Highway Division force during a series of years or even at the same time. Initials alone for surnames are also inadequate. R.E.J. could mean Ralph E. Jones, Roy E. Johnson, or Ruth E. Jackson and the party perusing the reports a few years later would get no idea as to who had been inspector.

Disposition of Report

The original (white) and yellow copy of the report will be sent directly to the district materials office. One copy (pink) shall be retained in the resident construction or county engineer's office. The green copy is to be retained by the inspector. The first two copies are to be forwarded as soon as possible (not later than the morning after the day covered by the report) to the respective offices.

2 SUBMISSION OF MATERIALS OFFICE REPORT FORMS

In addition to the Combined Daily Inspection Report of PCC Pavement - Form 830224, the following Materials Office report forms are required on portland cement concrete paving projects.

Form 920912 Portland Cement Shipment Yield Report - Instructions on preparing the report are contained in the PCC Plant Inspection Manual.

3 USE OF COMMERCIAL READY MIX CONCRETE ON PAVING PROJECTS

When the source of concrete for a paving project is a commercial ready-mix plant, each truck load of concrete must be identified by a Form 830212 or acceptable plant charge ticket showing the required information. Form 830212 is the only ready mix ticket allowed. No substitute or revised forms are allowed except as noted above.

A distinction is made regarding the amount of information required, between intermittently supplied loads for bridge approaches, street returns, etc., and continuous mainline paving operation.

For intermittent production other than mainline paving, complete information is required on the Form 830212 for each load, because of the greater possibility of need for water adjustment on the grade.

For continuous mainline paving, the Form 830212 must shown the plant name, contractor, project, date, quantity, class, and time batched. The complete information regarding water in the materials, water added, and total allowable water need only be shown initially at the beginning of each run, and each time thereafter when the moisture content changes or plant adjustments in the mixing water are made.

Any water added on the grade must, of course, be documented.

Moisture tests must be made frequently to insure uniformity in concrete consistency.

The discharge time must be entered on the Form 830212 for each load. The usual requirements for initialing the tickets at both plant and grade must be followed.

#### 4 CONCRETE DELIVERY TIMES

In order to insure that quality concrete is incorporated into the pavement, maximum delivery times have been included in the specifications for both continuous agitation (agitator trucks) and non-agitated trucks (dump trucks). The specification references are 2301.16 Sections E and F.

These delivery times should be verified at least once during each day of normal paving. Per Materials IM 527, the cement to water contact time should be recorded at least daily. These verifications should be recorded in the project field books.

During hot, dry, windy weather, the maximum time limitations listed in the specifications and in the Materials IM are critical limits set to insure that quality concrete is being placed and incorporated into the project.



.30 READY MIX CONCRETE

.31 FORM 830212, READY MIX CONCRETE

This form is designed to provide detailed and comprehensive information about the batching, mixing, and delivery of ready mix concrete used on construction projects. Form 830212 is the only ready mix ticket allowed. No substitute or revised forms are allowed except as noted below.

The inspector at the plant will be responsible for recording on Form 830212 plant identification, the truck number, ticket number, date, design number (if appropriate), project number, mix number, water reducer or retarders used, volume of load in cubic yards, time batched, number of mixing revolutions at plant, water in aggregates, mixing water added, subtotal of water in load and maximum water allowed, initialing ticket when complete.

The receiving inspectors will be responsible for recording the amount of water added at grade, if any, and showing Total Water, Air, and Slump, if determined. Also to be recorded are the time of discharge of the load and the inspectors initials.

It should be noted that the amount of water is shown in gallons or pounds for the entire load on the truck. The total permitted is determined by multiplying the weight of cement in the load by the maximum allowable water-cement ratio and converting to gallons.

If, upon delivery, additional mixing water is necessary to secure workable concrete, the receiving inspector must make sure the total permitted quantity of water is not exceeded.

Both plant and grade inspectors must insist that mixing either at the plant or at the point of delivery be done at the manufacturer's recommended mixing speed, and that specifications regarding the maximum and minimum number of revolutions be followed.

