NDOR

Nebraska
Department of Roads

State of Nebraska
Department of Roads
Materials and Research Division

# Materials Sampling Guide

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## Section 1
## General Instructions and Definitions

Section 1

General Instructions and Definitions

## General Instructions

1) When the sample or testing requirements of a material mentioned in this Materials Sampling Guide differs from those previously listed in our various field manuals, the Materials Sampling Guide will take precedence.

2) The Materials and Research Division pre-approves several materials before they reach the jobsite. When approved or pre-tested stock arrives on the project, certain requirements must be complied with before the material can be used. These requirements are stipulated in this guide.

3) The Materials and Research Division will be notified immediately of any substandard material arriving on a project.

4) It is recognized that in ordinary construction, some tests and observations may not comply with specification requirements. All test results obtained will be reported. The Project Manager will identify what action was taken regarding materials not meeting specification requirements. This disposition will include reasons for use of material, corrective action taken or reference to a check sample.

## General Definitions

**Certificate of Compliance (COC):** Manufacturer's Certificate of Compliance shall state that the material or item meets all requirements defined for the project. Each COC will include all pertinent data (i.e. size, quantity, specification number, codes, contractor performing work, project number, project location, etc.) for the materials represented by the certificate. An authorized representative of the manufacturing firm will sign the certification.

**Certificate of Tests (COT):** Manufacturer's Certificate of Tests shall show the required test results and certify that they are correct. The project number, project location and contractor will be indicated on the COT. An authorized representative of the manufacturing firm will sign the COT. In some instances, such as steel for reinforcement, the process of manufacture must also be shown.

The cost of providing the COC, the COT and all expenses incurred regarding testing and sampling will not be paid for directly. This will be considered subsidiary to items for which the contract provides direct payment.

**Minimum Materials Certificate, Sample and Inspection Requirements:**

- Q.C. Testing by Contractor – Contractor performs testing to control the quality of the material.

- Verification Sampling and Testing by NDOR – Nebraska Department of Roads personnel perform verification testing to correlate with contractor's test results and/or to verify the quality of material for acceptance.

- Independent Assurance Testing – Nebraska Department of Roads, Contractor, Consultant personnel, equipment and laboratories are evaluated on an annual basis. This evaluation will determine the testing personnel's competence performing their job. The evaluation will also assure that all equipment and testing facilities meet specification requirements.

The descriptions listed above are a very brief synopsis of the Quality Assurance Program for Construction. The Quality Assurance Program for Construction manual is located in this sampling guide. Please refer to it for a more in-depth description of the program.

Instructions for Local Public Agency (LPA) Projects

The Materials Sampling Guide is written to define roles and responsibilities for field, branch, and central laboratory personnel who sample or test on an NDOR project. On LPA projects, the LPA/Consultant Construction Engineering (CE) agreement defines who will fill each of the roles required by the Sampling Guide. All LPA/Consultant CE agreements are saved in the project file under the Local Project Divisions Environment in FALCON.

The LPA/Consultant CE agreement will define the following:

1) Field Personnel –The certified consultant or LPA field inspector/s assigned

2) Central Laboratory – Dependent on the material and agreement, this will be conducted by the NDOR Central Laboratory, or a NDOR Qualified Consultant or LPA laboratory.

3) Branch Laboratory – Dependent on the material and agreement, this will be conducted by the NDOR Central Laboratory or a NDOR Qualified Consultant or LPA laboratory.

4) Sample Required – It is the responsibility of the inspecting agency to determine which laboratory (NDOR Central, NDOR Branch, or NDOR qualified consultant or LPA) will perform the testing on a specific material. This responsibility extends to obtaining and delivering the sample to the appropriate laboratory.

Technician Requirements

- Certification:

  All consultant and LPA field inspection personnel and laboratory technicians must be certified to test and sample the materials for which they are responsible. Refer to Section 28 of the sampling guide for more information about the applicability of the Quality Assurance Program and technician certification requirements. The list of certified technicians is maintained in SiteManager.

- Independent Assurance:

All consultant and LPA field inspection personnel and laboratory technicians who sample and test for an LPA project on the NHS are required to have an annual IA conducted by an NDOR QA Manager or designee.

Qualified Laboratory Requirements

All consultant and LPA laboratories must be pre-qualified by NDOR to conduct the testing in the CE agreement. A list of NDOR qualified laboratories and the tests they are qualified to perform is maintained on the NDOR Materials and Research website.

NOTE: The NDOR Laboratory Qualification Manual is located on the Materials and Research Division's website and defines requirements that must be met to become an NDOR Qualified Laboratory.

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## Asphaltic Materials

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| **SECTION: 2 – Asphaltic Materials** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Asphaltic Oils | Quality | - - - - - - - - - - | When requested by the central laboratory, a sample consisting of one two-quart can from a tank car or truckload following receipt at project.<br><br>Sample to be submitted no later than five days to the central laboratory. | - - - - - - - - - - | Acceptance samples to be tested in the Central Laboratory | Section 27<br>Note 1<br>Note 2 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 2 – Asphaltic Materials** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 2) Asphalt, Emulsified Anionic and Cationic | Quality | - - - - - - - - - - | <u>Field-Diluted Emulsions</u><br>Unless diluted under the supervision of the engineer, a sample consisting of one one-quart plastic container from each tank car or truckload following dilution at project.<br><br><u>Supplier-Diluted and Supplier-Undiluted Emulsions</u><br>When requested by the central laboratory, a sample consisting of one one-quart plastic container from a tank car or truckload following receipt at project.<br><br>Sample to be submitted no later than five days to the central laboratory.<br><br>No further samples are required unless the appearance of the material or any physical characteristics of it indicates contamination or noncompliance with the specifications. | - - - - - - - - - - | Acceptance samples to be tested in the Central Laboratory. | Section 27<br>Note 1<br>Note 2 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 2 – Asphaltic Materials (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 3) Perform-ance Graded Binder | Quality | - - - - - - - - - - | Using one two-quart can, submit a two quart sample for each lot (3,750 tons) or final portion thereof, of each asphaltic concrete type produced.<br><br>Sample to be received no later than 10 days from sampling in the central laboratory.<br><br>**(This sampling frequency must be followed for each grade and source of PG Binder used on the project).**<br><br>The sample information must be entered in SiteManager. The following information must be included on the SiteManager sample tag: sample id number, project number, contract number, project manager, binder grade, date sampled, refinery, type and lot number of asphaltic concrete.<br><br>Sample to be submitted to the central laboratory. | - - - - - - - - - - | Acceptance samples to be tested in the Central Laboratory. | Section 27 Note 2 |

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## Section 3
## Asphaltic Concrete

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 3 – Asphaltic Concrete** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Asphaltic Concrete Type SPH, SPR | Air Void<br>Binder %<br>FAA<br>CAA<br>Gradation | See Specifications, Supplemental Specifications and/or Project Special Provisions.<br>(Normally one per 750 ton sub-lot) | Ensure a sample for each 750 ton sub-lot is retained by the contractor for possible branch laboratory testing. | One sample representing a 750 ton sub-lot will be tested for each 3750 ton lot. | Testing and sampling for verification testing and dispute resolution as needed. | Section 27 Note 3 |
| | Tensile Strength Ratio (TSR) T-283 | - - - - - - - - - - | A sample consisting of six specimens is required from the first lot of field production and randomly selected lots thereafter.<br><br>Additional samples if requested by the Materials and Research Division. | - - - - - - - - - - | Testing for Lot Field Production. | Section 27 Note 3 |
| 2) Asphaltic Concrete Type SPS | Air Void<br>Gradation<br>Binder % | See Specifications, Supplemental Specifications and/or Project Special Provisions.<br>(Normally one per 750 ton sub-lot) | Ensure a sample for each 750 ton sub-lot is retained by the contractor for possible branch laboratory testing. | One sample representing a 750 ton sub-lot will be tested for each 3750 ton lot. | Testing and sampling for verification testing and dispute resolution as needed. | Section 27 Note 3 |
| 3) Asphaltic Concrete Types OGFCCRM, OGFC, GGCRM, LC, RLC, SLX, SRM | Quality | See Specifications, Supplemental Specifications and/or Project Special Provisions.<br>(Normally one per 750 ton sub-lot) | Ensure a sample for each 750 ton sub-lot is retained by the contractor for possible branch laboratory testing. | One sample representing a 750 ton sub-lot will be tested for each 3750 ton lot. | Testing and sampling for verification testing and dispute resolution as needed. | Section 27 Note 3 |
| 4) Asphaltic Concrete Mixtures | Density | See Specifications, Supplemental Specifications and/or Project Special Provisions.<br>(Normally one per 750 ton sub-lot) | See Specifications, Supplemental Specifications and/or Project Special Provisions. | Testing and sampling for verification testing and dispute resolution as needed. | Testing and sampling only for dispute resolution. | - - - - - - - - - - |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 3 – Asphaltic Concrete** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 5) Asphaltic Concrete Pavement | Surface Smoothness | Contractor performs all QC pavement smoothness testing specified in the NDOR Standard Specifications for Highway Construction and/or Project Special Provisions. | Approximately 10 percent of contractor's results shall be randomly verified.<br><br>Project personnel will submit requests for pavement smoothness verification testing to the Materials & Research Division<br><br>Submit requests at least 7 days in advance to allow for scheduling. | ---------- | ---------- | ---------- |
| 6) Hydrated Lime or Type S Lime | Quality | ---------- | Lime is accepted for use with a supplier's certification stating it's compliance to the specification. | ---------- | ---------- | ---------- |
| 7) Warm Mix Asphalt (Chemical Additives) | Quality | ---------- | Warm Mix Asphalt is accepted with a binder-delivery ticket that states the type of additive and the percentage or amount used. | ---------- | ---------- | ---------- |

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## Section 4
## Asphaltic Concrete Materials

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| **Section: 4 – Asphaltic Concrete Materials** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Mineral Aggregate (Gravel, Sand, Sand-Gravel) | Quality | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project stockpile. | - - - - - - - - - - | One 60 pound sample for quality tests for source approval, if so designated on the DR Form 324 “Source of Aggregates To Be Used” when changes in quality or characteristics occur. No other samples for quality or verification are needed. | Section 27 Note 4 |
| 2) Crushed Rock (Limestone) | Quality | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project stockpile. | - - - - - - - - - - | One 60 pound sample for quality tests for 5000 tons of aggregate used or fraction thereof. | - - - - - - - - - - |
| 3) Crushed Rock (Limestone Screenings, Man-Sand) | Quality | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project stockpile. | - - - - - - - - - - | One 60 pound sample for quality tests for each 5000 tons of aggregate used or fraction thereof. | - - - - - - - - - - |
| 4) Quartzite and Granite | Quality | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project stockpile. | - - - - - - - - - - | One 60 pound sample for quality tests each 5000 tons of aggregate used or fraction thereof. | - - - - - - - - - - |
| 5) Quartzite, Chat and Granite (Screenings, Man-Sand) | Quality | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project stockpile. | - - - - - - - - - - | One 60 pound sample for quality tests for each 5000 tons of aggregate used or fraction thereof. | - - - - - - - - - - |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 4 – Asphaltic Concrete Materials (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 6) Crushed Mineral Aggregate or Chat for Micro-surfacing | Quality & Gradation, FAA, L.A. and Sand Equivalent | - - - - - - - - - - | One sample for gradations every 500 tons of material used or fraction thereof.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for first 1000 tons of aggregate used. Subsequent samples will be one 10 pound sample for each 1000 tons used, or fraction thereof. (Duplicate of sample tested in the field). | Section 27 Note 4 |
| 7) Mineral Filler | Plasticity Index & Gradation | - - - - - - - - - - | Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample per project at production for gradation and plasticity index, unless changes in quality or characteristics occur. | - - - - - - - - - - |

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## Section 5
## Cold Mix Bituminous Surfacing and Base

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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 5 – Cold Mix Bituminous Surfacing and Base** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Subgrade Sand | Gradation | - - - - - - - - - - | One sample for gradation test each 10th station.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The samples shall be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation test each mile. (Duplicate of sample tested in the field). | - - - - - - - - - - |
| 2) Mineral Filler | Plasticity Index & Gradation | - - - - - - - - - - | One sample for gradation test each 100 cubic yards or fraction thereof. The sample shall be taken at the project.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The samples shall be taken at the project. | - - - - - - - - - - | One 10 pound pre-construction sample per project for gradation and plasticity index. | - - - - - - - - - - |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 5 – Cold Mix Bituminous Surfacing and Base (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | . |
| 3) Combined Materials (Sand and Filler) | Gradation & Moisture | - - - - - - - - - - | One sample for gradation and moisture each 10th station or in cases of short sections Project Manager to determine sampling for compliance.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation test each mile (Duplicate of sample tested in the field). | - - - - - - - - - - |
| 4) Bituminous Aggregates (Includes Mixed in Place Bituminous Surfacing) | Quality | - - - - - - - - - - | One test for moisture and aeration as soon as each design section is well mixed. Then test as necessary to control moisture and aeration.<br><br>The sample shall be taken at the project.<br><br>Project personnel will supply the 1 gallon sample needed to perform the testing shown under the Branch Lab column. | One 1-gallon sample for progressive and other tests as soon as each design section is well mixed. Followed by one 1-gallon sample for verification tests each 2000 feet of windrow, or at the discretion of the Project Manager, as laid. (Submitted sample will be a duplicate of the sample tested in the field) | - - - - - - - - - - | Section 27 Note 1 |
| 5) Mineral Aggregates | Experimental Bituminous Mixture | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column. | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 5 – Cold Mix Bituminous Surfacing and Base (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 6) Mineral Filler | Experimental Bituminous Mixture | - - - - - - - - - - | Project personnel will supply the 40 pound sample needed to perform the testing shown under the central laboratory column. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |

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## Section 6
## Gravel and Crushed Rock for Surfacing

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| **Section: 6 – Gravel and Crushed Rock for Surfacing** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Gravel For Surfacing | Quality & Gradation | - - - - - - - - - - | One sample for each 500 ton or fraction thereof, at the project. Project personnel will provide the 10 and 60 pound samples needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for quality tests first 2,500 ton if so designated DR FORM 324 "Source Of Aggregates To Be Used."<br><br>One 10 pound sample for gradation test each 2,500 ton or fraction thereof (Duplicate of sample tested in the field)<br><br>NOTE: A central laboratory sample is required on all projects.<br>If the DR Form 324 – "Source of Aggre-gates To Be Used" form designates that a 60 pound sample is not needed field personnel must still submit a 10 pound sample. | Section 27<br>Note 1<br>Note 4 |
| 2) Crushed Rock for Surfacing | Quality & Gradation | - - - - - - - - - - | One sample for each 1,000 ton or fraction thereof, at the project. Project personnel will provide the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | No samples required if source is Kerford or Martin Marietta @ Weeping Water or Martin Marietta @ Fort Calhoun.<br><br>One 60 pound sample is required for each 4,000 ton or fraction thereof, from all other sources. | Section 27<br>Note 1 |

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## Section 7
## Mineral Aggregate for Armor Coat

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| **SECTION: 7 – Mineral Aggregate for Armor Coat** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Mineral Aggregate for Armor Coat (Gravel) | Quality & Gradation | - - - - - - - - - - | One sample for gradation test each 250 cubic yard or fraction thereof.<br><br>Project personnel will provide the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column.<br><br>The samples shall be taken at the project. | - - - - - - - - - | One 60 pound sample for quality tests first 1,000 cubic yards. If so designated on the DR FORM 324 “Source of Aggregates to Be Used”.<br><br>One 10 pound sample for gradation tests each 1,500 cubic yard or fraction thereof. (Duplicate of sample tested in the field).<br><br>NOTE: A Central Lab sample is required on all projects.<br>If the DR Form 324 – “Source of Aggregates To Be Used” form designates that a 60 pound sample is not needed field personnel must still submit a 10 pound sample. | Section 27 Note 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 7 – Mineral Aggregate for Armor Coat** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 2) Chip Seal (Limestone, Dolomite, Granite, Quartzite) | Quality & Gradation | - - - - - - - - - - | One sample for gradation test each 250 cubic yard or fraction thereof.<br><br>Project personnel will provide the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column.<br><br>The samples shall be taken at the project | - - - - - - - - - | One 60 pound sample for quality tests first 1,000 cubic yards. If so designated on the DR FORM 324 “Source of Aggregates to Be Used”.<br><br>One 10 pound sample for gradation tests each 1,500 cubic yard or fraction thereof. (Duplicate of sample tested in the field). | Section 27 Note 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 7 – Mineral Aggregate for Armor Coat** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 3) Lightweight Aggregate | Quality & Gradation | - - - - - - - - - - | One sample for gradation test each 250 cubic yard or fraction thereof.<br><br>Project personnel will provide the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column.<br><br>The samples shall be taken at the project. | - - - - - - - - - | One 60 pound sample for quality tests first 1,000 cubic yards. If so designated on the DR FORM 324 “Source of Aggregates to Be Used”.<br><br>One 10 pound sample for gradation tests each 1,500 cubic yard or fraction thereof. (Duplicate of sample tested in the field).<br><br>NOTE: A Central Lab sample is required on all projects.<br>If the DR Form 324 – “Source of Aggregates To Be Used” form designates that a 60 pound sample is not needed field personnel must still submit a 10 pound sample. | Section 27 Note 4 |

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## Section 8
## Crushed Rock and Crushed Rock Screenings for Base Course

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| **Section: 8 – Crushed Rock and Crushed Rock Screenings for Base Course** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Crushed Rock for Base Course | Quality, Gradation & Compaction | - - - - - - - - - - | One sample for gradation testing, each 1,500 ton or fraction thereof. (The approximate sample size for field performed gradation testing should consist of a 25 pound sample for crushed rock for base course and a 10 pound sample for crushed rock screenings for base course)<br><br>Additional samples should be taken at the discretion of the Project Manager to confirm that segregation, degradation or contamination of the material has not occurred prior to incorporation in to the work.<br><br>Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The samples shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for quality and gradation tests each 4,500 ton or fraction thereof. This will be a duplicate of sample tested in the field.<br><br>One 60 pound sample for moisture density curve if required. This sample shall be submitted prior to placement. | - - - - - - - - - - |
| 2) Crushed Rock Screenings for Base Course | | | | | | |

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## Section 9
## Grading

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
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| **Section: 9 – Grading** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Embank-ment (Cohesive and Granular) | Moisture Density | - - - - - - - - - - | In-place moisture-density tests every 500 cubic yards or fraction thereof for each lift or fill, depending on the soil type or as needed is indicated by changes in soil material. In cases of structure backfill, short deep embankments or other special situations, the sampling frequency should be increased as determined by the Project Manager to adequately represent the soil material. If tested layer is disturbed by construction operations, rain, etc., re-tests shall be taken to assure compliance with specifications prior to subsequent construction. Project personnel to supply the sample needed to perform the testing shown under the branch/central laboratory column. | Compaction curve data usually will be furnished by the Materials and Research Division. In those cases where these are not available, large samples (approximately 60 pounds) for compaction curves shall be submitted to the submitted to the central laboratory or branch laboratory by project personnel. | Compaction curve data usually will be furnished by the Materials and Research Division. In those cases where these are not available, large samples (approximately 60 pounds) for compaction curves shall be submitted to the central laboratory or branch laboratory by project personnel. | - - - - - - - - - - |
| | Gradation (If Specified) | - - - - - - - - - - | One sample every 500 cubic yards or fraction thereof for each lift or fill depending on the soil type, or as need is indicated by changes in soil material. In cases of short sections or structure backfill, each section should be represented by tests to adequately represent the material in the fill. Project personnel to supply the sample needed to perform the testing shown under the branch/central laboratory column. | One 10 pound sample for verification test each mile, or in cases of short sections, or structure backfill, the number of samples is to be increased to adequately correlate the samples taken in the field. (Duplicate of sampled tested in the field) This sample can be submitted to the central laboratory or branch laboratory by project personnel. | One 10 pound sample for verification each mile, or in cases of short sections, or structure backfill, the number of samples is to be increased to adequately correlate the samples taken in the field. (Duplicate of sample taken in the field) The sample can be submitted to the central laboratory or branch laboratory by project personnel. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

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## Compaction – Subgrade (Cohesive Soils)

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 10 – Compaction – Subgrade (Cohesive Soils)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Subgrade Compaction and Subgrade Re-construction | Moisture Density | - - - - - - - - - - | In-place moisture density tests every 1,500 square yards or fraction thereof, or in cases of short sections, moisture-density tests to confirm the Project Manager's judgment on compliance with specification requirements. Also each soil change should be represented. Moisture-density tests every 1,500 square yards or fraction thereof, per side of the subgrade for concrete base course widening and every 750 square yards for each shoulder. If tested layer is disturbed by construction operations, rain etc., re-tests shall be taken to assure compliance with specifications prior to subsequent construction. Moisture-density tests should also be taken at bridge ends, railroad crossings, project ends, county road intersections, driveways, patches etc., to confirm Project Manager's judgment on compliance with specifications.<br><br>Project personnel to supply the sample needed to perform the testing shown under the branch/central laboratory column. | Compaction curve data usually will be furnished by the Materials and Research Division. In those cases where these are not available, large samples (approximately 60 pounds) for compaction curves shall be submitted to the central laboratory or the branch laboratory by project personnel. | Compaction curve data usually will be furnished by the Materials and Research Division. In those cases where these are not available, large samples (approximately 60 pounds) for compaction curves shall be submitted to the central laboratory or branch laboratory by project personnel. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 10 – Compaction – Subgrade (Cohesive Soils)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 2) Fly Ash | Quality | - - - - - - - - - - | Project personnel will supply one one-pound sample for each 1,000 tons (minimum of three samples per project) of material used to perform the testing shown under the central laboratory column. | - - - - - - - - - - | One one-pound sample for each 1,000 tons (minimum of three samples per project) of material used for acceptance testing. | - - - - - - - - - - |
| 3) Subgrade Soil and Fly Ash for Mix Design | Quality | - - - - - - - - - - | Project personnel will supply one 150-pound sample of subgrade soil and a 15-pound sample of fly ash to perform the testing shown under the central laboratory column. Samples required 21 days prior to construction. | - - - - - - - - - - | One 150-pound sample of subgrade soil and one 15-pound sample of fly ash for verification testing and mix design. | - - - - - - - - - - |
| 4) Hydrated Lime or Pebble Quicklime | Quality | - - - - - - - - - - | Project personnel will supply one one-pound sample for each 1000 tons (minimum of three samples per project) of material used to perform the testing shown under the central laboratory column. (Place the lime in a plastic bag before putting in the cloth sample bags). | - - - - - - - - - - | One one-pound sample for each 1000 tons (minimum of three samples per project) of material used for quality tests. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 10 – Compaction – Subgrade (Cohesive Soils)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 5) Subgrade Soil and Hydrated Lime or Pebble Quicklime for Mix Design | Quality | - - - - - - - - - - | Project personnel will supply a 100-pound sample of subgrade soil and a five-pound sample of lime to perform the testing shown under the central laboratory column. (Place the lime in a plastic bag before putting in the cloth sample bags). | - - - - - - - - - - | One 100-pound sample of subgrade soil and one five-pound sample of lime to perform the testing for mix design. | - - - - - - - - - - |

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**Section 11**
**Compaction – Stabilized Portion of Granular Subgrade**

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 11 – Compaction Stabilized Portion of Granular Subgrade** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Stabilized Portion of Granular Subgrade | Moisture Density | - - - - - - - - - - | In-place moisture-density tests every 1,500 square yards or fraction thereof, or in cases of short sections, moisture-density tests to confirm the Project Manager's judgment of compliance with specification requirements. If tested layer is disturbed by construction operations, rain, etc. re-tests shall be taken to assure compliance with specifications prior to subsequent construction.<br><br>Project personnel will supply the samples needed to perform the testing shown under the central laboratory/branch laboratory columns.<br><br>Samples to be taken in the field. | One 60 pound sample of the granular material and one 20 pound sample of the soil binder, or one 60 pound sample of the combined mixture shall be submitted to the central or branch laboratory for compaction curve data. | One 60 pound sample of the granular material and one 20 pound sample of the soil binder,) or one 60 pound sample of the combined mixture shall be submitted to the central or branch laboratory for compaction curve data. | - - - - - - - - - - |
| | Quality & Gradation (If Specified) | - - - - - - - - - - | One sample every 1,000 square yards or fraction thereof for gradation, or in cases of short sections, each should be represented by tests to adequately represent the material in the fill. Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory/branch laboratory columns. Samples to be taken in the field. | One 10 pound sample for gradation tests each mile or fraction thereof. (Duplicate of sample tested in the field).<br><br>This sample to be submitted to the branch laboratory or the central laboratory. | One 10 pound sample for gradation tests every 5,000 square yards or fraction thereof. (Duplicate of sample tested in the field).<br><br>This sample to be submitted to the branch laboratory or the central laboratory. | - - - - - - - - - - |
| Laboratory Samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 11 – Compaction Stabilized Portion of Granular Subgrade (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 2) Soil Binder | Gradation & Plasticity Index | - - - - - - - - - - | One sample for gradation tests each 50 cubic yards or fraction thereof. If less than 10 percent retained on the No. 200 sieve, one sample for each 200 cubic yards of fraction thereof.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the branch laboratory/central laboratory column.<br><br>Sample to be taken at the project. | One 10 pound sample for gradation tests (lab to run PI) each 1000 cubic yards or fraction thereof. (Duplicate of sample tested in the field).<br><br>This sample to be submitted to the branch laboratory or the central laboratory | One 10 pound sample for gradation tests (lab to run PI) each 1000 cubic yards, or fraction thereof. (Duplicate of sample tested in the field)<br><br>This sample to be submitted to the branch laboratory or the central laboratory | - - - - - - - - - - |
| Laboratory Samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

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## Section 12
## Foundation Course (Crushed Concrete, Aggregate-D, and Bituminous)

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 12 – Foundation Course (Crushed Concrete, Aggregate-D, and Bituminous)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Crushed Concrete Foundation Course | Gradation | - - - - - - - - - - | One sample for testing each 500 cubic yard or fraction thereof. The sample shall be taken at the project. (The recommended sample size is 50 pounds) Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column. The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for gradation each 2500 cubic yards or fraction thereof. (Duplicate of sample tested in the field) | - - - - - - - - - - |
| 2) All Aggregates and Soil Binder | Experimental Base Course Mixtures | - - - - - - - - - - | Project personnel will submit the 60 pound samples of aggregates and the 20 pound sample of soil binder needed to perform the testing shown under the central laboratory column. The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample of each aggregate and one 20 pound sample of soil binder for EBCM mix design and moisture-density information. This sample is to be submitted prior to production. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 12 – Foundation Course (Crushed Concrete, Aggregate-D, and Bituminous)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 3) Bituminous Foundation Course | Gradation | - - - - - - - - - - | One sample for testing each 500 cubic yard or fraction thereof. The sample shall be taken at the project. (The recommended sample size is 35 pounds) | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| 4) Aggregate Foundation Course – D | Gradation, FAA & Compaction | - - - - - - - - - - | One sample for testing each 750 ton or fraction thereof. The sample shall be taken at the project. (The recommended sample size is 25 pounds)<br><br>Project personnel will supply the 25 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | First sample will be one 60 pound sample for gradation, FAA, Quality and moisture density tests. (Sample must be submitted prior to placement) Remaining samples will each be one 20 pound sample for gradation and FAA tests each 3,750 ton or fraction thereof. (Duplicate sample tested in the field). | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 12 – Foundation Course (Crushed Concrete, Aggregate-D, and Bituminous)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 5) Soil Binder | Plasticity Index & Gradation | - - - - - - - - - - | Project Personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the mixing locations. | - - - - - - - - - - | One 10 pound sample for testing each 1000 cubic yards of binder used or fraction thereof. | - - - - - - - - - - |
| 6) Foundation Course | Moisture Density | - - - - - - - - - - | In-place density tests every 1,500 square yards or fraction thereof, or in case of short sections, moisture-density tests to confirm compliance with the specifications. In-place density tests every 1,500 square yards or fraction thereof, per side for concrete base course widening. If tested layer is disturbed by construction operations, rain, etc. Re-tests shall be taken to assure compliance with the specifications. | - - - - - - - - - - | Compaction curve data will be included with the EBCM mix design information. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or a clean five gallon bucket with lid. | | | | | | |

