

**Division of Material Testing**  
**Materials Testing Manual**  
**Rev. 2006**

## **Chapter 1 - Purpose**

This manual describes the organization, functions and procedures relating to sampling and testing of materials incorporated into Connecticut Department of Transportation projects.

It is the function of the Division of Materials Testing to predetermine if materials used by Contractors and the Department in the construction and maintenance of transportation facilities comply with the specification requirements and plans, and to perform investigational work on new materials and procedures constantly being proposed for use in the construction and maintenance of our transportation system.

Testing procedures utilized by personnel of the Division of Materials Testing are as specified in the current edition of the ConnDOT Standard Specifications for Roads, Bridges and Incidental Construction (when reference is made to Standard Specifications it shall be understood that it is the most current edition); Standard Specifications and Methods of Sampling and Testing adopted by the American Association of State Highway and Transportation Officials (AASHTO); the American Society for Testing and Materials (ASTM); Federal and Military Specifications; and ConnDOT Reference File Purchasing Specifications.

## **Chapter 2 – Division of Materials Testing Overview**

The Division of Materials Testing, which consists of the Hot Mix Asphalt Section, Concrete - Steel Section, and the Chemical/Aggregate Section, is under the jurisdiction of the Director of Research and Materials (DRM). The DRM is assisted by three Transportation Supervising Materials Testing Engineers who lead the Chemical/Aggregate Section, Concrete and Steel Section, and Hot Mix Asphalt Section, and a complement of approximately 50 employees. The organization of the Division of Materials Testing is graphically represented in the following Organizational Chart. (Figure 1.)

It is the responsibility of the Director of Research and Materials, to supervise the operations of the three testing Sections in order to assure that materials are approved and/or rejected in accordance with the specified sampling and testing procedures consistent with sound engineering judgment. This information is recorded on the computer-based construction reporting system (Sitemanager- an AASHTOware product) resident on the Department's computer network for dissemination to the appropriate construction project and District personnel. It also serves as a historical list of all materials used on a project and their status. This information is used at the end of a project to determine that adequate acceptance and assurance testing was done for the quantities used on the project. Appendix D lists the material codes used with the computer-based system.

It is also the responsibility of the DRM to issue a final materials certificate at the completion of a project; and to supervise the operations such that the personnel policies, affirmative action goals, union contracts, code of ethics, and other pertinent Department guidelines/policies are brought to the attention of and enforced by each individual Section within the Division of Materials Testing.

The Director of Research and Materials, as a member of AASHTO and ASTM, advises and assists in the preparation and continuous revision of AASHTO and ASTM specifications used by the Department.

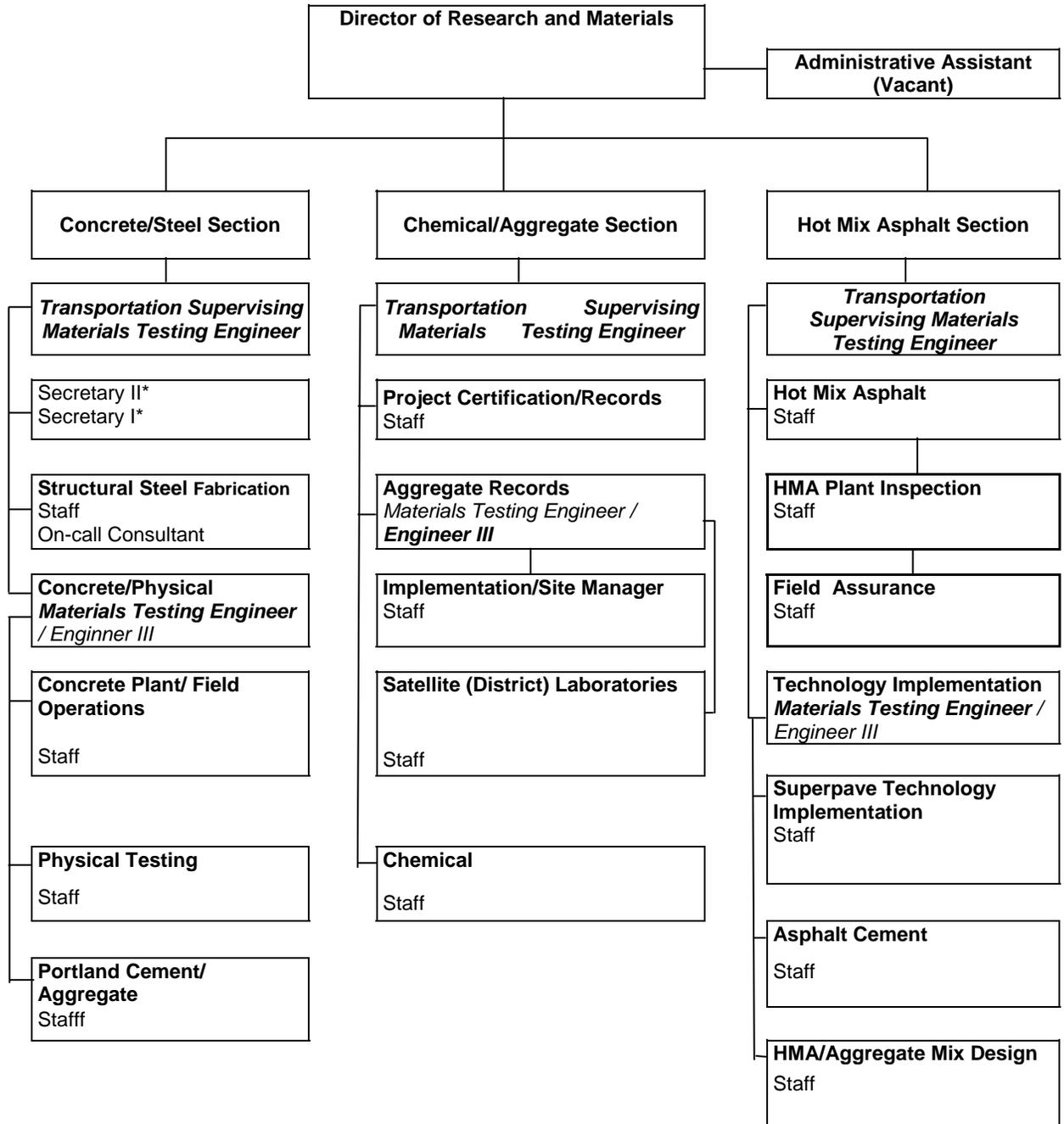
The Director of Research and Materials maintains an association with Materials Testing Engineers of other states through AASHTO correspondence and their annual meeting and maintains a close association with the surrounding states Material Testing Engineers through correspondence and meetings with the Northeastern States Materials Engineers Association. He also maintains a close relationship with professional organizations such as American Concrete Institute (ACI), New England Transportation Technician Certification Program (NETTCP), Northeast Asphalt User Group (NEAPUG), National Transportation Product Evaluation Program (NTPEP), Northeast Protective Coating Committee (NEPCOAT), and the Association of Asphalt Paving Technologists (AAPT).

The duties of the three Supervising Materials Testing Engineers include: the establishment of standards for the chemical and physical testing of all materials used by the Connecticut Department of Transportation; recommendation for approval or rejection of all materials tested; initiation of research into new and/or improved materials, test methods and equipment; the development of new procedures and equipment for testing; the preparation and review of detailed technical reports; submission of budget, equipment and overtime requirements; investigation of materials failures; and to confer with contractors and engineers on materials specifications and problems. It is also the responsibility of the three supervising engineers to collectively prepare a final materials certificate at the completion of any project.

The Division of Materials Testing participates in the AASHTO Accreditation Program (AAP). This program provides accreditation for laboratories that meet strict organization, personnel, equipment and testing proficiency requirements.

The program includes the following construction materials pertinent to the Division of Materials Testing:

- Asphalt Cement
- Performance Graded Binder
- Cut-back Asphalt
- Emulsified Asphalt
- HMA
- HMA Aggregate
- Portland Cement Concrete
- Portland Cement Concrete Aggregate



\* Administratively reports to Concrete/Steel Section – functionally to all three sections.

FIG. 1  
ORGANIZATIONAL CHART  
October 2003

## **Division of Materials Testing Overview (cont.)**

### CHEMICAL/AGGREGATE SECTION

The Chemical/Aggregate Section of the Division of Materials Testing is divided into three functional areas that are described as the Project Certification/Records Unit, Field Assurance/Satellite (District) Laboratories, and the Chemical Testing Laboratory.

#### Project Certification/Records Unit

This unit is responsible for tracking material testing on a project and ensuring that all material permanently incorporated into the project is tested/certified in sufficient quantity and that the results are acceptable or alternative acceptance criteria are met. Upon request from the District, a final materials certificate is provided for all completed projects stating the disposition of all materials incorporated into the project. If applicable, exceptions to the project specifications are listed individually on the certificate. Examples of this certification are located in Appendix B.

#### Satellite (District) Laboratories:

This unit oversees the operations of the four Satellite Laboratories located in each of the four Districts. These laboratories are located in each District to expedite the sampling and testing of common materials.

The unit is also responsible for maintaining an active independent assurance testing program for the Central and District Laboratories as required by the Federal Highway Administration (FHWA).

#### Chemical Unit:

This unit is responsible for analyzing chemical/physical properties of materials used by the Department. These materials include the following: portland cement, steel, epoxy, admixtures, paint (traffic, bridge), glass beads, purity of calcium and sodium chloride, limestone, hydrated lime, rope, chloride analysis of hardened concrete, topsoil, peat moss, hay and fiber mulch, wood chips and other related materials.

This unit is also responsible for performing Toxicity Characteristic Leaching Procedure (TCLP) on abrasive blast debris used to remove lead based paints from structural steel bridge structures. These materials are analyzed by wet chemical methods as well as instrumentation utilizing atomic absorption, gas chromatography, infrared spectrophotometry, ultra violet spectroscopy and carbon - sulfur analysis.

### CONCRETE/STEEL SECTION

The Concrete Steel Section is divided into four functional subsections: Structural Steel Fabrication; Physical Testing, Cement and Aggregate; Concrete Plant and Field Operations.

Structural Steel Fabrication - This unit has the responsibility to assure that all materials and physical aspects of structural steel fabrication are in compliance with the applicable specifications. This operation is accomplished by Division of Materials Testing personnel and assisted by personnel through a contractual agreement with an approved private testing agency. It is the duty of this unit to prepare and monitor this contract on day-to-day basis, and ensure compliance to it. Personnel in this unit are also responsible for the review and processing of the inspection reports and making recommendations to the Supervising Materials Testing Engineer and managers of the testing agency. Additional duties of this subsection include the review and approval of shop and field welding procedures, assistance to other divisions regarding welding techniques and procedures, on-site audits of field welding; testing and certification of Department approved welders; and any related duties as they apply to structural steel fabrication.

Physical Testing - The responsibilities of the physical testing unit include the testing for compressive strengths of concrete cylinders, testing of drilled cores, properties of brick and block, the tensile strengths of several ferrous and nonferrous structural steel products, the Rockwell or Brinell hardness of structural steel products, the coating thickness of zinc and epoxy coated products, and weld coupons for certification testing. This subsection also performs related testing on new products and materials being investigated by the Department.

Portland Cement and Aggregate - This unit is primarily responsible for the testing of portland cement, concrete sands, concrete patching materials, nonshrink grouts, preformed expansion joint fillers, concrete joint sealers, hydrated masonry lime, and blasting sand or related material. Additionally the subsection performs testing on cubes and slant shear blocks that are prepared from materials used in the field. The plasticity index of impervious fills and clays is determined. Related testing on new products and materials is also performed as required.

Concrete Plant/Field Operations - Inspectors in this unit are responsible for the quality assurance of concrete products fabricated for the Department. These products include reinforced concrete pipe, precast and prestressed concrete items. The duties of the individual inspectors are to sample all component materials for compliance testing, inspection of the casting beds and forms to ensure dimensional conformance to the approved drawings, observance of the concrete batching operation to ascertain conformance to an approved mix design, witnessing of all required test performed on the plastic concrete, monitoring of the concrete placement and consolidation operation, witnessing the testing of compression specimens to determine the hardened concrete strength, inspecting the finished product for conformance to all dimensional tolerances and finished appearance standards, and the maintenance of complete and accurate records of all phases of the work. Consultant testing personnel under contract to the Department are used as needed to supplement DMT personnel to meet this responsibility.

## HOT MIX ASPHALT SECTION

The Hot Mix Asphalt Section is divided into five functional units: Field Assurance, Asphalt Cement, Hot Mix Asphalt/Aggregate Mix Design, Plant Inspection and Superpave Technology Implementation.

Field Assurance - This unit is comprised of two subsections, each under the direction of a Materials Technician III who has specialized training and experience in the production, testing and placement of HMA mixes, and who is a working supervisor. One supervisor has various responsibilities that includes daily field supervision of the HMA field technicians and observation of their sampling and testing techniques; plant and field laboratory inspections to identify problems; working with producers to solve material problems when necessary; performing assurance sampling and testing as specified; training new personnel and reviewing procedures and specifications with the field technicians; serving as a liaison with the material source, the job site and the HMA section to remedy material and/ or related problems; and working closely with the HMA/Aggregate Mix Design unit to carry out production and investigative tasks. The other supervisor is responsible for the supervision of technicians performing HMA density testing in accordance with the annual HMA Materials and Bridge Deck Membrane Waterproofing Materials Complete-In-Place contract; the assurance testing of HMA and soils as required on construction projects; the maintenance of the Nuclear Regulatory Commission License for the Department and maintaining all records required under the Nuclear Regulatory Commission and the Department of Environmental Protection; the calibration of all nuclear gauges used on State projects; training and certifying all users of ConnDOT nuclear density gauges; and the general maintenance of all ConnDOT gauges.

Asphalt Cement - This unit is responsible for quality assurance of various performance graded binders and other petroleum based products. HMA paving and associate products tested are asphalt cements, emulsions, cut-back asphalts and component materials used in membrane

waterproofing systems on new bridge and bridge deck rehabilitation projects. Other materials tested by this unit are hot-poured joint sealers, dampproofing asphalts, pipe joint compound, and fuels for heating and diesel engines. This unit also performs absorption recovery tests on production mixtures, pavement samples and Recycled Asphalt Pavement (RAP).

Hot Mix Asphalt/Aggregate Mix Design - This unit is responsible for verifying that mix designs are in compliance with specifications. At the Central Laboratory, daily testing is performed on test specimens that are molded at Hot Mix Asphalt plants by the field technicians. Detailed records are maintained for each mixture produced and tested for every active vendor. The Hot Mix Asphalt Mix Design unit also performs extraction and gradation tests on submitted field samples; processes core samples as required; and investigates new mix designs, additives and aggregates.

HMA Plant Inspection - This unit is responsible for quality assurance of all HMA material used on construction and maintenance projects. Approximately forty source locations provide Hot Mix Asphalt mixtures for State projects. Each has a field laboratory that provides the field technician immediate, on-site test results to implement a quality assurance program to ensure high quality material as specified. In addition to the sampling and testing of Hot Mix Asphalt mixtures at the production site, the field technicians sample Performance Graded Binder, observe the production process; inspect fine and coarse aggregates; verify batch weights, mix temperatures and general mix appearance; check plant machinery and hauling vehicles for specification compliance. Field technicians maintain test records at each field laboratory and complete all applicable DMT forms, which they submit for processing.

Superpave Technology Implementation – This unit is responsible for the implementation of Superpave technology as it applies to Hot Mix Asphalt. This includes the review and implementation of new specifications and the design and verification of Superpave mix designs.

## **CARE IN SAMPLING**

Laboratory personnel regularly sample both fine and coarse aggregates, aggregate blends for roadbase applications, and other various materials used for Construction and/or Maintenance purposes. On a less frequent basis, these personnel also oversee the field sampling of aggregates and plastic PC Concrete by construction inspection personnel as required for assurance purposes. The frequency of these tests are included in Chapter 7 as well as a description of the sampling and testing practices utilized by the DMT.

Sampling is a critical component of testing and is performed in accordance with the applicable specification indicated under “sampling” in each section of this manual. DMT personnel collecting samples will utilize every precaution to obtain samples that are truly representative of the nature and condition of the material to be sampled. DMT personnel are certified in the applicable sampling procedures through NETTCP (New England Transportation Technician Certification Program) and qualified by established procedures as described in *appendix H* to assure uniform procedures in obtaining representative samples.

DMT personnel also regularly transport field samples to the central or satellite laboratories for testing. It is also important that samples are carefully handled and transported to prevent damage to the samples. Containers used to transport samples should be clean and adequate for the particular material being sampled. Furthermore, the containers should be durable and of a type and size that prevents loss, damage, or contamination of any portion of the sample.

It is not possible to overemphasize the need for the careful and judicious selection of a sample. A test report is worthless unless the sample has been properly obtained and is truly representative of the material sampled. No matter how precisely the laboratory test is carried out, if the sample is poorly obtained, false results will be reported. Proper sampling results in fairness to the producer, the contractor and the State. An improper sample may cause unnecessary delay in the

completion of the job and may later prove embarrassing to the State. It is the responsibility of the technician taking the sample to see that it is representative of the material being sampled, and to take all precautions to insure that it will remain such until tested.

## Chapter 3 – Chemical/Aggregate Section

### Overview

The Chemical/Aggregate Section performs tests on paints, metal, Portland cement, Portland cement concrete and its components, roadside materials aggregates and other miscellaneous materials. Responsibilities of this unit include the satellite (District) Laboratories and Chemical Testing. At the completion of a project, this section is also responsible for preparing a final materials certificate. This certificate states the disposition of all materials permanently incorporated into the project with regard to conformity with the plans and specifications. Examples of this certification are located in Appendix B.

A Transportation Supervising Materials Testing Engineer (TSMTE) is the administrative and technical head of the chemical/aggregate section and reports to the Director of Research and Materials.

The TSMTE initiates and directs the training of all personnel in the techniques of sampling, inspection and testing of materials pertaining to the Chemical/Aggregate Section; prepares and keeps current the Chemical/Aggregate section of the *Materials Testing Manual*; and initiates and aids in the preparation of new specifications.

Duties of the TSMTE also include daily contact with materials producers, contractors, engineers and others about materials and their use; directing the application of statistical techniques to quality control of materials; and preparing or supervising the preparation of technical reports and allied documents.

The overall operations of the Chemical/Aggregate Section shall be the responsibility of the TSMTE. Reporting directly to the TSMTE is a Transportation Engineer III (TE III) who is responsible for the daily routine operations of the section. Reporting directly to the TE III are Transportation Materials Technician III's and Transportation Engineer II's who are responsible for all activities performed by the various units within the Chemical/Aggregate Section.

### 3.1 Satellite Laboratories

The satellite laboratories are maintained by the Division of Materials Testing in each of the four Transportation Districts to expedite the sampling and testing of materials. These District Laboratories are assigned common materials sampling and testing functions to be performed within the District in which they are located.

The work and the personnel of each District Laboratory are under the immediate supervision of the TE III who reports directly to the TSMTE.

The principle duties of the District Laboratories are as follows:

1. Determine laboratory density of soils and processed aggregates
2. Inspect metal pipe and metal culvert ends at project sites
3. Inspect and sample transportation materials at quarries, gravel banks, Portland Cement Concrete plants, and other sources of supply for ConnDOT projects.
4. Perform gradation analysis of sands, gravels and broken or crushed stone.
5. Perform abrasion testing on gravels and broken/crushed stone.

6. Perform nondestructive strength test of in-place Portland Cement concrete by the Swiss Hammer Method and the Windsor Probe.
7. Inspect concrete batch plants, trucks and transit mixers
8. Observe and/or perform acceptance and assurance sampling and testing for aggregates and Portland Cement Concrete.
9. Obtain samples to be tested and transport them to the Central Laboratory.
10. Field inspect items being on planting projects
11. Research on any new materials
12. Assist Division of Purchasing regarding sampling and testing of road salts and sands for winter cover.
13. The District I Laboratory performs additional tests on coarse aggregates such as soundness, wear, specific gravity, absorption, unit weights, angularity, and elongation.

Sections 3.2 to 3.30 cover items tested by the Chemical Unit, while the remainder of Chapter 3 describes procedures and specifications for material tested by the four District Laboratories.

## 3.2 PAINT

The test methods indicated below will be used to test paint and will follow the procedure outlined in Federal Test Method Standard No. 141: Paint, Varnish, Lacquer and Related Materials; Method of Inspection, Sampling and Testing.

Sampling and testing will be in accordance with AASHTO, ASTM, Federal Supply Service, or by methods on file in the Laboratory. Modifications to referenced methods are listed in Appendix C.

### ALPHABETICAL INDEX OF FEDERAL TEST METHOD STANDARD NO. 141

| Title   | Method No.             |
|---|------------------------|
| Abrasion Resistance (Falling Sand)                          | ASTM D 968             |
| Application of Brushed Film                                 | 2141 (Modified)        |
| Coarse Particles or Skins                                   | ASTM D 185, FTM 141, B |
| 4092  |                        |
| Condition in Container                                      | 3011                   |
| Daylight Directional Reflectance                            | ASTM E 1347            |
| Dry Opacity (Contrast Ratio)                                | ASTM D 2805            |
| Drying Time   | 4061                   |
| Fineness of Grind   | ASTM D 1210            |
| Flexibility   | 6221                   |
| Immersion Resistance (Gasoline and Water)                   | ASTM D 1308            |
| Kauri Butanol Value   | ASTM D 1133            |
| Kauri Reduction   | ASTM D 1642            |
| Knife Test (Adhesion)                                       | 6304                   |
| Leafing Test (Aluminum) or<br>Bleeding Test (Traffic Paint) | ASTM D 480             |
| Involatile Material in Vehicle (Vehicle Solids)             | 4051 & 4053            |

|   |                 |
|---|-----------------|
| Odor  | ASTM D 1296     |
| Percentage Pigment  | 4021 (Modified) |
| Phtalic Anhydride, Percent by Weight of Nonvolatile Vehicle | ASTM D 563      |
| Preparation of Tin Panels                                   | 2012 (Modified) |
| Reducibility and Dilution Stability                         | 4203            |
| Refractive Index  | 4371            |
| Rosin and Diluting Resins                                   | ASTM D 1542     |
| Sampling  | 1022            |
| Self-Lifting Properties                                     | 6252            |
| Skinning  | 3021            |
| Specular Gloss  | ASTM D 523      |
| Viscosity (Paints)  | ASTM D 562      |
| Volatile Material in Vehicle                                | ASTM D 2369     |
| Washability   | 6141            |
| Water Percent by Mass                                       | 4081            |
| Weight Per Gallon   | ASTM D 1475     |

### **3.3 BLACK ENAMEL PAINT**

**Scope:** This section applies to black enamel paint for signs

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022

**Procedure:** In accordance with Federal Test Method Standard No. 141

**Specification:** In accordance with CONNDOT Reference File No. 25

**Report** - Form MAT-233

### **3.4 BURNT ORANGE ENAMEL**

**Scope** - This section applies to burnt orange enamel for trucks and maintenance equipment

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022

**Procedure:** In accordance with Federal Test Method Standard No. 141

**Specification:** In accordance with CONNDOT Reference File No. 104

**Report** - Form MAT-234

### **3.5 TRAFFIC PAINT, 15-MINUTE DRY, WHITE AND YELLOW**

**Scope** - This section applies to white and yellow pavement marking paint

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022

**Procedure:** In accordance with Federal Test Method Standard No. 141

**Specification:** In accordance with Federal Specification Paint TT-P-85E

**Report** - Form MAT-236, MAT-237, or MAT-240, whichever applies.

### **3.6 TRAFFIC PAINT, 3 MINUTE DRY, WHITE AND YELLOW**

**Scope** - This section applies to white and yellow low-heated fast-drying pavement marking paint.

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022

**Procedure:** In accordance with Federal Test Method Standard No. 141

**Specification:** In accordance with Federal Specification Paint TT-P-1952D

**Report** - Form MAT-235, MAT-238, or MAT-239, whichever applies.

### **3.7 SAND BLAST DEBRIS**

**Scope** - This section applies to the spent sandblast debris from bridge painting.

**Sampling:** A 500 ml can sample will be taken in the field by the project inspector

**Procedure:** In accordance with EPA Method 1311

**Specification:** In accordance with Connecticut DEP Drinking Water Remediation Standards

**Report** - Form MAT-231

### **3.8 CALCIUM CHLORIDE**

**Scope** – This section applies to calcium chloride to be used for dust control and ice removal.

**Sampling:** In accordance with AASHTO T 143

**Procedure:** In accordance with AASHTO T 143

**Specification:** In accordance with AASHTO M 144

**Report** - Form MAT-209

### **3.9 SODIUM CHLORIDE (ROCK SALT)**

**Scope** - This section applies to the composition, storage, inspection, acceptance, and delivery of sodium chloride obtained from natural deposits (Rock Salt) or artificially produced (Evaporated, Solar or other) that is to be used for snow and ice control on highways or bridges; or for use in inertia barriers.

**Sampling:** In accordance with AASHTO T2.

**Procedure:** Sieve analysis in accordance with ASTM M143, chemical analysis and moisture content in accordance with ASTM D 632.

**Specification:** In accordance with ConnDOT Reference File No. 139

**Report** - Form MAT-208

### **3.10 GLASS SPHERES (GLASS BEADS)**

**Scope** - This section applies to glass spheres (glass beads) for application on pavement markings to improve the night visibility of the marking film.

**Sampling:** One 50 lb (25 kg) bag will be taken for each Lot Number and forwarded to the DMT

**Procedure:** In accordance with AASHTO M 247

**Specification:** In accordance with AASHTO M247, Type 1.

**Report** - Form MAT-228 or MAT-229

### **3.11 SWEEPING COMPOUND**

**Scope** - This section applies to oil and water absorbent materials for use on floors and decks of concrete, wood and steel.

**Sampling:** In accordance with Federal Test Method Standard No. 536

**Procedure:** In accordance with Federal Specification P-A-1056

**Specification:** In accordance with Federal Specification P-A-1056

**Report** - Form MAT-212

### **3.12 CONCRETE CURING COMPOUND**

**Scope** - This section applies to concrete curing compound.

**Sampling:** In accordance with AASHTO T 155

**Procedure:** In accordance with AASHTO T 155, M 148

**Specification:** In accordance with Standard Specifications, Article M.03.01.10(c) and AASHTO M 148, Type II, Class B.

**Report** - Form MAT-315

### **3.13 PORTLAND CEMENT (Chemical Analysis and Fineness of Grind)**

**Scope** - This section applies apply to chemical analysis and fineness of Portland Cement.

**Sampling:** In accordance with AASHTO T 127

**Procedure:** In accordance with AASHTO T 105 for chemical analysis and T 98 for fineness of grind.

**Specification:** In accordance with AASHTO M 85

**Report** - Form MAT-315

### **3.14 PROTECTIVE COMPOUND MATERIAL**

**Scope** - This section applies to antispalling compound used as a protective material for concrete.

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022

**Procedure:** In accordance with AASHTO M 223

**Specification:** In accordance with Standard Specifications, Article M.03.01.11

**Report** - Form MAT-315

### **3.15 WATER FOR CONCRETE**

**Scope** - This section applies to water used in the production of Portland cement concrete.

**Sampling:** A 1 quart (1 liter) representative sample in a clean non-contaminated glass jar will be submitted from each source of supply.

**Procedure:** In accordance with AASHTO T 26

**Specification:** In accordance with Standard Specifications, Article M.03.01-4

**Report** - Form MAT-230

### **3.16 CHEMICAL ANALYSIS OF ALUMINUM ALLOY METALS**

**Scope** - This section applies to the determination of the chemical composition of Aluminum Alloy metals

**Sampling:** In accordance with ASTM E 55 for wrought products and ASTM E 88 for cast products.

**Procedure:** In accordance with ASTM E 34

**Specification:** In accordance with ASTM B 26, B211, B221

**Report** - Form MAT-315

### **3.17 CHEMICAL ANALYSIS OF CHROMIUM-NICKEL ALLOYS**

**Scope** - This section applies to the determination of the chemical composition of Chromium-Nickel Alloys

**Sampling:** In accordance with ASTM E 59

**Procedure:** In accordance with ASTM E 353

**Specification:** In accordance with ASTM A 193 and A 276

**Report** - Form MAT-315

### **3.18 CHEMICAL ANALYSIS OF CARBON ALLOYS**

**Scope** - This section applies to the determination of chemical composition of carbon alloys

**Sampling:** In accordance with ASTM E 59

**Procedure:** In accordance with ASTM E 350

**Specification:** In accordance with ASTM A 36, A 108, A 325, A 446, A 490, A 588 or A 606

**Report** - Form MAT-315

### **3.19 CHEMICAL ANALYSIS OF BRASS ALLOYS**

**Scope** - This section applies to the determination of chemical composition of brass alloys

**Sampling:** In accordance with ASTM E 255

**Procedure:** In accordance with ASTM E 54

**Specification:** In accordance with ASTM B 584

**Report** - Form MAT-315

### **3.20 ANALYSIS OF CARBON STEELS BY LECO ANALYZER**

**Scope** - This section applies to the determination of Carbon in metals

**Sampling:** In accordance with ASTM E 59

#### **Procedure**

##### Carbon Analysis

1. Turn power on
2. Turn on oxygen flow (41.37-55.16 kPa)
3. Switch clamp to carbon hose
4. Turn buret stopcock to exhaust position - check zero
5. Raise leveling bottle to upper cup until red leveling solution fills buret and seats float valve in buret. Lock it.
6. Turn buret stopcock to furnace position

7. Place sample into crucible (0.2- 0.5-g sample and 1 scoop of copper). Place the sample into the induction furnace.
8. Wait for combustion, then lower leveling fluid. When 2/3 empty, lower crucible from mechanism chamber. Remove sample with TONGS!
9. Turn the buret stopcock to exhaust position and allow the bottom of the meniscus to settle to zero on the buret stem.
10. Turn the buret stopcock to caustic position and raise leveling fluid
11. Wait 15 seconds
12. Lower leveling fluid - matching the menus of both solutions to obtain the carbon reading
13. Final buret reading depends on temperature and barometer reading

$$\text{Percent Carbon} = \frac{\text{buret reading}}{\text{sample mass}} \times \text{standard factor} \times \text{barometer factor}$$

**Specification:** In accordance with ASTM E 350 and E 353

**Report -** Form MAT-315

### 3.21 ANALYSIS OF SULFUR IN STEEL by LECO ANALYZER

**Scope -** This section applies to the determination of sulfur content in steel

**Sampling:** In accordance with ASTM E 59

**Procedure**

1. Prepare titrator
2. Add prewashed standard to crucible
3. Add 1 scoop of iron chips (accelerator) to crucible
4. Add 1 scoop of copper accelerator
5. Put cover on each crucible and place each into the mechanism
6. Set time
7. Put furnace on for 8 to 10 minutes, it will automatically titrate
8. Read buret reading

$$\text{Standard factor} = \frac{\text{Standard Percent}}{\text{(buret reading)}}$$

9. Prepare samples as standard (steps 2 - 8)

10. Calculate percent sulfur as follows:

$$\frac{\text{buret reading}}{\text{sample mass}} \times \text{std. factor} = \text{percent sulfur}$$

**Specification:** In accordance with ASTM E 350 and E 353

**Report -** Form MAT-315

### 3.22 CHLORIDE CONTENT IN HARDENED PORTLAND CEMENT CONCRETE

**Scope -** This section applies to determining total chloride content in Portland Cement concrete

**Sampling:** In accordance with Federal Highway Administration Report No. FHWA-RD-74-5 Section "Sample Acquisition."

**Procedure:** In accordance with Federal Highway Administration Report No. FHWA-RD-74-5

**Specification-** N/A

**Report – Form** MAT-246

### **3.23 SEED**

**Scope** - This section applies to seed mixture to establish turf or grass surfaces.

**Sampling-** N/A

**Procedure:** In accordance with Standard Specification Article M.13.04

**Specification:** In accordance with Standard Specification Article M.13.04

**Reports:** Form MAT-315

### **3.24 CUT-AND-FILL SOIL MATERIAL**

**Scope** - Tests are required of cut-and-fill slope soil in order to assess the lime requirements for optimum growth of grass and other desirable vegetation.

#### **Sampling**

1. Sample cut slopes separately from fill slopes
2. Obtain at least twenty sub-samples from an area to be sampled. Collect sub-samples in a clean container. Mix well in the container or on clean pavement. Submit approximately 25 lb (10 kg) of the composite sample with a properly completed Request for Test to the DMT.
3. Whenever possible, submit all cut-and-fill slope samples from a given project at one time.

**Procedure:** Upon receipt of a cut-and-fill soil sample, each sample should be well mixed and divided, preferably in a sample splitter. Draw a 1 qt (1 L) working sample and proceed as indicated in Section 3.43 for determination of lime requirement.

**Specifications** - N/A

**Report** - Form MAT-232

### **3.25 TOP SOIL**

**Scope** - Tests are required to ascertain whether or not topsoil meets the specifications for texture and organic content as well as to assess lime requirements for the optimum growth of grass or other desirable vegetation.

#### **Sampling**

Obtain at least 20 sub-samples of the loam stockpiles or of an area to be stripped for loam. Sampling depth should not exceed the depth of the topsoil.

1. Mix the sub-samples well on clean pavement or in a clean container
2. Send 20 lb (9 kg) of the composite sample to the laboratory with a properly completed Request for Test. When possible, send topsoil samples for an entire project at one time.

### Procedure

1. Upon receipt of the sample, divide in a sample splitter to a 1 qt (l L) working sample.
2. Place 1 lb (500 g) in an oven set for 230° F (110°C) for at least 12 hours. When dry, rub through a 850 µm sieve. Use this material to conduct mechanical analysis, as in the case of cut-and-fill soil material.
3. Soil Texture Classification by Partial Mechanical analysis: soil classification, that is the determination of whether a soil material physically falls into the category of a loam, a sandy loam, a sand, etc., is rapidly determined by a simplified mechanical analysis employing the Boyocous hydrometer method, which is based upon the velocity of settling particles according to Stokes Law. It is necessary in most soils to assist the dispersion of clay particles, and this is done by using a dispersing agent. A Calgon solution has been found acceptable for Connecticut soils.
  - 2.1 Calgon Solution: Weigh 571.25 g of Calgon into a 2 L beaker. Add one liter of distilled water, stir and pour clear portion into a clean 19 L bottle. Repeat additions of distilled water until all the Calgon goes into solution, adding to the solution in the 19 L bottle. Add enough distilled water to make 10 L of solution. It is convenient to store the bottle on a high shelf and use gravity feed from the bottle to a 1200 ml dispensing pipette.
  - 2.2 Sieve the oven dried soil through a 850 µm sieve. Place 10g of the sieved soil into a 400 ml beaker and add 10 ml distilled water and 10 ml 30 percent hydrogen peroxide, place into oven overnight. Wash sample into the soil mixer container along with 10 ml calgon solution and some tap water, mix for 15 minutes. Filter through a 45 µm into a 100 ml hydrometer cylinder. Carefully transfer the retained material into a preweighed 50 ml beaker, place into oven until dry. Stopper the cylinder, and thoroughly shake it by completely inverting the cylinder a minimum of 25 times. At the end of the shake, remove the stopper and add 3 drops of Amyl alcohol to reduce foam. After two hours, gently introduce the Boyocous hydrometer or Taylor hydrometer (ASTM 152 H). Read the hydrometer and record the temperature of the soil solution in degrees Fahrenheit.
3. Organic Content of Soil Material: Soil material organic content will be approximated by loss-on-ignition.
  - 3.1 Equipment
    - 3.1.1 110 °C oven, preferable with forced circulation
    - 3.1.2 Muffle furnace capable of sustaining up to 1100 °C
    - 3.1.3 Balance capable of weighing to within 0.1 mg
    - 3.1.4 Chemical laboratory glass desiccator
    - 3.1.5 Porcelain crucibles, equivalent to Coors Size 1, 0-22
  - 3.2 Determine the mass of the crucible and the soil material.
  - 3.3 Place crucible in muffle furnace that has been preheated to 900°C and allow furnace to heat up to 1100°C. Leave in furnace for 2½ hours. Remove crucible and soil material (now mineral ash) and cool for 10 minutes on wire grid; then place in desiccator and allow to cool to room temperature (minimum of 1 hour).

- 3.4 Remove the crucible from the desiccator and determine mas.
4. Soil reaction of pH: The soil reaction or degree of acidity or alkalinity of a soil can usually be easily determined by the use of a pH meter.
  - 4.1 Preparation of Soil Sample: Fill a 100 ml beaker half full of the air-dried, 850 µm soil material; add distilled water to make a thick but fluid pate; stir and allow to soak for a minimum of 15 minutes.
  - 4.2 Preparation of Instrument: Calibrate instrument according to instruction furnished with the instrument.
  - 4.3 Rinse electrodes, and lower into the prepared soil past. Be sure electrodes do not press side of beaker. Take reading according to directions furnished with instrument.
  - 4.4 Repeat reading at one-minute intervals until constant.
  - 4.5 Record the final pH of the soil paste on Form No. MAT-232
5. Limestone Requirements: In order to assess the limestone requirements of a given soil, the following information must be assembled:
  - 5.1. Soil texture (from the soil textural classification)
  - 5.2. Soil reaction (from the pH determination of the soil)
  - 5.3. Analysis of calcium, magnesium and aluminum (from the Morgan tests of the soil)

#### FORMULAS TO DETERMINE COMPOSITION OF TOPSOILS

$$\% \text{ Organics} = \frac{[c \text{ w/soil} - c \text{ w/ash}]}{[c \text{ w/soil} - \text{crucible mass}]} \times 100 \qquad \% \text{ Sand} = \frac{[\text{mass B w/sand} - \text{mass breaker}]}{[\text{mass of total sample}]} \times 100$$

$$\% \text{ Clay} = \frac{[(h-f) \times 1000]}{[\text{mass of sample}]} \times 100 \qquad \% \text{ Silt} = 100 - [\% \text{ sand} + \% \text{ clay}]$$

where: c = crucible weight in grams, b = beaker weight in grams h = hydrometer reading, f = Correction Factor (see Table 1)

Using the Textural Classification Triangle to plot the % SILT and the % CLAY. Where the two lines intersect within the triangle indicates the texture of the soil tested.

Table 1  
Correction Factors for Soil Hydrometer at various Temperatures.

| TEMPERATURE (°F) | FACTOR, F |
|------------------|-----------|
| 65               | 1.002488  |
| 66               | 1.002332  |
| 67               | 1.002272  |
| 68               | 1.002159  |

|    |          |
|----|----------|
| 69 | 1.002043 |
| 70 | 1.001923 |
| 71 | 1.001801 |
| 72 | 1.001675 |
| 73 | 1.001546 |
| 74 | 1.001414 |
| 75 | 1.001279 |
| 76 | 1.001141 |
| 77 | 1.001000 |
| 78 | 1.008560 |
| 79 | 1.000709 |
| 80 | 1.000560 |

LIME CONTENT (tons/c-2)

| pH  | Sand | Loamy-Sand | Sandy-Loam | Loam |
|-----|------|------------|------------|------|
| 4.5 | ¼    | 1          | 2          | 2 ¾  |
| 4.6 | ¼    | 1          | 1 ¾        | 2 ½  |
| 4.7 | ¼    | 1          | 1 ¾        | 2 ½  |
| 4.8 | ¼    | 1          | 1 ¾        | 2 ½  |
| 4.9 | ¼    | ¾          | 1 ½        | 2 ½  |
| 5.0 | ¼    | ¾          | 1 ½        | 2 ½  |
| 5.1 | ¼    | ¾          | 1 ½        | 2    |
| 5.2 | ¼    | ¾          | 1 ½        | 2    |
| 5.3 | ¼    | ¾          | 1 ¼        | 1 ¾  |
| 5.4 | ¼    | ½          | 1 ¼        | 1 ¾  |
| 5.5 | ¼    | ½          | 1 ¼        | 1 ½  |
| 5.6 | ¼    | ½          | 1          | 1 ½  |
| 5.7 | ¼    | ½          | 1          | 1 ¼  |
| 5.8 | 0    | ½          | ¾          | 1 ¼  |
| 5.9 | 0    | ¼          | ¾          | 1    |
| 6.0 | 0    | ¼          | ¾          | 1    |
| 6.1 | 0    | ¼          | ½          | 1    |
| 6.2 | 0    | ¼          | ½          | ¾    |
| 6.3 | 0    | ¼          | ½          | ¾    |
| 6.4 | 0    | 0          | ¼          | ½    |
| 6.5 | 0    | 0          | ¼          | ½    |
| 6.6 | 0    | 0          | 0          | ¼    |

**Specifications** - N/A

**Report** - Form MAT-232

### 3.26 PEAT

**Scope** - This section applies to determination of organic content, water-holding capacity, and ph of peat moss.

**Sampling:** One unopened bale of peat moss

**Procedure**

1. Organic content of peat

Determine mass of crucible. Rub the peaty material through a 850 µm sieve to remove large particles, then pack crucible  $\frac{3}{4}$  full. Determine mass carefully, being sure that the peat does not expand and that particles are not lost. If this occurs, empty crucible, blow clean, recheck crucible mass, pack crucible half-full and determine mass. Place crucible in wire triangle under a hood, and gently heat the bunsen burner to slowly begin ashing of the peat. Do not allow to burn with a flame; sure that particles do not escape with smoke. When the material has been oxidized to a black color, place the crucible in a muffle furnace which has been heated to 1000°C, and allow muffle to increase 1100°C. Ignite for 2-1/2 hours. Remove from muffle, cool on a wire grid for 10 minutes; then place in desiccator until cooled to room temperature. Determine mass of crucible and ash. Subtract the mass of the ash from the mass of the 110°C dried peat. The difference will be the loss of mass. Divide the loss of the mass by the mass of the peat, and multiply the result by 100 to obtain the percent organic content. Record all masses and computations on Form MAT-245.

2. Water Holding Test

- 2.1 Determine and record the mass of a dry clean 425µm sieve.
- 2.2 Fill the sieve with the peat material that passed the 2.00 mm sieve.
- 2.3 Set the sieve in a pan of water, being careful that the water does not flow over the top of the sieve. Fill the pan as often as necessary until the water appears at the top surface of the peat in the sieve. Keep the sieve in the pan of water for one hour after the surface of the peat is saturated.
- 2.4 Remove the sieve in a pan; set on a grooved drain board, and allow to drain for 4 hours. Determine the mass of the sieve with the wet peat.
- 2.5 Place the sieve with the wet peat in an oven set for 110°C; leave in the oven for 24 hours. Remove, cool, the determine the mass of the sieve and the oven-dry peat.
- 2.6 Subtract the mass of the sieve from items (2.4) and (2.5)
- 2.7 Divide the loss of mass (which is the mass of the water absorbed by the mass of the oven-dry peat); multiply by 100, and report as a percent water-holding capacity. This percentage should be much higher than 1000 percent and might exceed 1300 percent.

**Specification:** In accordance with Standard Specification Article M.13.07.14

**Report -** Form MAT-245

### 3.27 LIMESTONE

**Scope -** This section applies to the determination of the percent of CaCO<sub>3</sub> in limestone

**Sampling:** In accordance with Federal Test Method Standard No. 141, Method 1022. A 1L composite sample will be submitted with a Request for Test (Referee Method in case of discrepancy involving field inspecting).

**Procedure**

Gradations:

In the laboratory, a 50 g sample of the original sample will be placed in a 250 ml beaker and dried in an oven set for 110°C for 12 hours.

| Square Mesh Sieves | Percent Passing by Mass |
|--------------------|-------------------------|
| Pass 2.00 mm       | 100                     |
| Pass 850 µm        | 90                      |
| Pass 150 µm        | 40                      |

Chemical Test:

Analyze a 1-gram sample by the Indicator Titration Method as described in Section 1.005 of the AOAC. Report as percent calcium carbonate equivalence.

**Specification:** In accordance with Standard Specification Article M.13.02

Note: Limestone shall be agricultural ground dolomitic

**Report** - Form MAT-315 (gradation and the calcium carbonate equivalence)

### 3.28 FERTILIZER

**Scope** - This section applies to fertilizer used on ConnDOT projects

**Sampling-** A sample is not required. Request for test must have required documentation attached.

**Procedure:** In accordance with Standard Specification M.13.03

**Specification:** In accordance with Standard Specification Article M.13.03

**Report** - Form MAT-315

### 3.29 WOOD CELLULOSE FIBER MULCHES

**Scope** - This section applies to Hydroseeding soil to establish quick germinating vegetation to prevent erosion.

**Sampling:** A minimum of five sealed bags or bales should be selected at Standard No. 141, Method 1022 random from the shipment. Break the bales or bags into two equal portions. A 0.5 in. (13 mm) bat from the center of each bale should be drawn and placed into a clean plastic bag. The sample bag should then be tied closed to prevent the entry of moisture. Send the sample with a Request for Test to the Rocky Hill Laboratory.

**Procedure**

1. Select a 2 in x 2 in. (50 mm x 50 mm) sample from each of the five bats. Measure and record the mass. Place in an oven at 230 °F (110 °C), and dry for a minimum of 12 hours. Remove, cool and determine mass. Subtract oven dry mass from the original mass. The loss of mass is moisture. Divide loss of mass by oven dry mass of sample and multiply by 100. Report as percent moisture as received.
2. Report presence or absence of coloring matter or indicator dye as observed.

3. Select fibers from each bat to fill a 7 oz. (200 ml) beaker, add distilled water, soak for 1/2 hour, and run pH as described for soils.
4. Determine mass of crucible; select fibers from each bat to pack a crucible 3/4 full. Set oven for 230°F (110°C), and place in oven for 12 hours. Determine mass of crucible and fiber, and record mass of oven-dry fibers.
5. Ignite under hood with a burner, slowly, so fibers do not burn with a flame. When fibers are reduced in volume to less than half the original volume, place in muffle furnace set for 1650 °F 900 °C for two hours. Remove, cool in desiccator and determine mass
6. Compute loss in mass as percent organic content as described for soils

**Specification:** In accordance with Standard Specification Article M.13.05-4

**Report** - Form MAT-227

### 3.30 SOD

**Scope** - This section covers the testing of sod used for the immediate establishment of a grass surface.

**Sampling:** Select a roll of the material at random from the shipment after inspecting to assure that all rolls appear uniform. Cut a section one foot (meter) in length (full width) and submit with Request for Test to the Laboratory.

**Procedure:** Materials Testing personnel should consult the Office Engineering, facilities design section if there is any question as to the acceptability of the material.

**Specification:** In accordance with Standard Specification Article M.13.08

**Report** - Form MAT-315

### 3.31 SAMPLING OF AGGREGATES

**Scope** - This section covers sampling of coarse and fine aggregates at the source of supply and at the site of use. Typical sampling applications include sampling from flowing aggregate streams (bins or belt discharge), conveyor belts, roadways, stockpiles, or transportation vehicles.

**Sampling:** Samples for tests to be used in acceptance or rejection decisions are to be obtained by a representative of ConnDOT. Preliminary samples and tests for potential open faced banks or pits are the responsibility of the producer unless an adequate and representative stockpile has been prepared for testing for use on Department projects.

**Procedure:** In accordance with AASHTO T 2

**Specification:** N/A

**Report:** N/A

### **3.32 REDUCING SAMPLES OF AGGREGATE TO TEST SIZE**

**Scope** – This section covers the reduction of large field samples of aggregate to the appropriate size for laboratory testing by quartering or by use of the mechanical splitter.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 248

**Specification:** N/A      **Report:** N/A

### **3.33 SIEVE ANALYSIS OF AGGREGATES**

**Scope** - This section covers the determination of particle size distribution of fine and coarse aggregates for conformance to specifications. Sieve analysis tests are run on fine and coarse aggregates for Bituminous and PC Concrete, various roadbase and roadbed materials such as subbase and processed aggregate base, special riprap, and coarse aggregates for other incidental construction.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 27

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Forms MAT-205, MAT-206, or MAT-207, whichever is applicable.

### **3.34 MATERIALS FINER THAN THE #200 SIEVE BY WASHING**

**Scope** - This section covers determination of the percentage of material finer than a 75µm sieve in fine or coarse aggregates by washing. Clay and other water soluble materials are removed from the aggregate during this procedure.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 11

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Forms MAT-205, MAT-206, MAT-207, or MAT-223 whichever is/are applicable.

### **3.35 RESISTANCE TO DEGRADATION BY L.A. ABRASION**

**Scope** - This section covers the procedure for testing various sizes of coarse aggregate for resistance to degradation by use of the LA Abrasion machine.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 96

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Form MAT-211

### **3.36 SOUNDNESS OF AGGREGATE BY USE OF MAGNESIUM SULFATE**

**Scope** - This test method covers the procedure for testing aggregates to determine their resistance to disintegration by repeated immersion of the prepared samples in saturated solutions of magnesium sulfate.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 104

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Forms MAT-220 or MAT-221, whichever is applicable.

### **3.37 MOISTURE DENSITY RELATIONSHIP OF SOILS**

**Scope** - This section is for determining the relationship between the moisture content and density of soils and soils-aggregates when compacted in a mold of given size with a 4.54 kg hammer dropped from a height of 457 mm in accordance with AASHTO Designation T 180 Method D.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASTHO T 180, Method D

**Specification:** N/A

**Report:** Form MAT-213, and MAT-217 or MAT-218 whichever is applicable.

### **3.38 TOTAL EVAPORATIVE MOISTURE CONTENT OF AGGREGATE BY DRYING**

**Scope** - This method covers the test procedure to determine the amount of evaporable moisture (surface and moisture in pores) in a sample of aggregate by drying.

**Sampling:** In accordance with AASHTO T2

**Procedure:** In accordance with AASHTO T 255

**Specification:** N/A

**Report:** N/A

### **3.39 FLAT AND/OR ELONGATED PARTICLES IN COARSE AGGREGATE**

**Scope** - This test method is used to determine the amount of flat particles, elongated particles, or flat and elongated particles in coarse aggregates.

**Sampling:** In accordance with AASHTO T2

**Procedure:** In accordance with ASTM D4791

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Form MAT-104

### **3.40 FRACTURED PARTICLES IN COARSE AGGREGATE**

**Scope** - This section covers the determination of the amount of a coarse aggregate sample that consists of fractured particles that meet specified requirements.

**Sampling:** In accordance with AASHTO T2

**Procedure:** In accordance with ASTM D5821

**Specification:** In accordance with the applicable Standard Specification Article (M.01, M.02, M.03, M.04, M.05 or M.12), or project Special Provisions.

**Report:** Form MAT-104

### **3.41 BULK DENSITY (UNIT MASS) AND VOIDS IN AGGREGATE**

**Scope** - This section covers the determination of the density of coarse, fine, or mixed aggregates in a loose or compacted condition.

**Sampling:** In accordance with AASHTO T2

**Procedure:** In accordance with AASHTO T19

**Specification:** N/A

**Report:** Form MAT-104

### **3.42 SPECIFIC GRAVITY AND ABSORPTION OF COARSE AGGREGATE**

**Scope** - This test section covers the determination of specific gravity (bulk, saturated surface dry, and apparent) and absorption of coarse aggregates after 15 hours of soaking in water.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 85

**Specification:** N/A

**Report:** Form MAT-219

### **3.43 ORGANIC IMPURITIES IN FINE AGGREGATE FOR CONCRETE**

**Scope** - This section covers the determination of the presence of injurious organic compounds in fine aggregates for PC Concrete and cement mortars.

**Sampling:** In accordance with AASHTO T 2

**Procedure:** In accordance with AASHTO T 21

**Specification:** In accordance with Standard Specification Article M.03 or project Special Provisions.

**Report:** Form MAT-206

### **3.44 FIELD INSPECTION OF METAL PIPES AND PIPE ARCHES**

**Scope** - The field inspection of metal and aluminum pipe and structural plate pipe and pipe arches.

**Sampling** – Depending on the size of the shipment, one or two representative pieces of metal pipe, bands and accessories are selected by DMT and inspection personnel for testing.

**Procedure:** Procedures and Measurements are shown in the “Field Inspection of Metal and Aluminum Pipe” procedure located in Appendix G. Materials Certificates and certified test reports are also required.

**Specification:** In accordance with Standard Specification Section Article M.08

**Report** : Forms MAT-200, MAT-201, MAT-202, MAT-203, or MAT-204, whichever is applicable.

### **3.45 PENETRATION RESISTANCE TESTS**

**Scope** - This section covers the nondestructive testing of the strength of concrete in finished structures by driving a steel shaft into the surface of the concrete with a precisely governed explosive charge.

**Sampling:** Working with the Inspection personnel, select the areas to be tested. Whenever possible the area should be large enough to use the triangular template, as opposed to the single probe template.

**Procedure** : In order to obtain accurate results with this system, it is necessary to know the hardness of the coarse aggregate, as expressed in "Mohs". Generally broken stone is classed as Mohs No. 6 and crushed gravel is Mohs No. 5. However if there are any questions, samples can be checked at the Rocky Hill Laboratory for confirmation. For lightweight aggregate it is only necessary to determine the lb/ft<sup>3</sup> (kg/m<sup>3</sup>) of the concrete.

The testing procedure in the field will follow the instructions and guidelines stipulated in the latest edition of the manufactures operators manual, and will be performed only by individuals certified in the use of the equipment.

**Specification:** In accordance with project specifications

**Report** - Form MAT-210

### **3.46 SWISS HAMMER TEST**

**Scope** - This section covers the nondestructive testing of in-place hardened concrete.

**Sampling:** Working with the Inspection personnel, select the areas to be tested.

**Procedure:** The testing procedure in the field will follow the instructions and guidelines stipulated in the latest edition of the equipment manufactures operators manual.

**Specification:** In accordance with project specifications

**Report** - Form MAT-210

### **3.47 SAMPLING FRESHLY MIXED CONCRETE**

**Scope** - This section covers the procedures for obtaining representative samples of plastic PC Concrete delivered to Department projects, including sampling from stationary, paving and truck mixers, and sampling from agitating and nonagitating equipment used for delivering central mix concrete.

**Sampling:** Project personnel are responsible for sampling the concrete at the point of placement.

**Procedure:** In accordance with AASHTO T 141

**Specification:** N/A

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222

**Acceptance Report (Project Personnel):** MAT-308

### **3.48 MAKING AND CURING CONCRETE TEST SPECIMENS IN THE FIELD**

**Scope** - This section covers fabricating, curing, and transportation of PC Concrete cylinder test specimens. Project personnel are responsible for filling the cylinder molds, determining air content, temperature, and slump. Cylinders must be immediately placed where they can remain undisturbed for at least 24 hours.

**Sampling** - In accordance with the Standard Method for Sampling Freshly Mixed Concrete, AASHTO T 141.

**Procedure** - The procedures for molding test specimens and the procedures for curing, unless otherwise specified, will be in accordance with the Standard Method for Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field, AASHTO T 23.

**Assurance Report(DMT Only):**MAT-224, or MAT-225, and MAT-222

**Acceptance Report(Project Personnel):** MAT-308

### **3.49 SLUMP OF HYDRAULIC CEMENT CONCRETE**

**Scope** - This section covers the procedure to determine the slump of plastic PC Concrete.

**Sampling:** In accordance with AASHTO T 141

**Procedure:** - In accordance with the Standard Method of Test for Slump of Hydraulic Cement Concrete, AASHTO T 119.

**Specification:** In accordance with Standard Specification Article M.03 or project Special Provisions.

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222  
**Acceptance Report(Project Personnel):** MAT-308

### **3.50 MASS, YIELD, AND AIR CONTENT (GRAVIMETRIC) OF PC CONCRETE**

**Scope** - This section covers the test procedures for determining the mass (per cubic meter or cubic foot) of plastic PC Concrete delivered to project sites. The method also provides procedures for determining yield, cement content, and air content of the delivered mixture.

**Sampling** - In accordance with the Standard Method of Sampling Freshly Mixed Concrete, AASHTO T 141.

**Procedure** - In accordance with the Standard Method of Test for Mass per Cubic Meter (Cubic Foot), Yield and Air Content (Gravimetric) of Concrete, AASHTO T 121

**Specification:** In accordance with Standard Specification Article 4.01 or 6.01 and M.03 or project Special Provisions.

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222  
**Acceptance Report(Project Personnel)** - Form MAT-308.

### **3.51 AIR CONTENT OF PLASTIC CONCRETE BY THE PRESSURE METHOD**

**Scope** - This section covers the test procedure for determining the percentage of entrained air in plastic PC Concrete by use of the Type B air meter. This method is used for PC Concrete containing normal weight coarse aggregates.

**Sampling:** In accordance with the Standard Method of Sampling Freshly Mixed Concrete, AASHTO T 141.

**Procedure:** In In accordance with the Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method, AASHTO T 152.

**Specification:** In accordance with Standard Specification Article M.03 or project Special Provisions.

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222  
**Acceptance Report(Project Personnel)** - Form MAT-308.

### **3.52 AIR CONTENT OF PLASTIC CONCRETE BY THE VOLUMETRIC METHOD**

**Scope** - This section covers the test procedure for determining the percentage of entrained air in plastic PC Concrete that contains lightweight or cellular aggregates.

**Sampling:** In accordance with the Standard Method for Sampling Freshly Mixed Concrete, AASHTO T 141.

## Chapter 4 – Concrete/Steel Section

### Overview

The Concrete/Steel Section performs testing and/or inspection of portland cement concrete and related materials, structural steel and incidental construction and maintenance materials used by the Department. The section is composed of the following subsections: Concrete/Physical Testing, Cement/Aggregate/Portland Cement, Concrete Plant/Field Operations and Structural Steel Fabrication.

The Supervising Materials Testing Engineer (SMTE) is the administrative and technical head of the Concrete/Steel Section and reports directly to the Director of Research and Materials.

The SMTE directs the testing of all concrete, concrete products and allied products; directs the sampling and testing of metals. The SMTE also administers the inspection activities of a commercial testing agency under contract to the ConnDOT for the purpose of shop inspection of the fabrication of structural steel and precast/prestressed concrete structures. The SMTE makes recommendations as to the solution of problems concerning portland cement concrete, its production and use, and the fabrication of precast/prestressed concrete structures and structural steel; conducts research into the development of improved concrete mixes, concrete products and other construction materials; initiates and directs the training of laboratory and construction personnel in the sampling and testing of materials, to include training in the nondestructive testing of welds; reviews work activities of all employees to ensure technical competence in job performance and satisfactory attendance; prepares and keeps current the concrete/steel section of the DMT's *"Materials Testing Manual;"* initiates and aids in the preparation of material specifications; confers with producers, contractors and engineers concerning materials and their uses; initiates or supervises the preparation of technical reports or allied documents; directs the application of statistical techniques to the quality control of materials; prepares personnel, equipment and overtime budget requirements; directs the maintenance, calibration and procurement of equipment and apparatus necessary for testing and inspection purposes.

The SMTE is also responsible for the daily activities of Department personnel dedicated to the quality assurance of structural-steel and related materials for Department projects. The SMTE assigns, oversees, and evaluates these personnel.

Further duties of the SMTE include making recommendations as to the suitability for use of construction and maintenance materials used by the Department such as cement, concrete, aggregates, Portland cement concrete mixtures, precast and/or prestressed concrete products, structural steel products, pipe, guiderail, signs, traffic signals, highway illumination items, etc.

A Materials Testing Engineer (MTE)/Trans. Engineer III (TE3) assists the SMTE. The MTE/TE3 is responsible for the routine operation of the Concrete and Physical Test Unit, monitors the job performance of field personnel by periodic visits to the work sites and assesses an employee's technical competence and conformance to standard testing techniques. In the absence of the SMTE, the MTE/TE3 is the acting head of the entire Section.

Each of the functional subsections within the Section is headed by a Materials Technician III (MT3) or Trans. Engineer II (TE2) who directs the testing and inspection operations applicable to that subsection. The MT3 or TE2 supervises employees who are assigned to that subsection; schedules personnel for duty assignments; reviews work, both in progress and after completion, to ensure competent job performance by the employee; and monitors employee attendance and conformance to the daily work schedule.

#### 4.01 PORTLAND CEMENT CONCRETE

Concrete consists basically of two parts: the paste (cement and water) and inert materials (aggregates). In properly proportioned concrete, each particle of aggregate, regardless of size or shape, is completely surrounded by paste and all voids are filled with the paste. It should be noted that the quality of the concrete is greatly dependent upon the quality of the paste. The paste must have strength, durability and be resistant to the infiltration of water.

The cementing action of the paste is due to the chemical reaction between cement and water. This chemical reaction is spread over a period of time in which reaction occurs rapidly in the early stage and slows down in the later stages. About two and one half gallons of water per bag of cement is needed for the hydration of cement alone, but more water is used to obtain workability; and with more water, more aggregate may be used. When too much water is used, however, the quality of the concrete is lowered, less strength is obtained, and the concrete is less durable. Thus, for acceptable performance, the proper proportioning of water and cement (water-cement ratio) is essential within Portland cement concrete.

The volume of a concrete mix in the plastic state is equal to the volume of paste and air, plus the solid volume of the aggregates. The table below lists the proportions of the ingredients in the standard concrete mixes currently in use by the Department. All standard concrete mixes shall conform to one of the following:

| TYPE<br>of Portland<br>Cement<br>Concrete | Minimum<br>Compressive<br>Strength psi (Mpa)<br>@ 28-days | Maximum<br>Water/Cement Ratio<br>by weight(mass).<br>Cement weight (mass)<br>includes weight<br>(mass) of other<br>approved<br>Cementitious Material | Minimum weight (mass)<br>Of Cementitious<br>Materials<br>Lbs/cu yard (kg/cu meter) |
|---|---|--|--|
| Pavement                                  | 3500 (25)   | 0.49   | 611(365)   |
| Class A                                   | 3000 (21)   | 0.53   | 611(365)   |
| Class C                                   | 3000 (21)   | 0.53   | 658(390)   |
| Class F                                   | 4000 (28)   | 0.44   | 658(390)   |
| Slope Paving                              | 2000 (14)   | 0.69   | 451(270)   |

The proportions of the fine and coarse aggregate used in any mix shall conform to Article M.03.01 and be approved by the Engineer.

#### 4.02 COARSE AND FINE AGGREGATE FOR PORTLAND CEMENT CONCRETE

**Scope** - This section describes the methods used to determine the properties and suitability of coarse and fine aggregates for use in Portland cement concrete.

**Sampling** - Samples will be obtained as outlined in Section 3.31, "Sampling of Aggregates." Samples will be taken from bins or approved storage piles at the production site or batch plant.

**Procedure** – As described in "Coarse and fine aggregate for PC Concrete" listed in Appendix G.

**Specification** - Standard Specifications, Article M.03.01

**Report** - Forms MAT-205, MAT-206 or MAT-207.

#### **4.03 PORTLAND CEMENT**

**Scope** – This section covers the requirements for testing Portland cement to be used in the production of concrete for use in Department projects.

**Sampling** - All Portland cement delivered to a construction site will be sampled by a representative of the Department and submitted with a MAT-100 to the DMT. An acceptable sample is a single factory sealed bag of each type used on the project. Sampling at a terminal or bulk storage facility will be done by DMT personnel to assure the quality of Portland Cement used in concrete delivered to a project in accordance with the ConnDOT Program for Acceptance of Cement by Certification.

**Procedure** - Test procedures will be as prescribed by AASHTO M 85 or M 240, whichever is applicable.

**Specification** - In accordance with AASHTO M 85 or AASHTO M 240

**Report** - Form MAT-316, 317, 318, 319, or 320 whichever applies.

#### **4.04 TRANSVERSE JOINTS FOR CONCRETE PAVEMENT**

**Scope** - This section covers corrosion-resistant load transfer devices, preformed expansion joint fillers, and wood joint filler.

##### **LOAD TRANSFER DEVICES**

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a minimum of two (2) samples, accompanied by a Certified Test Report conforming to the requirements of Standard Specifications, Article 1.06.07, for each shipment. Note: Each sample must consist of at least three (3) load transfer dowels.

**Procedure** – DMT personnel will review the Certified Test Report to ensure conformance to specification. When required, assurance Tests will be performed in accordance with AASHTO T 253 and AASHTO T 244.

**Specification** - Standard Specifications, Article M.03.01-5

**Report** - Forms MAT-315.

##### **PREFORMED EXPANSION JOINT FILLERS**

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a Materials Certificate and Certified Test Report conforming to Standard Specifications, Article 1.06.07, for

each shipment. Samples for assurance testing when required must consist of one (1) square foot per size per shipment.

**Procedure** – DMT personnel will review the Certified Test Report to ensure conformance to specification. When required, assurance tests will be performed in accordance with AASHTO T 42

**Specification** - Standard Specifications, Article M.03.01-5

**Report** - Forms MAT-315

#### **WOOD JOINT FILLER**

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a Materials Certificate conforming to Standard Specifications, Article 1.06.07, for each shipment. Note: Materials Certificate must include a statement indicating preservative treatment.

**Procedure** – DMT personnel will review the Certified Test Report to ensure conformance to specification.

**Specification** - Standard Specifications, Article M.03.01-5

**Report** - Forms MAT-315

#### **4.05 LONGITUDINAL JOINT DEVICES**

**Scope** - This section covers longitudinal joint devices for use in the construction of concrete pavements.

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a Materials Certificate for each shipment. When required for assurance testing, one sample (six units) will be submitted for each mile (1.6 km) of pavement.

**Procedure** - DMT personnel will review the Certified Test Report to ensure conformance to specification. When required, assurance testing will be conducted in accordance with AASHTO T 244

**Specification** - In accordance with Standard Specifications, Article M.03.01-6. The dimensions will be as shown on the plans

**Report** - Form MAT-315

#### **4.06 PREFORMED EXPANSION JOINT FOR STRUCTURES**

**Scope** - This section covers expansion joint material to be used in the construction of concrete structures.

**Sampling** – Project personnel are responsible for submitting a minimum of one sample with a MAT-100 for each shipment. An acceptable sample is a square with a minimum dimension of 12-in on any side.

**Procedure**

1. Preformed expansion joint filler for bridges: In accordance with AASHTO T 42, Type II.
2. Premolded expansion joint filler for bridge bearings: In accordance with AASHTO T 42.

**Specification**

1. Preformed expansion joint filler for bridges: In accordance with AASHTO M 153, Type II.
2. Premolded expansion joint filler for bridge bearings: In accordance with AASHTO M 33.

**Report** - Form MAT-315.

## 4.07 JOINT SEALANTS

**Scope** - This section covers joint sealants for use in concrete pavement and concrete structures.

**Sampling** - In accordance with AASHTO M 173

**Procedure** - In accordance with AASHTO T 187

**Specification** - In accordance with AASHTO M 173

**Report** - Form MAT-424 or 425.

### Structures

**Sampling** - N/A

**Procedure** - Joint sealants for structures will be as specified on the plans or as required by the Special Provisions.

**Specification** - As specified on the plans or in the Special Provisions

**Report** - Form MAT-424 or 425.

## 4.08 ADMIXTURES

**Scope**

When project specifications require that an admixture shall perform the desired function without injurious effect upon the concrete, proof of conformance to this requirement will be in the form of a certified statement from a recognized laboratory. The certified statement will contain evidence based on tests pertinent to the admixture made in the recognized laboratory by the use of concrete materials and by methods that meet requirements of current AASHTO and ASTM standards. Tests may be made on samples taken from a quantity submitted by the Contractor for use on the project or on samples submitted and certified by the manufacturer as representative of the admixture to be supplied. A recognized laboratory is any cement and concrete laboratory approved by the Engineer and inspected regularly by the Cement and Concrete Reference Laboratory sponsored by ASTM and the National Institute of Standards and Technology.

**Sampling** - In accordance with AASHTO M 154 and AASHTO M 194

**Procedure** - Approval of the certified statement submitted for an admixture will qualify that admixture for inclusion in the Department Qualified Products List regarding Admixtures for Portland Cement Concrete.

**Specification** - In accordance with Standard Specifications, Article M.03.01-9

**Report – MAT-315**

#### **4.09 PROTECTIVE COMPOUND MATERIAL**

**Scope** - This section covers material used as a protective coating for surfaces of concrete structures.

**Sampling** - Samples are not required on a project level. Qualified products are listed on the Departments "Qualified Products List".

**Procedure** - Standard Specifications, Article M.03.01-11

**Specification** - Standard Specifications, Article M.03.01-11

**Report** - Form MAT-315.

#### **4.10 NON-SHRINK, NON-STAINING GROUT**

**Scope** - This section covers non-shrink, nonstaining grout for use as directed in the plans or specifications.

**Sampling** – Project personnel are responsible for submitting one (1) unopened container of the premixed material with a MAT-100 per shipment per project. Container will be clearly marked with the manufacturers name, date of production, batch number, and instructions for proper mixing, placement, and curing of the material.

**Procedure** - Non-shrink, nonstaining grout will be tested in accordance with ASTM C 1107, Grade B.

**Specification** - Standard Specifications, Article M.03.01-12

**Report** - Form MAT-330

#### **4.11 MAKING AND CURING CONCRETE TEST SPECIMENS IN THE LABORATORY**

**Scope** - This section covers procedures for making and curing test specimens of concrete in the laboratory under accurate control of materials and test conditions in order to determine variations in the properties of the plastic and hardened concrete.

**Sampling** - In accordance with the Standard Method for Sampling Freshly Mixed Concrete, AASHTO T 141.

**Procedure** - The procedure for preparing the concrete and the procedures for molding and curing the test specimens will be in accordance with the Standard Method of Making and Curing Concrete Test Specimens in the Laboratory, AASHTO T 126.

#### **4.12 CONCRETE CORES**

**Scope** - This section covers the procedure for obtaining, preparing and testing specimens of hardened concrete from structures and pavements.

**Sampling** - In accordance with the Standard Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, AASHTO T 24.

**Procedure** - In accordance with the Standard Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete, AASHTO T 24.

**Specification** - In accordance with Standard Specifications, Section 4.01 or 6.01 whichever applies.

**Report** - Form MAT-321

### **4.13 CONCRETE CORES (LENGTH)**

**Scope** - This section covers the procedure for determining the length of a core drilled from a concrete pavement or structure.

**Sampling** - In accordance with the Standard Method of Measuring the Length of Drilled Concrete Cores, AASHTO T 148, Section 4 – Test Specimens.

**Procedure** - In accordance with the Standard Method of Measuring the Length of Drilled Concrete Cores, AASHTO T 148, Section 5 - Procedure.

**Specification** - In accordance with Standard Specifications, Section 4.01 or 6.01 whichever applies.

**Report** - Form MAT-409

### **4.14 COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS**

**Scope** - This section covers the procedure for compression testing of molded concrete cylinders.

**Sampling** - In accordance with the Standard Method of Sampling Freshly Mixed Concrete, AASHTO T 141; the Standard Method of Making and Curing Concrete Test Specimens in the Lab, AASHTO T 126.

**Procedure** - In accordance with the Standard Method for Compressive Strength of Cylindrical Concrete Specimens, AASHTO T 22.

**Specification** - In accordance with Standard Specifications, Section 4.01 or 6.01

**Report** - Form MAT-308

### **4.15 STEEL REINFORCING BARS FOR CONCRETE**

**Scope** - This section covers deformed billet steel bars for concrete reinforcement.

**Sampling** - A sample of each size bar will be submitted for each shipment as follows: All sizes- one sample per size from each manufacturer for each 200 tons. Samples submitted for test will be cut from the shipment on the project site and will be not less than 5 ft. (1.5 m) in length.

**Procedure** - In accordance with AASHTO T 244

**Specification** - Bar reinforcement will be tested in accordance with procedures prescribed in AASHTO M 31 (ASTM A 615) and shall conform to the requirements of Grades 60 or metric grade 420, whichever is required by the project specifications. Bar reinforcement required to be galvanized or epoxy coated shall be in accordance with ASTM A 153 for galvanized material, or AASHTO M 284 for epoxy coated material.

**Report** - Form MAT-305

#### **4.16 WIRE AND WELDED WIRE STEEL WIRE FABRIC**

**Scope** - This section covers wire and welded steel wire fabric for use as concrete reinforcement.

**Sampling** – A 1 yd<sup>2</sup> (0.9 m<sup>2</sup>) sample of each type will be submitted for test per 8,000 yd<sup>2</sup> (7,000 m<sup>2</sup>) of fabric used.

**Procedure** - In accordance with AASHTO T 244

##### **Specification**

Specifications for the various types of wire and welded steel wire fabric shall be as follows:

1. Cold-drawn steel wire: AASHTO M 32
2. Welded steel wire fabric: AASHTO M 55
3. Deformed steel wire: AASHTO M 225
4. Welded Deformed Steel Wire Fabric: AASHTO M 221

**Report** - Form MAT-306 or 328 whichever applies.

#### **4.17 DEFORMED BAR MAT REINFORCEMENT**

**Scope** - This section covers deformed bar mat reinforcement for use in the construction of concrete pavement.

**Sampling** - One sample consisting of 1 yd<sup>2</sup> (m<sup>2</sup>) of each type will be submitted for each 1 mile (1.6 km) of pavement lane.

**Procedure** - In accordance with AASHTO T 244

**Specification** - In accordance with AASHTO M 54

**Report** - Form MAT-305

#### **4.18 PRESTRESSING STEEL**

**Scope** - This section covers uncoated high tensile strength, seven-wire, steel strand for use in prestressed and post-tensioned concrete members.

**Sampling** - One 7 ft. (2.2 m) length and one 1 ft. (305 mm) length of strand shall be sampled for test from each reel or coil. Up to five reel packs or coils identified with the same heat number can be covered with a single sample.

**Procedure** - In accordance with AASHTO T 244

**Specification** - In accordance with AASHTO M 203

**Report** - Form MAT-323

## 4.19 STRUCTURAL STEEL

**Scope** - This section covers all structural steel for use in riveted, bolted or welded construction.

### STEEL

**Sampling** - Test samples for the grade of structural steel specified on the plans or in the Special Provisions shall be in accordance with Standard Specifications, Article M.06.02-1 (Charpy V-notch)

**Procedure** - As specified on the plans or in the Special Provisions and in accordance with Standard Specifications, Article M. 06.02. Project personnel are responsible for submitting a MAT-100 when the material is delivered to the project site.

**Specification** - As specified on the plans or in the Special Provisions and in accordance with Standard Specifications, Article 6.03 and M.06.02.

**Report** - Form MAT-305 or 315 whichever applies.

## STRUCTURAL STEEL COATINGS

**Sampling** - Test samples of coatings are generally not required unless specified in the project Special Provisions or on the plans. All paint must be approved by the Northeast Protective Coating Committee (NEPCOAT) and listed on their Qualified Products List A or B.

**Procedure** – Fabricators of structural steel are responsible for making themselves aware of the entire coating specification for each individual project prior to starting the work. The DMT must be notified in advance of any coating work on structural steel for Department use. Field painting and touch-up work must conform to Article 6.03.03-38. Project personnel are responsible for submitting a MAT-100 when the material is delivered to the project site.

**Specification** - As specified on the plans, in the Special Provisions or in accordance with Standard Specifications, Article 6.03 and M.07.

**Report** - Form MAT-315.

## 4.20 EYEBAR STEEL

**Scope** - This section covers steel for eye bars.

**Sampling** - Sampling will conform to those required for the grade of steel specified on the plans or in the contract documents.

**Procedure** - Procedures shall conform to those required for the grade of steel specified on the plans or in the contract documents.

**Specification** - Specifications shall conform to those required for the grade of steel specified on the plans or in the contract documents.

**Report** - Form MAT-315.

#### **4.21 ANCHOR BOLTS**

**Scope** - This section covers anchor bolts, nuts and washers for structural steel construction.

**Sampling** - One (1) bolt for each size, heat #, and shipment is required for each project. Each sample must be submitted with a Certified Test Report and Materials Certificate.

**Procedure** - In accordance with AASHTO T 244

**Specification** - Standard Specs, M.06.02-2 and M.15.02-1, 2 and 3, and/or project special provisions.

**Report** - Form MAT-300 or MAT-301 whichever applies.

#### **4.22 HIGH STRENGTH BOLTS**

**Scope** - This section covers high strength bolts, nuts and washers for use in structural steel construction.

**Sampling** - Submit request for test with sample, Certified Test Report, and Materials Certificate.

**Procedure** - In accordance with "Standard Method of Test for Mechanical Testing of Steel Products" AASHTO T 244. Certified Test Report and Materials Certificate must show conformance to applicable specifications.

**Specification** - Standard Specifications, Articles M.06.02-5, and/or project special provisions.

**Report** - Form MAT-302

#### **4.23 STEEL SHAFTINGS AND FORGINGS**

**Scope** - This section covers pins and rollers for structural steel construction.

**Sampling** - In accordance with Standard Specifications, Article M.06.02-7

**Procedure** - In accordance with Standard Specifications, Article M.06.02-7

**Specialization** - In accordance with Standard Specifications, Article M.06.02-7

**Report** - Form MAT-305

#### **4.24 WELDED AND SEAMLESS STEEL PIPE**

**Scope** - This section covers welded and seamless steel pipe

**Sampling** - In accordance with ASTM A 53 and as supplemented in Standard Specifications, Article M.06.02-8.

**Procedure** - In accordance with ASTM A 53 and as supplemented in Standard Specifications, Article M.06.02-8.

**Specification** - In accordance with ASTM A 53 and as supplemented in Standard Specifications, Article M.06.02-8.

**Report** - Form MAT-315

## **4.25 METAL CASTINGS**

**Scope** - This section covers castings for general application in highway and bridge construction. Refer to Standard Specifications, Article M.06.02-9 for general condition of casting.

**Sampling** - In accordance with the governing specifications as indicated below.

**Procedure and Specification**- In accordance with the following unless otherwise specified:

Carbon Steel Castings shall conform to ASTM A 27. Grade 415-205, 450-240, or 485-250

Malleable Castings shall conform to ASTM A 47, Grade 24018.

Ductile Iron Castings shall conform to ASTM A 536, Grade 414-276-18.

Gray Iron Castings shall conform to ASTM A 48 Class 207.

Chromium Alloy Steel Castings shall conform to ASTM A 296 Grade 10.

**Report** - Form MAT-315

## **4.26 BRONZE OR COPPER ALLOY BEARING AND EXPANSION PLATES**

**Scope** - This section covers bronze or copper alloy bearing or expansion plates intended for use in bridge construction.

**Sampling** - Standard Specifications, Article M.06.02-10

**Procedure** - The Contractor shall submit a Certified Test Report confirming that the lubricant compound conforms to Standard Specifications, Article M.06.02-10 and the project specification.

**Specification** - Standard Specifications, Article M.06.02-10

**Report** - Laboratory test results will be reported on Form MAT-315

## **4.27 ALUMINUM CASTING, TUBING AND FITTINGS**

**Scope** - This section covers aluminum castings, tubing and fittings for ornamental posts, traffic rail posts, bases, post connection splice bars, end caps, etc.

**Sampling** - Standard Specifications, M.06.02-11

**Procedure** - In accordance with Standard Specifications, M.06.02-11

**Specification** - Standard Specifications, M.06.02-11

**Report** - Form MAT-315.

#### **4.28 MILL AND SHOP INSPECTION OF STRUCTURAL STEEL**

**Scope** - This section covers the mill and shop inspection of structural steel.

**Sampling** - N/A

**Procedure** - Mill and shop inspection shall be in accordance with Standard Specification, Article 6.03.03.

**Specification** - Standard Specification Article 6.03.03.

**Report** - Reports will be submitted in accordance with the consultant inspection contracts and distributed by DMT personnel to the appropriate district construction personnel.

#### **4.29 GALVANIZING**

**Scope** - This section covers galvanizing on iron and steel materials other than wire. Also, galvanized grates incorporated into catch basin tops are marked in the field by a Department inspector and are documented through the MAT-314 (PC-1) .

**Sampling** - N/A

**Procedure** - In accordance with ASTM A 123 or ASTM A 153, whichever shall apply.

**Specification** - In accordance with ASTM A 123 or ASTM A 153, whichever shall apply.

**Report** – Form MAT-315.

#### **4.30 FILLER METAL FOR WELDING**

**Scope** - This section covers filler metal for welding in highway construction.

**Sampling** - One sample of each size and lot of electrodes used for field welding shall be submitted for each project with certified test reports to the DMT.

**Procedure** - In accordance with Standard Specifications, Article M.06.04.

**Specification** - In accordance with Standard Specifications, Article M.06.04.

**Report** - Form MAT-315.

#### **4.31 CERTIFICATION OF WELDERS**

**Scope** - This section covers the certification of field welders who perform work on Department projects.

**Sampling** – All welders working on Department projects must be certified by the DMT and must possess a valid up-to-date certificate for the duration of any welding operations.

**Procedure** - In accordance with Standard Specifications, Article 6.03.03-6.

**Specification** - In accordance with Standard Specifications, Article 6.03.03-6.

**Report** - Welders who pass certification testing will be issued a ConnDOT Welder Certification I.D. card by DMT personnel. The ID card is valid for two years from date of issue and must be updated every six months. The ID card contains qualified weld processes and positions information.

## **4.32 REINFORCED CONCRETE PIPE AND ALLIED PRODUCTS**

### **Purpose**

This outline is to serve as a guide to personnel involved in the inspection of the manufacture of reinforced concrete pipe and allied products. Many factors enter into the proper control of reinforced concrete pipe manufacturing. It is a combination of good quality control and quality assurance.

1. Testing and inspection of the various materials selected for use.
2. Proper proportioning and adequate mixing of the materials.
3. Sufficient reinforcement and proper placement of reinforcement within form work.
4. Proper handling, placing and consolidating procedures.
5. Proper curing of the product.

To ensure effective inspection, each phase should be carefully observed. A competent inspector should become familiar with various manufacturing processes, designs, specifications, and procedures followed for the particular plant at which they are inspecting.

### **Scope**

This section covers reinforced concrete pipe and allied products, (reinforced elliptical concrete pipe, slotted reinforced concrete pipe, and reinforced concrete culvert ends for underdrains and outlets) that may be accepted by the Department on the basis of the manufacturer's certification. Products covered under this item shall include, but not be limited to, reinforced concrete pipe intended for use by the Department in the construction of culverts, slotted reinforced concrete pipe for use as underdrains, and reinforced concrete culvert ends.

### **Annual Plant Inspection**

The purpose of this inspection is to ensure that a plant is capable of producing a product in accordance with those standards set forth in AASHTO M 170M, AASHTO M 207M and AASHTO M 175M Type II, amended and supplemented by Standard Specifications, Article M.08.01 as applicable.

Inspection Form MAT-324 indicates the name, address and plant number of the manufacturer and list the number, make, capacity, type and condition of all scales and seal dates, mixers and pipe machines intended for use on ConnDOT projects.

### **Materials**

The inspector will obtain samples of cement, water, coarse aggregate, fine aggregate, admixtures and reinforcing steel he proposed for use on the project from the manufacturer and indicate on Form MAT-324 the suppliers of the materials.