All tickets for ready mixed concrete must be collected by the receiving inspector and filed with the project records. Appropriate daily or weekly reports must show the required information for the concrete mixed and delivered to the work.

The charge ticket provided by the ready mix plant may be used in lieu of Form 830212, provided all the required information can be legibly shown.

Form 830212  
6-86

## READY MIX CONCRETE

\_\_\_\_\_ Plant

Truck No. \_\_\_\_\_ Ticket No. \_\_\_\_\_

Date \_\_\_\_\_ Des. No. \_\_\_\_\_

Proj. No. \_\_\_\_\_

Mix No. \_\_\_\_\_ Retarder/Water Reducer? Yes \_\_\_ No \_\_\_

Conc. This Truck \_\_\_\_\_ C.Y.

Air agent added this truck \_\_\_\_\_ oz.

Time Batched \_\_\_\_\_ Discharged \_\_\_\_\_

Rev. Mixed (Plant) \_\_\_\_\_ Grade \_\_\_\_\_

Water (gal. or lbs. This Truck) 8.33lbs./gal.

In Aggregate	_____ gal.	_____ lbs.
Added (Plant)	_____ gal.	_____ lbs.
Subtotal	_____ gal.	_____ lbs.
Added Grade	_____ gal.	_____ lbs.

---

TOTAL WATER \_\_\_\_\_ gal. \_\_\_\_\_ lbs.

Maximum Water Allowed \_\_\_\_\_ gal. \_\_\_\_\_ lbs./cy

Air \_\_\_\_\_ Slump \_\_\_\_\_

Plant Insp. \_\_\_\_\_

Receiving Insp. \_\_\_\_\_



1.20 STRUCTURAL CONCRETE

1.21 WEEKLY REPORT ON STRUCTURAL CONCRETE, FORM 830211

The Resident Construction or County Engineer shall report each week on Form 830211 the record of proportions used in producing concrete for the project. Form 830211 will also show all results of sieve analysis tests and all data on test beams made and tested. The week covered by each report shall begin on Sunday morning and end on Saturday evening. One Form 830211 is required for each bridge design, including bridge deck surfacing and resurfacing, and each group of culverts.

The proposal may require the contractor to furnish a certified plant inspector. Duties and requirements will be as outlined in Section 3.09 of the Construction Manual as well as I.M. 214 & 528. Monitoring will be required by Construction personnel.

A. Report of Concrete Placed

Batch weight tables are available which show the correct cement batch weights and aggregate batch weights for different specific gravities, for all structural concrete mixes. These tables are available from the Materials Office in Ames.

Column A. Item No. and Unit Poured.

- (1) For bridges list as Pier 1 footing, Abut 1 backwall, Pier 3 columns, etc. The design number for bridges is to be placed in the space so designated at the top of the report form.
- (2) For culverts list the design number. The exact location of concrete within the culvert is not required on this form. If the exact location is needed at a later date, it can be obtained from the inspector's field book.

Column B. Date Poured

Column C. Mix Number. C-4, D-57, etc.

Column D. Size of Batch

The size of load will normally be six to seven cubic yards. When a mixer with more than one cubic yard capacity is used, the size of batch reported shall be one cubic yard. When a mixer with less than one cubic yard capacity is used, the size of batch (in cubic yards) actually mixed shall be reported.

Column E. Number of Batches

The number of batches shall be the cubic yards of concrete delivered to the project.

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Column F. Dry Batch Weight of Fine Aggregate  
In the example, 1-cubic yard batches and 4-bag batches were used. These dry batch weights may be determined by direct reading from the tables of current concrete plant manual.

<u>Established Information</u>			<u>To Be Determined</u>	
<u>Size of Batch</u>	<u>Mix Number</u>	<u>Fine Aggregate Specific Gravity</u>	<u>Table Number</u>	<u>Fine Aggregate Batch Weight</u>
1 cu. yd.	C4	2.66	T-202	1,483 lbs.
0.53 cu. yd.*	D57	2.66	T-207	751 lbs.

\* 4-bag batch = 14.298548 cu. ft. = 0.53 cu. yd.

If tables are not available, the dry batch weights of fine aggregate shall be determined from the proportions given in the specifications for the mix used.