# Materials Sampling Guide

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## Section 13
## Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) All – Mineral Aggregates and Soil Binder | Experimental Base Course Mixtures (When Mix Design Required) | Contractor to submit the 60 pound sample of sand and the 20 pound sample of soil binder needed to perform the testing shown under the central laboratory column. The contractor needs to submit the anticipated percentages of granular material and soil binder that will be used for stabilization. | ---------- | ---------- | Approximately 60 pounds of each aggregate and approximately 20 pounds of soil binder for EBCM mix design. To be submitted prior to mixture production. | ---------- |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 2) Mineral Aggregates (Commercial Production) | Quality & Gradation (If Specified) | - - - - - - - - - - | One sample for gradation each 300 cubic yards either at the source or on the project. (The recommended sample size is 25 pounds)<br>A minimum of one check sample for each 1000 cubic yards or fraction thereof shall be taken at the point material is incorporated in the work or at the point the materials is to be mixed with other materials. The gradation sample required may also serve as this acceptance and job control sample if it is taken at the point indicated above. Additional samples should be taken at the discretion of the project manager to confirm his judgment that segregation, degradation or contamination of the material has not occurred prior to incorporation into the work.<br>Project personnel will submit the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column. | - - - - - - - - - - | One 60 pound sample for quality tests first 1000 cubic yards if so designated on DR FORM 324 "Source of Aggregates to be Used", or when changes in quality or characteristics occur.<br><br>One 10 pound sample for gradation tests each 1000 cubic yard or fraction thereof. (Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | LOCATION OF ADDITIONAL INFORMATION | |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | **.** |
| 3) Coarse Sand | Quality & Gradation (If Specified) | - - - - - - - - - - | One sample for gradation tests each 300 cubic yards or fraction thereof. (The recommended sample size is 25 pounds)<br><br>Project personnel will submit the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column.<br>Sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for quality tests first 1000 cubic yards if so designated on DR FORM 324"Source of Aggregates to be Used", or when changes in quality or characteristics occur.<br><br>One 10 pound sample for gradation tests each 1000 cubic yard or fraction thereof. (Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| 4) Fine Sand | Gradation (If Specified) | - - - - - - - - - - | One sample for gradation tests each 300 cubic yards or fraction thereof. (The recommended sample size is 25 pounds)<br><br>Project personnel to submit the 10 pound sample needed to perform the testing shown under the Central lab column.<br>Sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation tests each 1000 cubic yards or fraction thereof (Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| 5) Soil Binder | Gradation & Plasticity Index | - - - - - - - - - - | One sample for gradation tests each 50 cubic yards or fraction thereof. (The recommended sample size is 10 pounds). If less than 10 percent retained on the No. 200 sieve, one sample for each 200 cubic yards or fraction thereof.<br>Project personnel to submit the 10 pound sample needed to perform the testing shown under the Central lab column.<br><br>Samples shall be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation test (lab to run P.I.) each 1000 cubic yards or fraction thereof (Duplicate of sample tested in the field) | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 6) Granular Base, Granular Fill, Granular Backfill and Sand Blanket | Moisture Density | - - - - - - - - - - | In place moisture density tests every 500 cubic yards or fraction thereof and for each one foot in thickness, or fraction thereof. In cases of short section, moisture-density tests to confirm the project manager's judgment on compliance with specification requirements. NOTE: If the layer is 2" or less, in thickness, density tests may be omitted. If curve data is not furnished, as in cases of some pit run materials, it will be necessary for the project personnel to submit the necessary samples to the Central or Branch laboratories for the determination of this information. | One sample to be submitted if necessary to perform curve data. | One 60 pound sample to be submitted if necessary to perform curve data. | - - - - - - - - - - |
| | Gradation (If Specified) | - - - - - - - - - - | Every 750 cubic yards or fraction thereof, or in cases of short sections the number of samples is to be increased to adequately represent the material in the fill. (The recommended sample size is 25 pounds) Project personnel will supply the 10 pound sample needed to perform the testing shown under the Central Lab column. Sample to be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation test every 3,750 cubic yards or fraction thereof, or in cases of short sections the number of samples is to be increased to adequately correlate the samples taken in the field (Duplicate of sample tested in the field) | Section 27 Note 1 Note 4 |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 7) Stabilized Portion of Granular Base, Granular Fill, Granular Backfill and Sand Blanket | Moisture Density | - - - - - - - - - - | In place moisture-density tests every 500 cubic yards, or fraction thereof, or in cases of short sections, moisture-density tests to confirm the project manager's judgment on compliance with specification requirements. If tested layer is disturbed by construction operations, rain etc., re-tests shall be taken to assure compliance with specifications prior to subsequent construction. The sample shall be taken at the project. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| | Gradation (If Specified) | - - - - - - - - - - | One sample every 750 cubic yards or fraction thereof for gradation, or in cases of short sections the number of samples is to be increased to adequately represent the material in the field. (The recommended sample size is 25 pounds) Project personnel will supply the 10-pound sample needed to perform the testing shown under the Central Lab column. The sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample for gradation test every 3,750 cubic yards or fraction thereof, or in case of short sections the number of samples is to be increased to adequately correlate the samples taken in the field.<br><br>(Duplicate of sample tested in the field) | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 8) Granular Backfill for Structures | Quality & Gradation | - - - - - - - - - - | One sample for gradation tests each 250 cubic yards or fraction thereof. (The recommended sample size is 25 pounds)<br><br>Project personnel will submit the 10 and 60 pound samples needed to perform the testing shown under the Central lab column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for quality tests if so designated on DR FORM 324 "Source of Aggregates to be Used", or when changes in quality or characteristics occur.<br><br>One 10 pound sample for gradation tests each 750 cubic yards or fraction thereof (Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| | Moisture Density | - - - - - - - - - - | In place density test each lift of aggregate placed. In case of short sections moisture density tests to confirm compliance with specifications.<br><br>Project personnel will supply the 60 pound sampled needed to perform the testing shown under the Central Lab column.<br><br>The sample shall be taken on the project. | - - - - - - - - - - | One 60 pound sample for compaction curve data. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 9) Granular Subdrains | FAA, Gradation, Quality & Compaction | - - - - - - - - - - | One sample for gradation tests each 250 cubic yards or fraction thereof. (The recommended sample size is 25 pounds)<br><br>Project personnel will supply the 10 and 60 pound samples needed to perform the testing shown under the Central Lab column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for compaction curve data as necessary.<br><br>One 10 pound sample for gradation tests each 750 cubic yards of aggregate or fraction thereof.<br><br>(Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| 10) Granular Backfill for Pipe Underdrain | Gradation, Quality & Compaction | - - - - - - - - - - | One sample for gradation tests each 250 cubic yards or fraction thereof. (The recommended sample size is 25 pounds)<br><br>Project personnel will supply the 10 and 60 pound samples needed to perform the testing shown under the Central lab column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for compaction curve data as necessary.<br><br>One 10 pound sample for gradation tests each 750 cubic yards of aggregate or fraction thereof.<br><br>(Duplicate of sample tested in the field) | Section 27<br>Note 1<br>Note 4 |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 13 – Granular Base, Granular Fill, Granular Backfill, Sand Blanket and MSE Walls (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 11) Select and Random Granular Backfill for MSE Walls | Quality, Gradation, Compaction, & Chemical Friction Angle | Before the wall is constructed, the contractor shall furnish to the engineer a Certificate of Compliance certifying that the granular backfill material complies with section 714 or 715 of the specifications. If more than one source is used, a Certificate of Compliance is required from each source. | Project personnel will submit one 60 pound sample per Wall needed to perform the testing shown under the Central Lab column. No further samples required if material is from the same source (pit location) or unless changes in Quality or Characteristics occur.<br><br>One Gradation for every 1000 cubic yards of material or portion thereof. | - - - - - - - - - - | One 60 pound sample for quality, gradation, compaction and chemical tests. | - - - - - - - - - - |
| Laboratory samples must be submitted in a canvas bag or clean five gallon bucket with lid. | | | | | | |

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## Section 14
## Portland Cement/Interground-Blended Cement/Silica Fume

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 14 – Portland Cement/Interground-Blended Cement/Silica Fume** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Portland Cement | Quality | - - - - - - - - - - | Refer to the Approved Products List. Portland cement can be used on the project when accompanied with a manufacturer's certification. A one gallon sample is required when requested by the Materials and Research Division, the inspector questions the material, or the material has been in storage for 90 days or more. Sample to be submitted to the central laboratory. | - - - - - - - - - - | One gallon sample when submitted from cement mill or field. | Section 29 Policy 4 |
| 2) Inter-ground/ Blended Cement | Quality | - - - - - - - - - - | Refer to the Approved Products List. Portland cement can be used on the project when accompanied with a manufacturer's certification. One gallon sample is required per project or for every 750 tons of interground/blended cement that is used on a project or if the inspector questions the material, or the material has been in storage for 90 days or more. Sample to be submitted to the central laboratory. | - - - - - - - - - -. | One gallon sample when submitted from field. | Section 29 Policy 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 14 – Portland Cement/Interground-Blended Cement/Silica Fume** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 3) Silica Fume | Quality | - - - - - - - - - - | Refer to the Approved Products List. Silica Fume is accepted for use with a manufacturer's certification. A one gallon sample is required when requested by the Materials and Research Division, the inspector questions the material, or the material has been in storage for 90 days or more. Sample to be submitted to the central laboratory | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |

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## Section 15
## Portland Cement Concrete for Pavement, Base Course, Pavement Patching

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 15 - Portland Cement Concrete For Pavement, Base Course, Base Course Widening, Pavement Patching, etc.** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Class E and F Aggregates | Quality & Gradation | One gradation test for each 1,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (60-pound sample is required). | Verification: Project personnel will randomly select one contractor's split sample (30 pounds) for each 3,000 ton or fraction thereof, for central lab.<br><br>Quality: Project personnel will supply a 60-pound sample for central lab. | - - - - - - - - - - | One contractor's split verification sample for each 3,000 ton or fraction thereof, for gradation tests.<br><br>One 60-pound sample for every 3,000 ton or fraction thereof, for quality tests. | Section 27 Note 1 |
| 2) Class A, B, and C Aggregates | Quality, Colorimetric, Percent Clay, & Gradation | One gradation test for each 2,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (30-pound sample is required). | Verification: Project personnel will randomly select one contractor's split sample (15 pounds) for each 6,000 ton or fraction thereof, for central lab.<br><br>Quality: Project personnel will submit DR FORM 324, Source of Aggregates to be Used, to the central lab. | - - - - - - - - - - | One contractor's split verification sample for each 6,000 ton or fraction thereof. | Section 27 Note 1 Note 4 |
| 3) Class R Aggregate | Quality & Gradation | One gradation test for each 1,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (when applicable, 60-pound ledge rock and 30-pound sand and gravel sample is required). | Verification: Project personnel will randomly select one contractor's split sample (30 pounds) for each 3,000 ton or fraction thereof, for central lab.<br><br>Quality: Frequency will be determined by mix design approval. | - - - - - - - - - - | One contractor's split verification sample for each 3,000 ton or fraction thereof. | Section 27 Note 1 Note 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 15 - Portland Cement Concrete For Pavement, Base Course, Base Course Widening, Pavement Patching, etc.** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 4) All Aggregates | Moisture | A minimum of one for every 1/3 day of operation as necessary for adequate control of aggregate proportions and total water content of the concrete. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 1 |
| 5) Mixing Water | Quality | - - - - - - - - - - | One gallon sample to be submitted to central laboratory, when of questionable nature. | - - - - - - - - - - | Mixing water will be tested in the central laboratory. | - - - - - - - - - - |
| 6) Wash Water | Quality | A request for approval must be submitted. | One gallon sample to be submitted to central laboratory | - - - - - - - - - - | Wash water will be tested in the central laboratory | Section 29 Policy 7 |
| 7) Plastic Concrete | Air Content | - - - - - - - - - - | <u>Paving</u><br>First load and then one per 300 cubic yards<br><br><u>Patching</u><br>Minimum of one test each 1/3 day's operation or sufficient number for proper control. | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 1 Note 6 |
| 8) Concrete Test Cylinders | Compressive Strength | - - - - - - - - - - | Four 4x8 cylinders shall be made for each day's placement. Cylinders will be tested in the branch laboratory or central laboratory. | Cylinders will be tested in the branch laboratory or central laboratory. | Cylinders will be tested in the branch laboratory or central laboratory. | Section 27 Note 1 Note 6 |
| 9) Concrete Cores | Slab Thickness | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | To be sampled by the Materials & Research Division in accordance with the Standard Specifications or Special Provisions. | - - - - - - - - - - |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 15 - Portland Cement Concrete For Pavement, Base Course, Base Course Widening, Pavement Patching, etc.** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 10) PCC Pavement | Surface Smoothness | Contractor performs all QC pavement smoothness testing specified in the NDOR Standard Specifications for Highway Construction and/or Project Special Provisions. | Approximately 10 percent of contractor's results shall be randomly verified.<br><br>Project personnel will submit requests for pavement smoothness verification testing to the Materials & Research Division<br><br>Submit requests at least 7 days in advance to allow for scheduling. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **Section 15 - Portland Cement Concrete For Pavement, Base Course, Base Course Widening, Pavement Patching, etc. (continued)** | | - - - - - - - - - - | | | - - - - - - - - - - |
| 11) Concrete Curing Materials | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A. Liquid Compounds | Yes – One quart sample from each lot or batch unless shipped from tested and approved stock. | No | No | No | Section 27 Note 8 |
| B. Plastic Film | No | No | No | No | - - - |
| C. Burlap Cloth | No | No | No | No | - - - |
| 12) Reinforcement Bars (Including Dowel Bars) | Yes – Two samples six foot long from every bar designation and heat number unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 9 |
| 13) Welded Steel Wire Fabric | Yes – One sample 36 inches square from each 75,000 square feet of fabric unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 9 |
| 14) Deformed Metal Joint Material | No – Project Manager shall check material for compliance with Standard Plans. | No | No | No | - - - - - - - - - - |
| 15) Elastomeric Compression Joint Seal | No | No | No | Yes | - - - - - - - - - - |
| 16) Lubricant Adhesive for Elastomeric Compression Joint Seals | No sample required. However, material should be as recommended or approved by the manufacturer for use with the joint seal. | No | No | No | - - - - - - - - - - |
| 17) Epoxy Compound | No | Yes | No | Yes | - - - - - - - - - - |
| 18) Joint and Crack Sealing Fillers | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | |
| A. Cold Applied Type | Yes – One five pound sample from each lot unless shipped from tested and approved stock. | Yes | Yes, if not on the approved products list | No | - - - - - - - - - - |
| B. Hot Poured Type | Yes – One sample per lot unless shipped from tested and approved stock. Additional samples are required if any physical characteristic of the material demonstrates non-compliance with the specification. | Yes | No | No | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **Section 15 - Portland Cement Concrete For Pavement, Base Course, Base Course Widening, Pavement Patching, etc. (continued)** | | | | | |
| 19) Load Transfer Device Assemblies for Reinforced Concrete Pavement Joints | Yes – See Standard Specifications for Highway Construction or Special Provisions. | No | No | Yes | - - - - - - - - - - |
| 20) Preformed Joint Filler | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A. Non-Extruding | No | Yes | No | No | - - - - - - - - - - |
| B. Bituminous | No | Yes | No | No | - - - - - - - - - - |
| C. Sponge Rubber | No | Yes | No | No | - - - - - - - - - - |
| 21) Pressure Relief Joint Filler, Preformed Flexible Polyurethane | Yes – One sample five inches wide and 30 inches long from each shipment of 1000 square feet or less of each thickness and kind, unless shipped from tested and approved stock, or specified brands used | No | No | Yes | - - - - - - - - - - |
| 22) Concrete Chemical Admixtures | No | No | No | No | Section 27 Note 7 |
| 23) Calcium Chloride | No | No | No | No | - - - - - - - - - - |

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## Section 16
## Portland Cement Concrete for Structures, Culverts and Miscellaneous Construction

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section 16 - Portland Cement Concrete For Structures, Culverts, and Miscellaneous Construction** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 1) Class E and F Aggregates | Quality & Gradation | One gradation test for each 1,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (60-pound sample is required). | Verification: Project personnel will randomly select one contractor's split sample (30 pounds) for each 3,000 ton or fraction thereof, for central lab.<br><br>Quality: Project personnel will supply a 60-pound sample for central lab. | - - - - - - - - - - | One contractor's split verification sample for each 3,000 ton or fraction thereof, for gradation tests.<br><br>One 60-pound sample for every 3,000 ton or fraction thereof, for quality tests. | Section 27 Note 1 |
| 2 ) Class A, B, and C Aggregates | Quality, Colorimetric, Percent Clay, & Gradation | One gradation test for each 2,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (30-pound sample is required). | Verification: Project personnel will randomly select one contractor's split sample (15 pounds) for each 6,000 ton or fraction thereof, for central lab.<br><br>Quality: Project personnel will submit DR FORM 324 'Source of Aggregates to be Used' to the central laboratory. | - - - - - - - - - - | One contractor's split verification sample for each 6,000 ton or fraction thereof. | Section 27 Note 1 Note 4 |
| 3) Class R Aggregate | Quality & Gradation | One gradation test for each 1,000 ton of aggregate or fraction thereof, for acceptance either at the plant or on the project.<br><br>Minimum of one gradation test for each project.<br><br>For ready mix plants in the Omaha area, the number of samples taken from the plant is determined by plant volume supplied to state and federal projects (when applicable, 60-pound ledge rock and 30-pound sand and gravel sample is required). | Verification Project personnel will randomly select one contractor's split sample (30 pounds) for each 3,000 ton or fraction thereof, for central lab.<br><br>Quality: Frequency will be determined by mix design approval. | - - - - - - - - - - | One contractor's split verification sample for each 3,000 ton or fraction thereof. | Section 27 Note 1 Note 4 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 16 – Portland Cement Concrete For Structures, Culverts, and Miscellaneous Construction (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 4) Lightweight Aggregate | Quality & Gradation | - - - - - - - - - - | See Specifications, Supplemental Specifications and/or Project Special Provisions<br><br>Project personnel to submit the 20 pound sample needed to perform the testing shown under the central laboratory column. | See Specifications, Supplemental Specifications and/or Project Special Provisions | One 20 pound sample per project | - - - - - - - - - - |
| 5) All Aggregates | Moisture | A minimum of one for every 1/3 day of operation as necessary for adequate control of aggregate proportions and total water content of the concrete. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 1 |
| 6) Mixing Water | Quality | - - - - - - - - - - | One Gallon sample to be submitted to central laboratory, when of questionable nature. | - - - - - - - - - - | Mixing water will be tested in the central laboratory. | - - - - - - - - - - |
| 7) Wash Water | Quality | A request for approval must be submitted | One gallon sample to be submitted to the central laboratory | - - - - - - - - - - | Wash water will be tested in the central laboratory | Section 29 Policy 7 |
| 8) Plastic Concrete | Air Content | - - - - - - - - - - | First load and then test one-third day's operation, or sufficient number for proper control.<br><br><u>Bridge Deck</u><br>Air content shall be taken in front of the paver on the deck. | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 1 |
| | Slump | - - - - - - - - - - | Minimum of one test for each day's operation, or sufficient number for proper control. Except for patching. | - - - - - - - - - - | - - - - - - - - - - | |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 16 – Portland Cement Concrete For Structures, Culverts, and Miscellaneous Construction (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 9) Lightweight Concrete | Air Content | - - - - - - - - - - | First load and then test one-third day's operation, or sufficient number for proper control.<br><br><u>Bridge Deck</u><br>Air content shall be taken in front of the paver on the deck. | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| | Slump | - - - - - - - - - - | Minimum of one test for each day's operation, or sufficient number for proper control. Except for patching. | - - - - - - - - - - | - - - - - - - - - - | |
| | Unit Weight | - - - - - - - - - - | <u>Bridge Deck</u><br>Unit weight shall be taken in front of the paver on the deck. | - - - - - - - - - - | - - - - - - - - - - | |
| 10) Concrete Test Cylinders | Compressive Strength | - - - - - - - - - - | One set of four 4x8 cylinders for any placement up to 100 cubic yards.<br><br>For pours over 100 cubic yards, three sets of four 4x8 cylinders are required representative of each 1/3 day's production.<br><br>Cylinders will be tested in the branch laboratory or the central laboratory. | Cylinders will be tested in the branch laboratory or the central laboratory. | Cylinders will be tested in the branch laboratory or the central laboratory. | Section 27<br>Note 1<br>Note 6 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 16 – Portland Cement Concrete For Structures, Culverts, and Miscellaneous Construction (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 11) Shotcrete - Mortar Cubes | Compressive Strength | - - - - - - - - - - | Two sets of three 2-inch cubes shall be made for every day's production.<br><br>Cubes will be tested in the branch or central laboratory. | Cubes will be tested in the branch or central laboratory. | Cubes will be tested in the branch or central laboratory. | Section 27, Note 6 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 16 – Portland Cement Concrete For Structures, Culverts and Miscellaneous Construction (continued)** | | | | | |
| 12) Concrete Curing Materials | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Liquid Compounds | Yes – One quart sample from each lot or batch unless shipped from tested and approved stock. | No | No | No | Section 27 Note 8 |
| B) Plastic Film | No | No | No | No | - - - - - - - - - - |
| C) Burlap Cloth | No | No | No | No | - - - - - - - - - - |
| 13) Reinforcement Bars (Including Dowel Bars) | Yes – Two samples six foot long from every bar designation and heat number unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 9 |
| 14) Welded Steel Wire Fabric | Yes – One sample 36 inches square from each 75,000 square feet of fabric unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 9 |
| 15) Concrete Chemical Admixtures | No | No | No | No | Section 27 Note 7 |

# Materials Sampling Guide

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## Section 17
## Guard Rail

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 17 – Guard Rail** | | | | | |
| 1) Beam Guard Rail | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Beam Element | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. Sample will be returned. | No | Yes | No | Section 27 Note 10 |
| B) Steel Posts, End Posts, Special Posts, Adaptor Plates | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. Sample will be returned. | No | Yes | No | Section 27 Note 1 Note 10 |
| C) End Anchor Assembly and Breakaway Terminal Section | Yes – At least one sample of each the items used in the guard rail assembly unless shipped from tested and approved stock. Sample will be returned. | No | No | Yes | Section 27 Note 10 |
| D) Miscellaneous Hardware Bolts, Washers, etc. | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. | No | No | Yes | Section 27 Note 1 Note 10 |
| E) Wood Guard Rail Posts and Blocks | No – Unless requested by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 25 |
| F) Insert Assembly | No – Unless requested by the Materials and Research Division | No | No | Yes | - - - - - - - - - - |
| 2) Cable Guard Rail | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Cable | Yes – At least one sample 6 ft long from each reel unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 10 |
| B) Posts and Hook Bolts | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. Sample will be returned. | No | No | Yes | Section 27 Note 10 |
| C) Tension Spring Assemblies | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. | No | No | Yes | Section 27 Note 10 |
| D) Anchor Assemblies | Yes – At least one sample of each of the items used in the guard rail assembly unless shipped from tested and approved stock. Sample will be returned. | No | No | Yes | Section 27 Note 10 |

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**Section 18**
**Fence, Handrail, and Barrier Rail Materials**

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 18 – Fence Materials** | | | | | |
| 1) Barbed Wire | Yes – One sample 4 ft long from one of each 50 spools. | No | No | No | Section 27 Note 1 |
| 2) Chain Link | Yes – One sample 4 ft long from one of each 50 rolls. | No | No | No | Section 27 Note 1 |
| 3) Right of Way | Yes – One sample 4 ft long from one of each 50 rolls. | No | No | No | Section 27 Note 1 |
| 4) Woven Wire | Yes – One sample 4 ft long from one of each 50 rolls. | No | No | No | Section 27 Note 1 |
| 5) Welded Wire Fabric | Yes – One sample 4 ft long from one of each 50 rolls. | No | No | No | Section 27 Note 1 |
| 6) Handrail and Barrier Rail | Yes – One full section sample from each size. Samples will be returned. | No | No | No | Section 27 Note 1 |
| 7) Fence Fasteners and Ties | Yes – Five from each 1,000 lbs. | No | No | No | Section 27 Note 1 |
| 8) Fittings and Hardware | Yes – One sample of each item. Samples will be returned. | No | No | No | Section 27 Note 1 |
| 9) Staples | Yes – Five staples from one of each 15 kegs or each 1,000 lbs. | No | No | No | Section 27 Note 1 |
| 10) Steel 'T' Line Posts | Yes – One post from each 5,000 posts or fraction thereof. Samples will be returned. | No | No | No | Section 27 Note 1 |
| 11) Tension Wire | Yes – One sample 4 ft long from each 2,000 lb or fraction thereof. | No | No | No | Section 27 Note 1 |
| 12) Tubular, 'H', and 'C' Sections for Post Braces, Top Rail, etc. | Yes – One full section sample from each lot. Samples will be returned. | No | No | No | Section 27 Note 1 |
| 13) Wooden Posts | No – Unless required by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 1 Note 25 |

## Materials Sampling Guide

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## Section 19
## Culvert Pipe, Drain Tile, Sewer Pipe, Slope Drains, etc.