### **Sampling**

Component materials will be sampled as follows:

1. Portland cement shall conform to AASHTO M 85. All cement will be sampled at the mill and tested by an approved laboratory whose methods and equipment are regularly inspected by the Cement and Concrete Reference Laboratory. One copy of the test report certifying the acceptability of the cement shall be furnished to the Director of Research and Materials. At the time of the annual inspection, the inspector may obtain a sample of cement currently in use and a copy of the corresponding certified test report. Cement shall be subject to sampling and testing at any time by the Department.
2. Aggregate: Aggregate Samples shall be obtained from approved storage piles or bins by the inspector during the annual inspection. Additional aggregate samples shall be taken at least once every month or from each new source.
3. Water: Each source of supply shall be sampled annually.
4. Reinforcement: Samples of each size and type of reinforcement shall be taken every six months, or as required.
5. Admixtures: Only approved admixtures shall be used. Samples of each type of admixture from each source of supply shall be obtained annually or as required.

### **Fabrication**

Fabrication of reinforced concrete pipe shall be in accordance with AASHTO M 170M; AASHTO M 207M; and Standard Specifications, Articles M.08.01-6, 9, 10 and 22, as applicable.

The inspector will observe the production process which shall include checking the splices, spacing and size of reinforcing at the time cages are assembled. The reinforcing shall be lapped not less than 51 mm and welded with an electric welding machine. The spacing, center-to-center, of adjacent rings of circumferential reinforcement in the cage shall not exceed 102 mm for pipe having a 102 mm wall thickness, nor exceed the wall thickness for larger pipe, and in no case shall exceed 152 mm. The cage shall contain sufficient longitudinal bars or members, extending through the wall of the pipe to maintain the reinforcement rigidly in shape and in the correct position within the form. For multiple layers, a line of circumferential reinforcement for any given total area may be composed of two layers for pipe with a wall thickness of less than 178 mm or three layers for pipe with a wall thickness of 178 mm or greater. The layers shall not be separated by more than the thickness of one longitudinal plus 6.4 mm. The multiple layers shall be fastened together to form a single rigid cage. All other specification requirements such as laps, welds, tolerance of placement in the wall of the pipe, etc., shall apply to this method of fabricating a line of reinforcement.

The reinforcing shall be free of objectionable coatings, particularly heavy corrosion prior to installation in the form. An adherent film of rust or mill scale is not considered objectionable. The reinforcement should be secure so that the placement of the concrete will not displace the steel from its proper position.

### **Curing**

The pipe shall be cured for a sufficient length of time so that the concrete will develop the specified strength at 28 days or less. After curing, the pipe shall not be subjected to sudden and drastic temperature changes.

### **Shipping**

Pipe shall not be shipped until it is at least 7 days old, unless earlier shipment is authorized by the Laboratory on the basis of 3-edge testing.

#### **Preliminary Tests and Tests for Extended Deliveries - Sampling**

As part of the yearly certification process, Laboratory personnel will select RCP and witness 3-edge testing in the Spring and Fall of each year that certification is requested, two of each size pipe up through 750 mm diameter and one of each size greater than 750 mm diameter. The pipe sample shall be tested by the 3-edge bearing test as per AASHTO T 280, except as follows:

1. Modified or special design pipe shall be tested to the 0.3 mm (0.01 in.) load and the ultimate load requirements as per AASHTO M 170 and M 207.
2. At the discretion of the Engineer, pipe of standard design, as specified in AASHTO M 170M, may be tested to the 0.3 mm (0.01 in.) requirement plus 10 percent additional load in lieu of ultimate load testing. Test pipe attaining 0.3 mm (0.01 in.) crack will not be acceptable for use on ConnDOT projects.

#### **Rejection**

For pipe that fails to meet the above requirements, it shall be necessary for the manufacturer to either physically isolate the rejected pipe in his yard or provide some means to clearly indicate the unacceptability of said pipe. When production is resumed on any size pipe previously rejected, preliminary tests shall be performed.

#### **Field Inspection of Reinforced Concrete Pipe**

Reinforced concrete pipe is accepted on certification providing that the Laboratory has inspected the manufacturer's facilities and fabrication procedures, and has performed the required load-bearing and materials tests to ensure to the fullest extent practical that the quality of materials, the process of fabrication and the plant tests for all reinforced concrete pipe supplied to ConnDOT projects are satisfactory; however, final acceptance of the pipe shall be the responsibility of the receiving district. All pipe received on the construction site will be inspected by District inspection personnel. Individual sections may be rejected for any of the following conditions:

1. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint
2. Defects that indicate imperfect proportioning, mixing or molding;
3. Surface defects indicating honeycombed or open texture;
4. Damaged or cracked ends where such damage would prevent making a satisfactory joint; and,
5. Any continuous crack having a surface width of 0.3 mm or more and extending for a length of 300 mm or more, regardless of position in the wall of the pipe.

The conditions outlined in (4) and (5) above are those which field personnel are most likely to encounter. These conditions can result during shipment or during handling on the project. Pipe may be repaired, if necessary, because of accidental damage during handling and will be acceptable if the repairs are sound, properly finished and cured, and the repaired pipe conforms to the requirements of the specifications. The exposure of the ends of the longitudinal steel, stirrups, or spacers that have been used to position cages during the manufacturing process shall not be cause for rejection. Each section of concrete pipe shall be clearly marked by the manufacturer with the following information:

Date of manufacture, Pipe Class, Size, Name or trademark of the manufacturer

This information will be obtained by the District inspection personnel from each section of pipe delivered to the project and will be submitted to the Laboratory with a Request for Test

(Form MAT-100), and the original (white copy) of the MAT-314 (PC-1) furnished with each shipment by the manufacturer.

#### **4.33 REINFORCED CONCRETE CULVERT ENDS**

**Scope** - This section covers reinforced concrete culvert ends to be used in culvert installations.

**Sampling** - Cement, aggregates, water, admixtures and steel reinforcement shall be sampled as described under 4.40 in this manual.

**Procedure** - Standard Specifications, Article M.08.01-22. Plant and field inspection procedures shall be as outlined in section 4.40 in this manual except 3-edge bearing tests will not be required.

**Specification** - Standard Specifications, Article M.08.01-22.

**Report** - MAT-314

#### **4.34 PLAIN AND PERFORATED CONCRETE DRAIN PIPE**

**Scope** - This section covers plain and perforated concrete drain pipe for use in drainage.

**Sampling** - Cement, aggregates, water and finished pipe will be sampled the same as described under 4.40, except as follows: Samples of each size and type of pipe shall be subjected to 3-edge bearing and absorption tests each spring and fall or prior to delivery. Frequency of test for extended deliveries shall not apply to this product.

**Procedure** - In accordance with AASHTO M 170M and T 280.

**Specification** - In accordance with AASHTO M 170M and T 280 and Standard Specifications, Article M.08.01-7, respectively.

**Report** - Form MAT-314

#### **4.35 PLASTIC AND POLYETHYLENE CORRUGATED DRAINAGE PIPE**

**Scope** - This section cover plastic and polyethylene corrugated pipe or tubing for use in drainage.

**Sampling** - Certified test reports in accordance with Standard Specification Article 1.06.07 will be submitted for each size of pipe.

**Procedure** - In accordance with AASHTO M 252 as supplemented and amended by Standard Specifications, Article M.08.01-25.

**Specification** - In accordance with AASHTO M 252 as supplemented and amended by Standard Specifications, Article M.08.01-25.

**Report** - Form MAT-315.

#### **4.36 GEOTEXTILES**

**Scope** - This section covers geotextile intended for use in highway drainage and erosion control of soil.

**Sampling** - NA.

**Procedure** - In accordance with Standard Specifications, Article M.08.01-26

**Specification** - In accordance with AASHTO M 288

**Report** - Form MAT-315

#### **4.37 POLYVINYL CHLORIDE PLASTIC PIPE**

**Scope** - This section covers polyvinyl chloride plastic pipe, elbows and couplings for highway drainage.

**Sampling** - The Contractor shall submit a Materials Certificate conforming to Standard Specifications, Article 1.06.07, for each shipment.

**Procedure** - N/A

**Specification** - In accordance with ASTM D 1785 for pipe, and ASTM D 2466 or ASTM D 2467 for couplings and elbows.

**Report** - Form MAT-315

#### **4.38 CATCH BASINS, MANHOLES AND DROP INLETS**

##### **BRICK**

**Scope** - This section covers brick (made from clay or shale and burned) intended for use in the construction of drainage structures.

**Sampling** - Six (6) bricks will be submitted to the Laboratory in accordance with AASHTO T 32 on a annual basis.

**Procedure** - In accordance with AASHTO T 32 and amended and/or supplemented by Standard Specifications, Article M.08.02-1.

##### **Specification**

Units shall conform to AASHTO M 91 as amended or supplemented by Standard Specifications, Article M.08.02-1. Brick shall be Grade SM unless otherwise specified.

**Report** - Form MAT-312

##### **CONCRETE BUILDING BRICK**

**Scope** - This section covers concrete building brick for use in the construction of drainage structures.

**Sampling** - Six (6) bricks will be submitted to the Laboratory in accordance with ASTM C 140 on a annual basis .

**Procedure** - In accordance with ASTM C 140

**Specification** - Units shall conform to ASTM C 55. Brick shall be Grade S II unless otherwise specified.

**Report** - Form MAT-309

## **MASONRY CONCRETE UNITS**

**Scope** - These requirements cover solid, precast, segmental concrete masonry units intended for use in the construction of drainage structures.

**Sampling** - Six (6) bricks will be submitted to the Laboratory in accordance with ASTM C 140 on a annual basis.

**Procedure** - Tested in accordance with ASTM C 140.

**Specification** - Units shall conform to ASTM C 139

**Report** - Form MAT-309

## **PRECAST UNITS FOR DRAINAGE STRUCTURES**

### **Scope**

This section covers precast concrete units to be used in the construction of drainage structures. Precast units shall include, but not be limited to, products such as box culverts, catch basins, drop inlet and manhole tops, riser sections, sumps and other appurtenances.

ConnDOT specifications provide for the acceptance of precast units on the basis of the manufacturer's certification and require the manufacturer to exercise certain quality control procedures to ensure that the units conform to the necessary requirements. The following outline describes the role of the Division of Materials Testing in monitoring the production, quality assurance and acceptance of precast concrete units.

### **Quality Control Manual**

Each fabricator which proposes to manufacture precast units for use by ConnDOT shall develop and maintain a plant-specific Quality Control Manual addressing in detail the production and certification process of products for use on Department projects. This Manual shall be submitted to the Director of Research and Materials on an annual basis for approval.

### **Annual Plant Certification**

Each plant shall also be subjected to an annual inspection by a representative of the Division of Materials Testing. The purpose of this inspection is to determine if the facility has the infrastructure to manufacture precast units to the requirements set forth in Standard Specifications, Article M.08.02-4. The inspection is also to determine if plant personnel are exercising in-plant quality control in accordance with the approved Quality Control Manual for that plant.

The inspector will review all phases of the manufacturing process, and will document the results of his inspection by completing the information required on Inspection Form MAT-324 "*Yearly Inspection of Precast/Prestressed Concrete Structure, and Concrete Pipe Manufacturers.*"

### **Sampling**

The quality of the materials used in the manufacture of precast units shall be determined by tests on samples taken in accordance with the following schedule: (Sample size, sampling methods and test procedures shall be as prescribed elsewhere in this Manual unless otherwise specified below).

1. Portland Cement: Cement shall conform to AASHTO M 85 or AASHTO M 240 and shall be from a Department qualified source. All cement shall be sampled at the mill and tested by an approved laboratory whose methods and equipment are regularly inspected by the Cement and Concrete Reference Laboratory. One copy of all test reports certifying the acceptability of the cement shall be furnished to the Division of Materials Testing. Cement shall be subject to sampling and testing at any time by the DMT.
2. Aggregate: Samples of aggregate shall be obtained from approved storage piles or bins by the inspector during the annual inspection. Additional samples shall be taken at least every month or from each new source.
3. Water: Each source of supply shall be sampled annually.
4. Reinforcement: Samples of each size and type of reinforcement shall be taken each six (6) months or as directed by the Engineer.
5. Miscellaneous Hardware: Manhole steps shall conform to AASHTO M 199M. Sampling frequency will be determined by the Engineer. All steel frames and grates incorporated into catch basin and drop inlet tops shall bear the Independent Testing Agency Acceptance stamp.
6. Admixtures: Only admixtures listed on the Department's Qualified Products List shall be used.

### **Fabrication Process Review**

During the annual inspection, the inspector will review the standard fabrication process in use at the plant to determine that the precast units are manufactured in accordance with the requirements specified in Standard Specifications, Article M.08.02-4, and the approved Quality Control Manual for that plant. The following areas of the production operations are to be carefully inspected:

1. Storage and handling of component materials.
2. Concrete batching and mixing equipment and procedures, including use of approved concrete mix designs.
3. Fabrication of reinforcement or reinforcing cages, where applicable.
4. Dimensions, condition and construction of forms.
5. Prior to placing concrete, the positioning of reinforcing bars or cages in the forms; and in the case of catch basin or drop inlet tops, the positioning of steel frames.
6. Transportation, placement and consolidation of plastic concrete.
7. Curing methods, handling and storage of units.
8. Dimensions, details, surface finish, and freedom from defects of finished units.
9. Proper marking and identification of units.
10. Application of protective compound to surfaces of precast catch basin and drop inlet tops which will be exposed when in service.

### **Review of Materials Testing by Plant Personnel**

The manufacturer is required to furnish the equipment and personnel necessary to perform compressive strength tests and air content determinations to demonstrate conformance to the contract specifications and plans, and to document the results of these tests in the plant records.

During the annual inspection, the inspector will review the testing equipment and procedures employed at the plant for conformance to the following requirements:

1. Sampling Freshly Mixed Concrete - AASHTO T 41
2. Making and Curing Concrete Test Specimens In The Field - AASHTO T 23
3. Obtaining and Testing Drilled Cores and Sawed Beams of Concrete - AASHTO T 24
4. Compressive Strength of Cylindrical Concrete Specimens - AASHTO T 22
6. Air Content of Freshly Mixed Concrete by the Pressure Method – AASTHTO T 52
7. Slump of Hydraulic Cement Concrete - AASHTO T 119
8. Frequency of sampling and testing shall be in accordance with Standard Specifications, Article M.08.02-4.
9. The compressive strength machine shall be calibrated by an approved agency at least once each twelve (12) months. The pressure meter/volumetric meter is to be calibrated by the plant quality control personnel as required by the Engineer.

The inspector will witness the performance of the required tests by the manufacturer's personnel and shall designate on Inspection Form MAT-324 those plant employees qualified to perform the respective tests. The inspector will consult the manufacturer's Quality Control Manual for the procedure for recording test results to ensure that said records are accurate, complete and available to a representative of the Division of Materials Testing upon request.

### **Shipping**

Precast units shall not be shipped until they have achieved design strength. It is the responsibility of the manufacturer to supply only precast units conforming to the requirements of the specifications and to be able to confirm this conformance with documented test results that are available for review by the Division of Materials Testing inspector. The manufacturer shall certify that the precast units do in fact conform to the necessary requirements by completing a, "*CERTIFICATION OF PRECAST CONCRETE PRODUCTS MAT-314 (PC-1)*" form and sending two copies of it to the ConnDOT Project Engineer with each shipment. The manufacturer shall retain one copy for their files.

### **Periodic Plant Inspection**

Once each month, while the plant is producing precast units for ConnDOT (or at a frequency to be determined by the Engineer), an inspector from the Division of Materials Testing will visit the plant to perform the following inspection activities:

1. Ascertain that the fabrication process and equipment used in production and the test procedures, equipment and personnel employed in the manufacturer's quality control program are in continuing compliance with the specifications and the approved Quality Control Plan for that plant.
2. Review the manufacturer's records relative to production, testing and shipment of the precast units for the purpose of determining that:
  - 2.1 the compressive strength, air content and slump of the concrete consistently met the requirements at time of shipping; and,
  - 2.2 the records are complete and accurate.
3. Sample component materials as prescribed previously under "Sampling."

### **Field Inspection of Precast Units**

Precast units are accepted on the basis of the manufacturer's certification. However, final approval of individual precast units is the responsibility of the receiving District. All precast units received on the construction site will be inspected by District inspection personnel. Individual units may be rejected for any of the following conditions:

1. Units that do not bear proper identification; e.g., manufacturer's name or trademark and date of manufacture.
2. Catch basin or drop inlet tops and sumps that are cracked, show evidence of honeycomb, or have areas of excessive patching.
3. Catch basin, drop inlets or manhole riser sections, bases and appurtenances that exhibit:
  - 3.1 Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
  - 3.2 Defects that indicate imperfect proportioning, mixing or molding.
  - 3.3 Surface defects indicating honeycombed or open texture on an area greater than 10 percent of the total surface area of the component.
  - 3.4 Damaged or cracked ends where such damage would prevent making a satisfactory joint.
  - 3.5 Any continuous crack having a surface width of 0.01 inch (0.3 mm) or more and extending for a length of 1 inch (300 mm) or more, regardless of position in the section wall.

Precast units may be repaired, because of accidental damage during handling, and will be acceptable if the repairs are realized through a preapproved repair procedure. The repair procedure shall be submitted by the fabricator in writing to the Engineer for approval. The repaired unit must conform to the requirements of the original specifications, as determined by the Engineer.

Each precast unit shall be clearly marked by the manufacturer with the date of manufacture and name or trademark of the manufacturer. This information, together with the ConnDOT stencil number or Testing Agency acceptance stamp on the steel frames and grates in the case of catch basin or drop inlet precast tops, will be verified by the District inspection personnel for each precast unit delivered to the project. Following a favorable on-site inspection, this information will then be submitted to the Division of Materials Testing on "REQUEST FOR TEST MAT-100" form for each type of unit included in a delivery grouped with the original white copy of the "CERTIFICATION OF PRECAST CONCRETE PRODUCTS MAT-314 (PC-1)" from the manufacturer. Upon receipt of all required information and certification, the Division of Materials Testing will generally recommend acceptance of the precast units.

### **METAL FOR DRAINAGE STRUCTURES**

**Scope** - This section covers metal for drainage structures such as frames, grates, covers and ladder rungs.

#### **Sampling**

A sample of each size and grade of structural steel from each shipment will be submitted for test. The other metals will be sampled in accordance with governing specifications.

#### **Procedure**

Procedures will be in accordance with the following:

Cast iron shall conform to the requirements of AASHTO M 105, Class 25 for the frames and Class 50 for the grates.

Cast steel shall conform to the requirements of ASTM A 27, grade optional, and shall be thoroughly annealed.

Structural steel shall conform to the requirements of ASTM A 36 or A 709, Grade 250 or better, as to the quality and details of fabrication, except that in the chemical composition of the steel, the two-tenths of one percent of copper may be omitted.

Malleable iron shall conform to the requirements of ASTM A 47 Grade 22010.

Ladder rungs for manholes shall conform to AASHTO M 199.

#### **Specification**

Cast iron shall conform to the requirements of AASHTO M 105, Class 25 for the frames and Class 50 for the grates.

Cast steel shall conform to the requirements of ASTM A 27, grade optional, and shall be thoroughly annealed.

Structural steel shall conform to the requirements of ASTM A 36 or A 709, Grade 250 or better, as to the quality and details of fabrication, except that in the chemical composition of the steel, the two-tenths of one percent of copper may be omitted.

Malleable iron shall conform to the requirements, of ASTM A 47 Grade 22010.

Ladder rungs for manholes shall conform to AASHTO M 199.

**Report** - MAT-314

### **4.39 SHEET PILING, TIMBER**

**Scope** - This section covers sheet piling constructed wholly or substantially of wood.

**Sampling** - Timber sheet piling will be inspected in the field by project personnel to determine conformance to specifications. Project personnel are responsible for submitting a Request for Test, with a Materials Certificate indicating the species of wood, dimensions, and certificate of treatment, if applicable, from the supplier.

**Procedure** - Laboratory personnel are responsible for reviewing the Request for Test and the Materials Certificate to determine conformance to applicable specifications.

**Specification** - Standard Specifications, Article M.09.01-1 and all project specifications including special provisions.

**Report** - Form MAT-315

### **4.40 SHEET PILING, STEEL**

**Scope** - This section covers sheet piling constructed wholly or substantially of steel.

**Sampling** - Steel sheet piling will be inspected in the field by project personnel to determine conformance to specifications. Project personnel are responsible for submitting a Request for Test, with a Materials Certificate.

**Procedure** - Laboratory personnel are responsible for reviewing the Request for Test and the Materials Certificate to determine conformance to applicable specifications.

**Specification** – Material shall conform to Standard Specifications Article M.09.01-2 and all project specifications.

**Report** - Form MAT-315.

#### **4.41 PILES, TIMBER**

**Scope** – This section covers treated and untreated timber piles.

**Sampling** - Timber piling will be inspected in the field by project personnel to determine conformance to specifications. Field inspection indicating dimensions, species, soundness, knots, holes, splits, peeling, cutting and trimming, straightness, taper and twist of grain. Project personnel are responsible for submitting a Request for Test, with a Materials Certificate indicating the species of wood, dimensions, and certificate of treatment, if applicable, from the supplier.

**Procedure** - Laboratory personnel are responsible for reviewing the Request for Test and the Materials Certificate to determine conformance Standard Specifications Article M.09.02 and all project specifications

**Specification** - Material shall conform to Standard Specifications, Article M.09.02.

**Report** - Form MAT-315

#### **4.42 PILES, STEEL**

**Scope** - This section covers rolled steel, sectioned, to be used as piles.

**Sampling** – Project field personnel are responsible for submitting a MAT-100, a Materials Certificate, and Certified Test Report with a sample (if required). Field personnel should contact the Division of Materials Testing for sampling requirements.

**Procedure** - In accordance with AASHTO T 244.

**Specification** - In accordance with Standard Specifications, Article M.09.02-3.

**Report** - Form MAT-327.

#### **4.43 PILES, CONCRETE**

**Scope** - This section covers precast, cast-in-place and prestressed (pretensioned) concrete piles for use in highway construction.

##### **PRECAST AND PRESTRESSED CONCRETE PILES**

**Sampling** – Samples are not required. Project personnel are responsible for notifying the Division of Materials Testing of the source of this material prior to fabrication. Quality Assurance inspection will be performed by the Department or its representative at the fabrication location. Upon receipt of the material, project personnel must submit a MAT-100 for all material.

**Procedure** – DMT personnel will review quality assurance documentation to determine conformance to specification.

**Specification** - In accordance with Standard Specifications, Article M.09.01-4 to M.09.01-6, whichever applies and with details shown on shop drawings, plans and special provisions.

**Report** – MAT- 315

#### **CAST-IN-PLACE CONCRETE PILES**

**Sampling** – Samples of the component materials are required in accordance with the requirements of that material.

**Procedure** – Component materials will be tested in accordance with the requirements of that material.

**Specification** - In accordance with Standard Specifications, and with details shown on shop drawings, plans, and special provisions.

**Report** – As indicated for component materials.

#### **4.44 CABLE GUIDE RAILING AND ANCHORAGES**

**Scope** - This section covers wire rope and fittings for use in the construction of wire rope railing supported by wood or steel posts.

**Sampling** – Samples are not required. Project personnel are required to submit a MAT-100 with a Materials Certificate.

**Procedure** – DMT personnel will review the submittal for conformance to project specifications.

**Specification** – Material must meet Standard Specifications, Article M.10.01-1. Materials Certificate shall conform to Standard Specifications Article 1.06.07.

**Report** - Form MAT-315.

#### **4.45 METAL BEAM-TYPE RAIL AND ANCHORAGES**

**Scope** - This section covers metal beam elements attached to steel posts by various type of hardware and ending in appropriate terminal treatment, intended for use in various highway guardrail installations.

#### **RAIL ELEMENT, RUB RAIL AND TERMINAL SECTIONS**

##### **Sampling**

Project personnel will submit Request for Test (Form MAT-100) indicating the following Brand Registration which shall be marked on each rail element, rub rail or terminal section:

1. Name or brand of manufacture.

2. Identification symbols, or code for heat number or coating lot.
3. Class (A or B).
4. Type (1 or 2).

**Procedure** – DMT personnel will review the submittal for conformance to project specifications.

**Specification:** Material must conform to Standard Specifications, Article M.10.02-3.

**Report** - Form MAT-329

## **OTHER COMPONENTS**

**Sampling** - A representative sample of each type of component from each shipment must be submitted with a MAT-100 and a Materials Certificate.

**Procedure** - DMT personnel will review the submittal for conformance to project specifications.

**Specification** - Material must conform to Standard Specifications, Article M.10.02-3.

**Report** - Form MAT-315

### **4.46 BARWAYS**

**Scope** - This section covers barways which prohibit access to off-road areas. They normally consist of two vertical posts and removable horizontal rails.

#### **WOOD POSTS - WOOD RAILS**

Field inspection for conformance to Standard Specifications, Article M.10.03-2.

**FITTINGS** - Submit one per type per project for test.

**Procedure** - As stated for wood posts and rails, above. Fittings shall be of the type and dimensions shown on the plans and shall be subject to approval by the Engineer.

**Report** - Form MAT-315

### **4.47 WIRE FENCE**

**Scope** - This section covers wire fence and support posts.

**Sampling** – All fence components will be inspected in the field by project personnel to determine conformance to specifications. Project personnel are responsible for submitting a Request for Test, with a Materials Certificate. For treated wood posts, a certificate of treatment is also required.

**Procedure** - Laboratory personnel are responsible for reviewing the Request for Test and the Materials Certificate to determine conformance to applicable specifications.

**Specification** – All Material shall conform to Standard Specifications, Article M.10.04

**Report** - Form MAT-315

#### **4.48 CHAIN-LINK FENCE**

**Scope** - This section covers aluminum-coated or polyvinyl chloride-coated steel chain-link fabric, aluminum alloy fabric, galvanized metal or polyvinyl chloride-coated material or aluminum alloy posts, top and brace rails, and fittings to be used in the construction of chain-link fence.

##### **FABRIC**

**Sampling** - One sample of chain-link fabric at least 3 feet (1 meter) wide and the full height of the fence will be submitted to the Division of Materials Testing for each shipment of 100 rolls or fraction thereof.

**Procedure** – In accordance with AASHTO T 244 and the following as applicable:

- a. Aluminum-Coated Steel Fabric: Standard Method of Test for Weight [Mass] of coating on aluminum-coated iron or steel articles, AASHTO T 213.
- b. Polyvinyl Chloride-Coated Steel Fabric: Standard Specification for Poly (Vinyl-Chloride) (PVC) –Coated Steel Chain Link Fence ASTM F 668.
- c. Aluminum Alloy Fabric: Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire, ASTM B 211.

**Specification** - In accordance with Standard Specifications, Article M.10.05-1 Fabric.

**Report:** – Form MAT-303

##### **METAL POSTS, RAILS, AND GATE**

###### **Sampling**

**Gate:** Submit one (1) request for test with a Materials Certificate for each shipment.

**Metal Posts and Rails:** Submit one (1) request for test with a Materials Certificate for each size and type.

**Procedure** – DMT personnel will review Materials Certificate for conformance to Standard Specification, Article 1.06.07.

**Specification** – In accordance with Standard Specification, Article M.10.05-2.

**Report** – Form MAT -315

##### **FITTINGS**

**Sampling** – Submit one (1) representative sample for each size and type.

**Procedure** – Average thickness of coating on hot-dipped galvanized fittings shall be determined with the use of a magnetic thickness gage in accordance with ASTM Practice E 376.

**Specification** – In accordance with ASTM A 153.

**Report** – Form MAT-325.

## **TENSION WIRE**

**Sampling** – Submit one (1) representative sample for each type of tension wire.

**Procedure** - In accordance with AASHTO T 244 and AASHTO T 213

**Specification** - In accordance with Standard Specifications, Article M.10.05-4, Tension and Tie Wire.

**Report** - Form MAT-326

## **4.49 OBJECT MARKERS**

**Scope** - This section covers aluminum sign blanks, silk-screen ink, reflective sheeting and steel posts for object markers.

**Sampling** - Submit one (1) representative post for test

**Procedure** - In accordance with AASHTO T 244, AASHTO T 65 and ASTM E 376  
Contractor shall submit a Materials Certificate conforming to Standard Specifications, Article 1.06.07 for aluminum sign blanks, silk-screen ink, reflective sheeting and hardware.

**Specification** - Standard Specifications, Article M.18.14

**Report** - Form MAT-315.

## **4.50 MASONRY FACING**

**Scope** - Masonry facing stone shall be either dimensioned masonry stone or ashlar masonry stone.

**Sampling** - Field inspection of stone by project personnel unless samples are required.

**Procedure** - N/A

**Specification** - In accordance with Standard Specifications, Article M.11.01

**Report** - Form MAT-315.

## **4.51 CEMENT RUBBLE MASONRY AND DRY RUBBLE MASONRY**

**Scope** - These requirements cover cement rubble and dry rubble masonry.

**Sampling** - Field inspection of stone by project personnel unless samples are required

**Procedure** - N/A

**Specification** - In accordance with Standard Specifications, Article M.11.02-1

**Report** - Form MAT-315.

## **4.52 BRICK MASONRY**

**Scope** – This section covers brick for use other than the construction of catch basins, manholes and drop inlets.

**Sampling** - Six bricks will be submitted to the Laboratory for each lot of 10,000 bricks or fraction thereof.

**Procedure** - In accordance with AASHTO T 32

**Specification** - In accordance with AASHTO M 114 and amended and/or supplemented in Standard Specifications, Article M.11.03. Brick shall be Grading SW, unless otherwise specified.

**Report** - Form MAT-312

#### **4.53 MORTAR**

**Scope** - This section covers all mortar for masonry construction.

**Sampling** - None

**Procedure** – Visual inspection of bags by project personnel. See Portland Cement for bulk testing procedures.

**Specification** - In accordance with the Department's Standard Specifications, Article M.11.04

**Report** - None

#### **4.54 BEARING AREAS**

**Scope** - This section covers prefabricated pads for bearing areas.

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a Materials Certificate conforming to Standard Specification, Article 1.06.07.

**Procedure** - DMT personnel are responsible for reviewing the Materials Certificate to determine conformance to project specifications.

**Specification** – In accordance with Standard Specifications, Article M.12.01.

**Report** - Form MAT-315

#### **4.55 CONCRETE BLOCK FOR SLOPE PROTECTION**

**Scope** - This section covers precast, rectangular blocks made from Portland cement concrete.

**Sampling** – Concrete block for slope protection will be sampled by DMT personnel on a quarterly basis.

**Procedure** - In accordance with ASTM C 140 and Standard Specifications, Article M.12.12.

**Specification** - In accordance with Standard Specifications, Article M.12.12

**Report** - Form MAT-313

## 4.56 HIGHWAY ILLUMINATION

**Scope** - This section covers materials used in highway illumination. The Contractor may use material and products of any manufacturer provided they meet the design standards and are approved by ConnDOT.

Typical items requiring approval are as follows:

1. Light Standards
2. Luminaries
3. Lamp Ballast
4. Cast Iron Junction Box
5. Single Conductors in Conduit
6. Nonmetallic Sheathed Cable
7. Navigation Lights

**Sampling** - The contract documents for the individual projects will generally designate the type of material documentation (i.e., Certified Test Report or Materials Certificate) required for materials used in highway illumination. In the absence of specific instructions for individual projects, the method of material control shall be in accordance with the provisions of Standard Specifications, Article 1.06.

**Procedure** - In accordance with the requirements of Standard Specifications, Section M.15, unless otherwise specified by contract documents.

**Specification** - In accordance with the requirements of Standard Specifications, Section M.15, unless otherwise specified by contract documents.

**Report** - Form MAT-315

## 4.57 TRAFFIC CONTROL SIGNALS

**Scope** - This section covers materials used in traffic control signal installations. The Contractor may use material and products of any manufacturer provided they meet the design standards and are approved by the Engineer.

**Sampling** - The contract documents for the individual projects will generally designate the type of material control (i.e., Certified Test Report or Materials Certificate) required for materials used in traffic control signal installations. In the absence of specific instructions for individual projects, the method of material control shall be in accordance with the provisions of Standard Specifications, Section 1.06.

**Procedure** - In accordance with the requirements of Standard Specifications, Section M.16, unless specified otherwise by contract documents.

**Specification** - In accordance with the requirements of Standard Specifications, Section M.16, unless specified otherwise by contract documents.

**Report** - Form MAT-315.

## 4.58 ELASTOMERIC BEARING PADS

**Scope** - This section covers laminated and non-laminated bearing pads and adhesive for use in the construction of bridge structures.

**Sampling** – Project personnel are responsible for submitting a MAT-100 with a Certified Test Report. In addition, a copy of the approved shop drawings must be provided. One test pad must be provided for every fifty (50) pads, or portion thereof, required on a structure. If there are multiple types/sizes of pads on a structure, the test pad shall be representative of the most common type/size. All samples shall be furnished at no cost to the State.

**Procedure** – DMT personnel will review the Certified Test Report and test material as required to determine conformance to the project specifications.

**Specification** - In accordance with Standard Specifications, Article M.17.01

**Report** - Form MAT-310

#### **4.59 ELASTOMERIC COMPRESSION SEAL**

**Scope** - This section covers compression seals manufactured from elastomeric material and lubricant adhesives for use in transverse joints in concrete structures.

**Sampling** - In accordance with Standard Specifications, Article M.17.02

**Procedure** - In accordance with Standard Specifications, Article M.17.02

**Specification** - In accordance with Standard Specifications, Article M.17.02

**Report** - Form MAT-315

#### **4.60 SIGNS**

**Scope** - This section covers materials used as signs on Department projects.

**Sampling** - The contract documents for the individual projects will generally designate the type of material documentation (i.e., Certified Test Report or Materials Certificate) required for materials used in signing installations. In the absence of specific instructions for individual projects, the method of material control shall be in accordance with provisions of Standard Specifications, Section 1.06.

**Procedure** - In accordance with Standard Specifications, Section M.18 unless specified otherwise by contract documents.

**Specification** - In accordance with Standard Specifications, Section M.18 unless specified otherwise by contract documents.

**Report** - Form MAT-315

#### **4.61 PRECAST, PRESTRESSED AND POST-TENSIONED CONCRETE MEMBERS**

**Scope** - These section covers precast, prestressed and post-tensioned concrete members for use in the construction of bridges or structures.

**Procedure** - Precast, prestressed and post-tensioned concrete members are inspected at the fabricating plant during fabrication and immediately prior to shipment by a representative of the DMT to ensure conformance with the requirements of the applicable specifications. Representative samples of component materials used in the manufacture of these concrete members may be sampled and tested to determine compliance with Standard Specifications.

**Specification** - In accordance with Project Specifications.

## **4.62 FABRICATION INSPECTION OF PRECAST CONCRETE MEMBERS**

**Scope** - Due to the critical function of precast, prestressed and post-tensioned concrete members as load-bearing units of bridges and structures, it is essential that these units be constructed in strict conformance with the specifications. To ensure this conformance, the Division of Materials Testing assigns an inspector to the manufacturing plant to inspect in detail, all phases of manufacture.

**Procedure** - Precast, prestressed and post-tensioned concrete members are inspected at the fabricating plant during fabrication and immediately prior to shipment by the Division of Materials Testing personnel to insure conformance with the requirements of the applicable specifications. Representative samples of component materials used in the manufacture of these concrete members are sampled by Division of Materials Testing personnel and tested to determine compliance with Standard Specifications.

### **Sampling**

The following component materials shall be sampled for test in accordance with standard ConnDOT procedures and frequencies listed below:

1. Portland cement: PC shall be from an approved source. Each load shall be accepted by certification. Samples shall be taken as directed by the Engineer.
2. Aggregate: Samples from bins or stockpiles each month for each source of supply, or as directed by the Engineer.
3. Admixtures: Only approved admixtures are to be used. Samples to be taken as directed by the Engineer.
4. Prestressing steel strand: Sample strand in accordance with Standard Specifications, Article M.14.01-2.
5. Post-tensioning tendons and anchorages: Sample as per Special Provisions.
6. Reinforcing steel: From each source, a 5 ft. (1.5 m) sample of each size for every 400 tons (181.4 mtons), with a minimum of one sample of each size from each source per project.

### **Inspection of Plant Facilities and Manufacturing Procedures (Inspection Form MAT-324)**

1. Storage and handling of materials
2. Batching, mixing, transportation and placement of concrete
3. Curing method and apparatus; i.e., steam, radiant heat or other approved method including provision for recording time and temperature data during the curing cycle.
4. Concrete testing equipment; i.e., compression-testing machine (should be calibrated each 12 months), pressure-type air meters, cylinder molds, slump cones, unit weight apparatus and facilities for moist-curing test cylinders in accordance with ASTM C 192.
5. Equipment and procedure for consolidation of concrete
6. Construction and capacity of casting beds
7. Dimensions, condition and construction of forms

8. Method and equipment for applying prestressing or post-tensioning forces
9. Method and equipment for measuring prestressing or post-tensioning forces and the procedure for measuring elongation of strands or tendons
10. Construction details, accuracy and calibration data of pressure gauges (Gauges shall be calibrated at intervals not to exceed 6 months).

### **Inspection of Casting Bed**

1. Check Cleanliness, level and alignment of form liner.
2. Check position of bulkheads for proper length of units and skewed or sloped ends, when applicable.
3. Inspect stringing of prestressing strands to ensure correct number and position of strands and location of "hold-downs."
4. For each strand: inspect tension, measure elongation and check gauge reading for proper force application. Force measurement of elongation and gauge reading shall check each other and the theoretical value within 5 percent; if they do not, suspend tensioning operations until the problem is corrected.
5. Witness back tensioning at the non-jacking end of deflected strands and straight strands to verify application of the required prestressing force in accordance with Standard Specifications, Article 5.14.03.
6. Inspect installation of post-tensioning tendons and anchorages, when applicable.
7. Check size, type and location of reinforcing steel, hardware and miscellaneous steel when placed in forms.
8. Inspect condition and alignment of side forms.
9. Check proper bracing and anchorage of casting bed and end anchorages.

### **Inspection of Concrete Operations**

1. Check identification marker for required data and placement in unit.
2. For deck units, inspect internal void forms for material, size and proper installation.
3. Inspect concrete delivered to forms for homogeneity and uniformity of successive batches.
4. Witness/monitor sampling of concrete for quality control testing
5. Witness slump, air tests, concrete temperature and unit weight for conformance to specifications; accept or deem unacceptable on basis of results.
6. Spot-check batching and mixing of concrete to assure that approved mix design and procedures are being used.
7. Inspect placement, consolidation and finishing of concrete for conformance to specifications and accepted concrete practices.
8. Ensure that approved curing method is used and applied at proper time; if steam or radiant heat is used, ensure that required preset period is observed.

### **Inspection of Fabricated Units**

1. Inspect units to determine if they were cured uniformly. Review the time/temperature record of curing cycle for specification compliance.
2. Witness testing of cylinders for required concrete strength prior to removal of forms or detensioning.
3. After removal of side forms, inspect units for honeycomb, cracks, etc. Report major defects to supervisor for structural review by ConnDOT Bridge Design Section and or Designer.
4. Inspect detensioning operations for proper sequence, method and timing of strand release.
5. Witness removal of units from casting bed.
6. Inspect completed units for as-built dimensions, camber, horizontal alignment, etc.

7. When applicable, witness testing of cylinders for required concrete strength prior to post-tensioning.
8. Witness post-tensioning operations (checking elongation of tendons and gauge readings) to assure gauge pressures and elongations are within prescribed limits.
9. Witness grouting of post-tensioning ducts for conformance to approved grout mix, equipment and pumping procedure.
10. Witness all repairs to determine compliance with approved procedures and use of approved materials.
11. Witness testing of cylinders to determine concrete strength for shipping, when required, and 28-day strength for acceptance.

**Report**

Results of all tests and inspections shall be reported on appropriate forms. The inspector will maintain accurate records in the form of a daily log and production records of all information concerning the manufacture of each individual member. Final approval of precast, prestressed and post-tensioned concrete members will be reported on Form MAT-315.

**Procedure:** In accordance with the Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method, AASHTO T 196.

**Specification:** In accordance with Standard Specification Article 4.01, 6.01, and M.03 or project Special Provisions.

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222  
**Acceptance Report(Project Personnel) - Form MAT-308.**

### **3.53 TEMPERATURE OF PLASTIC PORTLAND CEMENT CONCRETE**

**Scope -** This section covers the procedure for determining the temperature of plastic PC Concrete delivered to Department sites.

**Sampling:** In accordance with AASHTO T 141

**Procedure:** In accordance with AASHTO T 309

**Specification:** In accordance with Standard Specification Article M.03 or project Special Provisions.

**Assurance Report (DMT Only):** MAT-224, or MAT-225, and MAT-222  
**Acceptance Report(Project Personnel) - Form MAT-308.**

### **3.54 INSPECTION OF CONCRETE BATCH PLANTS AND TRUCK MIXERS**

**Scope -** Each year, preferably just prior to the active construction season, the District Laboratories will inspect for approval the portland cement concrete batch plants and truck mixers located within their respective districts, which produce concrete for use by the Department.

**Sampling –** Samples of plastic concrete are normally not required during the yearly inspection, however they may be requested by DMT personnel.

**Procedure:** In accordance with current inspection forms for Concrete Plants and Truck Mixers

**Specification:** In accordance with Standard Specifications, Article 4. 01. 03-2 (a) for Concrete Plants.

In accordance with Standard Specifications, Article 6.01.03-1(b) for Truck Mixers.

#### **Report**

Results of inspection will be reported Field Reports: Portland Cement Concrete Truck Mixers and Agitators (MAT-214), Portland Cement Concrete Dry Batch Plant (MAT-215), or Portland Cement Central Mix Plant (MAT-216); whichever applies.

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### **Overview**

All sampling and testing of HMA materials is performed at the frequency and by procedures specified in the specification. If not specified, the latest AASHTO and ASTM specifications available at time of bid govern when performing sampling and testing for acceptance. AASHTO and ASTM test modifications are listed in Table M.04.03-6 of the specification.

### **5.01 Performance Graded (PG) Asphalt Binder**

**Scope:** This section covers Performance Grade asphalt binders. PG binder suppliers must comply with the annual "Requirements for Annual Submission of Quality Control Plan, AASHTO R-26(M) and as modified in Table M.04.03-6 of the specification.

**Requirements:** The Contractor shall submit a Certified Test Report and bill of lading representing each delivery in accordance with AASHTO R-26(M). Upon material delivery, contractor plant personnel shall record lot number, date, grade of binder, witnessed by, hauler name, liquid supplier, ticket number, receiving storage tank number, quantity received and previous tank status(quantity) in the binder log (Form 435) provided by the State of Connecticut. The Contractor shall provide binder samples at the request of the Division Chief of Research and Materials (DC).

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** the following standard methods of test:

1. AASHTO T 44: Solubility of Bituminous Materials
2. AASHTO T 48: Flash and Fire Points by Cleveland Open Cup
3. AASHTO T 228: Specific Gravity of Semi-Solid Bituminous Materials
4. AASHTO T 240: Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)
5. AASHTO T 313: Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
6. AASHTO T 314: Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)
7. AASHTO T 315: Determining the Rheological Properties of Asphalt Binder Using the Dynamic Shear Rheometer (DSR)
8. AASHTO T 316: Viscosity Determination of Asphalt Binder Using Rotational Viscometer (RT)
9. AASHTO R 28: Accelerated Aging of Asphalt Binder Using a Pressure Aging Vessel (PAV)
10. AASHTO R 29: Grading or Verifying the Performance grade of an Asphalt Binder

**Report:** Form MAT 401

### **5.02 Cut-Back Asphalts**

**Scope:** These methods of test cover liquid petroleum products, produced by fluxing an asphaltic base with suitable light volatile solvents or distillates, to be used in the treatment of road surfaces.

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** the following standard methods:

1. AASHTO T 79: Flash Point with Tag Open Cup Apparatus for Use with Material having a Flash Less than 200°F (93.3°C)
2. AASHTO T 201: Kinematic Viscosity of Asphalts
3. AASHTO T 227: Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
4. AASHTO T 78: Distillation of Cutback Asphaltic Products
  - 4.1 AASHTO T 49: Penetration of Bituminous Materials
  - 4.2 AASHTO T 202: Viscosity of Asphalts by Vacuum Capillary Viscometer

**Report:** Form MAT-400

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### **5.03 Damproofing**

**Scope:** This section covers three asbestos-free asphalt roof coatings of brushing or spraying consistency suitable for use as waterproofing and damp proofing of concrete and concrete masonry.

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** the following standard methods:

1. AASHTO T 49: Penetration of Bituminous Materials
2. ASTM D 95: Moisture, percent
3. ASTM D 4479: Nonvolatile Matter, percent
4. AASHTO T 72: Saybolt Viscosity
5. AASHTO T 78: Distillation of Cutback Asphaltic Products

**Report:** Form MAT 315

### **5.04 Emulsified Asphalt**

**Scope:** These methods of test cover asphalt emulsions composed principally of a semisolid liquid asphaltic base, water, and an emulsifying agent. Sampling and testing for this item must be from Terminal and refinery sources of supply and from project tanker trucks when used as tack coat, emulsion for chip seal pavements, and specialty mixes.

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** AASHTO T 59: Testing Emulsified Asphalt

**Report:** Form MAT 402

### **5.05 Recovery of Asphalt Binder for HMA Materials**

**Scope:** This section covers the recovery of asphalt from a previously conducted extraction with reagent-grade trichloroethylene. The asphalt is recovered with properties substantially the same as those it possessed in the asphalt mixture and in quantity sufficient for testing. Sampling and testing for this item must be from newly mixed (virgin) HMA or materials that contain RAP; HMA stored in silos, from paver hoppers, pavement during lay down, and from roadway materials.

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** the following standard methods:

1. AASHTO T 164 (M): Quantitative Extraction of Bitumen from Bituminous paving Mixtures
2. AASHTO T 170 (M): Recovery of Asphalt from Solution by Abson Method
  - 2.1 AASHTO T 202: Viscosity of Asphalts by Vacuum Capillary Viscometer
  - 2.2 AASHTO T 315: Determining the Rheological Properties of Asphalt Binder Using the Dynamic Shear Rheometer (DSR)
  - 2.3 AASHTO R 29: Grading or Verifying the Performance Grade of an Asphalt Binder

**Report:** Form MAT 423

### **5.06 Hot Poured Sealers for PC Concrete and Asphalt Pavements**

**Scope:** This section covers joint sealants of the hot poured type intended for use in Portland cement concrete and asphalt concrete pavements.

**Sampling:** AASHTO T 40(M): Sampling Bituminous Materials

**Procedure:** ASTM D 5329

**Report:** Form MAT 424

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### **5.07 & 5.08 VACANT**

### **5.09 Asphaltic Plug Joint**

**Scope:** This section covers the components, testing, and application requirements for field molded asphaltic plug material used within expansion joints on bridges with asphalt concrete overlays or PC concrete decks.

**Sampling:** AASHTO T 40(M)

**Procedure:** ASTM D 6297 Table 1 and special provision

1. Thermoplastic Polymeric-modified asphalt binder per manufacturer specifications
2. Aggregate per manufacturer specifications
3. Foam expansion joint filler per manufacturer specifications
4. Steel bridge plate per manufacturer specifications

**Report:** Form MAT 315

### **5.10 Quantitative Extraction of Binder from HMA**

**Scope:** Determination of the percentage of bitumen in a paving mixture. It is not intended for use in recovering the bitumen for further testing. The aggregate and mineral matter recovered from this test is used for sieve analysis.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures

**Procedure:** AASHTO T 164 Method A (M). The ash correction Article 11.6.1

**Report:** MAT 412, MAT 412S or MAT 413. Ash results are reported on Form MAT 422.

#### **5.10.1 Binder Content by Ignition Method for HMA**

**Scope:** This method of test is intended for the determination of the total percentage of bitumen in HMA mixtures. Aggregate calibration for each type of mixture will be provided by the DC or may be submitted by the contractor for use during production.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 308(M), AASHTO T 328(M) Reducing Samples of HMA to Testing Size

**Report:** Form MAT 412, MAT 412S or MAT 413

#### **5.10.2 Correlation Between Production Pull & Binder Content by Ignition Method**

**Scope:** Total binder content of the mix as determined by the asphalt plant batching system, and the test result determined by the ignition oven, is no more than 0.2% different. The moisture content in the mix may be used to adjust the binder content determined by the ignition oven.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 308(M) Asphalt Binder Content of HMA by Ignition Method

AASHTO T 329(M): Moisture Content of Hot Mix Asphalt by Oven Method

AASHTO T 328(M) Reducing Samples of HMA to Testing Size

**Report:** Form MAT 412, MAT 412S or MAT 413

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### **5.11 Mechanical Analysis of Extracted Aggregate**

**Scope:** This method of test covers a procedure for the determination of the particle size distribution of fine and coarse aggregates extracted from HMA mixtures using sieves with square openings.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 30 (M), AASHTO T 328 (M) Reducing Samples of HMA to Testing Size

**Report:** Form MAT 412, MAT 412S or MAT 413

### **5.12 Resistance to Plastic Flow of Hot Mix Asphalt Mixtures**

**Scope:** This method of test determines of the stability and flow of Hot Mix Asphalt paving mixtures using Marshall Mold Specimens

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 245 (M): Resistance to Plastic Flow of Bit. Mixture Using Marshall Apparatus  
AASHTO T 328 (M) Reducing Samples of HMA to Testing Size

**Report:** Form MAT 412

### **5.13 Bulk Specific Gravity of Compacted HMA Mixtures**

**Scope:** This method determines of the bulk specific gravity of compacted HMA mixtures.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 166 (M): Bulk Specific Gravity of Compacted Asphalt  
Mixtures Using Saturated-Surface Dry Specimens  
AASHTO T 328 (M) Reducing Samples of HMA to Testing Size

**Report:** Form MAT 412 or Form MAT 412S

### **5.14 Maximum Specific Gravity of HMA Paving Mixtures**

**Scope:** Determination of the maximum specific gravity of uncompacted HMA paving mixtures.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures, AASHTO T 328 (M).

**Procedure:** AASHTO T 209 (M): Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

1. Use of potable water in place of distilled water as stated in T 209 (M)
2. Water bath temperature correction not utilized
3. Use of digital manometers used in place of mercury manometers
4. Bowl submerged in water bath until scale weight is at a constant, use of 10 +/- 1 minute specification not invoked

**Report:** Form MAT 412 or Form MAT 412S

### **5.15 Sampling HMA Paving Mixtures**

**Scope:** Procedures for sampling mixtures of HMA material with mineral aggregate.

**Sampling:** AASHTO T 168 (M): Sampling Bituminous Paving Mixtures

**Procedure:** AASHTO M 323: Superpave Volumetric Design Method, AASHTO T 328 (M).

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Sampling and testing is required to be performed by a NETTCP certified technician. The sample from the transport vehicle can be taken from one location as specified in AASHTO T 168-3 section 5.2.2. The technician or their representative may scoop all HMA mixtures from the sample container with the exception of 25.0 mm and Class- 4 mixes. The contractor technician, or their representative shall arrive a minimum of one hour in advance of any production to test component moisture and gradation properties, power on and preheat laboratory equipment, and prepare PC and test forms.

**Report:** Form MAT 412 or Form MAT 412S

### **5.16 Preparation of Marshall Mold Specimens**

**Scope:** These methods cover the preparation of test specimens using Marshall Apparatus in conformance with procedures specified in AASHTO R-12.

**Sampling:** AASHTO T 168 (M), AASHTO T 328 (M).

**Procedure:** AASHTO T 245 (M).

1. for production testing: One specimen is molded for each extraction test for production over 275 Tons per day.

**Report:** Form MAT 412

#### **5.16.1 Preparation of Gyratory Specimens**

**Scope:** These methods cover the preparation of test specimens using the gyratory compactor. Each apparatus must be calibrated, maintained and serviced per the manufacturer's recommendations.

**Sampling:** AASHTO T-168 (M), AASHTO T 328 (M).

**Procedure:** AASHTO M 323: Superpave Volumetric Mix Design  
AASHTO R 35(M): Superpave Volumetric Design for Hot Mix Asphalt  
AASHTO T 329(M): Moisture Content of Hot Mix Asphalt by Oven Method  
AASHTO T 312(M): Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor

Testing of HMA materials, fabrication of gyratory molds, theoretical, and liquid content, must be started and fabricated within 1/2 hour from the time of sampling from the delivery truck, and be completely finished within 2 hours. Physical, Volumetric and other properties will be calculated in accordance with the contract specifications and AASHTO M 323 and R 35(M).

### **5.17 Production Inspection at Hot Mix Asphalt Plants**

**Scope:** The purpose of production inspection is not only to check on the operations of the Contractor for compliance to the specifications, but also to assure that the Contractor is exercising adequate quality control to maintain compliance. The Contractor must maintain a certain degree of uniformity not only daily but also throughout the life of the contract. The aggregate in each stockpile must be of uniform quality and gradation; the materials must be fed into the plant in a uniform, controlled manner; the heating and drying of the aggregates must be uniform; the separation of the aggregates into their various bin sizes must be uniformly controlled; and the aggregates and the asphalt cement must be combined and mixed in a uniform, consistent manner.

**Sampling:** section 5.15 and 5.18

**Procedure:** contract specifications and Form MAT 430

Production inspection at the HMA plant is divided into four main categories:

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1. **Process Control (PC):** Performed by the HMA producer prior to production and shipment
2. **Quality Control (QC):** The sum total of activities performed by the seller (producer, manufacture, contractors) to make sure that a product meets contract specification requirements.
3. **Acceptance System (Acceptance/Verification Plan)** – All factors that comprise the Agency's determination of degree of compliance with contract requirements and value of a product. These factors include Agency sampling, testing, acceptance limits, risk, operating characteristics and inspection. These factors should also include validated results of contractor sampling and testing.
4. **Independent Assurance (IA):** IA is an unbiased and independent verification of the Quality Assurance system used as a method of determining the reliability of the test results obtained in the regular sampling and testing activities. The results of IA tests are not to be used as a basis of material Acceptance/Verification.

**Report:** FORM 412, MAT 413, and MAT 412S

### 5.17.1 Vacant

### 5.17.2 HMA Verification Testing Procedures

**Scope:** Verification (V) testing will be performed by the DC at an approximate frequency of (1 to 10) to the Contractor QC testing. V samples must be obtained by Department personnel from the same material sampled by the Contractor QC or their representative. Testing of this material will be performed at the Department's Central Laboratory and the results compared to Contractor results. If all delta limits listed in column C of Table 1 are not exceeded, the Contractor results will be considered valid.

Should any delta limit in column C be exceeded, the Contractor's Quality Control manager will be notified, and an investigation will be immediately initiated by the DMT to determine the assignable cause. This investigation will be conducted by the DMT's Independent Assurance (IA) section. The investigation could include the following:

- Split samples between IA and Contractor personnel
- Split samples between IA and DMT verification personnel
- Proficiency samples performed at Contractor facility
- Recalibration of testing equipment

Assignable cause may be one of the following:

- Improper testing procedure.
- Faulty equipment or improper calibration
- Misreporting of test results

Pending the results of this investigation, the Contractor data may be declared invalid. In this case, additional Verification test may be performed by the DMT on material produced on the date in question. All invalid Contractor data for that days' production will be replaced by results from standard verification testing and any additional testing performed by DMT. The Engineer may replace the entire days' testing results with a single result from verification testing for payment purposes. The Engineer will determine how much additional testing is required.

If it is determined that Contractor data is invalid due to misreporting of test results, NETTCP will be notified as to the results of the investigation, and the technician(s) involved in the testing will be put on probation by the DMT for the entire construction season. Should a pattern of invalidated test results be established as determined by the Engineer, the technician will be prohibited from testing materials for Department use until NETTCP investigates the technician further and determines that his/her certification is still warranted. Until this determination is made, the Contractor must provide another NETTCP certified technician at the plant to produce material for the Department.

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**Sampling:** QC samples and non-witnessed QC samples may be tested by the DMT.

**Procedure:** the following standard methods:

1. AASHTO T-308 (M) Determining the Asphalt Content of HMA by the Ignition Method.
2. AASHTO T-30 (M) Mechanical Analysis of Extracted Aggregate.
3. AASHTO T-209 (M) Theoretical Maximum Specific Gravity & Density of Bit. Paving Mixtures.
4. AASHTO T-166 (M) Bulk Specific Gravity of Compacted Asphalt Mixtures using Saturated Surface-Dry Specimens.
5. AASHTO T-164 (M) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

| <b>TABLE 1: VERIFICATION &amp; ACCEPTANCE LIMITS</b>    |                             |                            |                                |                          |
|---|-----------------------------|----------------------------|--------------------------------|--------------------------|
| Columns A and B are used for internal ranking purposes. |                             |                            |                                |                          |
| <b>Properties</b>                                       | <b>A<br/>(Delta X 0.25)</b> | <b>B<br/>(Delta X 0.5)</b> | <b>C<br/>Delta<br/> QC-QA </b> | <b>D<br/>(&gt;Delta)</b> |
| #200  | 0.18                        | 0.35                       | 0.7                            | > 0.7                    |
| #100  | 0.5                         | 1.0                        | 2.0                            | > 2.0                    |
| #50   | 0.5                         | 1.0                        | 2.0                            | > 2.0                    |
| #30   | 0.5                         | 1.0                        | 2.0                            | > 2.0                    |
| #16   | 0.5                         | 1.0                        | 2.0                            | > 2.0                    |
| #8  | 0.5                         | 1.0                        | 3.0                            | > 3.0                    |
| #4  | 0.5                         | 1.0                        | 3.0                            | > 3.0                    |
| 3/8"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| 1/2"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| 3/4"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| 1"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| 1 1/2"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| 2"  | 1.0                         | 2.0                        | 4.0                            | > 4.0                    |
| Pb  | 0.06                        | 0.12                       | 0.25                           | > 0.25                   |
| Va  | 0.18                        | 0.35                       | 0.71                           | > 0.71                   |
| VMA   | 0.18                        | 0.35                       | 0.71                           | > 0.71                   |
| VFA   | 3.5                         | 3.5                        | 3.5                            | > 3.5                    |
| Gmm   | 0.005                       | 0.009                      | 0.018                          | > 0.018                  |
| Gmb   | 0.003                       | 0.006                      | 0.011                          | > 0.011                  |
| Pbe   | 0.06                        | 0.12                       | 0.25                           | > 0.25                   |
| Pba   | 0.06                        | 0.12                       | 0.25                           | > 0.25                   |
| PD@Ni   | 0.18                        | 0.35                       | 0.71                           | > 0.71                   |
| PD@Nd   | 0.18                        | 0.35                       | 0.71                           | > 0.71                   |
| PD@Nm   | 0.18                        | 0.35                       | 0.71                           | > 0.71                   |
| Gse   | 0.005                       | 0.009                      | 0.018                          | > 0.018                  |
| #200/Pbe  | 0.03                        | 0.07                       | 0.15                           | > 0.15                   |
| Masses(% of total mass)                                 | 0.025                       | 0.05                       | 0.1                            | > 0.1                    |
| Heights (average of 4)<br>(mm of final height)          | 0.5                         | 1.0                        | 2.0                            | > 2.0                    |

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### **5.18 Duties of The HMA Plant Inspector**

**Scope:** The inspection will consist of checking the quality of materials in the stockpile, cold bins, and hot bins when required; inspection of processing, sampling; and testing the finished product for conformance to the specifications. The duties listed here are sample requirements to be performed by all types of Inspectors (i.e., PC, QC, (A), and IA). The responsibilities of a HMA inspector will include but are not limited to that shown in Form MAT 431.

**Sampling:** contract specification.

**Procedure:** contract specifications and Form MAT 432.

**Report:** FORM MAT 412, MAT 413, MAT 412S and Daily Inspector Report /Form MAT 431.

### **5.19 Degree of Particle Coating of HMA Mixtures**

**Scope:** This test is intended to determine the degree of coating of coarse particles of aggregate in a HMA mixture in relation to the wet mixing time. When HMA is mixed, coarse particles of aggregate are the last and the most difficult to coat, and their coating may be a measure of mixing effectiveness.

**Sampling:** AASHTO T 195 (M) and T 168 (M).

**Procedure:** AASHTO T 195 (M).

1. Only one truck load of mixture is sampled.
2. Sample is taken from opposite sides of the load.

**Report:** Form MAT 412 or MAT 412S.

### **5.20 Annual Qualification of Hot Mix Asphalt Plants**

**Scope:** This section covers requirements for qualifying facilities for the production of hot-mixed asphalt paving mixtures for use on Department projects annually or more frequently, as needed. Materials, technicians, mix designs, and the maintenance of calibration and test records must meet the contract specifications. The DC reserves the right to perform random spot inspections on any of the above items during the productions season.

**Sampling:** Sampling of materials and equipment will be done during site inspection by Department personnel.

**Procedure:** Hot Mix Asphalt plants are inspected annually during the spring season Form MAT 404 for Batch plants and Form MAT 405 for Drum Plants.

**Specifications:** Approval criteria for HMA Plants will be in accordance with AASHTO M 156(M) for a Batch Plant or a Drum Dryer Mixer Plant and contract specifications.

**Report:** Form 404 for Batch Plants and Form 405 for Drum plants

#### **5.20.1 - HMA Plant Field Testing Laboratory**

**Scope:** The Contractor shall furnish a field laboratory meeting the requirements of Section M.04.01-8(f) and have it approved by the DC prior to any production.

**Report:** Results of inspection will be reported on:

1. FORM MAT-404 - Check List for HMA Plants (batch type)
2. FORM MAT-405 - Check List for HMA plants (drum type)
3. FORM MAT-406 - Field Laboratory Apparatus Inspection Sheet
4. FORM MAT-407 – Deficiency Form
5. FORM MAT-415 – HMA guideline for sampling platform stand

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### **5.21 Hot Mix Asphalt Production - Request for Test**

**Scope:** Production and placement of Hot Mix Asphalt is unique in that mixtures must be tested during manufacture and placement and both are weather dependent. Consequently, testing personnel may be notified of upcoming paving operations with as little as 12 hours notice. It is imperative that project personnel provide notification to the Division of Materials Testing as soon as possible. Forms MAT 420 (District Construction) and MAT 421 (Maintenance) are guidelines for project personnel regarding HMA testing. The Division of Materials Testing typically sends these forms to projects in March of each year.

**Procedure:** Site Manager Procedures Manual

**Report:** MAT 100

### **5.22 HMA Inspection Personnel Assignment Procedure**

**Scope:** A priority system is utilized in assigning Hot Mix Asphalt plant inspectors, employing a review of computer-generated records of past plant performance, as well as first hand knowledge of recent plant performance and testing results. This priority system analyzes all test data on a daily basis, and rates the plants according to past performance data. This information assists in prioritizing daily assignment of HMA inspectors to bituminous plants based on the following:

- **Poor performance**
- **Daily tonnage produced**
- **Random sampling**

The ability of a bituminous plant to produce a consistent uniform product, meeting specifications 70% of the time or more, entitles that plant to an "A" rating and may reduce the inspection frequency.

#### **5.22.1 VACANT**

#### **5.22.2 Mix Design Submittal and JMF Change Procedure**

**Scope:** Each Plant must have each type of HMA material evaluated daily based on the current production specification for the purpose of establishing a ranking for that type. Based on the ranking a type receives must determine whether the material can be shipped un-interrupted or the plant ceases supply. Upon receiving one of these designations, the contractor may be required to submit an updated JMF (MAT 440 JMF Change form) for that type of material in order to continue supplying material.

**Sampling:** AASHTO R-35(M) and M-323

**Procedure:** Per current specification

As required, an annual submission of all JMF/mix design summary forms conforming to AASHTO R-35(M) and M-323 must be provided for each mix size and level, thirty (30) days minimum prior to production. The HMA supplier shall design and maintain detailed aggregate and mixture test data of each Superpave mix design for three years and provide a copy to the DC upon request. The Form MAT 429 revision 02/25/08 supplied by the DC shall be used for annual JMF submittals. If a different form is used, the form must be approved by the DC prior to use. All other required JMF information as stated in the contract specifications must be submitted along with Form Mat 429.

All consensus component aggregate properties must be provided by an AASHTO Materials Reference Laboratory (AMRL) and certified copies submitted to the DC for review, as part of the mix design/JMF, at least annually. All testing shall be performed in accordance with AASHTO T-304 (M) for Fine Aggregate Angularity (FAA), AASHTO T-176 for Sand Equivalency (S/E), ASTM D-5821 for Coarse Aggregate Angularity (CAA), ASTM D-4791 for Flat/Elongated (F/E), the Gsa, Gsb and Pwa. All JMF submittals shall include current copies of certified consensus property test results from an AMRL

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laboratory. The vendor will be notified by e-mail of the status of each JMF/mix design received. When the JMF/mix design is accepted, the vendor will then be notified of that mix's status, PPT, PT, A as described above.

After the acceptance of a JMF/mix design, the Contractor shall notify the DC of any change in source(s) of aggregate, binder, and other JMF changes in writing. All changes shall be reviewed by the DC for approval. Switching or changing component sources from those previously submitted is not allowed unless prior authorization is received. If a vendor wants to make changes in any mix component (aggregate or RAP) by more than 10%, that mix will be placed on a "PPT" status and a new JMF/mix design form MAT 429 shall be submitted and approved prior to production.

The continuous changing of JMFs is strongly discouraged as well as repeated failed trials without a documented effort to correct the problem. Repeated changes in JMFs and failed trials may lead to rejection of the material in question. JMF changes for gradation, Pb, Gmm, and Gse will be approved by the DC subject to the following requirements. JMF changes are permitted on HMA materials provided that:

- they are requested and pre-approved by the DC;
- changes do not exceed 50% of the tolerances for that item;
- they are based on a minimum of a two test trend;
- they are documented with a promptly submitted revised JMF;
- it is understood that the JMF change is effective from the time it was submitted forward and is not retroactive to the previous test or tests;
- request for JMF changes are received by the DC prior to the third test for Marshall materials; and
- request for JMF changes are received by the DC prior to any production for either Marshall or Superpave materials.

JMF changes to the component or mix Gsa, Gsb, Pwa, may be submitted on the JMF MAT 440 form. Aggregate consensus property changes will only be approved with proper documentation that the test results were obtained and performed by an AMRL accredited laboratory and must be submitted with detailed and summary documentation to the DC for approval. Changes to aggregate consensus properties will require a new mix design submittal on Form 429. JMF changes for these items are effective after the DC has reviewed and accepted. There will be no retroactive determinations made.

**Reports:** JMF annual submittal MAT 429, MAT 440

### **5.22.3 Vacant**

### **5.23 Vacant**

### **5.24 In-Place Density Testing of HMA**

**Scope:** This procedure covers the determination of the in-place density of HMA by using a calibrated Nuclear Density (ND) Gauge approved by the Engineer. This procedure is used by the Engineer or his representative as an in-situ method to ensure that HMA pavement density requirements are met for acceptance and payment purposes. This procedure establishes the correlation of the gauge, density testing of the material and calculation of the test results for acceptance and payment. Additional field correlation will be performed when placing HMA on limited access highways, as stated in section 5.24.1.

In general, acceptance testing of HMA for density should occur during the time of placement. However, acceptance testing of HMA for density may be performed after placement. Every attempt will be made to perform the acceptance testing within two working days of placement.

**Procedure:** Field testing of pavement density will be performed as stated herein and ASTM D 2950 (M). The density results obtained by this method will be reported as a percent of the maximum theoretical gravity (Gmm) performed in accordance with AASHTO T 209 (M).

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**Correlation:** All ND gauges will be correlated as directed by the DC each year prior to the start of the construction season or prior to initial use on Department projects. Correlation blocks will be provided by the Department or the gauge manufacturer. Alternate correlation blocks will be approved by the DC. The ND gauge will be correlated in accordance with the manufacturers' recommendations and by determining the count rate and density on approved correlation blocks. The ND gauge correlation procedure is as follows:

- A. Each reading will be a minimum of 4 minutes in duration.
- B. Four (4) incremental readings will be taken with gauge sitting on correlation block and averaged.
- C. Final test results of the ND on the correlation block will be within  $\pm 1.0$  pcf of the 164.5 pcf correlation block provided by the Department whether the source is positioned in the thick-lift or thin-lift position.
- D. The accuracy correlation (bias) will be determined as the difference from the known block density to the final calculated value as determined above.
- E. A bias value will be chosen to adjust the pcf result so the ND gauge meets the accuracy requirements stated in (C). If a ND gauge can not meet the accuracy requirements as stated herein and in ASTM D-2950(M): Appendix A, the ND gauge will be repaired by its owner and/or the manufacturer and correlated prior to its use.
- F. This bias will be utilized by the ND gauge owner and recorded on test reports for all occasions when the ND gauge is utilized on HMA materials until a new value is established.
- G. The DC reserves the right to require new correlation of a ND when there is evidence to suggest the device is inaccurate.

**Standardization:** As a minimum, standardization of the ND gauge will be performed daily prior to its use. This process will be performed in accordance with ASTM D-2950(M): Section 8, as described in the manufacturer's guidelines and as directed herein.

- A. Each day's standard count reading will be recorded. If the subject value is within 2 standard deviations of the target value established during the time of correlation, the gauge will be accepted for use.
- B. If the standard count does not fall within the required 2 standard deviations of the target value established during the time of correlation, additional standard counts may be run. If successive standard counts are not in compliance as stated above, the gauge cannot be used and must be re-correlated.

### Test location selection:

After the proper lots and sub-lots for testing are determined, in accordance with Article 4.06.04-1 D-1, the following methods will be used.

- A. All distance measurements will be taken by measurement device (measuring wheel) or reference stationing on the project.
- B. Longitudinal and transverse test site selection will be established utilizing stratified random sampling, ASTM D 3665.
- C. Transverse locations for the test site will be measured from the edge of paver pass.
- D. If the random number selected locates a transverse offset less than 1 ft. (0.3m) from either edge, relocate the gauge 1 ft. (0.3m) from that edge.
- E. For longitudinal joint testing, determined the test location within each sub-lot by use of random numbers. Longitudinal joint offset calculations are not required.
- F. Large vertical masses such as Jersey Barriers can affect the reading of a nuclear gauge. Therefore, when a random number locates the ND gauge less than 1 ft. (0.3m) from any vertical mass, relocate the gauge 1 ft. (0.3m) from that vertical mass.

### Testing Non-Bridge and Bridge HMA pavements:

The operation of the ND gauge for testing pavements will be as follows:

- A. For all test locations, two 60-second measurements (readings) will be taken in the direction of paving at 180 degree angles to each other (rotated around the center of the gauge). The density value reported for each test location will be the average of the two measurements.

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- B. For thick-lift HMA overlays of 2 ½ in. or greater in depth, testing will be performed using the testing position recommended by the manufacturer such that approximately 90 percent of a single reading will be affected by the top 3 to 4 in. of material.
  - C. For thin-lift HMA overlays 1 ½ to 2 ½ in., the testing must be performed using the testing position recommended by the manufacturer such that approximately 90 percent of a single reading will be affected by the top 2 in. of material

### Testing HMA Longitudinal Joints of Non-Bridge and Bridge HMA pavements (Hot side only):

- D. When successive adjacent (two or more) passes are made by the paver, proper lots and sub-lots for testing must be determined per Article 4.06.04-1 D-1. The following method shall be used while testing the total length of the longitudinal joint(s).
  - The edge of the gauge shall be placed parallel along the “hot side” of longitudinal joint, which locates the gauge source rod approximately 6-in. from the joint.

### **5.24.1 IN-PLACE Correlation for Density Testing on LIMITED ACCESS HIGHWAYS**

1) **Scope:** This procedure covers the determination of the in-place density of HMA by using an approved Nuclear Density (ND) Gauge correlated to HMA cores from the project by the Department on a daily basis. This procedure is used daily as an in-situ method to determine gauge bias and evaluate compliance to density requirements.

2) **Procedure:** Field testing shall be as stated herein. The density results obtained by this in place method shall be reported as a percent of the maximum theoretical gravity (Gmm) performed in accordance with AASHTO T 209 (M). Upon the establishment of this correlation location, the primary or substitute ND gauge shall be verified daily, as specified herein.

a) **Correlation:** The correlation (bias) value for each ND gauge shall be mix, plant and project specific. A bias for a ND gauge can not be carried over from one project to another using the same mix from the same plant. A new correlation may also be required when a different paver is used, the paver screed is repaired or replaced, a mix design change occurs, conditions otherwise change and at the start of the construction season.

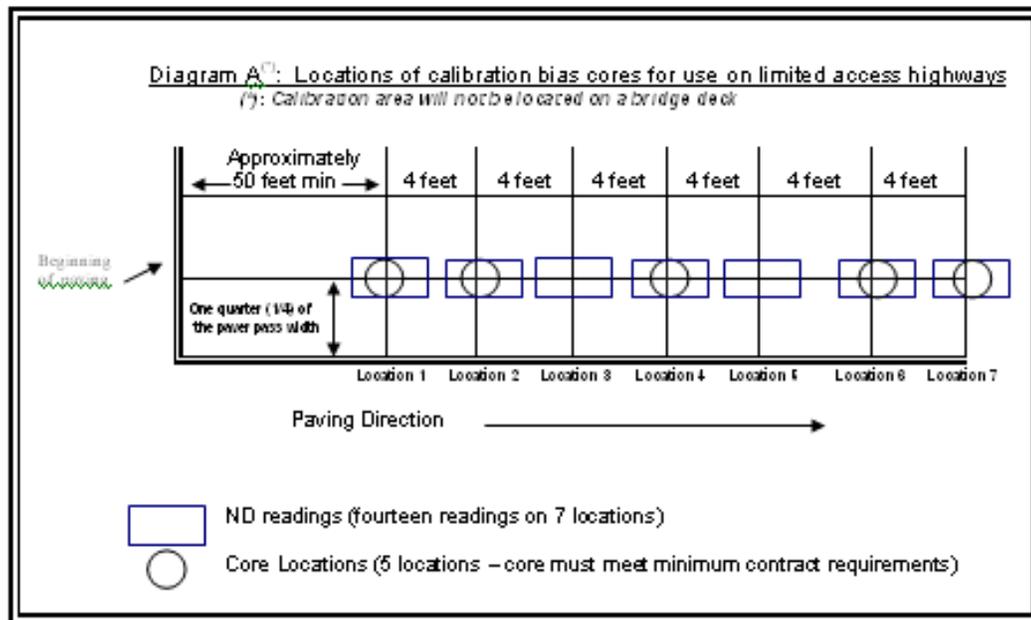
The ND gauge correlation procedure is as follows:

- i) The location selected for this correlation shall be on the project site on the mainline but in a location that is safely accessible for the duration of the project (such as a shoulder, on-ramp, etc.)
- ii) Fourteen (14) gauge readings and five (5) cores will be used to establish the correct bias and correlation. These readings must be taken four (4) feet from an unconfined edge and approximately fifty (50) feet beyond the beginning of the paver pass or as directed by the DC (please refer to diagram A).
- iii) The ND gauge must have its bias set to the value established by the DC for the first day of production and payments determined thereof. Each subsequent production day will have payment for density based on the core correlation bias established at the project.
- iv) Each ND gauge reading must be a minimum of 60 seconds in duration. Two (2) incremental readings must be taken at 180 degrees to each other for each test location.
- v) The fourteen ND gauge readings must be taken parallel to the direction of paving and on the same longitudinal tangent line with the ND locations outlined and marked in paint.
- vi) The ND density difference from the high-low of the 7 locations must be  $\leq 1.0$  percent of the mean of the determined density or a new location will be selected.
- vii) The first two locations (1 & 2), location 4, and the last two locations (6 & 7) must be where the cores are taken for correlation purposes. The cores must be taken from within the center of each of the ND gauge footprint at locations 1, 2, 4, 6 and 7 previously marked. Ice should be used to minimize any distortion or damage to cores.
- viii) Core thicknesses must match the project plans for the mainline pavement or a new location must be selected.

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- ix) Location 3 and 5 must remain intact to be used as a daily reference/ correlation for the project ND gauge or substitute ND gauge.
- x) The core density difference from the high-low of the five locations must be  $\leq 1.0$  percent of the mean of the determined density or a new location must be selected.
- xi) The final ND average of percent density from the 7 test locations will be calculated.
- xii) The final core average of percent density from the five cores must be determined and written on the project pavement near locations 3 & 5 to serve as a correlation reference site. The core density average must meet specifications or a new location must be established.
- xiii) The ND correlation bias (offset) will be determined as the difference from the known average core density to the known average ND gauge density value, as determined above. This daily bias value must be used with the ND gauge on the project.
- xiv) The bias value must be used to check the ND gauge on locations 3 & 5 so that the density of HMA pavement meets an accuracy requirement of  $\leq 1.0$  percent of known density. One test (2-60 second readings) must be taken each day of production.
- xv) If a ND gauge can not meet the accuracy requirements as stated herein, the ND gauge must be repaired by its owner and/or the manufacturer and correlated prior to its use. A substitute gauge will be required to be correlated on locations 3 & 5 and used to establish the bias for that gauge.
- xvi) This bias must be utilized by the ND gauge user and recorded on the daily test reports for all occasions when the ND gauge is utilized.



- 3) **Cores:** All cores must be six inch (6") in diameter or greater. Coring must be performed on the first day of paving. The Contractor shall fill the core holes with approved HMA on the same day. The cores will be tested by the Department. Density results of the core specimens will be determined using AASHTO T 331 (Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method). The density results of the cores will be forwarded to the project and Contractor.

**Report:** Form CON-133/MAT 438.

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### **5.24.2 Dispute Resolution request by Contractor for HMA density**

Dispute Resolution for HMA Density

**Scope:** The Contractor may request that the dispute resolution process be initiated for HMA Density when it is determined by the DC that in-place material does not meet the minimum density requirements determined by ND gage. The dispute resolution procedure is as follows:

**Procedure:**

- A. The Contractor shall request in writing that it be allowed to obtain cores in the area represented by the non-compliant material to the District administering the contract. If approved, all coring must be directed and witnessed by the DC or his/her representative. The administering unit will be responsible for coordinating the Contractor's activities with Materials Testing personnel.
- B. Five cores (6 inch diameter-wet sawed) must be obtained in accordance with ASTM D 3665 by the Contractor at locations on the mat determined by a stratified random procedure performed by the DC to represent the material in question.
- C. Five cores (6 inch diameter-wet sawed) must be obtained in accordance with ASTM D 3665 by the Contractor at locations on longitudinal joint (hot side only) by a stratified random procedure performed by the DC to represent the material in question.
- D. Cores must be labeled with number, location, and date and stored in a safe manner to ensure no damage occurs to the cores (i.e., core 1M for first mat core; core 1J for first joint core, etc).
- E. The cores must be tested in accordance with AASHTO T 331, as modified by the DC. The basis of the adjusted payment will be determined by comparing the average of the 5 core densities to the specifications. The Theoretical Maximum Specific Gravity (Gmm) used to calculate density will be the average Gmm on the day of production in question.
- F. All core data will be used for the determination of density except that individual cores that are damaged or obviously defective will be replaced with new cores from the same sub lot.
- G. Core holes shall be repaired immediately upon core extraction by decanting any free water, tack coating cut surface, filling with hot mixture of same type, and compacting with hand compactor or other mechanical means to the maximum compaction possible. The final core hole surface shall be with +1/8 inch of the finished pavement prior to opening to traffic.
- H. Traffic control, coring equipment, personnel, core hole repairs and HMA materials shall be provided by the Contractor at no expense to the Department.
- I. Laboratory testing of all cores will be performed by the DC at no expense to the Contractor.

**Report Form:** Form CON 133

### **5.24.3 VACANT**

### **5.25 Density of Soil and Soil - Aggregate by Nuclear Methods**

**Scope:** This procedure covers the determination of the in-place density of soil and soil aggregate by using an approved Nuclear Density (ND) Gauge. The procedure is used as an in-situ method to ensure that the soil density requirements are met for acceptance and payment purposes. These density requirements will be applied to all construction and resurfacing projects where the compacted depth is specified to be a minimum of 1-1/2 in. or greater. This procedure will establish the correlation of the gauge, testing of the material and calculation of the test results.

**Procedure:** Field testing must be as stated herein and AASHTO T 310 (M). The density results obtained by this method will be reported as a percent of the maximum proctor value performed in accordance with AASHTO T 180 Method D, sampled from the approved source. At the conclusion of each day's production, the final density average will be calculated.

**Correlation:** All ND gauges must be correlated by the Engineer each year prior to the start of the construction season or prior to initial use on Department projects. Correlation blocks will be provided by the Department or the gauge manufacturer. Alternate correlation blocks must be approved by the DC. The ND gauge must be correlated in accordance with the manufacturers' recommendations and by determining the count rate and density on approved correlation blocks. The range of densities of the correlation blocks must be similar to the expected pavement densities that will be encountered in the field. The ND gauge correlation procedure is as follows:

- a. Each reading must be a minimum of 4 minutes in duration.

## Chapter 6 - Laboratory Independent Verification Program

### 6.1 PERFORMANCE ASSESSMENT

Accurate test results are essential to a testing laboratory; therefore, our personnel and equipment are required to be verified. An independent assessment of our methods and equipment is performed through the AASHTO Accreditation Program (AAP). This program entails inspection by staffs from the AASHTO Materials Reference Laboratory (AMRL) and the Cement and Concrete Reference Laboratory (CCRL). In addition, the AMRL and CCRL send us proficiency samples to test, and our results are reported to them for evaluation.

After an inspection by AMRL or CCRL, any deficiencies noted shall be addressed so as to conform with required standards and standard test procedures.

When proficiency sample results are poor, an investigation will be made to determine the reasons. This investigation will include, but not be limited to, the following: review of work sheets and reporting documents; equipment check for deficiencies; scale check, if used; and a review of previous proficiency test results. The purpose is to attempt to identify the cause for deficient test results and to take corrective action as soon as possible. The determination shall kept on file for AMRL or CCRL review.

### 6.2 EQUIPMENT CALIBRATION, VERIFICATION AND CHECKING

The three tables below indicate testing equipment that must be calibrated, verified and checked in accordance with requirements set forth by the AASHTO Accreditation Program. Included are the frequency, range, procedure and method for tractability to the National Institute of Standards and Technology (NIST). To assure proper compliance with calibration, verification and checking requirements, a list based on these tables shall be maintained. It shall be detailed, include equipment numbers, and be used as a work document.

TABLE 1  
EQUIPMENT TO BE CALIBRATED

|                                   | ASTM AND/OR<br>AASHTO<br>REFERENCE                     | FREQUENCY<br>(Months) | PROCEDURE   | TRACEABILITY<br>to NIST               |
|-----------------------------------|--|-----------------------|---|---------------------------------------|
| Analytical<br>Balances            | AASHTO Methods for<br>Bituminous, Soils<br>Aggregates  | 24                    | Calibration Performed by<br>Outside Agency                                | Test Weights<br>Calibrated by<br>NIST |
| G.P. Balances<br>Scales & Weights | AASHTO<br>Methods for Bituminous,<br>Soils, Aggregates | 12                    | Calibration Performed by<br>Outside<br>Agency                             | Test Weights<br>Calibrated by<br>NIST |
| Mechanical<br>Compactor<br>(HMA)  | AASHTO<br>T 245  | 36                    | Calibrated to Give Results<br>Comparable With the<br>Hand Operated Hammer | Not Applicable                        |
| Mechanical<br>Compactor           | AASHTO<br>T 180  | 12                    | Calibrated to Give Results<br>Comparable With the<br>Hand Operated Hammer | Not Applicable                        |

TABLE 1 (Cont.)