Column G. Dry Batch Weight of Coarse Aggregate  
In the example, 1-cubic yard batches and 4-bag batches were used. These dry batch weights may be determined by direct reading from the tables as follows:

<u>Established Information</u>			<u>To Be Determined</u>	
<u>Size of Batch</u>	<u>Mix Number</u>	<u>Coarse Aggregate Specific Gravity</u>	<u>Table Number</u>	<u>Coarse Aggregate Batch Weight</u>
1 cu. yd.	C4	2.69	T-202	1,500 lbs.
0.53 cu. yd.*	D57	2.69	T-207	760 lbs.

\* 4-bag batch = 14.298548 cu. ft. = 0.53 cu. yd.

If tables are not available, the dry batch weights of coarse aggregate shall be determined from the proportions given in the specifications for the mix used.

Column H. Percent of Free Moisture in Fine Aggregate

Column I. Percent of Free Moisture in Coarse Aggregate

Column K. Total Water Used Per Batch.

This item consists of free water in materials plus water added to the mix. When ready-mix concrete is used, water will be added at the plant and may be added to "dry" loads at the job site. Water added at the job site is to be totaled and divided by the number of batches used to obtain an average per batch. This average is to be added to the free moisture in the aggregates and the water added at the plant to obtain the average total amount of water in each batch.

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- Column L. Actual Cement Batch Weights Used.  
Since there is no moisture correction to be made for cement, the cement batch weights may be determined by direct reading from the tables when the size of batch and the mix number are known. If tables are not available, the batch weights of cement shall be determined from the proportions given in the specifications for the mix used.
- Column M. Actual Batch Weights (corrected for moisture as determined in pycnometer test or by estimation).
- Column N. To correct the dry batch weights for moisture, multiply by the appropriate moisture correction reciprocal shown in table T-214A of the Plant Manual.
- Column O. Concrete Estimated.  
Calculate from plans the cubic yards in the portion of the structure poured.
- Column P. Concrete Used.  
Enter the amount (cubic yards) of concrete actually placed in the structural unit. When column P is subtracted from Column E, the amount of waste and/or rejected concrete is to be placed in the space for remarks.
- Column Q. Percent of Estimate Used.  
Divide column P by column O and multiply by 100.
- Column R. Concrete Treatment.  
Place the appropriate letter in this column for the type of treatment used.  
Example: W (retarder used in concrete).
- Column S. Air Content and Slump  
& Show all Air and slump test results in columns S & T  
T. respectively. If additional space is needed, use the space headed Additional Slump, Air Tests and Remarks along the left side. If this space is used, show also the date so that the additional test results are properly referenced to the respective units poured above. All non-complying tests should be so noted and volume of non-complying material identified. Retests should be referenced to original non-complying tests.

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B. Aggregate Sieve Analysis

Sieve analysis results for fine and coarse aggregates are to be reported on Form 830211. Information required includes appropriate sample identification numbers, percent passing the required screens and a statement of compliance or noncompliance. Sieve analysis worksheet form 180 should be maintained for your records of test activity.

C. Beam Data

Information concerning test beams made and tested is to be placed on Form 830211 as shown in the example. Computation factors are available in the Portland Cement Concrete Plant Inspection Manual.

D. Disposition of Report

The original and one copy (white and yellow) of the report shall be sent to the District Office. The District Office will forward the original (white) to the Materials Office in Ames. One copy (pink) shall be retained in the Resident Construction Engineer's Office. One copy (green) shall be retained by the inspector.

E. Bridge Deck Overlays

Form 830211 is required for reporting the record of proportions used in producing concrete for bridge deck overlay. However, it will not be necessary to complete columns K, O, P, Q, or R. All other information shall be reported as described above or indicated on sample form.

F. Frequency of Report

The engineer shall submit the first 830211 when concrete placement has begun, and shall continue to submit this report until all concrete is placed and all test results are reported, except that no report is required for any period that the contract is suspended by Form 238. When work is suspended or completed, it is to be so noted on the report.