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 19 – Culvert Pipe, Drain, Tile, Sewer Pipe, Slope Drains and Related Materials** | | | | | |
| 1) Culvert | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Zinc Coated Galvanized Steel, Aluminum Coated Steel, Polymer Coated Steel, Plastic | - - - - - - - - - - | See Post-Applied Coatings and Flexible Pipe Joints for Applicable Coating and Joint Information | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Culverts (All Shapes) | No | No | No | Yes | Section 27 Note 11 |
| b) Culverts (Plastic) | Yes – One 10' Section from each lot. | No | No | Yes | - - - - - - - - - - |
| c) Underdrains | Yes – One 24 inch sample of each size to include markings | No | No | Yes | Section 27 Note 11 |
| d) Flared End Sections | No | No | No | Yes | Section 27 Note 11 |
| e) Structural Plate Pipe | Yes – The coupon attached should be submitted for testing. If no coupon, a sample approximately 3 inches square should be submitted. The Project Manager shall advise the Materials and Research Division in writing as to the length, brand, size and heat numbers of the pipe. | No | Yes | No | - - - - - - - - - - |
| B) Concrete | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Culverts (All Shapes) | No | No | No | No | * |
| b) Flared End Sections | No | No | No | No | * |
| 2) Drain Tile | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Concrete | Yes – One-half of one percent of pipe required for a project. Minimum of one pipe section for each diameter. | No | No | No | Section 27 Note 1 |
| B) Bituminous Fiber | Yes – One-half of one percent of pipe required for a project. Minimum of one pipe section for each diameter. | No | No | No | Section 27 Note 1 |
| * See Section 29, Policy 9 'Policy Concerning Testing, Inspection and Reporting of Reinforced Concrete Culvert and Sewer Pipe and Concrete Flared End Sections' | | | | | |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | APPROVED PRODUCTS LIST | MANUFACTURER CERTIFIED TESTS REQUIRED | MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 19 – Culvert Pipe, Drain Tile, Sewer Pipe, Slope Drains and Related Materials (continued)** | | | | | |
| 3) Sewer Pipe | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Ductile Iron Pipe and Fittings | No | No | No | Yes | - - - - - - - - - - |
| B) Plastic | Yes – One10' section from each lot. | No | No | Yes | - - - - - - - - - - |
| C) Reinforced Concrete | No | No | No | No | Section 27 Note 1 * |
| 4) Slope Drains (Metal) | No | No | No | Yes | Section 27 Note 11 |
| 5) Related Materials | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Sealing Compound for Concrete Pipe Joints | Yes – One sample four feet long unless shipped from tested and approved stock. | Yes | No | No | - - - - - - - - - - |
| B) Bituminous Plastic Cement | Yes – One five pound (1/2 gallon) sample from each lot or batch unless shipped from tested and approved stock. | No | No | No | - - - - - - - - - - |
| C) Sewer Joint Compound | No | Yes | No | No | - - - - - - - - - - |
| D) Sewer Pipe Gaskets | Yes – One gasket from each lot or batch unless shipped from tested and approved stock. | Yes | No | Yes | - - - - - - - - - - |
| E) Flexible Pipe Joints | No | Yes | No | No | - - - - - - - - - - |
| F) Post Applied Coatings | No | Yes | No | No | - - - - - - - - - - |

***** See Section 29, Policy 9 'Policy Concerning Testing, Inspection and Reporting of Reinforced Concrete Culvert and Sewer Pipe and Concrete Flared End Sections'

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**Section 20**
**Bridge Materials**

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 20 – Bridge Materials** | | | | | |
| 1) Aluminum Filled Resilient Sealing Compound | Yes – One pint or three-pound sample from each lot or batch unless brand from Approved Products List used. | Yes | No | No | - - - - - - - - - - |
| 2) Asphalt Plank | Yes – Three planks from each 1000 planks of each thickness. | No | No | No | - - - - - - - - - - |
| 3) Lock-Pin and Collar Fasteners (High Strength Steel) | Yes – One lock-pin and collar fastener of each size and length from each 800 or fraction thereof, unless shipped from tested and approved stock. | No | No | Yes | Section 27 Note 12 |
| 4) Bridge Deck Drainage System | No | No | No | Yes | - - - - - - - - - - |
| 5) Caulking and Sealing Compounds | No | Yes | No | No | - - - - - - - - - - |
| 6) Deck Joint Seal | No – Unless requested | No | Yes | Yes | - - - - - - - - - - |
| 7) Form Insulation | No - Unless requested | No | Yes | No | - - - - - - - - - - |
| 8) Galvanized Sheet Metal | Yes – One sample approximately 30-40 square inches from each lot or batch. | No | No | No | Section 27 Note 1 |
| 9) Galvanized Steel Wire Strand | Yes – One sample six feet long from each lot of 5000 feet or less and two samples from lots of 5000 to 30,000 feet. | No | No | No | Section 27 Note 1 |
| 10) Lead Sheet | Yes – One sample approximately 30-40 square inches from each lot or batch. | No | No | No | Section 27 Note 1 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 20 – Bridge Materials (continued)** | | | | | |
| 11) Bolts, Nuts, and Washers | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Anchor | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) High Tensile | Unless shipped from tested and approved stock, the contractor has the option to either provide certified mill test reports on material used, or submit one sample bolt of each size to the central laboratory for destructive testing. The sample must be taken by the project manager and must be accompanied by a manufacturer's certificate of compliance. Materials shall not be approved for incorporation into the work until certified mill tests or sample test results and certificates of compliance are in hand. | No | - - - - - - - - - - | - - - - - - - - - - | Section 27 Note 12 |
| b) Low Carbon (Common) | No – Project manager to measure length and diameter. If galvanized, check in the field by use of magnetic instrument for both bolts and nuts. Report results to the Materials and Research Division. | No | No | Yes | Section 27 Note 12 |
| c) Swedge | No – Project manager to measure length and diameter. If galvanized, check in the field by use of magnetic instrument for both bolts and nuts. Report results to the Materials and Research Division. | No | No | Yes | Section 27 Note 12 |
| B) Structural Fasteners for Steel Bridges | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 20 – Bridge Materials (continued)** | | | | | |
| a) High Tensile (Regular and Weather Resisting Types) | * Yes – 0 to 25 — 3 Bolts, Nuts and Washers<br>26 to 50 — 4 Bolts, Nuts and Washers<br>51 to 90 — 5 Bolts, Nuts and Washers<br>91 to 150 — 6 Bolts, Nuts and Washers<br>151 to 280 — 7 Bolts, Nuts and Washers<br>281 to 500 — 9 Bolts, Nuts and Washers<br>501 to 1,200 — 11 Bolts, Nuts and Washers<br>1,201 to 3,200 — 13 Bolts, Nuts and Washers<br>3,201 to 150,000 — 15 Bolts, Nuts and Washers<br>150,001 and over — 15 Bolts, Nuts and Washers<br><br>**These samples are for destructive testing and will not be returned.**<br>*Sample frequency is for each lot. | No | Yes | No | Section 27 Note 12 |
| b) Low Carbon (Common) | No | No | No | Yes | Section 27 Note 12 |
| 12) Elastomeric Bearings | No - If these bearings have not been inspected by the Bridge Division, call the Steel Fabrication Inspection Unit, at (402)479-4763 and they will be inspected on the jobsite prior to installation | No | Yes | No | - - - - - - - - - - |
| A) Elastomeric Bearing Pads - Neoprene or Neoprene with Steel Shim | No – Random sampling may be performed by the Bridge Division, Steel Fabrication Inspection Unit, at (402)479-4763. | No | Yes | No | - - - - - - - - - - |
| B) Bearing Pads - Cotton Duck | No – Random sampling may be performed by the Bridge Division, Steel Fabrication Inspection Unit, at (402)479-4763. | No | Yes | No | - - - - - - - - - - |
| 13) Fixed and Expansion Bearings, TFE Type | No - If these bearings have not been inspected by the Bridge Division, call the Steel Fabrication Inspection Unit, at (402)479-4763 and they will be inspected on the jobsite prior to installation. | No | Yes | Yes | - - - - - - - - - - |
| 14) Confined Elastomeric Bearings (Pot Bearings) | No - If these bearings have not been inspected by the Materials and Research Division, call the Physical Tests Section at (402)479-3849 and they will be inspected on the jobsite prior to installation. | No | Yes | Yes | - - - - - - - - - - |
| 15) Strip Seal | No | No | Yes | Yes | - - - - - - - - - - |
| 16) Epoxy Compounds | No | Yes | No | No | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 20 – Bridge Materials (continued)** | | | | | |
| 17) Grouting Material | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Non-Shrink Grout | No | Yes | No | No | - - - - - - - - - - |
| B) Epoxy Type | No | Yes | No | No | - - - - - - - - - - |
| 18) Joint Sealing Fillers | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Cold Applied Type | Yes – One five pound minimum sample from each lot, unless shipped from tested and approved stock. | Yes | Yes, if not on the Approved Products List. | No | - - - - - - - - - - |
| B) Hot Poured Type | Yes – One sample per lot unless shipped from tested and approved stock. Additional samples are required if any physical characteristic of the material demonstrates non-compliance with the specification. | Yes | No | No | - - - - - - - - - - |
| 19) Paint | No – The contractor shall furnish a paint manufacturer's certification that the paint complies with the paint system specified. | Yes | No | Yes | Section 27 Note 1 |
| 20) Preformed Joint Filler | No | Yes | No | No | - - - - - - - - - - |
| 21) Pressure Relief Joint Filler, Preformed Flexible Polyurethane | No | Yes | No | No | - - - - - - - - - - |
| 22) Reinforcement Bars | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Bars (Including Dowel Bars) | Yes – Two samples six feet long from every bar designation and heat number unless shipped from tested and approved stock. | No | Yes | No | Section 27 Note 9 |
| B) Mechanical Splices | Yes – Two six foot samples of each size of reinforcing bar with coupler/splice in the middle | No | Yes | Yes | - - - - - - - - - - |
| C) Structural Wire Mesh | Yes – One sample 36 inches square from each 75,000 square feet of fabric unless shipped from tested and approved stock. | No | Yes | Yes | Section 27 Note 9 |
| 23) Steel | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Piling, Sheet Piling, Shells for Cast in Place Piling & Crossbracing for Piling | No | No | Yes | No | Section 27 Note 14 |
| B) Structural | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Substructure | No | No | No | Yes | Section 27 Note 15 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 20 – Bridge Materials (continued)** | | | | | |
| b) Superstructure | No | No | Yes | No | Section 27 Note 15 |
| 24) Precast and Prestressed Concrete Units | No | No | No | No | Section 27 Note 13 |
| 25) Prestressed Steel Wire Strand | Yes – One sample 12 feet long from each reel unless sampled at the manufacturer's plant by the testing agency of another state. | No | Yes | No | - - - - - - - - - - |
| 26) Prestressed Fine and Coarse Aggregate | Yes – One sample every 500 cubic yards of concrete. | No | No | No | - - - - - - - - - - |
| 27) Structural Steel for Concrete Girder Bridges | No – Engineer will check the structural steel for compliance. | No | No | Yes | - - - - - - - - - - |
| 28) Structural Fasteners for Concrete Girder Bridges | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) High Tensile (Regular and Weather Resisting Types) | * Yes – 0 to 25 3 Bolts, Nuts and Washers<br>26 to 50 4 Bolts, Nuts and Washers<br>51 to 90 5 Bolts, Nuts and Washers<br>91 to 150 6 Bolts, Nuts and Washers<br>151 to 280 7 Bolts, Nuts and Washers<br>281 to 500 9 Bolts, Nuts and Washers<br>501 to 1,200 11 Bolts, Nuts and Washers<br>1,201 to 3,200 13 Bolts, Nuts and Washers<br>3,201 to 150,000 15 Bolts, Nuts and Washers<br>150,001 and over 15 Bolts, Nuts and Washers<br><br>**These samples are for destructive testing and will not be returned.**<br>*Sample frequency is for each lot. | No | No | Yes | Section 27 Note 12 |
| B) Low Carbon (Common) | No | No | No | Yes | Section 27 Note 12 |
| 29) Epoxy Polymer Overlay | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Type III Epoxy | Yes – One 16-oz. sample for each component. | No | Yes | Yes | - - - - - - - - - - |
| B) Crushed Siliceous Gravel | Verification: Yes – 60-pound project sample for central laboratory.<br>Project Acceptance: Yes – 10-pound sample for field testing. | No | No | No | - - - - - - - - - - |

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**Section 21**
**Lighting and Signal Materials**

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 21 – Lighting and Signal Materials** | | | | | |
| 1) Bolts, Nuts and Washers | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Anchor Bolts for Light, Signal, Span Wire and Combination Poles | No | No | Yes | Yes | Section 27<br>Note 12<br>Note 16<br>Note 19 |
| B) Anchor Bolts for High Mast Towers and Overhead Sign Supports | Yes – The contractor shall furnish an extra bolt sample (including two nuts and two washers) from each heat of steel used on the project (or multiple projects) to the Materials and Research Division for destructive testing. (See Standard Specifications, Supplemental Specifications, and/or the Project Provisions for further information) | No | Yes | Yes | - - - - - - - - - - |
| 2) Electrical Items | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Cast Iron Frames and Covers for Pull Boxes | No | No | No | Yes | Section 27<br>Note 17<br>Note 18<br>Note 19 |
| B) Cast Iron Junction Boxes | No – Project Manager shall measure and determine quantity of galvanizing, if galvanized, and report to the Materials and Research Division. | No | No | Yes | Section 27<br>Note 17 |
| C) Conduit | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Aluminum<br>b) Fiber<br>c) Plastic<br>d) Steel (Rigid, Flexible)<br>e) Rigid Nonmetallic | Yes – One sample two feet long of each size from each lot or batch, unless UL (Underwriters' Laboratory) or ETL (Intertek testing services) approved. If UL or ETL label is attached and physical dimensions are correct, the conduit may be accepted. The Project Manager shall report the results of the field inspection in SiteManager. | No | No | No | Section 27<br>Note 17 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 21 – Lighting and Signal Materials (continued)** | | | | | |
| D) Light Poles | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Conventional Light Pole | No | No | Yes | Yes | Section 27<br>Note 16<br>Note 17<br>Note 19 |
| b) High Mast Pole | No | No | Yes | Yes | Section 27<br>Note 16<br>Note 17<br>Note 19 |
| c) Signal Standards | No | No | Yes | Yes | Section 27<br>Note 16<br>Note 17<br>Note 19 |
| d) Span Wire Pole | No | No | Yes | Yes | Section 27<br>Note 16<br>Note 17<br>Note 19 |
| e) Breakaway Base | No | No | Yes | Yes | Section 27<br>Note 16<br>Note 17<br>Note 19 |
| E) Ground Rod | No – Project Manager to measure diameter and length. Report in writing to the Materials and Research Division. | No | No | No | Section 27<br>Note 17 |
| F) Ground Wire | Yes – One sample one foot long from each lot | No | No | No | - - - - - - - - - - |
| G) Electrical Wire and Cable | Yes – One sample four feet long from each lot. If requested by the Materials and Research Division a manufacturer's certified test report may also be required. | No | Yes | No | Section 27<br>Note 17 |
| H) Span Wire, Tie Wire and Guy Wire | Yes – One sample six feet long from each lot. | No | No | No | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | APPROVED PRODUCTS LIST | MANUFACTURER CERTIFIED TESTS REQUIRED | MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED | LOCATION OF ADDITIONAL INFORMATION |
| **SECTION: 21 – Lighting and Signal Materials (continued)** | | | | | |
| I) Electrical Equipment | See Standard Specifications, Supplemental Specifications and/or the Project Special Provisions. | ---------- | ---------- | ---------- | ---------- |
| a) Photo-Electric Cells | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| b) Traffic Signals and Controllers | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| c) Transformers | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| d) Vehicle Detectors | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| e) Luminaires | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 Note 20 |
| f) Circuit Breakers | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| g) Fittings and Hardware | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| h) Pull Boxes | ---------- | ---------- | ---------- | ---------- | Section 27 Note 17 |
| J) Galvanized Steel Wire | Yes – One sample six feet long from each lot of 5,000 feet or less and two samples from lots of 5,000 to 30,000 feet. | No | No | No | Section 27 Note 1 |
| K) Grouting Material | ---------- | ---------- | ---------- | ---------- | ---------- |
| a) Non-shrink grout | No | Yes | No | No | ---------- |
| b) Epoxy Type | No | Yes | No | No | ---------- |
| L) Preformed Joint Filler | No | Yes | No | No | ---------- |
| M) Poles (Wood) | No – Unless requested by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 25 |
| N) Polyurethane Foamed Footings | Yes – The manufacturer's recommended quantity of each component to provide one quart when mixed, unless shipped from tested and approved stock, or specified brands are being used. | No | No | Yes | Section 27 Note 19 |

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**Section 22**
**Signing Materials**

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 22 – Signing Materials** | | | | | |
| 1) Bolts, Nuts and Washers | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) High Tensile | Unless shipped from tested and approved stock, the contractor has the option to either provide certified mill test reports on material used, or submit one sample bolt of each size to the central laboratory for destructive testing. The sample must be taken by the project manager and must be accompanied by a manufacturer's certificate of compliance. Materials shall not be approved for incorporation into the work until certified mill tests or sample test results and certificate of compliance are in hand. | No | Yes | - - - - - - - - - - | Section 27 Note 12 |
| B) Low Carbon (Common) | No – Project Manager to measure length and diameter. Galvanizing to be checked in the field by use of magnetic instrument for both bolts and nuts. Report results to Materials and Research Division. | No | No | Yes | Section 27 Note 12 |
| C) Sign Fasteners | Yes – Five bolts, nuts and washers from each lot of 500 fasteners unless shipped from tested and approved stock. | No | No | No | Section 27 Note 12 |
| D) Anchor | Yes – A bolt sample (including nuts and washers) from each heat of steel used on the project (or multiple projects) shall be submitted to the Materials and Research Division for destructive testing. | No | Yes | No | - - - - - - - - - - |
| 2) Brackets and Fasteners | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Aluminum | No | No | No | Yes | Section 27 Note 21 |
| B) Steel | No – Galvanizing thickness to be checked in the field by the Project Manager and a report of results submitted to the Materials and Research Division. | No | No | Yes | Section 27 Note 21 |
| 3) Detachable Letters, Numerals, Symbols and Borders | No | No | No | Yes | Section 27 Note 21 |
| 4) Acrylic Plastic Prismatic Reflectors | No | No | No | Yes | Section 27 Note 21 |
| 5) Reflective Sheeting | No | No | No | Yes | Section 27 Note 21 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 22 – Signing Materials (continued)** | | | | | |
| 6) Extrusheet | No | No | No | Yes | Section 27 Note 21 |
| 7) Sheet Aluminum | No | No | Yes | No | Section 27 Note 21 |
| 8) Sheet Metal Sleeves | No | No | No | Yes | Section 27 Note 21 |
| 9) Signing Supports and Structures | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Aluminum | No | No | Yes | No | Section 27 Note 21 |
| B) Steel | No – Galvanizing thickness to be checked in the field by the Project Manager and a report of results submitted to the Materials and Research Division. | No | Yes | No | Section 27 Note 21 |
| C) Wood Posts | No – Unless requested by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 25 |
| 10) Sign Supports, Overhead | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Main Members | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Truss Chords and Bracing | No | No | Yes | No | - - - - - - - - - - |
| b) Chord End Flanges | No | No | Yes | No | - - - - - - - - - -- |
| c) Vertical Posts and Bracing | No | No | Yes | No | Section 27 Note 21 |
| d) Catwalk Supports and Post Bases | No | No | Yes | No | Section 27 Note 21 |
| B) Secondary Members | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| a) Catwalk Grating | No | No | No | Yes | - - - - - - - - - - |
| b) Railing | No | No | No | Yes | - - - - - - - - - - |
| c) Bolts | No | No | No | Yes | - - - - - - - - - - |
| d) U-Bolts | No | No | No | Yes | - - - - - - - - - - |
| e) J-Bolts | No | No | No | Yes | - - - - - - - - - - |
| f) Chains | No | No | No | Yes | - - - - - - - - - - |
| g) Misc. Hardware | No | No | No | Yes | - - - - - - - - - - |

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## Section 23
## Traffic Control

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 23 – Traffic Control** | | | | | |
| 1) Barricade Warning Sign, Drum, and Tubular Post Reflective Material | Reflective material shall be tested in the field by field personnel and the reflectometer test results reported in SiteManager. | No | No | No | - - - - - - - - - - |
| 2) Barricade Warning Lights | No | Yes | No | No | - - - - - - - - - - |
| 3) Thermoplastic Pavement Marking | No | No | No | Yes | - - - - - - - - - - |
| 4) Glass Beads for Thermoplastic Pavement Marking | No | No | No | Yes | - - - - - - - - - - |
| 5) Polyurea Pavement Marking | No | Yes | No | No | - - - - - - - - - - |
| 6) Glass Beads for Polyurea Pavement Marking | No | No | No | Yes | - - - - - - - - - - |
| 7) Wet Reflective Polyurea Pavement Marking | No | Yes | No | No | - - - - - - - - - - |
| 8) Wet Reflective Media | No | Yes | No | No | - - - - - - - - - - |
| 9) Preformed Pavement Marking, Type IV | No | Yes | No | No | - - - - - - - - - - |
| 10) Wet Reflective Preformed Pavement Marking, Type IV | No | Yes | No | No | - - - - - - - - - - |
| 11) Temporary Pavement Marking Tape (Type I, II) | No | Yes | No | No | - - - - - - - - - - |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 23 – Traffic Control (continued)** | | | | | |
| 12) Permanent Pavement Marking, Type Paint | Yes – A minimum of one-quart sample of each color when the color's pay quantity exceeds 5,000 linear feet. | No | No | Yes, for each color | - - - - - - - - - - |
| 13) Glass Beads for Permanent Pavement Marking, Type Paint | Yes – A minimum of one-quart sample when the total striping quantity is greater than 5,000 linear feet. | No | No | Yes | - - - - - - - - - - |
| 14) Raised Pavement Markers (Temporary) | No | Yes | No | No | - - - - - - - - - - |
| 15) Raised Pavement Markers (Overlay) | No | Yes | No | No | - - - - - - - - - - |
| 16 Black Aggregate | No | No | No | Yes | - - - - - - - - - - |
| 17) Tubular Posts | No | Yes | No | No | - - - - - - - - - - -- |
| 18) Opposing Lane Dividers | No | Yes | No | No | - - - - - - - - - - |
| 19) Changeable Message Sign | No | Yes | No | No | - - - - - - - - - - |
| 20) Flashing Arrow Panel | No | Yes | No | No | - - - - - - - - - - |

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**Section 24**
**Roadside Development and Erosion Control**

| Item or Group | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** ***(TESTS TO BE MADE AT CENTRAL LABORATORY)*** | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 24 – Roadside Development and Erosion Control** | | | | | |
| 1) Erosion Control Fabrics | No | Yes | No | No | - - - - - - - - - - |
| 2) Rock Riprap | - - - - - - - - - - | | | | |
| A) Rock Riprap | Yes – One 60 lb. sample for each 5,000 tons or fraction thereof (sample to be used for quality tests). If material is from an approved source no sample required. | Yes | No | No | Section 27<br>Note 1<br>Note 26 |
| B) Filter Fabric for Rock Riprap | No | Yes | No | No | Section 27<br>Note 1<br>Note 26 |
| 3) Filter Fabric for Pipe Underdrains | No | Yes | No | No | - - - - - - - - - - |
| 4) Subsurface Drainage Matting | No | Yes | No | No | - - - - - - - - - - |
| 5) Geocell Cellular Confinement System | No | Yes | No | No | - - - - - - - - - - |
| 6) Gabions | - - - - - - - - - - | | | | |
| A) Gabion Baskets | No | Yes | No | No | - - - - - - - - - - |
| B) Gabion Stone Fill | Yes – One 60 lb. sample for each 5,000 tons or fraction thereof (sample to be used for quality tests). If material is from an approved source no sample required. | No | No | No | Section 27<br>Note 26 |
| 7) Revet Mattress | - - - - - - - - - - | | | | |
| A) Revet Mattress | No | Yes | No | No | - - - - - - - - - - |
| B) Revet Mattress Stone Fill | Yes – One 60 lb. sample for each 5,000 tons or fraction thereof (sample to be used for quality tests). If material is from an approved source no sample required. | No | No | No | Section 27<br>Note 26 |

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**Section 25**
**Miscellaneous Materials**

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 25 – Miscellaneous Materials** | | | | | |
| 1) Automatic Flood Control Gates | No | No | No | Yes | Section 27 Note 18 |
| 2) Bar Grates | No | No | No | Yes | - - - - - - - - - - |
| 3) Bricks | No | No | Yes | Yes | Section 27 Note 1 |
| 4) Concrete Filler Block | No | No | Yes | Yes | Section 27 Note 1 |
| 5) Damp proofing | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Asphalt | No | No | No | Yes | - - - - - - - - - - |
| B) Asphalt Primer | No | No | No | Yes | - - - - - - - - - - |
| 6) Flexible Delineators | No | Yes | No | No | - - - - - - - - - - |
| 7) Delineators | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Fasteners | Yes – Five bolts, nuts and washers from each lot of 500 fasteners unless shipped from tested and approved stock. | No | No | No | Section 27 Note 1 Note 12 Note 22 |
| B) Reflectors | Yes – Fifty reflectors from each lot or batch. No sample required if the reflectors are on the approved products list or are shipped from tested and approved stock. | Yes | No | No | Section 27 Note 1 Note 22 |
| C) Posts | Yes – One post of each size from each lot or batch unless shipped from tested and approved stock. | No | No | No | Section 27 Note 1 Note 23 |
| 8) Detectable Warning Panel | No | Yes | No | No | - - - - - - - - - - |
| 9) Glass Fiber Mulch | No | No | Yes | No | - - - - - - - - - - |
| 10) Gray Iron Castings (Cast Iron Grates, Frames, Covers, etc) | No | No | No | Yes | Section 27 Note 18 |
| 11) Pipe | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Copper | Yes – One 12 inch sample of each size | No | No | No | Section 27 Note 1 |
| B) Plastic | Yes – One 24 inch sample of each size to include marking | No | No | No | Section 27 Note 1 |
| C) Steel | Yes – One 12 inch sample of each size | No | No | No | Section 27 Note 1 |

| ITEM OR GROUP | Minimum Material Certificate, Test and Inspection Requirements | | | | |
|---|---|---|---|---|---|
| | **SAMPLE REQUIRED** *(TESTS TO BE MADE AT CENTRAL LABORATORY)* | **APPROVED PRODUCTS LIST** | **MANUFACTURER CERTIFIED TESTS REQUIRED** | **MANUFACTURER CERTIFICATION OF COMPLIANCE REQUIRED** | **LOCATION OF ADDITIONAL INFORMATION** |
| **SECTION: 25 – Miscellaneous Materials (continued)** | | | | | |
| 11) Pipe (continued) | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| D) Wrought Iron | No | No | No | Yes | Section 27 Note 1 |
| E) Ductile Iron Pipe and Fittings | No | No | No | Yes | - - - - - - - - - - |
| 12) Cold-Drawn Steel Wire | Yes – One sample four feet long from each ten tons or fraction thereof of each size of wire. | No | No | No | - - - - - - - - - - |
| 13) Prestressed Steel Wire Strand | Yes – One sample twelve feet long from each reel unless sampled at the manufacturer's plant by the testing agency of another state. | No | Yes | No | - - - - - - - - - - |
| 14) Right of Way Markers | No – Project Manager shall measure, test and report on DR Form 247 unless shipped from tested and approved stock. | No | No | No | Section 27 Note 24 |
| 15) Waterstop | Yes – One sample six inches in length unless shipped from tested and approved stock. | No | No | No | - - - - - - - - - - |
| 16) Wood Products | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Lumber | No – Unless requested by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 1 Note 25 |
| B) Timber | No – Unless requested by the Materials and Research Division. | No | See Note | See Note | Section 27 Note 1 Note 25 |
| 17) Hot Pour Sealant | Yes – One sample per lot unless shipped from tested and approved stock. Additional samples are required if any physical characteristic of the material demonstrates non-compliance with the specifications. | Yes | No | No | - - - - - - - - - - |
| 18) Fill Material for Inertial Barrier Modules | Gradation | - - - - - - - - - - | One sample for gradation tests each 100 cubic yards or fraction thereof. (The recommended sample size is 25 pounds) | - - - - - - - - - - | - - - - - - - - - - |
| 19) High Friction Surface Treatment | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - | - - - - - - - - - - |
| A) Aggregate | Yes, 60 lb sample taken by field personnel | No | No | Yes | Section 27 Note 27 |
| A) Polymer Binder Resin | Yes, 16 oz sample of lot used on project | No | Yes | Yes | Section 27 Note 27 |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 25 – Miscellaneous Materials (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 20) Culvert Sandfill | Quality & Gradation | - - - - - - - - - - | One sample for gradation tests each 100 cubic yards or fraction thereof. The recommended sample size is 25 pounds.<br><br>Project personnel will supply the 10 and 60 pound samples needed to perform the testing shown under the central laboratory column.<br><br>The samples shall be taken at the project. | - - - - - - - - - - | One 60 pound sample for quality tests if so designated on DR FORM 324 "Source of Aggregates to be Used" or when changes in quality or characteristics occur.<br><br>One 10 pound sample per project for gradation test (Duplicate of sample tested in field) | Section27<br>Note 1<br>Note 4 |
| 21) Sand and Sawdust for Absorption Field | Mix Design & Permeability | - - - - - - - - - - | Project personnel will supply the 60 pound sample of sand and the 20 pound sample of sawdust needed to perform the testing shown under the column.<br><br>The samples shall be taken at the project or mixing site. | - - - - - - - - - - | One 60 pound sample of sand and one 20 pound sample of sawdust pre-construction samples for mix design approval. | - - - - - - - - - - |

| MATERIAL | TYPE OF TEST | Minimum Material Certificate, Sample and Inspection Requirements | | | | |
|---|---|---|---|---|---|---|
| | | Q.C. SAMPLING AND TESTING BY CONTRACTOR | VERIFICATION SAMPLING AND TESTING BY NDOR | | | LOCATION OF ADDITIONAL INFORMATION |
| **Section: 25 – Miscellaneous Materials (continued)** | | | **FIELD PERSONNEL** | **BRANCH LAB** | **CENTRAL LAB** | |
| 22) Sand for Absorption Field | Gradation | - - - - - - - - - - | A minimum of two gradation tests per project The recommended sample size is 25 pounds.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample per project for gradation. | - - - - - - - - - - |
| 23) Sawdust for Absorption Field | Gradation | - - - - - - - - - - | A minimum of two gradation tests per project. The recommended sample size is 10 pounds.<br><br>Project personnel will supply the 10 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 10 pound sample per project for gradation. | - - - - - - - - - - |
| 24) Com-bined Sand/ Sawdust for Absorption Field | Permeability | - - - - - - - - - - | Project personnel will supply the 60 pound sample needed to perform the testing shown under the central laboratory column.<br><br>The sample shall be taken at the project. | - - - - - - - - - - | One 60 pound construction sample for permeability test. | - - - - - - - - - - |

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## Section 26
## Building Materials

# Section 26
# Building Materials
# Building Inspection and Acceptance

Inspection of buildings involves checking many items that are not normally encountered in the inspection of highway work. Any questions concerning building inspection should be directed to the Highway Architect of the Roadway Design Division (Rest Area buildings) or to the Architecture Section of the Capital Facilities and Transportation Services Division (all other buildings).