## EQUIPMENT TO BE CALIBRATED

|                                 | ASTM AND/OR<br>AASHTO<br>REFERENCE       | FREQUENCY                            | PROCEDURE   | TRACEABILITY<br>to NIST  |
|---------------------------------|--|--------------------------------------|---|--|
| Pressure Air Meters             | AASHTO<br>T 152                          | 36 Months                            | AASHTO T 152<br>(Section 4<br>Calibration of<br>Apparatus)  | Not Applicable   |
| Saybolt Viscometers             | AASHTO<br>T 59                           | 36 Months                            | AASHTO T 72<br>(Section 9)  | AASHTO T 72<br>(Section 9)   |
| Test Thermometers               | AASHTO<br>T 201<br>T 202<br>T 49<br>T 51 | 6 Months                             | ASTM E-77<br>(Section 9)  | Calibrated and<br>Compared with<br>Certified NIST<br>Thermometers                        |
| Unit Weight<br>Measures Scales  | AASHTO<br>T 19                           | 12 Months                            | AASHTO T 19<br>(Section 8)  | Not Applicable   |
| Viscometers                     | AASHTO<br>T 201<br><br>T 202             | 36 Months                            | Zeithfuchs Cross-<br>arm Viscometer<br>AASHTO T 201<br>(Section A3)<br>Vacuum Capillary<br>Viscometer | AASHTO T 201<br>(Section A3.2)<br><br>AASHTO T 202<br>(Section A4.2)<br><br>AASHTO T 202 |
| Compression Testing<br>Machines | AASHTO<br>T 22<br>T 245                  | 12 Months for<br>Load<br>Indications | Verification<br>Performed by<br>Outside Agency in<br>Accordance with<br>AAASHTO T 67                  | Proving Ring Verified<br>by NIST for<br>Contracted<br>Firm                               |

TABLE 2  
EQUIPMENT TO BE CHECKED

|  | ASTM<br>AND/OR<br>AASHTO<br>REFERENCE | CHECKING<br>FOR  | FREQUENCY<br>(months) | PROCEDURE   |
|--|---------------------------------------|--|-----------------------|---|
| Autoclave                                | AASHTO<br>T 107                       | Heating Time,<br>Temperature,<br><br>Pressure,<br>Cooling Time | 24                    | Performed by CCRL<br><br>AASHTO T 107<br>(Section 4.5)  |
| Autoclave Safety<br>Valve<br>Agency      | AASHTO<br>T 84                        | Proper Relief<br>of Pressure                                   | 6                     | Checked by Outside<br><br>AASHTO T 107<br>(Section 6.4) |
| Conical Mold,<br>Tamper                  | AASHTO<br>T 84                        | Critical Dimensions  | 24                    | Performed by AMRL<br>AASHTO T 84<br>(Section 4.3, 4.4)  |
| Testing Equipment<br>for Portland Cement | AASHTO<br>T 106                       | Critical Dimensions  | 24                    | Performed by CCRL<br>AASHTO T 106<br>(Section 3.4)      |
|  | T 137                                 | Critical Dimensions  | 24                    | AASHTO T 137<br>(Section 5)                             |
|  | T 131                                 | Critical<br>Dimensions   | 24                    | AASHTO T 131<br>(Section 3)                             |
| L.A. Machine                             | AASHTO<br>T 96                        | RPM & Critical<br>Dimensions                                   | 24                    | In-house procedure #42                                  |
| Steel Spheres                            | T 96                                  | Individual weight and<br>Charge weight                         | 24                    | In-house procedure #42                                  |
| Mechanical<br>Shakers                    | AASHTO<br>T 27                        | Sieving Thoroughness   | 12                    | In-house procedure #45                                  |
| Sulfate Oven                             | T 104                                 | Rate of Evaporation  | 12                    | In-house procedure #44                                  |
| Sulfate Soundness<br>Containers          | T 104                                 | Physical Condition   | 12                    | In-house procedure #43                                  |
| Sieves                                   | All applicable                        | Physical condition and<br>measure openings as<br>required.     | 6                     | M-92 via applicable In-house<br>procedures              |
| Drying Ovens                             | All applicable                        | Verify Temperature<br>Settings                                 | 4                     | Applicable in-house procedures                          |
| Manual Hammer                            | T 180                                 | Weight and critical<br>dimensions                              | 12                    | In-house procedure #31                                  |
| Molds                                    | T 180                                 | Critical dimensions  | 12                    | In-house procedure #32                                  |
| Straight Edge                            | T 180                                 | Planeness of edge  | 6                     | In-house procedure #33                                  |

Note: In-house procedures are maintained by the supervisor of the room where the equipment is located.

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- b. Four (4) incremental readings must be taken with gauge sitting on correlation block and averaged.
- c. Final test results of the ND on the correlation block must be within + 1.0 pcf of the 131.5 pcf correlation block provided by the Department whether the source is positioned in the thick-lift or direct transmission position.
- d. The accuracy correlation (bias) will be determined as the difference from the known block density to the final calculated value as determined above. A bias value will be chosen to adjust the pcf result so the ND gauge meets the accuracy requirements. If a ND gauge can not meet the accuracy requirements as stated herein, the ND gauge must be repaired by its owner and/or the manufacturer and correlation prior to its use. This bias must be utilized by the ND gauge owner and recorded on test reports for all occasions when the ND gauge is utilized on HMA materials until a new value is established.
- e. The Engineer reserves the right to require new correlation of a ND when there is evidence to suggest the source or the device is inaccurate.

**Standardization:** As a minimum, standardization of the ND gauge must be performed daily prior to its use. This process must be performed as defined in AASHTO T- 310, the manufacturer's guidelines, and as directed herein.

- a. Each day's standard count reading must be recorded. If the reading is within 2 standard deviations of the target value established during the time of correlation, the gauge will be acceptable for use.
- b. If the standard count does not fall within the required 2 standard deviations of the target value, additional standard counts may be run. If successive standard counts are not in compliance as stated above, the gauge cannot be used and must be re-correlated.

**Test location selection:** After the proper lots and sub-lots for testing are determined, in accordance with Department Standard Specification Article 4.06.04-1 D-1, the following methods shall be used. All distance measurements shall be taken by measurement device or reference stationing on the project.

- a. Field test site selection shall be established utilizing stratified random sampling in accordance with ASTM D 3665, or
- b. Select a repetitive feature located within the testing area, such as utility poles or job stationing. Count the number of markers present and divide by the number of tests to be performed, so that the lot is divided equally into a number of sub-lots (for example: if the lot spans 30 utility poles and 10 tests are required, each sub-lot will span 3 utility poles.)
- c. For soil testing, determine the longitudinal and transverse test location within each sub-lot by use of random numbers. If the random number selected locates a transverse offset less than 1 ft. (0.3m) from a limit of the material, relocate the gauge 1 ft. (0.3m) from that location
- d. Large masses such as traffic barriers can affect the accuracy of the ND gauge. Gauges located closer than 1 ft. (0.3m) from any such mass, should be relocated prior to use.

**Testing Soils:** The operation of the ND gauge will be as follows: a. for all test locations, four 30-second measurements must be taken at 90 degree angles to each other (rotated around the center of the gauge). The density value reported for each test location must be the average of the two measurements taken in either the BS or Direct Transmission mode.

**Report** - Form CON-125

### **5.26 Resistance of Compacted HMA to Moisture – Induced Damage**

**Scope** - This method covers preparation of specimens and measurement of the change of diametral tensile strength resulting from the effects of saturation and accelerated water conditioning of compacted HMA mixtures in the laboratory. This test will be performed on HMA Laboratory mixture, mixtures sampled from newly loaded trucks, field pavement samples, and pavement cores.

**Sampling and Procedure** - AASHTO T 283(M)

**Report** - AASHTO T-283(M) Table 1, or form MAT 428

## Chapter 7 – Schedule of Minimum Requirements for Sampling Materials for Test

This schedule prescribes the minimum requirements for sampling onstruction materials for acceptance testing and should be adhered to unless expressly directed by the contract specifications governing the specific work.

A request for test (MAT-100) for all materials used in construction and maintenance activities must accompany all samples, Certified Test Reports and/or Materials Certificates, and products listed on the Departments' Qualified Porducts List, that are submitted to the Division of Materials Testing.

### **General Notes:**

- 1.) **Elastomeric Bearing Pads:** For Structures with less than fifty pads, one test pad shall be furnished. For structures with more than 50 pads, one extra test pad shall be furnished for each additional 50 pads or portion thereof. If there are two or more types of pads used with a structure, and the total is less than 50, the most prevelant type shall be furnished.
- 2.) **Unsuitable Material:** Material to be inspected by the Engineer when excavation is initiated and periodically thereafter. Samples are to be submitted to the DMT when composition of the material changes as determined by the Engineer.
- 3.) **Illumination:** Materials Certificate and Request for Test, to include catalog number and other pertinent nomenclature needed to identify material as per approved catalog cut.
- 4.) **Precast Concrete Items:**
  - a. Barrier, Pipe, Catch Basins and other drainage items, handholes, light standards, boundary markers, and traffic foundations must be supplied by an approved fabricator. Acceptance shall be based on the certification of each shipment by the fabricator, and inspection by project personnel of each individual unit delivered to the project site. Project personnel are responsible for submitting a MAT-100 listing the cast dates of the units received, together with a copy of the manufacturers FORM MAT-314. "Certification of Precast Concrete Products" (PC-1). Upon receipt of these items, the DMT will generally recommend acceptance of the items.
  - b. For Culverts, project personnel must include piece mark and cast date on MAT-100.
- 5.) **Extensive Testing Period:** (#) Samples so designated require up to 2 weeks of extra time for testing. Samples should be submitted as soon as possible before use. Project personnel should contact the DMT to determine a more acurate test schedule and when results will be available.

- 6.) Reclaimed Waste:** This material is defined as debris from the demolition of buildings, structures, and pavements, residue from incineration, and recycled glass. Acceptable reclaimed waste includes concrete, bituminous concrete, glass, ceramics, brick, pavement subbase and base courses, and clinker from resource-recovery plants.
- i. Metal would be acceptable only when it is contained within large fragments of concrete. Reclaimed waste brought in from beyond the limits of a project must be accompanied by a Materials Certificate and Certified Test Report showing compliance with Article 1.06.07 and the Department of Environmental Protections' remediation standard regulations, unless the source of the material is a Department project and is acceptable to the Engineer. Sampling shall be at 2500 cubic yard intervals. Random assurance samples will be selected and tested to verify compliance with certification program.
- 7.) Reclaimed Miscellaneous Aggregate:** This material is defined as Glass-free and clinker-free reclaimed waste, which has been crushed, graded and blended, as specified with natural crushed stone or gravel. The provisions of paragraph 6 (i) also apply.
- 8.) Reclaimed Concrete Aggregate:** This material is defined as crushed and graded concrete removed from pavements or structures. The provisions of paragraph 6 (i) also apply.
- 9.) Bituminous Concrete Density:** For projects tested by Department personnel that require only one assurance test 1,000 to 39,999 tons a year (900 to 18,000 mtons) , each gauge operator is required to run assurance tests twice a year with DMT personnel. This will provide blanket coverage for all projects that require only one assurance test and will eliminate the need to provide individual assurance testing for these projects. All State owned density gauges are to be calibrated annually at the DMT and whenever the results are suspect.
- 10.) Aggregate Field Samples:** Field sample sizes listed for fine and coarse aggregates or blends may vary from sample size listed. Refer to AASHTO T-2 for exact sample sizes depending on nominal maximum size of aggregate.

***Legend for "Sampled By"***

- DL – District Laboratory
- CL – Central Laboratory (Rocky Hill)
- PP – Project personnel
- P-D – District Lab personnel upon notification by project
- P-C – Central Lab personnel upon notification by project
- AL – Department's Qualified Products List.

| Material   | Sampled By                       | Sample Size  | Sampling Location                                    | Frequency for Acceptance                      | Frequency for Ind. Assurance | Remarks   |
|--|----------------------------------|--|--|---|------------------------------|---|
| ANCHORAGES:<br>Precast<br><br>Cast-in-Place<br><br>Metal Bridge Rail   | PP<br><br><br>PP                 | see remarks<br><br><br>see remarks                             | project<br><br><br>project                           | 1/size/shipment<br><br><br>1/shipment         |                              | Submit request for test and MAT-314 (PC-1) See Note 4(a)<br><br>See: CONC. FOR STRUCTURES, CONCRETE PLACEMENT<br><br>Submit request for test with Materials Certificate.  |
| ANCHORING CEMENT   | PP                               | 1/bag  | project  | each brand                                    |                              | Submit sample and request for test.   |
| BAGGED STONE:<br>(1) Bag<br><br>(2) Stone  | PP<br><br>PP                     | see remarks<br><br>50 lbs. (25 kg)                             | project<br><br>project                               | 1/project<br><br>1/project                    |                              | No testing required/Field personnel must verify compliance to specification.<br><br>Submit sample and request for test.   |
| BAR-MAT REINFORCEMENT:   | PP                               | 1 sy. (1 m <sup>2</sup> )                                      | project  | 1/mile /pvt.<br>(1/2 km/pvmt)                 |                              | Submit sample and request for test. (See Note 5-3 days)   |
| #BAR REINFORCEMENT:<br>Deformed Uncoated or Epoxy Coated (All sizes)   | PP                               | 5 ft. (1.5 m)  | project  | 1/size/ manufacturer/<br>each 200 tons (180t) |                              | Submit samples & Certified Test Reports for coated bars with request for test. (See Note 5 - 3 days).   |
| BARRICADES: Construction   | PP                               | 1/project  | project  |   |                              | Submit request for test with a Materials Certificate.   |
| BARRICADE: Warning Lights  | PP                               | 1/project  | project  |   |                              | Submit request for test with a Materials Certificate.   |
| BARWAYS:<br>Fittings<br><br>Wood Post<br><br>Wood Rails  | PP<br><br>PP<br><br>PP           | 1/type /project<br><br>1/project<br><br>1/project              | project<br><br>project<br><br>project                |   |                              | Submit request for test with a Materials Certificate.<br><br>Submit request for test with a Materials Certificate.<br><br>Submit request for test with a Materials Certificate.   |
| BEARING PADS:<br>Laminated Elastomeric Bearing Pads<br><br>Plain Elastomeric Bearing Pads<br><br>Prefabricated Bearing Pads<br><br>Molded Pads (Metal Bridge Rail) | PP<br><br>PP<br><br>PP<br><br>PP | 1 pad<br><br>see remarks<br><br>see remarks<br><br>see remarks | project<br><br>project<br><br>project<br><br>project | see Note 1                                    |                              | Submit sample & Certified Test Report with request for test.<br><br>Submit request for test with a Materials Certificate and Certified Test Report.<br><br>Submit request for test with a Materials Certificate.<br><br>Submit request for test with a Materials Certificate. |
| BEDDING MATERIAL:  | PP                               | 25 lbs. (12kg)   | project  | 1/2500 cy (1/1900m <sup>3</sup> )             |                              | Submit sample and request for test.   |

| Material  | Sampled By | Sample Size   | Sampling Location | Frequency for Acceptance                                    | Frequency for Ind. Assurance              | Remarks   |
|---|------------|---------------|-------------------|---|---|---|
| BITUMINIOUS SURFACE TREATMENT:<br>Bituminous Material               | PP         | 2 qts. (2L)   | project           | 1/10,000 gal.(1/38kl)                                       |   | Submit request for test and Certified Test Report.  |
| Stone – Sand Cover  | PP         | 25 lbs.(12kg) | project           | each new source and each 1000 cy.(765m <sup>3</sup> )       |   | Submit sample and request for test.   |
| BLOCKS: (Masonry)<br>(for C.B., M.H., D.I., etc.)<br>(Paver Blocks) | *DL        | 6 each        | producer          | annually  |   | *Submit request for test unless sample is requested by DMT.   |
| BOLTS:<br>#Anchor   | PP         | see remarks   | project           | 1/size/heat #/each shipment                                 |   | Submit request for test, with sample, Certified Test Report and Materials Certificate. (See Note 5-3 days)  |
| High Strength   | PP         | see remarks   | project           | see remarks   |   | Submit request for test, with sample, Certified Test Report and Materials Certificate. Notify DMT. for further instructions prior to sampling.          |
| BORROW:<br>Lab. Density test  | PP         | 80 lbs.       | project           | each soil type/each 50,000 cy. *<br>(38,000m <sup>3</sup> ) |   | Submit sample and request for density test. * Density test is for information only not acceptance. If reclaimed see Note 6 for additional requirements. |
| Field Density test  | PP<br>*P-C |               | project           | each soil type/each 5,000 cy. (3800m <sup>3</sup> )         | * each 50,000 cy (38,000 m <sup>3</sup> ) | *Assurance test to be witnessed or performed by DMT personnel.  |
| #BRICK:<br>Masonry (for CB, MH & DI)                                | *DL        | 6 bricks      | producer          | annually  |   | *Submit request for test unless sample is requested by DMT.   |
| Clay (for sewer, sidewalk, etc.)                                    | PP         | 6 bricks      | project           | 6 each/10,000 or less                                       |   | Submit samples and request for test. (See Note 5 - 2 days).   |
| CASTINGS: (Metal)   | PP         | 2 test bars   | project           | 1/heat or cast date   |   | Submit request for test cast date and/or heat number with sample bars.  |
| CALCIUM CHLORIDE FOR DUST CONTROL                                   | PP         | 1 qt          | project           | 1/shipment  |   | Submit sample in airtight container and request for test.   |

| Material   | Sampled By | Sample Size    | Sampling Location | Frequency for Acceptance  | Frequency for Ind. Assurance | Remarks  |
|--|------------|----------------|-------------------|---|------------------------------|--|
| CATCH BASINS, DROP INLETS, MANHOLES:<br>#Brick for CB, MH, or DI                             | *DL        | 6 each         | producer          | annually  |                              | *Submit request for test unless sample is requested by DMT.  |
| #Cement – Portland - Bagged  | PP         | 1 bag          | project           | 1/project/ brand/type   |                              | Submit samples and request for test. (See Note 5 - 7 days).  |
| Portland – Bulk  | CL         |                |                   |   |                              | See: CEMENT (PORTLAND) - Bulk  |
| Concrete Building Blocks For CB, MH, DI  | *DL        | 6 each         | producer          | annually  |                              | *Submit MAT-100 unless sample is requested by DMT.   |
| Lime, Hydrated (mortar)  | PP         | 1 bag          | project           | 1/project/ each brand/<br>type  |                              | Submit sample and request for test.  |
| Manhole Castings   | PP         | 2 test bars    | project           | 1/heat or cast date   |                              | Submit request for test with heat number or cast date with sample bars.  |
| Manhole Steps  | PP         | see remarks    | project           | 1/ type project   |                              | Submit request for test with a Materials Certificate.  |
| Frames & Grates for CB & Drop Inlets   | CL         |                |                   | shipment  |                              | Inspected by DMT personnel at manufacturer.  |
| Pervious Material Gradation test   | PP         | 80 lbs.        | project           | gradation test: each<br>new source & each<br>5000 cy. (3800m <sup>3</sup> ) |                              | Submit sample and request for test. If reclaimed see Note 7 for additional requirements. See pervious structure backfill for density testing.                    |
| CATCH BASINS, DROP INLETS, MANHOLES (cont)<br>Precast Concrete Units                         | PP         |                | project           | 1/size/shipment   |                              | Submit request for test and MAT-314 (PC-1). (See Note 4(a)).   |
| #Reinforcing Bars: (Bar Reinforcement:<br>Deformed Uncoated or Epoxy Coated) (All<br>sizes). | PP         | 5 ft. (1.5m)   | project           | 1/size/manufacturer/<br>each 200 tons(180 t)                                |                              | Submit sample & Certified Test Report for coated bars and request for test. (See Note 5 – 3 days).   |
| Sand (Mortar/Drain. Struct.)   | PP         | 25 lbs. (12kg) | project           | each new source &<br>each 50 cy. (38m <sup>3</sup> )                        |                              | Submit sample and request for test.  |
| #CEMENT: (PORTLAND — BAGGED)   | PP         | See remarks    | project           |   |                              | Project personnel must verify that the cement bag is labeled AASHTO M-85 compliant. Do not submit request for test.  |
| CEMENT: (PORTLAND) — BULK  | CL         |                | plant             |   | **                           | Acceptance based on certification from prequalified sources.<br>**Select & test random samples of cement supplied to verify compliance w/ certification program. |
| CHAIN:   | PP         | 10 ft. (3 m)   | project           | 1/shipment  |                              | Tested in accordance with ASTM A413. Submit sample and request for test.   |
| CHAIN-LINK FENCE:<br>#Fabric   | PP         | 3 lf. (1m)     | project           | 1/each 100 rolls  |                              | Submit full-height sample and request for test. (See Note 5 - 2 days).   |
| #Fittings  | PP         | 1 each         | project           | 1/size/project  |                              | Submit sample and request for test. (See Note 5 - 2 days).   |
| Gate   | PP         | 1 each         | project           | 1/shipment  |                              | Submit request for test with a Materials Certificate.  |

| Material                                       | Sampled By | Sample Size                  | Sampling Location    | Frequency for Acceptance   | Frequency for Ind. Assurance              | Remarks  |
|--|------------|------------------------------|----------------------|--|---|--|
| CHAIN-LINK FENCE (cont.)                       |            |                              |                      |  |   |  |
| #Post, Top Rail                                | PP         | 1 each                       | project              | 1/type/ project  |   | Submit sample and request for test. (See Note 5 - 2 days).   |
| Post, Top Rail (AASHTO M181)                   | PP         | see remarks                  | project              | 1/size/ project  |   | Submit request for test with a Materials Certificate for 1/ shipment.  |
| #Tension Wire                                  | PP         | 3 lf. (1 m)                  | project              | 1/type/ project  |   | Submit sample and request for test. (See Note 5 - 2 days).   |
| CHEMICAL ANCHORS                               | AL         | see remarks                  | project              | each type  |   | Submit request for test. Refer to approved products list.  |
| COMPACTED GRAVEL FILL:                         |            |                              |                      |  |   |  |
| Gradation test                                 | PP         | 80 lbs. (40 kg)              | project              | each new source & each 5000 cy. (3800m <sup>3</sup> )                |   | Submit sample and request for test. If reclaimed see Note 7 for additional requirements.   |
| Laboratory density test                        | PP         | 80 lbs. (40 kg)              | project              | each new source & each 20,000 cy. (15,000 m <sup>3</sup> )           |   | Submit sample and request for test. * density test is for information only - not acceptance. Separate requests required for gradation and Density.   |
| Field Density                                  | PP         |                              | project              | 1 each 3 lifts; min. 3 each structure                                |   |  |
| CONCRETE: (Standard Mix Designs)               | CL         |                              | producers            | yearly/ each agg. source   |   | Obtain required mix design from District office.   |
| CONCRETE: (Special Mix Designs)                | CL         |                              | producers            | see remarks  |   | Submit to lab for each project.  |
| CONCRETE BASE:                                 |            |                              |                      | see remarks  |   | See: CONCRETE PAVEMENT   |
| CONCRETE FOR HEADERS:                          |            |                              |                      | see remarks  |   | See: CONCRETE FOR STRUCTURES.  |
| CONCRETE PAVEMENT:                             |            |                              |                      |  |   |  |
| #Bar-Mat Reinforcement                         | PP         | 1 sy. (1 m <sup>2</sup> )    | project              | 1/mile pvmt. (1/1.6 km)  |   | Submit sample and request for test. (See Note 5 - 3 days).   |
| #Cement (Portland) Bagged                      | PP         | 1 bag                        | project              | 1/shipment   |   | Submit sample and request for test. (See Note 5 - 7 days)  |
| Cement (Portland) Bulk                         | CL         |                              |                      |  |   | See: CEMENT (PORTLAND) – Bulk  |
| #Concrete Cores                                | P-C        | 4" core (100mm)              | project              | 1/500 ft. (1/150 m)  |   | Submit MAT-1. Cores taken by Laboratory personnel. (See Note 5 - 4 days). (Not required for fixed form.)   |
| Concrete, Compressive Strength Cylinders       | PP         | cylinder                     | project              | each 75 cy; min of one set each day. See remarks (60m <sup>3</sup> ) |   | Samples used to fabricate test specimens shall be obtained in accordance with AASHTO T 141 unless an alternative procedure has been approved by the Engineer. Submit Form MAT-308 for compressive strength. (Minimum of 4 cylinders per set) |
|  | *P-D       |                              |                      |  |   | * Assurance test & molding of cylinders to be witnessed or performed by DMT personnel. 1 per 50 sets of cylinders/ with min. 2 per yr. per project   |
| Concrete Placement                             |            |                              |                      |  |   | See: CONCRETE PAVEMENT PLACEMENT   |
| Curing   |            |                              |                      | see remarks  |   | See: CURING MATERIALS  |
| Expansion Contraction Joint Load Transfer Unit | PP         | see remarks                  | project              | 1/ shipment  |   | Submit request for test and a Materials Certificate from load transfer unit manufacturer.  |
| #Joint Filler (Preformed)                      | PP         | 1 sqft. (0.1m <sup>2</sup> ) | project              | 1/size/ shipment   |   | Submit request for test with a Materials Certificate unless Lab requests samples. (See Note 5 - 2 days).   |
| Joint Sealer                                   | PP         | *50 lbs. (25kg)              | project              | 1/batch  |   | *Submit request indicating Batch No. and Certified Test Report. Submit sample if requested by Lab.   |
| Sand   | P-D        | 25 lbs. (12kg)               | concrete batch plant | bi-weekly  | Every 10 tests as matl. is required (CP). | Submit request for test .  |

| Material  | Sampled By                                       | Sample Size    | Sampling Location    | Frequency for Acceptance  | Frequency for Ind. Assurance                                       | Remarks  |
|---|--|----------------|----------------------|---|--|--|
| CONCRETE PAVEMENT: (Cont)<br>Stone  | P-D  | 50 lbs. (25kg) | concrete batch plant | bi-weekly   | Every 10 tests as matl. is required (CP).                          | Submit request for test . If reclaimed see Note 8 for additional requirements.   |
| Water   | DL   | 1 qt. (1L)     | concrete batch plant | 1/each source supply/year   |  | Tested during annual plant inspection. Submit request for test yearly.   |
| #Welded Wire Steel Fabric   | See Reinforcing Steel (Welded Wire Steel Fabric) |                |                      |   |  |  |
| CONCRETE PAVEMENT PLACEMENT:<br>Slump test & Air Content<br>See remarks (a), (b)  | PP   | as needed      | project              | ea. 50 cy.(40 m <sup>3</sup> ) w/ min. of 1 each day pvmt. is being placed. See remarks(a), (b) | 1 per 50 sets of cylinders with a min. of two per year per project | (a) Frequency of testing may be increased at the discretion of the Engineer.   |
| CONCRETE FOR SIDEWALKS and END ANCHORS<br>(Concrete for sidewalks that are part of a bridge deck or other structure shall be tested as concrete for structures) | *P-D   |                |                      |   |  | (b) Initial slump and air content test shall be made on batches at start of daily concrete operations and in accordance with required frequency thereafter.  |
|   | PP   | Cylinder       | project              | each 75 cy (60 m <sup>3</sup> ); See remarks.   |  | Samples used to fabricate test specimens shall be obtained in accordance with AASHTO T 141 unless an alternative procedure has been approved by the Engineer. Submit Form MAT-308 for compressive strength. (Minimum of 4 cylinders per set).                                  |
| CONCRETE FOR STRUCTURES:<br>Bar Reinforcement:<br>Deformed Uncoated or Epoxy Coated (All sizes)   | PP   | 5 ft.          | Project              | 1/size/manufacturer/ each 200 tons (180t)   |  | Submit sample for test and Certified Test Report for coated bars and epoxy powder with request for test. (See Note 5 - 3 days).  |
| Cement (Portland) — Bulk<br>Concrete, Compressive Strength Cylinders  | CL<br>PP   | Cylinder       | project              | each 75 cy ; (60 m <sup>3</sup> ) min of one set each day. See remarks.                         |  | See: CEMENT (PORTLAND) - Bulk<br>Samples used to fabricate test specimens shall be obtained in accordance with AASHTO T 141 unless an alternative procedure has been approved by the Engineer. Submit Form MAT-308 for compressive strength. (Minimum of 4 cylinders per set). |
| Concrete Placement  | *P-D   |                |                      |   |  | 1 per 50 sets of cyls. with minimum 2 per year per project. *Assurance test & molding of cylinders to be witnessed or performed by DMT personnel<br>See: CONCRETE FOR STRUCTURES PLACEMENT   |
| Curing  |  |                |                      | see remarks   |  | See: CURING MATERIALS  |
| Joint Sealer (Structural Concrete)  | PP   | *              | project              | 1/shipment  |  | *See Special Provisions.   |
| Sand  | P-D  | 25 lbs. (12kg) | concrete batch plant | Bi-weekly as matl. Req.   | Every 10 tests as matl. is required. (CP)                          | Submit request for test.   |

| Material  | Sampled By | Sample Size     | Sampling Location    | Frequency for Acceptance   | Frequency for Ind. Assurance                                       | Remarks   |
|---|------------|-----------------|----------------------|--|--|---|
| CONCRETE FOR STRUCTURES: (Cont)<br>Stone  | P-D        | 50 lbs. (25kg)  | concrete batch plant | Bi-weekly as matl. Req.  | Every 10 tests as matl. is required. (CP)                          | Submit request for test. If reclaimed see Note 8 for additional requirements.   |
| Water   | DL         | 1 qt.           | concrete batch plant | 1/each source supply   |  | Tested during annual plant inspection. Submit request for test yearly.  |
| CONCRETE FOR STRUCTURES PLACEMENT:<br>Slump test, Air Content<br>See remarks (a), (b) | PP         | as needed       | project              | Each 50 cy. (40 m <sup>3</sup> ) w/ min. 1 each pour per class concrete. | 1 per 50 sets of cylinders/with a min. of two per yr. per project. | (a) Frequency of testing may be increased at the discretion of the Engineer.  |
|   | *P-D       | as needed       | project              |  |  | b) Initial slump and air content test shall be made on batches at start of daily concrete operations and in accordance with required frequency thereafter.  |
| CURBING:<br>*Concrete Curbing   | PP         | see remarks     |                      |  |  | *See: CONCRETE FOR STRUCTURES   |
| Precast Concrete Curbing  | PP         | see remarks     | project              | 1/shipment   |  | Submit request for test & MAT-314 (PC-1). (See Note 4A).  |
| Granite Slope Curbing, Granite Curbing & Granite Stone Curbing for Bridge             | PP         | see remarks     | project              | 1/shipment to project  |  | Submit request for test with signed field inspection statement indicating conformance to standard specifications. Submit sample if requested by DMT. Submit sample and request for test. (See Note 5 - 3 days). |
| #Metal Anchors - Curbing  | PP         | 1 each          | project              | 1/shipment   |  |   |
| Stone Curbing   | PP         | see remarks     | project              | 1/ shipment  |  | Submit request for test with signed field inspection statement indicating conformance to standard specifications. Submit sample if requested by DMT.  |
| CURING MATERIALS:<br>Liquid Membrane-Forming Compound                                 | PP         | 1 qt. (1 L)     | project              | 1/batch  |  | Submit request for test with batch number.  |
| Polyethylene Sheeting   | PP         | see remarks     | project              | 1/shipment   |  | No testing required/Field personnel must verify compliance to specification.  |
| DAMPPROOFING:<br>Primer and/or Seal Coat  | PP         | *2 qts. (2 L)   | project              | each batch or lot  |  | *Submit request for test with a Materials Certificate unless DMT requests a sample.   |
| DELINEATOR:   | PP         | see remarks     | project              | 1/project  |  | Submit request and request for test with a Materials Certificate.   |
| Steel Post  | PP         | 1 each shipment | project              | 1/project  |  | Submit sample and request for test. (See Note 5 - 3 days).  |
| Other Post  | PP         | 1 each shipment | project              | 1/project  |  | Submit request for test with a Materials Certificate.   |

| Material                                     | Sampled By | Sample Size        | Sampling Location | Frequency for Acceptance  | Frequency for Ind. Assurance            | Remarks  |
|--|------------|--------------------|-------------------|---|---|--|
| EARTH EMBANKMENT:<br>Laboratory Density test | PP         | 80 lbs. (40 kg)    | project           | each soil type & each 50,000 cy* (38,000m <sup>3</sup> )            |   | Submit sample and request for density test. *Density test is for information only - not acceptance.  |
| Field Density test                           | PP         |                    | project           | each soil type & each 5,000 cy. (3800m <sup>3</sup> )               |   |  |
|  | *P-C       |                    |                   |   | each 50,000 cy (38,000 m <sup>3</sup> ) | *Assurance test to be witnessed or performed by DMT personnel.   |
| ELASTOMERIC COMPRESSION SEAL:                | PP         | see remarks        | project           | each size/ length/shpmt.  |   | Submit request for test with a Materials Certificate.  |
| ELASTOMERIC EXPANSION DEVICE:                | *PP        |                    |                   |   |   | *See Special Provisions.   |
| EPOXY BONDING COMPOUND:                      | PP         | see remarks        | project           | 1/shipment w/required certification                                 |   | Submit request for test.   |
| EPOXY PAVEMENT MARKINGS:                     | PP         | 1 qt. (1L)         | project           | each batch  |   | Submit sample & all certification required by Special Provisions with request for test.  |
| EROSION CONTROL MATERIAL:                    | AL         | see remarks        | project           | each type or brand  |   | Submit request for test. Refer to approved products list, under erosion control matting.   |
| FERTILIZER:                                  | PP         | see remarks        | project           | 1/shipment  |   | Submit request for test with required affidavit.   |
| FREE-DRAINING MATERIAL:                      |            |                    |                   |   |   |  |
| Gradation                                    | PP         | 80 lbs.(40kg)      | project           | each type and each 6000 cy (4500m <sup>2</sup> )                    |   | Submit sample and request for test. If reclaimed See note 7 for additional requirements.   |
| Lab Density Test                             | PP         | 80 lbs.(40kg)      | project           | each soil type and each 30,000 cy. (23,000m <sup>3</sup> )          |   | Submit sample and request for test. * Density test is for information only not acceptance. Separate requests required for Gradation and density. |
| Field Density Test                           | PP         |                    | project           | each soil type and each 3,000 cy. (2300m <sup>3</sup> )             |   |  |
| GEOTEXTILE:                                  | AL         | see remarks        | project           | each type or brand  |   | Submit request for test. Refer to approved products list, under geotextile.  |
| GLASS SPHERES FOR REFLECTANCE:               | *DL        | original container | project           | 1 each batch  |   | *Submit request for test with batch number unless sample is requested by DMT.  |
| GRANULAR FILL: — Gradation                   | PP         | 80 lbs.(40kg)      | project           | each new source & each 5000 cy. for gradation.(4500m <sup>3</sup> ) |   | Submit sample and request for test. If reclaimed see Note 7 for additional requirements.   |
| #GROUT (NONSHRINK):                          | PP         | see remarks        | project           | 1/ shipment   |   | Submit request for test and Certified Test Report unless otherwise directed. (See Note 5 - 7 days).  |

| Material   | Sampled By | Sample Size                 | Sampling Location | Frequency for Acceptance  | Frequency for Ind. Assurance  | Remarks   |
|--|------------|-----------------------------|-------------------|---|---|---|
| HANDHOLE:<br>Cast-in-place                           | *PP        |                             |                   |   |   | *See :CONCRETE FOR STRUCTURES   |
| Precast  | PP         | see remarks                 | project           | 1/shipment  |   | Submit request for test with a MAT-314 (PC-1). (See Note 4 (a)).                |
| Plastic  | PP         | see remarks                 | project           | 1/shipment  |   | Submit request for test with a Materials Certificate unless otherwise directed. |
| HANDHOLE COVERS:                                     | CL         |                             |                   | shipment  |   | Inspected by DMT at manufacturer.   |
| HOT MIX ASPHALT MIXTURES:<br>Gradation – All Classes | P-C        | see remarks                 | batch/drum plants | gradation: Min. 3/day for 300 tons or more/day, or based on plant performance and tonnage. (3 per day for 275 t ) | Minimum of one per inspector per month & one per plant per month for plants producing over 4,000 tons/month (3600t) | Advise Division of Materials Testing the proceeding workday.                    |
| Marshall Molds Class 1                               | P-C        | 1250 gms (1250 gms)         | batch/drum plants | Minimum 1 mold 3 times per day for projects using 300 tons or more on any given day (275 t)                       | Minimum of one per inspector per month & one per plant per month for plants producing over 4,000 tons/month (3600t) |   |
| Other Classes (& C1 1 under 300 tons/day)            | P-C        | 1250 gms ea. Mold (1250gms) | batch/drum plants | Minimum 1 set daily   |   |   |

| Material   | Sampled By     | Sample Size       | Sampling Location | Frequency for Acceptance                                 | Frequency for Ind. Assurance   | Remarks   |
|--|----------------|-------------------|-------------------|--|--|---|
| Hot Mix Asphalt (continued)<br>Hot Mix Asphalt Density<br>Classes 1, 2, and 4                          | PP<br><br>*P-C | lot               | project           | See Standard Specifications Section 4.06 Tables 4 and 5. | *1 test per 20,000 tons (18,000 t) or 1 per, project per year for projects with 1,000 to 20,000 tons per year. (900 to 18,000 t) | Advise DMT in advance for scheduling (assurance test to be witnessed or performed by DMT personnel).<br><br>*See Note 9   |
| Superpave Mixtures*<br>* See contract specific special provisions.                                     |                |                   |                   |  |  |   |
| Tack Coat  |                |                   |                   |  |  | See: TACK COAT  |
| <b>ILLUMINATION (HIGHWAY):</b>   |                |                   |                   |  |  |   |
| # Anchor Bolts: Light Standard Base, Pedestal & Controller Foundation, Span Pole & Mast Arm Foundation | PP             | 1 bolt w/hardware | project           | 1/size/heat #/shipment                                   |  | Submit Request for Test with a sample, Certified Test Report, and Materials Certificate. (See Note 5, 3 days)   |
| Ballast:<br>Mercury Vapor Lamp<br>Sign Luminaire<br>Underbridge Luminaire                              | PP             | See remarks       | project           | 1/shipment   |  | Submit Request for Test with a Materials Certificate. (See Note 3)  |
| Bare Copper Grounding Conductor  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate.   |
| Cast-Iron Junction Box   | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate to include identification for threaded hubs & bosses. For surface mounted boxes, include stainless steel cap screws. (See Note 3). |
| Ground Rod   | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate.   |
| Light Standards  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with Certified Test Reports for base, shaft, bracket arm, hardware, galvanizing and deflection test.  |
| Light Standard Foundation (Precast)  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with MAT 314 (PC-1). (See Note 4(a)).   |
| Luminaire: Mercury Vapor, Underbridge, Sign  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate. (See Note 3).   |
| Navigation Lights  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate. (See Note 3).   |
| Nonmetallic Sheathed Cable   | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate.   |
| Pedestals (Aluminum or Steel)  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate.   |
| Photoelectric Control  | PP             | see remarks       | project           | 1/shipment   |  | Submit request for test with a Materials Certificate.   |

| Material   | Sampled By | Sample Size                    | Sampling Location | Frequency for Acceptance                | Frequency for Ind. Assurance | Remarks  |
|--|------------|--------------------------------|-------------------|---|------------------------------|--|
| ILLUMINATION (HIGHWAY): (cont)<br>Rigid Metal Conduit          | PP         | see remarks                    | project           | 1/shipment                              |                              | Submit request for test with a Materials Certificate. (See Note 3). For Rigid Metal Conduit in Structure, identification is also necessary for fittings, expansion fittings, outlet boxes & concrete conduit hanger inserts. |
| Rock Anchors   | PP         | 1 anchor assembly              | project           | 1/size/shipment                         |                              | Submit sample and request for test.  |
| Service Entrance & Cabinet                                     | PP         | see remarks                    | project           | 1/shipment                              |                              | Submit request for test with a Materials Certificate. (See Note 3).  |
| Single Conductor in Conduit                                    | PP         | see remarks                    | project           | 1/shipment                              |                              | Submit request for test with a Materials Certificate.  |
| INERTIAL BARRIER MODULES:                                      | PP         | see remarks                    | project           | 1/shipment                              |                              | Submit request for test with verification of product identification.   |
| Salt for Modules   | PP         | 25 lbs. (12kg)                 | project           | 1/shipment                              |                              | Submit sample and request for test. Do <u>not</u> combine salt and sand samples.   |
| Sand for Modules   | PP         | 25 lbs. (12kg)                 | project           | 1/shipment                              |                              | Submit sample and request for test.  |
| #JOINT FILLER: (Preformed)                                     | PP         | 1 sq. ft. (0.1m <sup>3</sup> ) | project           | 1/size/shipment                         |                              | Submit request for test with a material certificate unless Laboratory requests a sample. (See Note 5-2 days)   |
| JOINT SEALER:<br>Concrete and Bituminous Pavement (Hot Poured) | PP         | see remarks                    | project           | 1/batch                                 |                              | Submit request indicating Batch No. and Certified Test Report. Submit sample if requested by DMT.  |
| Structural Concrete (Caulked)                                  | *PP        | see remarks                    | project           |   |                              | *See Special Provisions.   |
| LONGITUDINAL JOINT SUPPORT                                     | PP         | unit                           | project           | 6 unit/mile of pavement<br>(4 units/km) |                              | Submit sample and request for test.  |
| #LONGITUDINAL JOINT SUPPORT BARS:                              | PP         | 30 in.(760 mm)                 | project           | 6 unit/mile of pavement<br>(4 units/km) |                              | Submit sample and request for test. (See Note 5 - 3 Days).   |
| MEMBRANE WATERPROOFING (HOT SYSTEM):<br>Fabric                 | PP         | see remarks                    | project           | 1/shipment                              |                              | Submit request for test with a Materials Certificate unless Laboratory requests a sample.  |
| Asphalt Primer   | PP         | see remarks                    | project           | each batch                              |                              | Submit request for test with a Materials Certificate unless Laboratory requests a sample.  |
| Waterproofing Asphalt  | PP         | see remarks                    | project           | each batch                              |                              | Submit request or test with a Materials Certificate unless Laboratory requests a sample.   |
| Asphalt Flashing Cement  | PP         | see remarks                    | project           | each batch                              |                              | Submit request for test with a Materials Certificate unless Laboratory requests a sample.  |
| MEMBRANE WATERPROOFING SYSTEM:                                 | PP         | see remarks                    | project           | 1/shipment                              |                              | *See Special Provisions  |

| Material   | Sampled By | Sample Size | Sampling Location | Frequency for Acceptance              | Frequency for Ind. Assurance | Remarks   |
|--|------------|-------------|-------------------|---------------------------------------|------------------------------|---|
| METAL BEAM RAIL:<br>#Backing Plate                       | PP         | 1 unit      | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| Miscellaneous Hardware                                   | PP         | 1 each kind | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| Rail Element, Rub Rail & Terminal Sections               | PP         | see remarks | project           | 1/shipment                            |                              | Submit request for test w/following data: manufacturer's name, identification no., thickness type, coating class; AASHTO Spec. M180. Submit sample if requested by DMT. |
| Offset Bracket<br>Steel                                  | PP         | see remarks | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| Wood   | PP         | see remarks | project           | 1/shipment                            |                              | Submit Material Certificate and certificate of treatment with request for test.   |
| Plastic  | PP         | see remarks | project           | 1/shipment                            |                              | Submit Material Certificate and Certified Test Report with request for test. Must have FHWA approval.   |
| Backup Channel   | P-D        | see remarks | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| Steel Posts  | PP         | 1 each type | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| METAL BEAM RAIL ANCHORAGE:<br>#Anchor Rods & Accessories | PP         | 1 each type | project           | 1/shipment                            |                              | Submit request for test with Material Certificate.  |
| Concrete Anchorages (Precast)                            | P-C        | see remarks | producer          | each type shipment                    |                              | Notify DMT of source prior to fabrication. Submit request for test for completed item with MAT-314 (PC-1).<br>*See: CONCRETE FOR STRUCTURES Concrete Placement          |
| *Concrete Anchorages (Cast in Place)                     |            |             |                   |                                       |                              |   |
| Connector Bolts & Plates                                 | PP         | 1 each      | project           | 1/project                             |                              | Submit request for test with Material Certificate.  |
| Hardware   | PP         | 1 each      | project           | 1/type/project                        |                              | Submit request for test with Material Certificate.  |
| #Rebars for Anchors                                      | PP         | 5 ft.       | project           | 1/size/manufacturer/<br>each 200 tons |                              | (See Note 5 - 3 days). See: BAR REINFORCEMENT.  |
| METAL BIN-TYPE RETAINING WALL:                           | P-D        | see remarks | project           | each unit                             |                              | Submit request for test to District Lab. For Field Inspection. Also submit random sample of any wall unit & hardware from each shipment if requested by DMT.            |
| METAL BRIDGE RAIL:                                       | P-C        | see remarks | producer          | each type/ project                    |                              | Notify Lab. of source prior to fabrication. Submit request for test for completed item.   |
| Preset Anchorage   | PP         | see remarks | project           | 1/shipment                            |                              | Submit request for test with Materials Certificate.   |
| MULCH:<br>Fiber  | PP         | 1 gal. (4L) | project           | 1/source                              |                              | Submit sample and request for test in moisture-proof container.   |
| Hay  | PP         | see remarks | project           | 1/shipment                            |                              | Submit request for test with signed field inspection statement indicating conformance to Specifications.  |

| Material  | Sampled By | Sample Size                                 | Sampling Location | Frequency for Acceptance  | Frequency for Ind. Assurance | Remarks  |
|---|------------|---|-------------------|---|------------------------------|--|
| MULCH: (cont)<br>Wood Chip  | PP         | see remarks                                 | project           | 1/each new source   |                              | Submit request for test with signed field inspection statement indicating conformance to Specifications.                                 |
| NAILS:  | PP         | 6 each                                      | project           | 1/shipment  |                              | Submit sample and request for test.  |
| OBJECT MARKERS:<br>Aluminum Sign Blanks,<br>Reflective Sheeting, Silk Screening | PP         | see remarks                                 | project           | 1/shipment  |                              | Submit request for test with a Materials Certificate.  |
| Steel Posts   | PP         | see remarks                                 | project           | 1/project   |                              | Submit sample and request for test.  |
| PAINT:<br>Bridge Paints (Primers & Finish coat)                                 | PP         | see remarks                                 | project           | 1/batch   |                              | Submit request for test with a Certified Test Report.  |
| Special Coatings (Paints for Special work)                                      | PP         | see remarks                                 | project           | 1/batch   |                              | Submit request for test with a Certified Test Report.  |
| Traffic Paints  | PP         | see remarks                                 | project           | 1/batch   |                              | Call DMT to confirm batch numbers prior to request for test submission.  |
| Temporary Traffic Paint   | PP         | see remarks                                 | project           | 1/shipment  |                              | Submit request for test with sample or Certified Test report.  |
| PARTIAL AND FULL-DEPTH PATCH :  |            |   |                   |   |                              |  |
| Deformed Uncoated or Epoxy Coated Rebar (All Sizes)                             | PP         | 5 ft..(1.5 m)                               | project           | 1/size/manufacturer/<br>each 200 tons                                       |                              | Submit sample and request for test with Certified Test Report for coated bars.   |
| #Cement (Gypsum-Portland)   | PP         | 1 bag                                       | project           | 1/project/brand   |                              | Submit sample and request for test, unless Special Provisions call for certification. (See Note 5 - 7 Days).                             |
| Compressive Strength Cylinders  | PP         | 1 set of four<br>6"x12" molded<br>cylinders | project           | each 75 cy; minimum<br>one set each day. See<br>remarks                     |                              | Submit cylinders to DMT for test. Contact to arrange for testing outside of normal hours. CYLINDERS MUST BE STRIPPED PRIOR TO SUBMITTAL. |
| Epoxy Bonding Compound  | PP         | see remarks                                 | project           | 1/shipment  |                              | Submit request for test with required certification.   |
| Epoxy Resin   | PP         | see remarks                                 | project           | 1/shipment  |                              | Submit request for test with a Materials Certificate.  |
| Sand  | PP         | 25 lbs. (12kg)                              | project           | biweekly as patch<br>being placed   |                              | Submit sample and request for test.  |
| Stone   | PP         | 50 lbs.                                     | project           | biweekly as patch<br>being placed   |                              | Submit sample and request for test. If reclaimed see Note 8.   |
| Water   | PP         | 1 qt. (1L)                                  | project           | 1/source/project  |                              | Submit sample and request for test.  |
| PEAT:   | PP         | 1 bale                                      | project           | 1/shipment  |                              | Submit sample and request for test.  |
| PERVIOUS STRUCTURAL BACKFILL:<br>Gradation                                      | PP         | 80 lbs. (40kg)                              | project           | gradation test: each<br>new source & each<br>5000 cy. (3800m <sup>3</sup> ) |                              | Submit sample and request for test. If reclaimed see note 7 for additional requirements.   |

| Material   | Sampled By | Sample Size     | Sampling Location | Frequency for Acceptance  | Frequency for Ind. Assurance | Remarks  |
|--|------------|-----------------|-------------------|---|------------------------------|--|
| PERVIOUS STRUCTURAL BACKFILL: (cont)<br>Laboratory Density test  | PP         | 80 lbs. (40 kg) | project           | Lab. density test: each new source & each 20,000 cy.* (15,000m <sup>3</sup> ) |                              | Submit sample and request for test. *Lab. density test is for information only - not acceptance. Separate requests required for gradation and lab. density.  |
| Field Density test   | PP         |                 | project           | field density test: each 5 ft. (1.5m) vertical; 3 per structure, minimum.     |                              |  |
| PENETRATING SEALER PROTECTIVE COMPOUND   | AL         | see remarks     | project           | each source   |                              | Submit request for test. Refer to approved products list.  |
| PILES:   |            |                 |                   |   |                              |  |
| *Cast-in-Place Piles   | *PP        |                 | project           |   |                              | *See: CONCRETE FOR STRUCTURES  |
| Cast-in-Place Pile Shells  | P-D        | see remarks     | project           | 1/shipment  |                              | Submit request for test to appropriate District Laboratory for field inspection of each shipment. Submit sample and request for test.  |
| Cast-in-Place Reinforcement  | PP         | 5 ft. (1.5m)    | project           | 1/size/manufacturer/<br>each 200 tons(180t)                                   |                              | Submit request for test with Materials Certificate.  |
| Pile Point Reinforcement   | PP         | see remarks     | project           | 1/size/shipment   |                              | Submit sample and request for test.  |
| Pile Splice Plates or Prefabricated Pile Splice  | PP         | 1 each          | project           | 1/size/shipment   |                              | Notify Lab of source prior to fabrication. Submit request for test of completed item.  |
| Precast Concrete Piles   | PP         | see remarks     | project           | each batch  |                              | Notify DMT of source prior to fabrication. Submit request for test identifying completed item.   |
| Prestressed Concrete Piles   | PP         | see remarks     | project           | each batch  |                              | Notify Central lab prior to sampling. Submit request for test, Materials Certificate, and Certified Test Report with sample.   |
| Steel Sheet Piling, Steel Piles  | *PP        | 2 ft. min.      | project           |   |                              | Submit request for test. Indicate species, dimensions & certificate of treatment, if applicable, with a Materials Certificate from supplier.   |
| Timber Piles   | PP         | see remarks     | project           | 1/shipment  |                              | Submit request for test with Materials Certificate from supplier.  |
| Temporary Piling (Steel and wood)  | PP         | see remarks     | project           | 1/type  |                              |  |
| PIPE:  |            |                 |                   |   |                              |  |
| Cast Iron – Culvert  | PP         | see remarks     | project           | 1/size/shipment   |                              | Submit request for test with a Materials Certificate.  |
| Cast Iron – Sanitary or Water  | *PP        | see remarks     | project           |   |                              | *See Special Provisions.   |
| Coated Corrugated or Helical Rib Culvert Pipe, Underdrain, Arch, Culvert End, Elbows, Tees, & Slotted Pipe | P-D        | see remarks     | project           | each size/shipment  |                              | Submit request for test with manufacturers and/or fabricators Certified Test Reports and material certifications, and contact appropriate District Laboratory for field inspection of each shipment. |

| Material   | Sampled By | Sample Size    | Sampling Location | Frequency for Acceptance     | Frequency for Ind. Assurance | Remarks  |
|--|------------|----------------|-------------------|------------------------------|------------------------------|--|
| PIPE: (cont)   |            |                |                   |                              |                              |  |
| Corrugated or Helical Rib Aluminium Alloy Culvert Pipe, Underdrain, Arch, Culvert End, Elbows and Tees | P-D        | see remarks    | project           | each size/shipment           |                              | Submit request for test with manufacturer's and/or fabricators Certified Test Reports and Materials Certifications, and contact appropriate District Laboratory for field inspection of each shipment. |
| Corrugated Structural Plate Pipe   | P-D        | see remarks    | project           | 1/shipment                   |                              | Submit request for test with manufacturers and/or fabricators Certified Test Reports and Materials Certifications, and contact appropriate District Laboratory for field inspection of each shipment.  |
| Copper Pipe  | PP         | see remarks    | project           | 1/size/shipment              |                              | Submit request for test and Materials Certificate.   |
| Ductile Iron – Sanitary or Water   | PP         | see remarks    | project           | 1/size/shipment              |                              | Submit request for test and Materials Certificate.   |
| Fiberglass   | PP         | see remarks    | project           |                              |                              | *See Special Provisions.   |
| Perforated & Plain Concrete Drain Pipe   | PP         | see remarks    | project           | each size/shipment           |                              | Submit request for test with a MAT-314 (PC-1). See Note 4(a).  |
| Polyethylene Corrugated Tubing   | PP         | see remarks    | project           | 1/shipment                   |                              | Submit request for test with a Materials Certificate unless DMT requests a sample.   |
| Polyethylene Water Pipe  | PP         | see remarks    |                   |                              |                              | See Special Provisions.  |
| Polyvinyl Chloride Pipe  | PP         | see remarks    | project           | 1/size/shipment              |                              | Submit request for test with a Material Certificate..  |
| Reinforced Concrete, Elliptical, Slotted, Culvert Ends, Ditch Liners                                   | PP         | see remarks    | project           | each size/shipment           |                              | Submit request for test with a MAT-314 (PC-1). See Note 4(a).  |
| Steel Pipe Sleeve  | PP         | see remarks    | project           | 1/shipment                   |                              | See Special Provisions, regarding method of test.  |
| PIPE INSTALLATION MATERIALS:   |            |                |                   |                              |                              |  |
| Gaskets:   |            |                |                   |                              |                              |  |
| Preformed Plastic  | PP         | see remarks    | project           | 1/size/shipment              |                              | Submit request for test with a Materials Certificate.  |
| Rubber O-Ring  | PP         | see remarks    | project           | 1/size/shipment              |                              | Submit request for test with a Materials Certificate.  |
| Pipe Joint Sealer:   |            |                |                   |                              |                              |  |
| Cold-Applied Bituminous Sealer   | PP         | see remarks    | project           | 1/batch                      |                              | Submit request for test indicating Batch No. Submit sample if requested by Laboratory  |
| Mortar :   |            |                |                   |                              |                              |  |
| Cement   | PP         | See remarks    | project           |                              |                              | Project personnel must verify that the cement bag is labeled AASHTO M-85 compliant. Do not submit request for test.  |
| Sand   | PP         | 25 lbs. (12kg) | project           | 1/50 cy. (38m <sup>3</sup> ) |                              | Submit sample and request for test.  |
| PLASTIC PAVEMENT MARKING:  |            |                |                   |                              |                              |  |
| Permanent  | PP         | see remarks    | project           | 1/shipment                   |                              | Submit request for test with Certified Test Report.  |

| Material  | Sampled By     | Sample Size              | Sampling Location      | Frequency for Acceptance  | Frequency for Ind. Assurance  | Remarks   |
|---|----------------|--------------------------|------------------------|---|---|---|
| PLASTIC PAVEMENT MARKING: (cont)<br>Temporary       | PP             | see remarks              | project                | 1/shipment  |   | Submit request for test with signed field inspection statement indicating conformance to Specifications.  |
| PRECAST CONCRETE BARRIER CURB:<br>New               | PP             | see remarks              | project                | 1/shipment  |   | See Note 4(a).  |
| Used (Temporary)                                    | PP             | see remarks              | project                | 1/shipment  |   | No testing required. Project personnel are responsible for determining acceptability for use on the project.  |
| PRECAST CONCRETE BOX CULVERT                        | PP             | see remarks              | project                | 1/shipment  |   | See note 4(b).  |
| PRECAST CONCRETE UNITS FOR DRAINAGE STRUCTURES      | PP             | see remarks              | project                | each type/shipment  |   | Submit request for test with MAT-314 (PC-1). See note 4(a)  |
| PRESTRESSED CONCRETE MEMBERS:                       | P-C            | see remarks              | manufacturer           | 1/shipment  |   | Notify DMT of source prior to fabrication. Submit request for test for completed item with Cast Date, D.O.T. Stencil if evident, (Note if none), Piecemark, Sequence, and Quantity. |
| PROCESSED AGGREGATE BASE:<br>Gradation              | PP<br><br>*P-D | 80 lbs. (40 kg)          | project                | each new source & each 5000 tons (4500t) for gradation              | <br><br>*each 30,000 tons, (18,000t) 1/project for gradation minimum. | Submit sample and request for test. If reclaimed see Note 7 for additional requirements.<br><br>Sampling of assurance test to be witnessed by DMT personnel.                        |
| Laboratory Density test                             | PP             | 80 lbs.                  | project                | each new source & each 20,000 tons (18,000t) for Lab. density test* |   | Submit sample and request for test. *Lab. Density test is for information only – not acceptance. Separate requests required for gradation and Lab. Density.                         |
| Field Density test                                  | PP<br><br>*P-C |                          | project<br><br>project | each soil type/each 3,000 tons (2700t)                              | <br><br>*1/30,000 tons (1/27000t) minimum 1/project                   |   |
| PROTECTIVE COMPOUND:                                | AL             | see remarks              | project                | each source   |   | Submit request for test. Refer to approved products list.   |
| #REINFORCING STEEL:<br>Bar-Mat Reinforcement        | PP             | 1 sy. (1m <sup>2</sup> ) | project                | 1/mile(1.6 km) /pavement  |   | Submit sample and request for test (See Note 5 - 3 days).   |
| Deformed Uncoated or Epoxy Coated Rebar (All sizes) | PP             | 5 ft. (1.5m)             | project                | 1/size/manufacturer/ each 200 tons(180t)                            |   | Submit samples, request for test, and Certified Test Report for coated bars and epoxy powder, as per Special Provisions.  |
| Welded Wire Steel Fabric: (Structures) & (Pavement) | PP             | 1 sy. (1m <sup>2</sup> ) | project                | 1/8000yd2 (6700m <sup>2</sup> )                                     |   | Submit samples and request for test.  |

| Material                                  | Sampled By | Sample Size    | Sampling Location | Frequency for Acceptance   | Frequency for Ind. Assurance          | Remarks  |
|---|------------|----------------|-------------------|--|---------------------------------------|--|
| #REINFORCING STEEL: (Cont)<br>(Sidewalk)  | PP         | see remarks    | project           | 1/supplier/project   |                                       | Submit request for test with signed field inspection statement indicating conformance to specifications.                 |
| RIPRAP:<br>Intermediate-Modified-Standard | PP         | see remarks    | project           | each type/shipment   |                                       | Submit request for test with signed field inspection statement indicating conformance to Standard Specifications M.12.02 |
| Special                                   | PP         | 50 lbs.(25 kg) | project           | 5000 cy (3800m <sup>3</sup> )  |                                       | Submit sample and request for test.  |
| ROLLED BANK GRAVEL SURFACE:               | PP         | 80 lbs. (40kg) | project           | each new source & each 5000 cy (3800m <sup>3</sup> ) min. 1/project. |                                       | Submit sample and request for test.  |
| ROLLED GRANULAR BASE:                     | PP         | 80 lbs. (40kg) | project           | each new source & each 5000 cy.(3800m <sup>3</sup> ) min. 1/project  |                                       | Submit sample and request for test. If reclaimed see Note 7 for additional requirements.                                 |
| SAND FOR:<br>Bituminous Cover             | PP         | 25 lbs. (12kg) | project           | each new source & each 2500 cy.(1900m <sup>3</sup> )                 | Every 10 tests, as matl. is required. | Submit sample and request for test.  |
| Concrete Pavement or Concrete Structures  | *P-D       | 25 lbs. (12kg) | batch plant       | bi-weekly as pavement is being placed.                               |                                       | *Submit request for test. (See Concrete Pavement or Concrete for Structures)   |
| Filter                                    | PP         | 25 lbs. (12kg) | project           | each new source & each 1000 cy. (765m <sup>3</sup> )                 |                                       | Submit sample and request for test.  |
| Mortar                                    | PP         | 25 lbs. (12kg) | project           | each new source, min. 1/project.                                     |                                       | Submit sample and request for test.  |
| Partial & Full-Depth Patch                | PP         | 25 lbs. (12kg) | project           | bi-weekly as patch being placed                                      |                                       | Submit sample and request for test.  |
| Trenching & Backfilling                   | PP         | 25 lbs. (12kg) | project           | each new source & each 2500 cy. . (1900m <sup>3</sup> )              |                                       | Submit sample and request for test.  |
| Underdrain                                | PP         | 25 lbs. (12kg) | project           | each new source & each 2500 cy. (1900m <sup>3</sup> )                |                                       | Submit sample and request for test.  |
| SEDIMENTATION CONTROL:<br>Hay Bales       | PP         | see remarks    | project           | each source  |                                       | Submit request for test with signed field inspection statement indicating conformance to specifications.                 |
| Silt Fence                                | PP         | see remarks    | project           | each type or brand   |                                       | See :GEOTEXTILE  |

| Material                            | Sampled By | Sample Size       | Sampling Location | Frequency for Acceptance                      | Frequency for Ind. Assurance | Remarks   |
|-------------------------------------|------------|-------------------|-------------------|---|------------------------------|---|
| SEED:                               | PP         | See remarks       | project           | 1/shipment                                    |                              | Submit request for test with required certification & original grass seed label from bag.                         |
| SHEAR CONNECTORS:                   | *PP/ AL    | 1 each size       | project           | 1/shipment                                    |                              | *If from approved source, submit MAT-100 w/sample and copy of in-plant control test report for material supplied. |
| SHOTCRETE:                          |            |                   |                   |   |                              |   |
| Fine Aggregate                      | PP         | 25 lbs. (12kg)    | project           | each new source & 500 cy (380m <sup>3</sup> ) |                              | Submit sample and request for test.   |
| Portland Cement - Bagged            | PP         | 1 bag             | project           | 1 each shipment                               |                              | Submit sample and request for test.   |
| Portland Cement - Bulk              | CL         |                   |                   |   |                              | See: CEMENT (PORTLAND) – Bulk   |
| Reinforcing Steel                   | PP         | see remarks       | project           | each shipment                                 |                              | See: REINFORCING STEEL for sample size.   |
| Water                               | PP         | 1 qt.             | project           | 1/source/project                              |                              | Submit sample and request for test.   |
| SIGNALS, TRAFFIC:                   |            |                   |                   |   |                              |   |
| #Anchor bolts for Span Pole (Steel) | PP         | 1 bolt w/hardware | project           | 1/sizeshipment/project                        |                              | Submit sample and request for test with a Materials Certificate and Certified Test Report. (See Note 5 – 3 Days)  |
| Control Cable                       | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate  |
| Controllers                         | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Detectors:                          |            |                   |                   |   |                              |   |
| Pressure-Sensitive Vehicle          | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Loop Vehicle                        |            |                   |                   |   |                              |   |
| Magnetic Vehicle                    |            |                   |                   |   |                              |   |
| Saw-Cut                             |            |                   |                   |   |                              |   |
| Mast Arm Assembly                   | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with Certified Test Reports for shaft, arm, shoe base, transformer base & hardware.       |
| #Messenger                          | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Pedestals                           | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Pedestrian Push-Button              | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Pedestrian Signal                   | PP         | see remarks       | project           | each shipment                                 |                              | Submit request for test with a Materials Certificate.   |
| Polyvinyl Chloride Conduit          | PP         | see remarks       | project           | 1/shipment                                    |                              | Submit request for test with a Materials Certificate.   |
| Precast Traffic Control Foundation  | PP         | see remarks       | project           | 1/shipment                                    |                              | Submit request for test with a MAT-314 (PC-1). (See Note 4(a)).   |

| Material  | Sampled By | Sample Size       | Sampling Location | Frequency for Acceptance                 | Frequency for Ind. Assurance | Remarks   |
|---|------------|-------------------|-------------------|--|------------------------------|---|
| SIGNALS, TRAFFIC: (Cont)  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Radio Receiver-Decoder  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Signals (Traffic)   | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Span Pole (Steel)   | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with Certified Test Reports (shaft, hardware & galvanizing).  |
| Span Pole (Wood):   | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with signed statement including field inspection data for dimensions, surface characteristics & identification in accordance with D.O.T. Standard Specification for item. |
| Span Pole (Wood) Anchors:<br>Anchor Plate                         | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Anchor Rod  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate  |
| Anchor Guy Strand Wire  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Guy Wire Protector  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Span Wire   | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| SIGNING:  |            |                   |                   |  |                              |   |
| Construction Signs & Posts  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Delineators (Reflectors)  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Metal Posts or Bridge Rail Mounting Brackets                      | PP         | 1/each w/hardware | project           | 1/shipment                               |                              | Submit sample and request for test with a Materials Certificate.  |
| Demountable Copy  | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test with a Materials Certificate.   |
| Foundation for Side-Mounted Sign Support (Class A Concrete)       |            | see remarks       |                   |  |                              | *See: CONCRETE FOR STRUCTURES   |
| #Bar Reinforcement: Deformed Uncoated or Epoxy Coated (All sizes) | PP         | 5 ft. (1.5m)      | project           | 1 size/manufacturer/each 200 tons (180t) |                              | Submit sample and request for test & Certified Test Report for coated bars and epoxy powder.  |
| #Metal Sign Posts   | PP         | 1/each w/hardware | project           | 1/size/project                           |                              | Submit sample and request for test. (See Note 5 – 3 days).  |
| Overhead Sign Supports:   | P-C        | see remarks       | producer          | each type                                |                              | Notify DMT of source prior to fabrication. Submit request for test for completed item.  |
| #Anchor Bolts   | PP         | see remarks       | project           | 1/size/heat #/each shipment              |                              | Submit sample and request for test, Certified Test Report and Materials Certificate. (See Note 5 – 3 days)  |
| #Nonshrink, Nonstaining Grout                                     | PP         | see remarks       | project           | 1/shipment                               |                              | Submit request for test and Certified Test Report unless otherwise directed. (See Note 5 - 7 days).   |

| Material                          | Sampled By | Sample Size    | Sampling Location | Frequency for Acceptance        | Frequency for Ind. Assurance | Remarks   |
|-----------------------------------|------------|----------------|-------------------|---------------------------------|------------------------------|---|
| SIGNING: (Cont)                   |            |                |                   |                                 |                              |   |
| Panel Bolt & Post Clip Assemblies | PP         | see remarks    | projects          | 1/shipment                      |                              | Submit request for test with a Certified Test Report unless directed otherwise.   |
| Reflective Sheeting               | PP         | see remarks    | project           | 1/shipment                      |                              | Submit request for test with a Certified Test Reports.  |
| Safety Signs & Accessories        | PP         | see remarks    | project           | 1/shipment                      |                              | Submit request for test with a Materials Certificate and Schedule A of project agreement.                                 |
| Sheet Aluminum Sign Face          | PP         | see remarks    | project           | 1/shipment                      |                              | Submit request for test with Certified Test Reports.  |
| Side-Mounted Sign Supports        | P-C        | see remarks    | producer          | each type                       |                              | Notify Lab. of source prior to fabrication. Submit request for test for completed item.                                   |
| Sign Panels (Extruded Aluminum)   | PP         | see remarks    | project           | 1/shipment                      |                              | Submit request for test with a Certified Test Reports.  |
| Stub Post                         | PP         | see remarks    | producer          | each type                       |                              | Notify Lab. of source prior to fabrication. Submit request for test for completed item.                                   |
| SLOPE PAVING:                     |            |                |                   |                                 |                              |   |
| Concrete                          |            | see remarks    |                   |                                 |                              | *See: CONCRETE FOR PAVEMENT   |
| RipRap                            | PP         | see remarks    | project           | 5000 cy( 3800m <sup>3</sup> )   |                              | Submit request for test with signed field inspection statement indicating conformance to Standard Specifications M.12.03. |
| Paver Blocks (see Blocks)         |            |                |                   |                                 |                              |   |
| SOD:                              | PP         | see remarks    | producer          | 1/shipment                      |                              | Submit request for test to DMT for inspection by Office of Design Landscape Personnel prior to delivery.                  |
| STONE FOR:                        |            |                |                   |                                 |                              |   |
| Masonry Facing                    | PP         | 1 each         | project           | 1/size/each shipment            |                              | Submit sample and request for test unless otherwise directed by Lab.  |
| Masonry Rubble                    | PP         | see remarks    | project           | 1/shipment                      |                              | Submit request for test with signed field inspection including results by project inspectors.                             |
| Noise Barriers                    | PP         | 50 lbs. (25kg) | project           | 5000 cy. (3800m <sup>3</sup> )  |                              | Submit sample and request for test.   |
| Partial & Full-Depth Patch        | PP         | 50 lbs. (25kg) | project           | bi-weekly as patch being placed |                              | Submit sample and request for test.   |
| Slope Protection                  | PP         | 50 lbs. (25kg) | project           | 1/5000 tons (4500t)             |                              | Submit sample and request for test.   |
| Underdrain                        | PP         | 50 lbs. (25kg) | project           | 1/2500 tons (2250t)             |                              | Submit sample and request for test.   |
| STRUCTURAL STEEL:                 | P-C        | see remarks    | source            |                                 |                              | Notify Lab. of source prior to fabrication. Submit request for test for completed item.                                   |
| STRUCTURAL STEEL SHAPES:          | P-C        | see remarks    | source            | 1 each type & size/ shipment    |                              | Notify DMT. of source prior to fabrication. Submit request for test for completed item.                                   |

| Material  | Sampled By  | Sample Size  | Sampling Location | Frequency for Acceptance   | Frequency for Ind. Assurance                                    | Remarks  |
|---|---|--------------|-------------------|--|---|--|
| <b>SUBBASE:</b>   |   |              |                   |  |   |  |
| Gradation   | PP  | 80 lbs.      | project           | each new Source & each 5000 cy (3800m <sup>3</sup> ) for gradation             | *each 50,000 cy, (38000m <sup>3</sup> )<br>1per project minimum | Submit sample and request for test. If reclaimed see Note 7 for additional requirements.   |
| Laboratory Density test   | PP  | 80 lbs.      | project           | each new source & each 20,000 cy (15,000m <sup>3</sup> ) for Lab density test* |   | Submit sample and request for test. * Lab. Density test is for information only – not acceptance. Separate requests required for gradation and Lab. Density.   |
| Field Density test  | PP<br>*P-C  |              | project           | each soil type each 3,000 cy (2300m <sup>3</sup> )                             | *1/30,000 cy. (23,000m <sup>3</sup> )<br>Minimum 1/ project     |  |
| SWISS HAMMER TEST:  | P-D   | see remarks  | project           |  |   | Submit request for test and notify District Lab. *Test for information only-not acceptance.  |
| TACK COAT:  | PP  | 2 qts.(2L)   | project           | 1/10,000 gal.(38kl)  |   | Submit sample and request for test.  |
| TEMPORARY ITEMS   | Temporary items that are not scheduled to be permanently incorporated into the work and are not safety-related will be accepted based on field inspection/evaluation by project personel. Therefore, project personnel should not submit a request for test to the DMT for these items. Temporary items that may be permanatly incorporated into the work or are safety related such as pavements and impact attenuators should have a request for test submitted following an acceptable field inspection/evaluation by project personel |              |                   |  |   |  |
| TEMPORARY PLASTIC PAVEMENT MARKING TAPE:                          | PP  | see remarks  | project           | each source  |   | Submit request for test with a signed field inspection statement indicating conformance to standard specification.   |
| THERMOPLASTIC PAVEMENT MARKING MATERIAL:                          | *PP   | see remarks  | project           | each batch   |   | *See Special Provisions.   |
| THREE-CABLE GUIDE RAIL:   |   |              |                   |  |   |  |
| Anchorage, Precast  | *PP   | see remarks  | project           | 1/shipment   |   | *Notify DMT of source prior to fabrication. Submit request for test for completed item with MAT-314 (PC-1).<br>*See: CONC. FOR STRUCTURES, CONCRETE PLACEMENT. |
| Anchorage, Cast-in-Place  | *PP   |              |                   |  |   |  |
| #Bar Reinforcement: Deformed Uncoated or Epoxy Coated (All Sizes) | PP  | 5 ft. (1.5m) | project           | 1/size/manufacturer/ each 200 tons (180 t)                                     |   | Submit sample and request for test with Certified Test Report for coated bars. (See Note 5 – 3 days).  |
| Fittings  | PP  | 1 each       | project           | 1 each type on project   |   | Submit request for test with Materials Certificate.  |
| Offset Brackets   | PP  | 1 each       | project           | 1/shipment   |   | Submit request for test with Materials Certificate.  |
| Single Cable Compensating Device                                  | PP  | 1 each       | project           | 1/shipment   |   | Submit request for test with Materials Certificate.  |
| #Steel Posts & Channel Anchors                                    | PP  | 1 each       | project           | 1 each size  |   | Submit request for test with Materials Certificate.  |
| Reflective Sheeting   | PP  | see remarks  |                   |  |   | Submit request for test with Materials Certificate.  |

| Material                                     | Sampled By | Sample Size    | Sampling Location | Frequency for Acceptance   | Frequency for Ind. Assurance | Remarks   |
|--|------------|----------------|-------------------|--|------------------------------|---|
| THREE-CABLE GUIDE RAIL: (cont)<br>#Wire Rope | PP         | See remarks    | project           | 1/shipment   |                              | Submit request for test with a Materials Certificate.   |
| TIMBER BARRIER:<br>Delineators               | PP         | 1 each         | project           | 1/project  |                              | Submit sample and request for test with a Materials Certificate.  |
| Hardware                                     | PP         | 1 each type    | project           | 1 each type/project  |                              | Submit sample and request for test.   |
| Timber                                       | PP         | see remarks    | project           | 1/project  |                              | Submit request for test indicating dimensions and species.  |
| TOPSOIL:<br>Seeding                          | PP         | 80 lbs. (40kg) | stockpile         | 1/1000 cy (765m <sup>3</sup> )<br>min. 1/project                         |                              | Submit sample and request for test.   |
| Planting                                     | PP         | 80 lbs. (40kg) | stockpile         | 1/1000 cy (765m <sup>3</sup> )<br>min. 1/project                         |                              | Submit sample and request for test.   |
| TRAFFIC-BOUND GRAVEL SURFACE:                | PP         | 80 lbs. (40kg) | project           | each new source &<br>each 2500 cy (1900m <sup>3</sup> )<br>for gradation |                              | Submit sample and request for test.   |
| TRAFFIC CONES:<br>Standard                   | PP         | see remarks    | project           | 1/shipment   |                              | Submit request for test with signed field inspection statement indicating conformance to specification. |
| 42 inch Traffic Cone                         | PP         | see remarks    | project           | 1/shipment   |                              | Submit request for test with a Materials Certificate and Certified Test Report.                         |
| TRAFFIC DRUMS:                               | PP         | see remarks    | project           | 1/shipment   |                              | Submit request for test with a Materials Certificate.   |
| UNSUITABLE MATERIAL:                         | PP         |                | project           |  |                              | *See Note 2.  |
| WALL FENCE:<br>(Stone & Farm)                | PP         | see remarks    | project           |  |                              | Submit request for test with signed statement including results of inspection by project inspector.     |
| WATER:<br>For Concrete                       | DL         | 1 qt. (1L)     | batch plant       | 1 each source of<br>supply yearly  |                              | Sampled during annual plant inspection.   |
| For Mortar                                   | PP         | 1 qt. (1L)     | project           | 1/source/project see<br>remarks  |                              | Submit sample and request for test if not from a potable water source.                                  |

| Material                    | Sampled By            | Sample Size  | Sampling Location | Frequency for Acceptance | Frequency for Ind. Assurance | Remarks   |
|-----------------------------|-----------------------|--------------|-------------------|--------------------------|------------------------------|---|
| WATERPROOFING FABRIC:       | PP                    | see remarks  | project           |                          |                              | See: MEMBRANE WATERPROOFING.  |
| #WELDER CERTIFICATE SAMPLES | *PC                   | as needed    | project           | as required              |                              | Notify DMT to schedule weld test.   |
| #WELDED WIRE STEEL FABRIC   | See Reinforcing Steel |              |                   |                          |                              |   |
| WELDING ELECTRODES:         | PP                    | 1 each       | project           | each size & lot          |                              | Submit sample and request for test with Certified Test Reports.   |
| WINDSOR PROBE TEST:         | P-D                   | see remarks  | project           |                          |                              | Submit request for test and notify District Lab. *Test for information only-not acceptance.                             |
| WIRE FENCE:                 |                       |              |                   |                          |                              |   |
| Steel Post & Braces         | PP                    | see remarks  | project           | each type, 1/shipment    |                              | Submit request for test with signed field inspection statement indicating conformance to specifications.                |
| Wood Post<br>Treated        | PP                    | see remarks  | project           | 1/shipment               |                              | Submit request for test with a Materials Certificate and certificate of treatment.                                      |
| Untreated                   | PP                    | see remarks  | project           | 1/shipment/project       |                              | Submit request for test with signed field inspection statement indicating conformance to specifications and dimensions. |
| Woven Wire Fencing          | PP                    | see remarks. | project           | 1/ shipment              |                              | Submit request for test with signed field inspection statement indicating conformance to specifications and dimensions. |
| WOOD POSTS:                 |                       |              |                   |                          |                              |   |
| Treated                     | PP                    | see remarks  | project           | 1/ shipment              |                              | Submit request for test with a Materials Certificate and certification of treatment.                                    |
| Untreated                   | PP                    | see remarks  | project           | 1/ shipment              |                              | Submit request for test with signed field inspection statement indicating conformance to specifications and dimensions. |

**REQUEST FOR TEST**

(302-06-0266)

MAT-100 REV 1/04

**STATE OF CONNECTICUT - DEPARTMENT OF TRANSPORTATION**

| Contract Number  |    | Fed Aid No. |    | CONTRACT NO.   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Sample No.   |    |             |    | SAMPLE NUMBER  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 9  | 10 | 11          | 12 | 13   | 14                        | 15                   | 16                            |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Kind of Material   |    |             |    | MATERIAL NUMBER  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 17   | 18 | 19          | 20 | 21   |                           |                      |                               |  |    | 22 | 23 | 24 | 25 | 26 |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Source of Supply   |    |             |    | VENDOR NO.   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Location   |    |             |    | DATE SAMPLED OR CAST   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 27   | 28 | 29          | 30 | 31   | 32                        |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sample Taken From  |    |             |    | LABORATORY TEST NO.  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 33   | 34 | 35          | 36 | 37   | 38                        | 39                   |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MAT-1 Completed by   |    | District    |    | ITEM NUMBER  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 40   | 41 | 42          | 43 | 44   | 45                        | 46                   | 47                            |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Date Sampled   |    | Phone #     |    | MATERIAL QTY REPRESENTED   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 48   | 49 | 50          | 51 | 52   | 53                        | 54                   |                               |  | 55 | 56 | 57 |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Using Agency   |    |             |    | UNIT OF MATERIAL   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Purpose  |    |             |    | TESTING UNIT CODE  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="11" style="background-color: #cccccc;">58</td> </tr> <tr> <td colspan="11"></td> </tr> </table>  |                           |                      |                               |  |    |    |    | 58 |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 58   |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #cccccc;">Item Number</th> <th style="background-color: #cccccc;">Item Quantity Represented</th> <th style="background-color: #cccccc;">Material Represented</th> <th style="background-color: #cccccc;">Additional Laboratory Numbers</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> |    |             |    | Item Number  | Item Quantity Represented | Material Represented | Additional Laboratory Numbers |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | USAGE CODE |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    | Item Number  | Item Quantity Represented | Material Represented | Additional Laboratory Numbers |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               | 59   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Unit of Material   |    |             |    | DATE RECEIVED  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 60   | 61 | 62          | 63 | 64   | 65                        |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Where Material Will be used  |    |             |    | DOT NUMBER   |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="6"></td><td style="background-color: #cccccc;">66</td><td style="background-color: #cccccc;">67</td><td style="background-color: #cccccc;">68</td> </tr> <tr> <td colspan="6"></td><td></td><td></td><td></td> </tr> </table>  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    | 66 | 67 | 68 |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           | 66                   | 67                            | 68   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D.O.T No.  |    |             |    | Batch No.  |                           |                      |                               | BATCH NO.  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 69   | 70 | 71          | 72 | 73   | 74                        | 75                   | 76                            | 77   | 78 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               |  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               | 79   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |    |             |    |  |                           |                      |                               | STATUS ASSIGNED  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |            |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

The MAT-100 must accompany all samples and documentation submitted to the Division of Materials Testing. The form can be pre-printed and handwritten or produced electronically through CMR/SiteManager. All samples other than PC concrete cylinders must have a MAT-100 attached or included so that the sample can be tracked by DMT personnel. Samples or documentation received without a MAT-100 will be returned to the project or discarded without any action by the DMT.

## MAT-101 REQUEST FOR TEST (ENVELOPE)

|  |  |
|--|--|
| FROM   | <p style="text-align: center;"><b>LABORATORY,</b><br/>BUREAU OF ENGINEERING &amp; HIGHWAY<br/>OPERATIONS<br/>280 WEST STREET</p> <p style="text-align: right;">ROCKY HILL<br/>CT 06067</p> |
| SAMPLE NO.   |  |
| REQUEST FOR TEST (MAT 100) INSIDE THIS TAG   |  |
| <p style="text-align: center;">STATE OF CONNECTICUT<br/>DEPARTMENT OF TRANSPORTATION<br/>BUREAU OF ENGINEERING &amp;<br/>HIGHWAY OPERATIONS<br/>SAMPLE SHIPPING TAG</p> <p>MAT- 101 REV 9/03</p> |  |

The MAT 101 should be used to secure a MAT-100 to a physical sample such as deformed steel bars and wire fabric. The inspector should use the string provided or tape to ensure the MAT-100 is not damaged or separated from the material sample.