G. Miscellaneous Concrete

Form 830211 is required for reporting the record of proportions used in producing concrete for slope protection, pile encasements, and filling steel shell piles. However, it will not be necessary to complete columns O, P, and Q of the form for these items.

1.22 USE OF READY-MIX STRUCTURAL CONCRETE

A. General

This instruction is written to standardize the operating procedures and restrictions for the use of ready-mix concrete for structures. These operating procedures and restrictions are especially applicable when pouring bridge floors.

B. Checklist

1. Specifications regarding plant and equipment approval and batching operations are to be followed. In addition to the proper plant calibration, the inspector should verify that each mixer used on the job has a current certification as required by Specification 2001.21C and I.M. 528. This should be recorded in the inspector's diary and will need to be repeated at least every 30 days.

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2. Batching and mixing should be limited to one lead truck until specification requirements as to slump and air content are met. These tests may be made at the plant or job site. The desired slump and air content should be secured in the lead truck before continuous operation is initiated. It is intended the ready mix plant supply concrete to the construction site that is within the specification limits. Continually adding excessive amounts of water or air agent to each load will not be permitted. If this happens, the inspector should stop the pour as soon as practical.
3. Batching of subsequent trucks may be continuous after tests on a lead truck indicate satisfactory air content and slump.
4. Since no concrete is to be placed in the forms or on the deck until approved, partial discharge (approximately 1 cubic yard) of the lead truck in concrete buckets, hoppers, or other suitable devices must be made to provide a representative sample.
5. Visual inspection of consistency shall be made on every subsequent batch, with actual air and slump tests made for every 20 c.y. of concrete. Any batch having questionable consistency should be checked for slump, and every batch may be tested if abnormal variations are evident or if it can be done with little or no delay to the contractor.
6. Target Slump  
Article 2403.03E specifically states that "Concrete shall be placed with a slump between 1 and 3 inches as a target range, allowing a maximum of 4 inches as a tolerance." If concrete is being delivered in excess of 3 inches, efforts will be made to bring it back into the target range. Pouring concrete consistently in excess of a 3-inch slump is not acceptable just because it is within the specification limits. Unless steps are being taken to zero in on the target value, the contractor is not complying with the intent of the specifications.
7. Rejection of any load of concrete shall be recorded by the bridge inspector and the contractor informed. The driver of the rejected load must be notified of the rejection and, before reloading, shall inform the plant inspector on his return to the plant regarding the disposition of the rejected load.
8. During pours, the inspector should alternate sampling among the various trucks involved in the operation.
9. If air content is erratic, the number of mixing revolutions may be increased, the size of batch reduced, or both these changes instituted. If, after these changes, the air content cannot be controlled within specified limits, the mixer shall be rejected for further use.
10. Mixers shall be completely emptied of wash water insofar as practicable before reloading. If the end chute is washed after loading, no wash water shall be allowed to enter the mixer.
11. Samples of unvibrated concrete shall be taken at the last point possible before incorporation into the structure. For normal crane and bucket placement, the sample may be taken as concrete is discharged from the ready-mix truck. When concrete is placed with a pump or belt placer, the sample shall be taken after the concrete has passed through the conduit or over the belt system.

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When the concrete reaches a stable consistency and is within target ranges, verification tests can be run between the truck and the place of deposit on the deck. If variations are consistent, the samples can be taken at the truck. Report the test results as taken and indicate the variance you are using. As the belt or pipe sections are shortened, additional verification tests may be needed.

12. No stops except for emergencies are to be permitted while the truck is loaded. Coffee or lunch breaks are not considered to be emergencies.
13. The inspectors will satisfy themselves regarding compliance with the specifications for the number of revolutions at mixing speed.
14. Before rejecting a load of concrete because the air content or slump is outside the specification requirements, resampling and retesting should be performed unless the rejection is based on obviously excessive slump.

.23 USE OF INSULATED FORMS FOR PROTECTION OF STRUCTURAL CONCRETE

A. General

The use of commercial insulation for the protection of concrete during cold weather, in lieu of housing and heating, is optional with the contractor. It is the contractor's responsibility to furnish insulation of sufficient quality and thickness to maintain the concrete at a temperature of not less than 50° F for the first 48 hours after placing.