Upon project completion, the Project Manager shall advise the Materials and Research Division, in writing, that all materials or items used were approved for use on the basis of tests, field inspection, or that approval was given by the Highway Architect or Architecture Section for use.

A copy of this letter should be sent to the Highway Architect or Architecture Section.

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## Section 27
## Notes

## Note 1
## Sampling and Testing Small Quantities of Noncritical Materials

Certain exceptions to the normal sampling and testing procedures may be made where quantities of noncritical items or materials are too small to justify the cost of testing or inspection. These exceptions in sampling and testing are intended for small quantities of materials whose positions on the project are not structurally critical. Such procedures are not to be permitted in materials for major structures, permanent mainline or ramp pavements, or other structurally critical items where use of unsound materials might significantly influence the performance, strength or durability of that item, or the public safety.

By submitting a DR Form 181, Letter of Certification by project manager, to the Materials and Research Division, the project manager may waive their respective sampling and testing requirements where quantities of noncritical items or materials are too small to justify the cost of testing or inspection. When this method is used, records must be documented as provided in paragraph 1(a) and/or (b) and paragraph 2 of DR Form 181.

The following tabulation indicates the approximate maximum quantities of material, excepting Portland cement concrete and asphaltic concrete that may be accepted under the methods indicated above:

a. Aggregates (for Portland cement concrete and asphaltic concrete quality testing of aggregate is required) – Not to exceed approximately 200 cubic yard per day nor more than approximately 500 cubic yard per project. Rock riprap and Gabion stone fill shall not exceed 1000 tons per project.

b. Bituminous Mixtures (cold mix) – Not to exceed approximately 50 tons per day nor more than approximately 250 tons per project.

c. Asphaltic Oils and Emulsified Asphalts – Not to exceed approximately 1500 gallons of each type per project.

d. Paint – Not to exceed approximately five gallons of each type per project. Brand name paints of the color specified and the weights and analysis on the container label should be the basis for acceptance.

e. Dimensional Lumber (2x4, 1x6, etc.) – Recognized commercial grades only may be used.

f. Masonry Items – Not to exceed approximately 100 pieces of each item. Acceptance should be based on physical measurements for nominal size and visual inspection. Masonry items may include but are not exclusive to bricks, concrete blocks, etc.

Portland cement concrete for the items and approximate quantities listed below may be accepted by entering a sample in SiteManager and selecting the “Small Quantities of Non-Critical Materials” Test Method:

a. Sidewalks – not to exceed 200 cubic yards per day

b. Median Surfacing – not to exceed 200 cubic yards per day

c. Concrete Base Course – not to exceed 200 cubic yards per day

d. Concrete Base Course Widening – not to exceed 200 cubic yards per day

e. Curb and Gutter – not to exceed approximately 500 linear feet per project, or 50 cubic yards per day, for more than two consecutive days

f. Slope Paving and Headers – not to exceed 50 cubic yards

g. Paved Ditch (intermittent water flow)

h. Single Culvert Headwalls and Collars

i. Catch Basins, Manhole Bases and Inlets

j. Concrete Ditch Checks

k. Post Hole Concrete (Fence and Guardrail)

l. Miscellaneous Concrete – Concrete placements of five cubic yards or less and which are non-critical. Non-critical refers to placements that will not be subject to traffic loading and for which failure is not likely to disrupt traffic or pose a threat of harm to the traveling public.

Acceptance under this system shall be based on the following:

a. Delivery tickets shall accompany each load.

b. The concrete plant must comply with the specifications.

c. Only state tested and approved aggregates, cements and admixtures may be used.

d. Project personnel will perform necessary testing on any material they feel may be of inferior quality.

e. The project manager will determine that the concrete for these items is from a known reliable source and fulfills the requirements for the purpose intended.

The above system is intended to provide a method whereby the project manager may be relieved of sampling and testing small quantities of material which, in his judgment, are placed in such a location within the project that the absence of sampling and testing does not materially affect the principle of sound engineering control. This program includes, but is not exclusive to, the items in the list above. Many other miscellaneous minor items (e.g., 3 or 4 posts, a few bolts, washers, nuts, a few pieces of pipe, short pieces of wire, a few pieces of reinforcing steel, a few feet of fencing material, etc.) will be within the definition of the above but cannot all be listed inasmuch as location on the project will determine the need to sample and test.

A word of caution: this system should not be used as a means of reducing sampling and testing of materials by adjusting daily delivery of quantities, nor to allow the contractor to provide non-specifications materials. It is intended that all materials shall comply with specification requirements but that this compliance is determined by experience and judgment and that the project manager shall retain absolute control over the determination of items to be accepted without the usual engineering controls.

## Note 2
## Asphaltic Oils, Performance Graded Binders, and Emulsified Asphalt

**Acceptance Procedures:**

General – The project manager must send his/her address to each supplier which is expected to ship asphaltic material to projects under his/her supervision.

Since payment for the asphalt materials is based on net tons or gallons shown on the supplier's certificate of compliance, it is important that the project manager check each truck to make sure that it has been completely emptied.

Only certified suppliers may furnish asphaltic material to the state. Certified suppliers have been instructed to furnish a copy of their certificate of compliance to the project manager for each truck shipped to the project.

The certificate of compliance is to be sent with the truck driver for delivery to the project manager.

A certificate of compliance is required and must certify:

a) The specific gravity at 60°F of the material.

b) Any special handling/storage requirements.

c) Net gallons at 60°F of the shipment.

d) That the material meets the specification requirements.

e) Certificates of compliance must be signed by an authorized employee of the supplier.

Asphaltic materials may be used immediately on the basis of the supplier's certificate of compliance.

A Bill of Lading may serve as a certificate of compliance, provided it contains all the required information.

Samples shall be taken in accordance with AASHTO T 40, Section 10, as applicable.

The contractor's certified sampling technician, under the supervision and direction of Nebraska Department of Roads personnel, will sample bituminous materials.

The contractor's certified sampling technician will fill out the DR Form 184, Certified Sample Registration, whenever a sample is taken. The Certified Sample Registration form will be located at the plant site.

Performance Graded Binders shall be sampled from the line between the storage tank and the mixer, or from the storage tank itself supplying material to that line.

## Note 3
## Asphaltic Concrete Small Quantities

The testing requirements of asphaltic concrete identified in the contract for quantities of less than one lot (3,750 tons) may be modified by the District Construction Engineer.

When testing requirements are modified, the method of acceptance, with agreement of the contractor, will be established by the engineer.

## Note 4
## Quality Tests of Aggregates

In order to reduce the duplication of quality tests of aggregates from the same source by the central laboratory, it is requested that DR Form 324, Source of Aggregates to be Used, (required for quality tests), be completed by the project manager for each project or purchase order. After recording the necessary information, this form should be forwarded to the Materials and Research Division prior to actual production of any aggregate.

After review by the Materials and Research Division, this form will be returned indicating if it will be necessary to submit a 60 pound sample to the central laboratory for quality tests or if the quality tests will be waived.

Quality test results obtained by the central laboratory for aggregates from the various sources throughout the state will be kept on file in the central laboratory.

For verification testing for sand-gravel aggregate, the sand equivalent test is required for all dry pits.

## Note 5
## Crushed Rock Aggregate Inspected at the Source

This note was removed effective January 1, 2013.

## Note 6
## Portland Cement Concrete

The minimum frequency for determining the yield, air content, and gradation of aggregates used is based on the average daily production. In some instances, for adequate control, it may be necessary to perform the required test more often.

Concrete Cylinders Size – 4x8 inch cylinder molds must be used on all projects. When testing 4x8 cylinders, 2 cylinders will be averaged for one test result. Compressive strength testing is required

until the design strength is obtained; not to exceed specification time constraints. For bridge decks, a 28-day compressive strength is required.

Shotcrete – Mortar Cubes: Two-inch cube molds must be used on all projects. Two sets of three 2-inch cubes will be made daily in the field. Three cubes will be tested and averaged for the final design compressive strength at 28 days.

## Note 7
## Concrete Chemical Admixtures

All types and brands of admixtures are to be recorded on the PCC Proportioning Report template.

If a concrete admixture is of a questionable nature, the ready mix producer must contact the company representative to address the concerns regarding the admixture. The findings of this investigation will be given to the project manager who must give his approval before the admixture can be used.

## Note 8
## Liquid Curing Compound

This material is pretested by the Materials and Research Division Laboratory with samples coming directly from the manufacturer. Upon passing the required tests, the cure compound is approved for one year from the date of approval. Approved lot numbers can be obtained by the Department of Roads Materials and Research Division website. Curing compound lot numbers not found must be sampled, tested and approved before being used. The project manager will notify the Materials and Research Division as to which project the material is to be used on.

## Note 9
## Reinforcing Steel, Bars and Fabric

Generally reinforcing steel, supplied by Nebraska manufacturers or fabricators, is sampled and tested by the central laboratory, which maintains a stock record of tested material at these plants. A 'Report of Shipment of Steel for Concrete Reinforcement'" is issued by the M&R Division to cover each shipment to a project.

Reinforcing steel may occasionally be furnished directly to the project from a manufacturer without being previously tested by the central laboratory. In this case, samples and certificates should be submitted to the central laboratory as prescribed by the MSG. Reinforcing steel furnished under these circumstances should not be used until tests are completed and approved.

## Note 10
## Beam and Cable Guard Rail and Fittings

Beam and cable guardrail and associated hardware furnished by each supplier is tested once each year to check their respective stock of material. Any material shipped from the tested stock of these suppliers to state projects will not require any additional sampling, testing, or certification. Shipping reports showing the material shipped will be distributed by the Materials and Research Division to the project manager and others concerned.

When the supplier's tested stock is exhausted, he may continue to ship additional material to state projects, however, this material must be covered by the type of certification shown in this sampling guide for the particular item involved. The certifications and supplier's shipping report will be sent to Materials and Research Division for approval and distribution to the project manager and others concerned.

Occasionally, guardrail material may be sampled on the project for a supplier's stock. In this case, the project manager will be notified by the Materials and Research Division concerning the samples required.

When steel posts (end posts, special posts, mounting brackets, etc.) used with beam guard rail are shipped to a project on the basis of certificates of compliance, they will be field checked by the project manager for correct dimensions and for the amount of zinc coating or paint thickness. A report showing the number of posts, the measurements, and coating thickness will be sent to the Materials and Research Division for distribution.

## Note 11
## Metal Culvert Pipe Field Inspection and Reporting

The random sampling procedure at the pipe fabricators plant requires the supplier to send a copy of his shipping report with the truck delivering the materials. The report will be addressed to 'Project Manager'. If the project manager or his inspector is not present when the material is unloaded, the report will be left with the contractor, if he is present, for transmittal to the project manager. Should the material be stockpiled at a site where neither the contractor nor his inspector is present, the truck driver will return the report to his office and it will be mailed to the project manager.

The shipping report may be either a Form MT-750 or a fabricator's bill of lading and will show the following information for the culvert pipe in the shipment: Quantity (linear feet), size, heat number, thickness of sheets for each size of pipe, brand, and the fabricator's certification of compliance.

The pipe may be approved for use as soon as the project manager verifies that the material received is as described on the shipping report, and that the pipe has not been damaged in shipment or handling. Any corrections or notes should be made on the project manager's copy of the shipping report that should then be sent to the Materials and Research Division. A copy of the project report covering the shipment will be sent to the project manager by the Materials and Research Division.

## Note 12
## Bolts, Nuts and Washers, and Structural Fasteners

Tested and approved stock will be tagged with a Department of Roads' white inspection tag (TL-5401) inside or outside of the container. Shipments so tagged may be used immediately. Shipment reports referencing to the stock test will be issued by Materials and Research Division.

## Note 13
## Precast and Prestressed Concrete Units (Bearing Piling, Sheet Piling, Girders, etc.)

Precast and prestressed concrete units are usually produced by commercial plants within the state. Inspection of these units is generally provided by Department of Roads' personnel.

When shipment from the fabricating plant is made to a project, a shipping report DR Form 214, Report of Shipment of Precast and Prestressed Concrete Units from Tested Stock, is completed by the inspector with copies to the Materials and Research Division, Division Engineer, and the project manager. A preliminary copy shall accompany the units with the driver of the hauling vehicle.

The shipping report gives the inspector's coding of each unit shipped and is verification of acceptability provided the units shipped show no evidence of damage incurred through handling enroute to the project.

No unit received on the project shall be used in the work until the project manager has checked the inspector's identification as shown on the shipping report with that shown on the units.

## Note 14
## Steel Bearing Piling, Steel Sheet Piling and Steel Shells for Cast-in-Place Piling

These items are accepted at the time of manufacture. The contractor shall be required to supply the project manager with the certified test reports when the material is delivered to the project. The project manager shall check the heat numbers shown on these reports with those on the piling. He shall forward the mill test reports to the Materials and Research Division.

## Note 15
## Structural Steel for Superstructure, Substructure, and Handrail

Structural steel is accepted for use on the basis of physical and chemical tests made at the time of manufacture. The department inspector at the fabrication plant will obtain, from the fabricator, the certified mill tests representing the structural shapes being fabricated. He will obtain a certificate of compliance listing all other items which are considered as miscellaneous and for which mill tests cannot be obtained. These miscellaneous items include tie rods and turnbuckles, bearing devices, nose angles, roadway devices and dam plates, armor angles, floor drains, and all bolts except high strength bolts, etc. He will review all mill tests for compliance with the specifications and approval will be stamped or written and signed by him. The project manager shall not accept for use any structural steel shapes until he has received the shop inspection reports and approved mill tests or certificates of compliance from Materials and Research Division, or approval to use this material. All mill test report sheets shall show the project number for which material will be used.

## Note 16
## Combination Mast Arm Signal and Lighting Poles, Mast Arm Signal Poles, Span Wire Poles, Pedestal Traffic Signal Poles and Light Poles

The Standard Specifications require that the manufacturer of the pole shall supply the anchor bolts, anchor bolt covers, pole bases, and all miscellaneous hardware. The pole manufacturer shall furnish a certificate stating that the poles and anchor bolts shall be capable of supporting the required load under the specified design criteria and shall withstand the specified wind and ice load. The pole manufacturer shall furnish certified mill tests of any materials used in the manufacturer of the pole and its accessories.

The specific requirement for each of the pole types and accessories is shown in the Standard Specifications.

## Note 17
## Electrical Items

Electrical items are accepted for use on the basis of sample inspection and testing, receipt of certified test reports, or certificates of compliance. Where required, certified tests or certificates of compliance shall be furnished to the project manager by the contractor. The project manager shall forward the certified tests and/or certificates of compliance to the Materials and Research Division for review and distribution.

The project manager shall not accept or permit the installation of any electrical items until he has received the required tests and/or certification documents indicating approval for use through communication with the Materials and Research Division, Traffic Engineering or concerned authority, pending receipt of the documentation. Special attention shall be given to those items which will not be readily available to inspection during or after completion of the work or where removal and replacement under adverse conditions such as under traffic, etc. would be an inconvenience to the contractor, the state, or the traveling public.

## Note 18
## Gray Iron Castings (Cast Iron Grates, Frames, Pull Box Frames and Covers, Junction Boxes, etc.)

When these items are furnished from the Lincoln or Omaha area, they will probably be supplied from a tested pour representing stock at the foundry. Shipments to projects from these stocks will be reported to the Materials and Research Division by the foundries. Castings will usually be identified by a letter or symbol representing the foundry, followed by numbers representing the date the casting was poured. The Materials and Research Division will issue a 'Report of Shipment of Gray Iron Castings' which will include a list of the items shipped to the project, the quantity, identification and references to the stock tests. This report constitutes approval of the tensile strength of the iron used in these castings. Since the finished castings are not inspected prior to shipment, acceptance should

be based on field inspection showing good workmanship and compliance with the dimensional and weight requirements specified in the contract documents.

Cast iron materials furnished from other sources may not be supplied from tested stocks. In this case, the project manager shall obtain the manufacturer's certificate of compliance for this material from the contractor prior to installation.

## Note 19
## Source of Certificate of Compliance

The certificate of compliance must be from the manufacturer, not the supplier.

## Note 20
## Luminaire Settings

Luminaire sockets have adjustments that provide for a choice of light distribution patterns. The project manager shall inspect the settings on each luminaire socket and report this setting to the Lighting Engineer. Adequate descriptive literature is provided with each type of luminaire to determine the setting. The report may be in the form of a letter, sketch, etc.

## Note 21
## Signing Items

Signing items are accepted for use on the basis of sample inspection, testing and receipt of certified test reports, and certificates of compliance. Sample inspection and testing will be performed by Traffic Engineering and Materials and Research Divisions. Where required, certified tests or certificates of compliance shall be furnished by the contractor to the project manager. The project manager shall forward the certified tests and certificates of compliance to the Materials and Research Division for approval and distribution.

The project manager shall not accept signing items for use until he has received the required tests and/or certification documents indicating approval for use or has verified acceptability of the signing items for use through communication with the Materials and Research Division, the Traffic Engineering Division, or concerning authority, pending receipt of the documentation.

## Note 22
## Reflectors and Fasteners

When shipment is made from approved stock, inspection tags will be attached to or placed within the container. Units can be used upon delivery to the project on the basis of the inspection tag. The Materials and Research Division will issue an acceptance report upon shipment of the units.

The brand of reflector used must be entered in SiteManager.

## Note 23
## Delineator Posts

When delineator posts are delivered to a project from a tested and approved stock, the bundles will be tagged with a Department of Roads' white inspection tag (TL-5401). The project manager does not need to notify the Materials and Research Division and can use this material upon delivery to the project. A shipment report will be issued by the Materials and Research Division which will refer to the stock test report numbers covering the posts and show the sizes and quantities represented.

Posts delivered to a project which are not supplied from a previously tested and approved stock should not be used until they have been tested and approved by the Materials and Research Division.

## Note 24
## Right of Way Markers

These units are usually produced by commercial plants within the state. Inspection of these units is generally provided by department personnel.

When shipment from the fabricating plant is made to a project, a shipping report (Report of Shipment of Precast Concrete ROW Markers From Approved Stock) is completed by the inspector with copies to the Materials and Research Division, district engineer, and project manager.

The shipping report gives the lot number and quantity shipped and is verification of acceptability provided the units shipped show no evidence of damage incurred through handling enroute to the project.

## Note 25
## Treated and Untreated Timber Piling, Treated Timber Sheet Piling, Fence Posts, Treated and Untreated Lumber, Treated and Untreated Timber, Wood Guard Rail Posts, Offset Blocks, Treated Poles and Sign Posts

These materials are normally accepted on the basis of Certificates of Compliance from the producer and treater or Certificates of Inspection and Treatment from a commercial testing laboratory arranged for by the supplier and approved by the Materials and Research Division.

Materials accepted on the basis of Certificates of Compliance from the producer and treater will usually not have any identifying hammer mark on the end.

Materials accepted on the basis of Certificate of Inspection and Treatment from a commercial testing laboratory will have a hammer mark on the end of each piece.

Wood materials may be used upon delivery to the project provided they have not been damaged and the proper identifying hammer mark is on the end of each piece and the report covering the inspection is on hand or the project manager has received approved Certificates of Compliance from the Materials and Research Division the for the materials delivered.

If material is delivered to the project prior to receipt of the test reports or Certificate of Compliance, the project manager shall notify the Materials and Research Division promptly, giving all pertinent data such as project number, name of Jobber or supplier, the mill or treating plant, car number, hammer mark, number of pieces, and any other information available. Action can then be started to obtain the test report of Certificate of Compliance in the event it has not been received at the laboratory.

Wood items are sometimes tested and placed in stock at jobber's plants. The Materials and Research Division has the test reports supplied by the commercial testing agency or the Certificates of Compliance from the producer and treater for any material which they have inspected and approved for the department. When the jobber makes a shipment to a state project, he submits a shipment report (Form TL-5162) to the Materials and Research Division showing the project number and other pertinent information. If the material shown on the shipment report is as specified for the project and reports covering the inspection and approval of the material are on file at the Materials and Research Division, the report is signed by Materials and Research Division and sent to the project manager.

## Note 26
## Rock Riprap and Gabion Stone Fill

The sampling of rock riprap and gabion stone fill is not required if the material is received from any of the following sources:

Concrete Materials Company (Sioux Falls, SD)
Fisher Sand & Gravel (Mitchell, SD)
Martin Marietta Materials (Ft Calhoun, NE)
Martin Marietta Materials (Guernsey, WY)
Hills Materials Company (Hot Springs, SD)
Kerford Limestone (Weeping Water, NE)
L. G. Everst (Del Rapids, SD)
Martin Marietta Materials (Weeping Water, NE)

Martin Marietta Materials (Granite Canyon, WY)
Spencer Quarry (Spencer, SD)

Since acceptance will be at the source, field inspection will normally be limited to observation for size, cleanliness and segregation problems. A delivery ticket for each load of rock riprap or gabion stone fill delivered to the project or work site should include the name of the producer, the date, the location of the quarry, the quantity delivered (in tons), the name of the contractor and the project number. The delivery ticket should be given to the department representative at the time of arrival.

If the rock riprap is from a source that is not pre-approved, contact the Materials and Research Division's Aggregate laboratory for sample criteria.

## Note 27
## High Friction Surface Treatment

These materials are accepted on the basis of Manufacturer Certified Tests and Certificates of Compliance.

Aggregate:

- The Certificate of Compliance must cite the Aluminum Oxide ($Al_2O_3$) content for calcined bauxite.

Polymer Binder Resin:

- The Manufacturer Certified Tests will require independent laboratory tests meeting the conditions of Table 1, Physical Requirements of the Polymer Binder Resin System; found in the special provisions.
- The Certificate of Compliance must include product, lot number, and expiration date.
- The material properties shall meet the conditions of Table 1, Physical Requirements of the Polymer Binder Resin System; found in the special provisions.
- The Certificate of Compliance must be signed by a company representative.
- Fourier Transform Infrared Spectrophotometry (FTIR) spectra is required from the manufacturer.

# NEBRASKA DEPARTMENT OF ROADS

# QUALITY ASSURANCE PROGRAM

# FOR

# CONSTRUCTION

# MATERIALS

**Materials Sampling Guide, Section 28**

January 1, 2015

**NEBRASKA DEPARTMENT OF ROADS**
**QUALITY ASSURANCE PROGRAM FOR CONSTRUCTION**

## TABLE OF CONTENTS

## 1. INTRODUCTION

**1.1** This manual describes a "Quality Assurance Program for Construction" established by the Nebraska Department of Roads (NDOR). The intent of this program is to provide adequate assurance that the materials and workmanship incorporated in transportation projects as specified in paragraph 1.5 of this section, are in reasonable conformity with the requirements of the plans and specifications including any approved changes.

**1.2** The first level of assurance is provided by qualified laboratories and testing personnel. This assures that equipment and personnel are capable of performing the tests properly. An Independent Assurance program provides the second level of assurance. This level assures that testing personnel and equipment remain capable of performing the tests properly. The third level of assurance is provided by verification sampling and testing. This level assures the quality of the product.

**1.3** This program has been developed in conformance with the criteria contained in 23 CFR 637 (B). It consists of an Acceptance Program and Independent Assurance Program. The Acceptance Program provides sampling and test results, obtained by qualified testing personnel and laboratories, used in the acceptance decision. The Independent Assurance Program provides for checking the testing personnel and test equipment.

**1.4** This Quality Assurance Program allows for the use of validated contractor-performed quality control (QC) test results for the acceptance decision. It also allows for the use of test results obtained by commercial laboratories in the Independent Assurance Program, as well as in acceptance decisions. Contractor and commercial laboratories and their personnel performing Quality Control sampling and testing used in the acceptance decision must be evaluated by the Independent Assurance Program.

**1.5** *Applicability* – This "Quality Assurance Program for Construction" is required for all highways on the National and State Highway Systems let through the NDOR Construction Division's electronic bidding system. It does not apply to roadside appurtenances to the National and State Highway Systems such as rest areas and weigh stations, except for any driving surfaces or parking areas associated with a roadside appurtenance. The program is also required for all local projects let through the NDOR electronic bidding system. If the project is not let through NDOR, a local jurisdiction may, at their discretion, specify the requirements contained herein for any or all construction projects under their authority.

## 2. DEFINITIONS

**2.1 *Acceptance Program*** – All factors that comprise NDOR's determination of the quality of the product as specified in the contract requirements. These factors include verification sampling, testing, and inspection, as well as results of quality control sampling and testing.