## MAT-102 MATERIAL SAMPLE ID CARD

### FRONT

|   |
|---|
| <p>Connecticut Department of Transportation<br/>Bureau of Engineering &amp; Highway Operations</p> <p>Form No. MAT -102<br/>MATERIAL SAMPLE</p> |
| <p>DIVISION OF MATERIALS TESTING<br/>280 WEST STREET<br/>Rocky Hill, Connecticut 06067</p>  |
| <p>The MAT-102 should be used to identify sample material submitted to the laboratory such as fine or coarse aggregate.</p>                     |

### REVERSE

|                      |
|----------------------|
| KIND OF MATERIAL     |
| SOURCE OF SUPPLY     |
| LOCATION OF SOURCE   |
| SAMPLE TAKEN FROM    |
| SAMPLED BY           |
| DATE SAMPLED         |
| QUANTITY REPRESENTED |

# MAT-103 REPORT OF REJECTED MATERIAL

|  |                |  |                      |
|--|----------------|--|----------------------|
| <b>REPORT OF REJECTED MATERIAL</b><br>(302-06-0266)  |                |  | DATE _____           |
| <b>MAT-103 REV 6/04</b>  |                | <b>STATE OF CONNECTICUT - DEPARTMENT OF TRANSPORTATION</b> |                      |
| Project Number   | Material       | Lab No.  |                      |
| Source of Supply   | Sample No.     | Quantity Represented                                       | Reason for Rejection |
| Complete section 1 <i>OR</i> 2.  |                |  |                      |
| <b>1. ACTION TAKEN</b>   |                |  |                      |
| <b>New Sample</b>  |                | Sample No.   | Lab No.              |
| <b>Material Replaced</b>   |                | Sample No.   | Lab No.              |
| <b>Signatures</b>  |                |  |                      |
| Inspector _____  |                |  |                      |
| Project Engineer _____   |                |  |                      |
| District or Assistant District Engineer _____  |                |  |                      |
| Town Official/Title (municipal projects only) _____  |                |  |                      |
| <b>2. ACCEPTANCE OF REJECTED MATERIAL WITHOUT ACTION</b>   |                |  |                      |
| In accordance with ConnDOT Standard Specifications Section 1.06.02 or 1.06.04 the non-complying material is hereby accepted by the District. |                |  |                      |
| <b>Signatures</b>  |                |  |                      |
| Inspector _____  |                |  |                      |
| Project Engineer _____   |                |  |                      |
| District or Assistant District Engineer _____  |                |  |                      |
| Town Official/Title (municipal projects only) _____  |                |  |                      |
| <i>For acceptance by Section 1.06.02 , All the following criteria must be met.</i>   |                |  |                      |
| 1. Results of prior and subsequent series of tests of the material or materials from the same source or sources are found satisfactory.      |                |  |                      |
| 2. The incidence and degree of non-conformance with the Contract requirements are, in the Engineer's judgement, within reasonable limits.    |                |  |                      |
| 3. The Contractor, in the Engineer's judgement, had diligently exercised material controls consistent with good practices.                   |                |  |                      |
| 4. No adverse effect on the value or serviceability of the completed work could result.  |                |  |                      |
| <i>For acceptance by Section 1.06.04 , Any credits, allowances, warranties, or other conditions of acceptance must be described below.</i>   |                |  |                      |
|  |                |  |                      |
|  |                |  |                      |
|  |                |  |                      |
| Orig - Division of Materials Testing   | Copy -District | Copy - Project Records                                     |                      |

The Report of Rejected Material form serves the following purpose;

1. Identify the project and material that did not meet specification.
2. Report action taken (if any) **which only includes retesting** the material with an additional sample and achieving acceptable results or **removing and replacing** the deficient material with acceptable material. When such an action is taken, the MAT-103 provides the DMT with information on how rejected material was addressed. Signatures are required in this section to acknowledge the rejection and the action taken.
  - a. Portland Cement Concrete is accepted or rejected based on concrete cylinder test results at 28 days of age. Windsor probe or Swiss Hammer results are for information only and will not override the test cylinder results at 28 days regardless of when they are performed. The District must accept the PC concrete using the alternative acceptance criteria.
3. In the case where no action was taken, the District may formally accept the non-complying or deficient material in accordance with Sections 1.06.02 or 1.06.04. Signatures in this section are intended for formal acceptance of the non-complying or deficient material by the District. In the case where material is accepted by a third party such as a Town or Consulting Engineer, the District must formally concur with the same signatures.

## MAT-104 REPORT OF TEST MISCELLANEOUS MATERIAL

|  |   |                |                    |
|--|---|----------------|--------------------|
|  | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>BUREAU OF HIGHWAYS<br>REPORT OF TEST OF MISCELLANEOUS MATERIAL<br>MAT 104 Revised July 2003 | DATE           | PROJECT/SAMPLE NO. |
|  |   | LABORATORY NO. |                    |
|  |   |                |                    |
|  | RECOMMENDED FOR   | REMARKS        |                    |

The MAT-104 will be used by DMT personnel to report the results of testing on materials that are not otherwise covered by any specific reporting form.

METAL PIPE (Steel)

**Note: Attach Manufacturer's/Fabricator's Material Certifications**

|   |   |                |                    |
|---|---|----------------|--------------------|
| KIND OF MATERIAL                        | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of Metal Pipe<br>MAT 200 Revised - July 2003 | Date           | Project/Sample No. |
| SOURCE OF SUPPLY                        |   | Laboratory No. |                    |
| LOCATION OF SOURCE OF SUPPLY            |   |                |                    |
| SAMPLE TAKEN FROM                       | Nominal Size of Pipe (inches/mm): _____   |                |                    |
| LOCATION OF                             | Thickness of Steel (inches/mm): _____   |                |                    |
| SAMPLED BY                              | Type of Seam: _____   |                |                    |
| DATE SAMPLED                            | Thickness of Asphalt (inches/mm): _____   |                |                    |
| USING AGENCY                            | Paved Invert (inches/mm): _____   |                |                    |
| QUANTITY PRESENTED                      | Type of Coupling Bands: _____   |                |                    |
| PURPOSE FOR WHICH MATERIAL WILL BE USED | Thickness of Steel - Bands (inches/mm): _____   |                |                    |
|   | Width of Coupling Bands (inches/mm): _____  |                |                    |
| SAMPLE RECEIVED                         | Corrugation or Helical Rib Size (inches/mm): _____  |                |                    |
| DATE MATERIAL WILL BE USED              | NOTE: Aluminized Steel Pipe does not require asphalt coating or paved invert  |                |                    |
| WHERE MATERIAL WILL BE USED             | Recommended For   | Remarks        |                    |
| Director of Research<br>and Materials   |   |                |                    |

**ALUMINUM ALLOY CULVERT PIPE**  
**PERFORATED ALUMINUM ALLOY PIPE FOR UNDERDRAINS**

**Note: Attach Manufacturer's/Fabricator's Material Certifications**

|   |  |                |                    |
|---|--|----------------|--------------------|
| KIND OF MATERIAL                        | <p align="center"><b>State of Connecticut<br/>                 Department of Transportation<br/>                 Bureau of Engineering and Highways<br/>                 Report of Test of Aluminum Pipe<br/>                 MAT 201 Revised- July 2003</b></p> | Date           | Project/Sample No. |
| SOURCE OF SUPPLY                        |  | Laboratory No. |                    |
| LOCATION OF SOURCE OF SUPPLY            |  |                |                    |
| SAMPLE TAKEN FROM                       | Nominal Size of Pipe (inches/mm): _____  |                |                    |
| LOCATION OF                             | Thickness of Sheet (inches/mm): _____  |                |                    |
| SAMPLED BY                              | Type of Seam: _____  |                |                    |
| DATE SAMPLED                            | Number of Rows of Perforations: _____  |                |                    |
| USING AGENCY                            | Diameter of Perforations (inches/mm): _____  |                |                    |
| QUANTITY PRESENTED                      | Height of Uppermost Rows of Perforations Above Bottom of Invert (inches/mm): _____   |                |                    |
| PURPOSE FOR WHICH MATERIAL WILL BE USED | Chord Length of Unperforated Segments (inches/mm): _____   |                |                    |
| SAMPLE RECEIVED                         | Type of Coupling Bands: _____  |                |                    |
|   | Thickness of Sheet - Bands (inches/mm): _____  |                |                    |
| DATE MATERIAL WILL BE USED              | Recommended For  | Remarks        |                    |
| WHERE MATERIAL WILL BE USED             |  |                |                    |
| Director of Research and Materials      |  |                |                    |

**MAT-202**

**PERFORATED METAL PIPE (Steel)**

**Note: Attach Manufacturer's/Fabricator's Material Certifications**

|  |   |                 |                    |  |
|--|---|-----------------|--------------------|--|
| KIND OF MATERIAL                                 | <p align="center"><b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Perforated Metal Pipe<br/>MAT 202 Revised- July 2003</b></p>  | Date            | Project/Sample No. |  |
| SOURCE OF SUPPLY                                 |   | Laboratory No.  |                    |  |
| LOCATION OF SOURCE OF SUPPLY                     |   |                 |                    |  |
| SAMPLE TAKEN FROM                                | <p>Nominal Size of Pipe (inches/mm): _____</p> <p>Thickness of Steel (inches/mm): _____</p> <p>Type of Seam: _____</p> <p>Number of Rows of Perforations: _____</p> <p>Diameter of Perforations (inches/mm): _____</p> <p>Height of Uppermost Rows of Perforations Above bottom of Invert (inches/mm): _____</p> <p>Chord Length of Unperforated Segment (inches/mm): _____</p> <p>Type of Coupling Bands: _____</p> <p>Thickness of Steel - Bands (inches/mm): _____</p> <p>Width of Coupling Bands (inches/mm): _____</p> <p>Corrugation or Helical Rib Size (inches/mm): _____</p> |                 |                    |  |
| LOCATION OF                                      |   |                 |                    |  |
| SAMPLED BY                                       |   |                 |                    |  |
| DATE SAMPLED                                     |   |                 |                    |  |
| USING AGENCY                                     |   |                 |                    |  |
| QUANTITY PRESENTED                               |   |                 |                    |  |
| PURPOSE FOR WHICH MATERIAL WILL BE USED          |   |                 |                    |  |
| SAMPLE RECEIVED                                  |   |                 |                    |  |
| DATE MATERIAL WILL BE USED                       |   | Recommended For | Remarks            |  |
| WHERE MATERIAL WILL BE USED                      |   |                 |                    |  |
| <p><b>Director of Research and Materials</b></p> |   |                 |                    |  |

**CULVERT END**

**Note: Attach Manufacturer's/Fabricator's Material Certifications**

|  |   |                 |                    |  |
|--|---|-----------------|--------------------|--|
| KIND OF MATERIAL                                     | <p align="center"><b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Culvert End<br/>MAT 204 Revised- July 2003</b></p>  | Date            | Project/Sample No. |  |
| SOURCE OF SUPPLY                                     |   | Laboratory No.  |                    |  |
| LOCATION OF SOURCE OF SUPPLY                         |   |                 |                    |  |
| SAMPLE TAKEN FROM                                    | Steel ( )      Aluminized Steel ( )      Aluminum ( )   |                 |                    |  |
| LOCATION OF  | Nominal Size (inches/mm): _____<br>Thickness of Sheet (inches/mm): _____<br>Thickness of Asphalt (inches/mm): _____<br>Dimension "B" (inches/mm): _____<br>Dimension "H" (inches/mm): _____<br>Dimension "L" (inches/mm): _____<br>Dimension "W" (inches/mm): _____<br>Attachment System: _____<br>Edge Reinforcement: _____<br><br>Note: Aluminum/Aluminized Steel does not require asphalt coating. |                 |                    |  |
| SAMPLED BY   |   |                 |                    |  |
| DATE SAMPLED   |   |                 |                    |  |
| USING AGENCY   |   |                 |                    |  |
| QUANTITY PRESENTED                                   |   |                 |                    |  |
| PURPOSE FOR WHICH MATERIAL WILL BE USED              |   |                 |                    |  |
| SAMPLE RECEIVED                                      |   |                 |                    |  |
| DATE MATERIAL WILL BE USED                           |   | Recommended For | Remarks            |  |
| WHERE MATERIAL WILL BE USED                          |   |                 |                    |  |
| <p><b>Director of Research<br/>and Materials</b></p> |   |                 |                    |  |



# MAT-206

| LT               |  |    | SILT             |  |    |
|------------------|--|----|------------------|--|----|
| ORIGINAL MASS    |  | gm | ORIGINAL MASS    |  | gm |
| LESS WASHED MASS |  | gm | LESS WASHED MASS |  | gm |
| MASS OF SILT     |  | gm | MASS OF SILT     |  | gm |
| SILT             |  | %  | SILT             |  | %  |

|            | RETAINED MASS | IND.RETAINED % | PASSING % | RETAINED % |            | RETAINED MASS | IND.RETAINED % | PASSING % | RETAINED % |
|------------|---------------|----------------|-----------|------------|------------|---------------|----------------|-----------|------------|
| 5/8"       |               |                |           |            | 5/8"       |               |                |           |            |
| 16.0 mm    |               |                |           |            | 16.0 mm    |               |                |           |            |
| 1/2"       |               |                |           |            | 1/2"       |               |                |           |            |
| 12.5 mm    |               |                |           |            | 12.5 mm    |               |                |           |            |
| 3/8"       |               |                |           |            | 3/8"       |               |                |           |            |
| 9.5 mm     |               |                |           |            | 9.5 mm     |               |                |           |            |
| No. 4      |               |                |           |            | No. 4      |               |                |           |            |
| 4.75 mm    |               |                |           |            | 4.75 mm    |               |                |           |            |
| No. 8      |               |                |           |            | No. 8      |               |                |           |            |
| 2.36 mm    |               |                |           |            | 2.36 mm    |               |                |           |            |
| No. 16     |               |                |           |            | No. 16     |               |                |           |            |
| 1.18 mm    |               |                |           |            | 1.18 mm    |               |                |           |            |
| No. 30     |               |                |           |            | No. 30     |               |                |           |            |
| 600 μm     |               |                |           |            | 600 μm     |               |                |           |            |
| No. 50     |               |                |           |            | No. 50     |               |                |           |            |
| 300 μm     |               |                |           |            | 300 μm     |               |                |           |            |
| No. 100    |               |                |           |            | No. 100    |               |                |           |            |
| 150 μm     |               |                |           |            | 150 μm     |               |                |           |            |
| PAN        |               |                |           |            | PAN        |               |                |           |            |
| TOTAL MASS |               |                | F.M.      |            | TOTAL MASS |               |                | F.M.      |            |

|   |   |         |         |  |                        |        |
|---|---|---------|---------|--|------------------------|--------|
| KIND OF MATERIAL                        | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENGINEERING & HWY OPERATIONS<br>REPORT OF TEST of SAND – MAT 206 Rev 7-03 |         |         | DATE   | Project/Sample Numbers |        |
| SOURCE OF SUPPLY                        |   |         |         | LABORATORY NO.   |                        |        |
| LOCATION OF SOURCE OF SUPPLY            | PASSING SIEVE   | PERCENT | PERCENT | COLOR (GARDNER COLOR STANDARD)<br>UNDER #11 <input type="checkbox"/> OVER #11 <input type="checkbox"/> |                        |        |
| SAMPLE TAKEN FROM                       | 1/2"<br>12.5 mm   |         |         | COMPRESSIVE STRENGTH (MPa)   |                        |        |
| LOCATION OF                             | 3/8"<br>9.5 mm  |         |         |  | 7 day                  | 28 day |
| SAMPLED BY                              | No. 4<br>4.75 mm  |         |         | SAMPLE SAND  |                        |        |
| DATE SAMPLED                            | No. 8<br>2.36 mm  |         |         | OTTAWA SAND  |                        |        |
| USING AGENCY                            | No. 16<br>1.18 mm   |         |         | PERCENT OF OTTAWA  |                        |        |
| QUANTITY REPRESENTED                    | No. 30<br>600 μm  |         |         | RECOMMENDED FOR  |                        |        |
| PURPOSE FOR WHICH MATERIAL WILL BE USED | No. 50<br>300 μm  |         |         | REMARKS  |                        |        |
| DATE MATERIAL WILL BE USED              | No. 100<br>150 μm   |         |         |  |                        |        |
| WHERE MATERIAL WILL BE USED             | FINENESS MODULUS  |         |         |  |                        |        |
| SAMPLE RECEIVED                         | SILT %  |         |         |  |                        |        |
| Director of Research and Materials      |   |         |         |  |                        |        |

# MAT-207

## Non-cumulative RETAINED MASSES

| NO. 3             |  |  |  | NO. 6            |  |  |  | NO. 8             |  |  |  |  |  |
|-------------------|--|--|--|------------------|--|--|--|-------------------|--|--|--|--|--|
| 2 1/2"<br>63 mm   |  |  |  |                  |  |  |  |                   |  |  |  |  |  |
| 2"<br>50 mm       |  |  |  | 1"<br>25 mm      |  |  |  | 1/2"<br>12.5 mm   |  |  |  |  |  |
| 1 1/2"<br>37.5 mm |  |  |  | 3/4"<br>19 mm    |  |  |  | 3/8"<br>9.5 mm    |  |  |  |  |  |
| 1 1/4"<br>31.5 mm |  |  |  | 1/2"<br>12.5 mm  |  |  |  | No. 4<br>4.75 mm  |  |  |  |  |  |
| 1"<br>25 mm       |  |  |  | 3/8"<br>9.5 mm   |  |  |  | No. 8<br>2.36 mm  |  |  |  |  |  |
| 1/2"<br>12.5 mm   |  |  |  | No. 4<br>4.75 mm |  |  |  | No. 16<br>1.18 mm |  |  |  |  |  |
| PAN               |  |  |  | PAN              |  |  |  | PAN               |  |  |  |  |  |

| NO. 4             |  |  |  | NO. 67           |  |  |  |     |  |  |  |  |  |
|-------------------|--|--|--|------------------|--|--|--|-----|--|--|--|--|--|
| 2"<br>50 mm       |  |  |  |                  |  |  |  |     |  |  |  |  |  |
| 1 1/2"<br>37.5 mm |  |  |  | 1"<br>25 mm      |  |  |  |     |  |  |  |  |  |
| 1 1/4"<br>31.5 mm |  |  |  | 3/4"<br>19 mm    |  |  |  |     |  |  |  |  |  |
| 1"<br>25 mm       |  |  |  | 1/2"<br>12.5 mm  |  |  |  |     |  |  |  |  |  |
| 3/4"<br>19 mm     |  |  |  | 3/8"<br>9.5 mm   |  |  |  |     |  |  |  |  |  |
| 1/2"<br>12.5 mm   |  |  |  | No. 4<br>4.75 mm |  |  |  |     |  |  |  |  |  |
| 3/8"<br>9.5 mm    |  |  |  | No. 8<br>2.36 mm |  |  |  |     |  |  |  |  |  |
| PAN               |  |  |  | PAN              |  |  |  | PAN |  |  |  |  |  |

| KIND OF MATERIAL                          | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENGINEERING & HWY OPERATIONS<br>REPORT OF TEST OF COARSE AGGREGATE<br>MAT 207 Revised July 2003 |                 |  |  | DATE               | PROJECT/SAMPLE NUMBERS |
|---|---|-----------------|--|--|--------------------|------------------------|
|   | SOURCE OF SUPPLY  |                 |  |  | LABORATORY No.     |                        |
| LOCATION OF SOURCE OF SUPPLY              | SQUARE MESH SIEVES  | PERCENT PASSING |  |  | PERCENTAGE OF WEAR |                        |
| SAMPLE TAKEN FROM                         | 2 1/2"<br>63 mm   |                 |  |  | SOUNDNESS % LOSS   |                        |
| LOCATION OF                               | 2"<br>50 mm   |                 |  |  | RECOMMENDED FOR    |                        |
| SAMPLED BY                                | 1 1/2"<br>37.5 mm   |                 |  |  |                    |                        |
| DATE SAMPLED                              | 1 1/4"<br>31.5 mm   |                 |  |  |                    |                        |
| USING AGENCY                              | 1"<br>25 mm   |                 |  |  |                    |                        |
| QUANTITY REPRESENTED                      | 3/4"<br>19 mm   |                 |  |  |                    |                        |
| PURPOSE FOR WHICH MATERIAL WILL BE USED   | 1/2"<br>12.5 mm   |                 |  |  | REMARKS            |                        |
| DATE MATERIAL WILL BE USED                | 3/8"<br>9.5 mm  |                 |  |  |                    |                        |
| WHERE MATERIAL WILL BE USED               | No. 4<br>4.75 mm  |                 |  |  |                    |                        |
|   | No. 8<br>2.36 mm  |                 |  |  |                    |                        |
|   | No. 16<br>1.18 mm   |                 |  |  |                    |                        |
| SAMPLE RECEIVED                           | No. 100<br>150 µm   |                 |  |  |                    |                        |
| <b>Director of Research and Materials</b> |   |                 |  |  |                    |                        |

**MAT-208**

**Rock Salt**

|                               |           |           |
|-------------------------------|-----------|-----------|
| sample weight                 | 1/2 inch  | % passing |
| ml AgNO <sub>3</sub> Sample   | 3/8 inch  | % passing |
| Wt of standard                | # 4       | % passing |
| ml AgNO <sub>3</sub> Standard | # 8       | % passing |
| % NaCl                        | # 30      | % passing |
| Salt Wt                       | Pan       |           |
| Dry salt Wt                   | Project # | Sample #  |
| % moisture                    | Date      | Analyst   |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |  |                      |                           |
|--|--|----------------------|---------------------------|
| <p>AASHTO M 143<br/>                 And ASTM D-632-94 Type 1<br/>                 (Except sec. 9.1.2 and 11.2)</p> <hr/> <p><b>Lab use only</b></p> <p>Material # _____</p> <p>Vendor # _____</p> <p>Date Sampled _____</p> <p>Destination Code _____</p> <p>Material Quantity _____</p> <p>Material Unit _____</p> <p>Date Received _____</p> <p>C or M _____</p> <p>Dates -----</p> | <p><b>State of Connecticut<br/>                 Department of Transportation<br/>                 Bureau of Engineering &amp; Highways<br/>                 Report of Test of Rock Salt<br/>                 MAT 208 Rev. 9-03</b></p> | Date _____           | Project/ Sample No. _____ |
|  |  | Laboratory No. _____ |                           |
|  |  | <b><u>Spec.</u></b>  | <b><u>Results</u></b>     |
|  | % NaCl   | 95 % min             | _____                     |
|  | Moisture   | 2% max               | _____                     |
|  | % Passing 1/2 inch   | 100                  | _____                     |
|  | % Passing 3/8 inch   | 95 – 100             | _____                     |
|  | % passing # 4  | 20 – 90              | _____                     |
|  | % passing # 8  | 10 – 60              | _____                     |
|  | % passing # 30   | 0 – 15               | _____                     |
|  | Person Performing Test (initials) : _____  |                      |                           |
|  | Recommended For  | Remarks              |                           |
|  |  |                      |                           |
| <b>Director of Research<br/>and Materials</b>  |  |                      |                           |

|                      |          |
|----------------------|----------|
| Project #            | Sample # |
| Date                 | Analyst  |
| Sample Wt.           |          |
| N KmnO <sub>4</sub>  |          |
| ml KmnO <sub>4</sub> |          |
| CaCl Factor          |          |
| % CaCl               |          |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |  |                 |                            |
|--|--|-----------------|----------------------------|
| <b>AASHTO M 144-86<br/>And ASTM D 98-93</b>  | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Calcium Chloride<br/>MAT 209 Rev. 9-03</b> | <b>Date</b>     | <b>Project/ Sample No.</b> |
| <b>Lab use only</b><br><br>Material #<br><br>Vendor #<br><br>Date Sampled<br><br>Destination Code<br><br>Material Quantity<br><br>Material Unit<br><br>Date Received<br><br>Batch #<br><br>C or M<br><br>Dates        ---- | <b>Laboratory No.</b>  |                 |                            |
|  | <b>Grade</b>   | <b>% CaCl</b>   |                            |
|  | <b>Grade 1</b>   | <b>min. 77%</b> |                            |
|  | <b>Grade 2</b>   | <b>min. 90%</b> | <b>% CaCl</b> _____        |
| <b>Grade 3</b>   | <b>min. 94%</b>  |                 |                            |
|  | Person Performing Test (initials) : _____  |                 |                            |
|  | <b>Recommended For</b>   | <b>Remarks</b>  |                            |
|  |  |                 |                            |
| <b>Director of Research<br/>and Materials</b>  |  |                 |                            |

**NON-DESTRUCTIVE TEST OF HARDENED PC CONCRETE**

**Note: The Windsor Probe and Swiss Hammer are in-place, non-destructive, tests for indicating concrete strength. This test is for information only. Final acceptance is the responsibility of the District Engineer.**

|   |  |                |                    |                         |         |  |
|---|--|----------------|--------------------|-------------------------|---------|--|
| KIND OF MATERIAL                        | <p align="center"><b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Non-Destructive PCC<br/>MAT 210 Revised July 2003</b></p>  | Date           | Project/Sample No. |                         |         |  |
| SOURCE OF SUPPLY                        |  | Laboratory No. |                    |                         |         |  |
| LOCATION OF SOURCE OF SUPPLY            |  |                |                    |                         |         |  |
| SAMPLE TAKEN FROM                       | <p>Windsor Probe(    ) Swiss Hammer(    )</p> <p><b>Producer of Concrete:</b> _____</p> <p><b>Project:</b>_____ <b>Location:</b>_____</p> <p>Age of Concrete at Test: _____</p> <p>CYL Numbers: _____</p> <p>Average of Readings: _____</p> <p>Readings in P.S./MPA: _____</p> |                |                    |                         |         |  |
| LOCATION OF                             |  |                |                    |                         |         |  |
| SAMPLED BY                              |  |                |                    |                         |         |  |
| DATE SAMPLED                            |  |                |                    |                         |         |  |
| USING AGENCY                            |  |                |                    |                         |         |  |
| QUANTITY PRESENTED                      |  |                |                    |                         |         |  |
| PURPOSE FOR WHICH MATERIAL WILL BE USED |  |                |                    |                         |         |  |
| SAMPLE RECEIVED                         |  |                |                    |                         |         |  |
| DATE MATERIAL WILL BE USED              |  |                |                    | Recommended For         | Remarks |  |
| WHERE MATERIAL WILL BE USED             |  |                |                    | <b>INFORMATION ONLY</b> |         |  |

# MAT-211

## Los Angeles Abrasion Test

Date of Test: \_\_\_\_\_

|                 | <u>Pass.</u><br>(inches/mm) | <u>Ret.</u><br>(inches/mm) |                                     |                             |
|-----------------|-----------------------------|----------------------------|-------------------------------------|-----------------------------|
| <b>Class A:</b> | 1 1/2 (37.5)                | 1 (25) -                   |                                     | + 12 (1.7mm)                |
|                 | 1 (25)                      | 3/4 (19) -                 |                                     | + 12 (1.7mm) _____          |
|                 | 3/4 (19)                    | 1/2 (12.5) -               |                                     |                             |
|                 | 1/2 (12.5)                  | 3/8 (9.5) - _____          |                                     | <b>Total of +12 (1.7mm)</b> |
|                 | <b>Total Weight =</b>       |                            |                                     |                             |
|                 |                             |                            | <b>Total Wt. -</b>                  |                             |
|                 |                             |                            | <b>Minus +12 (1.7mm)</b> _____      |                             |
| <b>Class B:</b> | 3/4 (19)                    | 1/2 (12.5) -               |                                     | <b>Total of -12 (1.7mm)</b> |
|                 | 1/2 (12.5)                  | 3/8 (9.5) - _____          |                                     |                             |
|                 | <b>Total Weight =</b>       |                            |                                     |                             |
|                 |                             |                            | <b>Total of -12 (1.7mm) =</b> _____ | <b>=</b> _____ <b>%</b>     |
|                 |                             |                            | <b>Total Weight</b>                 |                             |

**A: 1250 each required size – 12 spheres**  
**B: 2500 each required size – 11 spheres**

Dust = \_\_\_\_\_

### Concrete Mix Coarse Aggregate Data

|   |  |  |                |   |         |  |
|---|--|--|----------------|---|---------|--|
| KIND OF MATERIAL                        | <b>State of Connecticut<br/>                 Department of Transportation<br/>                 Bureau of Engineering &amp; Highways<br/>                 Report of Test of L. A. Abrasion<br/>                 MAT 211 Revised July 2003</b> |  | Date           | <b>IN-HOUSE<br/>                 TEST</b><br><br>Code 8 |         |  |
| SOURCE OF SUPPLY                        |  |  | Laboratory No. |   |         |  |
| LOCATION OF SOURCE OF SUPPLY            |  |  |                |   |         |  |
| SAMPLE TAKEN FROM                       | Class _____ Wear, % _____<br><br>Soundness, % Loss _____<br><br><br>Material # _____<br>Vendor # _____   |  |                |   |         |  |
| LOCATION OF                             |  |  |                |   |         |  |
| SAMPLED BY                              |  |  |                |   |         |  |
| DATE SAMPLED                            |  |  |                |   |         |  |
| USING AGENCY                            |  |  |                |   |         |  |
| QUANTITY PRESENTED                      |  |  |                |   |         |  |
| PURPOSE FOR WHICH MATERIAL WILL BE USED |  |  |                |   |         |  |
| SAMPLE RECEIVED                         |  |  |                |   |         |  |
| DATE MATERIAL WILL BE USED              |  |  |                | Recommended For   | Remarks |  |
| WHERE MATERIAL WILL BE USED             |  |  |                |   |         |  |

**MAT-212**

**Absorbent Compound**

| Gradation | Max.   | Min.   | Retained/ Results |
|-----------|--------|--------|-------------------|
| # 6       | 12.00% |        |                   |
| # 30      | 99.00% | 52.00% |                   |
| # 40      | 99.80% | 73.00% |                   |
| # 60      |        | 90%    |                   |
| Pan       |        |        |                   |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

**Person Accepting Technical Responsibility**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Absorbent Compound<br>MAT 212 Rev. 9-03 |                | Date           | Project/ Sample No. |
|---|---|----------------|----------------|---------------------|
|   |   |                | Laboratory No. |                     |
| <b>Spec. A – A – 1979 A</b>               | <u>Amount Retained</u>  | <u>Spec.</u>   | <u>Results</u> |                     |
|   | # 6   | Max 12%        | -----          |                     |
|   | # 30  | 52 - 99        | -----          |                     |
|   | # 40  | 73 – 99.8      | -----          |                     |
|   | #60   | min 90         | -----          |                     |
|   | Oil Absorbing Capacity ( min 0.6 ml)  |                | -----          |                     |
|   | Water Absorbing Capacity ( min 0.7 ml)  |                | -----          |                     |
|   | Solubility ( max 1.5%)  |                | -----          |                     |
|   | Density   |                | -----          |                     |
|   |   |                |                |                     |
| <b>Recommended For</b>                    |   | <b>Remarks</b> |                |                     |
| <b>Director of Research and Materials</b> |   |                |                |                     |

|   |  |                         |                                |                                    |
|---|--|-------------------------|--------------------------------|------------------------------------|
|   | <b>State of Connecticut<br/>                 Department of Transportation<br/>                 Bureau of Engineering and Highways<br/>                 Report of Test of Moisture/Density<br/>                 MAT 213 Revised July 2003</b> |                         | <b>Date</b><br>_____           | <b>Project Sample No.</b><br>_____ |
|   |  |                         | <b>Laboratory No.</b><br>_____ |                                    |
|   | <b>Maximum Density<br/>                 (Kg/cu.m-Lbs/cu.ft)</b> _____<br><br><b>Optimum Moisture</b> _____   |                         |                                |                                    |
| <b>Recommended For<br/>                 Information</b> |  | <b>Remarks</b><br>_____ |                                |                                    |

**MAT-214****State of Connecticut**

Department of Transportation  
 Division of Materials Testing  
 MAT 214 Revised July 2003

Inspection of Portland Concrete Truck Mixers and Agitators

| Company   | Location |  |  |  |
|---|----------|--|--|--|
| Laboratory # :  |          |  |  |  |
| Inspection Date:  |          |  |  |  |
| Inspected by:   |          |  |  |  |
| Truck # :   |          |  |  |  |
| Mixer # :   |          |  |  |  |
| Manufacturer of Mixer:                                      |          |  |  |  |
| Type Mixer (Inclined):                                      |          |  |  |  |
| Manufacturer's Rated Capacity<br>Gross Volume of Drum (CF): |          |  |  |  |
| Manufacturer's Rated Capacity (CF)                          |          |  |  |  |
| • For Mixing:   |          |  |  |  |
| • For Agitating:  |          |  |  |  |
| Max. Allowable volume/Mixing<br>(63.25% of gross volume):   |          |  |  |  |
| Mixing Speed of Drum (RPM):                                 |          |  |  |  |
| Agitating Speed of Drum (RPM):                              |          |  |  |  |
| Condition of Blades and Drum:                               |          |  |  |  |
| Revolution Counter:   |          |  |  |  |
| Timer:  |          |  |  |  |
| Volume of Water Tank:                                       |          |  |  |  |
| Water-Measuring Device:                                     |          |  |  |  |
| Approved For (specify max. CY):                             |          |  |  |  |
| • Truck - Mix:  |          |  |  |  |
| • Transit - Mix:  |          |  |  |  |
| • Central - Mix:  |          |  |  |  |
| Approved by:  |          |  |  |  |
| Date Approved:  |          |  |  |  |

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

Notes: 1) The capacity of truck mixers shall be in accordance with the manufacturer's ratings, except that the maximum capacity shall not exceed 63.25% of the total volume of the drum. If manufacturer's ratings are less than this amount, manufacturer's ratings shall govern (M.06.01.03-b).

2) Use Manufacturer's ratings for maximum allowable agitating capacities.

# MAT-215

STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
MAT 215 Revised July 2003

INSPECTION OF PORTLAND CEMENT CONCRETE DRY BATCH PLANT

|               |                  |
|---------------|------------------|
| INSPECTED BY: | INSPECTION DATE: |
|               | / /              |

|               |                       |                             |
|---------------|-----------------------|-----------------------------|
| <b>PLANT</b>  |                       |                             |
| NAME:         | SERIAL NUMBER:        | NUMBER OF BINS:             |
| LOCATION:     | CAPACITY:             | CONTENTS OF BINS:           |
| MANUFACTURER: | STATIONARY OR MOBILE: | ADEQUATE DISCHARGE CONTROL: |

|                                  |  |
|----------------------------------|--|
| <b>WEIGHING HOPPER</b>           |  |
| NUMBER OF WEIGHING COMPARTMENTS: | FREE MOVEMENT:                               |
| ADEQUATE DISCHARGE GATES:        | PROVISION FOR REMOVAL OF AGGREGATE OVERLOAD: |

| <b>SCALES</b>                  | <i>CEMENT</i> | <i>AGGREGATE</i> | <i>WATER</i> |
|--------------------------------|---------------|------------------|--------------|
| DIAL                           |               |                  |              |
| BEAM                           |               |                  |              |
| DIGITAL/PRINTOUT               |               |                  |              |
| INTERLOCKING                   |               |                  |              |
| FREE MOVEMENT                  |               |                  |              |
| DATE OF CONNECTICUT STATE SEAL |               |                  |              |

|                                     |  |
|-------------------------------------|--|
| <b>MISCELLANEOUS SPECIFICATIONS</b> |  |
| METHOD OF ADDING ADMIXTURES         |  |
| ADMIXTURE CALIBRATION               |  |
| METHOD OF HANDLING FROZEN AGGREGATE |  |
| CALIBRATION WEIGHT (10-50 LB)       |  |
| TYPE OF WATER                       |  |
| WATER SAMPLE TAKEN                  |  |
| CEMENT SOURCE                       |  |
| COARSE AGGREGATE SOURCE             |  |
| FINE AGGREGATE SOURCE               |  |
| ADMIXTURE SOURCE                    |  |

|                |                   |  |
|----------------|-------------------|--|
| <b>REMARKS</b> | LABORATORY NUMBER |  |
|                | MATERIAL NUMBER   |  |
|                | VENDOR NUMBER     |  |
|                | APPROVED BY       |  |
|                | DATE APPROVED     |  |

# MAT-216

STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
MAT 216 Revised July 2003  
INSPECTION OF PORTLAND CEMENT CONCRETE CENTRAL MIX PLANT

|               |                  |
|---------------|------------------|
| INSPECTED BY: | INSPECTION DATE: |
|               | / /              |

|               |                       |                             |
|---------------|-----------------------|-----------------------------|
| <b>PLANT</b>  |                       |                             |
| NAME:         | SERIAL NUMBER:        | NUMBER OF BINS:             |
| LOCATION:     | CAPACITY:             | CONTENTS OF BINS:           |
| MANUFACTURER: | STATIONARY OR MOBILE: | ADEQUATE DISCHARGE CONTROL: |

|                       |                      |                    |
|-----------------------|----------------------|--------------------|
| <b>XER</b>            |                      |                    |
| TYPE:                 | CONDITION OF LINER:  |                    |
| MIXING TIME, seconds: | CONDITION OF BLADES: | CONDITION OF DRUM: |

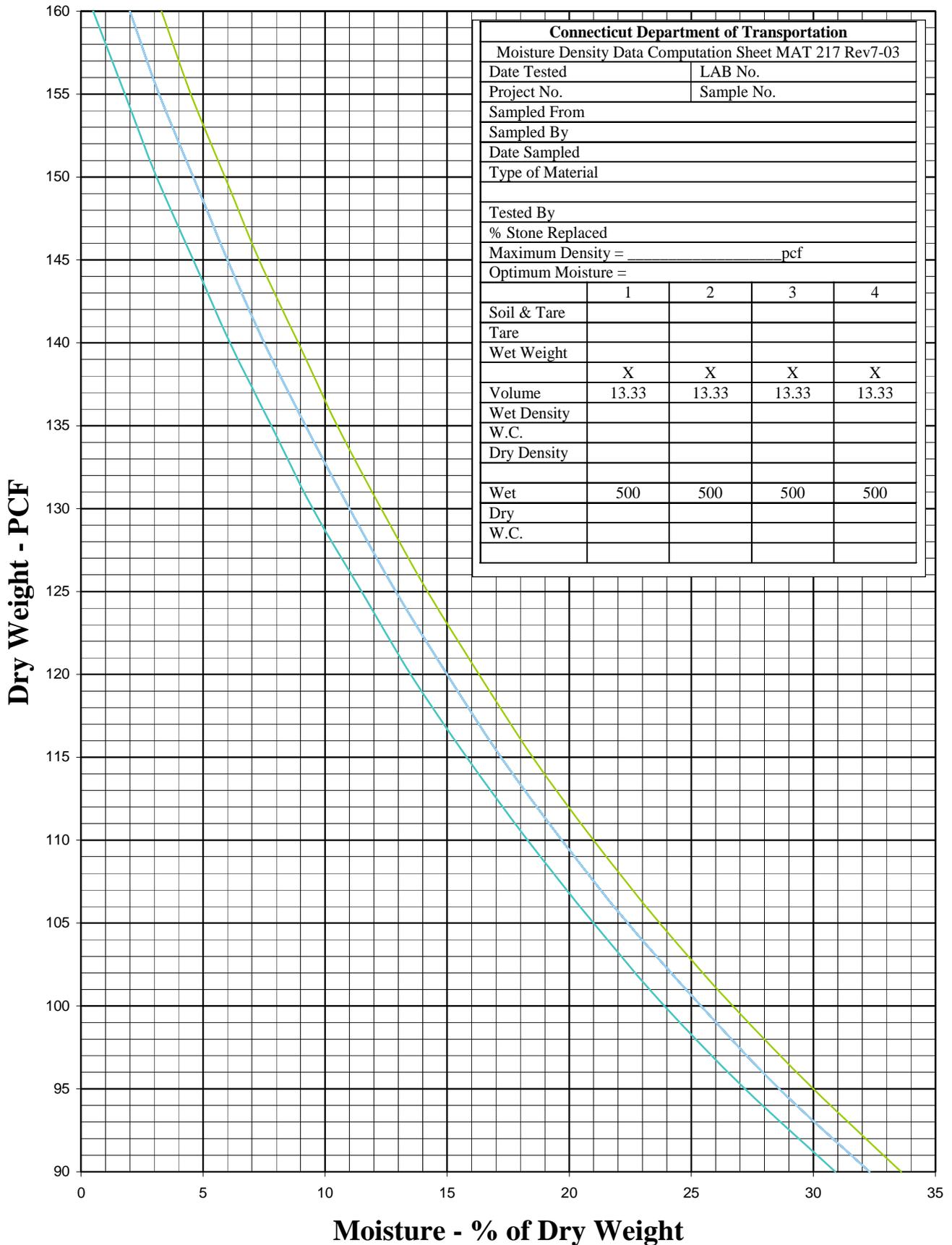
|                                  |  |
|----------------------------------|--|
| <b>WEIGHING HOPPER</b>           |  |
| NUMBER OF WEIGHING COMPARTMENTS: | FREE MOVEMENT:                               |
| ADEQUATE DISCHARGE GATES:        | PROVISION FOR REMOVAL OF AGGREGATE OVERLOAD: |

| <b>SCALES</b>                  | <b>CEMENT</b> | <b>AGGREGATE</b> | <b>WATER</b> |
|--------------------------------|---------------|------------------|--------------|
| DIAL                           |               |                  |              |
| BEAM                           |               |                  |              |
| DIGITAL/PRINTOUT               |               |                  |              |
| INTERLOCKING                   |               |                  |              |
| FREE MOVEMENT                  |               |                  |              |
| DATE OF CONNECTICUT STATE SEAL |               |                  |              |

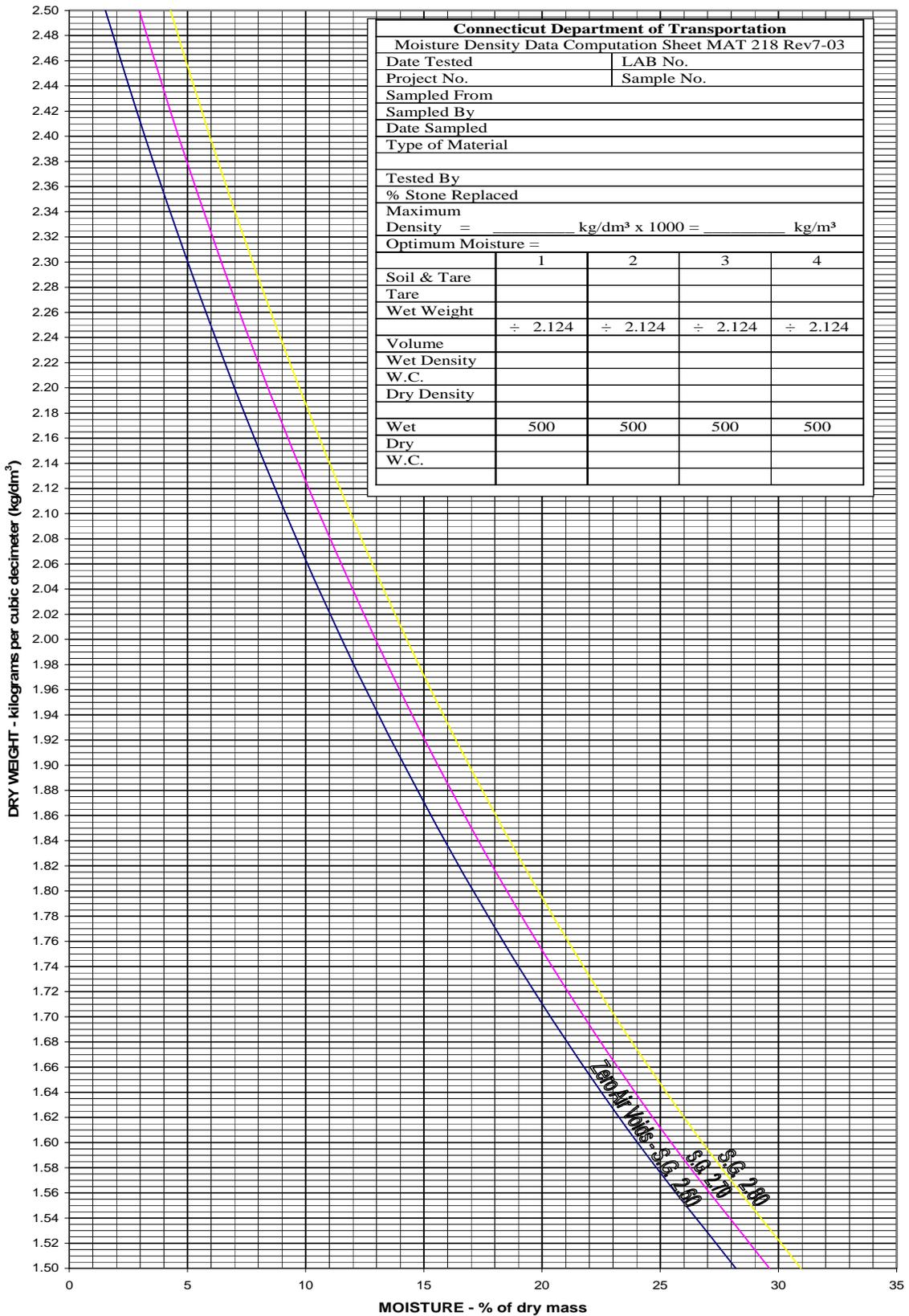
|                                     |  |
|-------------------------------------|--|
| <b>MISCELLANEOUS SPECIFICATIONS</b> |  |
| METHOD OF ADDING ADMIXTURES         |  |
| ADMIXTURE CALIBRATION               |  |
| METHOD OF HANDLING FROZEN AGGREGATE |  |
| CALIBRATION WEIGHT (10-50 LB)       |  |
| TYPE OF WATER                       |  |
| WATER SAMPLE TAKEN                  |  |
| CEMENT SOURCE                       |  |
| COARSE AGGREGATE SOURCE             |  |
| FINE AGGREGATE SOURCE               |  |
| ADMIXTURE SOURCE                    |  |

|                   |  |                   |  |                 |  |               |  |             |  |               |  |
|-------------------|--|-------------------|--|-----------------|--|---------------|--|-------------|--|---------------|--|
| <b>REMARKS</b>    | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 5px;">LABORATORY NUMBER</td><td></td></tr> <tr><td style="padding: 5px;">MATERIAL NUMBER</td><td></td></tr> <tr><td style="padding: 5px;">VENDOR NUMBER</td><td></td></tr> <tr><td style="padding: 5px;">APPROVED BY</td><td></td></tr> <tr><td style="padding: 5px;">DATE APPROVED</td><td></td></tr> </table> | LABORATORY NUMBER |  | MATERIAL NUMBER |  | VENDOR NUMBER |  | APPROVED BY |  | DATE APPROVED |  |
| LABORATORY NUMBER |  |                   |  |                 |  |               |  |             |  |               |  |
| MATERIAL NUMBER   |  |                   |  |                 |  |               |  |             |  |               |  |
| VENDOR NUMBER     |  |                   |  |                 |  |               |  |             |  |               |  |
| APPROVED BY       |  |                   |  |                 |  |               |  |             |  |               |  |
| DATE APPROVED     |  |                   |  |                 |  |               |  |             |  |               |  |
|                   |  |                   |  |                 |  |               |  |             |  |               |  |
|                   |  |                   |  |                 |  |               |  |             |  |               |  |
|                   |  |                   |  |                 |  |               |  |             |  |               |  |

# MAT-217 Worksheet: Moisture/Density (Proctor)



# MAT-218 Worksheet: Moisture/Density (Proctor) - Metric



**MAT - 219**  
**SPECIFIC GRAVITY AND ABSORPTION OF COARSE AGGREGATE – AASHTO T 85**  
**DIVISION OF MATERIALS TESTING MAT 219 Revised July 2003**

Source: \_\_\_\_\_ Location: \_\_\_\_\_ Date: \_\_\_\_\_

| <b>SAMPLE #</b>  |              | <b>1</b> | <b>2</b> | <b>3</b> |
|--|--------------|----------|----------|----------|
| <u>Mass of SSD Sample + Basket in Air</u>                  |              |          |          |          |
| <u>Less Mass of Basket in Air</u>                          |              |          |          |          |
| <u>Mass of SSD Sample</u>                                  | <b>B</b>     |          |          |          |
| <u>Mass of Saturated Sample in Water + Basket in Water</u> |              |          |          |          |
| <u>Less Mass of Basket in Water</u>                        |              |          |          |          |
| <u>Mass of Saturated Sample in Water</u>                   | <b>C</b>     |          |          |          |
| <u>Mass of SSD Sample</u>                                  | <b>B</b>     |          |          |          |
| <u>Less Mass of Saturated Sample in Water</u>              | <b>C</b>     |          |          |          |
| <u>Loss in Mass (Volume of SSD Sample)</u>                 | <b>B - C</b> |          |          |          |

|                                       |          |  |  |  |
|---------------------------------------|----------|--|--|--|
| <u>Mass of Oven-Dry Sample + Pan</u>  |          |  |  |  |
| <u>Less Mass of Pan</u>               |          |  |  |  |
| <u>Mass of Oven-Dry Sample in Air</u> | <b>A</b> |  |  |  |

|  |              |  |  |  |
|--|--------------|--|--|--|
| <u>Mass of SSD Sample in Air</u>                 | <b>B</b>     |  |  |  |
| <u>Less Mass of Oven-Dry Sample</u>              | <b>A</b>     |  |  |  |
| <u>Mass of Water (Volume of Permeable Voids)</u> | <b>B - A</b> |  |  |  |

|   |              |  |  |  |
|---|--------------|--|--|--|
| <u>Mass of Oven-Dry Sample</u>                  | <b>A</b>     |  |  |  |
| <u>Less Mass of Saturated Sample in Water</u>   | <b>C</b>     |  |  |  |
| <u>Loss in Mass (Volume of Oven-Dry Sample)</u> | <b>A - C</b> |  |  |  |

|  |                              |  |  |  |
|--|------------------------------|--|--|--|
| <u>Bulk Specific Gravity</u>             | $\frac{A}{B - C}$            |  |  |  |
| <u>Bulk Specific Gravity (SSD Basis)</u> | $\frac{B}{B - C}$            |  |  |  |
| <u>Apparent Specific Gravity</u>         | $\frac{A}{A - C}$            |  |  |  |
| <u>Absorption %</u>                      | $\frac{B - A}{A} \times 100$ |  |  |  |

**MAT-220**

Connecticut Department of Transportation-Division of Materials Testing  
**Fine Aggregate Soundness AASHTO T104 MAT 220 Rev. 7-03**

Kind of Material: \_\_\_\_\_  
 Tech/Eng. Initials: \_\_\_\_\_  
 Date Sampled: \_\_\_\_\_  
 Completed: \_\_\_\_\_

Source: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Date

**Original Grading (Plus # 4)  
 Soak - Dry - Schedule**

| Seive In(mm)  | Retained Mass | Pass & Ret. % | % Pass |
|---------------|---------------|---------------|--------|
|               |               |               | 100    |
| 1/2 (12.5)    |               |               |        |
| 3/8 (9.5)     |               |               |        |
| # 4 (4.75)    |               |               |        |
| #8 (2.36)     |               |               |        |
| #16 (1.18)    |               |               |        |
| #30 (600) μ   |               |               |        |
| #50 (300) μ   |               |               |        |
| <b>Totals</b> |               | <b>100</b>    |        |

|               |
|---------------|
| <b>Notes:</b> |
|               |
|               |

| Date in Sol. | Date | Date in oven |
|--------------|------|--------------|
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |

**Grading of Original Sample**

| Pass        | Ret. On     |   |
|-------------|-------------|---|
| 3/8 (9.5)   | # 4 (4.75)  | % |
| # 4 (4.75)  | #8 (2.36)   | % |
| #8 (2.36)   | #16 (1.18)  | % |
| #16 (1.18)  | #30 (600)μ  | % |
| #30 (600) μ | #50 (300) μ | % |

Total 100

(required sample not less than 100g for each size)

| Passing    | Retained    | Actual | Mass Before | Mass After | Loss in | Loss in        | Grading of | Weighted |
|------------|-------------|--------|-------------|------------|---------|----------------|------------|----------|
|            |             | Mass   | Test Gms.   | Test Gms.  | Gms.    | % Orig. Sample | Average    | %        |
| 3/8 (9.5)  | # 4 (4.75)  |        |             |            |         |                |            |          |
| # 4 (4.75) | #8 (2.36)   |        |             |            |         |                |            |          |
| #8 (2.36)  | #16 (1.18)  |        |             |            |         |                |            |          |
| #16 (1.18) | #30 (600)μ  |        |             |            |         |                |            |          |
| #30 (600)μ | #50 (300) μ |        |             |            |         |                |            |          |

Kind of Material: \_\_\_\_\_  
 Tech/Eng. Initials: \_\_\_\_\_  
 Date Sampled: \_\_\_\_\_  
 Completed: \_\_\_\_\_

Source: \_\_\_\_\_  
 Location: \_\_\_\_\_ Date \_\_\_\_\_

**Original Grading (Plus # 4)  
 Soak - Dry - Schedule**

| Seive In(mm)  | Retained Mass | Pass & Ret. % | % Pass |
|---------------|---------------|---------------|--------|
|               |               |               | 100    |
| 2 1/2 (63)    |               |               |        |
| 2 (50)        |               |               |        |
| 1 1/2 (37.5)  |               |               |        |
| 1 (25)        |               |               |        |
| 3/4 (19)      |               |               |        |
| 1/2 (12.5)    |               |               |        |
| 3/8 (9.5)     |               |               |        |
| # 4 (4.75)    |               |               |        |
| <b>Totals</b> |               | <b>100</b>    |        |

**Sample Sizes for Original Grading**

|              |                  |
|--------------|------------------|
| #            | lbs. (kg)        |
| <b>Total</b> | <b>lbs. (kg)</b> |

| Date in Sol. | Date | Date in oven |
|--------------|------|--------------|
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |
|              |      |              |

**Grading of Original Sample**

| Pass         | Ret. On      |   |
|--------------|--------------|---|
| 2 1/2 (63)   | 1 1/2 (37.5) | % |
| 1 1/2 (37.5) | 3/4 (19)     | % |
| 3/4 (19)     | 3/8 (9.5)    | % |
| 3/8 (9.5)    | # 4 (4.75)   | % |

Total 100

**(Required Sample Sizes)**

Sieve Not Less Consisting Actual Mass Before Mass After Loss in Loss in  
 Grading of Weighted

| Size                          | Than         | of                | Mass | Test Gms. | Test Gms. | Gms. |  |  |  |  |
|-------------------------------|--------------|-------------------|------|-----------|-----------|------|--|--|--|--|
| %                             | Orig. Sample | Average %         |      |           |           |      |  |  |  |  |
| 2 1/2 to 1 1/2<br>(63) (37.5) | 5000         | 3000 2 (50)       |      |           |           |      |  |  |  |  |
|                               |              | 2000 1 1/2 (37.5) |      |           |           |      |  |  |  |  |
| 1 1/2 to 3/4<br>(37.5) (19)   | 1500         | 1000 1 (25)       |      |           |           |      |  |  |  |  |
|                               |              | 500 3/4 (19)      |      |           |           |      |  |  |  |  |
| 3/4 to 3/8<br>(19) (9.5)      | 1000         | 670 1/2 (12.5)    |      |           |           |      |  |  |  |  |
|                               |              | 330 3/8 (9.5)     |      |           |           |      |  |  |  |  |
| 3/8 to # 4<br>(9.5) (4.75)    | 300          | 300 # 4 (4.75)    |      |           |           |      |  |  |  |  |

**MAT-222  
CONNECTICUT DEPARTMENT OF TRANSPORTATION  
DIVISION OF MATERIALS TESTING  
ASSURANCE REPORT: FIELD TESTING PERSONNEL AND  
EQUIPMENT MAT 222 Rev. 7-03**

PROJECT #: \_\_\_\_\_ DATE: \_\_\_\_\_

LOCATION: \_\_\_\_\_

CONSULTANT OR STATE INSPECTION \_\_\_\_\_

NAME (S) OF INSPECTOR (S), CERTIFICATIONS (NETTCP, ACI, ETC.),  
AND CERTIFICATION #'S

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

LIST CONCRETE AND OTHER TESTING EQUIPMENT ON SITE

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

AIR METER CALIBRATION DATE \_\_\_\_\_

REMARKS/OBSERVATIONS \_\_\_\_\_

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

FORM COMPLETED BY \_\_\_\_\_ DISTRICT LAB \_\_\_\_\_

**MAT-223**

**CONNECTICUT DEPARTMENT OF TRANSPORTATION  
DIVISION OF MATERIALS TESTING  
RECYCLED/RECLAIMED MATERIAL CERTIFICATION  
PROGRAM ASSURANCE REPORT MAT 223 Rev. 7-03**

Date sample taken:  
Date this report completed:  
Recycled/reclaimed producer:  
Location of producer:

Producer testing lab & location:  
DOT testing lab & location:  
Sample taken by: Initials:  
Sample witnessed by: Initials:

**SAMPLE TAKEN FROM (CHECK ONE)**

stockpile       belt       jobsite / other

**TYPE OF ASSURANCE TEST (CHECK ONE)**

Random sample taken at producers stockpile or belt by District Laboratory personnel.

- Did this sample meet Department of Environmental Protection Remediation Standard Regulations ?

yes       no

- Attach copy of environmental test of random sample to this report.

Split sample test. Sample taken by producer split in field for assurance testing and witnessed by District Laboratory personnel.

- Did both the producers sample and the Assurance Sample meet Department of Environmental Protection Remediation Standard Regulations ?

yes       no

- Attach copies of both environmental tests of to this report.

Briefly describe producers procedure for storing/stockpiling materials represented by environmental testing. (Ex., quantity of material stockpiled, tested, approved, then shipped to Department Projects)

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Comments / explanations / corrective actions:

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# MAT-224

**CONNECTICUT DEPARTMENT OF TRANSPORTATION  
DIVISION OF MATERIALS TESTING  
ASSURANCE REPORT: PLASTIC PC CONCRETE  
MAT 224 Rev. 7-03**

|                   |  |                      |  |
|-------------------|--|----------------------|--|
| DATE              |  | PROJECT NUMBER       |  |
| CLASS OF CONCRETE |  | TOWN                 |  |
| TRUCK NUMBER      |  | CONTRACTOR           |  |
| CYLINDER NUMBER   |  | CONCRETE PRODUCER    |  |
| MIX TEMPERATURE   |  | LOCATION/<br>STATION |  |

| BATCH WEIGHTS PER CUBIC YARD |               |              |                                 |              |              |              |                              |                        |
|------------------------------|---------------|--------------|---------------------------------|--------------|--------------|--------------|------------------------------|------------------------|
|                              | CEMENT<br>lb. | OTHER<br>lb. | SAND<br>+ ____% Moisture<br>lb. | STONE<br>lb. | STONE<br>lb. | STONE<br>lb. | TOTAL<br>MIXING WATER<br>lb. | TOTAL<br>WEIGHT<br>lb. |
| ACTUAL                       |               |              |                                 |              |              |              |                              |                        |
| MIX DESIGN                   |               |              |                                 |              |              |              |                              |                        |
| TOLERANCE                    | ± 1%          | ± 1%         | ± 2%                            | ± 2%         | ± 2%         | ± 2%         | ± 1% (Central Mix)           |                        |

| ENTRAINED AIR |                      |                       |       | SLUMP TEST |                              |                 |
|---------------|----------------------|-----------------------|-------|------------|------------------------------|-----------------|
| TIME TAKEN    | AIR-ENTRAINING AGENT | AMOUNT USED PER BATCH | % AIR | TIME TAKEN | TOTAL WATER PER BATCH (gal.) | AMOUNT OF SLUMP |
|               |                      |                       |       |            |                              |                 |
|               |                      |                       |       |            |                              |                 |

| UNIT WEIGHT |                                   |                          |                               |   |                                     |
|-------------|-----------------------------------|--------------------------|-------------------------------|---|-------------------------------------|
|             |                                   | -                        | =                             | ÷                                       | =                                   |
| TIME TAKEN  | WEIGHT OF MEASURE & SAMPLE<br>lb. | WEIGHT OF MEASURE<br>lb. | NET WEIGHT OF CONCRETE<br>lb. | VOLUME OF MEASURE<br>(ft <sup>3</sup> ) | UNIT WEIGHT<br>lb./ ft <sup>3</sup> |
|             |                                   |                          |                               |   |                                     |
|             |                                   |                          |                               |   |                                     |

| YIELD      |                           |                                     |  |                                 |   |    |                |
|------------|---------------------------|-------------------------------------|--|---------------------------------|---|----|----------------|
|            |                           | ÷                                   | =  | ÷                               | =   | ÷  | =              |
| TIME TAKEN | TOTAL BATCH WEIGHT<br>lb. | UNIT WEIGHT<br>lb./ ft <sup>3</sup> | YIELD PER BATCH<br>(ft <sup>3</sup> / batch) | BATCH SIZE<br>(y <sup>3</sup> ) | YIELD PER CUBIC YARD<br>(ft <sup>3</sup> / y <sup>3</sup> ) |    | RELATIVE YIELD |
|            |                           |                                     |  |                                 |   | 27 |                |
|            |                           |                                     |  |                                 |   | 27 |                |

\_\_\_\_\_  
Witnessed By (Print Name)

\_\_\_\_\_  
Project Inspector (Print Name)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

# MAT-225

**CONNECTICUT DEPARTMENT OF TRANSPORTATION  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING  
ASSURANCE REPORT: PLASTIC PC CONCRETE (METRIC)**

MAT 225 Rev. 7-03

|                   |  |                   |  |
|-------------------|--|-------------------|--|
| DATE              |  | PROJECT NUMBER    |  |
| CLASS OF CONCRETE |  | TOWN              |  |
| TRUCK NUMBER      |  | CONTRACTOR        |  |
| CYLINDER NUMBER   |  | CONCRETE PRODUCER |  |
| MIX TEMPERATURE   |  | LOCATION/STATION  |  |

| BATCH MASS PER CUBIC METER |              |             |                                |             |             |             |                          |                  |
|----------------------------|--------------|-------------|--------------------------------|-------------|-------------|-------------|--------------------------|------------------|
|                            | CEMENT<br>kg | OTHER<br>kg | SAND<br>+ ____% Moisture<br>kg | STONE<br>kg | STONE<br>kg | STONE<br>kg | TOTAL MIXING WATER<br>kg | TOTAL MASS<br>kg |
| ACTUAL                     |              |             |                                |             |             |             |                          |                  |
| MIX DESIGN                 |              |             |                                |             |             |             |                          |                  |
| TOLERANCE                  | ± 1%         | ± 1%        | ± 2%                           | ± 2%        | ± 2%        | ± 2%        | ± 1% (Central Mix)       |                  |

| ENTRAINED AIR |                      |                       |       | SLUMP TEST |                           |                 |
|---------------|----------------------|-----------------------|-------|------------|---------------------------|-----------------|
| TIME TAKEN    | AIR-ENTRAINING AGENT | AMOUNT USED PER BATCH | % AIR | TIME TAKEN | TOTAL WATER PER BATCH (L) | AMOUNT OF SLUMP |
|               |                      |                       |       |            |                           |                 |
|               |                      |                       |       |            |                           |                 |

| UNIT MASS  |                                |                       |                            |  |   |
|------------|--------------------------------|-----------------------|----------------------------|--|---|
|            |                                | -                     | =                          | ÷                                      | =   |
| TIME TAKEN | MASS OF MEASURE & SAMPLE<br>kg | MASS OF MEASURE<br>kg | NET MASS OF CONCRETE<br>kg | VOLUME OF MEASURE<br>(m <sup>3</sup> ) | MASS PER CUBIC METER<br>kg / m <sup>3</sup> |
|            |                                |                       |                            |  |   |
|            |                                |                       |                            |  |   |

| YIELD      |                           |   |   |                                 |                |
|------------|---------------------------|---|---|---------------------------------|----------------|
|            |                           | ÷   | =   | ÷                               | =              |
| TIME TAKEN | TOTAL MASS OF BATCH<br>kg | MASS PER CUBIC METER<br>kg / m <sup>3</sup> | YIELD PER BATCH<br>(m <sup>3</sup> / batch) | BATCH SIZE<br>(m <sup>3</sup> ) | RELATIVE YIELD |
|            |                           |   |   |                                 |                |
|            |                           |   |   |                                 |                |

\_\_\_\_\_  
Witnessed By (Print Name)  
\_\_\_\_\_  
Signature

\_\_\_\_\_  
Project Inspector (Print Name)  
\_\_\_\_\_  
Signature

|  |  |                       |                              |                                   |
|--|--|-----------------------|------------------------------|-----------------------------------|
|  | <p align="center"> <b>State of Connecticut<br/>           Department of Transportation<br/>           Bureau of Engineering &amp; Highways<br/>           Report of Project Field Inspection<br/>           MAT 226 Revised July 2003</b> </p> |                       | <p><b>Date</b></p>           | <p><b>Project/ Sample No.</b></p> |
|  |  |                       | <p><b>Laboratory No.</b></p> |                                   |
|  | <p align="center"> <b>The subject material has been field tested by project personnel<br/>           and was found to be in accordance with specifications.</b> </p>   |                       |                              |                                   |
| <p><b>Recommended For</b></p>  |  | <p><b>Remarks</b></p> |                              |                                   |
| <p align="center"> <b>Director of Research<br/>           and Materials</b> </p> |  |                       |                              |                                   |

# MAT-227

## Fiber Mulch

|                    |                   |
|--------------------|-------------------|
| Moisture sample wt | Crucible wt       |
| oven dry wt        | Crucible & sample |
| Moisture content   | crucible & ash    |
| pH                 | % organics        |
| Project #          | Sample #          |
| Date               | Analyst           |

**Specification Reference**

Standard Specification \_\_\_\_\_

Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_

Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_

Title: \_\_\_\_\_

|   |   |   |                                     |
|---|---|---|-------------------------------------|
| <b>Form<br/>814 A and 815<br/>M.13.05 - 3</b> | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Fiber Mulch<br/>MAT 227 Rev. 9-03</b> | <b>Date</b><br>_____  | <b>Project/ Sample No.</b><br>_____ |
|   |   | <b>Laboratory No.</b><br>_____  |                                     |
|   |   | pH _____<br>Moisture _____<br>% Organics _____<br><br>Person Performing Test (initials) : _____ |                                     |
|   | <b>Recommended For</b>  | <b>Remarks</b>  |                                     |
| <b>Director of Research<br/>and Materials</b> |   |   |                                     |

# MAT-228

# Glass Beads

|        |           |                     |
|--------|-----------|---------------------|
| Grams  | % Passing | Moisture Resistance |
| # 20   |           | Imperfect Wt        |
| # 30   |           | Round Wt            |
| # 40   |           | % perfects          |
| # 50   |           | Refractive index    |
| # 80   |           | Date                |
| # 100  |           | Analyst             |
| Pan    |           | Project #           |
| Totals |           | Sample #            |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |  |               |                |                     |
|--|--|---------------|----------------|---------------------|
| AASHTO M 247 – 81<br>Type 1 and Type 2 Gradation<br>Gradation – ASTM D 1214<br>Roundness – ASTM D 1155<br>Refractive Index   | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of Glass Beads<br>MAT 228 Rev. 9-03 |               | Date           | Project/ Sample No. |
|  |  |               | Laboratory No. |                     |
| <b>Lab use only</b><br><br>Material #<br><br>Vendor #<br><br>Date Sampled<br><br>Destination Code<br><br>Material Quantity<br><br>Material Unit<br><br>Date Received<br><br>Batch #<br><br>C or M<br><br>Dates            ---- | <b>% Passing</b>   | <b>Type 1</b> | <b>Type2</b>   | <b>Results</b>      |
|  | # 20   | 100           | ----           | -----               |
|  | # 30   | 75 – 95       | 100            | -----               |
|  | # 40   | -----         | 90 – 100       | -----               |
|  | # 50   | 15 – 35       | 50 - 75        | -----               |
|  | # 80   | -----         | 0 - 5          | -----               |
|  | # 100  | 0 – 5         | ----           | -----               |
|  | % Perfect  |               | > 70%          | -----               |
|  | Moisture Resistance  |               |                | -----               |
|  | Refractive Index   |               | > 1.50         | -----               |
|  | Person Performing Test (initials) : _____  |               |                |                     |
|  | Recommended For  | Remarks       |                |                     |
|  |  |               |                |                     |
| <b>Director of Research and Materials</b>  |  |               |                |                     |

# MAT-229

# Visi Beads

|      |            |           |
|------|------------|-----------|
|      | % Retained | Project # |
| # 10 |            | Sample #  |
| # 12 |            | Date      |
| # 14 |            | Analyst   |
| # 16 |            |           |
| # 18 |            |           |
| # 20 |            |           |
| pan  |            |           |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

**Person Accepting Technical Responsibility**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   |   |                   |                |                     |
|---|---|-------------------|----------------|---------------------|
| Reference File # 199 – C<br>Grading B     | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of Visi Beads<br>MAT 229 Rev. 9-03 |                   | Date           | Project/ Sample No. |
|   |   |                   | Laboratory No. |                     |
| <b>Lab use only</b>                       | <b>Material #</b>   | <b>% Retained</b> | <b>Specs.</b>  | <b>Results</b>      |
|   | Vendor #  | #10               | 0              | -----               |
|   | Date Sampled  | # 12              | 0 – 5          | -----               |
|   | Destination Code  | # 14              | 5 – 20         | -----               |
|   | Material Quantity   | # 16              | 40 – 80        | -----               |
|   | Material Unit   | #18               | 10 – 40        | -----               |
|   | Date Received   | # 20              | 0 – 5          | -----               |
|   | C or M  | Pan               | 0 – 2          | -----               |
| Dates                                     | Person Performing Test (initials) : _____   |                   |                |                     |
|   | Recommended For   | Remark            |                |                     |
| <b>Director of Research and Materials</b> |   |                   |                |                     |

# MAT-230

# Water

|                   |              |
|-------------------|--------------|
| Appearance        | Color        |
| pH                | Water Factor |
| ml Silver Nitrate | Chlorides    |
| Project #         | Sample #     |
| Date              | Analyst      |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

**Person Accepting Technical Responsibility**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |   |         |                |                     |
|--|---|---------|----------------|---------------------|
|  | <b>State of Connecticut<br/>         Department of Transportation<br/>         Bureau of Engineering &amp; Highways<br/>         Report of Test of Water<br/>         MAT 230 Rev. 9-03</b> |         | Date           | Project/ Sample No. |
|  |   |         | Laboratory No. |                     |
|  | Appearance -----<br>Color -----<br>pH -----<br>Chlorides -----<br><br>Person Performing Test (initials) : _____   |         |                |                     |
| Recommended For  |   | Remarks |                |                     |
| <b>Director of Research<br/>         and Materials</b> |   |         |                |                     |

# MAT-231

# TCLP / Total Lead

|           |           |
|-----------|-----------|
| Gradation | Project # |
| # 12      | Sample #  |
| # 16      | Date      |
| # 40      | Analyst   |
| # 50      |           |
| # 80      |           |
| Pan       |           |

**Specification Reference**

Standard Specification \_\_\_\_\_  
 Supplemental Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Other \_\_\_\_\_

**Person Accepting Technical Responsibility**

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   |   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
|---|---|---------|----------------|---------------------|--|------------------|----------------|--|--|--|------|-------|--|--|--|-----|-------|--|--|--|------|-------|--|--|--|------|-------|--|--|--|------|-------|--|--|--|-----|-------|--|--|
|   | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of TCLP<br>MAT 231 Rev. 9-03   |         | Date           | Project/ Sample No. |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
|   |   |         | Laboratory No. |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
|   | <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"><b>Gradation</b></td> <td style="width: 30%;"><b>Results</b></td> <td colspan="3"></td> </tr> <tr> <td># 12</td> <td>_____</td> <td colspan="3"></td> </tr> <tr> <td>#16</td> <td>_____</td> <td colspan="3"></td> </tr> <tr> <td># 40</td> <td>_____</td> <td colspan="3"></td> </tr> <tr> <td># 50</td> <td>_____</td> <td colspan="3"></td> </tr> <tr> <td># 80</td> <td>_____</td> <td colspan="3"></td> </tr> <tr> <td>Pan</td> <td>_____</td> <td colspan="3"></td> </tr> </table> <p style="text-align: right;">Person Performing Test (initials) : _____</p> |         |                |                     |  | <b>Gradation</b> | <b>Results</b> |  |  |  | # 12 | _____ |  |  |  | #16 | _____ |  |  |  | # 40 | _____ |  |  |  | # 50 | _____ |  |  |  | # 80 | _____ |  |  |  | Pan | _____ |  |  |
| <b>Gradation</b>                              | <b>Results</b>  |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| # 12  | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| #16   | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| # 40  | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| # 50  | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| # 80  | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| Pan   | _____   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| Recommended For                               |   | Remarks |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |
| <b>Director of Research<br/>and Materials</b> |   |         |                |                     |  |                  |                |  |  |  |      |       |  |  |  |     |       |  |  |  |      |       |  |  |  |      |       |  |  |  |      |       |  |  |  |     |       |  |  |

MAT-232

# TOP SOIL

|                    |                   |
|--------------------|-------------------|
| Sample Weight      | pH                |
| Hydrometer Reading | Temperature       |
| Beaker             | Beaker & Sand     |
| Crucible           | Crucible          |
| Crucible & Sample  | Crucible & Sample |
| Crucible & Ash     | Crucible & Ash    |
| % Organics         | % Organics        |
| % Sand             | % Silt            |
| % Clay             | Texture           |
| Project #          | Sample #          |
| Date               | Analyst           |

**Specification Reference**

Standard Specification \_\_\_\_\_

Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_

Other \_\_\_\_\_

**Person Accepting Technical Responsibility**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

|  |   |                   |                                  |
|--|---|-------------------|----------------------------------|
| <p>Forms<br/>814, 814 A, and 815<br/>M.13.01</p> | <p>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Top Soil<br/>MAT 232 Rev. 9-03</p>  | <p>Date _____</p> | <p>Project/ Sample No. _____</p> |
|  | <p>Laboratory No. _____</p>   |                   |                                  |
|  | <p>Texture _____</p> <p>% Silt _____</p> <p>% Clay _____</p> <p>% Sand _____</p> <p>% Organics ( 6 to 20%) _____</p> <p>pH _____</p> <p>Tons of Lime / Acre _____</p> <p style="text-align: right;">Person Performing Test (initials) : _____</p> |                   |                                  |
|  | <p>Recommended For</p>  | <p>Remarks</p>    |                                  |
| <p>Director of Research<br/>and Materials</p>    |   |                   |                                  |

# MAT-233

# Black Enamel

|                     |                                      |                                 |
|---------------------|--------------------------------------|---------------------------------|
| <u>SCOSITY@77°F</u> | <u>RY HARD</u>                       | <u>NENESS OF GRIND</u>          |
| <u>OLOR</u>         | <u>RY OPACITY</u>                    | <u>TOTAL SOLIDS,% BY WIEGHT</u> |
| <u>KINNING</u>      | <u>DOR</u>                           | <u>JLL HARDNESS</u>             |
| <u>LEXIBILITY</u>   | <u>O RESISTANCE &amp; % RETAINED</u> | <u>PECULAR GLOSS@60</u>         |
| <u>WT/GAL@77°F</u>  | <u>% PIGMENTS BY WT</u>              | <u>ON VOLATILE</u>              |
|                     | _____                                | _____                           |
|                     | _____                                | _____                           |
|                     | _____                                | _____                           |

**Specification Reference**

Specification \_\_\_\_\_  
 Supplement Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_  
 Others \_\_\_\_\_  
 Person Accepting Standard Technical Responsibility  
 Name: \_\_\_\_\_ Title: \_\_\_\_\_

|                                |  |  |                       |                            |
|--------------------------------|--|--|-----------------------|----------------------------|
| <b>Reference File No. 25-G</b> | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of Black Enamel<br/>MAT 233 Rev. 9-03</b> |  | <b>Date</b>           | <b>Project/ Sample No.</b> |
|                                | <b>Material #</b>  | <b>Vendor #</b>                                | <b>Laboratory No.</b> |                            |
| <b>Date Sampled</b>            | Viscosity (67-77) _____  | Color _____                                    |                       |                            |
| <b>Destination Code</b>        | Wt/gal (7.5 min) _____   | Dry hard(8 Hrs max) _____                      |                       |                            |
| <b>Material Quantity</b>       | % Pigment by Wt _____  | Setting and drying time _____                  |                       |                            |
| <b>Material Unit</b>           | Volatile matter in vech(55 max) _____  | Flexibility _____                              |                       |                            |
| <b>Date Received</b>           | Specular gloss(85 min) _____   | H <sub>2</sub> O resistance & % retained _____ |                       |                            |
| <b>Batch #</b>                 | Fineness of grind(7 min) _____   | Dry opacity(0.99 min) _____                    |                       |                            |
| <b>C or M</b>                  | Non volatile _____   | Odor _____                                     |                       |                            |
| <b>Dates</b>                   | Skinning _____   | Person Performing Test (initials)              |                       |                            |
|                                | <b>Recommended For</b>   | <b>Remarks</b>                                 |                       |                            |

**Director of Research and Materials**

# MAT-234

# Orange Enamel

|                      |   |                          |                    |
|----------------------|---|--------------------------|--------------------|
| <u>ISCOSITY@77°F</u> | <u>GAS RESISTANCE &amp; % RETAINED</u>            | <u>FINENESS OF GRIND</u> | <u>DRY HARD</u>    |
| <u>DUST FREE</u>     | <u>VOLATILE MATTER IN VECH</u>                    | <u>VEHICLE % WT</u>      | <u>DRY OPACITY</u> |
| <u>RECOATING</u>     | <u>S.P RETAINED AFTER BAKING</u>                  | <u>FULL HARDNESS</u>     | <u>ODOR</u>        |
| <u>FLEXIBILITY</u>   | <u>H<sub>2</sub>O RESISTANCE &amp; % RETAINED</u> | <u>SPECULAR GLOSS@60</u> | <u>SKINNING</u>    |
| <u>WT/GAL@77°F</u>   | <u>% PIGMENTS BY WT</u>                           | <u>NON VOLATILE</u>      | <u>COLOR</u>       |
|                      | _____   | _____                    |                    |
|                      | _____   | _____                    |                    |
|                      | _____   | _____                    |                    |
|                      | _____   | _____                    |                    |
|                      | _____   | _____                    |                    |
|                      | _____   | _____                    |                    |

Specification Reference

Standard Specification \_\_\_\_\_ Supplement Specification \_\_\_\_\_  
 Project Specification \_\_\_\_\_ Others \_\_\_\_\_  
 Person Accepting Technical Responsibility Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   |  |         |                |                     |
|---|--|---------|----------------|---------------------|
| Reference File No. 104-0                  | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of Orange Enamel<br>MAT 234 Rev. 9-03 |         | Date           | Project/ Sample No. |
|   | Material #   |         | Laboratory No. |                     |
| Vendor #                                  | Viscosity (75-85) _____ Dust free(1 Hr max) _____ color _____  |         |                |                     |
| Date Sampled                              | Wt/gal (8 min) _____ Dry hard(8 Hrs max) _____   |         |                |                     |
| Destination Code                          | % Pigment by Wt(16 min) _____ Full hardness(48 Hrs max) _____  |         |                |                     |
| Material Quantity                         | Volatile matter in vech(55 max) _____ Flexibility _____  |         |                |                     |
| Material Unit                             | Specular gloss(85 min) _____ H <sub>2</sub> O resistance & % retained _____  |         |                |                     |
| Date Received                             | S.P retained after baking _____ Gas resistance & % retained _____  |         |                |                     |
| Batch #                                   | Fineness of grind(6 min) _____ Dry opacity(0.92 min) _____   |         |                |                     |
| C or M                                    | Vehicle % wt(84 Hrs max) _____ Recoating _____   |         |                |                     |
| Dates                                     | Non volatile _____ Odor _____ Skinning _____   |         |                |                     |
|   | Person Performing Test (initials)<br>_____   |         |                |                     |
|   | Recommended For  | Remarks |                |                     |
| <b>Director of Research and Materials</b> |  |         |                |                     |

# MAT-235 White & Yellow Fast Dry, Solvent Based Pavement Markings

|  |  |   |
|--|--|---|
| <b>Color</b> <small>(Fed. 595 – 33538)</small>             | <b>Dry times</b> <small>(ASTM D 711)</small>               | <b>% Pigment</b> <small>(ASTM D 3720)</small> |
| <b>Contrast Ratio</b> <small>(Fed. Test 141-4121))</small> | <b>Direct Reflect.</b> <small>(Fed. Ref. 141-6121)</small> | 1 _____ (100) =                               |
| <b>Viscosity @ 77</b> <small>(ASTM D 562)</small>          | <b>Weight /Gal</b> <small>(ASTM D 1475)</small>            | 2 _____ (100) =                               |

**Specification Reference**

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |   |   |                       |                            |
|--|---|---|-----------------------|----------------------------|
| <b>M.07.20</b><br><br>Material #<br><br>Vendor # | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of White &amp; Yellow Fast<br/>Dry Solvent Based Pavement Markings<br/>MAT 235 Rev. 9-03</b> |   | <b>Date</b>           | <b>Project/ Sample No.</b> |
|  |   |   | <b>Laboratory No.</b> |                            |
| Date Sampled                                     | <b>White</b>  | <b>Yellow</b>                             |                       |                            |
| Destination Code                                 | Viscosity      80 – 100 KU  | 80 – 100 KU                               |                       |                            |
| Material Quantity                                | Dry Time        - 3 min.  | 3 min.                                    |                       |                            |
| Material Unit                                    | Direct Reflectance    85% +   | 50 % +                                    |                       |                            |
| Date Received                                    | Color   | Visual                                    |                       |                            |
| Batch #  | Contrast Ratio        0.96 +  | 0.96 +                                    |                       |                            |
| C or M   | Weight/Gal            11.8 +  | 11.8 +                                    |                       |                            |
| Dates                ----                        | % Pigment              55% +  | 55% +                                     |                       |                            |
|  |   | Person Performing Test (initials) : _____ |                       |                            |
|  |   | <b>Recommended For</b>                    | <b>Remarks</b>        |                            |
| <b>Director of Research<br/>and Materials</b>    |   |   |                       |                            |