The concrete when placed must be between 50 and 80°F. To ensure a temperature of at least 50°F for 48 hours after placement, the concrete for thin sections such as culvert walls, end posts, piling encasements, etc. should be 65°F or higher, since the only additional heat source is the heat of hydration. The concrete for massive sections such as stub abutments, heavy piers, and footings should be in the 55 to 65° range.

Since only dry insulation is effective, any insulation that becomes wet must be replaced before placing concrete. The insulation must be complete, thorough and well secured to provide maximum protection during the full curing period.

After the initial 48 hours, insulated forms must be left undisturbed for an additional 48 hours when they may be removed.

B. Checking Temperature of Concrete

For checking compliance with minimum temperature requirements during the 48-hour period after placement, thermometer wells should be cast in the concrete during the pour. The following procedure for checking the temperature is suggested:

1. Drill a 5/16 inch hole through the form at one or more locations where the temperature checks will be made.
2. Grease the rod issued with the thermometer and insert through the hole about 4 inches into the plastic concrete.
3. Remove the rod after the concrete is set and cover the hole with the insulating material.

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TRANSIT MIXER  
CONDITION CERTIFICATION

In accordance with requirements of Iowa Department of Transportation Standard Specifications Section 2001.21C this certifies the herein described transit mixer was examined on the date shown and was found to be in proper working condition, the fins and blades were not damaged or worn excessively, and the drum interior was free of hardened concrete buildup.

Unit Identification No. \_\_\_\_\_

Home Base \_\_\_\_\_

Owner \_\_\_\_\_

Mixer Manufacturer \_\_\_\_\_

Serial Number \_\_\_\_\_

MMB Rating (Mixing, Cu. Yd.) \_\_\_\_\_ Year New \_\_\_\_\_

Truck Manufacturer \_\_\_\_\_

Model \_\_\_\_\_

Year \_\_\_\_\_ Color \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

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Signature \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_

2M-Books 8-68-14913  
PB-15425

Iowa State Highway Commission  
Form No. 806

# Notice of Suspension or Resumption of Work

No.-----

Date-----19--- Project No.-----  
County-----

To:-----  
(Contractor)

You are hereby notified to suspend operations on the above project because of-----  
-----, effective on-----19---until further notice.

You are hereby notified that, since the conditions causing suspension of work on the above project  
no longer exist, you are to resume operations-----19---, on which date  
the charging of days of time against your contract period will be resumed until further suspension,  
or completion of the project.

This copy for  
CONTRACTOR

-----  
Resident or County Engineer-Inspector



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# NONCOMPLIANCE NOTICE

Contractor \_\_\_\_\_ Project No. \_\_\_\_\_

County \_\_\_\_\_ Contract No. \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

To: \_\_\_\_\_  
(Name) (Title) (Signature)

You are hereby notified that tests indicate that the \_\_\_\_\_

\_\_\_\_\_ is outside our specification tolerances. The specification violated is Article \_\_\_\_\_

the test data value is \_\_\_\_\_

and the specification limits are \_\_\_\_\_

Additional tests may be performed.

Noncomplying work may be required to be removed and replaced at no cost to the contracting authority.

You are to determine corrective action necessary.

You are to determine if you wish to discontinue operations until the additional tests confirm or refute this finding test.

Remarks: \_\_\_\_\_

Correction: \_\_\_\_\_

Signed: \_\_\_\_\_  
Inspector - Iowa DOT

Pour Data

Date	Mix	Time	Batch	Waste	Cement	FA	CA	Moist		Wet	WT.	lbs.	lbs.	lbs.	W/C	I N T
			Cy			Dry	Dry	F	A	F	A	H <sub>2</sub> O	H <sub>2</sub> O	H <sub>2</sub> O		
8-22-84	C3W2	7:15 6:30	2064	80	574	1381	1688	3.0	0.9	1424	1703	58	188	246	.431	RG
8-23-84	C3W2	7:00 6:30	2124	60	574	1381	1688	3.0	0.8	1424	1702	57	192	249	.433	RG

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Date	Test No.	Specific Gravity		FA	Diff	r = r.v.c. s = 1000	Filled H <sub>2</sub> O	
		P	P+S			Sp. Gr.	Grams	Init.
7/23/84	1	1398	2398	2022	376	2.66	S.J.	
7/25/84	2	1398	2398	2021	377	2.65	S.J.	

$$\frac{1000}{376} = 2.66$$

See IM 307  
For Testing  
Procedure.