**2.2 *Engineer*** – A representative duly authorized by the Director, such representative acting within the scope of the particular duties assigned to him/her or the authority given to him/her.

**2.3 *Independent Assurance Program*** – Activities that are an unbiased and independent evaluation of all sampling and testing procedures used in the acceptance program. Test procedures used in the acceptance program which are performed in the Materials and Research Central Laboratory are not covered by the Independent Assurance Program since the central laboratory maintains accreditation through the AASHTO Accreditation Program.

**2.4 *Proficiency Samples*** – Homogeneous samples that are distributed and tested by two or more laboratories. The test results are compared to assure that the laboratories are obtaining the same results.

**2.5 *Qualified Laboratories*** – Laboratories that are capable of performing test procedures as established by the NDOR Laboratory/Equipment Qualification Program (Appendix B). This program includes, as a minimum, provisions for checking test equipment and a requirement that the laboratory maintain records of all calibration checks.

**2.6 *Qualified Sampling and Testing Personnel*** – Personnel who are capable of sampling and testing construction materials as established by the NDOR Sampling and Testing Personnel Qualification Program (Appendix A). This program includes, as a minimum, requirements that personnel demonstrate their ability to perform sampling and testing procedures, as well as, pass a written examination.

**2.7 *Quality Assurance*** – All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

**2.8 *Quality Control*** – All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

**2.9 *Random Sample*** – A sample drawn from a lot in which each increment in the lot has an equal probability of being chosen.

**2.10 *Vendor*** – A supplier of project-produced material that is not the contractor, such as an aggregate producer or ready-mix concrete supplier.

**2.11 *Verification Sampling and Testing*** – Sampling and testing performed to validate the quality of a product.

## 3. ACCEPTANCE PROGRAM

**3.1** ***General*** – Materials incorporated into any highway construction project shall be subject to verification sampling and testing, as well as, QC sampling and testing when required by the specifications.

**3.2** ***Verification Sampling and Testing (Frequency, Location and Attributes)*** – Frequency of the verification sampling and testing will depend on whether or not the contractor's QC testing (See Section 3.3) is a part of the acceptance decision. Verification sampling and testing shall be performed at the location and frequency, and for the attributes (gradation, density, air content, etc.) established in the NDOR Materials Sampling Guide. Verification sampling and testing personnel, laboratories, and equipment shall be qualified in accordance with the NDOR Sampling and Testing Personnel Qualification Program (Appendix A) and the NDOR Laboratory/Equipment Qualification Program (Appendix B) and shall be evaluated under the Independent Assurance Program shown in Section 4 of this document. Qualified NDOR personnel or their designated agents shall perform verification sampling and testing. Copy of the verification test results will be sent to the contractor, NDOR project manager, and the Materials and Research Central Laboratory.

**3.2.1** *Project Produced Materials* – These materials can generally be described as those that are produced to meet the requirements of a specific project. They are characterized by being sampled at the construction project site and tested either at the project site or at a qualified laboratory. Aggregates, asphaltic concrete, and Portland cement concrete are considered project produced materials. The NDOR Materials Sampling Guide identifies the location and frequency for sampling and testing the various attributes (gradation, density, air content, etc.) of project produced materials.

**3.2.2** *Manufactured Materials* – These materials can generally be described as those that are manufactured to meet the requirements of a specific AASHTO, ASTM, or other standard. They can be used on numerous construction projects, provided they meet specification requirements for those projects. These materials may require sampling at the project site with the sample forwarded to the Materials and Research Central Laboratory for testing. These materials may also require manufacturer certifications and/or manufacturer certified test reports. Some manufactured materials may be pre-tested through arrangements with the Materials and Research Central Laboratory. Pre-tested materials are identified by approved lot numbers or identification tags indicating an NDOR approved material. Pre-tested materials that have been primarily tested or approved by the Materials and Research Central Laboratory may be used without further sampling and testing.

**3.2.3** *Approved Products List* – Materials identified in the NDOR Approved Products List may be used on a project by notifying the Engineer of the specific brand name. The NDOR Materials and Research Central Laboratory approves these materials for use on projects. Materials on the NDOR Approved Products List do not require sampling and testing on the project site, unless requested by the Engineer. They do not require a certificate of compliance or certified test report unless the need for such a document is specifically identified in the NDOR Approved Products List or the project specifications.

**3.3** ***Quality Control Sampling and Testing*** – Contractor performed Quality Control (QC) sampling and testing may be used as a part of the acceptance decision when required or allowed by the project specifications. Quality Control sampling and testing personnel, laboratories, and equipment shall be qualified in accordance with the NDOR Sampling and Testing Personnel Qualification Program (Appendix A) and the NDOR Laboratory/Equipment Qualification Program (Appendix B) and shall be evaluated under the Independent Assurance Program shown in Section 4 of this document. Quality control test results shall be validated by verification test results (See Section 3.2) obtained from independently taken samples. Qualified NDOR personnel or their designated agents shall perform verification sampling and testing.

**3.3.1** *Quality Control Program* – When required by the specifications a Quality Control Program must be developed by the contractor and submitted as required by the contract for approval. The minimum requirements of a Quality Control Program are shown in Appendix C. Specifications may require that additional information be provided in the Quality Control Program.

**3.3.2** *Dispute Resolution System* – When quality control test results are used in the acceptance decision, discrepancies arising between the verification sampling and testing performed by NDOR, or its designated agents, and quality control sampling and testing performed by the contractor, shall be resolved in a reliable, unbiased manner, by referee testing or evaluation performed by the Materials and Research Central Laboratory. On every sample, NDOR will retain enough material to conduct a dispute resolution on the original sample material. If NDOR doesn't have enough original material to sample, NDOR reserves the right to test from in-place material or other means of investigation. The decision by the Materials and Research Central Laboratory will be final. The Materials and Research Central Laboratory may obtain the services of an independent commercial laboratory accredited in the testing to be performed, by the AASHTO Accreditation Program or a comparable laboratory accreditation program approved by FHWA, to aid in resolving any dispute. The decision to utilize the services of an independent commercial laboratory rests solely with the Materials and Research Central Laboratory.

## 4. INDEPENDENT ASSURANCE PROGRAM

**4.1 *General*** – All sampling and testing procedures, personnel and equipment used as part of the acceptance decision shall be evaluated by the Independent Assurance (IA) Program. Any non-NDOR laboratory which performs Independent Assurance sampling and testing shall be accredited in the testing to be performed, by the AASHTO Accreditation Program or a comparable laboratory accreditation program approved by FHWA. The Independent Assurance Program includes both system and project-based approaches. The system approach shall be used unless the specifications for a project specifically require a project-based approach for independent assurance sampling and testing.

**4.1.1** *System Approach* – The system approach bases frequency of independent assurance activities on time, regardless of the number of tests, quantities of materials, or number of projects being tested by an individual being evaluated.

**4.1.2** *Project-Based Approach* – The project-based approach bases frequency of independent assurance activities primarily on quantities of materials being tested and requires minimum independent assurance activities on the project.

**4.2 *Sampling and Testing Frequency and Location*** – Independent assurance sampling and testing shall be performed at the location and frequency, and for the attributes (gradation, density, air content, etc.) established in the NDOR Materials Sampling Guide. Sampling and testing procedures performed by the Materials and Research Central Laboratory are not subject to the independent assurance program since the laboratory maintains accreditation through the AASHTO Accreditation Program.

**4.3 *Testing Equipment*** – Branch Laboratory equipment used for independent assurance sampling and testing shall be qualified by the Materials and Research Central Laboratory in accordance with the NDOR Laboratory/Equipment Qualification Program (Appendix B). The Central Laboratory shall qualify any AASHTO accredited commercial laboratory equipment used for independent assurance sampling and testing by verifying that the equipment has been calibrated/verified and that supporting calibration/verification data is on file. The frequency for qualifying independent assurance sampling and testing equipment shall not exceed one year. Qualification shall be scheduled on a more frequent basis if the operation of the equipment is suspect. The independent assurance equipment shall be other than that used for quality control sampling and testing. Any equipment used to perform verification and/or quality control sampling and testing for an acceptance decision shall be evaluated by independent assurance sampling and testing personnel. This evaluation shall include calibration checks and split or proficiency sample tests. The requirements for, and frequency of, verification and/or quality control equipment calibration are shown in Appendix B. Acceptable tolerance limits for the comparison of test results for split or proficiency samples are shown in Appendix D.

**4.4 *Testing Personnel*** – Branch Laboratory personnel who perform Independent Assurance sampling and testing shall be

qualified by the Materials and Research Central Laboratory in accordance with the NDOR Sampling and Testing Personnel Qualification Program (Appendix A). The Central Laboratory shall qualify any AASHTO accredited commercial laboratory personnel performing independent assurance sampling and testing by verifying that the laboratory is accredited in the applicable test procedures and that the personnel meet the AASHTO Accreditation Program requirements. When contractor's QC testing is part of the acceptance program, Individuals performing independent assurance sampling and testing may also perform the verification sampling and testing. When contractor's QC testing is not part of the acceptance program, Individuals performing independent assurance sampling and testing shall be other than those who perform verification sampling and testing. Any individual who performs verification or quality control sampling and testing shall be evaluated by independent assurance sampling and testing personnel at least once a year. This evaluation shall include observation and spilt or proficiency sampling and testing. Acceptable tolerance limits for the comparison of test results from spilt or proficiency samples are shown in Appendix D. An IA will not be required of any individual for the year they receive certification or recertification for AASHTO and ASTM test methods.

**4.5 *Comparison of Test Results*** – A prompt comparison of test results obtained by the individual being evaluated and the independent assurance tester shall be performed by a Quality Assurance Manager, a qualified evaluator designated by the Quality Assurance Manager, or AASHTO accredited commercial laboratory personnel. Acceptable tolerance limits for the comparison of test results from split or proficiency samples are shown in Appendix D. If the comparison of test results do not comply with the tolerances, a review of the test procedure and testing equipment shall be performed immediately to determine the source of the discrepancy. Corrective action must be identified and incorporated as appropriate, followed by additional independent assurance testing. Test results from all samples involved in the Independent Assurance Program shall be documented with reports maintained in Branch Laboratory files. Copies of these reports shall be transmitted to the appropriate District. When a project-based approach is used for the Independent Assurance Program, copies of the reports shall also be maintained in the project files. If an AASHTO accredited commercial laboratory performs independent assurance testing, all test results and reports shall be forwarded to the Central Laboratory for distribution to the appropriate Branch Laboratory and District.

**4.6 Annual Report of Independent Assurance Program Results** – An annual report, conforming in substance to that shown in Appendix F, shall be submitted to the FHWA Division Administrator summarizing the results of the NDOR system approach Independent Assurance Program.

## 5. MATERIALS CERTIFICATION

**5.1** A materials certification, conforming in substance to that shown in Appendix E shall be submitted to the FHWA Division Administrator for each construction project which:

5.1.1 Utilizes federal funding and is over $1,000,000 or

5.1.2 Subject to full federal oversight.

## 6. CONFLICT OF INTEREST

**6.1** To avoid the appearance of a conflict of interest, any qualified non-NDOR laboratory shall perform only one of the following types of testing on the same project: verification testing, quality control testing, independent assurance testing, or dispute resolution testing.

## 7. QUALIFICATION OF LABORATORIES AND SAMPLING AND TESTING PERSONNEL

**7.1 *Laboratories*:**

**7.1.1** The NDOR Materials and Research Central Laboratory shall be accredited and maintain accreditation through the AASHTO Accreditation Program.

**7.1.2** After June 29, 2000, all contractor, vendor and NDOR testing used in the acceptance decision shall be performed by qualified laboratories and/or equipment in accordance with the NDOR Laboratory/ Equipment Qualification Program (Appendix B).

**7.1.3** After June 29, 2000, any non-NDOR laboratory designated to perform independent assurance sampling and testing shall be accredited in the testing to be performed by the AASHTO Accreditation Program.

**7.1.4** After June 29, 2000, any non-NDOR laboratory that is used in dispute resolution sampling and testing shall be accredited in the testing to be performed by the AASHTO Accreditation Program.

**7.2 *Sampling and Testing Personnel*** After June 29, 2000, all sampling and testing data to be used in the acceptance decision or the independent assurance program shall be performed by qualified sampling and testing personnel in accordance with the NDOR Sampling and Testing Personnel Qualification Program (Appendix A).

## APPENDIX A

## SAMPLING AND TESTING PERSONNEL QUALIFICATION PROGRAM

**A1. *Purpose*** – This program provides uniform statewide procedures for sampling and testing personnel qualifications to ensure that tests required by the specifications are performed in accordance with prescribed sampling and testing methods.

**A2. *Qualification of Sampling and Testing Personnel***:

**A2.1** Any individual who samples and/or performs required tests on materials for acceptance or verification must be qualified.

**A2.2** Sampling and testing personnel will be qualified to perform tests for the acceptance or verification of materials in the areas of aggregates, soils, bituminous materials and Portland cement concrete. The test methods for which individuals will be qualified shall include, but are not limited to, those shown in Table A1. There may be other test procedures used in specific geographical locations of the state or used on unique construction projects in which sampling and testing personnel need to be qualified.

**A3. *Responsibility for Qualifying Sampling and Testing Personnel***:

**A3.1** The following personnel may qualify an individual to perform required tests on materials by observing each test and administering the required examinations:

**A3.1.1** Materials and Research Central Laboratory personnel.

**A3.1.2** Quality Assurance Managers; responsible for Branch Laboratory personnel and operations and responsible for Independent Assurance Sampling.

**A3.1.3** Qualified Branch Laboratory personnel who have been authorized by a Quality Assurance Manager.

**A3.1.4** Other NDOR personnel who have been qualified to perform specific tests may be authorized by the Materials and Research Central Laboratory to qualify others.

**A 3.1.5** Independent sources, such as the American Concrete Institute (ACI) or qualified consultants, with the approval of the Materials and Research Central Laboratory.

**A3.2** Each Branch Laboratory shall maintain a minimum of one individual qualified by the Materials and Research Central Laboratory for each test procedure performed within the Branch Laboratory's area of responsibility.

**A4. *Qualification Procedure***:

**A4.1** Except as noted in paragraph A4.2.1, to qualify, an individual must successfully perform the specific test or series of tests related to a specific level of qualification as identified in Table A1. The test performance, and any calculations required to determine specification compliance, must be done in the presence of an authorized evaluator as identified in Section A3.1. Successful performance is defined as demonstrating the ability to properly perform key elements for each test method. Anyone failing to demonstrate the ability to perform a test will, at the evaluator's convenience, be

allowed a maximum of two re-tests per test method in a calendar year.

**A4.2** After successful performance of a test method, the individual must also pass a written examination administered by an authorized evaluator with a minimum score of 70 percent. An individual failing the written examination may request a retest. The individual will be allowed an unlimited number of retests in a calendar year; however, the scheduling of retests for the written examination is at the evaluator's convenience.

**A4.2.1** Newly hired and temporary NDOR employees may obtain provisional certification issued by NDOR Quality Assurance Manager, to be qualified to conduct limited sample and testing as Asphalt, PCC, or Soils/Aggregate Field Technician certification . The provisional certification will permit the employee to perform the material testing while within sight and sound of a certified field or qualified laboratory technician. An employee will be able to perform testing under the provisional certification for a maximum of one construction season, however, the person must attend the first available certification training session.

**A4.3** Any individual who performs verification or quality control sampling and testing that fails to be qualified in that calendar year, or if the qualification is revoked, the individual must obtain additional training and again complete the testing requirements identified in Sections A4.1 and A4.2.

**A4.4** A standard set of examinations will be used statewide. The examination will be developed by a committee of personnel from the Materials and Research Central laboratory, Branch Laboratories, and may include industry representatives for test procedures used in contractor performed quality control testing.

**A4.5** As a part of the qualification process the individual must participate in proficiency or split sample testing through the independent assurance program. The results of the proficiency or split sample testing will be evaluated within the acceptable tolerance limits identified in Appendix D. If the comparison of test results does not comply with the tolerances, a review of the test procedure and equipment shall be performed immediately to determine the source of the discrepancy. Corrective action must be identified and incorporated as appropriate, prior to the individual performing additional testing on that test method.

**A4.6** Qualification of an individual is valid for not more than five years, after which the individual must be re-qualified.

**A4.7** Individuals certified through an independent source approved by the Materials and Research Central Laboratory are exempt from the qualification procedure outlined above.

**A4.8** Individuals performing contractor quality control testing who have been qualified or certified by another state transportation department may be exempt from all or portions of the qualification procedure outlined above. The Materials and Research Central Laboratory will make decisions regarding the granting of a total or partial exemption. To apply for an exemption, the contractor must submit to the Materials and Research Central Laboratory, the names of the individuals seeking exemption, a listing of test procedures for which the individual has been qualified or certified by another state transportation department and the individual's name, address and telephone number from the state transportation department having responsibility for that state's qualification/certification program.

**A5. *Documentation***:

**A5.1** The Materials and Research Central Laboratory will be responsible for maintaining electronic documentation in SiteManager of all individuals qualified to perform required tests for the acceptance of materials. The requirement for maintaining documentation is applicable to NDOR, LPA, and

consultant personnel performing acceptance and verification testing, and contractor personnel performing quality control testing. The entity coordinating the certification training will retain copies of the written examinations through the life of the qualification as well as maintaining necessary testing and certification protocol requirements and manuals.

**A6. *Disqualification***:

**A6.1** Notice of abuse or neglect for any procedures or responsibilities identified in this Quality Assurance Program shall be made to the Qualification Advisory Committee, chaired by the Materials and Research Engineer. The Advisory Committee will notify the person being investigated of the allegation and that the charges are being reviewed. The difference between neglect and abuse is intent and shall be determined by the Qualification Advisory Committee. Penalties shall be imposed upon the recommendation of the Qualification Advisory Committee. Penalties shall range from a minimum of 10-day suspension to a maximum of permanent revocation of the qualification certificate.

**A6.2** *Neglect* – The first instance of neglect shall result in a 10-day suspension of the qualification certificate. The second instance of neglect shall result in a 30-day suspension of the qualification certificate. A third instance of neglect shall be considered as and treated the same as abuse. Example of Neglect – failing to post or properly record a test result.

**A6.3** *Abuse* – The first instance of abuse shall result in a 90-day suspension of the qualification certificate. The second instance of abuse shall result in permanent revocation of the qualification. Permanent revocation of a qualification shall result in that individual being ineligible for qualification at any level. Example of Abuse – falsification of test results.

**A6.4** *Qualification Advisory Committee* – In addition to the Materials and Research Engineer as chair of the committee, two other NDOR members and two industry members shall be appointed to the committee by the Materials and Research Engineer. The Nebraska Chapter of the Associated General Contractors shall be consulted concerning the selection of the two industry members. The appointed members shall have no direct involvement with the case. The Qualification Advisory Committee may, at their discretion, conduct a hearing involving the individual accused of neglect or abuse and other interested parties.

**A6.5** The policies and procedures described above are applicable to NDOR personnel, or designated agent, involved in the acceptance and verification of materials as well as contractor personnel or vendor involved in quality control testing.

**A6.6** The reference made above to "suspension" applies only to suspension of the qualification certificate and is not intended to imply that an individual will be suspended from work. While suspension from work or termination of employment may be a consideration depending on the level of neglect or abuse exhibited, such action would be taken through normal NDOR or contractor procedures for disciplinary action.

## TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL

| SAMPLING AND TESTING PERSONNEL QUALIFICATION PROGRAM<br>Laboratory and Field Technician Certifications | | | |
|---|---|---|---|
| | **Concrete** | **Soils** | **Asphalt** |
| **[1]Laboratory** | [3]ACI Concrete Strength Testing Technician (5 year)<br>Maturity Curve Method of Development (5 year) | [3]Earthwork Technician II (5 year) | [3]Asphaltic Concrete Technician (5 year) |
| **Field** | [3]ACI Concrete Field Testing Technician (5 year)<br>[3]Concrete Plant Technician (5 year)<br>[3] Concrete Field Inspector/General Handling of Concrete (Lifetime)<br>Maturity Method Field Monitoring (5 year)<br>Profilograph Operator (5 year)<br>Portland Cement Sampler (One-Time Review) | [3]Earthwork Technician I (5 year) | PG Binder/Emulsion Sample Technician (One-Time Review)<br>[2]Asphaltic Field Technician I (5 year)<br>[2]Asphaltic Field Technician II (5 year) |
| Note 1 | The laboratory where the testing is conducted must appear on the Nebraska Qualified Consultant Laboratory list maintained on the Materials and Research website: http://www.nebraskatransportation.org/mat-n-tests/pdfs-docs/qualconsullabs.pdf | | |
| Note 2 | These inspector qualifications are required for NDOR employees in 2011 and highly recommended for anyone inspecting a state or federal aid project in Nebraska. Effective 2012, these qualifications will be required for all technicians hired for this type of inspection. | | |
| Note 3 | Qualified technicians hired for sampling and testing on federally funded projects or LPA projects on the NHS system must have an Independent Assurance Review (IA) on an annual basis one year after obtaining initial qualification. | | |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL

| CONCRETE | |
|---|---|
| **Concrete Laboratory Technicians** | |
| **Certification** | **ACI Concrete Strength Testing Technician**<br>A Concrete Strength Testing Technician is an individual who has demonstrated the knowledge and ability to properly perform, record and report the results of four basic ASTM laboratory procedures related to the determination of concrete compressive and flexural strength.<br><br>*This certification is required of all personnel performing project material acceptance testing and/or sampling of concrete.*<br><br>**Course Title:** Concrete Strength Testing Technician<br>**Training Coordinated By:** Nebraska Concrete and Aggregate Association<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager and ACI Website<br>**Authority:** ACI<br>**Prerequisite:** NA |
| **Technicians are Certified Proficient in** | |
| ASTM C 617 | Capping Cylindrical Concrete Specimens |
| ASTM C 1231 | Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders |
| ASTM C 39 | Compressive Strength of Cylindrical Specimens |
| ASTM C 78 | Flexural Strength of Concrete |
| | |
| **Certification** | **Maturity Curve Method of Development**<br>An individual who has demonstrated the knowledge and ability to develop a maturity curve Time-Temperature-Factor (TTF) for concrete applications.<br><br>**Course Title:** Maturity Curve Method of Development<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite:** ACI Concrete Field Test Technician & ACI Concrete Strength Testing Technician |
| **Technicians are Certified Proficient in** | |
| NDR C 1074 | Estimating Concrete Strength by the Maturity Method |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| CONCRETE, continued | |
|---|---|
| **Concrete Field Technicians** | |
| **Certification** | **ACI Concrete Field Testing Technician**<br>An ACI Concrete Field Testing Technician is an individual who has demonstrated the knowledge and ability to properly perform and record the results of seven basic field tests on freshly mixed concrete.<br><br>*This certification is required of all personnel performing project material acceptance testing and/or sampling of concrete.*<br><br>**Course Title**: Concrete Field Testing Technician – Grade I<br>**Training Coordinated By**: Nebraska Concrete and Aggregate Association<br>**Certification Duration**: 5 Year<br>**Certification Records Retained**: SiteManager and ACI Website<br>**Authority**: ACI<br>Prerequisite: Concrete Field Inspector/General Handling of Concrete |
| **Technicians are Certified Proficient in** | |
| ASTM C 31 | Making and Curing Concrete Test Specimens in the Field |
| ASTM C 138 | Unit Weight, Yield and Air Content (Gravimetric) of Concrete |
| ASTM C 143 | Slump of Hydraulic Cement Concrete |
| ASTM C 172 | Sampling of Freshly Mixed Concrete |
| ASTM C 173 | Air Content of Freshly Mixed Concrete by the Volumetric Method |
| ASTM C 231 | Air Content of Freshly Mixed Concrete by the Pressure Method |
| ASTM C 1064 | Temperature of Freshly Mixed Concrete |
| | |
| **Certification** | **Concrete Plant Technician**<br>This course has been prepared to cover the fundamentals of concrete, hydration, critical properties, tempering, hot & cold weather, batching & mixing, designing, proportioning of concrete, and aggregate sampling and testing.<br><br>A ready mix plant inspector must obtain Concrete Plant Technician certification and must be qualified in the test methods identified for the tests listed below.<br><br>*This certification is required for NDOR employees (one-time training) and all contractor personnel performing project material acceptance testing and/or sampling at a concrete plant.*<br><br>**Course Title:** Concrete Plant Technician<br>**Training Coordinated By:** Nebraska Concrete and Aggregate Association<br>**Certification Duration:** NDOR Employees – Lifetime; Contractor and Consultants Employees – 5 Years<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite**: NA |
| **Technicians are Certified Proficient in** | |
| AASHTO T 2 | Sampling Aggregates |
| AASHTO T 11 | Materials Finer Than 75 Microns (No 220 Sieve) in Mineral Aggregates by Washing |
| AASHTO T 27 | Sieve Analysis of Fine and Coarse Aggregates |
| AASHTO T 248 | Reducing Field Samples of Aggregate to Testing Size |
| AASHTO T 255 | Total Moisture Content of Aggregate by Drying |
| | |
| NDR T 506 | Determination of the Free Moisture Content of Aggregates |
| NDR S01 | Method of Sampling Portland and Intergrounded/Blended Cements |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| CONCRETE, continued | |
|---|---|
| **Concrete Field Technicians, continued** | |
| **Certification** | **Concrete Field Inspector/General Handling of Concrete**<br>The Portland Concrete Paving Inspection (131122) course is web-based and has been prepared by FHWA-NHI to cover Portland cement concrete paving materials and properties, project plans, safety, equipment, paving process, role of the inspector, paving activities, and urban paving.<br><br>**Course Title:** Concrete Field Inspector/General Handling of Concrete<br>**Training Coordinated By:** FHWA-NHI<br>**Certification Duration:** Lifetime<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite:** NA |
| **Technicians are Certified Proficient in** | |
| | |
| | |
| **Certification** | **Maturity Method Field Monitoring**<br>A Maturity Curve Monitoring Technician is an individual who has the knowledge and ability to properly perform the installation of the wires and monitor the concrete temperature. They shall demonstrate their ability to calculate the TTF and record the results in SiteManager.<br><br>*This certification is required of all personnel who are monitoring the maturity meter for acceptance testing.*<br><br>**Course Title:** Maturity Method Field Monitoring<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite**: NA |
| **Technicians are Certified Proficient in** | |
| NDR C 1074 | Estimating Concrete Strength by the Maturity Method |
| | |

**TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued**

| CONCRETE, continued | |
|---|---|
| **Concrete Field Technicians, continued** | |
| **Certification** | **Profilograph Operator**<br>The operator of the profilograph is an individual that can demonstrate the use and setup of the equipment, show knowledge of the data analysis and guidance system.<br><br>*This certification is required of all operators of the non-contact profiler.*<br><br>**Course Title:** Profilograph Operator<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite**: NA |
| **Technicians are Certified Proficient in** | |
| | |
| **Certification** | **Portland Cement Sampler**<br>To become certified as a Portland Cement Sampler the certified individual will be able to review, NDR S01, understand and/or perform actual demonstration of the sampling procedure.<br><br>**Training Coordinated By:** NDOR Materials & Research or Designee<br>**Certification Duration:** One time review<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research or Designee<br>**Prerequisite:** NA |
| **Technicians are Certified Proficient in** | |
| NDR S01 | Method of Sampling Portland and Interground/Blended Cements |
| | |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| SOILS | |
|---|---|
| **Soils Laboratory Technicians** | |
| **Certification** | **Earthwork Technician II**<br>This certification class is intended for laboratory technicians to become proficient to perform laboratory tests on soils. This includes step by step tests procedures and laboratory work. A trainee must demonstrate proficiency in laboratory testing to be qualified as an Earthwork Technician II.<br><br>*This certification is required of all personnel performing project material acceptance testing and/or sampling in the soil lab.*<br><br>**Course Title**: Earthwork Technician II<br>**Training Coordinated By:** LTAP<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite**: Earthwork Technician I |
| **Technicians are Certified Proficient in** | |
| AASHTO R 58 | Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test |
| AASHTO T 89 | Determining the Liquid Limit of Soils |
| AASHTO T 90 | Determining the Plastic Limit and Plasticity Index of Soils |
| AASHTO T 99 | Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12 in.) Drop |
| AASHTO T 248 | Reducing Samples of Aggregate to Testing Size |
| AASHTO T 265 | Laboratory Determination of Moisture Content of Soils |
| | |
| **Soils Field Technicians** | |
| **Certification** | **Earthwork Technician I**<br>This is a one day certification class intended to provide basic guidance to construction and materials personnel involved in field testing and inspection of earthwork construction.<br><br>*This certification is required of all personnel performing project material acceptance testing and/or sampling in the field.*<br><br>**Course Title**: Earthwork Technician I<br>**Training Coordinated By:** LTAP<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research<br>**Prerequisite:** Radiological Safety/Hazardous Material |
| **Technicians are Certified Proficient in** | |
| ASTM D 2167 | Density of Soil In-Place by the Rubber Balloon Method |
| AASHTO T 2 | Sampling of Aggregates |
| AASHTO T 11 | Materials finer than 75 Microns (No. 200 Sieve) in Mineral Aggregates by Washing |
| AASGTO T 27 | Sieve Analysis of Fine and Coarse Aggregates |
| AASHTO T 248 | Reducing Field Samples of Aggregate to Testing Size |
| AASHTO T 255 | Total Moisture Content of Aggregate by Drying |
| AASHTO T 310 | Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth) |
| AASHTO T 265 | Laboratory Determination of Moisture Content of Soils |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| ASPHALT | |
|---|---|
| **Asphaltic Laboratory Technicians** | |
| **Certification** | **Asphaltic Concrete Technician**<br>This three day certification class is required for all laboratory technicians that do work in the State of Nebraska. It consists of lectures, a full asphalt laboratory demonstration, and hands-on laboratory work, helping attendees better understand NDOR and AASHTO specifications and procedures. Participants will become familiar with and run the following aggregate and volumetric mix design tests: Flat and Elongated, Sand Equivalent. The objective of the class is that the attendees would be proficient in running the standardized test procedures, equipment, and subsequent calculations to be able to provide accurate reporting of test results for a Nebraska Qualified Superpave Asphalt Lab.<br><br>*This certification is required of all personnel performing project material acceptance testing and/or sampling.*<br><br>**Course Title**: Asphaltic Concrete Technician<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Duration**: 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| AASHTO T 166 | Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens |
| AASHTO T 168 | Sampling Bituminous Paving Mixtures |
| AASHTO T 209 | Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures |
| AASHTO T 27 | Sieve Analysis of Fine and Coarse Aggregate |
| AASHTO T 30 | Mechanical Analysis of Extracted Aggregates |
| AASHTO T 84 | Specific Gravity and Absorption of Fine Aggregate |
| AASHTO T 85 | Specific Gravity and Absorption of Coarse Aggregate |
| AASHTO T 269 | Volumetric Analysis of Compacted Hot Mix Asphalt (HMA) |
| AASHTO T 304 | Un-compacted Void Content of Fine Aggregate |
| AASHTO T 248 | Reducing Samples of Aggregate to Testing Size |
| ASTM D 5821 | Determining the Percentage of Fractured Particles in Coarse Aggregate |
| AASHTO T 312 | Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the SHRP Gyratory Compactor |
| AASHTO T 308 | Asphalt Content of Hot Mix Asphalt (HMA) by the Ignition Method |
| AASHTO T 269 | Percent Air Voids in Compacted Dense and Open Bituminous Mixtures |
| AASHTO T 2 | Sampling Aggregate |
| NDR T 587 | Density of Bituminous Concrete In-Place by Nuclear Method |
| | |

**TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued**

| ASPHALT, continued | |
|---|---|
| **Asphaltic Field Technicians** | |
| **Certification** | **PG Binder/Emulsion Sample Technician**<br>To become certified as a PG Binder/Emulsion Sample Technician the certified individual will be able to review, AASHTO T 40, demonstrate understand and perform actual demonstration of the sampling procedure.<br><br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Duration:** One time review<br>**Certification Records Retained:** SiteManager<br>Authority: NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| AASHTO T 40 | Bituminous Materials Sampling |
| | |
| **Certification** | **Asphaltic Field Technician I**<br>This one day certification class is required for all asphalt inspectors that do work on NDOR let projects. The objective of the class is to help inspectors become familiar with the NDOR QA/QC sampling program and equip them with the resources needed to implement all sampling and inspection requirements. Topics include: Asphalt laboratory equipment and testing, sampling schedules, density coring, production sampling, custody of samples, verification testing, production tolerances, testing tolerances, and related NDOR asphalt specifications.<br><br>Completion of Asphaltic Field Technician I also satisfies certification requirements for PG Binder/Emulsion Sample Technician.<br><br>**Course Title**: Asphaltic Field Technician I<br>**Training Coordinated By:** LTAP<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials &Research |
| **Technicians are Certified Proficient in** | |
| AASHTO T 40 | Bituminous Materials Sampling |
| **Certification** | **Asphaltic Field Technician II**<br>This one day certification class is required for all asphalt inspectors that do work on NDOR let projects. A continuation of the Asphaltic Field Technician I Class, the Technician II training equips participants with the necessary knowledge for inspection of asphalt laydown, compaction, plant production and delivery, pay factors, and the related NDOR asphalt specifications.<br><br>**Course Title:** Asphaltic Field Technician II<br>**Training Coordinated By:** LTAP<br>**Certification Duration:** 5 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| | |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| SAMPLING AND TESTING PERSONNEL QUALIFICATION PROGRAM |
|---|
| **Laboratory and Field Technician Certifications - Provisional** |
| The following provisional certifications are applicable for NDOR employees only and asphalt contractors performing acceptance testing. Refer to NDOR Sampling Guide Section 28, Appendix A for additional clarification. NDOR QA Managers (or approved designee) must complete DR Form 248 and submit it to SiteManager Materials Management staff once they issue a provisional certification. |

| CONCRETE | |
|---|---|
| **Provisional Certification** | |
| **Certification** | **Concrete Field Inspector/General Handling of Concrete Provisional Certification**<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification <u>Required</u> for:** NDOR New Hires/Temporary<br>**Certification Duration**: 1 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| ASTM C 143 | Slump of Hydraulic Cement Concrete |
| ASTM C 231 | Air Content of Freshly Mixed Concrete |
| ASTM C 31 | Making and Curing Concrete Test Specimens in the Field |
| ASTM C 172 | Sampling of Freshly Mixed Concrete |
| ASTM C 1064 | Temperature of Freshly Mixed Concrete |
| **SOILS** | |
| **Provisional Certification** | |
| **Certification** | **Soil/Aggregate Technician Provisional Certification**<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification <u>Required</u> for:** NDOR New Hires/Temporary<br>**Certification Duration:** 1 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| ASTM D 2167 | Density of Soil – Balloon Test |
| ASTM D 2488 | Description and Identification of Soils |
| AASHTO T 2 | Sampling Aggregate |
| AASHTO T 27 | Sieve Analysis of Fine and Coarse Aggregates |
| AASHTO T 248 | Reducing Field Samples of aggregate to Testing Size |
| AASHTO T 255 | Total Moisture Content of Aggregate by Drying |
| AASHTO T 310 | Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth) |
| NDR T506 | Determination of the Free Moisture Content of Aggregate |
| **ASPHALT** | |
| **Provisional Certification** | |
| **Certification** | **Asphaltic Technician Provisional Certification**<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification <u>Required</u> for:** NDOR New Hires/Temporary<br>**Certification Expiration:** 1 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** NDOR Materials & Research |
| **Technicians are Certified Proficient in** | |
| | Random Sampling (Hot Mix and Density Cores) |
| | Sample Size Reduction/Splitting |
| | Custody of Samples |

## TABLE A1 – TEST METHODS FOR QUALIFICATION OF SAMPLING AND TESTING PERSONNEL, Continued

| Asphalt, continued | |
|---|---|
| **Provisional Certification, continued** | |
| **Certification** | **Asphaltic Concrete Technician Provisional Certification**<br>**Training Coordinated By:** NDOR Materials & Research<br>**Certification Required for:** NDOR New Hires/Temporary<br>**Certification Expiration:** 1 Year<br>**Certification Records Retained:** SiteManager<br>**Authority:** Quality Assurance Manager or Designee |
| **Technicians are Certified Proficient in** | |
| AASHTO T 166 | Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens |
| AASHTO T 168 | Sampling Bituminous Paving Mixtures |
| AASHTO T 209 | Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures |
| AASHTO T 27 | Sieve Analysis of Fine and Coarse Aggregate |
| AASHTO T 30 | Mechanical Analysis of Extracted Aggregates |
| AASHTO T 84 | Specific Gravity and Absorption of Fine Aggregate |
| AASHTO T 85 | Specific Gravity and Absorption of Coarse Aggregate |
| AASHTO T 269 | Volumetric Analysis of Compacted Hot Mix Asphalt (HMA) |
| AASHTO T 304 | Uncompacted Void Content of Fine Aggregate |
| AASHTO T 248 | Reducing Samples of Aggregate to Testing Size |
| ASTM D 5821 | Determining the Percentage of Fractured Particles in Coarse Aggregate |
| AASHTO T 312 | Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the SHRP Gyratory Compactor |
| AASHTO T 308 | Asphalt Content of Hot Mix Asphalt (HMA) by the Ignition Method |
| AASHTO T 269 | Percent Air Voids in Compacted Dense and Open Bituminous Mixtures |
| AASHTO T 2 | Sampling Aggregate |
| NDR T 587 | Density of Bituminous Concrete In-Place by Nuclear Method |

## APPENDIX B

## LABORATORY/EQUIPMENT QUALIFICATION PROGRAM

**B1. *Purpose*** – This program provides uniform statewide procedures to ensure that laboratory facilities and equipment are adequate for performance of the required sampling and testing of materials.

**B2. *Scope*** – The scope of this program covers the qualification of all laboratories and equipment used for acceptance, verification, quality control, independent assurance and dispute resolution sampling and testing. The qualification of non-NDOR equipment is intended only to ensure that the equipment has been calibrated and/or verified on a regularly scheduled basis. The actual calibration and/or verification of equipment is the responsibility of the owner, unless otherwise required by NDOR. The Materials and Research Central Laboratory will calibrate branch laboratory equipment. All other NDOR-owned test equipment used for verification and independent assurance testing at the construction site will be calibrated by the Quality Assurance Manager. Equipment may be subjected to calibration, verification or other inspection prior to qualification or through the Independent Assurance program.

**B3. *Laboratory/Equipment Qualification and Responsibility for Qualification*** – All laboratories that perform testing for NDOR require qualification. Laboratory and equipment qualification shall be as follows:

**B3.1** *NDOR Materials and Research Central Laboratory* – The Materials and Research Central Laboratory shall be accredited through the AASHTO Accreditation Program.

**B3.2** *NDOR Branch Laboratories* – Branch Laboratories shall be qualified by the Materials and Research Central Laboratory.

**B3.3** *Field Laboratories* – Field laboratories at construction sites generally consist of a laboratory building provided by a contractor and testing equipment owned and provided by NDOR.

**B3.3.1** *Laboratory Building Qualification* – The laboratory building and any contractor furnished testing equipment shall be qualified by the NDOR Branch Laboratory Quality Assurance manager. The Quality Assurance Manager may authorize other Branch Laboratory personnel to perform the laboratory building qualification.

**B3.3.2** *Equipment Qualification* – NDOR owned testing equipment used in a field laboratory shall be qualified by the NDOR Branch Laboratory Quality Assurance Manager. The Quality Assurance Manager may authorize other Branch Laboratory personnel to perform equipment qualification activities.

**B3.4** *Commercial Laboratories* –

**B3.4.1** Commercial laboratories performing independent assurance testing or dispute resolution testing shall be accredited by the AASHTO Accreditation Program or a comparable laboratory program approved by the Federal Highway Administration. In addition, commercial laboratories performing independent assurance testing or dispute resolution testing must be qualified by the Materials and Research Division Central Laboratory to ensure that accreditation has occurred in the sampling and testing procedure being performed

**B3.4.2** Commercial laboratories per-

forming contract quality control testing shall be qualified by the Materials and Research Central Laboratory or the Branch Laboratory Quality Assurance Manager. The Materials and Research Central Laboratory shall determine the responsibility for qualifying commercial laboratories.

**B3.5** *Contractor Laboratories* – Contractor laboratories, when performing quality control testing, shall be qualified by the Materials and Research Central Laboratory or a Branch Laboratory Quality Assurance Manager. The Materials and Research Central Laboratory shall determine the responsibility for qualifying contractor laboratories. If the responsibility is assigned to the Branch Laboratory, the Quality Assurance Manager may authorize other Branch Laboratory personnel to perform contractor laboratory qualification activities.

**B3.6** *Vendor Laboratories (Material Suppliers)* – Vendor laboratories, when performing quality control testing, shall be qualified by the Materials and Research Central Laboratory or a Branch Laboratory Quality Assurance Manager. The Materials and Research Central Laboratory shall determine the responsibility for qualifying vendor laboratories. If the responsibility is assigned to the Branch Laboratory, the Quality Assurance Manager may authorize other Branch Laboratory personnel to perform vendor laboratory qualification activities.

**B4** ***Equipment Qualification and Responsibility for Qualification*****:**

**B4.1** Non-specialized sampling and testing equipment is considered as a part of the laboratories identified in Section B3 even though the equipment may not be physically housed in the laboratory. Responsibility for qualification of the equipment is the same as in Section B3.

**B4.2** Specialized sampling and testing equipment used for pay factor determination, material acceptance and/or material verification; that is, equipment not directly associated with one of the laboratories identified in Section B3, shall be qualified by the Materials and Research Central Laboratory. Specialized equipment, such as profilographs and nuclear density gauges, will be identified by the Materials and Research Division.

**B5*. Laboratory Qualification Process*** – The laboratory authority identified in Section B3 shall perform the following functions:

**B5.1** *Accredited Laboratories (Laboratories accredited through the AASHTO Accreditation Program.)*:

**B5.1.1** Verify that the accreditation is current and has occurred in the sampling and testing procedures performed.

**B5.2** *Non-Accredited Laboratories (All laboratories except accredited laboratories and field laboratory buildings.)*:

**B5.2.1** Identify the scope of testing to be performed by the laboratory.

**B5.2.2** Verify that manuals and/or test methods used to perform the tests are available and current.

**B5.2.3** Document that the laboratory has the required equipment to perform the tests.

**B5.2.4** Check the calibration/verification records for each piece of equipment to include:

**B5.2.4.1** Description of the equipment.

**B5.2.4.2** Identification or serial number of the equipment.

**B5.2.4.3** Identification of any traceable standard used for calibration.

**B5.2.4.4** Frequency of calibration.

**B5.2.4.5** Date of last calibration.

**B5.2.4.6** Date of next scheduled calibration.

**B5.2.4.7** Procedure used to calibrate equipment.

**B5.2.4.8** Procedure used to identify equipment not in compliance.

**B5.2.5** In addition, all equipment may be subjected to calibration/verification by the qualifying authority.

**B5.3** *Field Laboratories (Laboratory Building)*:

**B5.3.1** Verify that the laboratory building meets the requirements of the specification.

**B5.3.2** Verify that the building, furnishings and utilities have been maintained to the extent that testing equipment and testing personnel will be adequately accommodated.

**B6. *Frequency for Laboratory Qualification:***

**B6.1** *Accredited Laboratories.*

**B6.1.1** Accredited laboratories shall be qualified annually.

**B6.1.2** If the laboratory has not previously been used by NDOR or has not been used within the past year, the laboratory must be qualified prior to performing any testing.

**B6.2** *Non-Accredited Laboratories* – Laboratories that have not been accredited through the AASHTO Accreditation Program shall be qualified at an interval not to exceed two years.

**B6.3** *Field Laboratories (Laboratory Building)* – Contractor provided laboratory buildings shall be qualified as described in Section B5 at intervals not to exceed two years.

**B6.4** The owner of the laboratory shall have the responsibility for requesting laboratory qualification to meet the frequency schedule identified in Section B6.

**B7. *Laboratory Equipment – Calibration Procedures and Frequencies:***

**B7.1** The frequency and procedures for calibrating/verifying testing equipment is shown in Table B1.

**B7.2** The calibration procedure and frequency of calibration are applicable to equipment used for quality control testing, verification testing and independent assurance testing.

**B7.3** Calibration procedures and frequencies shown herein may vary from those established by the AASHTO Accreditation Program. Laboratories requesting AASHTO accreditation or accreditation by a comparable laboratory program approved by the Federal Highway Administration shall comply with accreditation program requirements for calibration frequencies and procedures.

**B7.4** The qualifying authority identified in Section B3 has the right to require calibration/ verification of equipment at intervals more frequent than discussed herein if the performance of the equipment is suspect or if the equipment has been moved.

**B8. *Documentation*.**

**B8.1** *Laboratory Qualification Records* – Copies of laboratory qualification records shall be kept on file as follows:

**B8.1.1** One copy within the qualified laboratory.

**B8.1.2** One copy by the qualifying authority as identified in Section B3.

**B8.1.3** One copy by the Materials and Research Central Laboratory for any laboratory that is mobile or any commercial laboratory that may be performing testing in more than one District. It is the responsibility of the qualifying authority to submit documentation to the Materials and Research Central Laboratory.

**B8.2** *Equipment Calibration/Verification Records:*

**B8.2.1** Calibration/verification records for laboratory equipment shall be kept on file in the laboratory.

**B8.2.2** Copies of calibration/verification records for NDOR owned equipment that is not normally a permanent part of a laboratory shall be kept on file as follows:

**B8.2.2.1** One copy by the qualifying authority identified in Section B3.

**B8.2.2.2** One copy by the District having ownership of the equipment.

**B8.3** All laboratory qualification records and equipment calibration/verification records shall be kept on file for a period of three years.

**B9. *Non-Compliance***:

**B9.1** Laboratories must meet the above requirements to become qualified. Laboratories failing to maintain the requirements contained herein are subject to disqualification.

**B9.2** Any equipment failing to meet specified calibration/verification requirements for a specific test method shall not be used for that test method.

**B10*. Dispute Resolution*** – Disputes concerning laboratory qualification or calibration/verification of equipment that cannot be resolved at the District level will be submitted to the Materials and Research Central Laboratory for resolution. The decision of the Materials and Research Central Laboratory will be final. The Materials and Research Central Laboratory may obtain the services of an AASHTO accredited independent commercial laboratory to aid in resolving a dispute. This independent commercial laboratory must be independent of the original process. The decision to utilize the services of an independent commercial laboratory rests solely with the Materials and Research Central Laboratory.

## TABLE B1 – EQUIPMENT CALIBRATION AND VERIFICATION FREQUENCY

| Equipment Calibration and Verification Frequency | | | |
|---|---|---|---|
| **Equipment** | **Requirement** | **Interval (months)** | **Method** |
| Stand, Funnel and Cylindrical Measure | Verify | 12 | AASHTO T 304 |
| Conical Molds and Tampers | Check Critical Dimensions - Verify | 12 | AASHTO T 84 |
| Sample Splitter | Verify | 12 | AASHTO T 248 |
| | | | |
| Breaking Head | Check Critical Dimensions - Verify | 12 | AASHTO T 245 |
| Compression Test Machine | Calibrate | 12 | AASHTO T 245 |
| Ignition Oven | Verify | 12 | AASHTO T 308 |
| Gyratory Compactors | Calibrate | 12 | AASHTO T 312 |
| Gyratory Molds and Ram Heads | Verify | 12 | AASHTO T 312 |
| Marshall Molds | Verify | 12 | AASHTO T 245 |
| Vacuum System | Calibrate | 12 | AASHTO T 209 |
| Manual and Mechanical Compactors (Marshall) | Verify | 36 | AASHTO T245 |
| | | | |
| PCC Air Meters | Verify | 12 | ASTM C231 |
| Bearing Blocks | Check Planeness - Verify | 12 | ASTM C 39 |
| Compression Test Machines | Calibrate | 12 | ASTM C 39 |
| Moist Rooms/Storage Tanks | Check Temp. and Humidity – Verify | 12 | ASTM C 39 |
| | | | |
| Capping Material | Strength – Verify | Each Lot | ASTM C 109 |
| PCC Unit Weight Measures | Verify | 12 | ASTM C 138 |
| | | | |
| Liquid Limit Device | Wear and Critical Dimensions - Verify | 12 | AASHTO T 89 |
| Grooving Tool | Critical Dimensions – Verify | 12 | AASHTO T 89 |
| Manual Soil Rammers | Weight and Critical Dimensions - Verify | 12 | AASHTO T 99 and 180 |
| Mechanical Soil Rammers | Weight and Critical Dimensions - Verify | 12 | AASHTO T 99 and 180 |
| Soil Molds | Check Critical Dimension / Volume Verify | 12 | AASHTO T 99 and T 180 |
| Straightedges | Planeness of Edges - Verify | 12 | AASHTO T 99 and T 180 |
| | | | |
| Balances, Scales and Weights | Verify | 12 | AASHTO M231 |
| Ovens | Temperature Settings - Verify | 12 | See Sheet B-7 |
| Mechanical Shakers | Sieving Thoroughness – Verify | 12 | AASHTO T 27 |
| Sieves | Check Physical Condition - Verify | 12 | AASHTO M 92 |
| Thermometers | Verify | 12 | ASTM E 77 |
| Nuclear Moisture/Density Gauges | Calibrate* | 12 | Manufacturer's Recommendation |

**TABLE B1 – EQUIPMENT CALIBRATION AND VERIFICATION FREQUENCY, Continued**

| PROCEDURE FOR VERIFYING OVENS | | | | | | |
|---|---|---|---|---|---|---|
| **Equipment Checked** | **Purpose** | **Inspection Equipment Required** | **Tolerance** | **Procedure** | **Interval (months)** | **Report** |
| Drying Ovens | This method provides instructions for checking drying ovens used in the laboratory. | A calibrated thermometer either Fahrenheit or Celsius graduated in $1.0^{o}$ increments having a range which includes the temperature range to be checked. | Drying ovens shall be capable of maintaining a constant temperature range listed in the appropriate test methods | Place the thermometer inside the well with the clothespin attached to the thermometer. Position the thermometer on the shelf where the samples are normally dried. | 12 Months | Send a copy of the results of each oven checked to the In-House Inspection Team for verification and issuance of a Certificate of Verification. |
| | | | | Take the first reading at least 1 hour after closing the oven (oven should remain undisturbed). | | |
| | | A thermometer well to retain heat while the oven door is open. | | Take as many readings as necessary to determine if the temperature range is within the specified tolerance (three consecutive readings, taken no less than ½ hr. apart, within the tolerance allowed are adequate). | | |
| | | A clothespin to hold thermometer in such a manner as to enable the operator to read the scale easily. | | Adjust the temperature of the oven if an observed temperature reading is outside the tolerance specified (allow at least ½ hr. for the temperature to stabilize between each adjustment). Return to step 3. | | |

## APPENDIX C

## QUALITY CONTROL PROGRAM MINIMUM REQUIREMENTS

---

**C1.** ***General*** – When required by the specifications a "Quality Control Program" must be developed by the contractor and submitted as required by the contract for approval. Minimum requirements for a Quality Control Program are identified herein. The specifications may require additional documentation or a more detailed Quality Control Program than these minimum requirements. The specification requirement takes precedent over the minimum requirements described herein.

***C2. Minimum Quality Control Program Requirements*:**

**C2.1** The contractor will provide, maintain and follow a quality control system that reasonably ensures the materials and work incorporated into the project conforms to the contract requirements.

**C2.2** The contractor shall provide qualified sampling and testing personnel to perform quality control inspection, sampling and testing required by the contract

**C2.3** The contractor will develop a Quality Control Plan and submit it to the Engineer for review and approval as identified in the specifications. The contractor's Quality Control Plan may include Quality Control Plans developed by subcontractors and/or vendors. As a minimum the Quality Control Plan will:

**C2.3.1** Include the project number, signature and date of signing by the contractor's authorized representative.

**C2.3.2** Identify the laboratory(s) to be used.

**C2.3.3** Provide an organization structure identifying:

**C2.3.3.1** The program administrator and names of sampling and testing personnel.

**C2.3.3.2** The qualifications, experience and level of authority of the program administrator.

**C2.3.3.3** The certificate numbers and duties of all sampling and testing personnel.

**C2.3.3.4** Include a sampling, testing and analysis plan with frequencies, location of sampling and methods of testing and analysis.

**C2.3.3.5** Include procedures for documenting quality control activities.

**C2.3.3.6** Address corrective actions to be taken when quality control and/or acceptance criteria are not met.

**C2.3.3.7** Address methods used to control product quality that cannot be adequately addressed by product testing.

**C2.4** The provisions of the Quality Control Program apply to the material and construction furnished under the contract. The Quality Control Program must, to the satisfaction of the Engineer, deal with issues affecting the achievement of a quality product, including workmanship, construction methods, plant operations, and sampling and testing methods.