# MAT-236 White & Yellow Regular Dry Solvent Based Pavement Markings

|  |   |   |
|--|---|---|
| <b>Weight/Gal</b> <small>(ASTM D 1475)</small>             | <b>Viscosity @ 77</b> <small>(ASTM D 562)</small>         | <b>% Pigment</b> <small>(ASTM D 3720)</small> |
| <b>Direct Reflect.</b> <small>(Fed. Ref. 141-6121)</small> | <b>Contrast Ratio</b> <small>(Fed. Test 141-4121)</small> | 1 _____ (100) =                               |
| <b>Dry times</b> <small>(ASTM D 711)</small>               | <b>Color</b> <small>(Fed. 595 – 33538)</small>            | 2 _____ (100) =                               |

**Specification Reference**

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   |  |                   |                       |                            |
|---|--|-------------------|-----------------------|----------------------------|
| <b>M.07.20</b>                                | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of White &amp; Yellow Regular Dry<br/>Solvent Based Pavement Markings<br/>MAT 236 Rev. 9-03</b> |                   | <b>Date</b>           | <b>Project/ Sample No.</b> |
| <b>Material #</b>                             |  |                   | <b>Laboratory No.</b> |                            |
| <b>Vendor #</b>                               |  |                   |                       |                            |
| <b>Date Sampled</b>                           | <b>White</b>   | <b>Yellow</b>     |                       |                            |
| <b>Destination Code</b>                       | <b>Viscosity</b> 70 – 80 KU  | <b>70 – 80 KU</b> |                       | _____                      |
| <b>Material Quantity</b>                      | <b>Dry Time</b> - 15 min.  | <b>15 min.</b>    |                       | _____                      |
| <b>Material Unit</b>                          | <b>Direct Reflectance</b> 85% +  | <b>50 % +</b>     |                       | _____                      |
| <b>Date Received</b>                          | <b>Color</b> Visual  | <b>Visual</b>     |                       | _____                      |
| <b>Batch #</b>                                | <b>Contrast Ratio</b> 0.96 +   | <b>0.96 +</b>     |                       | _____                      |
| <b>C or M</b>                                 | <b>Weight/Gal</b> 12.8 +   | <b>11.4 +</b>     |                       | _____                      |
| <b>Dates</b> ----                             | <b>% Pigment</b> 50% +   | <b>50% +</b>      |                       | _____                      |
|   | <b>Person Performing Test (initials) :</b> _____   |                   |                       |                            |
|   | <b>Recommended For</b>   | <b>Remarks</b>    |                       |                            |
|   |  |                   |                       |                            |
| <b>Director of Research<br/>and Materials</b> |  |                   |                       |                            |

# MAT-237 White & Yellow Airport Solvent Based Paint

|   |   |  |
|---|---|--|
| <b>Viscosity @ 77</b> (ASTM D 562)      | <b>Direct Reflect.</b> (Fed. Ref. 141-6121) | <b>Contrast Ratio</b> (Fed. Test 141-4121) |
| <b>Water Resistance</b> (ASTM D1308)    | <b>Dry times</b> (ASTM D 711)               | <b>Color test</b> (595-33538 yellow)       |
| <b>Flexibility</b> (Fed Test 141c-6223) |   |  |

**Specification Reference**

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |  |                                  |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
|--|--|----------------------------------|---------------------|-----------|------------|-------|--|----------|-----------|-------|--|--------------------|-------|-------|--|-------|--------------|-------|--|----------------|--------------|-------|--|--|---------------|-------|--|-------------|----------|-------|--|------------------|----------|-------|--|
| Fed. Test TT P 85E<br><br>Material #<br><br>Vendor #<br><br>Date Sampled<br><br>Destination Code<br><br>Material Quantity<br><br>Material Unit<br><br>Date Received<br><br>Batch #<br><br>C or M<br><br>Dates            ----  | <b>State of Connecticut<br/>Department of Transportation<br/>Bureau of Engineering &amp; Highways<br/>Report of Test of White and Yellow<br/>Airport Solvent Based Paint<br/>MAT 237 Rev. 9-03</b> | Date<br><br><hr/> Laboratory No. | Project/ Sample No. |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 2px;">Viscosity</td> <td style="width: 15%; padding: 2px;">70 – 80 KU</td> <td style="width: 15%; padding: 2px;">_____</td> <td style="width: 55%;"></td> </tr> <tr> <td style="padding: 2px;">Dry Time</td> <td style="padding: 2px;">- 30 min.</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;">Direct Reflectance</td> <td style="padding: 2px;">84% +</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;">Color</td> <td style="padding: 2px;">Visual match</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;">Contrast Ratio</td> <td style="padding: 2px;">White 0.90 +</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">Yellow 0.94 +</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;">Flexibility</td> <td style="padding: 2px;">NO Flaws</td> <td style="padding: 2px;">_____</td> <td></td> </tr> <tr> <td style="padding: 2px;">Water Resistance</td> <td style="padding: 2px;">No Flaws</td> <td style="padding: 2px;">_____</td> <td></td> </tr> </table> |  |                                  |                     | Viscosity | 70 – 80 KU | _____ |  | Dry Time | - 30 min. | _____ |  | Direct Reflectance | 84% + | _____ |  | Color | Visual match | _____ |  | Contrast Ratio | White 0.90 + | _____ |  |  | Yellow 0.94 + | _____ |  | Flexibility | NO Flaws | _____ |  | Water Resistance | No Flaws | _____ |  |
| Viscosity  | 70 – 80 KU   | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Dry Time   | - 30 min.  | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Direct Reflectance   | 84% +  | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Color  | Visual match   | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Contrast Ratio   | White 0.90 +   | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
|  | Yellow 0.94 +  | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Flexibility  | NO Flaws   | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Water Resistance   | No Flaws   | _____                            |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Person Performing Test (initials) : _____  |  |                                  |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| Recommended For  |  | Remarks                          |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |
| <b>Director of Research<br/>and Materials</b>  |  |                                  |                     |           |            |       |  |          |           |       |  |                    |       |       |  |       |              |       |  |                |              |       |  |  |               |       |  |             |          |       |  |                  |          |       |  |

# MAT-238

# Waterborne Airport Paint

|   |   |   |   |   |
|---|---|---|---|---|
| % Non Volatile (ASTM D 2697)<br><br>1 _____<br><br>1 _____<br><br>1 _____ (100) = _____<br><br>2 _____<br><br>_____ (100) = _____ | Fineness (ASTM D 1210)<br><br>_____   | Scrub Resistance (ASTM D 2486)<br><br>_____       | Freeze/Thaw (ASTM D 2243)<br><br>_____        |   |
|   | Dry times (ASTM D 711)<br><br>_____   | Color test (595-33538 yellow)<br><br>_____        | Direct Reflectance (ASTM E 97)<br><br>_____   |   |
|   | % Pigment (ASTM D 3723)<br><br>1 _____ (100)= _____<br><br>2 _____ (100)= _____<br><br>Avg. _____ | Viscosity @ 77 (ASTM D 562)<br><br>_____          | Flexibility (Fed Test 141c-6223)<br><br>_____ | Wt/Gal @ 77 (ASTM D 1475) (X)(0.10) = _____ lbs/gal<br><br>cup – cup & sample = X |
|   | _____ (100) = _____<br><br>Avg. _____   | Contrast Ratio (Fed. Test 141c-4121)<br><br>_____ | Water Resistance (TT-P 1952 D)<br><br>_____   |   |

**Specification Reference**

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility

Name: \_\_\_\_\_

Title: \_\_\_\_\_

|   |  |  |   |                           |
|---|--|--|---|---------------------------|
| Fed. Spec. Paint TT – P – 1952D<br>Traffic And Airfield Marking - Waterborne<br>Material # _____<br><br>Vendor # _____<br><br>Date Sampled _____<br><br>Destination Code _____<br><br>Material Quantity _____<br><br>Material Unit _____<br><br>Date Received _____<br><br>Batch # _____<br><br>C or M _____<br><br>Dates ----- | State of Connecticut<br>Department of Transportation<br>Bureau of Engineering & Highways<br>Report of Test of Waterborne Airport<br>Paint<br>MAT 238 Rev. 9-03   |  | Date _____<br><br>Laboratory No. _____    | Project/ Sample No. _____ |
|   | Viscosity 80 – 95 KU _____<br>Direct reflectance 85 + _____<br>Flexibility NO Flaws _____<br>Water Resistance NO Flaws _____<br>Contrast Ratio 0.92 + _____<br>Nonvolatile 60% + _____<br>Scrub Resistance 500+ cyl. _____ | Pigment 60 - 62% _____<br>Freeze/Thaw - 10KU _____<br>Lead % - 0.06% _____<br>Fineness 3.0 + _____<br>Color 6.0 CIELAB _____<br>Dry Time - 10 min. _____ | Person Performing Test (initials) : _____ |                           |
|   | Recommended For _____  | Remarks _____  |   |                           |
| Director of Research and Materials  |  |  |   |                           |

# MAT-239 Fast Dry White & Yellow Waterborne Paint

|  |  |  |  |
|--|--|--|--|
| <b>% Non Volatile</b> (ASTM D 2697)<br>1 _____<br>_____<br>_____ (100) =<br>_____<br>2 _____<br>_____<br>_____ (100) = | <b>% Pigment</b> (ASTM D 3723)<br>1 _____ (100)=<br>_____<br>2 _____ (100)=<br>_____<br>Avg. _____ | <b>Color test</b> (595-33538 yellow)<br>_____<br><b>Flash Point</b> (Ref. 200G)<br>_____<br><b>Flexibility</b> (Fed Test 141c-6223)<br>_____<br><b>Contrast Ratio</b> (Fed. Test 141c-4121)<br>_____<br><b>Wt/Gal @ 77</b> (ASTM D 1475) (X)(0.10) = lbs/gal<br>cup – cup & sample = X | <b>Scrub Resist.</b> (ASTM D 2486)<br>_____<br><b>Dry times</b> (ASTM D 711)<br>_____<br><b>Viscosity @ 77</b> (ASTM D 562)<br>_____ |
|--|--|--|--|

Specification Reference

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility \_\_\_\_\_

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|  |   |  |                                  |
|--|---|--|----------------------------------|
| Ref. File # 200F<br>White & Yellow 3 min. Fast Dry<br>Lead free, waterborne paint<br>Material # _____<br>Vendor # _____<br>Date Sampled _____<br>Destination Code _____<br>Material Quantity _____<br>Material Unit _____<br>Date Received _____<br>Batch # _____<br>C or M _____<br>Dates _____ | <b>State of Connecticut<br/>                 Department of Transportation<br/>                 Bureau of Engineering &amp; Highways<br/>                 Report of Fast Dry White &amp; Yellow<br/>                 Waterborne Paint<br/>                 MAT 239 Rev. 9-03</b> | <b>Date</b> _____<br><b>Laboratory No.</b> _____ | <b>Project/ Sample No.</b> _____ |
| Viscosity 80 – 90 KU _____<br>Flexibility NO Flaws _____<br>Weight/Gal. 12.5 + _____<br>Contrast Ratio 0.96 + _____<br>Nonvolatile 76% + _____<br>Flash Point 100+ _____<br>Scrub Resistance 800+ cyl. _____   | Pigment 58 - 63% _____<br>Lead % - 0.06% _____<br>Dry Time - 3 min. _____<br>Color Visual match _____   | Person Performing Test (initials) : _____        |                                  |
| Recommended For _____<br>_____   | Remarks _____<br>_____  |  |                                  |
| <b>Director of Research and Materials</b>  |   |  |                                  |

# MAT-240 Regular Dry White & Yellow Waterborne Paint

|   |  |  |
|---|--|--|
| <b>% Non Volatile</b> (ASTM D 2697)<br>1 _____ 2 _____<br><br>_____ (100) = _____ (100) = | <b>% Pigment</b> (ASTM D 3723)<br>1 _____ (100)=<br><br>2 _____ (100)= | <b>Color test</b> (595-13538 yellow)<br><br><b>Flexibility</b> (Fed Test 141c-6223)<br><br><b>Flash Point</b> (Ref. 207B)<br><br><b>Dry times</b> (ASTM D 711) |
| <b>Wt/Gal @ 77</b> (ASTM D 1475) (X)(0.10) = _____ lbs/gal<br>cup – cup & sample = X      | <b>Viscosity @ 77</b> (ASTM D 562)                                     | <b>Contrast Ratio</b> (Fed. Test 141c-4121)  |

**Specification Reference**

Standard Specification \_\_\_\_\_ Supplemental Specification \_\_\_\_\_

Project Specification \_\_\_\_\_ Other \_\_\_\_\_

Person Accepting Technical Responsibility \_\_\_\_\_

Name: \_\_\_\_\_ Title: \_\_\_\_\_

|   |  |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
|---|--|---|----------------------------|---------|----------------|-------------|----------------|--------|---------------|-------------|--------------|-------------|-------------|----------------|--------------|-------|--------------------|-------------|-------------|----------|-----------------|-------------|------------|--|--|------------------|-----------------|--|--|--|--|
| Ref. File # 207B<br>White & Yellow 15min. Reg. Dry<br>Lead free, waterborne paint<br><br><b>Material #</b><br><br><b>Vendor #</b><br><br><b>Date Sampled</b><br><br><b>Destination Code</b><br><br><b>Material Quantity</b><br><br><b>Material Unit</b><br><br><b>Date Received</b><br><br><b>Batch #</b><br><br><b>C or M</b><br><br><b>Dates</b> ---- | <b>State of Connecticut<br/>         Department of Transportation<br/>         Bureau of Engineering &amp; Highways<br/>         Report of Test of Regular Dry White<br/>         &amp; Yellow Waterborne Paint<br/>         MAT 240 Rev. 9-03</b>   | <b>Date</b><br><br><b>Laboratory No.</b>  | <b>Project/ Sample No.</b> |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
|   | <table style="width:100%; border: none;"> <tr> <td style="width:30%;">Viscosity</td> <td style="width:30%;">75 – 85 KU _____</td> <td style="width:30%;">Pigment</td> <td style="width:10%;">50 - 60% _____</td> </tr> <tr> <td>Flexibility</td> <td>NO Flaws _____</td> <td>Lead %</td> <td>- 0.06% _____</td> </tr> <tr> <td>Weight/Gal.</td> <td>12.5 + _____</td> <td>Freeze/Thaw</td> <td>-10KU _____</td> </tr> <tr> <td>Contrast Ratio</td> <td>0.96 + _____</td> <td>Color</td> <td>Visual match _____</td> </tr> <tr> <td>Nonvolatile</td> <td>70% + _____</td> <td>Dry Time</td> <td>- 15 min. _____</td> </tr> <tr> <td>Flash Point</td> <td>100+ _____</td> <td></td> <td></td> </tr> <tr> <td>Scrub Resistance</td> <td>500+ cyl. _____</td> <td></td> <td></td> </tr> </table> | Viscosity                                 | 75 – 85 KU _____           | Pigment | 50 - 60% _____ | Flexibility | NO Flaws _____ | Lead % | - 0.06% _____ | Weight/Gal. | 12.5 + _____ | Freeze/Thaw | -10KU _____ | Contrast Ratio | 0.96 + _____ | Color | Visual match _____ | Nonvolatile | 70% + _____ | Dry Time | - 15 min. _____ | Flash Point | 100+ _____ |  |  | Scrub Resistance | 500+ cyl. _____ |  |  |  |  |
| Viscosity   | 75 – 85 KU _____   | Pigment                                   | 50 - 60% _____             |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Flexibility   | NO Flaws _____   | Lead %                                    | - 0.06% _____              |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Weight/Gal.   | 12.5 + _____   | Freeze/Thaw                               | -10KU _____                |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Contrast Ratio  | 0.96 + _____   | Color                                     | Visual match _____         |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Nonvolatile   | 70% + _____  | Dry Time                                  | - 15 min. _____            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Flash Point   | 100+ _____   |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| Scrub Resistance  | 500+ cyl. _____  |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
|   |  | Person Performing Test (initials) : _____ |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
|   | <table style="width:100%; border: none;"> <tr> <td style="width:30%; border: none;"><b>Recommended For</b></td> <td style="border: none;"><b>Remarks</b></td> </tr> <tr> <td style="border: none; height: 40px;"></td> <td style="border: none;"></td> </tr> </table>  | <b>Recommended For</b>                    | <b>Remarks</b>             |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| <b>Recommended For</b>  | <b>Remarks</b>   |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
|   |  |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |
| <b>Director of Research<br/>         and Materials</b>  |  |   |                            |         |                |             |                |        |               |             |              |             |             |                |              |       |                    |             |             |          |                 |             |            |  |  |                  |                 |  |  |  |  |

**State of Connecticut Department of Transportation  
 Division of Materials Testing MAT 241  
 Independent Assurance Program Evaluation Report  
 Chemical Aggregate Section – Concrete Aggregates – Fine  
 Aggregate**

Purpose: This form is for evaluation of assurance testing of concrete aggregates. In accordance with the minimum requirements for testing, concrete aggregates are sampled and tested for acceptance purposes randomly on a bi-weekly basis, and assurance testing of these processes is required each ten tests. This assurance testing evaluates in-house (not directly related to the projects) sample reducing and gradation analysis of concrete aggregates tested at various satellite locations utilizing various equipment and personnel. See MAT 244 for assurance testing criteria.

**Date of bi-weekly period requiring assurance testing:**

| Number of assurance tests performed                                  | Number of assurance tests not meeting assurance criteria | Percentage of assurance tests not meeting assurance criteria | Was corrective action taken and noted for tests not meeting criteria? |
|--|--|--|---|
| <b>District II Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>District III Lab*</b>   |  |  |   |
|  |  |  |   |
| <b>District IV Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>Totals for Concrete Aggregate Assurance Testing in the Period</b> |  |  |   |
|  |  |  |   |

NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\* The District I Laboratory (Central Laboratory) tests all assurance samples provided by the Districts II, III, and IV Laboratories and is equally a part of the assurance testing program, including evaluations and determination of assignable cause for testing not meeting assurance testing criteria.

**State of Connecticut Department of Transportation  
 Division of Materials Testing MAT 242  
 Independent Assurance Program Evaluation Report  
 Chemical Aggregate Section – Subbase and Processed Aggregate  
 Base**

Purpose: This form is for evaluation of assurance testing of Subbase and Processed Aggregate Base. In accordance with the minimum requirements for testing, roadbase aggregates are sampled and tested for acceptance and assurance processes. To meet project related minimum testing requirements, project personnel notify the District Laboratories for required acceptance and assurance testing of these materials. The process starts at the project site, where laboratory personnel witness and critique the sampling procedure at the site. Laboratory acceptance testing is then performed and split samples are sent to Central Laboratory for in-house (not directly related to the projects) assurance testing, which evaluates sample reducing and gradation analysis of the materials tested at various satellite locations utilizing various equipment and personnel. See MAT 244 for assurance testing criteria.

| <b>Date of assurance testing period (from/to):</b>   |  |  |   |
|--|--|--|---|
| Number of assurance tests performed  | Number of assurance tests not meeting assurance criteria | Percentage of assurance tests not meeting assurance criteria | Was corrective action taken and noted for tests not meeting criteria? |
| <b>District II Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>District III Lab*</b>   |  |  |   |
|  |  |  |   |
| <b>District IV Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>Totals for Subbase &amp; Processed Aggregate Base<br/>Assurance Testing in the Period</b> |  |  |   |
|  |  |  |   |

NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\* The District I Laboratory (Central Laboratory) tests all assurance samples provided by the Districts II, III, and IV Laboratories and is equally a part of the assurance testing program, including evaluations and determination of assignable cause for testing not meeting assurance testing criteria.

**State of Connecticut Department of Transportation  
 Division of Materials Testing MAT 243  
 Independent Assurance Program Evaluation Report  
 Chemical Aggregate Section – Plastic PC Concrete**

Purpose: This form is for evaluation of assurance testing of plastic PC concrete. In accordance with the minimum requirements for testing, plastic PC concrete is required to be sampled and tested by project personnel for required acceptance and assurance testing. Upon notification of the projects for required assurance testing, laboratory personnel evaluate the sampling and testing procedure, verify that adequate and calibrated testing equipment is utilized and readily available, (and verify use of qualified personnel for NHS projects). When requested, technical expertise is also provided to the project personnel during the subject assurance testing. Forms MAT 222 and MAT 224 (MAT 225 for metric projects) are required to be completed by laboratory personnel during the assurance testing, and if testing deficiencies are encountered they are noted. District offices are notified via memorandum of any found deficiencies. NOTE: This form does not evaluate the projects on an individual basis for conformance to minimum acceptance and assurance testing requirements as specified in the "Schedule of Minimum Requirements for Sampling Materials for Test". As stated above, this form is for evaluation of the assurance testing of plastic PC concrete. Percentages below are based on tests that were requested by the projects and that are on file at the Division of Materials Testing.

**Date of assurance testing period:**

| Number of assurance tests performed                                   | Number of assurance tests noting any testing deficiencies | Percentage of assurance tests noting testing deficiencies | Was the project notified via memorandum of any testing deficiencies? |
|---|---|---|--|
| <b>District II Lab*</b>   |   |   |  |
|   |   |   |  |
| <b>District III Lab*</b>  |   |   |  |
|   |   |   |  |
| <b>District IV Lab*</b>   |   |   |  |
|   |   |   |  |
| <b>Totals for Plastic PC Concrete Assurance Testing in the Period</b> |   |   |  |
|   |   |   |  |

NOTES: \_\_\_\_\_

Note: During the assurance test, District Laboratory personnel request a copy of the batch ticket representing the material delivered to the project site. For verification of producer submitted/DOT approved mix designs, batch weights are recorded and compared to approved mix designs on file at the Division of Materials Testing. Additionally, unit weights and volumetric calculations are performed during the assurance test as part of the mix design verification procedure.

STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING MAT 244 Rev. 12-03

**AGGREGATE ASSURANCE SAMPLES – VARIATION LIMITS**

If assurance samples tested at the Central Laboratory vary from the samples tested at the District Laboratories by more than the percent shown below, the cause of the variations shall be investigated. These limits were derived from historical experience, along with engineering expertise.

| NO. 4 AGGREGATE        | NO. 6 AGGREGATE      | NO. 67 AGGREGATE     | NO. 8 AGGREGATE     |
|------------------------|----------------------|----------------------|---------------------|
| 37.5 mm (1 1/2") - 4.0 | 19.0 mm (3/4") - 4.0 | 19.0 mm (3/4") - 4.0 | 9.5 mm (3/8") - 5.0 |
| 25.0 mm (1") - 9.0     | 12.5 mm (1/2") - 6.0 | 9.5 mm (3/8") - 3.0  | 4.75 mm (#4) - 5.0  |
| 19.0 mm (3/4") - 6.0   | 9.5 mm (3/8") - 3.0  | 4.75 mm (#4) - 3.0   | 2.36 mm (#8) - 3.0  |
| 9.5 mm (3/8") - 3.0    | 4.75 mm (#4) - 3.0   | 2.36 mm (#8) - 3.0   | 1.18 mm (#16) - 3.0 |

| CONCRETE SAND             | SUBBASE                 | PROCESSED AGGREGATE BASE |
|---------------------------|-------------------------|--------------------------|
| 4.75 mm (#4) - 3.0        | 37.5 mm ( 1 1/2") - 6.0 | 19.0 mm (3/4") - 6.0     |
| 2.36 mm (#8) - 6.0        | 6.3 mm (1/4") - 6.0     | 6.3 mm (1/4") - 6.0      |
| 1.18 mm (#16) - 10.0      | 2.0 mm (#10) - 6.0      | 425 µm (#40) - 5.0       |
| 600 µm (#30) - 10.0       | 425 µm (#40) - 5.0      | 150 µm (#100) - 4.0      |
| 300 µm (#50) - 9.0        | 150 µm (#100) - 4.0     |                          |
| 150 µm (#100) - 4.0       | 75 µm (#200) - 3.0      |                          |
| F.M. – 0.40<br>SILT – 1.5 |                         |                          |

**State of Connecticut Department of Transportation  
 Division of Materials Testing MAT 245  
 Independent Assurance Program Evaluation Report  
 Chemical Aggregate Section – Concrete Aggregates – Coarse  
 Aggregate**

Purpose: This form is for evaluation of assurance testing of concrete aggregates. In accordance with the minimum requirements for testing, concrete aggregates are sampled and tested for acceptance purposes randomly on a bi-weekly basis, and assurance testing of these processes is required each ten tests. This assurance testing evaluates in-house (not directly related to the projects) sample reducing and gradation analysis of concrete aggregates tested at various satellite locations utilizing various equipment and personnel. See MAT 244 for assurance testing criteria.

**Date of bi-weekly period requiring assurance testing:**

| Number of assurance tests performed                                  | Number of assurance tests not meeting assurance criteria | Percentage of assurance tests not meeting assurance criteria | Was corrective action taken and noted for tests not meeting criteria? |
|--|--|--|---|
| <b>District II Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>District III Lab*</b>   |  |  |   |
|  |  |  |   |
| <b>District IV Lab*</b>  |  |  |   |
|  |  |  |   |
| <b>Totals for Concrete Aggregate Assurance Testing in the Period</b> |  |  |   |
|  |  |  |   |

NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\* The District I Laboratory (Central Laboratory) tests all assurance samples provided by the Districts II, III, and IV Laboratories and is equally a part of the assurance testing program, including evaluations and determination of assignable cause for testing not meeting assurance testing criteria.









**MAT-303**

|   |   |                 |                                      |         |
|---|---|-----------------|--------------------------------------|---------|
| PROJECT NUMBER:   | <b>MAT-303</b><br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>Chain Link Fence Fabric | PROCESSING DATE | MATERIAL CODE<br><br><b>3300</b>     |         |
| SAMPLE NUMBER:  |   | LABORATORY NO.  |                                      |         |
| <u>SPECIFICATION REFERENCE</u><br>STANDARD SPECIFICATION<br>SUPPLEMENTAL SPECIFICATION<br>PROJECT SPECIAL PROVISION<br>OTHER<br><br>PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u><br><br>NAME : _____<br>TITLE: _____ |   | Actual          | Specification                        |         |
|   | Height of Fabric, inches (mm)   |                 | As specified on plans or spec. prov. |         |
|   | Gage of Wire  |                 | No. 9 gage                           |         |
|   | Size of Mesh, inches (mm)   |                 | 2-inch (50 mm) mesh                  |         |
|   | Edge of Finish  |                 | Knuckled                             |         |
|   | Tensile Strength, psi (MPa)   |                 | See above                            |         |
|   | Weight of Coating, oz/ft <sup>2</sup> (g/m <sup>2</sup> )   |                 | See above                            |         |
|   | BEGIN DATE  | END DATE        | TESTED BY                            | REMARKS |
|   | RECOMMENDATION  |                 |                                      |         |
|   | DIRECTOR OF RESEARCH AND MATERIALS  |                 |                                      |         |

**MAT-304 (Reduced for inclusion in manual)**

|   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
|---|--------|-------|------|-------|-------------|------|--------|--------|-----------|---------|----------|---------|-----------|---------|----------|-------|-------|-----------------------|-----------------------|---------|--------|
| Source and Location of Fine Aggregate Supply:   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
| Source and Location of Coarse Aggregate Supply: |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
| Tests Witnessed by:                             |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
| Machine Readings                                |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
| RCP   | RCP    | RCP   | RCP  | Slot  | Method of   | Date | Date   | Age    | Req'd     | Req'd   | Req'd    | Actual  | Actual    | Actual  | Actual   | Core  | Absp. | Req'd Reinf.          | Actual Reinf.         | Remarks | Status |
| Size  | Length | Class | Wall |       | Manufacture | Cast | Broken |        | .01 Crack | .01+10% | Ultimate | Visible | .01 Crack | .01+10% | Ultimate |       |       | (in <sup>2</sup> /ft) | (in <sup>2</sup> /ft) |         |        |
| (in.)   | (ft)   |       |      | (Y/N) |             |      |        | (days) | (lbs.)    | (lbs.)  | (lbs.)   | (lbs.)  | (lbs.)    | (lbs.)  | (lbs.)   | (Y/N) | (%)   | i                     | o                     | i       | o      |
|   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
|   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
|   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |
|   |        |       |      |       |             |      |        |        |           |         |          |         |           |         |          |       |       |                       |                       |         |        |

**MAT-305**

|  |  |          |               |         |
|--|--|----------|---------------|---------|
| PROJECT NUMBER:  | <b>MAT-305</b>   | DATE     | MATERIAL CODE |         |
| SAMPLE NUMBER:   | State of Connecticut<br>Department of Transportation<br>REPORT OF TEST:<br>Steel Bars and Shapes | LAB #    |               |         |
| <p style="text-align: center;"><u>SPECIFICATION REFERENCE</u></p> <p>STANDARD SPECIFICATION _____</p> <p>SUPPLEMENTAL SPECIFICATION _____</p> <p>PROJECT SPECIAL PROVISION _____</p> <p>OTHER _____</p> <p style="text-align: center;">PERSON ACCEPTING _____</p> <p style="text-align: center;"><u>TECHNICAL RESPONSIBILITY</u></p> <p>NAME : _____</p> <p>TITLE: _____</p> | Size   |          |               |         |
|  | Grade  |          |               |         |
|  | Area, in <sup>2</sup> (mm <sup>2</sup> )   |          |               |         |
|  | Load, lbf (kN)   |          |               |         |
|  | Y.P., psi (MPa)  |          |               |         |
|  | Load, lbf (kN)   |          |               |         |
|  | T.S., psi (MPa)  |          |               |         |
|  | Elong. (%)   |          |               |         |
|  | Cold Bend  |          |               |         |
|  | Epoxy, mils (µm)   |          |               |         |
|  | Test No.   |          |               |         |
|  | Begin Test   | End Test | Tested By     | REMARKS |
|  | Recommendations  |          |               |         |
|  | ENGINEER OF MATERIALS  |          |               |         |

**Tables From ASTM A 82  
Steel Wire, Plain, For Concrete Reinforcement**

| <b>Table 1 Tension Test Requirements</b> |                 |
|--|-----------------|
| Tensile strength, min, ksi (MPa)         | 80 (550)        |
| Yield strength, min, ksi (MPa)           | 70 (485)        |
| Reduction of area, min, %                | 30 <sup>A</sup> |

<sup>A</sup>For material testing of 100 ksi (690 MPa) tensile strength, the reduction of area shall be not less than 25%.

| <b>Table 2 Tension Test Requirements (Material for Welded Wire Reinforcement)</b> |                      |                        |
|---|----------------------|------------------------|
|   | Size W1.2 and Larger | Smaller than Size W1.2 |
| Tensile strength based on wire nom. area, min, ksi (MPa)                          | 75 (515)             | 70 (485)               |
| Yield strength based on wire nom. Area, min, ksi (MPa)                            | 65 (450)             | 56 (385)               |
| Reduction of area, min, %   | 30 <sup>A</sup>      | 30 <sup>A</sup>        |

<sup>A</sup>For material testing over 100 ksi (690 MPa) tensile strength, the reduction of area shall be not less than 25 %.

| <b>Table 4 Permissible Variation in Wire Diameter</b> |  |  |
|---|--|--|
| Size Number   | Nominal Diameter, in. (mm)               | Permissible Variation Plus and Minus, in. (mm) |
| Smaller than W5                                       | Under 0.252 (6.40)                       | 0.003 (0.08)                                   |
| W5 to W12, incl                                       | 0.252 (6.40) to 0.391 (9.93), incl       | 0.004 (0.10)                                   |
| Over to W20, incl                                     | Over 0.391 (9.93) to 0.505 (12.83), incl | 0.006 (0.15)                                   |
| Over W20  | Over 0.505 (12.83)                       | 0.008 (0.20)                                   |

|  |   |            |                  |               |                |  |
|--|---|------------|------------------|---------------|----------------|--|
| PROJECT NUMBER:  | <b>MAT-306</b>  |            | PROCESSING DATE  | MATERIAL CODE |                |  |
| SAMPLE NUMBER:   | DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>Plain Wire for Welded Wire Fabric |            | LABORATORY NO.   | <b>3145</b>   |                |  |
| <u>SPECIFICATION REFERENCE</u><br>STANDARD SPECIFICATION _____<br>SUPPLEMENTAL SPECIFICATION _____<br>PROJECT SPECIAL PROVISION _____<br>OTHER _____<br><br><u>PERSON ACCEPTING TECHNICAL RESPONSIBILITY</u><br>NAME : _____<br>TITLE: _____ |   | Horizontal | Horizontal Spec. | Vertical      | Vertical Spec. |  |
|  | Spacing (in.)   |            | —                |               | —              |  |
|  | Size Number   |            |                  |               |                |  |
|  | Act. Diam. (in)   |            |                  |               |                |  |
|  | Nom. Area (in <sup>2</sup> )  |            | —                |               | —              |  |
|  | Load (lbf)  |            | —                |               | —              |  |
|  | T.S. (psi)  |            |                  |               |                |  |
|  | Condition   |            | —                |               | —              |  |
|  | BEGIN DATE  | END DATE   | TESTED BY        | REMARKS       |                |  |
|  | RECOMMENDATION  |            |                  |               |                |  |
| DIRECTOR OF RESEARCH AND MATERIALS   |   |            |                  |               |                |  |

|  |   |          |                 |               |  |
|--|---|----------|-----------------|---------------|--|
| PROJECT NUMBER:  | <b>MAT-307</b>  |          | PROCESSING DATE | MATERIAL CODE |  |
| SAMPLE NUMBER:   | DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST<br>General Tensile Strength |          | LABORATORY NO.  |               |  |
| <u>SPECIFICATION REFERENCE</u><br>_____<br><u>STANDARD SPECIFICATION</u><br>_____<br><u>SUPPLEMENTAL SPECIFICATION</u><br>_____<br><u>PROJECT SPECIAL PROVISION</u><br>_____<br><u>OTHER</u><br>_____<br><br><u>PERSON ACCEPTING</u><br>_____<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME: _____<br>TITLE: _____ | Size  |          |                 |               |  |
|  | Grade   |          |                 |               |  |
|  | Area (in <sup>2</sup> )   |          |                 |               |  |
|  | Load (lbf)  |          |                 |               |  |
|  | Y.P. (psi)  |          |                 |               |  |
|  | Load (lbf)  |          |                 |               |  |
|  | T.S. (psi)  |          |                 |               |  |
|  | Elong. (%)  |          |                 |               |  |
|  | Cold Bend   |          |                 |               |  |
|  | Galv (mils)   |          |                 |               |  |
|  | Test No.  |          |                 |               |  |
|  | BEGIN DATE  | END DATE | TESTED BY       | REMARKS       |  |
|  | RECOMMENDATION  |          |                 |               |  |
| DIRECTOR OF RESEARCH AND MATERIALS   |   |          |                 |               |  |

**STATE OF CONNECTICUT - DEPARTMENT OF TRANSPORTATION**

Division of Materials Testing 280 West Street , Rocky Hill CT 06067-3502

Report For Test on Portland Cement Concrete Cylinders

MAT-308 REV 6/03

|   |  |                                      |                        |
|---|--|--------------------------------------|------------------------|
| <i>Inspector is responsible for unshaded portion.</i> |  |                                      | <i>Lab</i>             |
| <i>personnel are responsible for shaded areas.</i>    |  |                                      |                        |
|   |  | Curing Box Used                      | Y    N    (Circle one) |
| <b>Project No.</b>                                    |  | <b>District</b>                      |                        |
| <b>Sample/Cyl. No.</b>                                |  | <b>Source</b>                        |                        |
| <b>Sample version</b>                                 |  | <b>Plant Location</b>                |                        |
| <b>Structure/location where concrete was placed</b>   |  | <b>Sampled From (i.e.chute/pump)</b> |                        |
| <b>Item Number/Code</b>                               |  | <b>Inspector</b>                     |                        |
| <b>Item Quantity</b>                                  |  |                                      |                        |
| <b>Material Quantity</b>                              |  | <b>Units</b>                         |                        |
| <b>Brand of Cement</b>                                |  |                                      |                        |
| <b>Required Strength</b>                              |  | <b>Contractor</b>                    |                        |

|                        |  |   |                                       |
|------------------------|--|---|---------------------------------------|
| <b>Air (C173/C231)</b> |  | } | <i>Measured at point of placement</i> |
| <b>Conc Temp C1064</b> |  |   |                                       |
| <b>Slump C143</b>      |  |   |                                       |

|                         | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------------|---|---|---|---|---|---|
| <b>Age</b>              |   |   |   |   |   |   |
| <b>Date Sampled</b>     |   |   |   |   |   |   |
| <b>Date Received</b>    |   |   |   |   |   |   |
| <b>Date Tested</b>      |   |   |   |   |   |   |
| <b>Cyl Dia.</b>         |   |   |   |   |   |   |
| <b>Total Load</b>       |   |   |   |   |   |   |
| <b>Load (PSI/Mpa)</b>   |   |   |   |   |   |   |
| <b>Average</b>          |   |   |   |   |   |   |
| <b>Status</b>           |   |   |   |   |   |   |
| <b>Lab No.</b>          |   |   |   |   |   |   |
| <b>Material No.</b>     |   |   |   |   |   |   |
| <b>Vendor No.</b>       |   |   |   |   |   |   |
| <b>Destination Code</b> |   |   |   |   |   |   |
| <b>Usage Code</b>       |   |   |   |   |   |   |
| <b>Tested by</b>        |   |   |   |   |   |   |

**Item Number** : Contract Item under which Contractor is being paid for concrete that is represented by sample.

**Item Quantity**: Amount of concrete/Number of items represented by sample in pay units for that contract item. It is never cylinders

**Material Quantity**: Amount of Concrete represented by sample. Min. Schedule for Test requires one sample every 75 CY for structures and 50 CY for pavement. It is never cylinders.



Durometer Readings

- 1.
- 2.
- 3.
- 4.
- 5.

Average =

Identification

Conn.:

Proj. No.:

Manufacturers I.D.:

Pad Type No.:

Month and Year:

Bridge Number:

Lot Number:

Pad Number:

|   |                                      |             |                |         |
|---|--------------------------------------|-------------|----------------|---------|
| <b>PROJECT NUMBER:</b>  | <b>MAT-310</b>                       | DATE        | MATERIAL CODE  |         |
| <b>SAMPLE NUMBER:</b>   | STATE OF CT D.O.T.<br>REPORT OF TEST | LAB #       | <b>3505</b>    |         |
| <u>SPECIFICATION REFERENCE</u><br>_____ STANDARD SPECIFICATION<br>_____ SUPPLEMENTAL SPECIFICATION<br>_____ PROJECT SPECIAL PROVISION<br>_____ OTHER<br><br>_____ PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u><br><br>NAME : _____<br>TITLE: _____ | ELASTOMERIC BEARING PAD              | PAD DATA    |                |         |
|   | Size                                 |             | SPECIFICATIONS |         |
|   | Slope                                |             |                |         |
|   | Spacing (Lam.)                       |             |                |         |
|   | No. & Thickness                      |             |                |         |
|   | Edge Cover                           |             |                |         |
|   | Elast. Layer                         |             |                |         |
|   | Comp. Strain                         |             |                |         |
|   | Duro. Hardness                       |             |                |         |
|   | Shop Drawing                         |             |                |         |
|   | Cert. Test Report                    |             |                |         |
|   | Test Date                            | Report Date | Tested By      | Remarks |
|   | Recommendation                       |             |                |         |
|   | ENGINEER OF MATERIALS                |             |                |         |

**Compression Units**

|  |    |    |    |    |    |
|--|----|----|----|----|----|
| Specimen:  | #1 | #2 | #3 | #4 | #5 |
| Gross Area (A), in <sup>2</sup> (mm <sup>2</sup> ) |    |    |    |    |    |
| Maximum Load (W), lbf (N)                          |    |    |    |    |    |

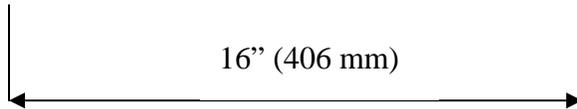
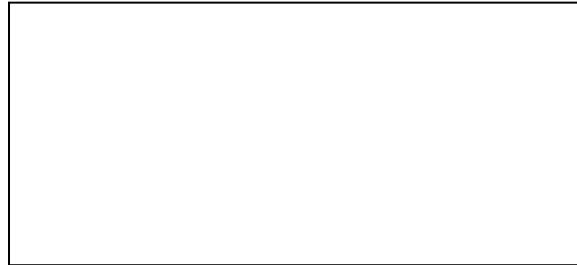
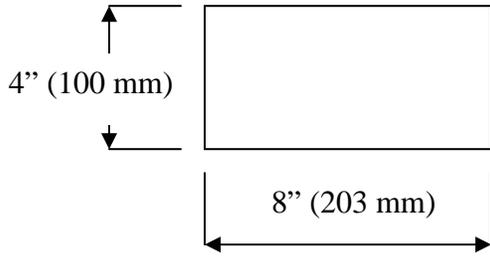
**Absorption Units**

|   |    |    |    |    |    |
|---|----|----|----|----|----|
| Specimen:   | #1 | #2 | #3 | #4 | #5 |
| Saturated Weight 5-h boil (W <sub>b</sub> ),<br>lb (kg) |    |    |    |    |    |
| Oven Dry Weight – Final (W <sub>d</sub> ),<br>lb (kg)   |    |    |    |    |    |

Compressive Strength, psi = W/A

Absorption, % = 100(W<sub>b</sub>-W<sub>d</sub>)/W<sub>d</sub>

|  |   |          |           |    |         |                 |               |            |            |  |
|--|---|----------|-----------|----|---------|-----------------|---------------|------------|------------|--|
| PROJECT NUMBER:  | <b>MAT-312</b><br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST<br>CLAY BRICK |          |           |    |         | PROCESSING DATE | MATERIAL CODE |            |            |  |
| SAMPLE NUMBER:   |   |          |           |    |         | LABORATORY NO.  |               |            |            |  |
| <u>SPECIFICATION REFERENCE</u><br>STANDARD SPECIFICATION _____<br>SUPPLEMENTAL SPECIFICATION _____<br>PROJECT SPECIAL PROVISION _____<br>OTHER _____<br><br>PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ |   | #1       | #2        | #3 | #4      | #5              | Ave           | Spec. Ave. | Spec. Ind. |  |
|  | Depth, in (mm)  |          |           |    |         |                 |               |            |            |  |
|  | Length, in (mm)   |          |           |    |         |                 |               |            |            |  |
|  | Width, in (mm)  |          |           |    |         |                 |               |            |            |  |
|  | Strength, psi (MPa)   |          |           |    |         |                 |               |            |            |  |
|  | Absorption by 5-hour boiling (%)  |          |           |    |         |                 |               |            |            |  |
|  | BEGIN DATE  | END DATE | TESTED BY |    | REMARKS |                 |               |            |            |  |
|  | RECOMMENDATION  |          |           |    |         |                 |               |            |            |  |
| DIRECTOR OF RESEARCH AND MATERIALS   |   |          |           |    |         |                 |               |            |            |  |



|  |  |   |           |          |                                  |  |   |  |  |
|--|--|---|-----------|----------|----------------------------------|--|---|--|--|
| PROJECT NUMBER:  |  | <b>MAT-313</b><br>STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>CONCRETE BLOCK FOR SLOPE PROTECTION |           |          | PROCESSING DATE                  |  | <b>MATERIAL CODE</b><br><br><b>3197</b> |  |  |
| SAMPLE NUMBER:   |  |   |           |          | LABORATORY NO.                   |  |   |  |  |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br>PERSON ACCEPTING<br>_____<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ |  | SAMPLE 1  | SAMPLE 2  | SAMPLE 3 | SPEC.                            |  |   |  |  |
|  | L, Length,<br>inches (mm)                      |   |           |          | 16 +/- 1/2 in<br>406 +/- 12.5 mm |  |   |  |  |
|  | W, Width,<br>inches (mm)                       |   |           |          | 8 +/- 1/2<br>203 +/- 12.5 mm     |  |   |  |  |
|  | H, Height,<br>inches (mm)                      |   |           |          | 4 +/- 1/2<br>100 +/- 12.5 mm     |  |   |  |  |
|  | A, Area,<br>in <sup>2</sup> (mm <sup>2</sup> ) |   |           |          | ----                             |  |   |  |  |
|  | Load,<br>lbf (N)                               |   |           |          | ----                             |  |   |  |  |
|  | Strength,<br>psi (MPa)                         |   |           |          | 3000 psi<br>21 MPa               |  |   |  |  |
|  | BEGIN DATE                                     | END DATE  | TESTED BY | REMARKS  |                                  |  |   |  |  |
|  | RECOMMENDATION                                 |   |           |          |                                  |  |   |  |  |
|  | DIRECTOR OF RESEARCH AND MATERIALS             |   |           |          |                                  |  |   |  |  |



|         |      |
|---------|------|
| Signed: | DATE |
|---------|------|

|  |  |                 |               |
|--|--|-----------------|---------------|
| PROJECT NUMBER:  | <b>MAT-315</b>   | PROCESSING DATE | MATERIAL CODE |
| SAMPLE NUMBER:   | DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>ALTERNATIVE EVALUATION<br>TEST SHEET  | LABORATORY NO.  |               |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br><br><u>PERSON ACCEPTING</u><br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ | <p style="text-align: center;"><b>The subject material has been evaluated based on the following:</b></p> <ul style="list-style-type: none"> <li>( ) Certified Test Report (attached/on file)</li> <li>( ) Materials Certificate (attached/on file)</li> <li>( ) Laboratory personnel at the fabrication plant</li> <li>( ) Test bars for the cast dates listed</li> <li>( ) The Approved Product List</li> <li>( ) Approved Catalog Cut</li> <li>( ) Field Inspection by Project Personnel</li> <li>( ) Past Performance</li> <li>( ) Proprietary Item</li> </ul> |                 |               |
|  | BEGIN DATE   | END DATE        | TESTED BY     |
|  | RECOMMENDATION   |                 | REMARKS       |

|                            |  |
|----------------------------|--|
| SAMPLE                     |  |
| BRAND                      |  |
| TYPE                       |  |
| IN LAB                     |  |
| 94 Lbs. Bag<br>42 Kgs. Bag |  |
| GAL CAN                    |  |
| OTHER                      |  |

**Specification Reference**  
 STANDARD SPECIFICATION \_\_\_\_\_  
 SUPPLEMENTAL SPECIFICATION \_\_\_\_\_  
 PROJECT SPECIAL PROVISION \_\_\_\_\_  
 OTHER \_\_\_\_\_

PERSON ACCEPTING  
TECHNICAL RESPONSIBILITY

NAME \_\_\_\_\_  
 TITLE \_\_\_\_\_

|                          |  |                  |  |           |
|--------------------------|--|------------------|--|-----------|
| DATE TO CHEM. RM.        |  | FULL<br>CHEMICAL |  | PROJECT # |
| DATE RESULTS<br>RETURNED |  | FINESS ONLY      |  | SAMPLE #  |

|  |                                 |                              |  |                                  |               |                            |  |
|--|---------------------------------|------------------------------|--|----------------------------------|---------------|----------------------------|--|
| <b>Mat - 316</b>                               | AASHTO M - 85<br>(ASTM C - 150) |                              |  | LAB NO.                          |               |                            |  |
| <b>REPORT OF TEST PORTLAND CEMENT (TYPE I)</b> |                                 |                              |  |                                  |               |                            |  |
| PHYSICAL SECTION TEST RESULTS                  |                                 |                              |  | CHEMICAL SECTION TEST RESULTS    |               |                            |  |
| TEST   | LAB<br>RESULT                   | AASHTO<br>SPEC.              |  | TEST                             | LAB<br>RESULT | AASHTO<br>SPEC.            |  |
| AIR<br>CONTENT %                               |                                 | 12 MAX.                      |  | FINENESS<br>SoCm/Gm              |               | 2600 -<br>4200             |  |
|  |                                 |                              |  | SiO <sub>2</sub> %               |               | NONE                       |  |
| AUTOCLAVE<br>EXPANSION %                       |                                 | .80 MAX                      |  | Al <sub>2</sub> O <sub>3</sub> % |               | NONE                       |  |
| COMPRESSIVE<br>STRENGTH                        |                                 |                              |  | Fe <sub>2</sub> O <sub>3</sub> % |               | NONE                       |  |
| 1 Day MPa<br>PSI                               |                                 | NONE                         |  | MgO %                            |               | 6.0 MAX.                   |  |
| 3 Day MPa<br>PSI                               |                                 | 12 MPa Min.<br>1740 PSI Min. |  | SO <sub>3</sub> %                |               | a) 3.0 MAX.<br>b) 3.5 MAX. |  |
| 7 Day MPa<br>PSI                               |                                 | 19 MPa Min.<br>2760 PSI Min. |  | LOSS ON<br>IGNITION %            |               | 3.0 MAX.                   |  |
|  |                                 |                              |  | INSOLUABLE<br>RESIDUE %          |               | 0.75 MAX.                  |  |
|  |                                 |                              |  | C <sub>3</sub> S %               |               | NONE                       |  |
| TIME OF<br>SETTING                             |                                 |                              |  | C <sub>2</sub> S %               |               | NONE                       |  |
| VICAT, MIN                                     |                                 | 45 to 375                    |  | C <sub>3</sub> A %               |               | NONE                       |  |

|                  |  |  |  |  |
|------------------|--|--|--|--|
|                  |  |  |  | a) WHEN C <sub>3</sub> A < 8%<br>b) WHEN C <sub>3</sub> A > 8%<br>NOTES: |
| RECOMMENDED FOR: |  |  |  | REMARKS:   |

MAT-316 - Page 2

CEMENT \_\_\_\_\_ TYPE \_\_\_\_\_ LAB NO. \_\_\_\_\_

|                    |       |       |                    |  |  |  |
|--------------------|-------|-------|--------------------|--|--|--|
| T - 106<br>C - 109 | DATE: | TIME: | T - 137<br>C - 185 |  |  |  |
| CUBES MADE:        |       |       | AIR CONTENT        |  |  |  |
| AGE                |       |       | WATER %            |  |  |  |
| DATE               |       |       | WATER ml           |  |  |  |
| 1.                 |       |       | FLOW %             |  |  |  |
| 2.                 |       |       | GROSS WT           |  |  |  |
| 3.                 |       |       | - CUP WT           |  |  |  |
| AVG                |       |       | = NET WT           |  |  |  |
|                    |       |       | FACTOR             |  |  |  |
|                    |       |       | NET WT*<br>FACTOR  |  |  |  |
|                    |       |       | AIR CONT %         |  |  |  |

|                   |           |                    |                    |  |  |  |
|-------------------|-----------|--------------------|--------------------|--|--|--|
| DATE              |           |                    |                    |  |  |  |
| T-107<br>C-151    | AUTOCLAVE | T-129<br>C-187     | NORMAL CONSISTANCY |  |  |  |
| TIME<br>BARS MADE |           | WATER %            |                    |  |  |  |
| BARS MEASURE      |           | WATER ml           |                    |  |  |  |
| SWITCHES ON       |           | PENETRATI<br>ON mm |                    |  |  |  |
| VENT CLOSED       |           |                    |                    |  |  |  |

|              |  |                |                     |         |  |
|--------------|--|----------------|---------------------|---------|--|
| 295 PSI      |  | T-131<br>C-191 | VICAT - TIME OF SET |         |  |
| ADD 3 HOURS  |  |                | MADE                | INITIAL |  |
| SWITCHES OFF |  | TIME OF<br>DAY |                     |         |  |
| DOWN 1 ½ HRS |  | HR: MIN        |                     |         |  |
| COOL 30 MIN  |  | MINUTES        |                     |         |  |
| AFTER STEAM  |  |                |                     |         |  |
| BEFORE STEAM |  |                |                     |         |  |

|             |  |
|-------------|--|
| DIFFERENCE  |  |
| % EXPANSION |  |

|             |  |
|-------------|--|
| SAMPLE      |  |
| BRAND       |  |
| TYPE        |  |
| IN LAB      |  |
| 94 Lbs. Bag |  |
| 42 Kgs. Bag |  |
| GAL CAN     |  |
| OTHER       |  |

|   |       |
|---|-------|
| <b>Specification Reference</b>                      |       |
| STANDARD SPECIFICATION                              | _____ |
| SUPPLEMENTAL SPECIFICATION                          | _____ |
| PROJECT SPECIAL PROVISION                           | _____ |
| OTHER   | _____ |
| PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u> |       |
| NAME  | _____ |
| TITLE   | _____ |

|                       |  |               |  |           |
|-----------------------|--|---------------|--|-----------|
| DATE TO CHEM. RM.     |  | FULL CHEMICAL |  | PROJECT # |
| DATE RESULTS RETURNED |  | FINESS ONLY   |  | SAMPLE #  |

|  |                                 |                              |  |                                  |            |                            |  |
|--|---------------------------------|------------------------------|--|----------------------------------|------------|----------------------------|--|
| <b>Mat - 317</b>                         | AASHTO M - 85<br>(ASTM C - 150) |                              |  |                                  |            | LAB NO.                    |  |
| REPORT OF TEST PORTLAND CEMENT (TYPE IA) |                                 |                              |  |                                  |            |                            |  |
| PHYSICAL SECTION                         |                                 |                              |  | CHEMICAL SECTION                 |            |                            |  |
| TEST                                     | LAB RESULT                      | AASHTO SPEC.                 |  | TEST                             | LAB RESULT | AASHTO SPEC.               |  |
| AIR CONTENT %                            |                                 | 22 MAX<br>16 MIN             |  | FINENESS<br>SoCm/Gm              |            | 2600 -<br>4200             |  |
|  |                                 |                              |  | SiO <sub>2</sub> %               |            | NONE                       |  |
| AUTOCLAVE EXPANSION %                    |                                 | .80 MAX                      |  | Al <sub>2</sub> O <sub>3</sub> % |            | NONE                       |  |
| COMPRESSIVE STRENGTH                     |                                 |                              |  | Fe <sub>2</sub> O <sub>3</sub> % |            | NONE                       |  |
| 1 Day $\frac{\text{MPa}}{\text{PSI}}$    |                                 | NONE                         |  | MgO %                            |            | 6.0 MAX.                   |  |
| 3 Day $\frac{\text{MPa}}{\text{PSI}}$    |                                 | 10 MPa Min.<br>1450 PSI Min. |  | SO <sub>3</sub> %                |            | c) 3.0 MAX.<br>d) 3.5 MAX. |  |
| 7 Day $\frac{\text{MPa}}{\text{PSI}}$    |                                 | 16 MPa Min.<br>2320 PSI Min. |  | LOSS ON IGNITION %               |            | 3.0 MAX.                   |  |
|  |                                 |                              |  | INSOLUABLE RESIDUE %             |            | 0.75 MAX.                  |  |
|  |                                 |                              |  | C <sub>3</sub> S %               |            | NONE                       |  |
| TIME OF SETTING                          |                                 |                              |  | C <sub>2</sub> S %               |            | NONE                       |  |
| VICAT, MIN                               |                                 | 45 to 375                    |  | C <sub>3</sub> A %               |            | NONE                       |  |

|                  |  |  |  |  |
|------------------|--|--|--|--|
|                  |  |  |  | NOTES:<br>c) WHEN C <sub>3</sub> A < 8%<br>d) WHEN C <sub>3</sub> A > 8% |
| RECOMMENDED FOR: |  |  |  | REMARKS:   |

MAT-317 - Page 2

CEMENT \_\_\_\_\_ TYPE \_\_\_\_\_ LAB NO. \_\_\_\_\_

|  |  |  |   |      |         |  |
|--|--|--|---|------|---------|--|
| T - 106<br>C - 109      DATE:                      TIME: |  |  | T - 137<br>C - 185                                      |      |         |  |
| CUBES MADE:  |  |  | AIR CONTENT   |      |         |  |
| AGE  |  |  | WATER %   |      |         |  |
| DATE   |  |  | WATER ml  |      |         |  |
| 1.   |  |  | FLOW %  |      |         |  |
| 2.   |  |  | GROSS WT  |      |         |  |
| 3.   |  |  | - CUP WT  |      |         |  |
| AVG  |  |  | = NET WT  |      |         |  |
|  |  |  | FACTOR  |      |         |  |
|  |  |  | NET WT*<br>FACTOR                                       |      |         |  |
|  |  |  | AIR CONT %  |      |         |  |
| DATE   |  |  |   |      |         |  |
| T-107<br>C-151                      AUTOCLAVE            |  |  | T-129<br>C-187                      NORMAL CONSISTANCY  |      |         |  |
| TIME<br>BARS MADE  |  |  | WATER %   |      |         |  |
| BARS MEASURE   |  |  | WATER ml  |      |         |  |
| SWITCHES ON  |  |  | PENETRATI<br>ON mm                                      |      |         |  |
| VENT CLOSED  |  |  |   |      |         |  |
| 295 PSI  |  |  | T-131<br>C-191                      VICAT - TIME OF SET |      |         |  |
| ADD 3 HOURS  |  |  |   | MADE | INITIAL |  |
| SWITCHES OFF   |  |  | TIME OF<br>DAY  |      |         |  |
| DOWN 1 ½ HRS   |  |  | HR: MIN   |      |         |  |
| COOL 30 MIN  |  |  | MINUTES   |      |         |  |

|              |  |
|--------------|--|
| AFTER STEAM  |  |
| BEFORE STEAM |  |
| DIFFERENCE   |  |
| % EXPANSION  |  |

|             |  |
|-------------|--|
| SAMPLE      |  |
| BRAND       |  |
| TYPE        |  |
| IN LAB      |  |
| 94 Lbs. Bag |  |
| 42 Kgs. Bag |  |
| GAL CAN     |  |
| OTHER       |  |

|   |       |
|---|-------|
| <b>Specification Reference</b>                      |       |
| STANDARD SPECIFICATION                              | _____ |
| SUPPLEMENTAL SPECIFICATION                          | _____ |
| PROJECT SPECIAL PROVISION                           | _____ |
| OTHER   | _____ |
| PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u> |       |
| NAME  | _____ |
| TITLE   | _____ |

|                       |  |               |  |           |
|-----------------------|--|---------------|--|-----------|
| DATE TO CHEM. RM.     |  | FULL CHEMICAL |  | PROJECT # |
| DATE RESULTS RETURNED |  | FINISS ONLY   |  | SAMPLE #  |

|  |               |                              |  |                                  |            |                |  |
|--|---------------|------------------------------|--|----------------------------------|------------|----------------|--|
| <b>Mat - 318</b>                         | AASHTO M - 85 | (ASTM C - 150)               |  |                                  |            | LAB NO.        |  |
| REPORT OF TEST PORTLAND CEMENT (TYPE II) |               |                              |  |                                  |            |                |  |
| PHYSICAL SECTION                         |               |                              |  | CHEMICAL SECTION                 |            |                |  |
| TEST                                     | LAB RESULT    | AASHTO SPEC.                 |  | TEST                             | LAB RESULT | AASHTO SPEC.   |  |
| AIR CONTENT %                            |               | 12 MAX.                      |  | FINENESS<br>SoCm/Gm              |            | 2600 -<br>4200 |  |
|  |               |                              |  | SiO <sub>2</sub> %               |            | 20.0 MIN.      |  |
| AUTOCLAVE EXPANSION %                    |               | .80 MAX                      |  | Al <sub>2</sub> O <sub>3</sub> % |            | 6.0 MAX.       |  |
| COMPRESSIVE STRENGTH                     |               |                              |  | Fe <sub>2</sub> O <sub>3</sub> % |            | 6.0 MAX.       |  |
| 1 Day <u>MPa</u><br>PSI                  |               | NONE                         |  | MgO %                            |            | 6.0 MAX.       |  |
| 3 Day <u>MPa</u><br>PSI                  |               | 10 MPa Min.<br>1450 PSI Min. |  | SO <sub>3</sub> %                |            | 3.0 MAX..      |  |
| 7 Day <u>MPa</u><br>PSI                  |               | 17 MPa Min.<br>2470 PSI Min. |  | LOSS ON<br>IGNITION %            |            | 3.0 MAX.       |  |
|  |               |                              |  | INSOLUABLE<br>RESIDUE %          |            | 0.75 MAX.      |  |
|  |               |                              |  | C <sub>3</sub> S %               |            | 55.0 MAX.      |  |
| TIME OF SETTING                          |               |                              |  | C <sub>2</sub> S %               |            | NONE           |  |

|                  |  |           |  |                    |  |        |  |
|------------------|--|-----------|--|--------------------|--|--------|--|
| VICAT, MIN       |  | 45 to 375 |  | C <sub>3</sub> A % |  | 8 MAX. |  |
|                  |  |           |  | NOTES:             |  |        |  |
| RECOMMENDED FOR: |  |           |  | REMARKS:           |  |        |  |

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CEMENT \_\_\_\_\_ TYPE \_\_\_\_\_ LAB NO. \_\_\_\_\_

|                                      |  |  |                                       |         |  |  |
|--------------------------------------|--|--|---------------------------------------|---------|--|--|
| T – 106<br>C – 109    DATE:<br>TIME: |  |  | T – 137<br>C – 185                    |         |  |  |
| CUBES MADE:                          |  |  | AIR CONTENT                           |         |  |  |
| AGE                                  |  |  | WATER %                               |         |  |  |
| DATE                                 |  |  | WATER ml                              |         |  |  |
| 1.                                   |  |  | FLOW %                                |         |  |  |
| 2.                                   |  |  | GROSS WT                              |         |  |  |
| 3.                                   |  |  | - CUP WT                              |         |  |  |
| AVG                                  |  |  | = NET WT                              |         |  |  |
|                                      |  |  | FACTOR                                |         |  |  |
|                                      |  |  | NET WT*<br>FACTOR                     |         |  |  |
|                                      |  |  | AIR CONT %                            |         |  |  |
| DATE                                 |  |  |                                       |         |  |  |
| T-107<br>C-151    AUTOCLAVE          |  |  | T-129<br>C-187    NORMAL CONSISTANCY  |         |  |  |
| TIME<br>BARS MADE                    |  |  | WATER %                               |         |  |  |
| BARS MEASURE                         |  |  | WATER ml                              |         |  |  |
| SWITCHES ON                          |  |  | PENETRATI<br>ON mm                    |         |  |  |
| VENT CLOSED                          |  |  |                                       |         |  |  |
| 295 PSI                              |  |  | T-131<br>C-191    VICAT – TIME OF SET |         |  |  |
| ADD 3 HOURS                          |  |  | MADE                                  | INITIAL |  |  |
| SWITCHES OFF                         |  |  | TIME OF<br>DAY                        |         |  |  |
| DOWN 1 ½ HRS                         |  |  | HR: MIN                               |         |  |  |

|              |  |         |  |  |
|--------------|--|---------|--|--|
| COOL 30 MIN  |  | MINUTES |  |  |
| AFTER STEAM  |  |         |  |  |
| BEFORE STEAM |  |         |  |  |
| DIFFERENCE   |  |         |  |  |
| % EXPANSION  |  |         |  |  |
|              |  |         |  |  |

|             |  |
|-------------|--|
| SAMPLE      |  |
| BRAND       |  |
| TYPE        |  |
| IN LAB      |  |
| 94 Lbs. Bag |  |
| 42 Kgs. Bag |  |
| GAL CAN     |  |
| OTHER       |  |

|   |       |
|---|-------|
| <b>Specification Reference</b>                      |       |
| STANDARD SPECIFICATION                              | _____ |
| SUPPLEMENTAL SPECIFICATION                          | _____ |
| PROJECT SPECIAL PROVISION                           | _____ |
| OTHER   | _____ |
| PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u> |       |
| NAME  | _____ |
| TITLE   | _____ |

|                       |  |               |  |           |
|-----------------------|--|---------------|--|-----------|
| DATE TO CHEM. RM.     |  | FULL CHEMICAL |  | PROJECT # |
| DATE RESULTS RETURNED |  | FINESS ONLY   |  | SAMPLE #  |

|   |                                 |                              |  |                                  |            |                |  |
|---|---------------------------------|------------------------------|--|----------------------------------|------------|----------------|--|
| <b>Mat - 319</b>                          | AASHTO M - 85<br>(ASTM C - 150) |                              |  |                                  | LAB NO.    |                |  |
| REPORT OF TEST PORTLAND CEMENT (TYPE IIA) |                                 |                              |  |                                  |            |                |  |
| PHYSICAL SECTION                          |                                 |                              |  | CHEMICAL SECTION                 |            |                |  |
| TEST                                      | LAB RESULT                      | AASHTO SPEC.                 |  | TEST                             | LAB RESULT | AASHTO SPEC.   |  |
| AIR CONTENT %                             |                                 | 12 MAX.                      |  | FINENESS<br>SoCm/Gm              |            | 2600 -<br>4200 |  |
|   |                                 |                              |  | SiO <sub>2</sub> %               |            | 20.0 MIN.      |  |
| AUTOCLAVE EXPANSION %                     |                                 | .80 MAX                      |  | Al <sub>2</sub> O <sub>3</sub> % |            | 6.0 MAX.       |  |
| COMPRESSIVE STRENGTH                      |                                 |                              |  | Fe <sub>2</sub> O <sub>3</sub> % |            | 6.0 MAX.       |  |
| 1 Day MPa<br>PSI                          |                                 | NONE                         |  | MgO %                            |            | 6.0 MAX.       |  |
| 3 Day MPa<br>PSI                          |                                 | 10 MPa Min.<br>1450 PSI Min. |  | SO <sub>3</sub> %                |            | 3.0 MAX..      |  |
| 7 Day MPa<br>PSI                          |                                 | 17 MPa Min.<br>2470 PSI Min. |  | LOSS ON<br>IGNITION %            |            | 3.0 MAX.       |  |
|   |                                 |                              |  | INSOLUBLE<br>RESIDUE %           |            | 0.75 MAX.      |  |
|   |                                 |                              |  | C <sub>3</sub> S %               |            | 55.0 MAX.      |  |
| TIME OF SETTING                           |                                 |                              |  | C <sub>2</sub> S %               |            | NONE           |  |
| VICAT, MIN                                |                                 | 45 to 375                    |  | C <sub>3</sub> A %               |            | 8 MAX.         |  |
|   |                                 |                              |  | NOTES:                           |            |                |  |
| RECOMMENDEDED FOR:                        |                                 |                              |  | REMARKS:                         |            |                |  |

CEMENT \_\_\_\_\_ TYPE \_\_\_\_\_ LAB NO. \_\_\_\_\_

|                                      |  |  |                    |  |  |  |
|--------------------------------------|--|--|--------------------|--|--|--|
| T - 106<br>C - 109    DATE:<br>TIME: |  |  | T - 137<br>C - 185 |  |  |  |
| CUBES MADE:                          |  |  | AIR CONTENT        |  |  |  |
| AGE                                  |  |  | WATER %            |  |  |  |
| DATE                                 |  |  | WATER ml           |  |  |  |
| 1.                                   |  |  | FLOW %             |  |  |  |
| 2.                                   |  |  | GROSS WT           |  |  |  |
| 3.                                   |  |  | - CUP WT           |  |  |  |
| AVG                                  |  |  | = NET WT           |  |  |  |
|                                      |  |  | FACTOR             |  |  |  |
|                                      |  |  | NET WT*<br>FACTOR  |  |  |  |
|                                      |  |  | AIR CONT %         |  |  |  |

|                             |  |                                      |  |  |  |
|-----------------------------|--|--------------------------------------|--|--|--|
| DATE                        |  |                                      |  |  |  |
| T-107<br>C-151    AUTOCLAVE |  | T-129<br>C-187    NORMAL CONSISTANCY |  |  |  |
| TIME<br>BARS MADE           |  | WATER %                              |  |  |  |
| BARS MEASURE                |  | WATER ml                             |  |  |  |
| SWITCHES ON                 |  | PENETRATI<br>ON mm                   |  |  |  |
| VENT CLOSED                 |  |                                      |  |  |  |

|              |  |                                       |         |  |
|--------------|--|---------------------------------------|---------|--|
| 295 PSI      |  | T-131<br>C-191    VICAT - TIME OF SET |         |  |
| ADD 3 HOURS  |  | MADE                                  | INITIAL |  |
| SWITCHES OFF |  | TIME OF<br>DAY                        |         |  |
| DOWN 1 ½ HRS |  | HR: MIN                               |         |  |
| COOL 30 MIN  |  | MINUTES                               |         |  |
| AFTER STEAM  |  |                                       |         |  |
| BEFORE STEAM |  |                                       |         |  |
| DIFFERENCE   |  |                                       |         |  |
| % EXPANSION  |  |                                       |         |  |

|                            |  |
|----------------------------|--|
| SAMPLE                     |  |
| BRAND                      |  |
| TYPE                       |  |
| IN LAB                     |  |
| 94 Lbs. Bag<br>42 Kgs. Bag |  |
| GAL CAN                    |  |
| OTHER                      |  |

|   |
|---|
| <b>Specification Reference</b>                      |
| STANDARD SPECIFICATION _____                        |
| SUPPLEMENTAL SPECIFICATION _____                    |
| PROJECT SPECIAL PROVISION _____                     |
| OTHER _____   |
| PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u> |
| NAME _____  |
| TITLE _____   |

|                          |  |                  |  |           |
|--------------------------|--|------------------|--|-----------|
| DATE TO CHEM. RM.        |  | FULL<br>CHEMICAL |  | PROJECT # |
| DATE RESULTS<br>RETURNED |  | FINESS ONLY      |  | SAMPLE #  |

|   |                                 |                              |  |  |               |                          |  |
|---|---------------------------------|------------------------------|--|--|---------------|--------------------------|--|
| <b>Mat - 320</b>                          | AASHTO M - 85<br>(ASTM C - 150) |                              |  | LAB NO.  |               |                          |  |
| REPORT OF TEST PORTLAND CEMENT (TYPE III) |                                 |                              |  |  |               |                          |  |
| PHYSICAL SECTION                          |                                 |                              |  | CHEMICAL SECTION   |               |                          |  |
| TEST                                      | LAB<br>RESULT                   | AASHTO<br>SPEC.              |  | TEST   | LAB<br>RESULT | AASHTO<br>SPEC.          |  |
| AIR<br>CONTENT %                          |                                 | 12 MAX.                      |  | FINENESS<br>SoCm/Gm  |               | NONE                     |  |
|   |                                 |                              |  | SiO <sub>2</sub> %   |               | NONE                     |  |
| AUTOCLAVE<br>EXPANSION %                  |                                 | .80 MAX                      |  | Al <sub>2</sub> O <sub>3</sub> %                               |               | NONE                     |  |
| COMPRESSIVE<br>STRENGTH                   |                                 |                              |  | Fe <sub>2</sub> O <sub>3</sub> %                               |               | NONE                     |  |
| 1 Day MPa<br>PSI                          |                                 | 12 MPa Min.<br>1740 PSI Min. |  | MgO %  |               | 6.0 MAX.                 |  |
| 3 Day MPa<br>PSI                          |                                 | 24 MPa Min.<br>3480 PSI Min. |  | SO <sub>3</sub> %  |               | a) 3.5 MAX<br>b) 4.5 MAX |  |
| 7 Day MPa<br>PSI                          |                                 | NONE                         |  | LOSS ON<br>IGNITION %  |               | 3.0 MAX.                 |  |
|   |                                 |                              |  | INSOLUABLE<br>RESIDUE %  |               | 0.75 MAX.                |  |
|   |                                 |                              |  | C <sub>3</sub> S %   |               | NONE.                    |  |
| TIME OF<br>SETTING                        |                                 |                              |  | C <sub>2</sub> S %   |               | NONE                     |  |
| VICAT, MIN                                |                                 | 45 to 375                    |  | C <sub>3</sub> A %   |               | 15 MAX.                  |  |
|   |                                 |                              |  | e) WHEN C <sub>3</sub> A < 8%<br>f) WHEN C <sub>3</sub> A > 8% |               |                          |  |
|   |                                 |                              |  | NOTES:   |               |                          |  |
| RECOMMENDED FOR:                          |                                 |                              |  | REMARKS:   |               |                          |  |

|  |  |  |                    |  |  |  |
|--|--|--|--------------------|--|--|--|
| T - 106<br>C - 109      DATE:<br>TIME: |  |  | T - 137<br>C - 185 |  |  |  |
| CUBES MADE:                            |  |  | AIR CONTENT        |  |  |  |
| AGE                                    |  |  | WATER %            |  |  |  |
| DATE                                   |  |  | WATER ml           |  |  |  |
| 1.                                     |  |  | FLOW %             |  |  |  |
| 2.                                     |  |  | GROSS WT           |  |  |  |
| 3.                                     |  |  | - CUP WT           |  |  |  |
| AVG                                    |  |  | = NET WT           |  |  |  |
|  |  |  | FACTOR             |  |  |  |
|  |  |  | NET WT*<br>FACTOR  |  |  |  |
|  |  |  | AIR CONT %         |  |  |  |

|      |  |
|------|--|
| DATE |  |
|------|--|

|                               |  |  |  |  |  |
|-------------------------------|--|--|--|--|--|
| T-107<br>C-151      AUTOCLAVE |  | T-129<br>C-187      NORMAL CONSISTANCY |  |  |  |
| TIME<br>BARS MADE             |  | WATER %                                |  |  |  |
| BARS MEASURE                  |  | WATER ml                               |  |  |  |
| SWITCHES ON                   |  | PENETRATI<br>ON mm                     |  |  |  |
| VENT CLOSED                   |  |  |  |  |  |

|              |  |   |         |  |
|--------------|--|---|---------|--|
| 295 PSI      |  | T-131<br>C-191      VICAT - TIME OF SET |         |  |
| ADD 3 HOURS  |  | MADE                                    | INITIAL |  |
| SWITCHES OFF |  | TIME OF<br>DAY                          |         |  |
| DOWN 1 ½ HRS |  | HR: MIN                                 |         |  |
| COOL 30 MIN  |  | MINUTES                                 |         |  |
| AFTER STEAM  |  |   |         |  |
| BEFORE STEAM |  |   |         |  |
| DIFFERENCE   |  |   |         |  |
| % EXPANSION  |  |   |         |  |

| Length,<br>in (mm) | Diameter<br>in (mm) | Length/Diameter | Strength Correction<br>Factor |
|--------------------|---------------------|-----------------|-------------------------------|
|                    |                     |                 |                               |
|                    |                     |                 |                               |
|                    |                     |                 |                               |

**Table 1 (AASHTO T 24)**

| Ratio of Length of Cylinder to Diameter | Strength Correction Factor |
|---|----------------------------|
| 1.75                                    | 0.98                       |
| 1.50                                    | 0.96                       |
| 1.25                                    | 0.93                       |
| 1.00                                    | 0.87                       |

|   |  |                   |                        |                                     |                                   |                                   |  |
|---|--|-------------------|------------------------|-------------------------------------|-----------------------------------|-----------------------------------|--|
| PROJECT NUMBER:   | <b>MAT 321</b><br>STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>PC CONCRETE CORES FOR STRENGTH |                   |                        | PROCESSING DATE                     | MATERIAL CODE                     |                                   |  |
| SAMPLE NUMBER:  |  |                   |                        | LABORATORY NO.                      |                                   |                                   |  |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br><br>_____<br>PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME: _____<br>TITLE: _____ |  | Load,<br>lbf (kN) | Strength,<br>Psi (MPa) | Corrected<br>Strength,<br>Psi (MPa) | 85% Req.<br>Strength<br>psi (MPa) | 75% Req.<br>Strength<br>psi (MPa) |  |
|   | Sample 1   |                   |                        |                                     |                                   |                                   |  |
|   | Sample 2   |                   |                        |                                     |                                   |                                   |  |
|   | Sample 3   |                   |                        |                                     |                                   |                                   |  |
|   | Average  |                   |                        |                                     |                                   |                                   |  |
|   | BEGIN DATE   | END DATE          | TESTED BY              | REMARKS                             |                                   |                                   |  |
|   | RECOMMENDATION   |                   |                        |                                     |                                   |                                   |  |
|   | DIRECTOR OF RESEARCH AND MATERIALS   |                   |                        |                                     |                                   |                                   |  |

|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|--|--|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------|
| PROJECT NUMBER:  | <b>MAT-322</b>   | PROCESSING DATE | MATERIAL CODE      |                    |                    |                    |                    |                    |                    |                    |             |
| SAMPLE NUMBER:   | DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>LENGTH OF DRILLED CONCRETE CORES | LABORATORY NO.  |                    |                    |                    |                    |                    |                    |                    |                    |             |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br><br>PERSON ACCEPTING<br>_____<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ | Spec.<br>I.D.  | Center<br>(in)  | Outer<br>1<br>(in) | Outer<br>2<br>(in) | Outer<br>3<br>(in) | Outer<br>4<br>(in) | Outer<br>5<br>(in) | Outer<br>6<br>(in) | Outer<br>7<br>(in) | Outer<br>8<br>(in) | Ave<br>(in) |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
|  |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
| BEGIN DATE   |  | END DATE        |                    | TESTED BY          |                    | REMARKS            |                    |                    |                    |                    |             |
| RECOMMENDATION   |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |
| DIRECTOR OF RESEARCH AND MATERIALS   |  |                 |                    |                    |                    |                    |                    |                    |                    |                    |             |



Yearly Inspection of Pre-stressed, Precast and Reinforced Concrete Pipe Manufacturers

Date: \_\_\_\_\_

Inspection by: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax No: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Plant Name \_\_\_\_\_

Address \_\_\_\_\_

Plant Manager \_\_\_\_\_

Items of Manufacture \_\_\_\_\_

\_\_\_\_\_

| MIXERS       |      |          |
|--------------|------|----------|
| Manufacturer | Type | Capacity |
|              |      |          |
|              |      |          |
|              |      |          |

| PIPE MACHINES |      |       |
|---------------|------|-------|
| Manufacturer  | Type | Sizes |
|               |      |       |
|               |      |       |
|               |      |       |

| CALIBRATION of SCALES |                     |                     |
|-----------------------|---------------------|---------------------|
| Scale                 | Date of Calibration | Calibration Company |
| Cement                |                     |                     |
| Aggregate             |                     |                     |
| Water                 |                     |                     |
| Other                 |                     |                     |

| TESTING EQUIPMENT       |                     |                       |
|-------------------------|---------------------|-----------------------|
| Testing Machine         | Date of Calibration | Calibration Company   |
| 3-Edge                  |                     |                       |
| Compression             |                     |                       |
| Concrete Testing Equip. | Condition           | Calib. Info Available |
| Air Meter               |                     |                       |
| Slump Cone              |                     |                       |
| Thermometers            |                     |                       |

**PLANT QUALITY CONTROL PERSONNEL**

Employee

ACI / PCI Certified

NETTCP Conc. Tech.