Specific Gravity C. A.

P = Pyc. Filled H<sub>2</sub>O  
S = 2000 Grams

Date	Test	P	P+S	W	Diff.	Sp. Gr.	Init.	Remarks
7/23/84	1	2616	4616	3870	746	268	S.J.	$\frac{2000}{746} = 2.68$
7/25/84	2	2638	4638	3887	751	266	S.J.	
								See IM 307 For Testing Procedure

P. A. Moisture

Date	Time	W	WI	Diff	%	Test By			
11-6-84	8:30 A	2024	2004	20	3.2	RG	Sp. G = 266	See IM 308 For Test Procedure	
11-21-84	8:00 A	2024	2005	19	3.0	RG	Sample = 1000		
							$\frac{(w-w_p) G_s \times 100}{(G_s - 1) S} = \frac{20 \times 266}{1.66 \times 1000} = 3.2\%$		
C. A. Moisture									
11-6-84	1:30 P	3881	3869	22	1.8	RG	Sp. G = 266		
							Sample = 2000		

		Scale		Sensitivity $\neq$		Tolerance	
Date	Am Pm	S <sup>+</sup> O.K.	Init.	Date	Am Pm		Init
8-21-84	A	O.K.	S.J.				
8-22-84	P	O.K.	S.J.				
8-22-84	P	O.K.	R.G.				





	Mix	Speed	+	Mix Time	
Date	mix speed	mix time	Time	Insp.	
8-21-84	10 RPM	60 sec.	7:30	RG	
8-21-84	10 RPM	60 sec.	1:30	RG	

beams made

Date	Beam No.	Mix	air	Slump	Time	Init.
10/10/84	m-45	C-3WR	6.6	1 1/2	9:50	S.J.
10/10/84	m-46	C-3WR	6.3	1 3/4	1:40	S.J.

Beams Broken

Date	Beam No.	Mix	Age	Depth	Width	Ind. Load	Actual load	End React.	Comp. Factor	Mod. Rupt.	Bx Loc.	Test By
10-18-84	m-45	C3WR	7	6:00	6.00	5200	5150	2575	.25000	644	3/4"	RG
10-24-84	m-46	C3WR	14	6.00	6.02	6200	6120	3060	.24917	762	1/4"	RG

See I.M. 316 For Test Procedure







January 1990  
Supersedes January 1989

Form 820912  
10-89



Iowa Department of Transportation  
Office of Materials

Page 1 of 1

Report No. 2

Date October 14, 1989

Portland Cement  
Shipment Yield Report

County Story County Source Ash Grove Contract No. 29999

Project FM-85(25)-55-85 Contractor Acme Paving Co.

Plant Location NW Cor of E29 and R77 (SW Cor Sec 15 T84N R23W)

Date	Type	Invoice No.	Weight Billed (Tons)	Date	Type	Invoice No.	Weight Billed (Tons)	Date	Type	Invoice No.	Weight Billed (Tons)
10/9	I	107312	28.19	10/12	I	107332	28.37	10/13	I	107352	27.86
"	(	107313	28.14	"	(	107333	28.24	"	(	107353	28.14
10/10	(	107314	27.85	"	(	107334	28.20	"	(	107354	27.99
"	(	107315	27.81	"	(	107335	28.03	"	(	107355	28.10
"	(	107316	27.92	"	(	107336	28.18	"	(	107356	27.79
10/12	(	107317	28.21	"	(	107337	28.03	"	(	107357	26.99
"	(	107318	25.49	"	(	107338	27.78	"	(	107358	27.65
"	(	107319	26.57	10/13	(	107339	28.13	"	(	107359	25.00
"	(	107320	28.06	"	(	107340	28.25	"	(	107360	27.94
"	(	107321	28.02	"	(	107341	28.32	"	(	107361	26.20
"	(	107322	28.15	"	(	107342	27.89	"	(	107362	28.28
"	(	107323	28.36	"	(	107343	27.98	"	(	107363	26.57
"	(	107324	28.08	"	(	107344	26.50	10/14	(	107364	27.97
"	(	107325	27.73	"	(	107345	28.28	"	(	107365	28.05
"	(	107326	28.26	"	(	107346	27.97	"	(	107366	28.18
"	(	107327	27.83	"	(	107347	27.91	"	(	107367	28.13
"	(	107328	25.55	"	(	107348	28.34	"	(		
"	(	107329	28.19	"	(	107349	27.88	"	(		
"	(	107330	26.61	"	(	107350	28.34	"	(		
"	(	107331	28.18	"	(	107351	27.96	"	(		