## APPENDIX D

## ACCEPTABLE TOLERANCE LIMITS FOR INDEPENDENT ASSURANCE SPLIT OR PROFICIENCY SAMPLES

| Acceptable Tolerance Limits for Independent Assurance Split or Proficiency Samples | | | | |
|---|---|---|---|---|
| **Material** | **Test Procedure** | **Standard** | **Test Method** | **Split Sample Tolerance** |
| **Portland Cement Concrete** Coarse Aggregate | Gradation | NDR T 27 | Split or *Proficiency | |
| | > No. 4 | | | T 27, Table 2 Multi-lab Precision |
| | ≤ No. 4 | | | T 27, Table 2 Multi-lab Precision |
| **Portland Cement Concrete** Fine Aggregate | Gradation | NDR T 27 | Split or *Proficiency | |
| | 3/8" thru No. 200 | | | T 27, Table 2 Multi-lab Precision |
| **Portland Cement Concrete** Fresh Concrete | Yield | ASTM C 138 | Split or *Proficiency | ± 3% |
| | Slump | ASTM C 143 | | ± 1.0 in. |
| | Air Content | ASTM C 138 | | ± 1% |
| | Cylinder and Strength | ASTM C 31 | | 20% of the mean** |
| * See footnote page 28-D-4 | | | | |
| ** See footnote page 28-D-4 | | | | |

| **Material** | **Test Procedure** | **Standard** | **Test Method** | **Split Sample Tolerance** |
|---|---|---|---|---|
| **Embankment** | In-Place Density | AASHTO T 238 | Split or *Proficiency | ± 2.5% |
| | In-Place Moisture | AASHTO T 239 | | ± 1.5% |
| **Subgrade** | In-Place Density | AASHTO T 238 | Split or *Proficiency | ± 2.5% |
| | In-Place Moisture | AASHTO T 239 | | ± 1.5% |
| **Granular Foundation Course (Regular)** | Gradation | NDR T 27 | Split or *Proficiency | T 27, Table 2 Multi-lab Precision |
| | In-Place Density | AASHTO T 238 | | ± 2.5% |
| | In-Place Moisture | AASHTO T 239 | | ± 1.5% |
| * See footnote page 28-D-4 | | | | |

## ACCEPTABLE TOLERANCE LIMITS FOR INDEPENDENT ASSURANCE SPLIT OR PROFICIENCY SAMPLES, Continued

| Material | Test Procedure | Standard | Test Method | Split Sample Tolerance | |
|---|---|---|---|---|---|
| **Asphalt Concrete (Superpave)** Coarse Aggregate | Coarse Aggregate Angularity | ASTM D 5821 | Split or Proficiency | ± 10.0% | |
| **Asphalt Concrete (Superpave)** Fine Aggregate | Fine Aggregate Angularity | AASHTO T 304 (Method A) | Split or Proficiency | ± 0.5% | |
| **Asphalt Concrete (Superpave)** Combined Aggregate | Gradation | AASHTO T 30 | Split or Proficiency | 3/4 in (19 mm) | 5% Tolerance |
| | | | | 1/2 in (12.5 mm) | |
| | | | | 3/8 in (9.5 mm) | |
| | | | | No. 4 (12.5 mm) | |
| | | | | No. 8 (2.36 mm) | |
| | | | | No.16 (1.18 mm) | 4% Tolerance |
| | | | | No. 30 (600 µm) | |
| | | | | No. 50 (300 µm) | |
| | | | | No. 200 (75 µm) | 2% Tolerance |
| **Asphalt Concrete (Superpave)** Complete Mixture | Asphalt Content | Ignition Oven AASHTO T 308 | Split or Proficiency | ± 0.5% | |
| | Gyratory Compaction | AASHTO T 312 | | Visual Observation | |
| | Air Voids | AASHTO T 269 | | ± 1.0% | |
| | Bulk Specific Gravity | AASHTO T 166 | | ± 0.020 | |
| | Theoretical Maximum Specific Gravity | AASHTO T 209 | | ± 0.015 | |
| Note: For specialty mixes see special provisions. | | | | | |

| Material | Test Procedure | Standard | Test Method | Split Sample Tolerance |
|---|---|---|---|---|
| **Asphalt Concrete (Conventional)** Combined Aggregate | Gradation | AASHTO T 30 | Split or Proficiency | |
| | >5/8" | | | ± 5% |
| | 5/8" thru No. 200 | | | ± 3% |
| | Passing No. 200 | | | ± 1.5% |
| **Asphalt Concrete (Conventional)** Complete Mixture | Asphalt Content | Ignition Oven AASHTO T 308 | Split or Proficiency | ± 0.5% |
| | Marshall Compaction | AASHTO T 245 | | Visual Observation |
| | Air Voids | AASHTO T 269 | | ± 1.0% |
| | Voids in Mineral Aggregate | Calculated | | -1.00 to +1.25 From Min. |
| | Bulk Specific Gravity | AASHTO T 166 | | ± 0.020 |
| | Theoretical Maximum Specific Gravity | AASHTO T 209 | | ± 0.015 |

## ACCEPTABLE TOLERANCE LIMITS FOR INDEPENDENT ASSURANCE SPLIT OR PROFICIENCY SAMPLES, Continued

| Footnotes | |
|---|---|
| *The Federal Proficiency Sample Testing Program rating scale will be used. The program uses a scale of 1 to 5. When a rating of 2 or lower is achieved corrective action shall be taken. The ratings have no valid standing beyond showing the difference between the individual's results and the average for a particular test. | |
| **Ratings** | **Range (Number of Standard Deviations)** |
| 5 | Less than 1 |
| 4 | 1 to 1.5 |
| 3 | 1.5 to 2 |
| 2 | 2 to 2.5 |
| 1 | Greater than 2.5 |
| | |
| **The difference between compared test results shall not exceed the indicated percentage of the mean of the compared test results – the mean being the average of the two test results. | |
| EXAMPLE: Portland Cement Concrete Compressive Strength | |
| Job control test value | 3000 psi |
| Independent Assurance test value | 4000 psi |
| Mean | 3500 psi |
| 20% difference | 700 psi |
| Both values are within 20% of the mean | |
| | |

## APPENDIX E

## LETTER OF CERTIFICATION BY STATE ENGINEER

Division Administrator
U. S. Department of Transportation
Federal Highway Administration
Lincoln, Nebraska

Date: _____

Nebraska Project No.: _____

Location: _____

Contractor: _____

Type of Work: _____

This is to certify that:

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications. All independent assurance samples and tests are within tolerance limits of the samples and tests that are used in the acceptance program.

Exceptions to the plans and specifications are explained on the attached sheet.

Sincerely

Materials and Research Engineer

_____ Additional Materials Certifications will be required for this project.

_____ This is the only Materials Certification required for this project.

_____ This is the final Materials Certification required for this project. Previous certifications were sent on the dates indicated below.

| Contractor | Type of Construction | Date Sent |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |

## APPENDIX F

### Nebraska Department of Roads
### Annual Report to FHWA On System Wide Approach of Independent Assurance Testing
### National Highway System

### Annual FHWA IA Program Report

### Introduction

As required by 23 CFR 637 (B), the intent of this document is to report the results of NDOR's annual compliance assessment of the System Approach to Independent Assurance on the National Highway System. NDOR does not currently have a compliance percentage goal established, however we anticipate revisiting this, upon completion of data driven tracking methods for these certifications.

| General Project and Lab Information<br>Federally Funded Projects Under Construction | |
|---|---|
| **Project Type** | **Number of Projects** |
| Federally Funded State Projects | |
| Federally Funded LPA Projects | |
| Total | |

| Assessment of Lab Qualifications for Federally Funded Projects | | | |
|---|---|---|---|
| **Material** | **Lab Type** | **Number of Labs that Performed Sampling and/or Testing** | **Number of Labs that Performed Sampling and/or Testing and were Qualified by NDOR or Maintain AASHTO Accreditation** |
| Asphalt | Contractor Labs | | |
| | LPA Labs [I] | | |
| | Consultant Labs | | |
| Concrete | Consultant Labs | | |
| | LPA Labs [II] | | |
| Soil | Consultant Labs | | |
| | LPA Labs [III] | | |
| **Statewide Corrective Action:** | | | |
| | Asphalt | | |
| | Concrete | | |
| | Soils | | |

| NDOR QA Program Totals | | |
|---|---|---|
| | **Total Technician Certifications/Total Required** | **Percentage** |
| Technician Certifications | | |
| Technician IAs | | |

| Assessment of Technician Certification: Federally Funded State Projects<br>Projects that Required a Certified Material Tester | |
|---|---|
| **Project Types** | **Number of Projects Assessed** |
| Asphalt | |
| Concrete | |
| Soil | |

| Assessment of Technician Certification Status | | | | | |
|---|---|---|---|---|---|
| **Project Types** | **Required Certifications** | **A Number of Technicians that Performed Sampling and/or Testing for Acceptance that Required Certification** | **B Number of Technicians that Performed Sampling and/or Testing for Acceptance and were Certified** | **C Number of Technicians that Performed Sampling and/or Testing for Acceptance and were Provisionally Certified [IV]** | **D Percent of Technicians who were Certified to Perform the Sampling and/or Testing for Acceptance they Performed ((B + C) / A) x 100** |
| Asphalt | Asphaltic Concrete Technician | | | | |
| Concrete | ACI Concrete Field Testing Technician | | | | |
| | | | | | |
| Soil | Earthwork Technician I | | | | |
| | Earthwork Technician II | | | | |
| **Statewide Corrective Action:** | | | | | |
| | Asphalt | | | | |
| | Concrete | | | | |
| | Soils | | | | |

| Assessment of Technician Certification Status | | | |
|---|---|---|---|
| **Project Types** | **Required Certifications** | **E Number of Certified Technicians who met System Approach Obligations for Independent Assurance** | **F Percent of Certified Technicians who Performed Sampling and/or Testing and met IA Obligations (E / (B + C)) x 100** |
| Asphalt | Asphaltic Concrete Technician | | |
| Concrete | ACI Concrete Field Testing Technician | | |
| | | | |
| Soil | Earthwork Technician I | | |
| | Earthwork Technician II | | |
| **Statewide Corrective Action:** | | | |
| | Asphalt | | |
| | Concrete | | |
| | Soils | | |

| Assessment of Technician Certification: Federally Funded LPA Projects<br>Projects that Required a Certified Material Tester | |
|---|---|
| **Project Types** | **Number of Projects Assessed** |
| Asphalt | |
| Concrete | |
| Soil | |

| Assessment of Technician Certification Status | | | | | |
|---|---|---|---|---|---|
| **Project Types** | **Required Certifications** | **J<br>Number of Technicians that Performed Sampling and/or Testing for Acceptance that Required Certification** | **K<br>Number of Technicians that Performed Sampling and/or Testing for Acceptance and were Certified** | **L<br>Number of Technicians that Performed Sampling and/or Testing for Acceptance and were Provisionally Certified [VI]** | **M<br>Percent of Technicians who were Certified to Perform the Sampling and/or Testing for Acceptance they Performed<br>((K + L) / J) x 100** |
| Asphalt | Asphaltic Concrete Technician | | | | |
| Concrete | ACI Concrete Field Testing Technician | | | | |
| | | | | | |
| Soil | Earthwork Technician I | | | | |
| | Earthwork Technician II | | | | |
| **Statewide Corrective Action** | | | | | |
| | Asphalt | | | | |
| | Concrete | | | | |
| | Soils | | | | |

| Assessment of Technician Certification Status | | | |
|---|---|---|---|
| **Project Types** | **Required Certifications** | **N Number of Certified Technicians who met System Approach Obligations for Independent Assurance** | **O Percent of Certified Technicians who Performed Sampling and/or Testing and met IA Obligations (N / (K + L)) x 100** |
| Asphalt | Asphaltic Concrete Technician | | |
| Concrete | ACI Concrete Field Testing Technician | | |
| | | | |
| Soil | Earthwork Technician I | | |
| | Earthwork Technician II | | |
| **Statewide Corrective Action** | | | |
| | Asphalt | | |
| | Concrete | | |
| | Soils | | |

**I.** The City of Lincoln does not use contractor QC tests in their acceptance decision.
**II.** The City of Lincoln does not use contractor QC tests in their acceptance decision.
**III.** The City of Lincoln does not use contractor QC tests in their acceptance decision.
**IV.** If a technician is both certified and provisionally certified, the certification will be recorded in column B.
**V.** Provisional certifications are not acceptable for consultants or LPA employees.
**VI.** LPA and Consultant technicians are reported here

## APPENDIX G

## FHWA LETTER OF APPROVAL FOR THE QUALITY ASSURANCE PROGRAM FOR CONSTRUCTION

U.S. Department of Transportation
Federal Highway Administration

NEBRASKA DIVISION

100 Centennial Mall North
Room 220
Lincoln, NE 68508
(402)742-8460

February 17, 2011

In Reply Refer To:
HDA-NE

Moe Jamshidi
State Materials and Research Engineer
Nebraska Department of Roads
1500 Highway 2
PO Box 94759

Dear Moe:

This is in response to your request for the FHWA Nebraska Division's approval of the Nebraska Department of Roads (NDOR) Quality Assurance Program for Construction (QAP) Manual. NDOR's QAP Manual was reviewed in 2001 and found to be acceptable. This review process was an iterative process between NDOR and FHWA until the QAP Manual was accepted. At that time, NDOR's QAP Manual was found to in compliance with the provisions of 23 CFR 637 Subpart B – Quality Assurance Procedures for Construction.

All changes or modification to the NDOR QAP Manual for Construction subsequent to the 2001 review have been reviewed and approved by FHWA. The most recent change to the QAP Manual, which was reviewed and approved by FHWA, was dated July 1, 2010. The change was to "Section 3.3.2. Dispute Resolution System" which added this clarifying statement: "On every sample, NDOR will retain enough material to conduct a dispute resolution on the original sample material. If NDOR doesn't have enough original material to sample, NDOR reserves the right to test from in-place material or other means of investigation."

FHWA will continue to review the QAP Manual for approval as NDOR updates or modifies the document.

Sincerely yours,

Frank M. Rich

Frank M. Rich, P.E.
Sr. Transportation Engineer
FHWA, NE Division

# NEBRASKA DEPARTMENT OF ROADS

# Policies

## Materials Sampling Guide, Section 29

# Policy for Precast/Prestressed Concrete Plant Inspection
# NDOR Inspector

Required Certification: ACI Field Test Technician Grade I; NDOR Field Technician; NDOR Plant Technician

Recommended Certification: ACI Strength Test Technician Grade I; PCI Quality Control Personnel Certification Level I and II

General: Refer to Section 705 in the 2007 Standard Specification for Highways, and all supplements to the Standard Specifications.

Each inspector is expected to perform any or all tasks within the non-administrative area of prestressed concrete inspection and control. NDOR inspectors may observe and/or verify their assigned tasks. Production tasks may continue even though an NDOR inspector is not present to observe the task, provided the production schedule has been given to the NDOR inspector, and the work is proceeding according to schedule. The definition of 'Verify' is that NDOR inspectors will review plant inspector's written documentation of the task or perform separate tests. All inspectors shall obtain the required certification and should obtain the recommended certification.

Inspectors shall comply with all of the safety programs prescribed by the facility. All personnel are required to wear safety hard hats, safety footwear, and safety glasses while observing and/or verifying the work in the production area.

1. One sample of prestress strand twelve feet long from each reel shall be submitted to Materials and Research for testing 30 days before the anticipated time of use. (NDOR Standard Specifications for Highway Construction, 705.02 paragraph 14)
2. Inspection and recording of tensioning.
    A. The NDOR inspector shall observe and/or verify the tensioning of all strands.
    B. A small number of broken wires are acceptable in a setup as long as the number is limited to not more than 2%.
        1. The area of broken wires shall not exceed 2% of the cross sectional area of the stressing strand. (705.02, 10)
        2. No more than 1 broken wire will be allowed in a single strand. (705.02, 12)

General

1. Checking of dimensions of members, numbers, size and positions of tendons, reinforcing steel, other incorporated materials, opening, blockouts, etc.
    A. After the plant inspector has notified NDOR inspector the bed is ready to be reviewed, the NDOR inspector may observe and/or verify the bed.
    B. All reinforcing steel shall be observed or verified to ensure the bars are of the correct type and size and have been placed in the proper location.
    C. The type, size, anchorage, and location of all embedded items shall be observed and/or verified.
    D. The NDOR inspector should perform checks as needed to verify the quality control department data.
2. Regular inspection of batching, mixing, conveying, placing, compacting, finishing and curing of concrete.
    A. Precast/Prestressed Portland cement concrete production facilities shall comply with the requirements in the Precast/Prestressed Concrete Institute (PCI) for certified plants.

1. Whenever there is reason to suspect a problem with the equipment, any or all of the equipment may be inspected.

B. Precast plants that are not PCI certified will be NRMCA certified.

3. Preparation of concrete specimens for strength testing and performance of concrete tests (slump, air content, unit weight, etc.).

A. Concrete testing verification shall be the responsibility of the NDOR inspector. Table 705.03 shows the minimum required sampling and testing. The Engineer may make more verification test samples if the quality of the plants testing is deemed inadequate.

B. The NDOR inspector shall observe and/or verify the sampling, fabrication and testing for all specimens.

4. Inspection of de-tensioning, product removal from beds, handling and storing operations.

A. The NDOR inspector shall observe and/or verify the de-tensioning.

1. De-tensioning shall be accomplished before the temperatures of the units drop more than 60 degrees from the maximum cure strength temperature and while they are still moist. (705.03, 9)

2. After de-tensioning, prestressed concrete girder shall be inspected for cracking. If any cracks are discovered in the middle of the girder on the bottom flange face, the girder shall be rejected. (703.03,9.9.C)

B. Verifying of dimensions of members, camber, numbers, opening, blockouts, etc.

1. The quality control department shall notify the NDOR inspector when the product is ready to be reviewed.

2. The NDOR inspector may perform checks to verify the quality control department data.

C. Each precast/prestressed concrete structural unit shall be stamped or marked with an identification number and its manufacture date. (705.03, 8g)

D. Initial camber should be recorded on all prestressed concrete products for which cylinders are made and initial camber measurement is appropriate.

E. Visual inspection of the product for strand slippage should be monitored and evaluated. If slippage occurs, the Construction Division shall be notified, and the girder will be evaluated.

5. Final inspection of finished product prior to shipment.

A. Verify the product has been marked with a number and date related to shop drawings and product records for accurate identification. Green label is placed on end of girder for final approval.

B. Visual inspection of the product for general appearance should be made. Cracking is frequently indicative of incorrect procedures in design, production, or handling.

C. The NDOR inspector shall observe and/or verify the post-pour inspection.

6. General observation of plant equipment, working conditions, weather, and other items, which have the potential for affecting the products.

7. All products sent to state projects shall be accompanied by a shipping ticket. The NDOR inspector will be given the opportunity to perform a final inspection before it leaves the plant.

<u>Precast/Prestress Inspection Records and Reports</u>

The filing pattern outlined below has been devised to ensure the integrity and uniformity of files kept in the inspector's plant file. It is expected that all such files will be kept in order and up to date.

1. Correspondence File material shall be filed by date with current data at the front of the file and cross referenced by date of letter, date received, person receiving, also those acting upon correspondence.

A. State of Nebraska

B. Producer

C. Miscellaneous

2. Materials and Tests Section
   A. Field Gradations
      1. Fine Aggregate
      2. Coarse Aggregate
   B. Sampling Identification material shall be filed by date/report number (certifications are filed with report.)
      1. Fine Aggregate
      2. Coarse Aggregate
      3. Portland Cement
      4. Admixtures
      5. Prestressed Strand
      6. Concrete Reinforcing Steel
      7. Cold Rolled Steel
      8. Welded Steel Wire Fabric
      9. Structural Wire Mesh
      10. Miscellaneous
3. Materials and Research inspectors shall record the following:
   A. Compressive Strength SiteManager Report
      1. Project Number if known
      2. Unit Identification from plans
      3. Date Fabricated
      4. Proportioning Report Number
      5. Test Date
      6. Maximum Machine Load
      7. Compressive Strength
      8. Stress/ Strain Data
   B. Stress/Drain Data
   C. Shipping Report
      1. Project Number
      2. Unit Identification from plans
      3. Date Fabricated
      4. Date Shipped
      5. Length of each Pile or Girder

<u>NDOR Inspector Checklist for Steam Curing</u>

1. Verify temperature sensor or thermometer locations.
   A. One approved continuous recording thermometer or sensor for each 115 feet of casting bed, with a minimum of 2 thermometers or sensors located in each enclosure.
2. Verify that steam jets are not directed at the forms.
3. Anything that causes the forms to heat up at a faster rate than the concrete can cause problems.
   A. Verify that the temperature of the concrete is maintained near placement temperature until the concrete has reached initial set.
   B. Verify that the temperature rate of rise does not exceed 60°F per hour after initial set.
   C. Verify that the temperature did not exceed 175°F.
4. Verify that the relative humidity inside the enclosure is maintained between 70% and 100%.
5. Verify that the temperature in the concrete is maintained so that the difference between highest and lowest temperature station readings will not be more than 30°F.
   A. A dial thermometer pushed through the holes in the tarp works well for checking the temperature along the unit(s).

B. There must be adequate room, 3 inches minimum, for the steam to circulate all the way around the forms.
C. Wind can blow the tarps against the forms and completely stop the steam from circulating around the units.
D. Make sure the end of the bed is well protected and that there is as much steam getting to the ends as the rest of the bed.
E. Wind blowing in the end of the bed can drastically reduce the temperature.

Elongation Instructions

Elongation shall follow the recommended practice of the Precast/Prestressed Concrete Institute except as out lined below or stated on the plans. The plant inspector shall peform elongation calculations with a report submitted to the NDOR inspector for verification.

1. Calculate the elongations using the equation on page 36 of the PCI Quality Control Technician/Inspector Training Manual.
   A. The Central Laboratory shall determine the Modulus of Elasticity.
   B. Initial tension should be from 5% to 25% of the final load, to pull the slack strand taut.
   C. Strands are tensioned to approximately 70% of their ultimate capacity except where the plans indicate otherwise.
   D. Tolerance based on the PCI Quality Control Manual is ± 5% from the desired value. This relates to the actual gage pressure and elongation verses the calculated values of each. It also relates to an algebraic comparison of the variation of the gage pressure to variations in elongations.
2. Tensioning corrections for elongation and load are:
   A. Strand Seating
      1. Dead End Seating
      2. Live End Seating
      3. Splice Chuck \Seating
   B. Bed shortening for self-stressing beds
   C. Abutment rotation of movement of anchorages for fixed abutment beds
   D. Elongation of abutment anchor rods
   E. Thermal effects
   F. Drape
3. The NDOR inspector verifies the elongation calculations were performed by use of the following DR forms:
   A. DR 349, Single Strand Elongation for Piles and Inverted Tee's
   B. DR 350, Multistrand Elongation for Girders
   C. DR 351, Draped Single Strand Elongation Form for Girders
   D. DR 353, Draped Strand Angle Schematic

# Policy for Precast/Prestressed Concrete Plant Inspection
# Fabricator Inspector

Required Certification: ACI Field Test Technician Grade I; NDOR Field Technician; NDOR Plant Technician; PCI Quality Control Personnel Certification Level I and II

Recommended Certification: ACI Strength Test Technician Grade I

General: Refer to Section 705 in the 2007 Standard Specification for Highways, and all supplements to the Standard Specifications.

Each inspector is expected to perform any or all tasks within the non-administrative area of prestressed concrete inspection and control. Thus, all inspectors shall obtain the required certification and should obtain the recommended certification.

1. Identification, examination, acceptance and plant testing of materials and subassemblies.
   A. All precast/prestressed concrete structural units shall be produced in a Precast/Prestressed Concrete Institute (PCI) certified plant.
   B. The contractor shall provide the NDOR inspector a 4-week production schedule that is updated as necessary. If the NDOR inspector is given less than 1 NDR workday's notice of a schedule change, then the fabricator may not proceed until the engineer has reviewed the change. The engineer may observe any or all of the procedures and shall have access to all reported data at any time during fabrication. The NDOR inspector shall report any inconsistencies to the job superintendent and note them in the plant diary. (NDOR Standard Specifications for Highway Construction 705.03, paragraph 5)
   C. Quality control records should be identified with the same job number, piece number, and project number, if known, and other information as used to identify the product after inspection.
   D. One sample of prestress strand twelve feet long from each reel shall be submitted to the NDOR inspector for testing 30 days before the anticipated time of use. (NDOR Standard Specifications for Highway Construction,705.02 paragraph 14)
2. Inspection and recording of tensioning.
   A. Tensioning of all strands shall be done in the presence of the NDOR inspector.
   B. A small number of broken wires are acceptable in a setup as long as the number is limited to not more than 2%.
      1. The area of broken wires shall not exceed 2% of the cross sectional area of the stressing strand. . (705.02, 10.)
      2. No more than 1 broken wire will be allowed in a single strand. . (705.02, 12.)
3. Inspection of beds and forms prior to concreting.
   A. One of the most important inspections functions is the pre-pour inspection. It is much easier to make corrections before concrete is placed.
   B. The overall length, width, thickness, and other basic dimensions should be checked on all sides of the form before concrete placement begins.
4. Checking of dimensions of members, numbers, size and positions of tendons, reinforcing steel, other incorporated materials, opening, blockouts, etc.
   A. The quality control department shall notify the NDOR inspector when a set-up is ready to be reviewed.
   B. All reinforcing steel shall be reviewed to ensure the bars are of the correct type and size and have been placed in the proper location.
   C. The type, size, anchorage and location of all embedded items shall be checked.
   D. The NDOR inspector may occasionally perform checks to verify the quality control department data.
5. Regular inspection of batching, mixing, conveying, placing, compacting, finishing and curing of concrete.

A. Precast/Prestressed Portland cement concrete production facilities shall comply with the requirements in the Precast/Prestressed Concrete Institute (PCI) for certified ready mix plants.
1. Whenever there is reason to suspect a problem with the equipment, any or all of the equipment may be inspected.
B. B. Precast plants that are not PCI certified will be NRMCA certified

6. Preparation of concrete specimens for strength testing and performance of concrete tests (slump, air content, unit weight, etc.).
A. Concrete quality control shall be the responsibility of the Contractor. Concrete shall be sampled and tested as shown in Table 705.03.

7. Inspection of de-tensioning, product removal from beds, handling and storing operations.
A. De-tensioning shall be done in the presence of the NDOR inspector.
1. De-tensioning shall be accomplished before the temperatures of the units drop more than 60 degrees from the peak cure strength temperature and while they are still moist. (705.03 paragraph 9.b.(9))
2. After De-tensioning prestressed concrete girder shall be inspected for cracking. If any cracks are discovered between quarter points in the middle of the girder on the bottom flange face, the girder shall be rejected. 703.03,9.9.C)
B. Verifying of dimensions of members, camber, numbers, opening, block outs, etc.
1. The quality control department shall notify the NDOR inspector when the product is ready to be reviewed.
2. The NDOR inspector may occasionally perform checks to verify the quality control department data.
C. Before products are moved into storage, the NDOR inspector shall evaluate the product for deficiencies. This may be done while in the storage area if the NDOR inspector has complete access to the product.
D. To identify the condition of a product as it moves through plant operations, paint marks shall be placed on the ends of the girders by the NDOR inspector.
1. Products marked with red paint are to identify reject items.
2. Products marked with yellow paint should have their defects evaluated and repaired. Once the repair is complete and accepted, the yellow paint is covered with green paint.
3. Products marked with green paint are approved for shipment at the appropriate time.
E. Each precast/prestressed concrete structural unit shall be stamped or marked with an identification number and its manufacture date, by the NDOR inspector. (705.03, 8g)
F. Initial camber should be recorded on all prestressed concrete products for which cylinders are made and initial camber measurement is appropriate.
G. Visual inspection of the product for strand slippage should be monitored and evaluated. If slippage occurs, the Construction Division shall be notified and the girder will be evaluated.

8. Final inspection of finished product prior to shipment, by NDOR inspector.
A. Verified the product has been marked with a number and date related to shop drawings and product records for accurate identification. Green label is placed on end of girder for final approval.
B. Visual inspection of the product for general appearance should be made. Cracking is frequently indicative of incorrect procedures in design, production, or handling.

9. General observation of plant equipment, working conditions, weather and other items, which have the potential for affecting the products.

10. All products sent to state projects shall be accompanied by a shipping ticket. The NDOR inspector shall confirm the shipment before it leaves the plant.

Elongation Instructions

Elongation shall follow the recommended practice of the Precast/Prestressed Concrete Institute except as out lined below or stated on the plans. Elongation calculations shall be preformed by the plant inspector with a report submitted to the NDOR inspector for verification.