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Additional remarks

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**SOURCE of CEMENT and POZZOLANS**

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**AGGREGATES and WATER**

Material

Source

Size

---



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**SOURCE of CATCH BASIN FRAMES and GRATES**

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**REINFORCEMENT**

Domestic Steel

---

Foreign Steel onsite

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**ADMIXTURES**

Manufactures of Admixtures

Name

Type

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**Q.C. PLAN DEFICIENCIES**

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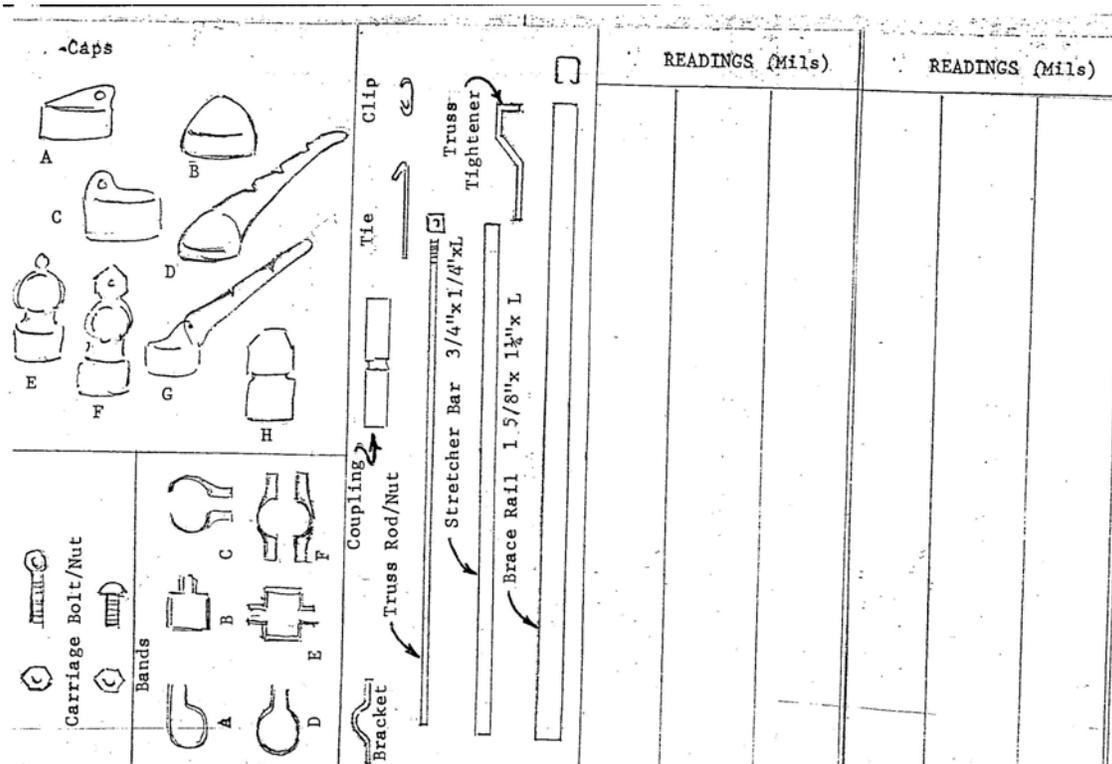
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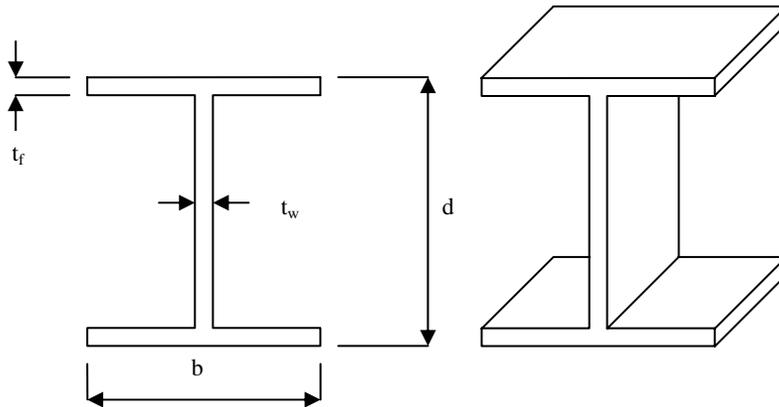


|                 |  |                 |               |
|-----------------|--|-----------------|---------------|
| PROJECT NUMBER: | <b>MAT- 325</b>  | PROCESSING DATE | MATERIAL CODE |
| SAMPLE NUMBER:  | Connecticut Department of Transportation<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST<br>CHAIN LINK FENCE HARDWARE | LABORATORY NO.  | <b>3320</b>   |

|  | ITEM       | Galv. Oz/in <sup>2</sup> (g/m <sup>2</sup> ) | ITEM      | Galv. Oz/in <sup>2</sup> (g/m <sup>2</sup> ) |
|--|------------|--|-----------|--|
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
|  |            |  |           |  |
| <u>SPECIFICATION REFERENCE</u><br>_____<br><u>STANDARD SPECIFICATION</u><br>_____<br><u>SUPPLEMENTAL SPECIFICATION</u><br>_____<br><u>PROJECT SPECIAL PROVISION</u><br>_____<br><u>OTHER</u><br>_____<br><br>_____<br><u>PERSON ACCEPTING</u><br>_____<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ | BEGIN DATE | END DATE                                     | TESTED BY | REMARKS                                      |
| RECOMMENDATION   |            |  |           |  |

DIRECTOR OF RESEARCH AND MATERIALS

|   |   |          |                 |               |
|---|---|----------|-----------------|---------------|
| PROJECT NUMBER:   | <b>MAT-326</b><br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>CHAIN LINK FENCE TENSION WIRE |          | PROCESSING DATE | MATERIAL CODE |
| SAMPLE NUMBER:  |   |          | LABORATORY NO.  |               |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br>_____<br>PERSON ACCEPTING<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>_____<br>NAME : _____<br>TITLE: _____ |   | Actual   | Specification   |               |
|   | Gage of Wire  |          |                 |               |
|   | Tensile Strength,<br>psi (MPa)  |          |                 |               |
|   | Weight of Coating,<br>oz/ft <sup>2</sup> (g/m <sup>2</sup> )  |          |                 |               |
|   | BEGIN DATE  | END DATE | TESTED BY       | REMARKS       |
|   | RECOMMENDATION  |          |                 |               |
|   | DIRECTOR OF RESEARCH AND MATERIALS  |          |                 |               |



|  |   |               |                                |                                    |
|--|---|---------------|--------------------------------|------------------------------------|
| PROJECT NUMBER:  | <b>MAT-327</b>  | POST DATE     | LAB #                          | MAT. CODE<br><b>3549</b>           |
| SAMPLE NUMBER:   | CT D.O.T.<br>REPORT OF TEST<br>H-Piles and Wide Flange Shapes | DATE RECEIVED |                                | RECEIVED BY                        |
| <u>SPECIFICATION REFERENCE</u><br>STANDARD SPECIFICATION _____<br>SUPPLEMENTAL SPECIFICATION _____<br>PROJECT SPECIAL PROVISION _____<br>OTHER _____<br><br>PERSON ACCEPTING _____<br><u>TECHNICAL RESPONSIBILITY</u><br>NAME: _____<br>TITLE: _____ | <b>Item</b>   | <b>Sample</b> | <b>Specification</b>           |                                    |
|  |   |               | U.S. Cust. (in)                | Metric (mm)                        |
|  | b, flange width   |               | + 1/4<br>- 3/16                | + 4<br>- 3                         |
|  | d, depth  |               | +1/4<br>-3/16                  | +6<br>-5                           |
|  | t <sub>f</sub> , flange thickness                             |               | ---                            | ---                                |
|  | t <sub>w</sub> , web thickness                                |               | ---                            | ---                                |
|  | wt/ft   |               | +/-2.5%                        | +/-2.5%                            |
|  | Tensile Strength<br>(ksi, MPa)                                |               | Gr. 36: 58-80<br>Gr. 50: 65-95 | Gr. 36: 400-550<br>Gr. 50: 450-655 |
| Begin Date   | End Date  | Tested By     | REMARKS                        |                                    |
|  |   |               |                                |                                    |
| ENGINEER OF MATERIALS  |   |               |                                |                                    |

# ASTM A 496

## Steel Wire, Deformed, for Concrete Reinforcement

**Table 4 Tension Test Requirements (Material for Welded Wire Reinforcement)**

|                  |               |
|------------------|---------------|
|                  | psi (MPa) min |
| Tensile strength | 80000 (550)   |
| Yield strength   | 70000(485)    |

**Section 9 Permissible Variation in Weight**

9.1 The permissible variation in weight of any deformed wire is +/-6% of its nominal weight. The theoretical weights shown in Table 1, or similar calculations on unlisted sizes, shall be used to establish the variation.

|  |   |            |                     |               |                   |  |
|--|---|------------|---------------------|---------------|-------------------|--|
| PROJECT NUMBER:  | <b>MAT-328</b>  |            | PROCESSING DATE     | MATERIAL CODE |                   |  |
| SAMPLE NUMBER:   | DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>MISCELLANEOUS MATERIALS |            | LABORATORY NO.      | <b>3145</b>   |                   |  |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br><br><u>PERSON ACCEPTING</u><br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>NAME : _____<br>TITLE: _____ |   | Horizontal | Horizontal<br>Spec. | Vertical      | Vertical<br>Spec. |  |
|  | Spacing (in.)   |            | —                   |               | —                 |  |
|  | Size Number   |            |                     |               |                   |  |
|  | Unit Wt. (lb/ft)  |            |                     |               |                   |  |
|  | Nom. Area (in <sup>2</sup> )  |            | —                   |               | —                 |  |
|  | Load (lbf)  |            | —                   |               | —                 |  |
|  | T.S. (psi)  |            |                     |               |                   |  |
|  | Condition   |            | —                   |               | —                 |  |
|  | BEGIN DATE  | END DATE   | TESTED BY           | REMARKS       |                   |  |
|  | RECOMMENDATION  |            |                     |               |                   |  |
| DIRECTOR OF RESEARCH AND MATERIALS   |   |            |                     |               |                   |  |

|  |  |                 |                                  |         |
|--|--|-----------------|----------------------------------|---------|
| PROJECT NUMBER:  | <b>MAT-329</b><br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF MATERIALS TESTING<br>REPORT OF TEST OF<br>MISCELLANEOUS MATERIALS  | PROCESSING DATE | MATERIAL CODE<br><br><b>3406</b> |         |
| SAMPLE NUMBER:   |  | LABORATORY NO.  |                                  |         |
| <u>SPECIFICATION REFERENCE</u><br>_____<br>STANDARD SPECIFICATION<br>_____<br>SUPPLEMENTAL SPECIFICATION<br>_____<br>PROJECT SPECIAL PROVISION<br>_____<br>OTHER<br>_____<br>_____<br>PERSON ACCEPTING<br>_____<br><u>TECHNICAL RESPONSIBILITY</u><br>_____<br>_____<br>NAME : _____<br>TITLE: _____ | Acceptance is based upon a Brand Registration and Guarantee filed with the Engineer (Division of Materials Testing) by the fabricator in accordance with AASHTO M180. The fabricator for this material is _____.<br>The thickness type is _____ and the coating class is _____.<br>The heat number is _____. |                 |                                  |         |
|  | BEGIN DATE   | END DATE        | TESTED BY                        | REMARKS |
|  | RECOMMENDATION   |                 |                                  |         |
| DIRECTOR OF RESEARCH AND MATERIALS   |  |                 |                                  |         |

**SAMPLE IN LAB:** \_\_\_\_\_

**SAMPLE DIMENSIONS:** \_\_\_\_\_

|                                 |
|---------------------------------|
| <b>AASHTO</b><br><b>M - 153</b> |
|---------------------------------|

|                                       |
|---------------------------------------|
| <b>TYPE I - SPONGE RUBBER</b>         |
| <b>TYPE II – CORK</b>                 |
| <b>TYPE III – SELF EXPANSION CORK</b> |

|                                 |       |
|---------------------------------|-------|
| <u>SPECIFICATION REFERENCE</u>  |       |
| STANDARD SPECIFICATION          | _____ |
| SUPPLEMENTAL SPECIFICATION      | _____ |
| PROJECT SPECIAL PROVISION       | _____ |
| OTHER                           | _____ |
| PERSON ACCEPTING                |       |
| <u>TECHNICAL RESPONSIBILITY</u> |       |
| NAME:                           | _____ |
| TITLE:                          | _____ |

**P. E. J. F. (CORK – SPONGE RUBBER) M - 153**

|   | <b>MATERIAL CODES</b><br>L.F.T. 3155<br>SQ.FT 3158 | <b><u>LABORATORY NUMBER</u></b> |
|---|--|---------------------------------|
|   | LAB RESULTS  | SPECIFICATIONS                  |
| SPECIFIED THICKNESS (in.)                                       |  |                                 |
| MEASURED THICKNESS (in.)  |  | AS SPECIFIED ± 0.0625           |
| AMOUNT OF EXTRUSION (in.)                                       |  | 0.25 MAX.                       |
| COMPRESSION REQUIRED FOR 50%<br>REDUCTION OF THICKNESS (P.S.I.) |  | 50 to 1500                      |
| AMOUNT OF THICKNESS RECOVERED %                                 |  | 90 MIN.                         |
| <b>REMARKS:</b>   | <b>RECOMMENDED FOR:</b>                            |                                 |
|   |  |                                 |

**MAT-330**  
**Report of Test of Preformed Expansion Joint**

|   |                    |
|---|--------------------|
| AASHTO M – 153 TYPE II CORK                               | LABORATORY NUMBER: |
|   | EXTRUSION          |
| DIAL READING (PLATE & SAMPLE)                             |                    |
| MINUS DIAL READING (PLATE ONLY)                           |                    |
| = SAMPLE THICKNESS (in.)                                  |                    |
| ½ SAMPLE THICKNESS (in.)                                  |                    |
| PLUS DIAL READING (PLATE ONLY)                            |                    |
| =DIAL READING @ 50% THICKNESS                             |                    |
| AMOUNT OF EXTRUSION @ 50% THICKNESS                       |                    |
|   |                    |
|   | RECOVERY           |
| DIAL READING (PLATE & SAMPLE)                             |                    |
| MINUS DIAL READING (PLATE ONLY)                           |                    |
| = SAMPLE THICKNESS (in.)                                  |                    |
| ½ SAMPLE THICKNESS (in.)                                  |                    |
| PLUS DIAL READING (PLATE ONLY)                            |                    |
| =DIAL READING @ 50% THICKNESS                             |                    |
| P.S.I. USING MEDIUM RANGE @50% THICKNESS                  | TIME:              |
| TOTAL LOAD (P.S.I. * 4) (lbs.)                            |                    |
| AMOUNT OF COMPRESSION (TOTAL LOAD/16) (P.S.I.)            |                    |
| DIAL READING AFTER 10 MINUTES OF RECOVERY                 | TIME:              |
| MINUS DIAL READING (PLATE ONLY)                           |                    |
| =RECOVERED THICKNESS (in.)                                |                    |
| %RECOVERY = (RECOVERED THICKNESS / SAMPLE THICKNESS)* 100 |                    |

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# 400 Series Forms

**REPORT OF TEST :  
CUTBACK ASPHALT  
FORM MAT- 400**

DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

MC-250 CUT-BACK ASPHALT (AASHTO M 82)  
SPECIFIC GRAVITY (Hydr.)  
(AASHTO T 227 ASTM D 1298)

KIN VISCOSITY @ 140 °F  
(AASHTO T-201) (ASTM D 2171)

FLASH POINT (TOC) (AASHTO T 79)  
spec 150°F (66 °C)

TEST ON  
RESIDUE

PEN @ 77 °F (AASHTO T 49)  
spec 120-250 (ASTM D-5)

ABSOL VISC @ 140 (BULB-B)  
(AASHTO T 202 ASTM 2170)  
spec 300-1200

\_\_\_\_\_ @ \_\_\_\_\_ °F

\_\_\_\_\_ @ 60 °F

X200

(ASTM D 402)  
(AASHTO T  
78)

**DISTILLATION**

| Spec (%) | Temp.  | Amt. | % |
|----------|--------|------|---|
| 0        | 374 °F |      |   |
| 0-10     | 437 °F |      |   |
| 15-55    | 500 °F |      |   |
| 60-87    | 600 °F |      |   |
| 67 (min) | 680 °F | /2=  |   |
|          |        | 100- | = |

|   |
|---|
| <u>Specification Reference</u>            |
| Standard Specification _____              |
| Project Special Prov. _____               |
| Other _____                               |
| PERSON ACCEPTING TECHNICAL RESPONSIBILITY |
| Name: _____                               |
| Title: _____                              |

|                                  |   |                |  |
|----------------------------------|---|----------------|--|
| KIND OF MATERIAL                 | <b>FORM MAT-400</b><br>STATE OF CONNECTICUT   | DATE           |  |
| SOURCE OF SUPPLY                 | DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENG & HWY OPERATIONS<br>REPORT OF TEST: CUTBACK ASPHALT | LABORATORY NO. |  |
| LOCATION OF SOURCE OF SUPPLY     | FLASH POINT °F  |                |  |
|                                  | KINEMATIC VISC. @ 140 °F, CS  |                |  |
| SAMPLE TAKEN FROM                | DIST.% BY VOL. OF TOTAL DIST. TO 680 °F   |                |  |
|                                  | TO 374 °F   |                |  |
| LOCATION OF                      | TO 437 °F   |                |  |
|                                  | TO 500 °F   |                |  |
| SAMPLED BY                       | TO 600 °F   |                |  |
|                                  | RESIDUE FROM DISTILLATION TO 680 °F   |                |  |
| DATE SAMPLED                     | VOLUME PERCENT BY DIFFERENCE  |                |  |
|                                  | TEST ON RESIDUE FROM DIST.  |                |  |
| USING AGENCY                     | PENETRATION AT 77 °F 100g 5 sec.  |                |  |
|                                  | DUCTILITY AT 77 °F IN cm  |                |  |
| QUANTITY REPRESENTED             | ABSOLUTE VISCOSITY AT 140 °F  |                |  |
|                                  | SPECIFIC GRAVITY @ 60 °F  |                |  |
| MATERIAL WILL BE USED FOR        | WEIGHT PER GALLON @ 60 °F   |                |  |
| DATE USED                        | RECOMMENDED FOR   | REMARKS        |  |
| WHERE USED                       |   |                |  |
| SAMPLE RECEIVED                  |   |                |  |
| DIRECTOR OF RESEARCH & MATERIALS |   |                |  |

**REPORT OF TEST: ASPHALT BINDER  
MAT- 401**

|   |   |           |                |                 |
|---|---|-----------|----------------|-----------------|
| KIND OF MATERIAL                        | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENGINEERING & HIGHWAY OPERATIONS<br>REPORT OF TESTS |           | DATE           |                 |
| SOURCE OF SUPPLY                        | <b>ASPHALT BINDER MAT-401</b>   |           | LABORATORY NO. |                 |
| LOCATION OF SOURCE OF SUPPLY            | TEST  | TEST TEMP | RESULTS        | RECOMMENDED FOR |
| SAMPLE TAKEN FROM                       | SPECIFIC GRAVITY @ 25 C   |           |                | REMARKS         |
| LOCATION OF                             | FLASH POINT, C  |           |                |                 |
|   | VISCOSITY (Brookfield) @ 135 C Pa-s   |           |                |                 |
| SAMPLED BY                              | VISCOSITY (Brookfield) @ 165 C Pa-s   |           |                |                 |
| DATE SAMPLED                            | DYNAMIC SHEAR G*/sin(delta)kPa  |           |                |                 |
|   | RTFO AGED RESIDUE:  |           |                |                 |
| USING AGENCY                            | MASS CHANGE, %  |           |                |                 |
| QUANTITY REPRESENTED                    | DYNAMIC SHEAR G*/sin(delta)kPa  |           |                |                 |
|   | PAV AGED RESIDUE:   |           |                |                 |
| PURPOSE FOR WHICH MATERIAL WILL BE USED | DYNAMIC SHEAR G*/sin(delta) kPa   |           |                |                 |
| DATE MATERIAL WILL BE USED              | CREEP STIFFNESS   |           |                |                 |
|   | M VALUE   |           |                |                 |
| SAMPLE RECEIVED                         | DIRECT TENSION  |           |                |                 |
|   | FAILURE STRAIN  |           |                |                 |
| DIRECTOR OF RESEARCH & MATERIALS        |   |           |                |                 |

**EMULSIFIED ASPHALT  
FORM MAT-402**

ANIONIC - AASHTO M-140( ASTM D-997)  
CATIONIC - AASHTO M-208(ASTM D-2397)

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

% RESIDUE BY DISTILLATION  
(AASHTO T-59.7-9 ASTM D-244)

SAYBOLT VISCOSITY  
(AASHTO T-59.21-23)

weight after heat  
+ 1.5  
  
Tare of apparatus (all parts)  
-  
=====

\_\_\_\_\_ = % (by weight)  
2

X \_\_\_\_\_  
SUS/SFS  
(corr.)

WEIGHT PER GALLON  
(AASHTO T-59.75-80)  
\_\_\_\_\_

DISTILLATION RESULTS  
total dist oil dist  
200  
- \_\_\_\_\_ = %  
200  
\_\_\_\_\_ = %  
2

PEN. OF RESIDUE  
(AASHTO T-49)  
\_\_\_\_\_

PART. CHARGE  
(AASHTO T-59.18-20)  
\_\_\_\_\_

|   |
|---|
| <u>Specification Reference</u>                                  |
| Standard Specification _____                                    |
| Project Special Prov. _____                                     |
| Other _____   |
| PERSON ACCEPTING<br>TECHNICAL RESPONSIBILITY<br>Name:<br>Title: |

|                                  |   |         |                |
|----------------------------------|---|---------|----------------|
| KIND OF MATERIAL                 | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION  |         | DATE           |
| SOURCE OF SUPPLY                 | BUREAU OF ENG & HWY OPERATIONS<br>REPORT OF TEST: EMULSIFIED ASPHALT<br><b>FORM MAT-402</b> |         | LABORATORY NO. |
| LOCATION OF SOURCE OF SUPPLY     | VISCOSITY, SAY. FUROL @ _____ °F., _____ SEC.   |         |                |
|                                  | PARTICLE CHARGE TEST  |         |                |
| SAMPLE TAKEN FROM                | SIEVE TEST, %   |         |                |
|                                  | OIL DISTILLATE, BY VOL. OF EMULSION, %  |         |                |
| LOCATION OF                      | CEMENT MIXING TEST, %   |         |                |
|                                  | TEST ON DISTILLATION RESIDUE:   |         |                |
| SAMPLED BY                       | PENETRATION 77 °F., 100 g., sec.  |         |                |
|                                  | DUCTILITY 77 °F., cm.   |         |                |
| DATE SAMPLED                     | SOLUBILITY, %   |         |                |
|                                  | ASH, %  |         |                |
| USING AGENCY                     | MODIFIED MISCIBILITY WITH WATER   |         |                |
|                                  | SETTLEMENT, 5 DAYS, %   |         |                |
| QUANTITY REPRESENTED             | DEMULSIBILITY, %  |         |                |
|                                  | SPECIFIC GRAVITY @ 60 °F  |         |                |
| MATERIAL WILL BE USED FOR        | WEIGHT PER GALLON @ 60 °F   |         |                |
| DATE USED                        | RECOMMENDED FOR   | REMARKS |                |
| WHERE USED                       |   |         |                |
| SAMPLE RECEIVED                  |   |         |                |
| DIRECTOR OF RESEARCH & MATERIALS |   |         |                |





**Hot Storage Tanks:**

- Lines to be separated or equipped with a reverse pump to eliminate contamination
- Thermostatically controlled, with a thermometer in bulkhead
- Sampling valves as specified, located in lower half of an end bulkhead

Number of storage tanks on site \_\_\_\_\_

| Tank Inventory: | <u>Tank No.</u> | Capacity | Type of Asphalt |
|-----------------|-----------------|----------|-----------------|
|                 |                 |          |                 |
|                 |                 |          |                 |
|                 |                 |          |                 |
|                 |                 |          |                 |
|                 |                 |          |                 |

**Tickets:**

All vendors producing bituminous concrete for the State of Connecticut under the terms of a contract must have their truck-weighing scales, storage bin scales and mixing plant automated so as to provide a detailed ticket containing the following information:

- 1) State of Connecticut printed on ticket
- 2) Name of producer, and identification of plant or specific storage bin, if used
- 3) Date and time of day
- 4) Individual bin high/target/low batch weights
- 5) Type of material\* (including RAP (dry weight) percentage and moisture content, if used)
- 6) Net weight of material
- 7) Gross weight or tare weight of truck
- 8) Project number, purchase order number, name of contractor (if contractor other than producer), whichever applies
- 9) Truck number for positive identification of truck

\*NOTE: Class 3 mixture to be used for machine-placed curbing must be shown on the ticket as "curb Mix only."

Items 1 to 9 must be printed on the ticket. The time of day may be printed by a separate time clock.

Seal Dates: Plant: \_\_\_\_\_  
 Truck : \_\_\_\_\_  
 Storage Bin(s): \_\_\_\_\_

- Copy of Printout(s) (Plant and Truck)
- D.E.P. Operating Permit

**Automation and Recordation of Bituminous Concrete Plant:**

**FORM 404 (REV 3-1-06) Check List for Bituminous Concrete Plants (Batch Type) Page 3 of 3**

The plant shall be equipped with an automated weighing, cycling, and monitoring system approved by the Director of Research and Materials, and installed as part of the batching equipment with displays located in full view of the operator

The system shall include equipment for accurately proportioning the various components of the mixture by weight and in the proper order, controlling the cycle sequence and timing the mixing operations. The entire batching and mixing interlock cut-off circuits shall interrupt and stop the automatic batching operations whenever an error exceeding the acceptable tolerance occurs in proportioning. An asterisk (\*) shall be automatically printed next to any batch weight(s) exceeding tolerances shown below.

The automatic proportioning system shall be capable of consistently delivering materials within the full range of batch sizes with the following tolerances:

Each Aggregate Component:  $\pm 1.5\%$  of individual of cumulative target weight for each bin

Mineral filler:  $\pm 0.5\%$  of the total batch

Bituminous Material:  $\pm 0.1\%$  of the total batch

Zero Return (Aggregate):  $\pm 0.5\%$  of the total batch

Zero Return (Bituminous Material):  $\pm 0.1\%$  of the total batch

Tolerance controls shall be automatically or manually adjustable to provide for spans suitable for less than full size of batches.

Recording equipment shall monitor the batching sequence of each component of the mixture and produce a printed record of these operations on each truck ticket in accordance with Subarticle 4.06.03-2 and as specified herein. For each day's production, each D.O.T. project shall be provided a clear, legible copy of the recording. Provision will be made so that scales may not be manually manipulated during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest.

A printed character (asterisk or other shall also automatically be printed on the batch plant printout when the automatic batching sequence is interrupted or switched to auto-manual or manual during proportioning..

( ) Ten standard 50 lb. (22.7 kg.) test weights for checking plant scales.

Hot Storage Bins:                      Type of Heat:                      Capacity of bin(s):                      Number of Bin(s):

( ) Heated  
( ) Unheated Brand/mfg.

Brand/Manufacture: \_\_\_\_\_

The bins shall be equipped with a light or indicator to show when the level of material reaches the top of the discharge cone.

Please note any variations in specifications below:

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CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

**FORM 405 (REV 3-1-06) Check List For Bituminous Concrete Plants (Drum Type) Page 1 of 3**

Plant: \_\_\_\_\_ Location: \_\_\_\_\_

Inspected By: \_\_\_\_\_ Date \_\_\_\_\_

Plant Size: \_\_\_\_\_ T.P.H.

– The mixing plant used in the preparation of bituminous concrete shall conform to the following requirements.

Aggregates: \_\_\_\_\_ Source of Supply: \_\_\_\_\_

- |   |                  |
|---|------------------|
| <input type="checkbox"/> Crushed Gravel | Fine Aggregate   |
| <input type="checkbox"/> Natural Stone  |                  |
| <input type="checkbox"/> Screenings     | Coarse Aggregate |
| <input type="checkbox"/> Stone Sand     |                  |
| <input type="checkbox"/> Trap Rock      |                  |

Mineral Filler

- Separate Bin
- Delivery System accurate to 0.1% of total weight of bituminous mixture
- 5-second interrupt interlock

Aggregate Weighing:

- Continuous weighing device
- Individual Feeders (belt type)
- 5-second interrupt device
- Moisture compensating device
- Means for diverting aggregate prior to entry into drum
- Belt scale accurate to +/-1/2 of 1% (verified by plant records)

Dust Return Type:  Pneumatic  Screw conveyer

Bitumen Delivery System:

- Accurate to 0.1% based on total weight of mixture
- Presetting actual Bitumen content directly as a percentage/per total mixture weight
- Interlock to halt production within 5 seconds if Bitumen flow is interrupted
- Temperature compensating device to correct quantity of asphalt to 60F (16C)
- Recordation of Proportions. The plant shall be quipped with an automatic digital recording device approved by the Director of Research and Materials, that simultaneously records the weight of each aggregate, mineral filler if added separately and bitumen a 5-minute intervals during production time and on demand. The recordation shall include the actual bitumen quantity as a percentage of the total weight. The maximum resolution shall be 0.1 tons for dry aggregate, 0.01

**FORM 405 (REV 3-1-06) Check List For Bituminous Concrete Plants (Drum Type) Page 2 of 3**

tons for mineral filler if added separately, 0.01 tons for bitumen and 0.1% for bitumen content. All recording shall show the date, including day, month, and year, and time to the nearest minute for each print. For each day's production, each DOT project(s) shall be provided with a clear and legible copy of the recording.

Mixing Plant and Machinery:

- A capacity of at least 125 tons (115 metric tons) per hour
- A minimum of four (4) cold-feed storage bins
- RAP capability, per specifications
- Scalping screens or other devices installed in the cold feed system to remove any debris or other foreign material in excess of 4 inches (100 mm). (Individual bins shall be labeled for the aggregate sizes being used.)
- Flights in drum checked and found in satisfactory condition.
- The plant shall have at hand the required number of 50-lb. (22.7 kg) test weights for frequent testing off all scales.
- Provisions shall be made at the drum outlet so that the pyrometer reading may be checked by means of an armored thermometer

Hot Storage Tanks:

- Lines to be separated or equipped with a reverse pump to eliminate contamination.
- Thermostatically controlled, with a thermometer in bulkhead
- Sampling valves as specified, located in lower half of an end bulkhead

Number of Storage tanks on site: \_\_\_\_\_

| Tank Inventory: | <u>Tank No.</u> | <u>Capacity</u> | <u>Type of Asphalt</u> |
|-----------------|-----------------|-----------------|------------------------|
| _____           |                 |                 |                        |
| _____           |                 |                 |                        |
| _____           |                 |                 |                        |

Hot Storage Bins:                      Type of Heat    Capacity                      Number of Bins

- Heated
- Unheated
- The bins shall be equipped with a light or indicator to show when the level of material reaches the top of the discharge cone

Brand/manufacturer: \_\_\_\_\_

Silo and/or Truck Scales

All vendors producing bituminous concrete for the state under the terms of a contract must have their truck-weighing scales, storage bin scales and mixing plant automated to provide a detailed ticket to accompany each load. Tickets must include the following information:

**FORM 405 (REV 3-1-06) Check List For Bituminous Concrete Plants (Drum Type) Page 3 of 3**

1. State of Connecticut printed on ticket
2. Name of producer, identification of plant and specific storage bin, if used
3. Date and time of day
4. Individual bin high/target/low batch weights
5. Type of material\* (including RAP (dry weight) percentage and moisture content, if used)
6. Net weight of material
7. Gross weight or tare weight of truck
8. Project number, purchase order number, name of contractor (if contractor other than producer), whichever applies
9. Truck number for positive identification of truck

\*NOTE: Class 3 mixture to be used for machine-placed curbing must be shown on the ticket as “curb mix only.”

Items 1 to 9 must be printed on the ticket. The time of day may be printed by a separate time clock.

The State reserves the right to have a weighman at the scales to monitor the weighing of trucks.

**Plant Scales:**

In addition to complying with the above requirements, the weighing equipment shall be constructed with the necessary adjustable devices that will permit any part thereof that gets out of alignment or adjustment to be easily readjusted so that the weighing device will function properly. Scales will be checked and sealed by the Weights and Measures Division at least annually and more often if deemed necessary in to insure their accuracy.

Seal Dates: \_\_\_\_\_ Plant: \_\_\_\_\_

Truck: \_\_\_\_\_

Storage Bin(s): \_\_\_\_\_

- Copy of Printout(s) (Plant and Truck)
- D.E.P. Operating Permit

Please note any variations in specifications below:

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CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING

**FORM MAT-406 (rev 3-06)**

**Page 1 of 6**

**FIELD LABORATORY (Mix Plant) - APPARATUS INSPECTION SHEET**

Plant: \_\_\_\_\_ Inspection Date: \_\_\_\_\_

Site: \_\_\_\_\_ Inspector(s): \_\_\_\_\_

Contractor Representative: \_\_\_\_\_

FIELD LABORATORY REQUIREMENTS

**At all points during the production season this lab will comply with all requirements.**

GENERAL:

1. A field laboratory that is equipped for performing required tests shall be provided at each mixing plant for the use of the State's inspectors at no expense to the State.
2. The Contractor shall ensure that the State's inspectors are given priority in the use of the field laboratory.
3. The field laboratory shall be approved by the Director of Research and Materials.
4. The field laboratory shall:
  - ( ) a. be a separate building or a separate room and shall have a minimum floor space of 89 sq. ft (7.5 m<sup>2</sup>) [100 sq. ft (9.3 m<sup>2</sup>) for laboratories constructed after January 1, 1991] with the least dimension to be 6 ft (1.8 m)
  - ( ) b. has windows installed that allow for sufficient light and ventilation
  - ( ) c. has a source of fresh air from a door and/or from windows that open
  - ( ) d. have an exhaust fan located directly behind and within 2 ft (0.6 m) of both extractor and drying source, and 12m. (304 mm) from top of workbench and shall not adversely effect the room temperature
  - ( ) f. has a telephone available within audible range of the testing area
  - ( ) g. be equipped with a suitable heating and air conditioning cooling system able to maintain the temperature between 65°F and 80°F(18°C to 27°C)
  - ( ) h. be clean, and be free of all materials and equipment not associated with the laboratory

EQUIPMENT:

The field laboratory shall be equipped with the following:

- ( ) 1. Paint brush: 1 in to 1 ½ in (25 mm to 38 mm) wide
- ( ) 2. Hand brush: suitable for cleaning sieves
- ( ) 3. 1000 ml unbreakable wash bottle or flask.

MIX PLANT FIELD LABORATORY – APPARATUS INSPECTION SHEET (continued)

- ( ) 4. Two, 6 in. (152 mm) spatulas, heavy enough to rod molds without bending
- ( ) 5. Thermometer 50°F to 450°F (10°C to 230°C)
- ( ) 6. Putty knife or scraper
- ( ) 7. Trowel or similar tool to quarter Class 4 samples
- ( ) 8. Eye wash station: A double (two-eye) wash station (2,000 ml minimum) capable of cleaning both eyes simultaneously, installed in the laboratory for ready access contents shall be temperproof and dated.  
Solution Expiration Date: \_\_\_\_\_
- ( ) 9. Scoop: large enough to scoop a 1200 g sample
- ( ) 10. Heavy (Kraft) wrapping paper: 36 in. (915 mm) minimum width
- ( ) 11. Long-handled, pointed shovel
- ( ) 12. Six metal pie plates: 10 in. (250 mm) minimum diameter
- ( ) 13. Five, 3 gal (12L) sample buckets. Eight, 3 gal (12L) sample buckets for Superpave Labs only. \*\*\*
- ( ) 14. Sample splitter suitable to split aggregate samples and sand, through and including No. 4 aggregate
- ( ) 15. Fire extinguisher: for electrical or chemical fires, effective on all solvents used in the laboratory  
Date refilled or checked (within one year)
- ( ) 16. Hot plate and infrared lamp of suitable wattage, or a vented drying oven for drying samples
- ( ) a. Type (describe) \_\_\_\_\_
- ( ) b. Placed within 2 ft (0.6 m) of exhaust fan
- ( ) c. Vented to the outside (if oven)
- ( ) 17. Oven
- ( ) a. Thermostatically controlled so as to maintain temperature within  $\pm 5^\circ\text{F}$  ( $3^\circ\text{C}$ )
- ( ) b. Temperature range of 104°F to 395° (40°C to 200°C)
- ( ) c. inside dimension shall be at least 17 in W x 12 in. D x 17 in. H (432 mm/304 mm/432 mm)
- ( ) 18. A suitable non-chlorinated solvent that has been approved by the Director of Research and Materials (Some non chlorinated solvents may require additional equipment or supplies, which shall be the responsibility of the Contractor. These may include a potable water source, a revised disposal method and other items deemed necessary for the particular solvent used.

MIX PLANT FIELD LABORATORY – APPARATUS INSPECTION SHEET (continued)

- a. Brand
- b. Solvent to be located at a reasonable distance from the laboratory –not to exceed 75 ft (25m)
- c. Materials Safety Data Sheet to be posted in the field laboratory.\*

\*A statement from the Department of Environmental Protection, Water Compliance Unit, reads:  
Discharge of solvents into the surface or ground waters is not an acceptable method for disposal. This waste should be collected in a sealed, quality container free of leaks and held on site in a dry location for adequate disposal through a licensed waste hauler. Ground and surface water discharge require a permit under the provisions of the Connecticut General Statutes.)

19. Centrifugal Extractor. (May be waved if ignition oven is used). \*\*\*

- a. Sufficient amount of filter rings and filter paper on hand
- b. Rings and paper are at least the outside diameter of the extractor bowl
- c. Solvent disposal from the extractor is piped directly to the outside into a closed container
- d. Minus 200 (75  $\mu$ m) sieve material loss check:

Original dry weight: \_\_\_\_\_  
After-wash dry weight: \_\_\_\_\_  
Percent Loss: \_\_\_\_\_

20. Ignition Oven: Correction Factor: \_\_\_\_\_ Mix. \_\_\_\_\_ Agg. See Additional Sheet. \*\*\*  
Date Scale last calibrated.. \_\_\_\_\_ Brand. \_\_\_\_\_

21. Truck Body Release Agent:

Brand Name: \_\_\_\_\_

22. Sieve Shaker

- a. Motorized shaker having a horizontal sieving motion and a tapping action (or one of equal performance as determined by the Director of Research and Materials Testing)
- b. Equipped with an automatic 0 to 30 minute timer capable of turning off the shaker after a predetermined 0 to 30 minute time period
- c. Brand Name: \_\_\_\_\_
- d. Shaking Action:  Good  Fair  Unacceptable
- e. Sieve retaining & Holddown  Good  Fair  Unacceptable
- f. Able to hold a 15 in. (380 mm) nest of sieves  Yes  No
- g. Timer accuracy:  Acceptable  Unacceptable

MIX PLANT FIELD LABORATORY – APPARATUS INSPECTION SHEET (continued)

( ) 23. Sieves: Set of U.S. Standard 8 in. (200 mm) or 12 in. (300 mm) sieves; minimum of one each of the following:

- ( ) a. Pan \*, cover #200 (75 μm)\*, #100(150μm)\*, #50(300μm)\*, #30(600μm)\*, #16(1.18mm)\*, 8(2.36mm), #4(4.75 mm), 3/8” (6.3mm), 1/2” (9.5 mm), 3/4” (19 mm), 1” (25 mm), 1 1/2” (37.5 mm), and 2” (50mm)  
\*may be half-height

| <b>% Passing</b> | <b>Referee Sample</b> | <b>Plant Sieves</b> | <b>Acceptable Tolerance</b> |
|------------------|-----------------------|---------------------|-----------------------------|
| #200 (75 μm)     |                       |                     | 0.6%                        |
| #100(150μm)      |                       |                     | 0.9%                        |
| #50 (300 μm)     |                       |                     | 1.2%                        |
| #30 (600 μm)     |                       |                     | 1.5%                        |
| #16(1.18mm)      |                       |                     | 1.7%                        |
| #8 (2.36 mm)     |                       |                     | 1.8%                        |
| #4 (4.75 mm)     |                       |                     | 2.1%                        |
| 3/8” (9.75 mm)   |                       |                     | 2.4%                        |
| 1/2” (12.5mm)    |                       |                     | 2.4%                        |
| 3/4” (19.0 mm)   |                       |                     | 2.4%                        |
| 1” (25 mm)       |                       |                     | 2.4%                        |

( ) 24. Electronic Balances

- ( ) a. 1500g capacity; 1 g sensitivity
- ( ) b. Type: \_\_\_\_\_
- ( ) c. Brand Name: \_\_\_\_\_

( ) 25. Workbench: Adequate in Size

( ) 26. Sampling table: Adequate size for sampling Class 4 samples and theoretical gravities 36 in. x 36 in. (914 mm x 914 mm)

( ) 27. Marshall Mold Block

- ( ) a. Wood block dimensions: 8 in. x 8 in. x 18 in. (203 mm x 203 mm x 457 mm)
- ( ) b. Steel Plate dimension: 12 in. x 12 in. x 1 in. (304 mm x 304 mm x 25 mm)
- ( ) c. Steel plate to be plum and level
- ( ) d. Block to be firmly attached to a concrete slab or floor

MIX PLANT FIELD LABORATORY – APPARATUS INSPECTION SHEET (continued)

28. Mechanical Marshall Hammer
- a. Automatically compacts sample and shuts off motor after desired number of strokes
  - b. Trip hammer falls the same distance for every stroke
  - c. Spring-loaded clamp ring to hold molds in position for easy insertion and removal from compactor
29. Marshall Molds
- a. Two-mold cylinders, one base plate, one extension collar, one mechanical mold extractor
  - b. A sufficient amount of 4 in. (102 min) paper disks
  - c. Molds, upper collar and base plate fit together freely
30. Sampling Platform or Catwalk (FORM 415)\*
- a. Safe and adequate with step access and railing to accommodate the inspector. \*If two mixing plants, one platform may be used for both plants, and the 75 ft (25m) maximum requirement may be waived. Platform must be as close to the laboratory as traffic patterns allow.
  - b. Located a safe distance from plant and a maximum of 75 ft (25 m) from the laboratory entrance.
  - c. Located so that plant traffic flow is not impeded.
  - d. Height of platform adequate to sample any size truck
  - e. Platform permanently anchored and wobbles free
  - f. Sampling Platform structure: no visible weak or rotted materials
  - g. General Condition:            Acceptable            Unacceptable
  - h. Sufficient lighting for night work – Describe: \_\_\_\_\_

For plants doing Superpave, the following equipment shall also be required:

- ( ) 300 ft<sup>2</sup> minimum floor space and 20 ft<sup>2</sup> of counter space.
- ( ) Balance with 20kg. (42 lbs) capacity, and sufficient sensitivity to read to  $\pm 0.1$  grams. For the bowl determination method the balance shall be equipped with a suitable suspension apparatus and holder to permit weighing the sample while suspended from the center of the scale pan or balance.
- ( ) Thermometers: Calibrated liquid-in-glass, total immersion type, of suitable range with gradations at least over 0.1° (0.2F) and a maximum scale error of 0.1° (0.2F) as prescribed in ASTM Specification E2.
- ( ) Vacuum Pump or Water Aspirator: For evacuation of air from the container: The vacuum pump or water aspirator shall be equipped with a needle valve to maintain constant vacuum. \*\*\*
- ( ) Water bath: Shall be capable of maintaining constant temperature and constant suitable water level.
- ( ) Manometer and Residual Pressure Manometer. Two (2) Meeting contract requirements and NIST traceable per ASSHTO T-209 (6.4-5). \*\*\* (Mercury Manometers will be band in 2007).
- ( ) Superpave Gyrotory Compactor: capable of providing a consolidation pressure of  $600 \pm 18$  kPa, an angle of gyration of  $1.25 \pm 0.02$  degrees, and a speed of gyration of  $30 \pm 0.5$  rpm. Gyrotory shall be directly connected to printer.
- ( ) Three (3) cylindrical molds: large enough to accommodate the following specimen requirements: 150 mm diameter, 150 mm maximum heights, and 90 mm minimum height.
- ( ) Extrusion jack or arbor press: capable of extruding compacted specimens from molds without distortion or damage.
- ( ) 12 Cu. ft forced draft oven capable of being controlled to  $\pm 3^\circ\text{C}$  as a minimum of 104°C to 395°C (40°C to 200°C)
- ( ) Timer: Accurate to one minute increments and capable of measuring from 1 min. to 60 min. timer shall have audible alert when the time has expired.
- ( ) Pans: Four (4) metal pans of adequate size to hold 5000 grams of material, for reheating gyrotory sample to compaction temperature.
- ( ) The field laboratory shall include a PC, printer and dedicated phone/modem suitable to run software and perform all necessary computations, as directed by the Director of Research and Materials Testing. This equipment shall be maintained in good working order and be made available for use by State inspectors.
- ( ) The field laboratory shall have potable source and drainage for use with testing equipment.

\*\*\* Specifications that have been upgraded 2/06

**FIELD REPORT:  
LABORATORY-PLANT DEFICIENCY  
FORM MAT-407**

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING

Date \_\_\_\_\_

Producer \_\_\_\_\_ Location \_\_\_\_\_

On the above date, the following deficiencies were found in your Plant/Laboratory

| Item      | Deficiency |
|-----------|------------|
| 1. _____  | _____      |
| 2. _____  | _____      |
| 3. _____  | _____      |
| 4. _____  | _____      |
| 5. _____  | _____      |
| 6. _____  | _____      |
| 7. _____  | _____      |
| 8. _____  | _____      |
| 9. _____  | _____      |
| 10. _____ | _____      |

Please make the necessary corrections as soon as possible.

Failure to correct the indicated deficiencies may results in loss of State approval.

\_\_\_\_\_  
Inspector  
Connecticut Department of Transportation  
Division of Research and Materials





**FIELD REPORT  
INSPECTION OF  
IN-PLACE HMA  
FORM MAT-410**

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING

Class of material: \_\_\_\_\_  
Producer: \_\_\_\_\_  
Inspection Date: \_\_\_\_\_  
Placement Date: \_\_\_\_\_  
Material usage: \_\_\_\_\_  
Material depth: \_\_\_\_\_

Inspection requested by: \_\_\_\_\_  
Weather conditions at time of placement: \_\_\_\_\_  
Air temperature \_\_\_\_\_  
Base Temperature \_\_\_\_\_  
Mix placement Temperature: \_\_\_\_\_  
Laboratory Test Report No. \_\_\_\_\_

PROJECT NO. \_\_\_\_\_

1. General appearance of
  - a. Satisfactory \_\_\_\_\_
  - b. Dry \_\_\_\_\_ Wet \_\_\_\_\_
  - c. Open \_\_\_\_\_ Tight \_\_\_\_\_
  - d. Boney \_\_\_\_\_
  - e. High dust \_\_\_\_\_
  - f. Porous \_\_\_\_\_
  - g. Inconsistent Mixture \_\_\_\_\_
  - h. Fat spots \_\_\_\_\_
  - i. Hairline-type cracks \_\_\_\_\_
  - j. Larger cracks \_\_\_\_\_

2. Apparent Pavement Defects:      None \_\_\_\_\_  
Bleeding \_\_\_\_\_ Stripping \_\_\_\_\_ Cracking \_\_\_\_\_ Rutting \_\_\_\_\_  
Smearing \_\_\_\_\_ Raveling \_\_\_\_\_ Other: \_\_\_\_\_

3. After-paving traffic Data:    Closed \_\_\_\_\_ Open immediately \_\_\_\_\_  
Open after final rolling \_\_\_\_\_ Open after cooled \_\_\_\_\_  
Durational pavement: open to traffic (days-weeks-months) \_\_\_\_\_

4. Paving/rolling equipment and procedures: \_\_\_\_\_  
\_\_\_\_\_

5. Field personnel educated comments on mix: \_\_\_\_\_  
\_\_\_\_\_

6. Laboratory personnel comments and recommendations: \_\_\_\_\_  
\_\_\_\_\_

Inspector: \_\_\_\_\_

# MAT- 411 CODING SHEET: NCS TRANS-OPTIC EP-30-6404-321 (BUBBLE SHEET)

## ConnDOT Data Sheet

Date: \_\_\_\_\_ Project: \_\_\_\_\_ Class: \_\_\_\_\_ Design Level \_\_\_\_\_

Vendor Location: \_\_\_\_\_ Tech Name(s): \_\_\_\_\_

| VENDOR CODE | SAMPLED DATE | MIX CODE | PROJECT NUMBER | SAMPLE NUMBER | DATE RECEIVED | TONS USED | TECH ID | AUTHORIZED CERT. NO. |
|-------------|--------------|----------|----------------|---------------|---------------|-----------|---------|----------------------|
| 0 0 0 0     | 0 0 0 0      | 0 0 0 0  | 0 0 0 0        | 0 0 0 0       | 0 0 0 0       | 0 0 0 0   | 0 0 0 0 | 0 0 0 0              |
| 1 1 1 1     | 1 1 1 1      | 1 1 1 1  | 1 1 1 1        | 1 1 1 1       | 1 1 1 1       | 1 1 1 1   | 1 1 1 1 | 1 1 1 1              |
| 2 2 2 2     | 2 2 2 2      | 2 2 2 2  | 2 2 2 2        | 2 2 2 2       | 2 2 2 2       | 2 2 2 2   | 2 2 2 2 | 2 2 2 2              |
| 3 3 3 3     | 3 3 3 3      | 3 3 3 3  | 3 3 3 3        | 3 3 3 3       | 3 3 3 3       | 3 3 3 3   | 3 3 3 3 | 3 3 3 3              |
| 4 4 4 4     | 4 4 4 4      | 4 4 4 4  | 4 4 4 4        | 4 4 4 4       | 4 4 4 4       | 4 4 4 4   | 4 4 4 4 | 4 4 4 4              |
| 5 5 5 5     | 5 5 5 5      | 5 5 5 5  | 5 5 5 5        | 5 5 5 5       | 5 5 5 5       | 5 5 5 5   | 5 5 5 5 | 5 5 5 5              |
| 6 6 6 6     | 6 6 6 6      | 6 6 6 6  | 6 6 6 6        | 6 6 6 6       | 6 6 6 6       | 6 6 6 6   | 6 6 6 6 | 6 6 6 6              |
| 7 7 7 7     | 7 7 7 7      | 7 7 7 7  | 7 7 7 7        | 7 7 7 7       | 7 7 7 7       | 7 7 7 7   | 7 7 7 7 | 7 7 7 7              |
| 8 8 8 8     | 8 8 8 8      | 8 8 8 8  | 8 8 8 8        | 8 8 8 8       | 8 8 8 8       | 8 8 8 8   | 8 8 8 8 | 8 8 8 8              |
| 9 9 9 9     | 9 9 9 9      | 9 9 9 9  | 9 9 9 9        | 9 9 9 9       | 9 9 9 9       | 9 9 9 9   | 9 9 9 9 | 9 9 9 9              |

- Use a No. 2 pencil only.
- Do not use ink, ballpoint, or felt tip pens.
- Make solid marks that fill the oval completely.
- Erase cleanly any marks you wish to change.
- Make no stray marks on this form.
- Do not fold, tear, or mutilate this form.
- PROTECT THIS FORM FROM DIRT AND ASPHALT SMUDGES.

| #200<br>(0.075 mm) | #100<br>(0.150 mm) | #50<br>(0.300 mm) | #30<br>(0.600 mm) | #16<br>(1.18 mm) | #8<br>(2.36 mm) | #4<br>(4.75 mm) | #3/8"<br>(9.5 mm) | #1/2"<br>(12.5 mm) | #3/4"<br>(19.0 mm) | #1"<br>(25.0 mm) | TEST<br>MODULE |
|--------------------|--------------------|-------------------|-------------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------------|------------------|----------------|
| 0 0 0 0            | 0 0 0 0            | 0 0 0 0           | 0 0 0 0           | 0 0 0 0          | 0 0 0 0         | 0 0 0 0         | 0 0 0 0           | 0 0 0 0            | 0 0 0 0            | 0 0 0 0          |                |
| 1 1 1 1            | 1 1 1 1            | 1 1 1 1           | 1 1 1 1           | 1 1 1 1          | 1 1 1 1         | 1 1 1 1         | 1 1 1 1           | 1 1 1 1            | 1 1 1 1            | 1 1 1 1          |                |
| 2 2 2 2            | 2 2 2 2            | 2 2 2 2           | 2 2 2 2           | 2 2 2 2          | 2 2 2 2         | 2 2 2 2         | 2 2 2 2           | 2 2 2 2            | 2 2 2 2            | 2 2 2 2          |                |
| 3 3 3 3            | 3 3 3 3            | 3 3 3 3           | 3 3 3 3           | 3 3 3 3          | 3 3 3 3         | 3 3 3 3         | 3 3 3 3           | 3 3 3 3            | 3 3 3 3            | 3 3 3 3          |                |
| 4 4 4 4            | 4 4 4 4            | 4 4 4 4           | 4 4 4 4           | 4 4 4 4          | 4 4 4 4         | 4 4 4 4         | 4 4 4 4           | 4 4 4 4            | 4 4 4 4            | 4 4 4 4          |                |
| 5 5 5 5            | 5 5 5 5            | 5 5 5 5           | 5 5 5 5           | 5 5 5 5          | 5 5 5 5         | 5 5 5 5         | 5 5 5 5           | 5 5 5 5            | 5 5 5 5            | 5 5 5 5          |                |
| 6 6 6 6            | 6 6 6 6            | 6 6 6 6           | 6 6 6 6           | 6 6 6 6          | 6 6 6 6         | 6 6 6 6         | 6 6 6 6           | 6 6 6 6            | 6 6 6 6            | 6 6 6 6          |                |
| 7 7 7 7            | 7 7 7 7            | 7 7 7 7           | 7 7 7 7           | 7 7 7 7          | 7 7 7 7         | 7 7 7 7         | 7 7 7 7           | 7 7 7 7            | 7 7 7 7            | 7 7 7 7          |                |
| 8 8 8 8            | 8 8 8 8            | 8 8 8 8           | 8 8 8 8           | 8 8 8 8          | 8 8 8 8         | 8 8 8 8         | 8 8 8 8           | 8 8 8 8            | 8 8 8 8            | 8 8 8 8          |                |
| 9 9 9 9            | 9 9 9 9            | 9 9 9 9           | 9 9 9 9           | 9 9 9 9          | 9 9 9 9         | 9 9 9 9         | 9 9 9 9           | 9 9 9 9            | 9 9 9 9            | 9 9 9 9          |                |

| #200<br>(0.075 mm) | #100<br>(0.150 mm) | #50<br>(0.300 mm) | #30<br>(0.600 mm) | #16<br>(1.18 mm) | #8<br>(2.36 mm) | #4<br>(4.75 mm) | #3/8"<br>(9.5 mm) | #1/2"<br>(12.5 mm) | #3/4"<br>(19.0 mm) | #1"<br>(25.0 mm) | TEST<br>MODULE |
|--------------------|--------------------|-------------------|-------------------|------------------|-----------------|-----------------|-------------------|--------------------|--------------------|------------------|----------------|
| 0 0 0 0            | 0 0 0 0            | 0 0 0 0           | 0 0 0 0           | 0 0 0 0          | 0 0 0 0         | 0 0 0 0         | 0 0 0 0           | 0 0 0 0            | 0 0 0 0            | 0 0 0 0          |                |
| 1 1 1 1            | 1 1 1 1            | 1 1 1 1           | 1 1 1 1           | 1 1 1 1          | 1 1 1 1         | 1 1 1 1         | 1 1 1 1           | 1 1 1 1            | 1 1 1 1            | 1 1 1 1          |                |
| 2 2 2 2            | 2 2 2 2            | 2 2 2 2           | 2 2 2 2           | 2 2 2 2          | 2 2 2 2         | 2 2 2 2         | 2 2 2 2           | 2 2 2 2            | 2 2 2 2            | 2 2 2 2          |                |
| 3 3 3 3            | 3 3 3 3            | 3 3 3 3           | 3 3 3 3           | 3 3 3 3          | 3 3 3 3         | 3 3 3 3         | 3 3 3 3           | 3 3 3 3            | 3 3 3 3            | 3 3 3 3          |                |
| 4 4 4 4            | 4 4 4 4            | 4 4 4 4           | 4 4 4 4           | 4 4 4 4          | 4 4 4 4         | 4 4 4 4         | 4 4 4 4           | 4 4 4 4            | 4 4 4 4            | 4 4 4 4          |                |
| 5 5 5 5            | 5 5 5 5            | 5 5 5 5           | 5 5 5 5           | 5 5 5 5          | 5 5 5 5         | 5 5 5 5         | 5 5 5 5           | 5 5 5 5            | 5 5 5 5            | 5 5 5 5          |                |
| 6 6 6 6            | 6 6 6 6            | 6 6 6 6           | 6 6 6 6           | 6 6 6 6          | 6 6 6 6         | 6 6 6 6         | 6 6 6 6           | 6 6 6 6            | 6 6 6 6            | 6 6 6 6          |                |
| 7 7 7 7            | 7 7 7 7            | 7 7 7 7           | 7 7 7 7           | 7 7 7 7          | 7 7 7 7         | 7 7 7 7         | 7 7 7 7           | 7 7 7 7            | 7 7 7 7            | 7 7 7 7          |                |
| 8 8 8 8            | 8 8 8 8            | 8 8 8 8           | 8 8 8 8           | 8 8 8 8          | 8 8 8 8         | 8 8 8 8         | 8 8 8 8           | 8 8 8 8            | 8 8 8 8            | 8 8 8 8          |                |
| 9 9 9 9            | 9 9 9 9            | 9 9 9 9           | 9 9 9 9           | 9 9 9 9          | 9 9 9 9         | 9 9 9 9         | 9 9 9 9           | 9 9 9 9            | 9 9 9 9            | 9 9 9 9          |                |

Mark Reflex® by NCS EM-227383-1:65432

Printed in U.S.A.

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**Note: This Form is two-sided. Reverse side is for test modules three, four and five which identical to test modules one and two.**



# Form 412 (Reverse side)

# 1 \_\_\_\_\_

# 2 \_\_\_\_\_

|           |  |  |        |
|-----------|--|--|--------|
| % Passing |  |  |        |
| 200       |  |  |        |
| 50        |  |  |        |
| 30        |  |  |        |
| 8         |  |  |        |
| 4         |  |  |        |
| 3/8"      |  |  |        |
| 1/2"      |  |  |        |
| 3/4"      |  |  |        |
| 1"        |  |  |        |
| 1-1/2"    |  |  |        |
|           |  |  | Mold # |

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|  |  |  | Mold # |

**JMF**

|        |  |
|--------|--|
| AC     |  |
| 200    |  |
| 50     |  |
| 30     |  |
| 8      |  |
| 4      |  |
| 3/8"   |  |
| 1/2"   |  |
| 3/4"   |  |
| 1"     |  |
| 1-1/2" |  |

# 3 \_\_\_\_\_

# 4 \_\_\_\_\_

# 5 \_\_\_\_\_

|           |  |  |        |
|-----------|--|--|--------|
| % Passing |  |  |        |
| 200       |  |  |        |
| 50        |  |  |        |
| 30        |  |  |        |
| 8         |  |  |        |
| 4         |  |  |        |
| 3/8"      |  |  |        |
| 1/2"      |  |  |        |
| 3/4"      |  |  |        |
| 1"        |  |  |        |
| 1-1/2"    |  |  |        |
|           |  |  | Mold # |

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|  |  | Mold # |

# Report of Test Form 412S

FORM MAT 412S rev. 3-1-06

|   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|---|---|--|----------------|-----------------------------------|--|----------------|-------------------------------|--|--------------------------|-------------------------------|--|--|
| Sampling<br>Determine<br>or Paving<br>Materials<br>ARSHO-<br>T188                             | <b>Project Number</b>                                       |  |                | <b>Gyrations:</b>                 |  |                | <b>Material Code:</b>         |  |                          | <b>Production Date</b>        |  |  |
|   | <b>Vendor Number</b>  |  |                | <b>Mix Time (Dry-<br/>weight)</b> |  |                | <b>NETTCP ID #:</b>           |  |                          | <b>Contract</b>               |  |  |
|   | <b>Plant</b>  |  |                | <b>Technician Name/Print</b>      |  |                |                               |  |                          | <b>Departure Tonnage</b>      |  |  |
|   | <b>Location</b>   |  |                | <b>Test Time (AM/PM)</b>          |  |                | <b>Test Time (AM/PM)</b>      |  |                          | <b>Test Time (AM/PM)</b>      |  |  |
|   | <b>Mix Size:</b>  |  | <b>Level</b>   | <b>Truck Number</b>               |  |                | <b>Truck Number</b>           |  |                          | <b>Truck Number</b>           |  |  |
|   | <b>Percent RAP:</b>   |  |                | <b>Truck Temp.</b>                |  |                | <b>Truck Temp.</b>            |  |                          | <b>Truck Temp.</b>            |  |  |
|   | <b>Production AC</b>  |  |                | <b>Sublot Number</b>              |  |                | <b>Sublot Number</b>          |  |                          | <b>Sublot Number</b>          |  |  |
|   | <b>J.M.F AC</b>   |  |                | <b>Syro Temp. (1)-(2)</b>         |  |                | <b>Syro Temp. (1)-(2)</b>     |  |                          | <b>Syro Temp. (1)-(2)</b>     |  |  |
| Igneous<br>Oven<br>Method<br>For<br>Determining<br>Rapport<br>Gradation                       | <b>Correction Factor / Ignition Oven Ticket Information</b> |  |                | <b>Moisture mass on Sieke</b>     |  |                | <b>Moisture mass on Sieke</b> |  |                          | <b>Moisture mass on Sieke</b> |  |  |
|   | <b>Test</b>   |  |                | <b>Wt. Loss</b>                   |  |                | <b>Wt. Loss</b>               |  |                          | <b>Wt. Loss</b>               |  |  |
|   | <b>Test 1</b>   |  |                | <b>% Loss</b>                     |  |                | <b>% Loss</b>                 |  |                          | <b>% Loss</b>                 |  |  |
|   | <b>Test 2</b>   |  |                | <b>Temp Comp</b>                  |  |                | <b>Temp Comp</b>              |  |                          | <b>Temp Comp</b>              |  |  |
| Sieve<br>Analysis<br>of Fine<br>and<br>Coarse<br>Aggregates<br>ARSHO-<br>T28                  | <b>Test 3</b>   |  |                | <b>Pk kg Ignition mass</b>        |  |                | <b>Pk kg Ignition mass</b>    |  |                          | <b>Pk kg Ignition mass</b>    |  |  |
|   | <b>Gradation</b>  |  |                | <b>Moisture mass Change</b>       |  |                | <b>Moisture mass Change</b>   |  |                          | <b>Moisture mass Change</b>   |  |  |
|   | <b>Gradation Sieve Size</b>                                 |  |                | <b>mass</b>                       |  |                | <b>mass</b>                   |  |                          | <b>mass</b>                   |  |  |
|   | <b>mm</b>   |  |                | <b>X Fed.</b>                     |  |                | <b>X Fed.</b>                 |  |                          | <b>X Fed.</b>                 |  |  |
|   | <b>0.075</b>  |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>0.150</b>  |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>0.300</b>  |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>0.600</b>  |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>1.18</b>   |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>2.50</b>   |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>4.75</b>   |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>9.5</b>  |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>19.0</b>   |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
|   | <b>37.5</b>   |  |                | <b>passing</b>                    |  |                | <b>passing</b>                |  |                          | <b>passing</b>                |  |  |
| <b>75.0</b>   |   |  | <b>passing</b> |                                   |  | <b>passing</b> |                               |  | <b>passing</b>           |                               |  |  |
| <b>150.0</b>  |   |  | <b>passing</b> |                                   |  | <b>passing</b> |                               |  | <b>passing</b>           |                               |  |  |
| Prepared<br>Specimens<br>by<br>Gradation<br>Sample<br>Specific<br>Gradation<br>ARSHO-<br>T488 | <b>Pwa</b>  |  |                | <b>Pwa JMF</b>                    |  |                |                               |  |                          |                               |  |  |
|   | <b>Gsa</b>  |  |                | <b>Specimen</b>                   |  |                | <b>Average</b>                |  |                          | <b>Average</b>                |  |  |
|   | <b>Gsb</b>  |  |                | <b>Bowl</b>                       |  |                | <b>Results</b>                |  |                          | <b>Results</b>                |  |  |
|   | <b>Specimens mass in air</b>                                |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| Maximum<br>Specific<br>Gravity<br>ARSHO-<br>T283  | <b>Submerged specimens mass in air [H]</b>                  |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Loss mass of specimens in water [J]</b>                  |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Value of specimens [I-J]</b>                             |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Gmb @ Mass [42a - 8.828]</b>                             |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Mass of NMR plus bowl in air [A]</b>                     |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Loss mass of bowl in air</b>                             |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Mass of NMR in air</b>                                   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Mass of NMR plus bowl in water</b>                       |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Loss mass of bowl in water</b>                           |  |                |                                   |  |                |                               |  |                          |                               |  |  |
|   | <b>Mass of NMR in water</b>                                 |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>Value of NMR</b>   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>Gmm [42a - 8.811]</b>  |   |  | <b>0.020</b>   |                                   |  |                |                               |  |                          |                               |  |  |
| <b>VAC<sub>MA</sub></b>   |   |  | <b>1.0</b>     |                                   |  | <b>4.0</b>     |                               |  |                          |                               |  |  |
| <b>VMA<sub>s</sub></b>  |   |  | <b>1.0</b>     |                                   |  |                |                               |  |                          |                               |  |  |
| <b>VMA<sub>m</sub></b>  |   |  | <b>1.0</b>     |                                   |  |                |                               |  |                          |                               |  |  |
| <b>G<sub>se</sub></b>   |   |  | <b>0.030</b>   |                                   |  |                |                               |  |                          |                               |  |  |
| <b>D<sub>f</sub></b>  |   |  | <b>0.05</b>    |                                   |  |                |                               |  |                          |                               |  |  |
| <b>VFA - [(100)(VMA-VA)/(VMA) (Min.-Max.)]</b>  |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>HEIGHT [R] @ Min</b>   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>HEIGHT [R] @ Max</b>   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>HEIGHT [H] @ Max</b>   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>DENSITY @ Mass - [Gmb @ Mw / Gmm] * 100</b>  |   |  | <b>max</b>     |                                   |  | <b>98.0</b>    |                               |  |                          |                               |  |  |
| <b>DENSITY @ Mass - [Gmb @ Mw / Gmm] * 100</b>  |   |  | <b>1.0</b>     |                                   |  | <b>96.0</b>    |                               |  |                          |                               |  |  |
| <b>DENSITY @ Min - [Gmb @ M / Gmm] * 100</b>  |   |  | <b>max</b>     |                                   |  |                |                               |  |                          |                               |  |  |
| <b>DUST/ ASPHALT - [(8.875mm / P<sub>1s</sub>)]</b>   |   |  | <b>0.3</b>     |                                   |  | <b>0.3</b>     |                               |  |                          |                               |  |  |
| <b>Hot Bin Pollr From Plant %</b>   |   |  |                |                                   |  |                |                               |  | <b>Aggregate Source:</b> |                               |  |  |
| <b>J.M.F DATE</b>   |   |  |                |                                   |  |                |                               |  | <b>CA -</b>              |                               |  |  |
| <b>Change</b>   |   |  |                |                                   |  |                |                               |  | <b>FA -</b>              |                               |  |  |
| <b>Temp / Weather</b>   |   |  |                |                                   |  |                |                               |  | <b>FA -</b>              |                               |  |  |
| <b>Pk</b>   |   |  |                |                                   |  |                |                               |  |                          |                               |  |  |
| <b>Gk [Gravily of Binder]</b>   |   |  |                |                                   |  | <b>1.033</b>   |                               |  | <b>1.033</b>             |                               |  |  |
| <b>Gak [Gravily of Aggregate blend]</b>   |   |  |                |                                   |  | <b>1.033</b>   |                               |  | <b>1.033</b>             |                               |  |  |

Page 1

**REPORT OF TEST  
HMA  
FORM MAT- 413**

| PROJECT                                   |  | FED AID NO.   |         | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION |  |      |  |  |  |
|---|--|---|---------|--|--|------|--|--|--|
| Sample No.                                |  | BUREAU OF ENGINEERING & HWY OPERATIONS<br>REPORT OF TEST of HMA MAT 413 Rev 10-03   |         |  |  |      |  |  |  |
| Kind of Material                          |  | PASSING SIEVE   | Percent |  |  | M.F. | MARSHALL TESTS   |  |  |
| Source of Supply                          |  | #200  |         |  |  |      | VOIDS  |  |  |
|   |  | 50  |         |  |  |      | STABILITY  |  |  |
| LOCATION OF                               |  | 30  |         |  |  |      | FLOW   |  |  |
|   |  | 8   |         |  |  |      | Theo. Gravity  |  |  |
| Sample Taken from                         |  | 4   |         |  |  |      | <b>Status Assigned</b><br>Accepted (A)<br>Rejected (R)<br>Pending (P)<br>Penalty (D) |  |  |
|   |  | 3/8   |         |  |  |      |  |  |  |
| Location of                               |  | 1/2   |         |  |  |      |  |  |  |
|   |  | 3/4   |         |  |  |      |  |  |  |
| Sampled By                                |  | 1   |         |  |  |      |  |  |  |
|   |  | 1-1/2   |         |  |  |      |  |  |  |
| Date Sampled                              |  | ASPHALT   |         |  |  |      |  |  |  |
|   |  | TEMP OF MIX ° F   |         |  |  |      |  |  |  |
| Using Agency                              |  | TIME OF TEST  |         |  |  |      |  |  |  |
| Quantity Represented                      |  | REMARKS<br><br>STANDARD SPECIFICATION _____<br>SUPPLEMENTAL SPECIFICATION _____<br>PROJECT SPECIAL PROVISION _____<br>OTHER _____<br><br>PERSON ACCEPTING TECHNICAL RESPONSIBILITY<br><br>NAME _____<br><br>TITLE _____ |         |  |  |      |  |  |  |
| Purpose                                   |  |   |         |  |  |      |  |  |  |
| Where Material Will be used (Town)        |  |   |         |  |  |      |  |  |  |
| Sample Received at Testing Site           |  |   |         |  |  |      |  |  |  |
| <b>Director of Research and Materials</b> |  |   |         |  |  |      |  |  |  |



# GUIDELINE: HOT MIX ASPHALT SAMPLING PLATFORM (OSHA REG. 1910.24) FORM MAT- 415

Excerpt from OSHA Regulation 1910.24:

(d) *Stair width.* Fixed stairways shall have a minimum width of 22 inches.

(e) *Angle of stairway rise.* Fixed stairs shall be installed at angles to the horizontal of between 30° and 50°. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at an angle to the horizontal within the permissible range. Table D-1 gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations are not limited to those given in Table D-1.

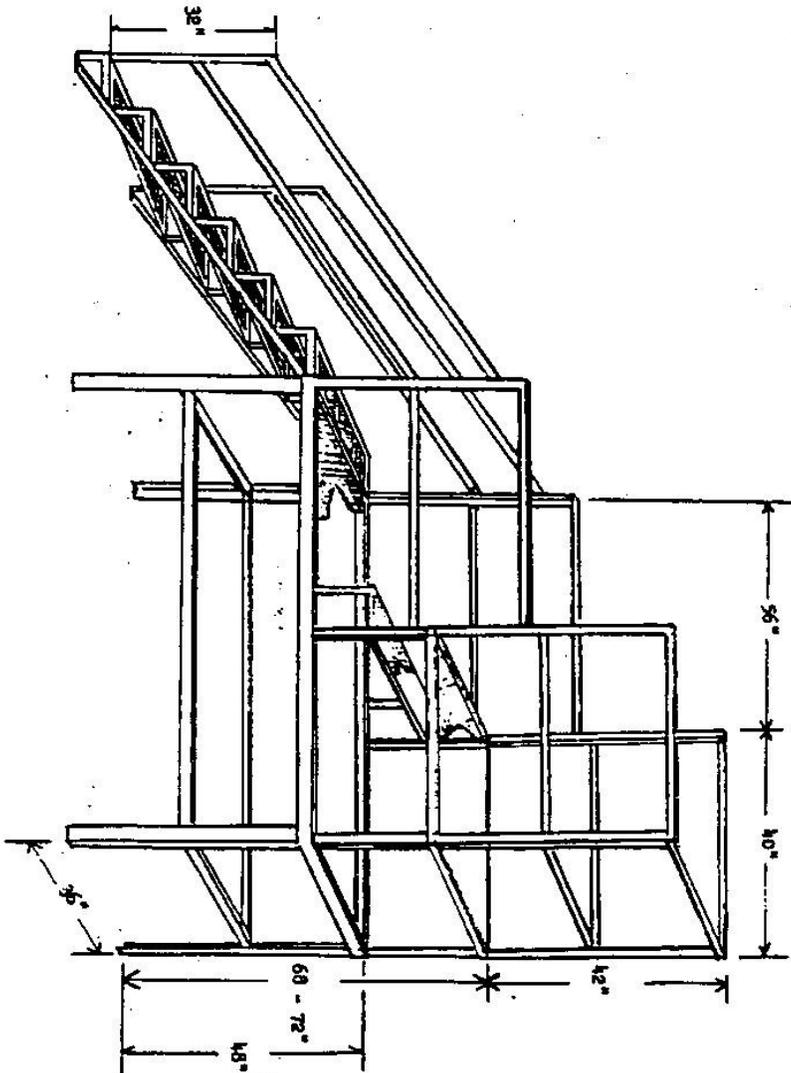
(f) *Stair Treads.* Each tread and the top landing of a stairway where risers are used, should have a nose which extends one-half inch to one inch beyond the face of the lower riser. Noses should have an even leading edge. All treads shall be reasonably slip-resistant and the nosings shall be of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs.

TABLE D-1

| Angle to horizontal | Rise<br>(in inches) | Tread run<br>(in inches) |
|---------------------|---------------------|--------------------------|
| 30°-35°             | 6 1/2               | 11                       |
| 32°-00'             | 6 3/4               | 10 3/4                   |
| 33°-41'             | 7                   | 10 1/2                   |
| 35°-16'             | 7 1/4               | 10 1/4                   |
| 36°-52'             | 7 1/2               | 10                       |
| 38°-29'             | 7 3/4               | 9 3/4                    |
| 40°-00'             | 8                   | 9 1/2                    |
| 41°-44'             | 8 1/4               | 9 1/4                    |
| 43°-21'             | 8 1/2               | 9                        |
| 45°-00'             | 8 1/4               | 8 3/4                    |
| 46°-38'             | 9                   | 8 1/2                    |
| 48°-16'             | 9 1/4               | 8 1/4                    |
| 49°-54'             | 9 1/2               | 8                        |

(g) *Railings and handrails.* Standard railings shall be provided on the open sides of all exposed stairways and stair platforms. Handrails shall be provided on at least one side of closed stairways, preferably on the right side descending. Stair railings and handrails shall be installed in accordance with provisions of section 1910.23.

SAMPLING PLATFORM, TYPICAL



**WORKSHEET:  
ASH CONTENT OF  
HMA  
FORM MAT-416**

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
OFFICE OF RESEARCH AND MATERIALS  
DIVISION OF MATERIALS TESTING

|              |  |  |              |           |       |
|--------------|--|--|--------------|-----------|-------|
|              |  |  |              | PG Binder | # 200 |
| Date Sampled |  |  | Field        |           |       |
| Sampled by   |  |  | Corrected AC |           |       |
| Ash by       |  |  | Difference   |           |       |

a) Sample Weight \_\_\_\_\_

d) Wt. of extracted Agg \_\_\_\_\_ Dish No. \_\_\_\_\_

Wt. of mineral matter & filter paper

Original wt. of filter paper

|     |
|-----|
| -   |
| c = |

c) Increase in wt. of paper (0.1g)

b) Total wt. of mineral matter in extract (0.1g)

$V_1$  (total volume) ml  $V_1 =$  \_\_\_\_\_

Wt. of ignition dish & ash (0.0001g)

$V_2$  (volume after removing aliquot) ml  $V_2 =$  \_\_\_\_\_

Original wt. of ignition dish (0.0001g)

$V_1 - V_2 =$

g) Wt. of ash

|     |
|-----|
| -   |
| g = |

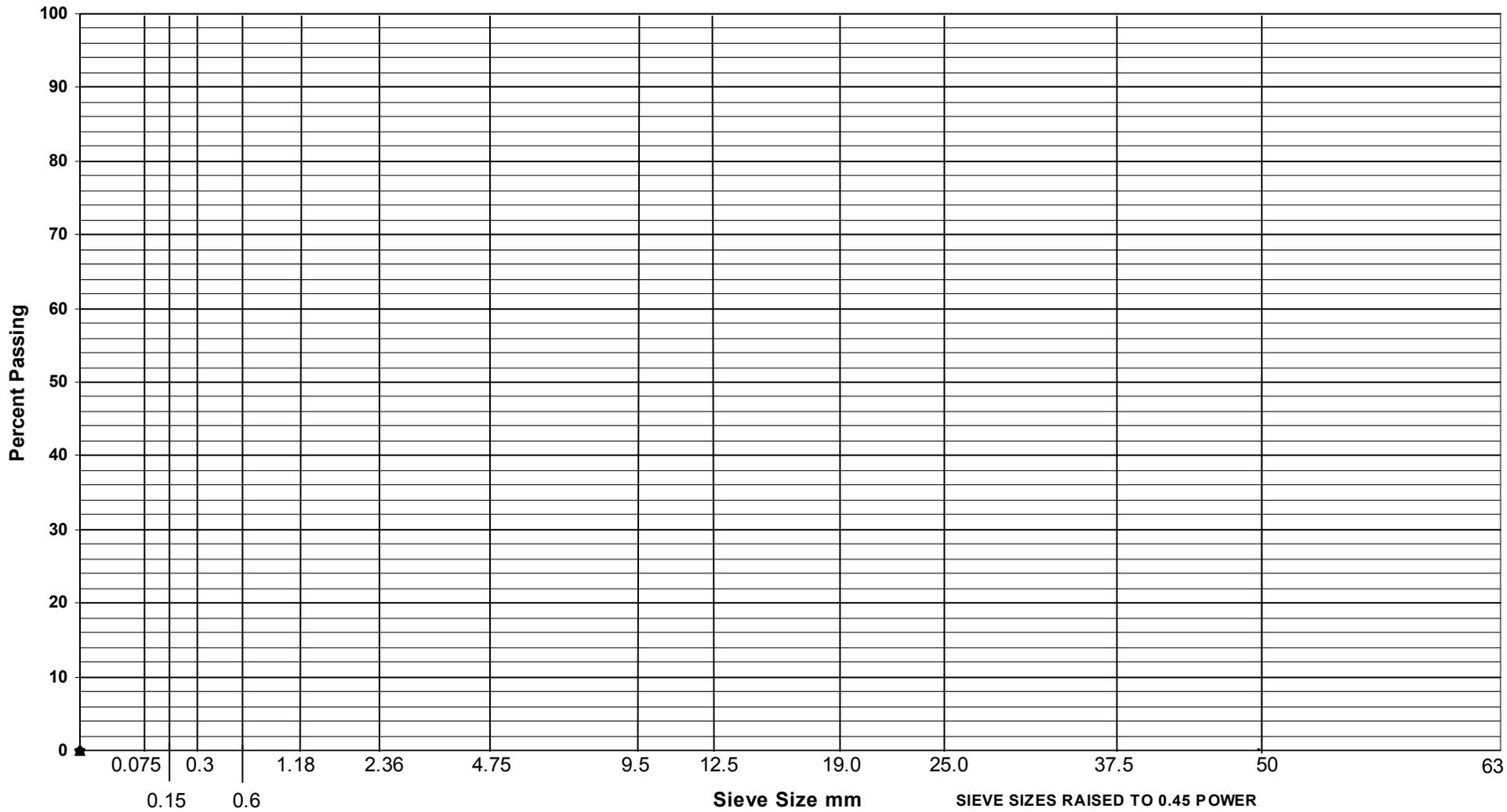
$$b = g \left( \frac{V_1}{V_1 - V_2} \right) \quad b =$$

e) Total wt. of extracted Agg. (0.1g)

$e = b + c + d$  \_\_\_\_\_  $e =$  \_\_\_\_\_

Percent Asphalt =  $100(a-c)/a$  (0.01%) = \_\_\_\_\_

**WORKSHEET:  
HMA GRADATION GRAPH (0.45 POWER)  
FORM MAT-417**



**Field Report : Cleaning and  
Sealing Joints & Cracks in  
Pavement  
Form MAT- 418**

**Connecticut Dept. of Transportation  
Division of Materials Testing  
Rev 11/03**

**Date:**

**Materials Investigator(s):**

**Subject:**

**Project  
Details:**

- Placement of materials under maintenance contract number : \_\_\_\_\_
- Project No: \_\_\_\_\_
- Date of application: \_\_\_\_\_
- Weather: \_\_\_\_\_
- Contractor \_\_\_\_\_

**Remarks:**

---

**Quality Control Plan for Fine Aggregates used in HMA**

**QCPFA**(revised 10-03)

**1. Basic Information and Personnel**

a. Name and address of property owner or lessee:

b. Name, title, and telephone number of company contact person:

c. Name, title, telephone number, and certifications, if applicable, of the person(s) responsible for the QCPFA:

d. Name and affiliation of the geologist(s) familiar with the operation:

**2. Controls implemented during excavation**

a. Overburden removal

1. To what depth is overburden removed?

2. What is the minimum separation between the edge of overburden stripping and the production face?

3. How will sloughed overburden be avoided?

4. Will the overburden be stored within the area to be mined?

## b. Mining controls

1. Describe how excavation will be performed so that intended materials are being mined?

2. Who will make the determination?

3. How will clean-out materials from old ramps, overlying lifts, stripping, or floor leveling be handled?

4. What tests are used to verify that intended materials are being mined?

5. How will it be assured that your material meet all specifications as required by the latest ConnDOT M.04 criteria before it is shipped?

## c. Product uniformity controls

1. Describe the method for loading out shot rock or sand & gravel from a face to minimize non-uniformity.

2. Describe any other procedure(s) used to minimize non-uniformity.

**3. Processing controls**

a. Describe how non-uniformity will be minimized during aggregate processing.

b. Describe how aggregate quality will be improved by processing.

**4. Stockpiling**

a. Describe how non-uniformity will be minimized in stockpiling.

b. Describe how contamination will be minimized in stockpiles.

c. Describe how stockpiles will be monitored for non-uniformity and contamination:

1. How will non-uniformity and contamination be visually monitored, and by whom?

2. What physical tests will be employed to monitor quality of fine aggregate?

3. What is the minimum testing frequency?

4. Who will do the tests?

5. What actions will be taken when material does not meet requirements?

**5. Records**

a. What quality monitoring records are maintained?

b. Where are the quality monitoring records kept?

c. Who is responsible for maintaining these records?

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
DIVISION OF MATERIAL TESTING

**2005 REQUESTED DISTRICT PROCEDURES FOR HOT MIX ASPHALT (HMA)  
IN CONSTRUCTION, SITE MANAGER, CMR/NON CMR, AND MUNICIPAL PROJECTS**  
**(Page 1 of 2 rev. 2/14/05)**

**1. PRODUCTION CALL-INS:** All user agencies are to call in all production orders of hot-mix asphalt (HMA), *one working day prior* to scheduled pick up or delivery, to the applicable District Project Coordinator listed below. If unable to contact the District personnel and/or when any cancellations or changes occur, please notify the Central Laboratory as soon as possible by calling Jonathan Whitbeck or Andy Bednar at **(860) 258-0325/0708**. Any HMA not called in cannot be provided test coverage, in accordance with standard specifications.

To report production orders, notify your respective District personnel listed below from 8:00 a.m. to 2:30 p.m. and give them the following information, in the order listed below: (Please be as accurate as possible when reporting the estimated amount of material to be used)

- a. Plant and location.
- b. Estimated amount of material (tons).
- c. Class (es) of materials to be used.\*
- d. Project number.
- e. Time material will be picked up from plant.
- f. Is density testing required?

\*SUPERPAVE MIXES MUST INCLUDE MIX SIZE AND LEVEL (i.e., 12.5 L2 for 12.5 Level 2)

|   |  |   |  |
|---|--|---|--|
| <b><u>DISTRICT 1</u></b><br>Paul Carl<br>(860) 258-4660 | <b><u>DISTRICT 2</u></b><br>Robert Dumas<br>(860) 823-3268 | <b><u>DISTRICT 3</u></b><br>Mary Spring<br>(203) 389-3179 | <b><u>DISTRICT 4</u></b><br>Tom Weldon<br>(860) 585-2742 |
|---|--|---|--|

**IMPERATIVE:** The Central Laboratory must be notified *immediately* of cancellations or of any changes from the call in as soon as they occur.

**2. NIGHTWORK AND WEEKEND:** Paving scheduled at night and weekends must be called in as soon as possible (preferably 2 or 3 working days prior) in order to provide production coverage.

**3. HMA USAGE:** Due to QC data requirements for contractors, the Lab must have daily material totals. Project personnel should provide District Coordinators with updates daily.

**4. MAT-100 CG: Computer Generated MAT-100:** Construction Management Reporting (CMR) systems users and Site Manager users have the ability to generate and print MAT-100's at their terminal. Hand written MAT-100's are discouraged. MAT 100's are required for HMA production, Density (HMA and Soils), and Density Assurance Testing. **MAT-7's are no longer to be used.** Each day's production will require one MAT-100 per class of material.

**5. HMA MIX DEFICIENCY AT PLANT:** In the event that a deficiency situation has occurred at the HMA plant, you will be notified of the time period in which the deficiency occurred. You will be required to submit a production quantity of material used during the deficiency period and also the quantity of material for the acceptable portion. This data must be reported back to the Central Laboratory as soon as possible in order to process the deficient production. A separate B# and MAT-100 CG will be required for the deficient tonnage. The Laboratory will provide the dollar amount of the deficiency to be assessed.

**2005 REQUESTED DISTRICT PROCEDURES FOR HOT-MIX ASPHALT  
IN CONSTRUCTION, SITE MANAGER, CMR/NON CMR, AND MUNICIPAL PROJECTS**  
**(Page 2 of 2)**

**6. DENSITY DEFICIENCY AT PROJECT:** All density testing is required to be submitted to the Division of Materials including Consultant and/or Private Testing Labs within 48 hours of completion. If the days testing indicating a deficiency or possible deficiency (borderline results), the lab shall be notified within 24 hours and an electronic copy, sent to David Howley Fax (860) 258-0399 or email [david.howley@po.state.ct.us](mailto:david.howley@po.state.ct.us) immediately with the stated payable tons. A memorandum will then be sent to the project engineer recommending a payment percentage within two days of receiving all applicable information. The appropriate individuals will be on the cc list.

**7. BOX SAMPLES:** The user agency should obtain boxed samples whenever the material is questionable. They may also request additional testing to be performed by the Central Laboratory. Materials found to be obviously defective at the job site by the user agency should not be accepted and the Central Laboratory should be contacted immediately. You will be informed as to when a Laboratory representative can be available. Please submit three (3) boxed samples of the questionable material, along with all applicable information, to the Central Laboratory for analysis. The sample size of each sample should contain 5,000 grams (11.0 lbs.) of HMA and be submitted in either of the standard containers available from Stores as follows:

Stock Number: 349-02-0031 Box: Paper, reinforced, with covers, 6" x 6" x 3".