Mix No.	lbs. Cement per C.Y.	Cy. Batched	Cement Batched (Tons)
C-4WRG	503	5782	1454.17
M-4	825	168	69.30
C-4WR	593	147	43.59
Left in Scale (tons)	This Check (+)		+ 1.53
	Previous Yield Check (-)		- 1.68
Total Weighed (Batch Scale)			1566.91

Total Billed Weight (Tons): 1554.62

$$\text{Yield Percent} = \frac{\text{Total Tons Batched}}{\text{Total Tons Billed}} \times 100$$

$$\left( \frac{1566.91}{1554.62} \right) \times 100 = 100.77\%$$

Plant Inspector

*Joe Blaw*







Co. & Proj.		
Producer		
Contractor		
Sampled by	Date	Date
Sample Loc.		

**Coarse Sample**

**Coarse Sample**

**Coarse Sample**

Orig. Dry Weight **5763.0**  
 Dry Wt. Washed Sample

Orig. Dry Weight  
 Dry Wt. Washed Sample

Orig. Dry Weight  
 Dry Wt. Washed Sample

Sieve Size	Wt. Retd.	% Retd.	% Retd. X-----	% Psg. Final	Specs.	Wt. Retd.	% Retd.	% Retd. X-----	% Psg. Final	Specs.	Wt. Retd.	% Retd.	% Retd. X-----	% Psg. Final	Specs.
1 1/2"					100										
1.05"	25.0	.4		99.6	95-100										
3/4"	1049.0	18.2		81.4											
.525"	2180.0	37.9		43.5	25-60										
3/8"	1671.5	29.0		14.5											
4	763.0	13.2		1.3	0-10										
8	21.0	0.4		0.9	0-5										
Total +4	5709.5														
Pan	51.5	0.9													
Total	5761.0	100													

**Fine Sample**

**Fine Sample**

**Fine Sample**

Orig. Dry Weight **2987.0**  
 Dry Wt. Washed Sample **2945.0**  
 Washing Loss **42.0**

Orig. Dry Weight **661**  
 Dry Wt. Washed Sample **660**  
 Washing Loss

Orig. Dry Weight  
 Dry Wt. Washed Sample  
 Washing Loss

Sieve Size	Wt. Retd.	% Retd.		Specs.	Wt. Retd.	% Retd.		Specs.	Wt. Retd.	% Retd.		Specs.
		Final	Passing			Final	Passing			Final	Passing	
3/8"								100				
4					14	2.1		97.9	90	100		
8					47	7.1		90.8	70	100		
16					95	14.4		76.4				
30					202	30.5		45.9				
50					239	36.2		9.7				
100					59	8.9		0.8				
200				1.4	3	0.5		0.3	0-1.5			
Wash	42.0	1.4			1	0.8						
Pan	0.5				1	0.3						
Total	42.5				661	100						
Less +4												
Passing #4												

Date Reptd.	Date Reptd.	Date Reptd.
Tested by	Tested by	Tested by

711

Co. & Proj.		
Producer		
Contractor		
Sampled by	Date	Date
Sample Loc.		