1. Calculate the elongations using the equation on page 36 of the PCI Quality Control Technician/Inspector Training Manual.
   A. The Central Laboratory shall determine the Modulus of Elasticity.
   B. Initial tension should be from 5% to 25% of the final load, to pull the slack strand taut.
   C. Strands are tensioned to approximately 70% of their ultimate capacity, except where the plans indicate otherwise.
   D. Tolerance based on the PCI Quality Control Manual is ± 5% from the desired value. This relates to the actual gage pressure and elongation verses the calculated values of each. It also relates to an algebraic comparison of the variation of the gage pressure to variations in elongations.
2. Tensioning corrections for elongation and load are:
   A. Strand Seating
      1. Dead End Seating
      2. Live End Seating
      3. Splice Chuck Seating
   B. Bed shortening for self-stressing beds
   C. Abutment rotation of movement of anchorages for fixed abutment beds
   D. Elongation of abutment anchor rods
   E. Thermal effects
   F. Drape

# Policy for Precast/Prestressed Concrete Products Grooming and Repair Procedures

* Prior to contractor beginning with any non-standard repair work, an NDOR inspector will review any grooming or repair work.

* In this document, when the word manual is used, it is referring to the manual for the Evaluation and Repair of Precast, Prestressed Concrete Bridge Products-Precast/Prestressed Concrete Institute (PCI)-Div.03 Concrete-030140.

Standard Imperfections That Require Grooming and/or Repairs Include:

1. Cracks less than 0.012 inches (0.30 mm) in width caused by design parameters or standard practices (such as diagonal cracking at the end of girders caused by prestress forces).
2. Spalls that do not expose reinforcement.
3. Irregular top surface finish textures.
4. Honeycombing less than ½ inches in depth and greater than 12 square inches, will require repair according to the manual.
5. Minor air voids about ½ inches in depth and greater than 12 square inches, will require repair according to the manual.
6. Pour lines that show no indication of de-bonding or cold jointing nothing needs to be done.

Non-Standard Imperfections Include:

1. Refer to the PCI's Manual
2. Anything not covered by the PCI's manual shall be approved by the Engineer.

Non-Standard Repair May Commence Upon the Following:

1. The NDOR inspector(s) notify Contractor QC personnel of existing Non-Standard imperfections. (Or Contractor QC personnel notify NDOR inspector(s) of Non-Standard imperfections.)
2. Contractor will perform the repairs according to the PCI's manual
3. If contractor wants to modify the procedures found in the PCI's manual, must submit a request to Construction Division and Inspector in writing. Approval must be made prior to the beginning of any work.
4. Construction Division will approve in writing via email the submitted procedure or modification to the procedure after consulting Bridge Division.

# Acceptance Policy for Portland Cement and Interground/Blended Cements

## General

These instructions cover the acceptance procedures for Portland and interground/blended cements supplied for use in Nebraska state highway construction and maintenance.

The State of Nebraska Standard Specifications, Supplemental Specifications, and Materials Sampling Guide for Highway Construction are a part of these instructions. This requirement includes all shipments by rail, truck, or barge supplied directly to contractors through suppliers or ready mix plants.

## Certified Mill Analysis:

Portland and interground/blended cements mills are required to furnish the Materials and Research Division a copy of their certified mill analysis each time the cement produced for use in Nebraska Department of Roads (NDOR) projects. The certified mill analysis report shall include the following:

- Mill location,
- Type of Portland and interground/blended cements,
- Grinding period,
- Associated manufacturer product name,
- Portland cement shall conform to ASTM C 150,
- Interground/blended cements shall conform to ASTM C 595.

## Approved Products List:

Portland and interground/blended cements on the NDOR's Approved Products List (APL) can be used on the project when accompanied by a manufacturer's certification. The requirements for being on the NDOR's APL are:

## Option 1:

1. Twenty consecutive passing mill samples and each sample will represent five separate grinds or blends. Manufacturer shall randomly collect samples in separate grinds or blends to create a composite sample of ten pounds. The ten pound sample will be tested at the NDOR central laboratory.
2. The mill analysis and the NDOR test results for the twenty consecutive passing samples shall conform to one of the following:
    A. Portland cement shall conform to ASTM C 150.
    B. Interground/blended cements shall conform to ASTM C 595.
        i. Report the type of each supplemental cementitious materials (SCMs) and slag cement used for final product.
        ii. Report the total cementitious replacement per ASTM C 595.
            1. Refer to subsection 1004.02, paragraph 2.
        iii. ASTM C 1567 at 28 days
            1. Refer to subsection 1004.04, paragraph 3 of the Nebraska Standard Specification for Acceptance Requirements
3. If there is a change to SCM source, the manufacturer shall notify the PCC Engineer of the change and follow paragraph 1.

Option 2:

1. Portland and blended cements maybe accepted with the approval of the Portland Cement Concrete Engineer and a signed reciprocity agreement with another highway state agency. The Portland cement or blended cement must meet NDOR specifications.

Sampling Procedure at Mill:

The sampling procedure requirement for Portland cement is one 10-lb sample. The sample shall be taken on the first production day of each month for each type produced. The sample will be a composite of that day's production. Each sample will be shipped in a leak and moisture resistant container and will be identified with the location and name of the production mill, type of cement, date produced, and storage bin number. The accompanying paperwork, including the mill analysis, shall be for the sample being submitted to NDOR and placed in a sealed envelope.

Sample Shipping:

The samples are to be shipped to the NDOR Materials and Research facility at the address listed below. The manufacturer will be responsible for the cost of shipping.

When using Ground Shipping:
Portland Cement Concrete Laboratory
Nebraska Department of Roads
Materials and Research Division
1400 Nebraska Highway 2
Lincoln, Nebraska 68509-4759

Certificates of Compliance:

Certificates of Compliance shall be issued by the producing mills. Copies of the certificates must accompany each load from a terminal. The forms must include the following:

- Name and location of the producing cement mill,
- Consignee and destination of the shipment,
- Date shipped from the producing mill (not the date shipped from the terminal),
- Railroad car or truck identification number,
- Manufacturer and type of Portland or interground/blended cement,
- Quantity of Portland or interground/blended cement shipped,
- Certified test number, date, and bin or silo number.

Each form for a truck shipment must include a non-repeated order number or identification number. The following signed certification statement or similar wording must also be included on the form.

This is to certify that this shipment of cement was taken from the bin indicated and that it meets the specification requirements of the Nebraska Department of Roads.

This certification must be signed at the mill loading site or at the terminal location. When Portland or interground/blended cement is shipped from a terminal, a copy of the mill

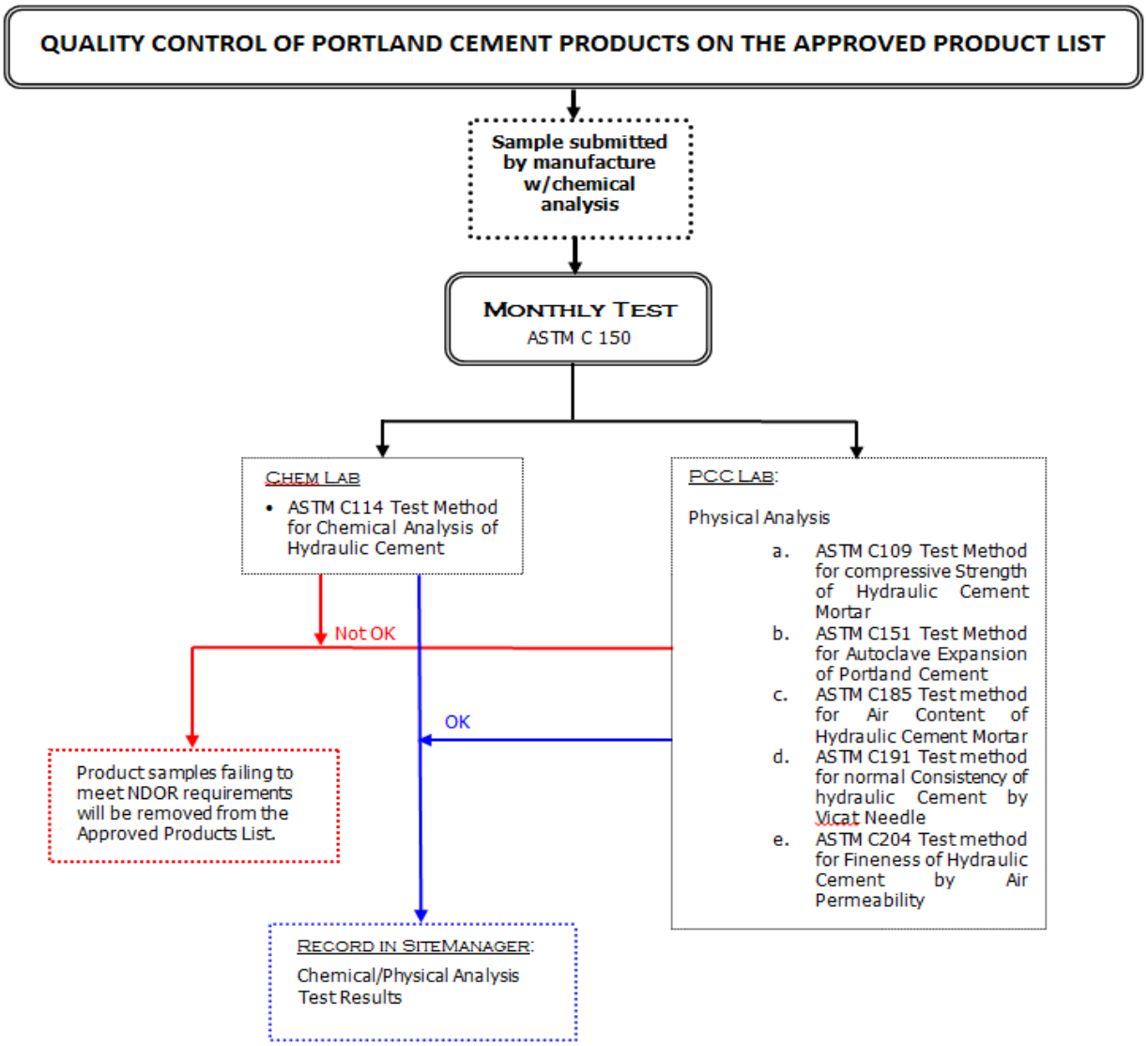
certification must accompany the load. The actual quantity shipped to a ready mix plant or job site must be shown on the certification.

Sampling From Bulk Shipment Railroad Car, Truck, or Batch Plant Silo:

Refer to NDR S01 the Method of Sampling for Portland and Interground/Blended Cements found on the M&R website (Standard Test Methods Manual).

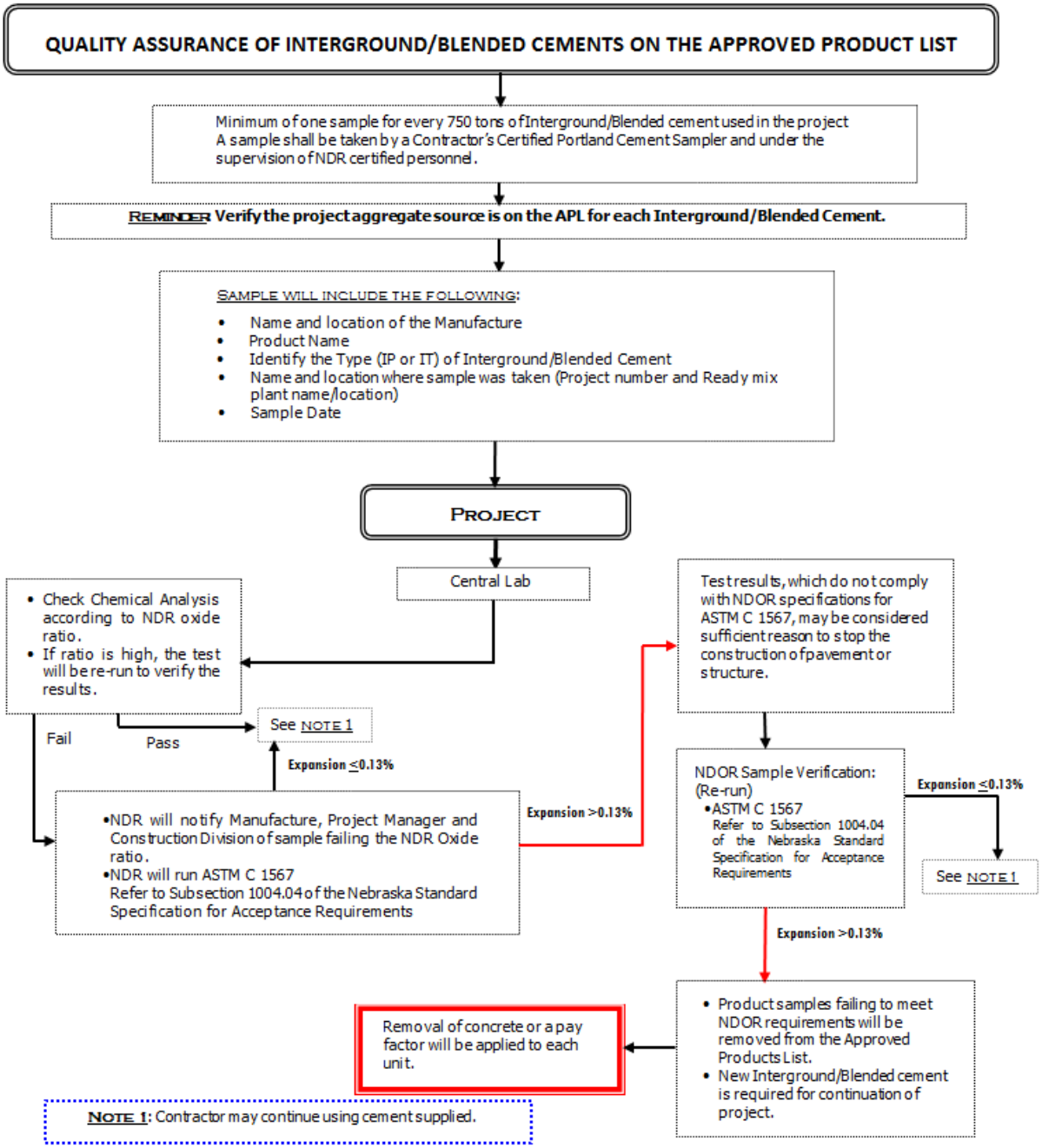
Quality Control of Portland Cement:

The Materials and Research Division has established the following flow chart to represent the procedures for the quality control of Portland cement.



Quality Assurance of Interground/Blended Cement:

The Materials and Research Division has established the following flow chart to represent the procedures for the quality assurance for interground/blended cement.



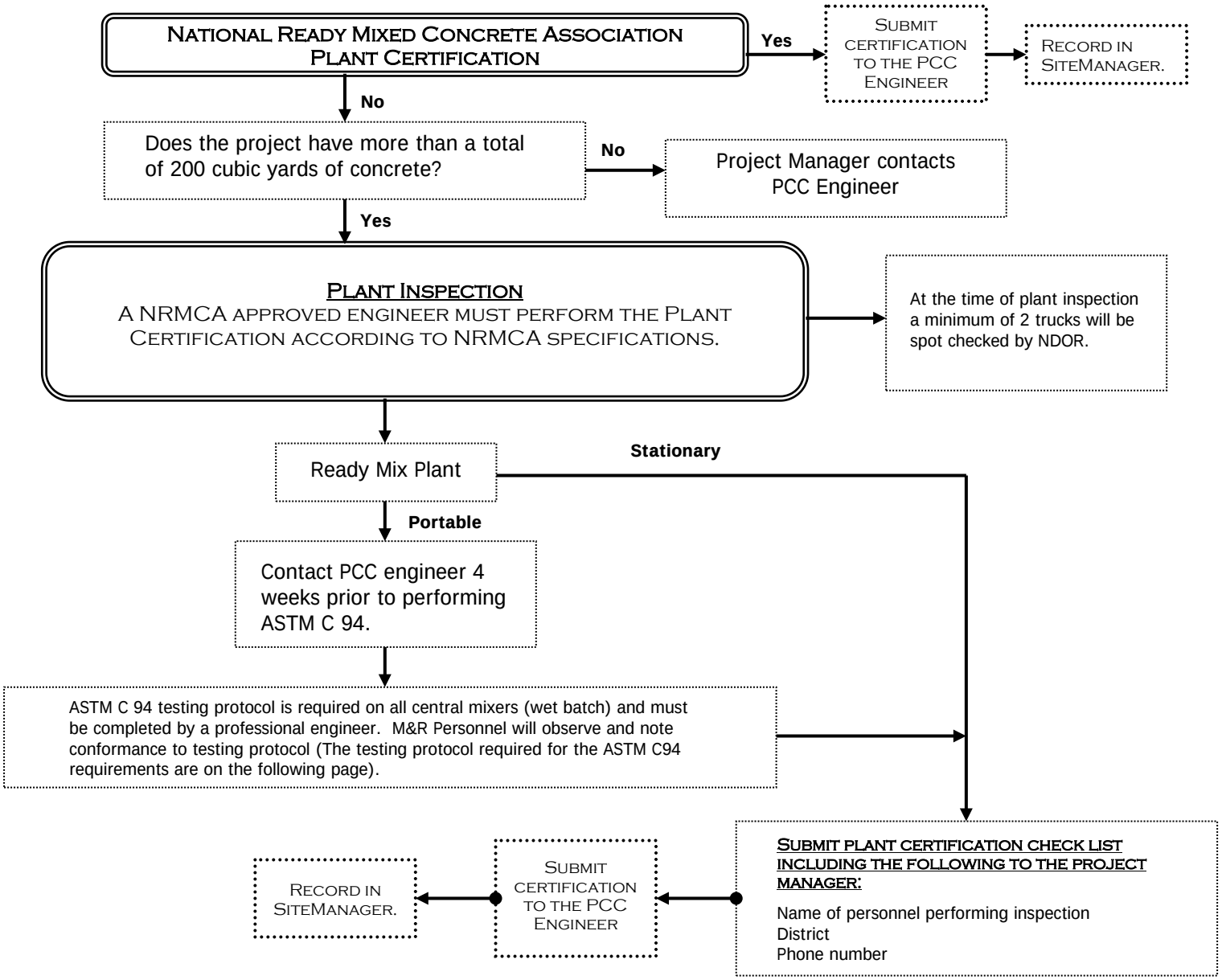
## Acceptance Policy for Pozzolans (Fly Ash or Calcined Natural Pozzolan)

This policy was removed effective January 1, 2014.

# Acceptance Policy for Slag Cement for Use in Concrete

This policy was removed effective January 1, 2014.

# Policy for Certification of Ready Mix Plants




NOTE:

1. Stationary and Portable Plants/Truck Certifications are required every two years.
   a. ASTM C 94 is required when a portable plant is relocated.
   b. During plant certification, if a plant is using washwater in the concrete mix, the washwater shall be tested. See Item 12 of this policy for required testing.

# ASTM C 94 Requirements for Central Mixer Batch Plants

1. ASTM C 94 shall be performed on all portable and new stationary wet batch plants.

2. Contractor is responsible to have testing performed by ACI certified Grade I Technician.

3. Test results shall be certified and submitted to the engineer for the ASTM C 94 testing along with the plant certification check list.

4. NDOR Materials and Research will have personnel observing the testing and noting conformance to the testing protocol.

5. Testing shall be performed within the first three days of the concrete plant's production.

6. All plants shall be allowed to perform regular paving operations at minimum of 60 sec. mix time or at the plant manufacturers' recommended mixing time, whichever is greater.

7. Samples will be taken immediately after batching has been completed.

8. There shall be two samples: one at 15% and at 85% of the batch, in loaders, wheel barrows, a storage location etc. The samples must be protected to maintain the quality of the concrete.

9. Slump and air should be performed within 15 min. of each sample.

10. In accordance with ASTM C 94, Table A1.1., Requirements for Uniformity of Concrete, at a minimum, the following five tests will be performed, and four of the tests must pass for the plant to be approved at that specified mixing time.

    1. Mass per cubic foot calculated to an air free basis, (¼ cu. ft can be used)
    2. Air Content, volume % of concrete
    3. Slump
    4. Coarse aggregate content, portion by mass of each sample retained on #4 sieve, %
    5. Average compressive strength at 7 days for each sample, based on average strength of three test specimens, %

Optional: Mass per unit volume of air free mortar based on average for all comparative samples tested, % (If this is used in addition to the 5 above, a total of five of the six must pass the ASTM C 94 tolerances).

11. If a mixer performance test fails immediately and the contractor wants to continue a performance test at that particular mixing time, two consecutive tests must pass four of the five ASTM C 94 uniformity requirements.

12. Washwater Testing
    The following tests may be completed by NDOR to pre-approve washwater that is to be used in a concrete mix:

| | |
|---|---|
| NDR 1602 | Mixing Water Used in the production of Hydraulic Cement Concrete |
| ASTM C 1603 | Measurement of Solids in water |
| ASTM C 31 | Making and curing Concrete Test Specimens in the Field |
| ASTM C 109 | Compressive Strength of Hydraulic Cement Mortar |
| ASTM C 191 | Time of Setting of Hydraulic Cement by Vicat Needle |
| NDR D 512 | Chloride Ion in Water – Method B |
| NDR T 290 | Determining Water – Soluble Ion in Soil – Method A |
| NDR C 114 | Chemical Analysis of Hydraulic Cement- Testing (Alkalinity) |

# Pipe Material Policy

This policy was removed effective July 1, 2013. For more information, refer to Drainage Design and Erosion Control Manual.

# Policy Concerning Concrete and Precast Pipe Plant Certification Including Testing, Inspection and Approval of Reinforced Concrete Culvert and Sewer Pipe and Concrete Flared-End Sections

## General:

Concrete pipe/precast manufacturers performing work for NDOR projects must be certified by the ACPA (American Concrete Pipe Association) or the NPCA (National Precast Concrete Association). The ACPA or NPCA certified facility must submit documentation of this certification to the Nebraska Department of Roads, Materials and Research Division on an annual basis for review. NDOR must receive a copy of any and all ACPA or NPCA audit reports, including a list of quality control personnel, certifications, noted deficiencies and corrective actions taken by the manufacturer.

In addition to the ACPA or NPCA certification, NDOR reserves the right to perform quality assurance testing, at any time, to ensure compliance with NDOR Specifications. Said testing will be conducted under the supervision of the Materials and Research Division at the pipe manufacturer's plant using the department's portable testing equipment and an approved testing frame provided by the pipe manufacturer. When considered desirable by the Materials and Research Division, tests may be conducted at the department's central laboratory. Certified suppliers must agree to allow NDOR inspectors free and reasonable access to all appropriate manufacturing and processing facilities. NDOR will notify manufacturers, in writing, when deviations from specifications have occurred which may potentially jeopardize a manufacturer's certification status.

Once a concrete pipe/precast manufacturing plant has been qualified for NDOR work, it will be placed on the NQMV (Nebraska Qualified Materials Vendor) list, maintained by the Materials and Research Division. This NQMV list is subject to change at the discretion of the Nebraska Department of Roads.

## Specifications and Test Methods:

The requirements of AASHTO Specification M 170-95, M 206-95 and M207-95 and the test methods designated therein will govern for reinforced concrete pipe. Requirements for the class of pipe shall be as specified by department policies, plans, and the State of Nebraska Standard Specifications for Highway Construction. Concrete flared-end sections will be required to conform to the requirements of the department's standard designs and to the applicable requirements of AASHTO Specification M 170-95, M 206-95, or M 207-95, Class II, Class A-II or Class HE-II respectively.

## NDOR Assurance Testing and Reporting:

NDOR assurance testing of Class III, IV, and V pipe and flared ends will be based on the results of drilled core strength testing and/or three-edge-bearing strength tests; by conformance with the design prescribed in the specifications; and by freedom from defects as determined by visual inspection. Pipe that fails to meet the strength requirements as determined by the selected test type may not be retested in order to pass assurance testing using one of the other test options aforementioned.

NDOR will maintain records of the size, type, linear footage, or quantity of pipe and flared ends supplied for Nebraska projects. Assurance testing frequency may be based upon several factors, including the quantity of pipe shipped by the plant, ACPA or NPCA reports and past assurance test results at a particular manufacturing facility. NDOR will notify the manufacturer not less than 5 working days prior to conducting assurance testing. Test results from NDOR will be reported and kept on file by the Materials and Research Division as part of an on-going quality assurance program.

Disqualification of a Concrete Pipe/Precast Manufacturer

DOR may disqualify a concrete pipe/precast manufacturer from supplying pipe products under the following conditions:

1) The manufacturer is no longer ACPA or NPCA certified, or
2) NDOR assurance testing has identified major production deficiencies.

Once a manufacturer is removed from the NQMV list, pipe products produced by the manufacturer will not be accepted on NDOR projects. Upon taking corrective actions to resolve the major production deficiencies, the manufacturer may ask to be put back on the NQMV list. Before reinstatement is granted, the Materials and Research Division will re-qualify the manufacturer to confirm that the production deficiencies have been resolved.

Special Designs:

Pipe designs that are not shown in AASHTO specifications (modified or special designs) will be approved on the basis of three-edge-bearing strength tests for the load to produce the 0.01 inch crack and ultimate load; by conformance with the design requirements; and by freedom from defects as determined by visual inspection. Testing of these modified or special designed pipes will be conducted by NDOR. Design computations must be submitted to NDOR for review a minimum of five working days before tests will be conducted.

Manufacturer Responsibilities:

The manufacturer must provide proper documentation including mill tests and signed shipment reports to cover all reinforced concrete pipe, concrete flared-end sections, and precast units supplied for use on Nebraska projects. Approved shipping report forms will be supplied by NDOR. Said shipping report is to be signed by the manufacturer indicating that the supplied material is in full compliance with NDOR project contract requirements and that all steel incorporated in the manufacture of the pipe or flared-ends complies with current Federal 'Buy America Act' provisions.

All reinforced concrete pipe and flared ends supplied by the certified plant for use on NDOR projects shall be marked by the manufacturer as required in the Nebraska Standard Specification for Highway Construction, Section 1037.02.

Pipe or flared-end sections scheduled for use on Nebraska projects may be shipped at anytime by the certified manufacturing plant. However, pipe or flared-end sections that have failed assurance testing will be culled from the manufacturers stock under the supervision of an NDOR inspector. All rejected or culled pipe will be clearly marked on the section interior by the manufacturer (using permanent ink marking) stating that the pipe is 'NOT FOR NDOR USE'.

Such rejected pipe will not be allowed for use on Nebraska projects (or any other projects under the authority of NDOR).

No section of pipe or flared ends will be allowed for shipment by the manufacturer which contains any of the defects or does not meet specification requirements as follows:

1. Fractures or cracks passing through the shell except for a single end crack that does not exceed the depth of the joint.
2. Defects that indicate imperfect proportioning, mixing, and molding.
3. Surface defects indicating a honeycombed or open texture.
4. Damaged ends where such damage would prevent making a satisfactory joint.
5. Exposed steel reinforcement (exposed ends of stirrups or spacers used to position reinforcement is not cause for rejection).
6. Pipe does not include the required manufacturer's markings as per Nebraska Standard Specifications for Highway Construction, Section 1037.02.

This policy is considered in good faith and cooperation between the Nebraska Department of Roads and concrete pipe/precast manufacturers regarding testing, inspection, and reporting of reinforced concrete pipe products for state use. This policy, with its terms and conditions, is to be adhered to by each pipe manufacturer performing work and manufacturing products destined for State of Nebraska projects.