Stock Number: 349-02-0023 Box: Corrugated paper, 6" x 6" x 8".

***NOTE:*** Notify the Central Laboratory immediately of HMA rejected at the job site and returned to the plant so that if a plant problem is the cause, the situation can be corrected and the correct quantities will be shown for that day's production.

*Samples submitted in UNAUTHORIZED CONTAINERS, without a MAT-100, or without prior notification will be returned to the project with no testing being performed.*

**8. THEORETICAL DENSITY DATA BY VENDOR:** A list of the average of the 10 previous theoretical density entries for each class of material from each plant will be sent to each District Project Coordinator on a weekly basis. Each project requiring this information should call their respective Project Coordinator.

**CONNECTICUT DEPARTMENT OF TRANSPORTATION  
DIVISION OF MATERIAL TESTING**

**2005 REQUESTED DISTRICT PROCEDURES OF HMA FOR MAINTENANCE AND PERMITS**

**1. PRODUCTION CALL-INS:** All user agencies are to call in all production orders of hot-mix asphalt (HMA), *one working day prior* to scheduled pick up or delivery, to the applicable District personnel listed below. If unable to contact the District personnel and/or when any cancellations or changes occur, please notify the Central Laboratory as soon as possible by calling Jonathan Whitbeck or Andy Bednar at (860) 258-0325/258-0708. Any HMA not called in cannot be provided test coverage, in accordance with standard specifications.

The Central Laboratory, at the beginning of each production year, performs production trials to approve HMA plants and mixes for State production. Initially, all production orders must be called in. Beginning with the month of June, only production orders of 25 tons or more need to be called in.

To report production orders, notify your respective District personnel listed below from 8:00 a.m. to 2:30 p.m. and give them the following information, in the order listed below: (Please be as accurate as possible when reporting the estimated amount of material to be used)

- |   |  |
|---|--|
| a. Plant and location.                  | e. Purchase Order number.                                      |
| b. Estimated amount of material (tons). | f. Location where material will be used (both route and town). |
| c. Class(es) of material to be used.*   | g. Hauling agency; Vendor in place (VIP), State hauled, etc... |
| d. Project number and letter(s).        | h. Time material will be picked up from <u>plant</u> .         |
|   | i. Is density testing required?                                |

\*SUPERPAVE MIXES MUST INCLUDE MIX SIZE AND LEVEL (i.e., 12.5 L2 for 12.5 Level 2)

| <b><u>DISTRICT 1</u></b>                                | <b><u>DISTRICT 2</u></b>    | <b><u>DISTRICT 3</u></b>                            | <b><u>DISTRICT 4</u></b>          |
|---|-----------------------------|---|-----------------------------------|
| <b>Section 11</b><br>Louis Maffessoli<br>(860) 875-4993 | Tim Yuhas<br>(860) 823-3247 | <b>Section 31</b><br>Jane Yost<br>(203) 265-2246    | Cliff Henderson<br>(860) 585-2800 |
| <b>Section 13</b><br>Bonnie Weller<br>(860) 529-7411    |                             | <b>Section 33</b><br>Karen Hussey<br>(203) 972-5098 |                                   |

**2. IMPERATIVE:** The Central Laboratory must be notified *immediately* of cancellations or of any changes from the call-in as soon as they occur.

**3. NIGHTWORK & WEEKENDS:** Paving scheduled at night and weekend must be called in as soon as possible, (preferably 2 or 3 working days prior), in order to provide production coverage.

**4. HMA USAGE:** At the conclusion of each V.I.P. project, submittal of total tonnage itemized by class and vendor is requested.

**5. DEFICIENCIES:**

- A. Plant Deficiencies: In the event that a deficiency situation has occurred at the HMA plant, you will be notified of the time period in which the deficiency occurred. You will be required to submit the following:
- 1) A production total is needed for material used during the penalty period. This data must be reported back to the Central Laboratory immediately in order to notify State Purchasing of the deficiency;

**2005 REQUESTED DISTRICT PROCEDURES OF HMA FOR MAINTENANCE AND PERMITS**

2) A total of *two* (2) MAT-100's will be required. One MAT-100's is to be used with the accepted portion of material meeting state specifications and a second MAT-100's used to represent the deficiency amount of HMA produced. The Laboratory will provide the dollar amount of the deficiency to be assessed.

B. Density Deficiencies: Necessary items required by outside Agencies/Industries in order to process reports are:

- 1) HMA Plant Report – Provided by HMA producer/QC representative to Lab by electronic mode (email, fax transmittal) within 2 working days of completion of work.
- 2) Density Report (CON-133) – Provided by the District/Laboratory technician within 2 working days of completion of work (Attachment 2).
- 3) HMA Payable Tons – Provided by the Maintenance Garage clerk within 4 working days of completion of work (upon notification of penalty).

Procedures to be followed:

- 1) As soon as a density report is finalized with the actual Gmm, Laboratory personnel will verbally notify the appropriate supervisory planner and garage clerk in the District Maintenance Office.
- 2) A memorandum will then be prepared that indicates all pertinent information and payment recommendations after the clerk has provided the tonnage to the Laboratory. This memorandum concerning a density penalty will be mailed to the applicable supervisory planner within the District Maintenance Office with a carbon copy to the Accounts Payable Office and the pavement advisory team supervisor. The District notifies the contractor.

**6. MAT-100's:** All HMA production orders of 25 tons or more are required to be submitted for testing by a MAT-100. MAT-100's are also required when **DENSITY** of HMA is specified. Mat-100's are to be submitted to the Laboratory only after the days final payable quantity is totaled. **MAT-7's will not be used in lieu of MAT-100's in 2005.**

**7. BOX SAMPLES:** The user agency should obtain boxed samples whenever the material is questionable. They may also request additional testing to be performed by the Central Laboratory. Materials found to be obviously defective at the jobsite by the user agency should not be accepted and the Central Laboratory should be contacted immediately. You will be informed as to when a Laboratory representative can be available. Please submit three (3) boxed samples of the questionable material, along with all applicable information, to the Central Laboratory for analysis. The sample size of each sample should contain 2,500 grams of HMA and be submitted in either of the standard containers available from Stores as follows:

Stock Number: 349-02-0031 Box: Paper, reinforced, with covers, 6" x 6" x 3".

Stock Number: 349-02-0023 Box: Corrugated paper, 6" x 6" x 8".

***NOTE:*** Notify the Central laboratory immediately of HMA rejected at the jobsite and returned to the plant so that if a plant problem is the cause, the situation can be corrected and that the correct quantities are shown for that day's production.

*Samples submitted in UNAUTHORIZED CONTAINERS, without a MAT-100's, or without prior notification will be returned to the project with no testing being performed.*

|  |  |                |                   |                   |
|--|--|----------------|-------------------|-------------------|
| <b>MAT-422</b>   | <b>Project</b>                         |                |                   |                   |
| <b>ASH Correction</b>  | <b>Date Sampled</b>                    |                |                   |                   |
|  | <b>Sample Number</b>                   |                |                   |                   |
|  | <b>Sampled By</b>                      |                |                   |                   |
|  | <b>Ash tested By</b>                   |                |                   |                   |
|  | <b>Extractor type/model # utilized</b> |                |                   |                   |
|  | <b>Location</b>                        |                |                   |                   |
|  |  |                | <b>Crucible #</b> | <b>Crucible #</b> |
| <b>HMA Extraction by Solvent</b>   | <b>tag</b>                             | <b>Formula</b> |                   |                   |
| HMA sample mass  | a                                      |                |                   |                   |
| Mass of extracted aggregate  | b                                      |                |                   |                   |
| Mass of binder (uncorrected)   | c                                      | a - b          |                   |                   |
| Percent binder (uncorrected)   | d                                      | (c/a)*100      |                   |                   |
| <b>Filter Paper Masses</b>   |  |                |                   |                   |
| Mass of mineral agg. + filter paper  | e                                      |                |                   |                   |
| Mass of filter paper   | f                                      |                |                   |                   |
| Mass of mineral aggregate on filter paper  | g                                      | e - f          |                   |                   |
| <b>Effluent Volumes</b>  |  |                |                   |                   |
| Total solvent + binder volume (ml)   | h                                      |                |                   |                   |
| Volume of sample taken (ml)  | i                                      |                |                   |                   |
| Sample volume multiplier   | j                                      | h / i          |                   |                   |
| <b>Crucible masses (utilized 10 ml)</b>  |  |                |                   |                   |
| Mass of crucible after ignition  | k                                      |                |                   |                   |
| Tare mass of crucible  | l                                      |                |                   |                   |
| Mass of mineral aggregate after ignition   | m                                      | k - l          |                   |                   |
| <b>Calculated mass of mineral aggregate</b>  |  |                |                   |                   |
| Sample volume multiplier   | j                                      |                |                   |                   |
| Mass of mineral aggregate after ignition   | m                                      |                |                   |                   |
| Calculated mass of mineral agg. in sample  | n                                      | j * m          |                   |                   |
| <b>Correction for extracted sample</b>   |  |                |                   |                   |
| Calculated mass of mineral agg. in sample  | n                                      |                |                   |                   |
| Mass of mineral aggregate on filter paper  | g                                      |                |                   |                   |
| Mass of extracted aggregate  | b                                      |                |                   |                   |
| Corrected mass of extracted aggregate  | o                                      | n + g + b      |                   |                   |
| <b>Determination of correct Percent Binder</b>   |  |                |                   |                   |
| HMA sample mass  | a                                      |                |                   |                   |
| Corrected mass of extracted aggregate  | o                                      |                |                   |                   |
| Mass of binder (corrected)   | p                                      | a - o          |                   |                   |
| <b>Percent binder (corrected)</b>  | q                                      | (p/a)*100      |                   |                   |
| <b>Ash Correction Factor</b>   | r                                      | d-q            |                   |                   |
| <b>Summary of Procedure</b>  |  |                |                   |                   |
| <b>Step 1:</b>   |  |                |                   |                   |
| ▫ Perform extraction in accordance with AASHTO T-164.  |  |                |                   |                   |
| ▫ Record original HMA mass (a) & extracted agg. mass (b).  |  |                |                   |                   |
| <b>Step 2:</b>   |  |                |                   |                   |
| ▫ Record filter paper masses (e) & (f) before and after use.   |  |                |                   |                   |
| <b>Step 3:</b>   |  |                |                   |                   |
| ▫ Measure volume of Effluent in ml to the nearest 0.1ml and record volume (h).   |  |                |                   |                   |
| ▫ Stir effluent vigorously and sample 10 ml using an pipette and record volume (ii). Take sample from middle of cylinder |  |                |                   |                   |
| <b>Step 4:</b>   |  |                |                   |                   |
| ▫ Tare a clean crucible and record mass (l).   |  |                |                   |                   |
| ▫ Pour the complete portion of effluent into a tared crucible.   |  |                |                   |                   |
| ▫ Place onto a hot plate set preheated to 125 C.   |  |                |                   |                   |
| ▫ Evaporate solvent using a simmer, being careful the sample never boils (± 20 minutes).                                 |  |                |                   |                   |
| ▫ Place on a Bunsen burner to complete evaporation (± 5 minutes).  |  |                |                   |                   |
| ▫ Place in muffle set at 600 C (± 30 minutes).   |  |                |                   |                   |
| ▫ Cool in dessicator .   |  |                |                   |                   |
| ▫ Weight to nearest 0.001g and record as mass (k).   |  |                |                   |                   |
| <b>Step 5:</b>   |  |                |                   |                   |
| ▫ Perform calculations to determine corrected Percent Binder and Ash correction factor.                                  |  |                |                   |                   |
| <i>Note: Post extraction total time: approximately 1 hour.</i>   |  |                |                   |                   |

|  |       |                  |         |  |           |                    |                      |
|--|-------|------------------|---------|--|-----------|--------------------|----------------------|
| <b>FIELD REPORT: Storage Bin Testing</b> |       |                  |         | STATE OF CONNECTICUT                         |           |                    |                      |
| <b>FORM MAT-423</b>                      |       |                  |         | DEPARTMENT OF TRANSPORTATION                 |           |                    |                      |
|  |       |                  |         | BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS |           |                    |                      |
|  |       |                  |         | DIVISION OF MATERIALS TESTING                |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
| PLANT                                    |       |                  |         | LOCATION                                     |           |                    |                      |
| CLASS OF MIX                             |       |                  |         | DATE SAMPLE                                  |           |                    |                      |
| LAB NUMBER                               |       |                  |         | SAMPLED BY                                   |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
| <b>A/C 10 SAMPLE DATA</b>                |       |                  |         |  |           |                    |                      |
| DATE                                     |       | SOURCE OF SUPPLY |         | SAMPLE TAKEN FROM                            |           | ORIGINAL VISCOSITY | ORIGINAL PENETRATION |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
| <b>OUT-of-SILO SAMPLES (3 Samples)</b>   |       |                  |         |  |           |                    |                      |
| Sample No.                               | Time  | Temperature      | Tonnage | Truck No.                                    | Viscosity | Penetration        |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         | Average                                      |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
| <b>ON-PROJECT SAMPLES (3 Samples)</b>    |       |                  |         |  |           |                    |                      |
| Sample No.                               | Time  | Temperature      | Tonnage | Truck No.                                    | Viscosity | Penetration        |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
|  |       |                  |         | Average                                      |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |
| <b>TIME IN SILO SAMPLES (3 samples)</b>  |       |                  |         | <b>RESULTS of THIN FILM OVEN TEST</b>        |           |                    |                      |
| Sample No.                               | Hours | Minutes          |         | % Loss on Heating                            |           |                    |                      |
|  |       |                  |         | Penetration                                  |           |                    |                      |
|  |       |                  |         | Penetration X 0.8                            |           |                    |                      |
|  |       |                  |         | Viscosity                                    |           |                    |                      |
| Average                                  |       |                  |         | Viscosity X 1.2                              |           |                    |                      |
|  |       |                  |         |  |           |                    |                      |

**JOINT SEALANTS- HOT POURED  
FOR PAVEMENTS  
FORM MAT-424**

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

AASHTO M-173M-301

| <u>BONDING TEST</u> |    |    |    | <u>FLOW TEST</u>   |
|---------------------|----|----|----|--------------------|
| DATE                | #1 | #2 | #3 |                    |
| 1                   |    |    |    |                    |
| 2                   |    |    |    |                    |
| 3                   |    |    |    | <u>PENETRATION</u> |
| 4                   |    |    |    |                    |
| 5                   |    |    |    |                    |

|                                |  |
|--------------------------------|--|
| <u>Specification Reference</u> |  |
| Standard Specification _____   |  |
| Project Special Prov. _____    |  |
| Other _____                    |  |
| PERSON ACCEPTING               |  |
| TECHNICAL RESPONSIBILITY       |  |
| Name:                          |  |
| Title:                         |  |

|                           |   |                |
|---------------------------|---|----------------|
| KIND OF MATERIAL          | <b>FORM MAT-424</b><br>STATE OF CONNECTICUT   | DATE           |
| SOURCE OF SUPPLY          | DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENG & HWY OPERATIONS<br>REPORT OF TEST: HOT POURED JOINT SEALANTS | LABORATORY NO. |
| Location of SOURCE        | SAFE HEATING TEMPERATURE  |                |
| SAMPLE TAKEN FROM         | PENETRATION @ 77 °F   |                |
| LOCATION OF Sample        | FLOW @ 140 °F   |                |
| SAMPLED BY                | BOND (FIVE CYCLES)  |                |
| DATE SAMPLED              |   |                |
| USING AGENCY              |   |                |
| QUANTITY REPRESENTED      |   |                |
| MATERIAL WILL BE USED FOR |   |                |
| DATE USED                 | RECOMMENDED FOR   | REMARKS        |
| WHERE USED                |   |                |
| SAMPLE RECEIVED           |   |                |

DIRECTOR OF RESEARCH & MATERIALS

**JOINT SEALANTS- COLD APPLIED  
BIT. SEALER/SEWER JOINTS  
FORM MAT-425**

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

|  |  |                            |  |
|--|--|----------------------------|--|
| LOSS ON HEAT (5hr @ 325 F)<br>AASHTO T-47 ASTM D-6 |  | PEN. (CONE w/150gm @ 77 F) |  |
|  |  |                            |  |
|  |  |                            |  |

|   |  |  |  |
|---|--|--|--|
| ASH OPEN CUP (1hr @ 1100 F)<br>AASHTO T-111 |  | SOLUBILITY & ORG. INSOLUBLE<br>AASHTO T-44 ASTM D-2042 |  |
|   |  |  |  |
|   |  |  |  |

Specification Reference  
 Standard Specification \_\_\_\_\_  
 Project Special Prov. \_\_\_\_\_  
 Other \_\_\_\_\_

PERSON ACCEPTING  
 TECHNICAL RESPONSIBILITY  
 Name: \_\_\_\_\_  
 Title: \_\_\_\_\_

|                           |  |         |                |
|---------------------------|--|---------|----------------|
| KIND OF MATERIAL          | <b>FORM MAT-425</b><br>STATE OF CONNECTICUT  |         | DATE           |
| SOURCE OF SUPPLY          | DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENG & HWY OPERATIONS<br>REPORT OF TEST: COLD APPLIED BIT. JOINT SEALANTS |         | LABORATORY NO. |
| Location of SOURCE        | PENETRATION  |         |                |
| SAMPLE TAKEN FROM         | LOSS ON HEAT   |         |                |
| LOCATION OF Sample        | SOLUBILITY   |         |                |
| SAMPLED BY                | ORGANIC INSOL  |         |                |
| DATE SAMPLED              | ASH CONTENT  |         |                |
| USING AGENCY              |  |         |                |
| QUANTITY REPRESENTED      |  |         |                |
| MATERIAL WILL BE USED FOR |  |         |                |
| DATE USED                 | RECOMMENDED FOR  | REMARKS |                |
| WHERE USED                |  |         |                |
| SAMPLE RECEIVED           |  |         |                |

DIRECTOR OF RESEARCH & MATERIALS

SILO STORAGE TESTING REPORT rev(3/01/6) Form MAT-426

|                                  |                  |                   |         |                    |               |               |
|----------------------------------|------------------|-------------------|---------|--------------------|---------------|---------------|
| Plant                            |                  |                   |         |                    |               |               |
| Plant                            |                  |                   |         | Location           |               |               |
| Class of Mix                     |                  |                   |         | Date Sampled       |               |               |
| Lab. Number                      |                  |                   |         | Sampled By         |               |               |
| % Rap                            |                  |                   |         |                    |               |               |
| Binder                           |                  |                   |         |                    |               |               |
| Date                             | Source of Supply | Sample Taken From |         | Original Viscosity | G*/sin(delta) |               |
|                                  |                  |                   |         |                    |               |               |
| Out of Silo Samples (3 Samples)  |                  |                   |         |                    |               |               |
| Sample No.                       | Time             | Temperature       | Tonnage | Truck No.          | Viscosity     | G*/sin(delta) |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   | Average |                    |               |               |
| Silo                             |                  |                   |         |                    |               |               |
| Silo No.                         |                  | Type of Heat      |         | Cone               | Gate          | Side Wall     |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   | Average |                    |               |               |
| Time In Silo Samples (3 samples) |                  |                   |         |                    |               |               |
| Sample No.                       |                  | Hours             | Minutes |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
|                                  |                  |                   |         |                    |               |               |
| Average                          |                  |                   |         |                    |               |               |

# Form 427: Scale Check Form

Form MAT-427 Revised 3-1-06

## SCALE CHECK FORM

INSPECTOR \_\_\_\_\_  
PLANT \_\_\_\_\_  
LOCATION \_\_\_\_\_  
TRUCK # \_\_\_\_\_

DATE \_\_\_\_\_

## SCALE CALIBRATION DATES

PLANT \_\_\_\_\_  
SILO \_\_\_\_\_  
SCALE HOUSE \_\_\_\_\_

TRUCK GROSS WEIGHT \_\_\_\_\_  
TRUCK LIGHT WEIGHT \_\_\_\_\_  
TRUCK NET WEIGHT \_\_\_\_\_

TICKET NET WEIGHT \_\_\_\_\_  
TRUCK NET WEIGHT \_\_\_\_\_  
DIFF= \_\_\_\_\_  
% DIFF= \_\_\_\_\_

Attach copy of truck ticket.  
Be consistent when weighing truck.( Driver in, Driver out )

DESCRIBE SCALES THAT ARE BEING COMPARED:



$S_t$  = tensile strength (kPa) (psi)       $t$  = specimen thickness, mm (in)  
 $P$  = maximum load (Newton) ( $lb_f$ ) x 4.448 =       $D$  = specimen diameter, mm (in)  
Newtons

ATS CS = Average Tensile Strength of Conditioned Specimens  
ATS UCS = Average Tensile Strength of Unconditioned Specimens

# Form MAT 429: JMF Summary Sheet

Form MAT-429 SUMMARY SUPERPAYE MIX DESIGN - rev (3/1/06)

|                         |  |                       |  |
|-------------------------|--|-----------------------|--|
| <b>Plant</b>            |  | <b>Project</b>        |  |
| <b>Location</b>         |  | <b>Level</b>          |  |
| <b>Plant Type/Capac</b> |  | <b>Grations</b>       |  |
| <b>Date Submitted</b>   |  | <b>Revision Date:</b> |  |

| <b>Descripti</b>      | <b>Size/Type of Aggregate</b> | <b>Source of Supply</b> | <b>end Percen</b> |
|-----------------------|-------------------------------|-------------------------|-------------------|
| <b>CA-Aggregate 1</b> |                               |                         |                   |
| <b>CA-Aggregate 2</b> |                               |                         |                   |
| <b>CA-Aggregate 3</b> |                               |                         |                   |
| <b>CA/RAP-Aggreg</b>  |                               |                         |                   |
| <b>FA-Aggregate 5</b> |                               |                         |                   |
| <b>FA-Aggregate 6</b> |                               |                         |                   |
| <b>FA-Aggregate 7</b> |                               |                         |                   |

| <b>Nom. Size</b>    | <b>Contractor Data</b> |              |              |              |              |              |              | <b>Calc.</b>                  | <b>Specifications</b> |                 | <b>Contractor</b> |                   |
|---------------------|------------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------------------------|-----------------------|-----------------|-------------------|-------------------|
|                     | <b>Agg 1</b>           | <b>Agg 2</b> | <b>Agg 3</b> | <b>Agg 4</b> | <b>Agg 5</b> | <b>Agg 6</b> | <b>Agg 7</b> |                               | <b>JMF</b>            | <b>Coat. pt</b> |                   | <b>Rest. Zone</b> |
|                     | CA                     | CA           | CA           | CA/RAP       | FA           | FA           | FA           | JMF                           | Comp.                 |                 |                   | Submitted         |
| <b>Description</b>  |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>Lead Percent</b> |                        |              |              |              |              |              |              |                               |                       |                 |                   | <i>Info Only</i>  |
| <b>0.075</b>        |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>0.150</b>        |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>0.300</b>        |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>0.600</b>        |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>1.18</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>2.36</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>4.75</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>9.5</b>          |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>12.5</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>19.0</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>25.0</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>37.5</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>50.0</b>         |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>Pb</b>           |                        |              |              |              |              |              |              | <b>Production Pb (w/ RAP)</b> |                       |                 | <b>JMF Pb</b>     |                   |
| <b>Pwa</b>          |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>Gsa</b>          |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |
| <b>Gsb</b>          |                        |              |              |              |              |              |              |                               |                       |                 |                   |                   |

| <b>Test Results</b> |  |
|---------------------|--|
| Gmm                 |  |
| Gmb - Nma           |  |
| Gmb - Nde           |  |
| Height-Nm           |  |
| Height-Nde          |  |
| Height-Nm           |  |
| Gse                 |  |
| Va - Ndes           |  |
| VMA - Nde           |  |
| VFA - Nde           |  |
| Pba                 |  |
| Pbe                 |  |
| Dust/Pbe            |  |

**User Notes:**

- White cells to be completed by the contractor
- Production Pb (w/ RAP) = The total production binder in the HMA
- Contractor JMF should reflect extracted asphalt and washed sieved an

**Remarks:**

# Form MAT 430: Nuclear Inspector Checklist

Project #: \_\_\_\_\_  
Date: \_\_\_\_\_  
Route/Town: \_\_\_\_\_  
Announced Arrival/Departure Time: \_\_\_\_\_

Traffic Pattern Used (1-15): \_\_\_\_\_ Number of Paving Lanes: \_\_\_\_\_  
Number of Lanes Closed: 0, 1, 2, 3, etc. \_\_\_\_\_ Posted Roadway Speed Limit: \_\_\_\_\_  
Number of Flagmen: \_\_\_\_\_ Location of Flagmen: \_\_\_\_\_  
Number of Policemen: \_\_\_\_\_ Location of Police officers: \_\_\_\_\_  
Traffic Cones: yes or no \_\_\_\_\_ If Yes Spacing: \_\_\_\_\_  
Did Traffic Breech Pattern: yes or no \_\_\_\_\_ Did Traffic Drive on Hot Mat: yes or no \_\_\_\_\_

At any time did you have to be your own traffic control: yes or no

Was traffic control/pattern adequate throughout operation: yes or no  
If no briefly describe issues or incidents: Did you notify DOT Crew Leader: yes or no

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

Did traffic control pattern change: yes or no

Were you notified prior to pattern being pulled or changed: yes or no If no did you tell the Crew Leader: yes or no  
Did Crew Leader address the problem: yes or no

Did you have adequate time to finish testing before pattern pulled or swapped: yes or no If no did you tell the Crew Leader: yes or no  
Did Crew Leader arrange for you to finish testing: yes or no

If compaction readings are below specifications, when did you notify the DOT crew Leader and or Paving Foreman: \_\_\_\_\_

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

DOT Crew Leader: \_\_\_\_\_ Paving Foreman: \_\_\_\_\_

Maintenance Garage: \_\_\_\_\_

## **Form MAT 431: ConnDOT Quality Control Plan Outline for HMA**

This outline of the ConnDOT Quality Control Plan for HMA is provided as a guideline for the Prime Contractor to follow. The Quality Control (QC) Plan shall indicate detailed specific information requested in the categories listed relating to the principle parts of the Construction of the Project, including but not limited to:

- Inspection and approval of the HMA plant
- The HMA Mix Design and Source Aggregate information
- QC plant HMA inspection and testing services

*NOTE: The Prime Contractor (as defined in section 1.01 of the 816) shall be solely responsible for the development and submission of this quality control plan. When Sub-Contractors are designated to perform some of the contractual items, it remains the responsibility of the Prime Contractor to provide the necessary information required herein.*

### 1. Title Page

- Project Information
- Plant Information

### 2. Table of Contents

### 3. QC Personnel Issues

- Responsibilities under the quality control plan
- Plan Administrator
- Plant and Field Process Control Technician (PCT)
- Plant and Field Quality Control Technician (QCT)

### 4. Plant Issues (may be inspected separately by ConnDOT)

- Mixing Plant Make, model, and capacity (including silo information)
- Plant Laboratory equipment inventory and calibration records

### 5. Material Issues

- Material source(s) of supply
- Minimum schedule of component material(s) sampling and testing

### 6. Mix Design Issues

- Superpave Mix design
- Pre-production inspection & trials

### 7. QC Plant Process Control during production

- Providing Minimum Process/Quality Control in accordance with Contract
- Determination of Lot and Sub-lot Sizes
- Visual Inspection as Part of Quality Control
- Frequency of sampling and testing HMA materials
- Documentation of all sampling and testing results
- Immediate Response to out-of-spec Test Results

### 8. Troubleshooting for out of specification materials

- Process Balance
- Transportation of Mixtures
- Material Transfer Vehicle (if applicable)
- Paving Equipment (make, model and size)
- Longitudinal Joints
- Preparation of transverse joint during start and finish of paving
- Establishing and maintaining rolling and compaction patterns
- Visual Inspection as Part of Quality Control

### 9. Other Project Issues

- Trench steel plating
- Smoothness issues
- Sealing of all saw cuts

### 10. Acceptance and IA Program

- QC, A and IA Program Coordination
- Access by Agency for comparison of Quality Control, Acceptance, and/or Independent Test Results

### 11. Dispute Resolution

- Development of written action plan and timetable for potential disputes

# Form 432: Inspector Duties Guide and Field Procedure Form

rev 3-1-06

## **1. HMA Plant Rankings and operating status protocol:**

**“A” – Approved ranking:** Given to a material class from a producer with a current ranking of 70% or better based on specification compliance for

1. (Grad): Gradation (all applicable sieves for the class)
2. (Pb): binder content
3. (Va): Air Voids
4. (VMA): Voids in Mineral Aggregate
5. (Gmm): Maximum Theoretical Gravity
6. (Gse): Effective Specific Gravity
7. (P<sub>Ni</sub>): Percent Density at Initial gyrations, and
8. (P<sub>Nm</sub>): Percent Density at maximum gyrations.

Ranking is the average of the 10-test running average for that class of material. For a test to be deemed acceptable, every single item of the above 8 criteria must meet specifications for each test. An “A” will also be given to a supplier after successfully completing a PT test on that material. Materials ranking an “A” will be permitted to be shipped to Department projects with no interruption provided that they continue to meet all specifications.

**“PT” – Production Trial ranking:** Given to a class of material from a producer with a current ranking of 69% or less based on specification compliance for Grad, Pb, Va, VMA, Gmm, Gse, P<sub>Ni</sub>, and P<sub>Nm</sub>. Ranking is also the average of the 10-test running average for that class of material. A “PT” is also the first test status after a successful “PPT” is obtained. Materials ranking an “PT” will be permitted to be shipped to Department projects with no interruption provided they continue to meet all specifications but will be subject to more inspection, IA testing and oversight by Department inspection personnel.

**“PPT” – Pre-Production Trial ranking:** Given to a class of material from a producer with no prior production history or has a change in one or more component aggregate from the JMF on record with the DRM. “PPT” status will also be given to a class that:

- from an “A” ranking, has been ordered to “cease production” due to two consecutive tests not meeting specifications for gradation or Pb specification in a single day, or
- from a “PT” ranking, has been ordered to “cease production” due to one single test not meeting specifications for gradation or Pb specification in a single day, or
- has four consecutive tests not meeting Va, VMA, Gmm, Gse, P<sub>Ni</sub>, or P<sub>Nm</sub> for multiple days of production.

HMA materials ranked with a “PPT” shall not be permitted to be shipped to CTDOT projects. PPT testing shall be performed on that class of material by the HMA producer and meet all specifications before production shipment may be resumed. At no time shall material ranked PPT be shipped to CTDOT projects.

Contractors that have mix classes ranked a PPT may use one of the following methods to change the ranking. When option (A) is used and PPT meets all specifications for above items 1-8, the PPT is considered a passing test and the class is rated a PT. When the DRM is not onsite to witness the PPT, the PPT option (B) procedure must be followed and materials with test results delivered to the DRM and meet the “B” tolerances shown on table 1, as determined by the DRM.

**Option A:** Schedule a day when the DRM can be at the HMA facility to witness a passing test or,

**Option B:** Notify the DRM that a trial will be conducted by the Contractor or their representative, perform needed testing and submit the passing test results along with 2 gyratory molds, 2,500 grams of boxed HMA for binder and gradation determination and 2,500 grams of cooled, loose HMA for Gmm determination.

## **2. HMA Mixture JMF changes procedure:**

JMF changes for Grad, Pb, Gmm, and Gse will be approved by the DRM subject to the following requirements. JMF changes are permitted on HMA materials provided that:

- they are requested and pre-approved by the DRM,
- changes do not exceed 50% of the tolerances for that item,
- they are based on a two test trend,
- they are documented with a promptly submitted revised JMF,

- request for JMF changes are received to the DRM prior to the second test of the day for Superpave materials,
- request for JMF changes are received to the DRM prior to the third test for Marshall materials, and request for JMF changes are received to the DRM prior to any production for either Marshall or Superpave materials.

Repeated JMF requests for a mix or JMF requests to avoid a monetary disincentive or cessation of supply will be denied and HMA materials subject to applicable cessation and/or monetary disincentives or rejection.

JMF changes to the component or mix Gsa, Gsb, Pwa, or aggregate consensus properties will only be approved with proper documentation that the test results were obtained and performed by an AMRL accredited Laboratory and be submitted with proper detailed and summary documentation to the DRM for approval. JMF changes for these items will only become effective the next production day after the DRM has reviewed and accepted the JMF request for change. There will be no retroactive determinations made.

### **3. Cessation of Supply and Disincentive procedure:**

A class of mix is subject to "cessation of supply" when the production testing is not in conformance with the specifications, rankings fall below a PT, as stated herein and in the specifications, or it has been determined by the DRM that the production facility, the field laboratory, testing personnel or materials are in non-compliance with the specifications. "Cessation of supply" status may be cause for a monetary disincentive and/or PPT trials as follows:

#### ***Superpave: Monetary Disincentive and PPT trials for HMA materials:***

- When two consecutive tests from a batch, drum, or silo do not meet specifications for gradation or Pb for a mix with an "A" ranking in a single day, or
- When a single test from a from a batch, drum, or silo does not meet specifications for gradation or Pb for a mix with a "PT" ranking in a single day.

#### ***Marshall: Monetary Disincentive and PPT trials for HMA materials:***

- When two consecutive tests from a batch, drum, or silo do not meet master range specifications for gradation or Pb for a mix in a single day, or
- When three consecutive tests from a batch, drum, or silo do not meet JMF specifications for gradation or Pb for a mix in a single day, or

#### ***Superpave cessation and PPT trials only (no monetary disincentive) for HMA mixtures:***

1. batch or drum plant: when four consecutive tests do not meet specifications for volumetrics (Va, VMA, Gmm, Gse, P<sub>Ni</sub>, and P<sub>Nm</sub>), for a mix with an "A" ranking regardless when taken, or
2. batch or drum plant: when two consecutive tests do not meet specifications for volumetrics, for a mix with a "PT" ranking regardless when taken, or
3. Silo: when two consecutive tests do not meet specifications for volumetrics, regardless when taken, or
4. Silo: when a single test does not meet specifications for gradation or Pb, or
5. Batch, drum plant, or Silo: when two consecutive PT tests fails volumetrics, or
6. Batch, drum plant, or Silo: when two tests for Gse is greater than the JMF Gsa or less than the JMF Gsb for that class.

### **4. Verification Testing Procedure and Tolerances:**

Verification (V) testing will be selected by the DRM at a typical frequency of (1 to 6) to the Contractor QC testing. (V) samples will be randomly obtained by Department personnel from among the QC samples produced by QC contractor or their representative. The (V) samples will be tested by the DRM at the Central Laboratory and compared to the Tolerances shown in Table 1. Sample comparisons between QC and (V) samples will be considered acceptable when the difference falls within the tolerances shown in column "C" of Table 1. Samples will also be tabulated using columns "A" and "B" for internal ranking purposes.

### **5. PRODUCTION INSPECTION AT HOT MIX ASPHALT PLANTS**

The purpose of production inspection is not only to check on the operations for compliance to the specifications, but also to insure the best possible quality product with the available materials and equipment. The primary goal during production is to maintain a certain degree of uniformity not only daily but also throughout the life of the contract. The aggregate in each stockpile must be of uniform quality and gradation; the materials must be fed into the plant in a uniform, controlled manner; the heating and drying of the aggregates must be uniform; the separation of the aggregates into their various bin sizes must be uniformly controlled; and the aggregates and the asphalt cement must be combined and mixed in a uniform, consistent manner. For these reasons, the inspector must be thoroughly familiar with all phases of the manufacturing process, be a well-qualified and conscientious inspector by being alert, knowledgeable, and persuasive. Production inspection at the HMA plant is divided into four main categories:

- a. **Process Control (PC):** *Typically performed by the HMA producer prior to production and shipment*
  - i. Tests component aggregates for consistency and conformance to JMF
  - ii. Ensures stockpiles are source approved, uniform and free from contamination
  - iii. Tests for moisture of each component prior to start up daily
  
- b. **Quality Control (QC):** *Typically performed by the HMA producer during production*
  - i. Ensure proper HMA JMF and settings of Plant are as needed
  - ii. Tests HMA for conformance to JMF
  - iii. Analyzes test data, investigates causes of non-conformance, defines assignable cause(s), and takes immediate corrective action, as needed
  - iv. Reports findings to appropriate party
  - v. Oversees the activities of the PC personnel
  
- c. **Verification (V):** *Typically performed by the State Highway Agency (SHA) and uses split or independent samples to the QC samples to verify test data.*
  - i. Performs testing and oversight at HMA plant to validate or verify QC test data
  - ii. Prepares daily inspector reports of contract compliance items
  - iii. Performs investigations when (V) tests do not compare to QC test data
  - iv. Orders necessary mix adjustments to ensure mixture quality and specification compliance, as needed
  
- d. **Acceptance (A):** *Typically performed by the State Highway Agency (SHA) or their representative*
  - i. Performs testing of HMA for payment
  - ii. Orders cessation of supply or recommends disincentives for non-conforming materials
  - iii. Approves new and revisions to JMF
  - iv. Oversees the activities of the QC personnel
  
- e. **Independent Assurance (IA):** *Typically performed by a separate SHA unit to ensure conformity of testing proficiency, personnel and equipment consistency.*
  - i. Performs split or independent testing at HMA facility
  - ii. Evaluates QC and (A) personnel for protocol compliance and condition of testing equipment
  - iii. Analyzes test data and compares to QC and (A) test results to detect malfunctioning, non-calibrated equipment, test errors or other sources of variability beyond the permissible tolerances stated in the specification

## **6. DUTIES OF THE HMA PLANT INSPECTOR**

The duties listed here are minimum requirements to be performed by all types of Inspectors (i.e., PC, QC, (A), and IA). The daily responsibilities of an HMA inspector shall be for elements and frequency, as specified in the contract, and will typically include but is not limited to the following items.

### **A. PC and QC duties prior to HMA production:**

- \_\_\_ 1. Check for the proper operation of the HMA plant drum/batch machinery (belts, sensors, silos, etc.)
- \_\_\_ 2. Obtain proper samples of aggregate components and RAP for gradation, binder content to compare against the latest JMF and perform moisture(s) to be supplied to the plant operator for proper plant adjustments, as specified in the contract
- \_\_\_ 3. Inspect component aggregates for consistency, quality, cleanliness and approved source of supply according to JMF requirements
- \_\_\_ 4. Ensure no segregation and contamination between stockpiles or cold-feed bins has occurred
- \_\_\_ 5. Discuss any findings and communicate any concerns with pay loader operator
- \_\_\_ 6. Ensure that field laboratory sampling, testing and safety equipment inventory is in strict compliance with contract specifications
- \_\_\_ 7. Turn on & preheat laboratory testing equipment one hour prior to use (Ignition ovens, heating ovens, controlled water baths, etc.)
- \_\_\_ 8. Check laboratory testing equipment & calibrations (gyratory, thermometers, scales, manometer, etc.) and record in on-site Calibration Records Manual
- \_\_\_ 9. Turn on PC, printer, modem and prepare specified software forms and spreadsheets and ensure ample paper is available
- \_\_\_ 10. Ensure proper latest JMF and HMA laboratory correction factors are available and accurate for the material being tested
- \_\_\_ 11. Ensure appropriate PG binder grade to be used for the day's production and document all deliveries with bill of lading, source of supply, delivered ground tank and sample for DRM use, as specified

- \_\_\_ 12. Prepare proper testing form(s) with date, project class, NETTCP certification #, and facility ID
- \_\_\_ 13. Select appropriate random numbers for sampling and testing based on estimated call in production and contract test frequency
- \_\_\_ 14. Ensure copy of all proper AASHTO and ASTM sampling and testing protocols and contract documents are available for reference
- \_\_\_ 15. Maintain and review test data charts, past technician notes and copies of past testing reports to spot potential problems or trends that may be avoided or minimized
- \_\_\_ 16. Confirm assignment with Plant operator and ensure class(es) to be produced are ranked with proper (A) or PT status.
- \_\_\_ 17. Perform needed PPT testing prior to production and report test results, as specified in contract
- \_\_\_ 18. Perform and review all above stated testing to ensure accuracy and compliance to contract specifications
- \_\_\_ 19. Inspect all Haul units for proper canvas cover and ensure they are free of contaminating materials and fuel oil
- \_\_\_ 20. Take immediate action to report and document any issue of non-compliance and what corrective action(s) were taken, when needed
- \_\_\_ 21. Perform other duties as ordered or required

**B. PC and QC duties during HMA production:**

- \_\_\_ 1. Inspect the physical characteristics of the HMA mixture in the haul unit for appearance of a lean or dry mix deficiency or an excess of asphalt, too coarse or too fine, uncoated particles, mix segregation or non-uniform appearance.
- \_\_\_ 2. Check the temperature of the mix for conformance to specifications and obtain proper HMA sample from haul unit
- \_\_\_ 3. Record sample number, time, truck, class, temperature and plant/silo location with any observed comments on software form
- \_\_\_ 4. Reduce sample to appropriate size(s) to prepare mixture for gyratory specimens, Gmm and binder content and label accordingly
- \_\_\_ 5. Perform laboratory testing on gyratory specimens, Gmm, and binder content and check for conformance with specifications
- \_\_\_ 6. Collect copy of truck ticket sampled, ignition oven ticket, gyratory specimen printouts and attach with test report for DRM
- \_\_\_ 7. Maintain all test data on approved software and save/archive and printout test data for records. Submit results to DRM within 24 hrs.
- \_\_\_ 8. Place properly labeled gyratory specimens and store for DRM retrieval a maximum of 15 days
- \_\_\_ 9. Order a "cease production" and necessary PPT trials, as appropriate, and immediately report all failing tests to DRM
- \_\_\_ 10. Take immediate corrective action, determine assignable causes and make needed modifications any time a test is in non-conformance with required specifications and report to the DRM
- \_\_\_ 11. Inspect the process of the Batch and Drum plant operations from the mixing control house for proper aggregate and mixture temperatures, cold-feed and hot bin function, aggregate and asphalt scale weights, State seal dates, full automatic batching sequence
- \_\_\_ 12. Check printouts on each truck ticket for requested ticket data for mix proportion, class, RAP content, moisture, target component weights and related information compliance are included
- \_\_\_ 13. Check that over or under pulls beyond allowable tolerances of aggregate proportions or double bin pulling do not occur and that HMA plant is running only on full automatic (not auto –manual or manual), and that all information is indicated on truck tickets or plant printouts, as required by specifications.
- \_\_\_ 14. Take immediate action and document any issue of non-compliance and what corrective action(s) were taken, when needed
- \_\_\_ 15. Perform other duties as ordered or required

**C. Verification (V) and Acceptance (A) duties during HMA production:**

- \_\_\_ 1. Confirm estimated call-in details with QC personnel
- \_\_\_ 2. Inspect HMA Plant and field laboratory for deficiencies
- \_\_\_ 3. Review that PC/QC personnel have performed 6A & 6B items thoroughly and results are in compliance with contract specifications
- \_\_\_ 4. Perform selective laboratory test equipment calibration check, review all prior and current test results and calibration records
- \_\_\_ 5. Perform selective items from 6A & 6B to ensure compliance with contract specifications
- \_\_\_ 6. Oversee the Contractor PC and QC testing personnel sampling and testing procedures for proper test protocol compliance and contract testing frequency
- \_\_\_ 7. Consult with Central office with any issues relating to PC/QC personnel, HMA production, mixture compliance, cessation of supply, improper operations, JMF revisions or other immediate issues of concern
- \_\_\_ 8. Orders cessation of supply and PPT testing, as needed
- \_\_\_ 9. Prepare and submit Daily Inspector Reports

- \_\_\_ 10. Retrieve all QC test samples and proper documentation
- \_\_\_ 11. Perform verification testing of QC samples at Central Laboratory and check compliance with table 1
- \_\_\_ 12. Immediately investigate assignable cause(s) of QC technicians, laboratory equipment and mixture to determine source of non-compliance and direct corrective action
- \_\_\_ 13. Other related inspection and oversight duties, as required.

**D. Independent Assurance duties during HMA production:**

- \_\_\_ 1. Review that PC/QC/V/A personnel have performed 6A thru 6C items thoroughly and results are in compliance with contract specifications
- \_\_\_ 2. Obtain independent assurance samples and observe QC and V personnel sampling and testing compliance to AASHTO/ASTM and NETTCP protocol
- \_\_\_ 3. Assist with investigations of failed V testing
- \_\_\_ 4. Assist with troubleshooting, mixture compliance, test error, equipment and plant difficulties and recommend solutions
- \_\_\_ 5. Other related inspection and oversight duties, as required

| <b>TABLE 1: QUALITY VERIFICATION &amp; ACCEPTANCE TOLERANCES</b> |                            |                            |                            |                  |
|--|----------------------------|----------------------------|----------------------------|------------------|
| <b>Properties</b>  | <b>Tolerance (maximum)</b> | <b>Tolerance (maximum)</b> | <b>Tolerance (maximum)</b> | <b>Tolerance</b> |
|  | <b>A (C x 0.25)</b>        | <b>B (C x 0.5)</b>         | <b>C</b>                   | <b>D (&gt;C)</b> |
| #200   | 0.18                       | 0.35                       | 0.7                        | > 0.7            |
| #100   | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| #50  | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| #30  | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| #16  | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| #8   | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| #4   | 0.5                        | 1.0                        | 2.0                        | > 2.0            |
| 3/8"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| 1/2"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| 3/4"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| 1"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| 1 1/2"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| 2"   | 1.0                        | 2.0                        | 4.0                        | > 4.0            |
| Pb   | 0.06                       | 0.12                       | 0.25                       | > 0.25           |
| Va   | 0.18                       | 0.35                       | 0.71                       | > 0.71           |
| VMA  | 0.18                       | 0.35                       | 0.71                       | > 0.71           |
| VFA  | 3.5                        | 3.5                        | 3.5                        | > 3.5            |
| Gmm  | 0.005                      | 0.009                      | 0.018                      | > 0.018          |
| Gmb  | 0.003                      | 0.006                      | 0.011                      | > 0.011          |
| Pbe  | 0.06                       | 0.12                       | 0.25                       | > 0.25           |
| Pba  | 0.06                       | 0.12                       | 0.25                       | > 0.25           |
| PD@Ni  | 0.18                       | 0.35                       | 0.71                       | > 0.71           |
| PD@Nd  | 0.18                       | 0.35                       | 0.71                       | > 0.71           |
| PD@Nm  | 0.18                       | 0.35                       | 0.71                       | > 0.71           |
| Gse  | 0.005                      | 0.009                      | 0.018                      | > 0.018          |
| #200/Pbe   | 0.15                       | 0.15                       | 0.15                       | > 0.15           |
| Masses<br>(% of total mass)                                      | 0.025%                     | 0.05%                      | 0.1%                       | > 0.1%           |
| Heights (average of 4)<br>(mm of final height)                   | 0.5                        | 1.0                        | 2.0                        | > 2.0            |

# Form MAT 433: Ignition Oven Correction Factor

State of Connecticut

Department of Transportation

Division of Materials Testing

Ignition Oven Correction Factor work sheet Form Mat-433 Revised 3/1/06

| COMPANY    |                 | PLANT / LOCATION |        |                    |
|------------|-----------------|------------------|--------|--------------------|
| MATERIAL   | MIN SAMPLE SIZE | MAXSAMPLE SIZE   | SOURCE | CORRECTION FACTORS |
| 1 1/4      | 3500 g          | 4000 g           |        |                    |
| 1          | 3000 g          | 3500 g           |        |                    |
| 3/4"       | 2000 g          | 2500 g           |        |                    |
| 1/2"       | 1500 g          | 2000 g           |        |                    |
| 3/8"       | 1200 g          | 1700 g           |        |                    |
| 1/4"       | 1200 g          | 1700 g           |        |                    |
| S. Sand    | 1200 g          | 1700 g           |        |                    |
| Screenings | 1200 g          | 1700 g           |        |                    |
| Blend      | 1200 g          | 1700 g           |        |                    |
| N. Sand    | 1200 g          | 1700 g           |        |                    |
| N. Sand    | 1200 g          | 1700 g           |        |                    |
| RAP        | 1200 g          | 1700 g           |        |                    |

DATE

STATE INSPECTOR

CONTRACTOR REP

ALL AGGREGATES SHALL BE BURNED AT 538° C FOR 45 MINUTES EACH

## **Form 434: Outline of Quality Control Plan for Density of HMA Pavements**

Rev. 3-07

### **Online resources and guidelines on the WEB:**

[http://www.cflhd.gov/design/documents/material/qc\\_plans.pdf](http://www.cflhd.gov/design/documents/material/qc_plans.pdf)

<http://www.fhwa.dot.gov/construction/cpmi04b2.htm>

### **Introduction:**

This Quality Control Plan Outline for Density of HMA Pavements is a suggested outline of the QC plan that is required by specifications to be submitted by the Contractor. This outline is intended to assist the Contractor in providing minimum information required by the specifications to assess the process and organization performing the HMA paving and compaction.

This Quality Control Plan Outline for Density of HMA Pavements is required by contract specifications to be submitted by the DRM prior to the beginning of any paving. It must be on record if the Contractor is to have the right to dispute any acceptance density testing performed by the DRM. The absence of an approved Quality Control Plan Outline for Density of HMA Pavements or the lack of QC data for any day a deficiency occurs will be evidence to the DRM that the contractor does not have the ability to dispute any density deficiency with cores, as permitted in the Contract.

This document is intended to provide guidance to the Department, Prime Contractors, subcontractors, and other suppliers as to what is expected from the HMA paving contractor. The Quality Control Plan Outline for Density of HMA Pavements is a framework for the contractor's quality process for the loading, transportation, delivery, placement and density of HMA pavements. This plan and the contract specifications define the expected results and how those results will be achieved and make it possible for DRM to verify that the contractor, as an organization, has addressed the basic elements of its pavement density quality processes and responsibilities.

The Contractor shall provide inspection staff to perform and record density test. Acceptance of this plan by DRM and the adherence to this plan by the Contractor will not absolve the contractor, in any way, from the responsibility of meeting all contract specifications.

### **Suggested Quality Control Plan Outline Elements for Density of HMA Pavements:**

1. List what type of density testing device and calibration/standardization procedure to be followed.
2. State that QC testing and its related process control procedures are to provide the Contractor needed data that the placement process is in compliance with contract specifications. Payment will be determined solely from acceptance testing performed by the DRM. State QC processes.
3. List procedure of what steps will be taken when non-compliance density test data is found.
4. State number of rollers, roller setting (amplitude & frequency) and speed/impacts per foot (ipf) in plan. Shall include when vibratory and non-vibratory rolling will be used, in conformance with specifications.
5. Statement of which best paving practices employed with paver operations to obtain density.
6. Statement of how road grade and profile will be maintained and in conformance with contract plans. Include source of references, how transitions, longitudinal joints will be constructed and what steps will be taken to ensure no damage comes to pavement structures drainage fixtures and other existing roadway items.

# MAT-105 RETURN OF REQUEST FOR TEST

|   |  |                      |  |         |   |  |  |  |  |  |  |   |                                       |   |  |   |  |
|---|--|----------------------|--|---------|---|--|--|--|--|--|--|---|---------------------------------------|---|--|---|--|
| <b>RETURN OF REQUEST<br/>FOR TEST MAT-105<br/>REV 9/03</b>  |  |                      |  |         | STATE OF CONNECTICUT<br>DEPARTMENT OF TRANSPORTATION<br>BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS<br>DIVISION OF MATERIALS TESTING |  |  |  |  |  |  |   |                                       |   |  |   |  |
| PROJECT   | DISTRICT   | REQUEST FOR TEST NO. |  | Lab No. | DATE  |  |  |  |  |  |  |   |                                       |   |  |   |  |
| TO  |  |                      |  | FROM    |   |  |  |  |  |  |  |   |                                       |   |  |   |  |
| <p><b>The Request Identified above is being returned for the reasons indicated below. Please take the necessary corrective action and resubmit the MAT-100 to the Division of Materials Testing for processing.</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; padding: 5px;"><input type="checkbox"/> Submit a Sample</td> <td style="width: 50%; padding: 5px;"><input type="checkbox"/> Submit a Field Inspection Statement</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> Submit a Materials Certificate</td> <td style="padding: 5px;"><input type="checkbox"/> Recheck_____</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> Submit a Certified Test Report</td> <td style="padding: 5px;"><input type="checkbox"/> Other (see below)</td> </tr> <tr> <td colspan="2" style="padding: 5px;"><input type="checkbox"/> The Certified Test Report/Material Certificate does not meet the requirements of Article 1.06.07 of the Standard Specifications.</td> </tr> </table> <p><b>REMARKS</b></p> |  |                      |  |         |   |  |  |  |  | <input type="checkbox"/> Submit a Sample | <input type="checkbox"/> Submit a Field Inspection Statement | <input type="checkbox"/> Submit a Materials Certificate | <input type="checkbox"/> Recheck_____ | <input type="checkbox"/> Submit a Certified Test Report | <input type="checkbox"/> Other (see below) | <input type="checkbox"/> The Certified Test Report/Material Certificate does not meet the requirements of Article 1.06.07 of the Standard Specifications. |  |
| <input type="checkbox"/> Submit a Sample  | <input type="checkbox"/> Submit a Field Inspection Statement |                      |  |         |   |  |  |  |  |  |  |   |                                       |   |  |   |  |
| <input type="checkbox"/> Submit a Materials Certificate   | <input type="checkbox"/> Recheck_____                        |                      |  |         |   |  |  |  |  |  |  |   |                                       |   |  |   |  |
| <input type="checkbox"/> Submit a Certified Test Report   | <input type="checkbox"/> Other (see below)                   |                      |  |         |   |  |  |  |  |  |  |   |                                       |   |  |   |  |
| <input type="checkbox"/> The Certified Test Report/Material Certificate does not meet the requirements of Article 1.06.07 of the Standard Specifications.   |  |                      |  |         |   |  |  |  |  |  |  |   |                                       |   |  |   |  |

The MAT-105 is used by DMT personnel to report a deficiency in a request for test submittal and relay the necessary information to project personnel for action.

## Appendix B – Final Materials Certification

A Final Materials Certificate (FMC) is issued for each project and summarizes the results of quality assurance testing of the material and assurance testing personnel and equipment used on the project. The responsibility of the Division of Materials Testing, when all material used on the project are sampled and found to meet the specification, and all the testing personnel and equipment on the project are found to be in good working order and performing the tests according to specification, is to issue a Final Material Certificate without exceptions. All testing must be complete in accordance with the “Minimum Schedule of Sampling Materials for Test”, Chapter 7 in this manual. Frequency of testing must also be met so that the total quantity of material used on the project is represented by acceptable samples.

It is also the responsibility of the DMT to identify what material or testing personnel/equipment that did not meet the project specifications or testing standards. This is accomplished through the issuance of a FMC listing exceptions to the specifications.

When material does not meet specification a form, the MAT- 103 “Report of Rejected Material” is used to document how the deficiency was addressed. This form must be completed for any rejected material samples, and must include the signatures of appropriate Project and District personnel acknowledging the rejection.

Section 1 of the Form, “Action Taken” describes the physical action taken to retest or replace the material. This addresses when rejected materials were removed and replaced with acceptable material, or were resampled and found acceptable. The Lab # of the acceptable re-test is required on this form. Within the DMT, this form requires the review and dated initials of Supervising Engineers, to acknowledge that the rejected material was addressed. If physical action was not taken, Section 2 of the MAT 103 must be completed.

Section 2 of the Form, “Alternate Acceptance of Rejected Material” documents the acceptance of non-compliant materials or minor quantities of untested materials in accordance with Section 1.06.02 of the Department’s Standard Specification. This Section states that the Engineer may accept a material or combination of materials and therefore waive noncomplying test results, provided that all of the following conditions are met:

1. Results of prior and subsequent series of tests of the material or materials from the same source or sources are found satisfactory.
2. The incidence and degree of non-conformance with the Contract requirements are, in the Engineers judgment, within reasonable limits.
3. The contractor, in the Engineers judgment, had diligently exercised material controls consistent with good practices.
4. No adverse affect on the value or serviceability of the completed work could result.

Supervising Engineers within the DMT must carefully review this section to ensure the material can be accepted under this criteria. Projects that did not perform any testing would obviously not meet the above, while a job that utilized minor amounts of non-conformant material from a producer who generally meets requirements may meet the above. Exception can be taken and noted on the Final Certification if it is determined by the DMT that the alternate acceptance criteria has not been met.

Adequate Assurance Testing: Project related assurance testing is required as specified in the minimum schedule, or Exceptions for deficiencies will be noted on the Final Materials Certificate. This does not include internal Assurance Testing requirements that are not directly associated with the project, and are described in Appendix H.

Examples of Final Materials Certificates follow.

The following memorandum is addressed to the Administrator of Construction and is required for all Federal aid projects.

**STATE OF CONNECTICUT**

**DEPARTMENT OF TRANSPORTATION**

# *Memorandum*

COM-09A REV. 2/91 Printed on Recycled or Recovered Paper

*to* [Name]  
Construction Administrator  
Bureau of Engineering and  
Highway Operations

*subject* MATERIALS CERTIFICATION  
STATE PROJECT NUMBER: [XXX-YYY]  
FAP No: [ABCDEFGHIJ]

*date* [Month, day year]

*from* [Name]  
Director of Research and Materials  
Bureau of Engineering and  
Highway Operations

THIS IS TO CERTIFY THAT:

Results of tests on acceptance samples indicate the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformity with approved plans and specifications, and that such results compare favorably with the results of independent assurance sampling and testing.

Exceptions to the plans and specifications are documented in the project records and are also listed below:

1. (If these are too numerous an attachment is used to list them. An example of this attachment is shown on the following page.)
- 2.
- 3.
- 4.

If you have any questions regarding this information, please contact [Name], Supervising Materials Testing Engineer, at this office. His Telephone number is (860) 258-[XXXX].

{Author}:[typist]/[Drive location/filename]

cc: [Name of District Engineer] - District [X]  
[Name of District OOC liason]  
[DRM NAME] - DMT Files

Attachment

To: [Construction Administrator]  
From: [Director of R&M][month day, year]  
STATE PROJECT NUMBER: [xxx-yyy]

**EXCEPTIONS - ITEMS NOT TESTED**

| <u>Item No.</u> | <u>Final Quantity</u>           | <u>Final Quantity</u> |
|-----------------|---------------------------------|-----------------------|
| 1.12            | Detour Signs                    | 400 SF                |
| 2.7             | Pervious Structure Backfill     | 60 CY                 |
| 2.8             | Class A Concrete                | 87 CY                 |
| 2.13            | Dampproofing                    | 60 SY                 |
| 2.18            | Concrete Handhole               | 1 Ea.                 |
| 2.21            | T.C. Fnd. Spanpole              | 2 Ea.                 |
| 2.22            | T.C. Fnd. Type I                | 3 Ea.                 |
| 2.23            | T.C. Fnd. Controller type 4     | 1 Ea.                 |
| 2.34            | Loop Detector                   | 3 Ea.                 |
| 2.62            | Alum. Sign Face                 | 265 SF                |
| 2.65            | 4" Yellow Painted Lines         | 1808 LF               |
| 2.66            | 4" White painted Lines          | 1729 LF               |
| 2.67            | Painted Legend Arrows           | 100 SF                |
| 2.70            | Street Light Pole Bases         | 28 Ea.                |
| 2.84            | Metal Beam Rail                 | 1 Ea.                 |
| 5.14            | Compacted Gravel Backfill       | 350 CY                |
| 5.24            | Catch Basin                     | 2 Ea.                 |
| 5.30            | Replace C.B. Top                | 2 Ea.                 |
| 5.38            | 30" R.C.P.                      | 352 LF                |
| 8.13            | 5" Concrete Sidewalk            | 831 SF                |
| 8.14            | 8" Concrete Sidewalk            | 658 SF                |
| 8.16            | Processed Agg Base              | 515 CY                |
| 8.17            | Bit. Pave Class I               | 561 Ton               |
| 8.27            | 20"x8' Sliding Chain Link Fence | 1 Ea.                 |
| 8.28            | 4" White Pave Marks             | 2112 LF               |
| 8.29            | Painted Legend, Arrows          | 2 SF                  |
| 8.31            | 2' Concrete Retaining Wall      | 60 LF                 |
| 8.36            | Bit. Curbing                    | 3250 LF               |
| 8.43            | 2" RMC                          | 614 LF                |
| 8.45            | Aluminum Sliding Gate           | 1 Ea.                 |
| 8.46            | Swing Gate                      | 1 Ea.                 |
| 8.48            | 4' PVC Chain Link Fence         | 33 LF                 |
| 8.52            | 5' Pedestrian Gate              | 1 Ea.                 |

The following memorandum is addressed to the Administrator of Maintenance and is required for all maintenance projects funded with Federal aid funds.

STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION

*memorandum*

COM-09A REV. 2/91 Printed on Recycled or Recovered Paper

Project No. XXX-YYYY  
FAP No.: [yyy-XXXXXXXX]

*date* [Month Day, Year]

*to* [Name]  
Transportation Maintenance Administrator  
Bureau of Engineering and  
Highway Operations

*from* [Name]  
Director of Research and Materials  
Bureau of Engineering and  
Highway Operations

THIS IS TO CERTIFY THAT:

Results of tests on acceptance samples indicate the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformity with approved plans and specifications, and that such results compare favorably with the results of independent assurance sampling and testing.

Exceptions to the plans and specifications are documented in the project records and are also listed below:

- 1.
- 2.
- 3.
- 4.

[Author]:[typist]/[drive location/file name]

cc: [Name(s) District maintenance]  
[Name Capital Services]  
[Name DMT] - DMT File

The following letter is addressed to the FHWA Division Administrator and is required for all Department projects funded with Federal aid.

---

[Month Day, Year]

[Name]  
Division Administrator - HPR-CT  
Federal Highway Administration  
628-2 Hebron Avenue - Suite 303  
Glastonbury, Connecticut 06033

Dear [Name]:

Subject: MATERIAL CERTIFICATION  
State Project Number: [XXX-YYY]  
Federal Aid Number: [MGS-STPA/B-951(151),]  
[STPA-STPB-95-1(151)2]

THIS IS TO CERTIFY that results of tests on acceptance samples indicate the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformity with approved plans and specifications, and that such results compare favorably with the results of independent assurance sampling and testing.

Exceptions to the plans and specifications are documented in the project records and are also listed below:

- 1.
- 2.
- 3.

Sincerely,

[Name]  
Director of Research and Materials  
Bureau of Engineering and  
Highway Operations

[Author]:[typist]\[Drivelocation]/[file name]  
bcc: [Name Manager of Construction]  
[Name District Engineer] - District [X]  
[Name -Cap Services]  
[Name DMT] - DMT Project Files  
bcc: [Name] -FHWA-CT

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| AASHTO<br>T 30-03  | Section 6.2 thru 6.5 Samples are not routinely washed  |
| AASHTO<br>T 40-02  | All sampling during production shall be from the ground tank. Upon request by the DRM, a 1-qt sample shall be taken after 1-gal (minimum) is drained off.  |
| AASHTO<br>T 164-05 | <p>Method A</p> <p>APPARATUS:</p> <p>Section 5 ConnDOT in addition to AASHTO apparatus includes infrared lamp and substitutes graduated cylinder with a 1000 ml flask.</p> <p>Section 6. Reagent. Must be Conn D.O.T. approved *****</p> <p>Article 8.2.1 all classes of HMA except Class 4 are scooped from the sample container.</p> <p>Section 9.1 and 9.2 Moisture content is periodically determined on production samples as plant conditions require.</p> <p>Section 11.1 See Section 9.0 AASHTO T 164</p> <p>Section 11.3 and 11.5 Filter paper is dried and weighed in field using heat lamp or oven when an ash test is performed.</p> <p>Section 11.6.2 Extract is collected if an ash test is to be performed</p> <p>Section 11.6.2 Performed on selected samples only</p> <p>Section 11.6.2 A three test running average is used to correct for total binder in HMA.</p>  |
| AASHTO<br>T 166-05 | NOT MODIFIED   |
| AASHTO<br>T 168-03 | <p>Section 4.1: Samples are taken at one point in the pile instead of two samples 180 degrees from each other. All classes of bituminous concrete except Class 4 are scooped from the sample container instead of remixing and quartering. (Method verified by laboratory study).</p> <p>Section 4.3: Samples from a hauling vehicle are taken from only one point instead of four as specified.</p> <p>Selection of Samples: Sampling is equally important as the testing, and the sampler shall use every precaution to obtain samples that are truly representative of the bituminous mixture.</p> <p>Box Samples: In order to enhance the rate of processing samples taken in the field by construction or maintenance personnel, the box samples requested by laboratory will immediately be given Laboratory numbers. The samples will be tested in the order received and data processed to be determine conformance to material specifications and to prioritize inspections by laboratory personnel. The only exception to this procedure will be if the field inspectors suspect nonconformance of material specifications and request priority testing for acceptance or rejection.</p> |
| AASHTO<br>T-170-00 | <p>Recovery of Asphalt from Solution by Abson Method</p> <p>Delete the referenced section and replace with the language shown:</p> <p>5.0 Apparatus</p> <p>Centrifuge batch unit capable of exerting a minimum centrifugal force of 770 times gravity or a continuous unit capable of exerting a minimum force of 300 times gravity.</p> <p>5.1. Centrifuge tubes- a 250ml wide mouth bottles</p> <p>5.2. Extraction Flasks- a 500ml three angle necks and joints flask with 24/40 side necks.</p> <p>5.3.2. Glass Tubing- Heat resistant glass tubing, having 10mm inside diameter and a gooseneck shaped delivery tube, for connecting the flask to the condenser.</p> <p>5.3.3. Inlet Aeration Tube- 180mm in length having a 6mm outside diameter with a 10-mm bulb carrying six staggered holes approximately 1.5 mm in diameter.</p>   |

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|                 | <p>5.3.4. Electric Heating Mantle- Variable transformer to fit a 500 ml flask.</p> <p>5.3.5 Water-jacketed Condenser, Alliham type, with 200 mm minimum jacket length.</p> <p>5.3.6. Thermometer- an ASTM low distillation thermometer having a range of -2 to 300_C (30 to 580_F), respectively, and conforming to the requirements in ASTM specification E 1</p> <p>5.3.7. Gas Flow Meter- A type capable of indicating a gas flow of up to 1000 ml per minute.</p> <p>5.3.8. Corks. NO. 20</p> <p>5.3.9. Flexible Elastometric Tubing-</p> <p>5.3.10. Separatory Funnel 500 ml capacity or larger</p> <p>6.0. Reagents and Materials</p> <p>6.1. Carbon Dioxide Gas- A pressurized tank, with pressure-reducing valve. The solvent for extracting the asphalt from the mixtures should be reagent grade trichloroethylene or methylene chloride. Other solvents may affect the bitumen to change its properties significantly from that as it exists in the mixture.</p> <p>8. Sample</p> <p>8.1. The sample shall consist of the solution from previous extraction of a sample of sufficient mass to result in approximately 105 to 110 g of recovered bitumen.</p> <p>9. Procedure</p> <p>9.1. The entire procedure, from the start of the extraction to the final recovery, must be completed within 8 hours.</p> <p>9.2 Centrifuge the solution from the previous extraction for a minimum of 30 minutes at 770 times gravity (approx. 2700rpm) in 250 wide mouth bottles.<br/>           Assemble the apparatus as shown in figure 1 with the separatory funnel in the thermometer hole in the cork. Lower the aeration tube so that the bulb is in contact with the bottom of the flask. Fill the separatory funnel with the centrifuged solution and open the stopcock to fill the flask approximately one-half full of solvent mixture. Apply low heat to the flask and start distillation. Introduce carbon dioxide gas at a low rate (approx. 100mL/minute) to provide agitation and prevent foaming. Adjust the funnel stopcock to introduce fresh solvent at a rate that will keep the flask approximately one half full during distillation, adding additional solvent mixture to the funnel into all solvent has been introduced into the distillation flask. When the temperature reaches 157 to 160_C (315 to 320_F), increase the carbon dioxide gas flow to approximately 900mL/minute. Maintain this gas flow rate for 20 minutes while also maintaining the temperature of the residue in the flask at 160 to 166_C (320 to 330_F).</p> |
| AASHTO T 176-02 | <p>Section 4.2 Obtain enough material to yield slightly more than eight 85 ml (3 oz) tins</p> <p>Section 5. Procedure</p> <p>5.4.1 Samples must be run at 45 seconds and 10 minutes</p> <p>5.4.2 Omit manual shaker method,</p> <p>5.4.3 Omit Hand Method</p>  |
| AASHTO T 195-98 | <p>Section 3.3 only one truck load of mixture is sampled. Samples are taken from opposite sides of the load.</p>   |
| AASHTO          | <p>Section 6.4 Bowl is suspended 2 minutes prior to reading rather than 10 minutes. This makes no</p>  |

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| T 209-05           | significant difference in results.<br>8.3 Omit Pycnometer method.   |
| AASHTO<br>T 238    | Section 1.2 Method C - Air gap is not used (Backscatter)<br><br>Section 10.3.7 At each test location 4 readings shall be taken and averaged. Each reading shall be a minimum of 30 seconds.   |
| AASHTO<br>T 245-04 | Section 3.3.1 A molding temperature of 140 to 146 C is used<br><br>Section 3.5.1 Seventy-five (75) blows per side are used on Classes 1 and 12, per ConnDOT design requirements<br><br>Section 3.1 for production testing: one specimen is molded for each extraction test (generally five molds per day) for production over 275 metric tons/day. Other mixtures: two specimens per extraction test.   |
| AASHTO<br>T 275-00 | Replaced by AASHTO TP-69-04   |
| AASHTO<br>T 283-03 | This protocol shall be performed at the HMA plant in accordance with section 7 on class 12.5 (all applicable levels) by the Contractor or their representative at a time designated by the DRM  |
| AASHTO<br>M156     | <p>AASHTO M156 (M)<br/>STANDARD SPECIFICATIONS FOR BITUMINOUS MIXING PLANTS</p> <hr/> <p>Terminology</p> <p><u>Batch Plant</u>: A manufacturing facility for producing bituminous paving mixtures that proportions the aggregate and bituminous constituents into the mix by weighed batches, adds bituminous material by either weight or volume, and mixes the blend.</p> <p><u>Drum Mix Plant</u>: A manufacturing facility for producing bituminous paving mixtures that continuously proportions aggregates, heats and dries them in a rotating drum, and simultaneously mixes them with a controlled drum, and simultaneously mixes them with a controlled amount of bituminous material. The same plant may produce cold-mixed bituminous paving mixtures without heating and drying the aggregate.</p> <p>4. REQUIREMENTS FOR ALL PLANTS</p> <p>4.1 Uniformity – The plant shall be capable of uniformly combining and mixing various sizes of aggregate from stockpiles reclaimed asphalt pavement, if required, and bituminous material.</p> <p>4.1.1 Plants producing material during nighttime hours shall have suitable lighting at the sample platform and surrounding areas for the inspector to obtain samples safely.</p> <p>4.1.2. The plant shall have a capacity of at least producing 125 tons per hour, and a minimum of four (4) cold-feed storage bins unless otherwise approved by the Director of Research and Materials.</p> <p>4.1.3. The cold-feed storage bins shall be constructed and loaded by equipment and methods that prevent intermixing or contamination of the cold-feed aggregates.</p> <p>4.1.4 HMA mixtures may be stored in bins especially designed for that purpose at the mixing plant site.</p> <p>4.1.5. The HMA mixtures used from the bins shall be of a uniform quality and meets all the specification requirements for the particular mix involved.</p> <p>4.1.6. Scalping screens or similar devices shall be installed in the cold-feed system, to remove any debris or other foreign material in excess of 4 inches.</p> <p>4.1.7. Individual bins shall be labeled for the aggregate sizes being used.</p> <p>4.1.8. The plant shall have at hand a sufficient number of standard 50-lb test weights for frequent testing of all scales. In addition to complying with the above requirements, the weighing</p> |

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|  | <p>equipment shall be constructed with the necessary adjustable devices that will permit any part thereof that is out of alignment or adjustment to be easily readjusted so that the weighing device will function properly.</p> <p>4.1.9. Scales will be checked and sealed by the Weights and Measures Division at least annually and more often if deemed necessary.</p> <ol style="list-style-type: none"> <li>a. For each day's production, each ConnDOT project(s) shall be provided a clear, legible copy of the recording.</li> <li>b. Provisions shall be made so that scales used to load the hauling vehicles may not be manually manipulated during the printing process.</li> <li>c. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest.</li> </ol> <p>4.2 Equipment for Preparation of Bituminous Material:</p> <p>4.2.1 Tanks for storage of bituminous material shall be equipped for heating the material, under effective and positive control at all times, to the temperature required in the paving mixture specifications. Heating shall be by steam or oil coils, electricity, or other means such that no flame shall contact the heating tank.</p> <p>4.2.1.1. Hot storage tanks shall be equipped with thermometers and means for positive control of asphalt temperature at all times. Storage tank capacity shall be such as to ensure continuous operation of the plant and uniform temperature of the asphalt material when it is introduced into the aggregate.</p> <p>4.2.1.2 The lines and valves shall be so arranged that there is no contamination when different binders are used for different mixes.</p> <p>4.2.1.3 Each tank shall be equipped with an accessible valve in the lower half of the bulkhead whereby liquid samples may be taken.</p> <p>4.2.2. The circulating system for the bituminous material shall be of adequate capacity to provide proper and continuous circulation between storage tank and proportioning units during the entire operating period.</p> <p>4.2.2.1 The discharge end of the bituminous material circulating pipe shall be kept below the surface of the bituminous material in the storage tank to prevent discharging the hot bituminous material into the open air.</p> <p>4.2.2.2 All pipe lines and fittings shall be steam or oil-jacketed or otherwise properly insulated to prevent heat loss. When the bituminous material is emulsified asphalt, provisions should be made in the bitumen transfer system that will enable the operator to turn off or reduce the heat media from all lines, pumps, and jacketed bituminous material buckets as soon as the system is open and circulating properly.</p> <p>4.2.3. Storage tank capacity shall be such as to ensure continuous operation of the plant and uniform temperature of the bituminous material when it is introduced into the aggregate. Tanks shall be calibrated accurately to 100-gal (378.5-L) intervals and shall be accessible for measuring the volume of bituminous material at any time.</p> <p>4.2.4. When filled or native bituminous materials are used, means shall be provided for agitation to maintain a uniform product.</p> <p>4.2.3 Mineral Filler – Adequate dry storage shall be provided for mineral filler, when required, and provision shall be made for accurate proportioning.</p> <p>4.2.4 Cold Aggregate Feeder – The plant shall be provided with mechanical means for uniformly feeding the aggregates into the dryer so that uniform production and temperature may be assured. When aggregates must be blended from two or more bins at the cold feed to meet the requirements of the paving mixture specifications, a synchronized proportioning method shall be provided.</p> <p>4.4.1 If recycling capability is required, the plant shall be equipped with mechanical means for feeding the desired weight of reclaimed asphalt pavement into the mix. Facilities shall be provided for obtaining samples of the reclaimed asphalt pavement.</p> <p>4.5 Dryer – A dryer of satisfactory design capable of drying and heating the aggregate to the moisture and temperature requirements of the paving mixture specifications shall be provided.</p> |  |
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|      | <p>4.6 Bituminous Control Unit:</p> <p>4.6.1 Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of bituminous material. Accuracy of the metering devices shall be within 1.0% of the actual weight being measured when that weight has been determined using another measuring device and shall be within 0.5% when that weight has been determined using test weights. Bituminous material scales shall conform to 8.5.</p> <p>4.6.2 Suitable means shall be provided, either by steam or oil jacketing, or other insulation, for maintaining the specified temperature of the bituminous material in the pipe lines, meters, weigh buckets, spray bars, and other containers or flow lines.</p> <p>4.7 Thermometric Equipment:</p> <p>4.7.1 An armored recording thermometer of suitable range shall be fixed in the bituminous material feed line at a suitable location near the discharge at the mixer unit.</p> <p>4.7.2 Approved recording thermometers, pyrometers, or other recording thermometric instruments shall be fixed at the discharge chutes of the dryer and, when applicable, in the hot fines bin to register and record automatically the temperature of the heated aggregate or heated mixture.</p> <p>4.7.2.1 The Director of Research and Materials reserve the right to pass upon the efficiency of the pyrometer; and for better regulation of the aggregate temperature, he may direct the replacement of the instrument by some approved temperature-recording apparatus and may further require that daily temperature charts be filed with him.</p> <p>4.8 Emission Controls:</p> <p>4.8.1 A dust collection system shall be provided. The system shall be made to waste the material so collected, or to return all or any part uniformly to the mixture.</p> <p>4.8.2 Other emissions, such as smoke but excepting water vapor, shall be controlled to be in compliance with applicable limits.</p> <p>4.9 Surge and Storage Bins – If bins are used for surge or storage, they shall be such that mixture drawn from the bin meets the requirements of the paving mixture.</p> <p>4.10 Safety Requirements:</p> <p>4.10.1 Adequate and safe stairways to the mixer platform shall be provided if applicable. Guarded ladders to other plant units shall be located where required.</p> <p>4.10.2 All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly protected.</p> <p>4.10.3 Amply unobstructed space shall be provided on the mixing platform if applicable.</p> <p>4.10.4 An unobstructed passage shall be maintained at all times in and around the truck loading space. This space shall be kept free of drippings from the mixing platform. A ladder or platform shall be located at the truck loading space to permit easy and safe inspection of the mixture as it is delivered into the trucks. Overhead protection shall be provided where necessary.</p> <p>6. Requirements for Plants Controlling Gradation of Hot Dry Aggregates</p> <p>6.1 Plant Screens</p> <p>6.1.1 Plants shall be equipped with plant screens located between the dryer and hot aggregate bins and shall have adequate capacity and size range to separate the heated aggregate into the size required for proportioning so that they may be recombined consistently within the specification limits.</p> <p>6.1.2 The nominal maximum size aggregate in the fines bin shall be specified. The screen type and size shall be determined by the operator. No aggregate shall be larger than the maximum specified.</p> <p>6.1.3 Control shall be based on frequent bin samples tested in accordance with Test Method C 136. Aggregate in each bin, including mineral filler, shall be combined in proper proportions, and the composite shall be checked for compliance with the paving mixture specifications.</p> <p>6.2 Hot Mix Bins:</p> <p>6.2.1 Hot Bin Storage of sufficient capacity to ensure uniform and continuous operation shall be provided. Bins shall be divided into the specified number of compartments arranged to</p> |