**Coarse Sample**

**Coarse Sample**

**Coarse Sample**

Orig. Dry Weight
Dry Wt. Washed Sample

Orig. Dry Weight
Dry Wt. Washed Sample

Orig. Dry Weight
Dry Wt. Washed Sample

Sieve Size	Wt. Retd.	% Retd.	% Retd. X----	% Psg. Final	Specs.	Wt. Retd.	% Retd.	% Retd. X----	% Psg. Final	Specs.	Wt. Retd.	% Retd.	% Retd. X----	% Psg. Final	Specs.
1/2"															
1.05"															
3/4"															
.525"															
3/8"															
4															
8															
Total +4															
Pan															
Total															

**Fine Sample**

**Fine Sample**

**Fine Sample**

Orig. Dry Weight
Dry Wt. Washed Sample
Washing Loss

Orig. Dry Weight
Dry Wt. Washed Sample
Washing Loss

Orig. Dry Weight
Dry Wt. Washed Sample
Washing Loss

Sieve Size	Wt. Retd.	% Retd.		Specs.	Wt. Retd.	% Retd.		Specs.	Wt. Retd.	% Retd.		Specs.
		Final	Passing			Final	Passing			Final	Passing	
3/8"												
4												
8												
16												
30												
50												
100												
200												
Wash												
Pan												
Total												
Less +4												
Passing #4												

Date Reptd.	Date Reptd.	Date Reptd.
Tested by	Tested by	Tested by
Date	Date	Date

Form 830212  
6-86

READY MIX CONCRETE

M R M Plant \_\_\_\_\_  
 Truck No. 9 Ticket No. 2  
 Date 9/24/88 Des. No. \_\_\_\_\_  
 Proj. No. FN-6-6(22)-21-48  
 Mix No. C-4 Retarder/Water Reducer? Yes \_\_\_ No X  
 Conc. This Truck 7 C.Y. \_\_\_\_\_  
 Air agent added this truck 44 oz.  
 Time Batched 2:40 Discharged 3:10  
 Rev. Mixed (Plant) 70 Grade \_\_\_\_\_

Water (gal. or lbs. This Truck) 8.33lbs./gal.  
 In Aggregate 42 gal. \_\_\_\_\_ lbs.  
 Added (Plant) 168 gal. \_\_\_\_\_ lbs.  
 Subtotal 210 gal. \_\_\_\_\_ lbs.  
 Added Grade - gal. \_\_\_\_\_ lbs.  


---

 TOTAL WATER 210 gal. \_\_\_\_\_ lbs.  
 Maximum Water Allowed 256 gal. \_\_\_\_\_ lbs./cy  
 Air \_\_\_\_\_ Slump \_\_\_\_\_  
 Plant Insp. D.H.  
 Receiving Insp. J.B.



# Iowa Department of Transportation

Highway Division, Office of Materials, Ames, Iowa

Central

Lab No. \_\_\_\_\_

## IDENTIFICATION OF SAMPLE FOR TEST

(Read Instructions on back before taking sample and filling out form)

Sender's Sample No. \_\_\_\_\_

Use \_\_\_\_\_ Contract Number \_\_\_\_\_

Project \_\_\_\_\_ Road No. \_\_\_\_\_

Design No. \_\_\_\_\_ Specification No. \_\_\_\_\_

(Name) \_\_\_\_\_ (Address) \_\_\_\_\_

Brand \_\_\_\_\_

of Producing Plant \_\_\_\_\_

Sec. \_\_\_\_\_ Twp. \_\_\_\_\_ Range \_\_\_\_\_ Co. \_\_\_\_\_

Material Represented \_\_\_\_\_

Quantity Represented \_\_\_\_\_

(Name) \_\_\_\_\_ (Address) \_\_\_\_\_

pled \_\_\_\_\_

(Name) (Title) (Address) (Phone)

(Name) (Title) (Address) (Phone)

(Name) (Title) (Address) (Phone)

(Name) (Title) (Address) (Phone)

(Name) (Title) (Address) (Phone)

ed by: \_\_\_\_\_ Date \_\_\_\_\_

I Detailed Information:

nt give analysis printed on container. For tile give grade specified, etc.)

Multiple horizontal lines for providing detailed information.

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