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|  | <p>ensure separate and adequate storage of appropriate fractions of the aggregate.</p> <p>6.2.2. Each compartment shall be provided with an overflow chute of such size and at such a location to prevent any backing up of material into other compartments or into contact with the screen.</p> <p>6.2.3. Bins shall be equipped with “tell-tale” devices to indicate the position of the aggregate in the bins at the lower quarter points. An automatic plant shut off shall be provided to operate when any aggregate bin becomes empty.</p> <p>6.2.4. Adequate and convenient facilities shall be provided for obtaining aggregate samples from each bin.</p> <p>7. Requirements for Plants Controlling Gradation of Cold, Damp Aggregates.</p> <p>7.1 Maximum Aggregate Size – Oversize aggregate shall be rejected by suitable methods or devices before the aggregate enters the cold feed, or by plant screens complying with 6.1.</p> <p>7.2 Cold Feed Bins:</p> <p>7.2.1 Cold feed bins for storing aggregates prior to proportioning shall be equipped with “tell-tale” devices to indicate the position of the aggregate in the bins at the lower quarter points. An automatic plant shut-off shall be provided to operate when any aggregate bin becomes empty or the flow from any bin gate becomes restricted.</p> <p>7.2.2 Adequate and convenient facilities shall be provided for obtaining samples of the full flow of aggregate from each cold feed bin and from the total cold feed.</p> <p>7.2.3 Adequate and convenient facilities shall be provided for diverting aggregate flow into trucks or other suitable containers to check the accuracy of the aggregate delivery system.</p> <p>7.2.4 Control shall be based on frequent samples from each cold-feed bin and the total cold feed tested by Test Method C136. Results of total cold fee samples shall be checked for compliance with the paving mixture specifications.</p> <p>8. REQUIREMENTS FOR BATCH PLANTS</p> <p>8.1 Control of Aggregate Gradation – The plant shall be equipped to control aggregate gradation in accordance with the requirements of either Section 6 or Section 7.</p> <p>8.1.1 The mixer shall be a batch mixer of an approved twin pug mill type, suitably jacketed, of not less than 2,000 pounds capacity, equipped with a sufficient number of paddles or blades and set in proper order to produce properly mixed batches of any material required under these specifications.</p> <p>8.1.2 When the blade clearance exceeds <math>\frac{3}{4}</math> inch, either the shortened blades or the worn liners, or both, shall be replaced to reduce the clearance to <math>\frac{3}{4}</math> inch or less.</p> <p>8.1.3 The mixing blades of the pug mill shall be so set that they shall circulate the mixture in the pug mill in a horizontal direction around the mill, unless otherwise approved by the Director of Research and Materials.</p> <p>8.2 Weigh Box or Hopper</p> <p>8.2.1 Means shall be provided for weighing aggregate from each bin into a weigh box or hopper, suspended on scales and ample in size to hold a full batch.</p> <p>8.2.2 The weigh box or hopper shall be supported on fulcrums and knife edges that will not easily be thrown out of alignment or adjustments.</p> <p>8.2.3 Gates, both on the bins and the hopper, shall not leak.</p> <p>8.3. Aggregate Scales;</p> <p>8.3.1. Scales for any weigh box or hopper may be either beam or springless dial type and shall be of standard make and design. The accuracy of the weighing device shall be within 1.0% of the actual weight being measured when that weight has been determined using another measuring device and shall be within 0.5% when that weight has been determined using test weights.</p> <p>8.3.2. The change in load required to alter noticeably the position of rest of the indicating element (or elements) of a nonautomatic indicating scale shall not be greater than 0.1% of the nominal scale capacity.</p> <p>8.3.3. Beam type scales shall be equipped with a device to indicate that the required load is being</p> |  |
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|  | <p>approached. This device shall indicate at least the last 200 lb (91 kg) of the load.</p> <p>8.3.4. Graduation intervals for either beam or dial scales shall not be greater than 0.15 of the nominal scale capacity. Scale graduations and markings shall be plainly visible.</p> <p>8.3.5. On dial scales, parallax effects shall be reduced to the practical minimal with clearance between the indicator index and scale graduations not exceeding 0.06 in. (1.5 mm).</p> <p>8.3.6. Scales shall be equipped with adjustable pointers for marking the weight of each material to be weighed into the batch.</p> <p>8.3.7. Not less than ten test weights, each of 50 lb (22.7 kg) nominal weight and each stamped with its actual weight to within <math>\pm 0.05\%</math> shall be provided for the purpose of testing and calibrating the scales. For each scale a suitable cradle or platform shall be provided for applying the test loads. The test weights shall be kept clean and conveniently located for calibration of the scale.</p> <p>8.4 Bituminous Material Bucket:</p> <p>8.4.1 If a bucket is used, it shall be large enough to handle a batch in a single weighing</p> <p>8.4.2 The filling system and bucket shall be of such design, size and shape that the bituminous material will not overflow, splash or spill outside the bucket during filling and weighing.</p> <p>8.4.3 The time required to add the bituminous material shall not exceed 20 s. Where the quantity of bituminous material is metered, provision shall be made to check the delivery of the meter by actual weight.</p> <p>8.4.4 The bucket shall be steam or oil jacketed or equipped with properly insulated electric heating units. It shall be arranged to deliver the bituminous material in a thin uniform sheet or in multiple sprays over the full length of the mixer.</p> <p>8.5 Bituminous Material Scales – Scales for the weighing of bituminous material shall meet the requirements for aggregate scales, as specified in 8.3 except a device to indicate at least the last 20 lb (0.1 kg) of the approaching total load shall be provided. Beam type scales shall be equipped with a tare beam or adequate counterbalance for balancing the bucket and compensating periodically for the accumulation of bituminous material on the bucket.</p> <p>8.6 Mixer Unit for Batch Method:</p> <p>8.6.1 The plant shall include a batch mixer of an approved twin shaft pugmill type capable of producing a uniform mixture.</p> <p>8.6.1.1. The mixture shall be designed to provide means of adjusting the clearance between the mixer blades and liner plates to ensure proper and efficient mixing.</p> <p>8.6.1.2. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust by dispersion.</p> <p>8.6.1.3. The mixer shall be constructed to prevent leakage of the contents.</p> <p>8.6.1.4. Mixer discharge shall not cause appreciable segregation.</p> <p>8.6.2 The mixer shall be equipped with a positive means for governing mixing time and an accurate time lock to control the operation of a complete mixing cycle by locking the weight box gate after the charging of the mixer until closing of the mixer gates at the completion of the cycle; it shall lock the bituminous material bucket throughout the dry mixing period and shall lock the mixer gate throughout the dry and wet mixing periods.</p> <p>8.6.2.3 If required by the specifications, a mechanical batch counter shall be installed as part of the timing device and shall be designed to register only completely mixed batched.</p> <p>8.7 Automation of Batching:</p> <p>8.7.1 If required by the specifications, an automatic weighing, cycling, and monitoring system shall be installed as part of the batching equipment.</p> <p>8.7.2 The system shall include equipment for accurately proportioning the various components of the mixture by weight or by volume in the proper order, and equipment for controlling the cycle sequence and timing of mixture operations. There shall be auxiliary interlock cut-off circuits to interrupt and stop the automatic batching operations whenever an error exceeding the acceptable tolerance occurs in proportioning.</p> <p>8.7.2.1 Each batch shall be kept separate throughout the weighing and mixing operations.</p> <p>8.7.3 The automatic proportioning system shall be capable of consistently delivering component materials for any batch size within the following tolerances of the target weight(s):</p> |  |
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|  | <p>a. Aggregate (each bin) <math>\pm 1.5\%</math> of the weight of aggregate</p> <p>b. Mineral Filler <math>\pm 0.5\%</math> of the total batch weight,</p> <p>c. Asphalt Material <math>\pm 0.1\%</math> of the total batch weight,</p> <p>d. Zero Return (Aggregate) <math>\pm 0.5\%</math> of the total batch weight,</p> <p>e. Zero Return (Asphalt Material) <math>\pm 0.1\%</math> of the total batch weight</p> <p>Control of the proportioning system shall be immediately adjusted if proportions are found to be outside the tolerances.</p> <p>Recording equipment shall monitor the batching sequence of each component of the mixture and produce a printed record of these operations.</p> <p>For each day's production, each ConnDOT project(s) shall be provided a clear, legible copy of the recording.</p> <p>There will be provisions so that scales may not be manually manipulated during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest.</p> <p>A printed character (asterisk or other) shall automatically be printed on the batch plant printout whenever the automatic batching sequence is interrupted or switched to auto manual or manual during the proportioning of a mixture.</p> <p>8.7.4 The electrical circuits for the above delivery tolerances of each cut-off interlock shall be capable of providing the total span for the full allowable tolerance for maximum batch size. Tolerance controls shall be automatically or manually adjustable to provide spans suitable for less than full-size batches (Note 1). The automatic controls and interlock cut-off circuits shall be capable for being consistently coordinated with the batching scale or meter within an accuracy of 0.2% of the nominal capacity (Note 2) of said scale or meter throughout the full range of the batch sizes.</p> <p>Note 1 – If separate tolerance controls are not provided for the batching of mineral filler, it will be necessary to reduce the aggregate tolerances to <math>\pm 0.5\%</math> for those batches requiring mineral filler.</p> <p>Note 2 – The term “nominal capacity” of a scale or meter where referred to herein is defined as the maximum quantity which the scale or meter is capable of measuring.</p> <p>8.8.2 If a digital tape or ticket recorder is used, it shall record the proportions as indicated on the batching scale or meter within an accuracy of 0.5% of maximum batch size.</p> <p>8.8.3 If graphical recording is used, it shall be designed so that the stylus will traverse at least 9 in. (229 mm) of the recorder width for the total aggregate weight and maximum bituminous material weight or volume; the preceding based on maximum batch size.</p> <p>8.8.3.1. The charts shall be designed so that all quantities, including zero can be read directly and shall have a resolution of at least ten lines per inch. The chart speed shall be such that individual aggregate weights, when batched cumulatively, can be clearly identified.</p> <p>8.8.3.2 The recorder shall record the proportions as indicated on the batching scale or meter within an accuracy of 0.5% of the maximum batch size.</p> <p>10. REQUIREMENTS FOR DRUM MIX PLANTS <span style="float: right;">10.1</span></p> <p>Control of Aggregate Gradation- The plant shall be equipped to control aggregate gradation in accordance with the requirements of Section 7.</p> <p>10.2 AGGREGATE DELIVERY SYSTEM</p> <p>10.2.1. Each cold feed bin shall have a device to feed the aggregate accurately and uniformly. No gravity-type feeders will be permitted. The feeding orifice shall be adjustable and indicators provided to show the gate opening. Each feeder shall be interlocked so that production is interrupted within 5 seconds if any cold bin becomes empty or the flow is obstructed.</p> <p>10.3 All aggregates shall be weighed by a continuous weighing device either as it is proportioned by the individual feeders or after all materials have been deposited on a common belt. Belt scales shall be installed according to the scale manufacturer's recommendations.</p> |
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|  | <p>Means shall be provided for diverting the aggregate after passing over the belt scale and prior to entry into the drum. The belt scale(s) shall have an accuracy requirement of <math>\pm .05\%</math>.</p> <p>10.4 All proportioning controls for aggregates, including mineral filler and asphalt, shall be located at the panel that also controls the mixer and temperature. The controls shall maintain aggregate flow accuracy such that the total variation of all materials being drawn per interval of time shall not exceed an amount equal to 1.5 percent of the total weight of bituminous mixture per interval of time. The feed rates of aggregates from the cold bins, mineral filler when used, and asphalt shall be established for each mix type initially by passing the individual aggregates and mineral filler over the continuous weighing device and the asphalt through the meter, respectively. The feed rates shall be checked periodically. Weight indicators shall display in the control room the weights of dry aggregate and mineral filler in tons per hour shall continuously accumulate the weights of material during the production period of the day. Where mineral filler is included in the aggregate passing over the belt scale, only one indicator will be required. The maximum resolution shall be 0.1 tons for dry aggregate and 0.01 tons for mineral filler if added separately. When mineral filler is to be added, it shall be fed from a bin and feeder separate from the aggregate cold bins. The system shall have a device to feed the mineral filler at adjustable rates accurately and uniformly. When mineral filler is proportioned separately, the delivery system shall be accurate to 0.1 percent based on the total weight of the bituminous mixture. The feeder shall be interlocked in such a manner such that no filler is lost in the form of fugitive dust. Where the separate addition of mineral filler is required, it shall be added with a maximum variation of 0.5 percent on the basis stated above for aggregates. The flow rate of aggregate shall be continuously displayed in the control room in tons per hour. The maximum resolution shall be 1 ton per hour for dry aggregate and 0.1 ton per hour for mineral filler if added separately.</p> <p>10.5 The plants shall be equipped with an automatic digital recording device that simultaneously records the weights of each aggregate, mineral filler if added separately and asphalt at five-minute intervals during production time and on demand. The recordation shall include the actual asphalt content based upon the quantity as a percentage of the total mixture weight. The maximum resolution shall be 0.1 tons for dry aggregate, 0.01 tons for mineral filler if added separately, 0.01 tons for asphalt and 0.1% for asphalt content. All recordings shall show the date, including day, month, year, and time to the nearest minute for each print.</p> <p>10.6 <b>MOISTURE COMPENSATOR</b></p> <p>A moisture compensation device shall be capable of electronically changing the wet weight of aggregate to dry aggregate weight. The compensator may be set manually based on moisture tests performed on composite aggregate samples. The maximum graduations on the compensator shall be 0.1 percent. It shall be the daily responsibility of plant personnel to sample and determine the moisture content in the cold-feed aggregates.</p> <p>Additional moisture determinations shall be made as requested by the Engineer.</p> <p>A detailed record of the moisture determinations shall be kept and made available to the Engineer or his representative upon request.</p> <p>10.7 <b>BITUMEN DELIVERY SYSTEM</b></p> <p>A meter shall proportion the asphalt and the meter shall be accurate to 0.1 percent based on the total weight of the HMA mixture. The system shall be interlocked so that production is interrupted within 5 seconds if the asphalt flow to the mixer unit ceases. A temperature-compensating device shall be installed in conjunction with the meter to correct the quantity of asphalt to 60F. The asphalt control shall be capable of presetting the actual asphalt content directly as a percentage based on total weight of mixture. The maximum graduation on the control shall be 0.1 percent. The asphalt delivery system shall be coupled with the aggregate delivery system to automatically maintain the required proportions as the aggregate flow varies. The delivery tolerance for asphalt shall be <math>\pm 0.1</math> percent of the total mixture weight. The flow rate of asphalt shall be continuously displayed in the control room and shall have a maximum resolution of 0.1 tons per hour. A quantity indicator shall display in the control room</p> |
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|   | <p>the quantity of asphalt and shall continuously accumulate the quantity of asphalt during the production period in the day.<br/>The maximum resolution shall be 0.01 tons. The indicators shall be able to be reset to zero and be locked.</p> <p>10.8 Mixer Unit<br/>The plant shall include a continuous mixer of a type, having an "automatic burner" control and capable of producing a uniform mixture within the job mix tolerances. Flights within the drum which are missing, loose, broken, bent, scalloped or worn excessively from their new condition shall be replaced to the satisfaction of the Engineer. The mixture shall be discharged into a hot bituminous mixture-holding bin meeting the requirements for storage bins (silos).</p> <p>RAP</p> <p>10.9 Mixing of RAP with this new aggregate shall occur before the binder introduction point.<br/>RAP shall be fed into the drum so that it will not come in direct contact with the burner flame.</p> <p>10.10 Automatic Aggregate Sampling Device:<br/>An automatic aggregate sampling device shall be provided which will divert a representative combined aggregate sample into a hopper or container for the purpose of gradation testing. The device shall effectively sample the full width and depth of the aggregate flow without losing any portion of the sample. The sampling point shall be after the aggregate is proportioned and prior to its mixing with asphalt.</p> <p>11 STORAGE BINS (SILOS):</p> <p>11.1 Storage time is defined as the time interval beginning with the discharge from HMA mixing unit to the time of completion of discharge from the holding bin. Each bin shall be inspected and/or tested by the Department to determine acceptance of the HMA mixture at specific storage times. Acceptance shall be based upon the ability of the bin to hold and discharge mixes within the quality criteria given below. The evaluation will be based on sampling and testing of stored mixtures unless otherwise directed. If the mixture drawn from a storage bin shows signs of detrimental aggregate segregation, asphalt migration, asphalt hardening or improper temperature control, the Director of Research and Materials may discontinue delivery from the storage bins until satisfactory results can be achieved. Unless so otherwise permitted by the Director of Research and Materials, the HMA mixtures shall not be stored in holding bins longer than the following periods:</p> <table border="0"> <thead> <tr> <th colspan="2">Maximum Storage Time Type Bin All Classes</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Open Surge Bin 2 hr.</td> </tr> <tr> <td>2.</td> <td>Unheated bin 4 hrs.</td> </tr> <tr> <td>3.</td> <td>Heated; no inert gas in bin 8 hrs</td> </tr> <tr> <td>4.</td> <td>Heated: inert gas in bin 14 hrs</td> </tr> </tbody> </table> <p>Prior approval must be obtained for storage times greater than those indicated above. Mixtures will be evaluated for approval on an individual class basis as determined by the Director of Research and Materials.<br/>For verification of weights or proportions and character of materials and determination of temperatures used in the preparation of the mixture, the ConnDOT Laboratory personnel will have access at any time to all parts of the mixing plant.<br/>Acceptance Criteria for Mix Quality after Storage:</p> <table border="0"> <tbody> <tr> <td>a.</td> <td>Temperature <math>\pm</math> 25F from pug mill discharge</td> </tr> <tr> <td>b.</td> <td>Gradation within job mix formula tolerances</td> </tr> <tr> <td>c.</td> <td>Asphalt Content within job mix formula tolerances</td> </tr> </tbody> </table> | Maximum Storage Time Type Bin All Classes |  | 1. | Open Surge Bin 2 hr. | 2. | Unheated bin 4 hrs. | 3. | Heated; no inert gas in bin 8 hrs | 4. | Heated: inert gas in bin 14 hrs | a. | Temperature $\pm$ 25F from pug mill discharge | b. | Gradation within job mix formula tolerances | c. | Asphalt Content within job mix formula tolerances |
|---|--|---|--|----|----------------------|----|---------------------|----|-----------------------------------|----|---------------------------------|----|---|----|---|----|---|
| Maximum Storage Time Type Bin All Classes |  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| 1.  | Open Surge Bin 2 hr.   |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| 2.  | Unheated bin 4 hrs.  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| 3.  | Heated; no inert gas in bin 8 hrs  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| 4.  | Heated: inert gas in bin 14 hrs  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| a.  | Temperature $\pm$ 25F from pug mill discharge  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| b.  | Gradation within job mix formula tolerances  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |
| c.  | Asphalt Content within job mix formula tolerances  |   |  |    |                      |    |                     |    |                                   |    |                                 |    |   |    |   |    |   |

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|  | <p>d. Asphalt Cement* Viscosity @ 140F 5500 poises when tested by AASHTO T 202 (* Recovered from mixture by AASHTO Method T170 (modified))</p> <p>Quantity Documentation: The quantity of mixture drawn from storage bins and delivered to department projects shall be weighted and recorded on scales meeting the requirements of Subarticle 4.06.1. Other quantity measuring and recording devices are permitted subject to the approval of the Director of Research and Materials. Coating on the bins internal surfaces or additives to the HMA mixes shall not be used unless specifically permitted by the Director of Research and Materials.</p> <p>The bins shall be equipped with a light or indicator to show when the level of material reaches the top of the discharge cone.</p> <p>The bins shall not be emptied below the top of the discharge cone until the use of the bin is completed each day.</p> <p>The material remaining in the discharge cone may be rejected if there is evidence of segregation upon discharge into the truck.</p> <p>The recovered asphalt from the mix samples shall meet requirements of Subarticle M.04.01-5.</p> <p>Samples for these tests will be taken from appropriate points in the conveyor system or trucks loaded from the bins.</p> <p>Report – Form 404 for Batch Plants and Form 405 Drum plants</p> |  |
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| <p>AASHTO T 308-05</p> | <p>In addition to the standard testing procedure, the State of Connecticut has adopted a procedure that addresses a correction factor that is calculated using the composite aggregate percentages (Composite Aggregate Correction Factor Method (CACF)).</p> <p>The aggregate is burned in compliance with the standard ASSHTO procedure. All modifications are listed for this method only.</p> <p>5.5. Omit. Replace with: The individual aggregate samples are to be dried in an oven at 105 ± 5°C (221 ± 9° F) for a minimum of 24 hours.</p> <p>6.2. Omit Note 2</p> <p>6.3. Omit.</p> <p>6.6. Omit. Replace with: Perform a gradation analysis on the burned blank and compare it to the gradation performed prior to burning.</p> <p>6.7. Omit.</p> <p>6.8. Omit.</p> <p>The correction factor for any material may now be calculated by multiplying the percent aggregate times the correction factor for that aggregate, then; by adding up all the individual factors from that material to come up with that materials correction factor.</p> <p>(Note: All correction factors must be re-calculated every time a materials percentage pulls change.)</p> |  |
| <p>ASTM D 2922</p>     | <p>Density of soil and aggregate by Nuclear Methods<br/>See Section 5.25 of this Manual</p>   |  |
| <p>ASTM D 2950</p>     | <p>1.1 For thick-lift bituminous concrete overlays of 63 mm or greater in depth, testing shall be performed using the testing position recommended by the manufacturer such that 90 per cent of a single reading will be affected<br/>By the top 80 mm to 100 mm of material.</p>   |  |

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|                                  | <p>1.2 For thin-lift bituminous concrete overlays 40 mm to 63 mm, the testing shall be performed using the testing position recommended by the manufacturer such that 90 percent of a single reading will be affected by the top 50 mm of material.</p> <p>1.3 For all tests, each test location will have two readings taken at 90-degree angles to each other (rotated around the center of the gauge). The density value reported will be the average of the two readings.</p>   |
| <p>Federal Test Method 2012</p>  | <p>PREPARATION OF TIN PANELS<br/>Section 1. Scope</p> <p>1.1 This method prescribes the type of tin panels to be used and the procedure to follow in their preparation for testing paints, varnish, lacquer, and related products.</p> <p>Section 2. Equipment<br/>2.1 Test panels general. The finished tin panel shall conform to the requirements of Fed. Spec. QQ-T-425 for Class A2 (best coke), Grade 1, 31 gauge ICL tinplate having a base mass per base box of 45.4 kg and equivalent mass per square meter of 0.20 kg.</p> <p>2.2 For flexibility tests. The tinplate specified in 2.1 shall be made by plating manufacturer's standard Gauge No., 31 (.27 mm), soft skin rolled temper (condition 4) steel sheet of nonaging quality conforming to Fed. Spec. QQ-S-698.</p> <p>2.2.1 Bending property. Panels (76.2 mm x 127 mm) cut at random from the plated sheet, when bent through an arc of 160 degrees over mandrels from 3.2 mm to 25.4 mm in diameter, shall conform to the circumference of each mandrel without any deformation such as bulging, buckling, or breaking.</p> <p>Section 3. Cleaning Solutions – Acetone<br/>3.1, 3.2 and note 1, are to be deleted and replaced by the following:<br/>3.1 Solvent- This solvent shall consist of A.C.S. certification acetone.</p> |
| <p>Modified Test Method 2141</p> | <p>APPLICATION OF BRUSHED FILMS<br/>Section 2. Application</p> <p>2.1 Delete the following four (4) sentences from Paragraph 2.1: "A Luer-type glass syringe shall be filled with the material under test and distributed over the panel quickly and uniformly spread at a predetermined or specified rate or wet film thickness. Then determine the mass the wetted brush and the Luer syringe filled with the coating materials. Re-determine the mass of the brush and syringe after application of coating. Spreading rate, if required, can be determined with this data."</p>   |
| <p>Modified Test Method 4021</p> | <p>PIGMENT CONTENT (ORDINARY CENTRIFUGE MODIFIED)<br/>Section 2. Reagents</p> <p>3.1 Extraction Mixture A. Delete 6 volumes benzene - Fed. Spec. VV-B-231, and replace with the following:<br/>6 volumes 1, 1, 1 Trichlorethane, stabilized technical grade.</p>  |

Appendix D – Material Identification for Coding Purposes

|     |   |      |      |
|-----|---|------|------|
| 1   | PAINT – ENAMEL (BLACK/ORANGE)                   | GALS | L    |
| 11  | PAINT - BLACK PAVEMENT MARKING                  | L.F. | M    |
| 12  | PAINT – ENAMEL (BURNT ORANGE, FAST-104-M)       | GALS | L    |
| 15  | STAIN   | GALS | L    |
| 21  | PAINT - PRIMER (ZINC CHROMATE & IRON OXIDE)     | GALS | L    |
| 23  | PAINT - (GENERAL)                               | GALS | L    |
| 27  | PAINT - FOR SPAN POLES                          | GALS | L    |
| 28  | PAINT – BRIDGE                                  | GALS | L    |
| 29  | GREASE  | LBS. | KG   |
| 30  | PAINT - COATING SYS. FOR EXISTING STRUCT. STEEL | GALS | L    |
| 31  | PAINT - PRIME COAT FOR EXISTING STRUCT. STEEL   | GALS | L    |
| 32  | PAINT - INTERM. COAT FOR EXISTING STRUCT. STEEL | GALS | L    |
| 33  | PAINT - TOP COAT FOR EXISTING STRUCT. STEEL     | GALS | L    |
| 35  | PAINT - COATING SYSTEM FOR NEW STRUCT. STEEL    | GALS | L    |
| 36  | PAINT - PRIME COAT FOR NEW STRUCT. STEEL        | GALS | L    |
| 37  | PAINT - INTERM. COAT FOR NEW STRUCT. STEEL      | GALS | L    |
| 38  | PAINT - TOP COAT FOR NEW STRUCT. STEEL          | GALS | L    |
| 39  | PAINT - FOR FIELD TOUCHUP                       | GALS | L    |
| 40  | PAINT - FOR OVERHEAD SIGN SUPPORT - STR. STEEL  | GALS | L    |
| 41  | PAINT - (LINSEED OIL ALKYD)                     | GALS | L    |
| 43  | PENETRATING SEALER FOR EXISTING STRUCT. STEEL   | GALS | L    |
| 50  | PAINT - (ZINC RICH ZRC FED.)                    | GALS | L    |
| 52  | PAINT – TRAFFIC (15 MINUTE DRY)                 | GALS | L    |
| 54  | PAINT - WATERBORNE PVMNT MARK (15 MINUTE)       | GALS | L    |
| 56  | PAINT - WATERBORNE PVMNT MARK (15 MINUTE)       | L.F. | M    |
| 58  | PAINT - WATERBORNE PVMNT MARK (15 MINUTE)       | S.F. | SQ.M |
| 60  | PAINT - WATERBORNE PVMNT MARK (3 MINUTE)        | GALS | L    |
| 62  | PAINT - WATERBORNE PVMNT MARK (3 MINUTE)        | L.F. | M    |
| 64  | PAINT – EPOXY                                   | GALS | L    |
| 69  | EPOXY   | TEST | TEST |
| 70  | EPOXY   | GALS | L    |
| 71  | EPOXY POWDER COATING                            | LBS. | KG   |
| 72  | EPOXY INJECTION RESIN                           | L.F. | M    |
| 74  | PAINT - EPOXY - TWO(2) PART                     | GALS | L    |
| 75  | EPOXY RESIN                                     | L.F. | M    |
| 76  | PAINT – PRIMER                                  | GALS | L    |
| 78  | PAINT - (FINISH)                                | GALS | L    |
| 80  | PAINT – TRAFFIC (15 MINUTE DRY)                 | S.F. | SQ.M |
| 82  | PAINT – TRAFFIC (3 MINUTE DRY)                  | S.F. | SQ.M |
| 84  | PAINT – TRAFFIC (15 MINUTE DRY)                 | L.F. | M    |
| 86  | PAINT – TRAFFIC (3 MINUTE DRY)                  | L.F. | M    |
| 88  | GRAFFITI REMOVER                                | GALS | L    |
| 90  | EPOXY PAINT                                     | L.F. | M    |
| 92  | EPOXY PAINT                                     | S.F. | SQ.M |
| 93  | PAINT - EPOXY MASTIC ALUMINUM                   | GALS | L    |
| 94  | PAINT - WATERBORNE PVMNT MARK (3 MINUTE)        | S.F. | SQ.M |
| 97  | SAND BLAST DEBRIS - TOXICITY TEST               | TEST | TEST |
| 98  | CERTIFIED TEST REPORT                           | NONE | NONE |
| 99  | MATERIALS CERTIFICATE                           | NONE | NONE |
| 100 | SHOP DRAWINGS                                   | NONE | NONE |
| 101 | CATALOG CUTS                                    | NONE | NONE |
| 102 | PAINT - PRIMER (ZINC RICH)                      | GALS | L    |
| 103 | PAINT - EPOXY - H.B. POLYAMIDE                  | GALS | L    |
| 104 | URETHANE - H.B.                                 | GALS | L    |
| 105 | WIRE FOR METALIZING                             | LBS. | KG   |

|     |   |      |      |
|-----|---|------|------|
| 106 | SEE APPROVED SUPPLIER LIST                | NONE | NONE |
| 109 | SEE SPECIAL PROVISIONS                    | NONE | NONE |
| 120 | THINNERS                                  | GALS | L    |
| 200 | PAINTED PAVEMENT MARKINGS - TEMPORARY     | L.F. | M    |
| 201 | PAINTED PAVEMENT MARKINGS - TEMPORARY     | S.F. | SQ.M |
| 202 | PAINT - PAVEMENT MARKINGS - TEMPORARY     | GALS | L    |
| 203 | PLASTIC PAVEMENT MARKING TAPE - TEMPORARY | L.F. | M    |
| 205 | CEMENT - CONTACT                          | GALS | L    |
| 206 | PREFORMED BLACK MARKING TAPE              | L.F. | M    |
| 207 | PLASTIC PAVEMENT MARKING TAPE - TEMPORARY | S.F. | SQ.M |
| 208 | THERMOPLASTIC PAVEMENT MARKINGS           | L.F. | M    |
| 210 | THERMOPLASTIC PAVEMENT MARKINGS           | S.F. | SQ.M |
| 298 | SODIUM CHLORIDE - INERTIAL BARRIERS       | LBS. | KG   |
| 299 | CALCIUM CHLORIDE - SODIUM CHLORIDE        | TONS | MTON |
| 302 | CALCIUM CHLORIDE                          | TONS | MTON |
| 303 | ROCK SALT (SODIUM CHLORIDE)               | TONS | MTON |
| 306 | GLASS SPHERES                             | LBS. | KG   |
| 307 | ABSORBING COMPOUND (OIL/GREASE)           | LBS. | KG   |
| 308 | GLASS SPHERES                             | L.F. | M    |
| 309 | GLASS SPHERES                             | S.F. | SQ.M |
| 310 | PAVEMENT LINE - PREFORMED PLASTIC         | L.F. | M    |
| 311 | PAVEMENT MARKINGS - PREFORMED PLASTIC     | S.F. | SQ.M |
| 312 | PAVEMENT MARKINGS - REFLECTIVE            | EACH | EACH |
| 314 | TAPE - REFLECTIVE                         | L.F. | M    |
| 315 | PAVEMENT MARKERS - RAISED                 | EACH | EACH |
| 316 | TAPE - MARKING                            | ROLL | ROLL |
| 318 | PAVEMENT MARKINGS FILM                    | ROLL | ROLL |
| 320 | LINSEED OIL                               | GALS | L    |
| 321 | SWEEPING COMPOUND                         | LBS. | KG   |
| 323 | PROTECTIVE COMPOUND                       | S.F. | SQ.M |
| 324 | CONCRETE CURING COMPOUND                  | GALS | L    |
| 325 | PROTECTIVE COMPOUND                       | GALS | L    |
| 326 | WATER FOR CONCRETE                        | TEST | TEST |
| 327 | WATER                                     | GALS | L    |
| 328 | PROTECTIVE COATING                        | S.F. | SQ.M |
| 495 | TOPSOIL                                   | S.Y. | SQ.M |
| 496 | FERTILIZER                                | LBS  | KG   |
| 497 | SEED                                      | LBS  | KG   |
| 500 | SEED                                      | S.Y. | SQ.M |
| 503 | WOOD STAKE                                | EACH | EACH |
| 506 | FLAGGING                                  | EACH | EACH |
| 507 | TWINE                                     | L.F. | M    |
| 508 | WIRE 10 GA.                               | L.F. | M    |
| 509 | WIRE 12 GA.                               | L.F. | M    |
| 510 | PEAT                                      | C.Y. | CU.M |
| 511 | LIMESTONE                                 | TONS | MTON |
| 512 | FERTILIZER                                | S.Y. | SQ.M |
| 513 | WOOD CELLULOSE FIBER MULCHES              | S.Y. | SQ.M |
| 514 | MULCH (HAY)                               | S.Y. | SQ.M |
| 515 | MULCH (WOOD CHIP)                         | S.Y. | SQ.M |
| 516 | BURLAP FOR EROSION CONTROL                | S.F. | SQ.M |
| 518 | SOD                                       | S.Y. | SQ.M |
| 519 | HOSE                                      | L.F. | M    |
| 520 | PAPER                                     | ROLL | ROLL |
| 521 | HERBICIDE                                 | S.Y. | SQ.M |
| 531 | STONE MULCH                               | C.Y. | CU.M |

|      |  |      |      |
|------|--|------|------|
| 532  | SOILS FOR LIME DETERMINATION                 | TEST | TEST |
| 533  | LIME   | LBS. | KG   |
| 534  | MULCH - WOOD FIBER                           | LBS. | KG   |
| 536  | PLANT MATERIALS                              | EACH | EACH |
| 542  | TOPSOIL                                      | C.Y. | CU.M |
| 697  | PIPE - R.C. - ACCESSORIES                    | EACH | EACH |
| 699  | PIPE R.C.                                    | L.F. | M    |
| 756  | PIPE R.C. CLASS 5                            | L.F. | M    |
| 804  | BOX CULVERT (PRECAST CONCRETE)               | L.F. | M    |
| 823  | PIPE R.C. CULVERT END                        | PCS. | PCS. |
| 865  | BARRIER (PRECAST CONCRETE) TEMPORARY         | L.F. | M    |
| 895  | BARRIER (PRECAST CONCRETE)                   | L.F. | M    |
| 926  | BARRIER (PCAST CONC) CONNECTING HARDWARE     | EACH | EACH |
| 1200 | GASKETS, O-RING                              | EACH | EACH |
| 1418 | FOOTING (PRECAST)                            | PCS. | PCS. |
| 1422 | PRECAST SECTION                              | PCS. | PCS. |
| 1425 | DOUBLE WALL SECTION                          | PCS. | PCS. |
| 1430 | MANHOLE - REDUCER (PRECAST)                  | EACH | EACH |
| 1432 | FOUNDATION (PRECAST)                         | EACH | EACH |
| 1434 | CAPS (PRECAST)                               | PCS. | PCS. |
| 1435 | ANCHOR                                       | EACH | EACH |
| 1436 | BOUNDARY MARKERS (PRECAST)                   | EACH | EACH |
| 1440 | CATCH BASIN - SECTIONS PRECAST               | EACH | EACH |
| 1441 | MANHOLE - SECTIONS (PRECAST)                 | EACH | EACH |
| 1444 | CATCH BASIN - RISER (PRECAST)                | EACH | EACH |
| 1448 | HANDHOLE & COVER (PRECAST)                   | EACH | EACH |
| 1458 | CATCH BASIN - SUMP (PRECAST)                 | EACH | EACH |
| 1462 | HANDHOLE (PRECAST)                           | EACH | EACH |
| 1467 | SLAB (PRECAST)                               | EACH | EACH |
| 1468 | LIGHT FOUNDATION (PRECAST)                   | EACH | EACH |
| 1470 | PEDESTAL BASE (PRECAST)                      | EACH | EACH |
| 1481 | MANHOLE - SLAB (PRECAST)                     | EACH | EACH |
| 1491 | MANHOLE - RISER (PRECAST)                    | EACH | EACH |
| 1499 | MANHOLE - BASE (PRECAST)                     | EACH | EACH |
| 1500 | PANELS (PRECAST)                             | EACH | EACH |
| 1505 | TRANSITION (PRECAST)                         | EACH | EACH |
| 1506 | ADAPTOR (PRECAST)                            | EACH | EACH |
| 1511 | CURB (PRECAST)                               | L.F. | M    |
| 1515 | TOP (PRECAST-SPECIAL)                        | EACH | EACH |
| 1522 | MANHOLE - SUMP (PRECAST)                     | EACH | EACH |
| 1600 | CONCRETE PRODUCTS (PRECAST)                  | EACH | EACH |
| 1633 | MANHOLE - TOP (PRECAST)                      | EACH | EACH |
| 1634 | MANHOLE - CONE (PRECAST)                     | EACH | EACH |
| 1649 | CATCH BASIN - TOP & FRAME & GRATE            | EACH | EACH |
| 1699 | WICK DRAIN                                   | L.F. | M    |
| 1700 | PIPE - DRAIN                                 | L.F. | M    |
| 1708 | PIPE - FOR UNDERDRAIN                        | L.F. | M    |
| 1783 | PIPE - CORRUGATED ALUMINUM (COUPLINGS)       | EACH | EACH |
| 1785 | PIPE - CORRUGATED STRUC. PLATE - ACCESSORIES | EACH | EACH |
| 1789 | PIPE - CORRUGATED ALUMINUM                   | L.F. | M    |
| 1807 | CULVERT END ALUM. ALLOY                      | EACH | EACH |
| 1839 | NUTS, BOLTS, WASHERS                         | TEST | TEST |
| 1940 | PIPE - C.C.M. - ACCESSORIES                  | EACH | EACH |
| 1949 | PIPE - C.C.M.                                | L.F. | M    |
| 1950 | PIPE - A.C.C.M. - COUPLING BAND              | EACH | EACH |
| 1975 | PIPE - CORRUGATED STRUC. PLATE               | L.F. | M    |

|      |  |      |      |
|------|--|------|------|
| 1977 | PIPE - A.C.C.M.                              | L.F. | M    |
| 2000 | REF. MAT. 1                                  | MAT. | MAT. |
| 2018 | CULVERT END - COATED METAL                   | EACH | EACH |
| 2057 | PIPE - A.C.C.M. - ACCESSORIES                | EACH | EACH |
| 2110 | PIPE - CAST IRON                             | L.F. | M    |
| 2116 | PIPE - CAST IRON - FITTINGS                  | EACH | EACH |
| 2258 | PIPE - PRECOATED CORR. METAL - ACCESSORIES   | EACH | EACH |
| 2401 | PIPE - CLAY - FITTINGS AND ACCESSORIES       | EACH | EACH |
| 2402 | PIPE - CLAY                                  | L.F. | M    |
| 2449 | PIPE - COPPER                                | L.F. | M    |
| 2450 | PIPE - COPPER - ACCESSORIES                  | EACH | EACH |
| 2501 | PIPE - DUCTILE IRON                          | L.F. | M    |
| 2510 | PIPE - DUCTILE IRON - FITTINGS & ACCESSORIES | EACH | EACH |
| 2520 | WATER MAIN                                   | L.F. | M    |
| 2521 | WATER MAIN & APPURTENANCE                    | L.F. | M    |
| 2522 | WATER MAIN FITTINGS & ACCESSORIES            | TEST | TEST |
| 2600 | PIPE - POLYETHYLENE                          | L.F. | M    |
| 2648 | PIPE - FITTINGS                              | EACH | EACH |
| 2649 | PIPE - POLYVINYL CHLORIDE                    | L.F. | M    |
| 2672 | PIPE - POLYETHYLENE - COUPLINGS              | EACH | EACH |
| 2713 | PIPE - STAINLESS - CLAMP                     | EACH | EACH |
| 2724 | PIPE - STEEL                                 | L.F. | M    |
| 2725 | PIPE - STEEL - FITTINGS & ACCESSORIES        | EACH | EACH |
| 2731 | PIPE - FIBERGLASS - FITTINGS & ACCESSORIES   | EACH | EACH |
| 2738 | RETAINER GLAND                               | EACH | EACH |
| 2739 | CURB STOP & BOX                              | EACH | EACH |
| 2995 | DOWEL SPLICE SYSTEM (EPOXY COATED)           | EACH | EACH |
| 2997 | DOWEL SPLICE SYSTEM                          | EACH | EACH |
| 2998 | DEFORMED STEEL BARS (EPOXY COATED)           | LBS. | KG   |
| 3014 | CYLINDER CONCRETE TEST FROM PROJECT          | CYL. | CYL. |
| 3016 | GROUT  | QRT. | L    |
| 3017 | CEMENT DURACAL                               | BAGS | BAGS |
| 3019 | CONCRETE CORES                               | CORE | CORE |
| 3020 | SET 45                                       | BAGS | BAGS |
| 3021 | CEMENT - MASONRY                             | BAGS | BAGS |
| 3023 | CYLINDER CONCRETE CURING BOX                 | EACH | EACH |
| 3025 | MORTAR PATCH                                 | BAGS | BAGS |
| 3026 | POLYMER MORTAR TOPPING                       | S.F. | SQ.M |
| 3029 | SHOTCRETE                                    | GALS | L    |
| 3030 | SHOTCRETE                                    | TEST | TEST |
| 3032 | BEAMS - CONCRETE TEST FROM PROJECT           | BEAM | BEAM |
| 3033 | CORES - CONCRETE TEST FROM PROJECT           | CORE | CORE |
| 3040 | GROUT - NON SHRINK                           | BAGS | BAGS |
| 3041 | GROUT  | LBS. | KG   |
| 3042 | GROUT  | TEST | TEST |
| 3043 | GROUT - EXPANSIVE MIX                        | L.F. | M    |
| 3044 | GYP SUM - FAST SETTING                       | BAGS | BAGS |
| 3047 | CURING MATS - BURLAP                         | S.Y. | SQ.M |
| 3050 | PRESTRESSED CONCRETE MEMBERS                 | L.F. | M    |
| 3052 | CURING COMPOUND - LIQUID MEMBRANE            | C.Y. | CU.M |
| 3053 | CURING SHEET - BURLAP                        | S.Y. | SQ.M |
| 3054 | CURING MATERIAL - POLYETHYLENE               | S.Y. | SQ.M |
| 3056 | GROUT TEST CUBE                              | EACH | EACH |
| 3057 | SAND BLAST MATERIAL                          | LBS  | KG   |
| 3058 | MAG 70                                       | GALS | L    |
| 3060 | CEMENT - PORTLAND TYPE I                     | BAGS | BAGS |

|   |      |      |
|---|------|------|
| 3061 CEMENT - PORTLAND TYPE II                              | BAGS | BAGS |
| 3062 CEMENT - PORTLAND TYPE III                             | BAGS | BAGS |
| 3066 CEMENT - PORTLAND TYPE I/II                            | BAGS | BAGS |
| 3070 CEMENT - MASONRY                                       | BAGS | BAGS |
| 3072 CEMENT - COPOLYMER MORTAR PATCH                        | GALS | L    |
| 3073 CEMENT - PORTLAND                                      | LBS  | KG   |
| 3075 EPOXY BONDING COMPOUND                                 | GALS | L    |
| 3076 EPOXY MORTAR   | S.F. | SQ.M |
| 3078 ADHESIVE   | GALS | L    |
| 3079 EPOXY PROTECTIVE COATING                               | S.F. | SQ.M |
| 3081 CEMENT, PATCHING                                       | BAGS | BAGS |
| 3084 ADMIXTURE  | C.F. | CU.M |
| 3086 ADMIXTURE (AIR ENTRAINING)                             | GALS | L    |
| 3087 ADMIXTURE (RETARDER)                                   | GALS | L    |
| 3088 ADMIXTURE (WATER REDUCING)                             | GALS | L    |
| 3092 JOINT SEALER   | GALS | L    |
| 3093 JOINT SEALER   | LBS. | KG   |
| 3094 JOINT SEALER   | L.F. | M    |
| 3095 JOINT SEALER   | TUBE | TUBE |
| 3099 SWISS HAMMER TEST                                      | TEST | TEST |
| 3100 DEFORMED STEEL (REINFORCING)                           | LBS. | KG   |
| 3103 ANCHORS FOR CURBING                                    | L.F. | M    |
| 3104 ANCHORS - CHEMICAL                                     | EACH | EACH |
| 3105 GROUT - CHEMICAL                                       | QRTS | L    |
| 3106 CEMENT - RAPID HARDENING                               | BAGS | BAGS |
| 3107 CEMENT - RAPID HARDENING                               | LBS. | KG   |
| 3109 SUPPORT FOR REINFORCEMENT                              | L.F. | M    |
| 3112 POST TENSION COMPONENTS                                | EACH | EACH |
| 3114 POST TENSIONING DEVICES                                | L.F. | M    |
| 3116 PRESTRESSING COMPONENTS                                | L.S. | L.S. |
| 3136 COUPLING DEVICE  | EACH | EACH |
| 3138 DOWELS - STEEL   | EACH | EACH |
| 3139 TRANSVERSE TIE STRAND                                  | L.F. | M    |
| 3145 WIRE AND WELDED STEEL WIRE FABRIC                      | S.Y. | SQ.M |
| 3148 PRESTRESSING CABLE (STRAND)                            | REEL | REEL |
| 3152 LONGITUDINAL JOINT SUPPORT                             | EACH | EACH |
| 3155 EXPANSION JOINT FILLER                                 | L.F. | M    |
| 3156 TRANSVERSE CONTRACTION JOINT                           | L.F. | M    |
| 3157 TRANSVERSE EXPANSION JOINT                             | L.F. | M    |
| 3158 PREFORMED EXPANSION JOINT FILLER                       | S.F. | SQ.M |
| 3159 ELASTOMERIC EXPANSION DEVICE                           | L.F. | M    |
| 3162 PREMOLDED EXPANSION FILLER                             | L.F. | M    |
| 3163 EXPANSION JOINT SEALER                                 | TEST | TEST |
| 3164 PREFABRICATED EXPANSION JOINT                          | L.F. | M    |
| 3166 POLYETHYLENE SHEETING                                  | S.Y. | SQ.M |
| 3168 NOISE BARRIER (TIMBER)                                 | PCS. | PCS. |
| 3169 NOISE BARRIER (POLES)                                  | PCS. | PCS. |
| 3170 NOISE BARRIER (WOOD)                                   | S.F. | SQ.M |
| 3171 WIRE CABLE   | L.F. | M    |
| 3188 CATCH BASIN / MANHOLE - PLASTIC STEPS                  | EACH | EACH |
| 3197 CONCRETE BLOCKS - SLOPE PROT., 16x8x4<br>(406x203x102) | EACH | EACH |
| 3199 HOLLOW CONCRETE BLOCKS                                 | EACH | EACH |
| 3200 BRICK (CONCRETE)                                       | EACH | EACH |
| 3201 BRICK (CLAY)   | EACH | EACH |
| 3202 MANHOLE - BLOCKS (CONCRETE)                            | EACH | EACH |

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|------|--|------|------|
| 3203 | CATCH BASIN - BLOCKS (CONCRETE)              | EACH | EACH |
| 3204 | CATCH BASIN - FRAMES                         | EACH | EACH |
| 3205 | CATCH BASIN - GRATES                         | EACH | EACH |
| 3206 | MANHOLE - COVERS                             | EACH | EACH |
| 3207 | MANHOLE - FRAMES                             | EACH | EACH |
| 3209 | MANHOLE - COVERS & FRAMES                    | EACH | EACH |
| 3211 | HANDHOLE COVERS                              | EACH | EACH |
| 3212 | CATCH BASIN - FRAME & GRATE                  | EACH | EACH |
| 3214 | HANDHOLE COVERS & FRAMES                     | EACH | EACH |
| 3215 | CATCH BASIN / MANHOLE - STEPS                | EACH | EACH |
| 3217 | SCUPPERS                                     | EACH | EACH |
| 3219 | MANHOLE - RISER (CAST IRON)                  | EACH | EACH |
| 3223 | SCUPPER COMPONENTS                           | PCS. | PCS. |
| 3228 | MANHOLE - TOP & COVER (CAST IRON)            | EACH | EACH |
| 3229 | DRAINS                                       | EACH | EACH |
| 3230 | CONCRETE PIPE REINFORCEMENT                  | ROLL | ROLL |
| 3236 | GRATES                                       | EACH | EACH |
| 3237 | CATCH BASIN - TRAP HOOD                      | EACH | EACH |
| 3241 | CATCH BASIN FRAMES & GRATES - STEEL FOR      | TONS | MTON |
| 3242 | CATCH BASIN RISER - STEEL FOR                | L.F. | M    |
| 3243 | SCUPPER - GRATES & FRAMES                    | EACH | EACH |
| 3247 | MANHOLE - RINGS (CAST IRON)                  | EACH | EACH |
| 3251 | CATCH BASIN - ADJUSTMENT RING                | EACH | EACH |
| 3252 | MANHOLE - ADJUSTMENT RING                    | EACH | EACH |
| 3253 | CASTINGS (METAL)                             | EACH | EACH |
| 3300 | FENCE - CHAIN LINK - FABRIC                  | L.F. | M    |
| 3307 | FENCE - CHAIN LINK - GATE                    | EACH | EACH |
| 3308 | FENCE - CHAIN LINK - GATE HARDWARE           | PCS. | PCS. |
| 3309 | FENCE - CHAIN LINK                           | L.F. | M    |
| 3310 | FENCE - CHAIN LINK - POST                    | EACH | EACH |
| 3319 | FENCE - BARBED WIRE                          | L.F. | M    |
| 3320 | FENCE - CHAIN LINK - HARDWARE & ACCESSORIES  | PCS. | PCS. |
| 3323 | FENCE - WOOD                                 | L.F. | M    |
| 3325 | FENCE - WIRE                                 | L.F. | M    |
| 3326 | FENCE - WIRE POST & HARDWARE FOR             | PCS. | PCS. |
| 3327 | FENCE - PROTECTIVE                           | L.F. | M    |
| 3329 | FENCE - STONE                                | LF   | M    |
| 3332 | EXPANSION ANCHORS                            | EACH | EACH |
| 3333 | POST   | EACH | EACH |
| 3335 | HOOK BOLTS                                   | EACH | EACH |
| 3336 | FENCE - RAIL                                 | L.F. | M    |
| 3397 | TERMINAL SECTIONS                            | PCS. | PCS. |
| 3398 | RAIL ELEMENT SYSTEMS                         | L.F. | M    |
| 3401 | METAL BEAM RAIL - TYPE R-B                   | L.F. | M    |
| 3402 | METAL BEAM RAIL - TYPE R-I                   | L.F. | M    |
| 3403 | METAL BEAM RAIL - TYPE MD-B                  | L.F. | M    |
| 3404 | METAL BEAM RAIL - TYPE MD -I                 | L.F. | M    |
| 3405 | METAL BEAM RAIL ANCHORAGE                    | EACH | EACH |
| 3406 | METAL BEAM RAIL                              | L.F. | M    |
| 3407 | METAL BEAM RAIL ELEMENT                      | L.F. | M    |
| 3408 | RUB RAIL ELEMENT                             | L.F. | M    |
| 3409 | POSTS FOR METAL BRIDGE RAIL                  | EACH | EACH |
| 3410 | METAL BEAM RAIL - HARDWARE & ACCESSORIES FOR | PCS. | PCS. |
| 3411 | METAL BEAM RAIL - POST FOR                   | EACH | EACH |
| 3413 | BOX BEAM RAILING                             | L.F. | M    |
| 3414 | METAL HAND RAIL                              | L.F. | M    |

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| 3419 | TWO AND/OR THREE CABLE GUIDE RAILING     | L.F. | M    |
| 3420 | TWO-CABLE GUIDE RAILING COMPONENTS       | EACH | EACH |
| 3421 | CABLE GUIDE RAILING ANCHORAGE            | EACH | EACH |
| 3422 | SWEDGE BOLT                              | EACH | EACH |
| 3423 | GUIDE CABLE FITTINGS                     | EACH | EACH |
| 3424 | CABLE ANCHORAGE COMPONENTS               | EACH | EACH |
| 3425 | THREE-CABLE GUIDE RAILING COMPONENTS     | EACH | EACH |
| 3429 | METAL BRIDGE RAIL                        | L.F. | M    |
| 3430 | METAL BRIDGE RAILING COMPONENTS          | EACH | EACH |
| 3431 | STEEL POST FOR CABLE GUIDE RAILING       | EACH | EACH |
| 3432 | ELASTOMERIC COMPRESSION JOINT SEAL       | L.F. | M    |
| 3433 | LUBRICANT ADHESIVE                       | L.F. | M    |
| 3434 | BRIDGE RAIL PROTECTIVE FENCE             | L.F. | M    |
| 3435 | PRESET ANCHORAGE                         | EACH | EACH |
| 3437 | PAD FOR METAL BRIDGE RAIL                | L.F. | M    |
| 3439 | GUIDE CABLE                              | L.F. | M    |
| 3441 | BARRICADES                               | EACH | EACH |
| 3442 | WOOD PLANKS                              | EACH | EACH |
| 3443 | WOOD POSTS                               | EACH | EACH |
| 3444 | CLOSED CELL ELASTOMER                    | C.I. | CUDM |
| 3449 | TIMBER GUIDE RAIL                        | LF   | M    |
| 3450 | TIMBER GUIDE RAIL-ANCHORAGES             | EACH | EACH |
| 3451 | TIMBER GUIDE RAIL-HARDWARE & ACCESSORIES | EACH | EACH |
| 3496 | PLASTIC SHEETING- REINFORCED             | EACH | EACH |
| 3497 | BOLTS FOR BLADES                         | EACH | EACH |
| 3498 | TARPS - CANVAS                           | EACH | EACH |
| 3500 | GROUT - ANCHOR BOLT                      | QRT. | L    |
| 3504 | ANCHOR BOLTS                             | EACH | EACH |
| 3505 | ELASTOMERIC BEARING PAD                  | C.I. | CUDM |
| 3506 | ADHESIVE FOR BONDING BEARING PADS        | GALS | L    |
| 3507 | CHARPY V - NOTCH TEST                    | TEST | TEST |
| 3508 | BLADES - SNOW PLOW                       | EACH | EACH |
| 3509 | BLADES - GRADER                          | EACH | EACH |
| 3510 | BLADES - PAYLOADER                       | EACH | EACH |
| 3511 | CHAIN                                    | L.F. | M    |
| 3514 | GABIONS                                  | EACH | EACH |
| 3517 | STEEL GRID DECKING                       | S.F. | SQ.M |
| 3518 | TIMBER FACE                              | S.F. | SQ.M |
| 3519 | METAL BIN-TYPE RETAINING WALL            | S.F. | SQ.M |
| 3521 | TRANSVERSE TERMINAL JOINT                | L.F. | M    |
| 3522 | BOLTS                                    | EACH | EACH |
| 3523 | BOLTS & WASHERS                          | EACH | EACH |
| 3524 | BOLTS & NUTS                             | EACH | EACH |
| 3525 | ROPE (MANILA)                            | LBS. | KG   |
| 3526 | ROPE (POLYESTER)                         | L.F. | M    |
| 3529 | WELD EQUIPMENT QUALIFICATION             | TEST | TEST |
| 3530 | ROPE (SISAL)                             | L.F. | M    |
| 3531 | PREFABRICATED BEARING PADS               | EACH | EACH |
| 3532 | STEEL PILE SHELL                         | L.F. | M    |
| 3535 | SHEET STEEL FOR PILES (ASTM-A328)        | L.F. | M    |
| 3537 | STRUCTURAL STEEL                         | CWT. | KG   |
| 3538 | STRUCTURAL TIMBER                        | L.F. | M    |
| 3539 | TIMBER FOR PILES                         | L.F. | M    |
| 3540 | BEARINGS - POT OR SPHERICAL              | EACH | EACH |
| 3541 | WELDING ELECTRODES                       | LBS. | KG   |
| 3542 | STUD SHEAR CONNECTOR                     | EACH | EACH |

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| 3543 | STUDS - WELDING                          | EACH | EACH |
| 3545 | FENDER SYSTEM HARDWARE                   | PCS. | PCS. |
| 3546 | GABIONS                                  | C.Y. | CU.M |
| 3549 | STEEL H-PILES                            | LBS. | KG   |
| 3552 | TEST BARS - CHROMIUM ALLOY STEEL CASTING | BARS | BARS |
| 3553 | TEST BARS - GRAY IRON CASTING            | BARS | BARS |
| 3557 | PILE                                     | L.F. | M    |
| 3558 | PILE SPLICE PLATES                       | EACH | EACH |
| 3559 | STEEL PILE POINT                         | EACH | EACH |
| 3561 | FIBERGLASS JACKET                        | L.F. | M    |
| 3563 | STRUCTURAL STEEL PLATES                  | L.S. | L.S. |
| 3564 | STRUCTURAL STEEL SUPPORTS                | EACH | EACH |
| 3565 | STRUCTURAL STEEL ITEMS                   | EACH | EACH |
| 3566 | STEEL PLATES                             | EACH | EACH |
| 3569 | STRUCTURAL STEEL - LOW ALLOY             | CWT. | KG   |
| 3570 | STRUCTURAL STEEL                         | L.F. | M    |
| 3571 | STRUCTURAL STEEL                         | L.S. | L.S. |
| 3576 | STRUCTURAL STEEL BRACKET                 | EACH | EACH |
| 3578 | PILE SPLICE - PREFORMED                  | EACH | EACH |
| 3580 | WELD TEST SAMPLE                         | EACH | EACH |
| 3595 | TEMPORARY ILLUMINATION                   | EACH | EACH |
| 3598 | LUMINAIRE WITH BALLAST & LAMP            | EACH | EACH |
| 3599 | LUMINAIRE & BALLAST                      | EACH | EACH |
| 3600 | FIRE ALARM SYSTEM                        | EACH | EACH |
| 3601 | GROUND ROD SLEEVES                       | EACH | EACH |
| 3603 | WARNING LIGHT                            | DAYS | DAYS |
| 3607 | GENERATOR                                | EACH | EACH |
| 3609 | METER SOCKET                             | EACH | EACH |
| 3610 | CONDUIT (FIBERGLASS)                     | L.F. | M    |
| 3612 | CABLE DUCT                               | L.F. | M    |
| 3616 | ELECTRICAL METALLIC TUBING               | TEST | TEST |
| 3617 | POLE - BASE                              | EACH | EACH |
| 3619 | ANCHOR - LIGHT STANDARD                  | EACH | EACH |
| 3620 | TRANSFORMER                              | EACH | EACH |
| 3625 | POLE - ANCHOR                            | EACH | EACH |
| 3627 | CONTACTOR                                | EACH | EACH |
| 3629 | POLES - TRANSMISSION & SUPPORT           | EACH | EACH |
| 3631 | POLE - SPAN COMBINATION                  | EACH | EACH |
| 3635 | WIRE - #16                               | L.F. | M    |
| 3636 | ELECTRICAL HARDWARE - MISC.              | L.S. | L.S. |
| 3639 | FLASHER CABINET                          | EACH | EACH |
| 3640 | DUCT & SEALER                            | L.F. | M    |
| 3643 | COUPLINGS                                | EACH | EACH |
| 3645 | POLE - LIGHT & FIXTURES                  | EACH | EACH |
| 3646 | CONDUIT (FLEXIBLE PLASTIC)               | L.F. | M    |
| 3648 | CONT. INTERFACE COMM. UNIT               | EACH | EACH |
| 3649 | COMPUTER MEMORY                          | EACH | EACH |
| 3651 | AUXILIARY EQUIPMENT CABINET              | EACH | EACH |
| 3653 | TERMINAL BLOCK                           | EACH | EACH |
| 3688 | LIGHT STANDARD & BRACKET                 | EACH | EACH |
| 3689 | BRACKET (GALVANIZED)                     | EACH | EACH |
| 3690 | ANCHOR HARDWARE (MISCELLANEOUS)          | EACH | EACH |
| 3691 | NUTS AND/OR WASHERS                      | EACH | EACH |
| 3693 | CONDUIT                                  | EACH | EACH |
| 3696 | CABLE - AERIAL                           | L.F. | M    |
| 3697 | BRACKET - (ILLUMINATION) FOR WOOD POLE   | EACH | EACH |

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|------|--------------------------------|------|------|
| 3698 | WOOD POLE FOR ILLUMINATION     | EACH | EACH |
| 3700 | SODIUM LUMINAIRE               | EACH | EACH |
| 3701 | ELECTRICAL SWITCH              | EACH | EACH |
| 3703 | FUSE HOLDER & FUSE             | EACH | EACH |
| 3704 | LIGHT STANDARD                 | EACH | EACH |
| 3705 | TAPE                           | L.F. | M    |
| 3707 | BOLTS - HIGH STRENGTH          | EACH | EACH |
| 3709 | GROUND WIRE                    | L.F. | M    |
| 3710 | GROUND ROD & CLAMP             | EACH | EACH |
| 3711 | GROUND ROD                     | EACH | EACH |
| 3713 | LUMINAIRE - UNDER BRIDGE       | EACH | EACH |
| 3714 | LUMINAIRE - SIGN               | EACH | EACH |
| 3715 | BALLAST - MERCURY VAPOR LAMP   | EACH | EACH |
| 3723 | CONDUIT - RIGID METAL          | L.F. | M    |
| 3724 | JUNCTION BOX (CAST IRON)       | EACH | EACH |
| 3725 | SINGLE CONDUCTOR IN CONDUIT    | L.F. | M    |
| 3727 | PHOTOELECTRIC CONTROL          | EACH | EACH |
| 3728 | SERVICE ENTRANCE AND CABINET   | EACH | EACH |
| 3729 | LIGHTS - NAVIGATION            | EACH | EACH |
| 3730 | SINGLE CONDUCTOR               | L.F. | M    |
| 3733 | ADAPTER BASE ASSEMBLY          | EACH | EACH |
| 3734 | METAL CONDUIT AND FITTINGS     | L.F. | M    |
| 3735 | SIGNS - INTERNALLY ILLUMINATED | EACH | EACH |
| 3738 | SERVICE CABINET                | EACH | EACH |
| 3739 | FUSES                          | EACH | EACH |
| 3742 | BEACONS                        | EACH | EACH |
| 3743 | CONDUIT & APPURTENANCES        | L.F. | M    |
| 3745 | AMPLIFIER                      | EACH | EACH |
| 3748 | SIGNAL ACCESSORIES             | EACH | EACH |
| 3749 | JUNCTION BOX COVER             | EACH | EACH |
| 3752 | ELBOW                          | EACH | EACH |
| 3753 | BUSHINGS                       | EACH | EACH |
| 3754 | CLAMP                          | EACH | EACH |
| 3756 | STRAPS                         | EACH | EACH |
| 3758 | CIRCUIT BREAKERS               | EACH | EACH |
| 3759 | ELECTRICAL FITTINGS            | EACH | EACH |
| 3760 | FLASHER E/M                    | EACH | EACH |
| 3762 | CABINET AND CONTROLLER         | EACH | EACH |
| 3763 | CAPS                           | EACH | EACH |
| 3764 | SIGN (VARIABLE MESSAGE)        | EACH | EACH |
| 3765 | PEDESTRIAN PUSH BUTTON & SIGN  | EACH | EACH |
| 3766 | TRAFFIC SIGNAL EQUIPMENT       | EACH | EACH |
| 3774 | SERVICE CABINET & COMPONENTS   | EACH | EACH |
| 3775 | SERVICE COMPONENTS             | TEST | TEST |
| 3777 | SERVICE ELECTRICAL             | EACH | EACH |
| 3778 | LIGHTING FIXTURES              | EACH | EACH |
| 3779 | GROUNDING CONNECTORS           | EACH | EACH |
| 3782 | COORDINATING UNIT              | EACH | EACH |
| 3783 | LOOP SAW CUT MATERIAL          | L.F. | M    |
| 3786 | ARROW SIGNAL                   | EACH | EACH |
| 3787 | FLASHING SIGNAL                | EACH | EACH |
| 3790 | TRAFFIC SIGNAL ITEMS           | TEST | TEST |
| 3791 | TIMER                          | EACH | EACH |
| 3792 | LANE CONTROL SYSTEM            | L.S. | L.S. |
| 3793 | OPTICAL DETECTOR               | EACH | EACH |
| 3794 | VEHICLE EMITTER                | EACH | EACH |

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|------|--|------|------|
| 3795 | PHASE SELECTOR                           | EACH | EACH |
| 3797 | DETECTORS                                | L.S. | L.S. |
| 3798 | TEMPORARY SIGNALIZATION                  | L.S. | L.S. |
| 3799 | BRACKET                                  | EACH | EACH |
| 3800 | TRAFFIC SIGNAL FOUNDATION                | EACH | EACH |
| 3801 | PEDESTAL (ALUMINUM OR STEEL)             | EACH | EACH |
| 3802 | SPAN POLE (STEEL)                        | EACH | EACH |
| 3803 | FLASHING ARROW                           | DAYS | DAYS |
| 3804 | SPAN POLE (WOOD)                         | EACH | EACH |
| 3805 | WOOD POLE ANCHOR                         | EACH | EACH |
| 3806 | MAST ARM ASSEMBLY                        | EACH | EACH |
| 3807 | TRAFFIC SIGNALS                          | EACH | EACH |
| 3808 | PEDESTRIAN SIGNALS                       | EACH | EACH |
| 3809 | PEDESTRIAN PUSH BUTTONS                  | EACH | EACH |
| 3810 | CONTROLLER                               | EACH | EACH |
| 3812 | LOOP VEHICLE DETECTOR                    | EACH | EACH |
| 3813 | LOOP VEHICLE DETECTOR AND SAWCUT         | EACH | EACH |
| 3814 | LOOP DETECTOR (WIRE)                     | L.F. | M    |
| 3815 | LOOP DETECTOR (PLASTIC COMPOUND)         | GALS | L    |
| 3817 | VEHICLE DETECTOR (MAGNETIC)              | EACH | EACH |
| 3844 | CONTROL CABLE                            | L.F. | M    |
| 3847 | MESSENGER                                | L.F. | M    |
| 3848 | SPAN WIRE                                | L.F. | M    |
| 3849 | CONDUIT POLYVINYL CHLORIDE               | L.F. | M    |
| 3854 | SPAN WIRE ASSEMBLY                       | EACH | EACH |
| 3855 | ELECTRICAL WIRE                          | L.F. | M    |
| 3856 | WIRE AND DUCT                            | L.F. | M    |
| 3861 | TRAFFIC CONTROL CABINET                  | EACH | EACH |
| 3862 | POLE SHAFT                               | EACH | EACH |
| 3864 | TRAFFIC SIGNAL LAMP                      | EACH | EACH |
| 3865 | VEHICLE DETECTOR AND AMPLIFIER           | EACH | EACH |
| 3869 | TEST EQUIPMENT                           | L.S. | L.S. |
| 3874 | CABLE CLAMP                              | EACH | EACH |
| 3875 | CABLE CLOSURES                           | EACH | EACH |
| 3878 | CONDUIT (METAL) LIQUID TIGHT             | L.F. | M    |
| 3880 | POLE ARM                                 | EACH | EACH |
| 3881 | MESSENGER CABLE AND HARDWARE             | L.F. | M    |
| 3882 | GUY WIRE                                 | L.F. | M    |
| 3883 | GUY WIRE SHIELD                          | EACH | EACH |
| 3893 | SIGN SUPPORT (TUBULAR)                   | EACH | EACH |
| 3895 | POST - SIGN                              | L.F. | M    |
| 3898 | SUPPORT BRACKET                          | EACH | EACH |
| 3899 | SIGN SUPPORT (CANTILEVER)                | EACH | EACH |
| 3900 | SIGN SUPPORT (STRUCTURAL STEEL)          | CWT. | KG   |
| 3927 | TRAFFIC DRUM                             | DAYS | DAYS |
| 3928 | SIGN SUPPORT (OVERHEAD)                  | EACH | EACH |
| 3929 | SIGN SUPPORT (STRUCTURE MOUNTED)         | EACH | EACH |
| 3932 | DELINEATOR POSTS                         | EACH | EACH |
| 3933 | DELINEATOR                               | EACH | EACH |
| 3934 | REFLECTIVE SHEETING                      | S.F. | SQ.M |
| 3936 | SIGN PANELS (EXTRUDED ALUMINUM)          | S.F. | SQ.M |
| 3937 | PANEL BOLT AND POST CLIP ASSEMBLIES      | EACH | EACH |
| 3938 | SIGN FACE SHEET ALUMINUM                 | S.F. | SQ.M |
| 3939 | SIGNS                                    | EACH | EACH |
| 3940 | SIGN SUPPORT (SIDE MOUNTED)              | EACH | EACH |
| 3942 | SIGN SUPPORT (FOUNDATION FOR SIDE MOUNT) | EACH | EACH |

|      |   |      |      |
|------|---|------|------|
| 3943 | OBJECT MARKER   | EACH | EACH |
| 3944 | SIGNS - (SAFETY) AND ACCESSORIES                            | EACH | EACH |
| 3945 | CONSTRUCTION SIGNING  | S.F. | SQ.M |
| 3946 | SIGN FACE ILLUMINATED                                       | S.F. | SQ.M |
| 3948 | TRAFFIC CONES   | EACH | EACH |
| 3949 | DELINEATOR AND POST   | EACH | EACH |
| 3950 | SIGN BLANKS (ALUMINUM)                                      | EACH | EACH |
| 3952 | SIGN POST   | EACH | EACH |
| 3953 | SIGN HARDWARE   | EACH | EACH |
| 3954 | BARRICADE   | L.F. | M    |
| 3956 | TRAFFIC DRUMS   | EACH | EACH |
| 3958 | CONSTRUCTION BARRICADES                                     | S.F. | SQ.M |
| 3960 | SIGN FACE EXTRUDED ALUMINUM                                 | S.F. | SQ.M |
| 3963 | TEMPORARY GLARE SCREEN                                      | EACH | EACH |
| 3964 | DELINEATOR BRACKETS   | EACH | EACH |
| 3965 | INERTIAL BARRIER MODULE                                     | EACH | EACH |
| 3967 | SHEET ALUMINUM  | S.F. | SQ.M |
| 3970 | IMPACT ATTENUATOR   | EACH | EACH |
| 3972 | SIGNS (REFLECTIVE)  | EACH | EACH |
| 3973 | SIGNS AND SUPPORTS  | EACH | EACH |
| 3974 | CONSTRUCTION BARRICADE                                      | EACH | EACH |
| 3978 | SIGNS (RUNWAY)  | EACH | EACH |
| 3984 | CABLE - FIBER OPTICS  | L.F. | M    |
| 3985 | GEOTEXTILE  | S.Y. | SQ.M |
| 4001 | BITUMINOUS CONCRETE - CLASS 001                             | TONS | MTON |
| 4002 | BITUMINOUS CONCRETE - CLASS 002                             | TONS | MTON |
| 4003 | BITUMINOUS CONCRETE - CLASS 003                             | TONS | MTON |
| 4004 | BITUMINOUS CONCRETE - CLASS 004                             | TONS | MTON |
| 4005 | BITUMINOUS CONCRETE - CLASS 005                             | TONS | MTON |
| 4008 | BITUMINOUS CONCRETE - CLASS 008                             | TONS | MTON |
| 4012 | BITUMINOUS CONCRETE - CLASS 012                             | TONS | MTON |
| 4014 | BITUMINOUS CONCRETE - CLASS 014                             | TONS | MTON |
| 4015 | BITUMINOUS CONCRETE SURFACE COURSE - FAA                    | TONS | MTON |
| 4016 | BITUMINOUS CONCRETE BASE COURSE - FAA                       | TONS | MTON |
| 4017 | BITUMINOUS CONCRETE - CLASS 114                             | TONS | MTON |
| 4023 | BITUMINOUS CONCRETE - CLASS 5A WITH<br>POLYPROPYLENE FIBERS | TONS | MTON |
| 4024 | BITUMINOUS CONCRETE - CLASS 5B WITH POLYESTER<br>FIBERS     | TONS | MTON |
| 4025 | DIESEL FUEL   | GALS | L    |
| 4027 | JOINT SEAL ROPE   | L.F. | M    |
| 4028 | BITUMINOUS CONCRETE LEVELING COURSE - FAA                   | TONS | MTON |
| 4046 | ASPHALT CEMENT - PG 52-34                                   | GALS | L    |
| 4047 | ASPHALT CEMENT - PG 58-28                                   | GALS | L    |
| 4048 | ASPHALT CEMENT - PG 58-34                                   | GALS | L    |
| 4049 | ASPHALT CEMENT - PG 70-28                                   | GALS | L    |
| 4050 | ASPHALT CEMENT - PG 64-22                                   | GALS | L    |
| 4051 | ASPHALT CEMENT - PG 64-28                                   | GALS | L    |
| 4052 | 9.5 MM(0.375 IN) LEVEL 1 HMA                                | TONS | MTON |
| 4053 | 9.5 MM(0.375 IN) LEVEL 2 HMA                                | TONS | MTON |
| 4054 | 9.5 MM(0.375 IN) LEVEL 3 HMA                                | TONS | MTON |
| 4055 | 9.5 MM(0.375 IN) LEVEL 4 HMA                                | TONS | MTON |
| 4056 | 12.5 MM(0.5 IN) LEVEL 1 HMA                                 | TONS | MTON |
| 4057 | 12.5 MM(0.5 IN) LEVEL 2 HMA                                 | TONS | MTON |
| 4058 | 12.5 MM(0.5 IN) LEVEL 3 HMA                                 | TONS | MTON |
| 4059 | 12.5 MM(0.5 IN) LEVEL 4 HMA                                 | TONS | MTON |

|      |   |      |      |
|------|---|------|------|
| 4060 | 19.0 MM(0.75 IN) LEVEL 1 HMA              | TONS | MTON |
| 4061 | 19.0 MM(0.75 IN) LEVEL 2 HMA              | TONS | MTON |
| 4062 | 19.0 MM(0.75 IN) LEVEL 3 HMA              | TONS | MTON |
| 4063 | 19.0 MM(0.75 IN) LEVEL 4 HMA              | TONS | MTON |
| 4064 | 25.0 MM(1.0 IN) LEVEL 1 HMA               | TONS | MTON |
| 4065 | 25.0 MM(1.0 IN) LEVEL 2 HMA               | TONS | MTON |
| 4066 | 25.0 MM(1.0 IN) LEVEL 3 HMA               | TONS | MTON |
| 4067 | 25.0 MM(1.0 IN) LEVEL 4 HMA               | TONS | MTON |
| 4068 | 37.5 MM(1.5 IN) LEVEL 1 HMA               | TONS | MTON |
| 4069 | 37.5 MM(1.5 IN) LEVEL 2 HMA               | TONS | MTON |
| 4070 | 37.5 MM(1.5 IN) LEVEL 3 HMA               | TONS | MTON |
| 4071 | 37.5 MM(1.5 IN) LEVEL 4 HMA               | TONS | MTON |
| 4072 | #4 SUPERPAVE LEVEL 1                      | TONS | MTON |
| 4073 | #4 SUPERPAVE LEVEL 2                      | TONS | MTON |
| 4074 | #4 SUPERPAVE LEVEL 3                      | TONS | MTON |
| 4075 | #4 SUPERPAVE LEVEL 4                      | TONS | MTON |
| 4100 | AC - 05                                   | GALS | L    |
| 4101 | AC - 10                                   | GALS | L    |
| 4102 | AC - 20                                   | GALS | L    |
| 4104 | AC - 15                                   | GALS | L    |
| 4109 | MC - 0250                                 | GALS | L    |
| 4111 | MC - 3000                                 | GALS | L    |
| 4128 | RS - 1                                    | GALS | L    |
| 4133 | SS - 1                                    | GALS | L    |
| 4139 | CATIONIC EMULSION (CRS-2)                 | GALS | L    |
| 4142 | CATIONIC EMULSION (CMS-2)                 | GALS | L    |
| 4146 | CATIONIC EMULSION (CSS-1)                 | GALS | L    |
| 4168 | GASKET                                    | TEST | TEST |
| 4171 | COAL TAR PITCH EMULSION                   | GALS | L    |
| 4173 | ASPHALT FLASHING CEMENT                   | GALS | L    |
| 4174 | COATING MATERIAL FOR CORR. STRUCT. PLATES | GALS | L    |
| 4176 | SEALER FOR BITUMINOUS PAVEMENT            | GALS | L    |
| 4177 | CONCRETE JOINT SEALERS                    | LBS. | KG   |
| 4178 | PIPE JOINT COMPOUND                       | GALS | L    |
| 4181 | ASPHALT-SATURATED ROOFING FELT            | S.Y. | SQ.M |
| 4182 | JOINT SEAL EMULSION                       | GALS | L    |
| 4198 | PRIMER AND MASTIC                         | S.Y. | SQ.M |
| 4199 | MEMBRANE WATERPROOFING                    | S.Y. | SQ.M |
| 4201 | MEMBRANE WATERPROOFING SYSTEM             | S.Y. | SQ.M |
| 4202 | WOVEN COTTON FABRIC                       | S.Y. | SQ.M |
| 4203 | WOVEN GLASS FABRIC                        | S.Y. | SQ.M |
| 4204 | WATERPROOFING ASPHALT                     | GALS | L    |
| 4206 | WATERPROOFING (PRIMER)                    | GALS | L    |
| 4207 | DAMPPROOFING (PRIMER)                     | GALS | L    |
| 4208 | DAMPPROOFING (SEALER)                     | GALS | L    |
| 4210 | ELASTOMER EXPANSION JOINT BINDER          | LBS. | KG   |
| 4697 | SAND ( MASONRY ) - GRADING A              | C.Y. | CU.M |
| 4698 | SAND (FOR SNOW AND ICE CONTROL)           | TEST | TEST |
| 4699 | SAND (FOR SNOW AND ICE CONTROL)           | C.Y. | CU.M |
| 4700 | SAND (FOR CONCRETE MIX)                   | C.Y. | CU.M |
| 4703 | SAND (FILLER)                             | C.Y. | CU.M |
| 4704 | SAND ( MASONRY ) - GRADING B              | C.Y. | CU.M |
| 4705 | SAND (OTTAWA)                             | C.Y. | CU.M |
| 4706 | SAND (SILICA)                             | C.Y. | CU.M |
| 4707 | SAND (U-DRAIN)                            | C.Y. | CU.M |
| 4709 | SAND (FOR TRENCHING AND BACKFILLING)      | C.Y. | CU.M |

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| 4712 SAND (FILTER)                              | C.Y. | CU.M |
| 4715 SAND (CONCRETE)                            | TONS | MTON |
| 4749 AGGREGATE (LIGHTWEIGHT)                    | C.Y. | CU.M |
| 4754 TRAFFIC BOUND BROKEN STONE SURFACE         | TONS | MTON |
| 4755 SUBGRADE                                   | C.Y. | CU.M |
| 4757 STONE (FOR TREE ROOT PROTECTION)           | C.Y. | CU.M |
| 4759 STONE (BROKEN) - No. 8                     | TONS | MTON |
| 4760 STONE (BROKEN) - No. 67                    | TONS | MTON |
| 4761 STONE (BROKEN) - No. 6                     | TONS | MTON |
| 4763 STONE (BROKEN) - No. 4                     | TONS | MTON |
| 4764 STONE (BROKEN) - No. 3                     | TONS | MTON |
| 4765 STONE (FOR DRY RUBBLE MASONRY)             | C.Y. | CU.M |
| 4766 IMPERVIOUS FILL                            | C.Y. | CU.M |
| 4767 STONE (BAGGED)                             | TEST | TEST |
| 4768 BURLAP BAGS                                | EACH | EACH |
| 4769 STONE (BAGGED)                             | C.Y. | CU.M |
| 4770 STONE ( FOR SLOPE PROTECTION )             | C.Y. | CU.M |
| 4771 STONE (MASONRY)                            | TONS | MTON |
| 4772 STONE (U-DRAIN)                            | TONS | MTON |
| 4773 RIPRAP                                     | C.Y. | CU.M |
| 4776 BALED HAY                                  | L.F. | M    |
| 4782 RIPRAP                                     | TONS | MTON |
| 4791 PROCESSED AGGREGATE SUBBASE                | C.Y. | CU.M |
| 4793 FILL (LIGHTWEIGHT)                         | C.Y. | CU.M |
| 4800 COARSE AGGREGATE FOR CONCRETE MIX          | C.Y. | CU.M |
| 4801 GRAVEL (SCREENED)                          | TONS | MTON |
| 4808 GRAVEL (CRUSHED) - No. 8                   | TONS | MTON |
| 4809 GRAVEL (CRUSHED) - No. 67                  | TONS | MTON |
| 4810 GRAVEL (CRUSHED) - No. 6                   | TONS | MTON |
| 4812 GRAVEL (CRUSHED) - No. 4                   | TONS | MTON |
| 4813 GRAVEL (CRUSHED) - No. 3                   | TONS | MTON |
| 4816 SAND FOR TRENCHING & BACKFILLING           | TEST | TEST |
| 4817 STONE DUST                                 | TONS | MTON |
| 4819 GRAVEL ( BANK RUN )                        | C.Y. | CU.M |
| 4820 GRAVEL FILL                                | C.Y. | CU.M |
| 4822 TRAFFIC BOUND GRAVEL SURFACE               | C.Y. | CU.M |
| 4823 ROLLED GRAVEL BASE                         | C.Y. | CU.M |
| 4825 COMPACTED GRAVEL FILL                      | C.Y. | CU.M |
| 4826 GRANULAR FILL                              | C.Y. | CU.M |
| 4827 GRAVEL BASE                                | C.Y. | CU.M |
| 4865 GRAVEL BASE                                | TEST | TEST |
| 4895 PROCESSED - GRADING C                      | TEST | TEST |
| 4896 FILTER MATERIAL                            | TEST | TEST |
| 4897 PROCESSED - GRADING C                      | C.Y. | CU.M |
| 4898 SCREENINGS                                 | TONS | MTON |
| 4900 PROCESSED AGGREGATE SUBBASE                | TEST | TEST |
| 4901 BEDDING MATERIAL                           | C.Y. | CU.M |
| 4902 BORROW                                     | C.Y. | CU.M |
| 4905 FREE DRAINING MATERIAL                     | C.Y. | CU.M |
| 4906 PERVIOUS STRUCTURE BACKFILL                | C.Y. | CU.M |
| 4907 PROCESSED AGGREGATE BASE                   | TONS | MTON |
| 4908 SUBBASE                                    | C.Y. | CU.M |
| 4909 GRANITE STONE CURBING                      | L.F. | M    |
| 4910 GRANITE SLOPE CURBING                      | L.F. | M    |
| 4911 PROCESSED AGGREGATE (MEDIUM AND/OR COARSE) | TONS | MTON |
| 4913 STONE FOR SLOPE PAVING                     | S.Y. | SQ.M |

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|---|------|------|
| 4915 SAND (FOR INERTIAL BARRIERS)                         | LBS  | KG   |
| 4925 GRADING C - PROCESSED (LAB DENSITY TEST)             | C.Y. | CU.M |
| 4926 PROCESSED AGGREGATE BASE (LAB DENSITY TEST)          | TONS | MTON |
| 4927 PROCESSED AGGREGATE SUBBASE (LAB DENSITY TEST)       | C.Y. | CU.M |
| 4928 IMPERVIOUS FILL (LAB DENSITY TEST)                   | C.Y. | CU.M |
| 4950 BORROW (LAB DENSITY TEST)                            | C.Y. | CU.M |
| 4951 CALCIUM CHLORIDE STABILIZING BASE (LAB DENSITY TEST) | TONS | MTON |
| 4952 COMPACTED GRAVEL FILL (LAB DENSITY TEST)             | C.Y. | CU.M |
| 4953 EMBANKMENT (LAB DENSITY TEST)                        | C.Y. | CU.M |
| 4954 PERVIOUS STRUCTURE BACKFILL (LAB DENSITY TEST)       | C.Y. | CU.M |
| 4955 SUBBASE (LAB DENSITY TEST)                           | C.Y. | CU.M |
| 4956 EARTH FILL   | C.Y. | CU.M |
| 4957 BANK RUN GRAVEL (LAB DENSITY TEST)                   | C.Y. | CU.M |
| 4958 FREE DRAINING MATERIAL (LAB DENSITY TEST)            | C.Y. | CU.M |
| 4960 RAILROAD BALLAST                                     | TONS | MTON |
| 4961 STONE (CRUSHED FOR SLOPE PROTECTION)                 | TEST | TEST |
| 4962 GRAVEL FILL  | TEST | TEST |
| 4964 TRAFFIC BOUND GRAVEL SURFACE                         | TEST | TEST |
| 4965 ROLLED GRAVEL BASE                                   | TEST | TEST |
| 4966 ROLLED BANK GRAVEL SURFACE                           | TEST | TEST |
| 4967 COMPACTED GRAVEL FILL                                | TEST | TEST |
| 4968 PERVIOUS STRUCTURE BACKFILL                          | TEST | TEST |
| 4969 SUBBASE  | TEST | TEST |
| 4970 PROCESSED AGGREGATE (MEDIUM OR COARSE)               | TEST | TEST |
| 4971 BANK RUN GRAVEL                                      | TEST | TEST |
| 4972 BEDDING MATERIAL                                     | TEST | TEST |
| 4973 SAND (U-DRAIN)                                       | TEST | TEST |
| 4974 STONE (U-DRAIN)                                      | TEST | TEST |
| 4977 FREE DRAINING MATERIAL                               | TEST | TEST |
| 4978 PROCESSED AGGREGATE BASE                             | TEST | TEST |
| 4979 POROUS BACKFILL                                      | TEST | TEST |
| 4980 POROUS BACKFILL                                      | C.Y. | CU.M |
| 4981 SELECT MATERIAL                                      | C.Y. | CU.M |
| 4982 REINFORCED EARTH BACKFILL                            | C.Y. | CU.M |
| 6505 ROOFING FELT   | S.Y. | SQ.M |
| 6525 PIPE JOINT LUBRICANT                                 | GALS | L    |
| 6533 FILTER FABRIC  | S.Y. | SQ.M |
| 6534 EROSION CONTROL FABRIC                               | S.Y. | SQ.M |
| 6535 FILTER FABRIC  | L.F. | M    |
| 6540 DOOR FRAMES  | EACH | EACH |
| 6541 DOORS  | EACH | EACH |
| 6544 HINGES   | EACH | EACH |
| 6552 LIME - HYDRATED                                      | BAGS | BAGS |
| 6555 LAVATORY ACCESSORIES                                 | EACH | EACH |
| 6558 INSULATION   | S.F. | SQ.M |
| 6563 COAL TAR EPOXY FOR PILING                            | L.F. | M    |
| 6564 COAL TAR EPOXY                                       | GALS | L    |
| 6566 LAWN DRAIN   | EACH | EACH |
| 6567 ASPHALT SHINGLES                                     | S.F. | SQ.M |
| 6569 EXHAUST FANS   | EACH | EACH |
| 6571 CAULK & SEALANT                                      | GALS | L    |
| 6574 ELECTRICAL PANEL                                     | EACH | EACH |
| 6600 TIMBER FOR PILES                                     | L.F. | M    |
| 6604 CABLE CONNECTIONS                                    | L.F. | M    |

|                                       |      |      |
|---------------------------------------|------|------|
| 6613 FLASHING                         | L.F. | M    |
| 6622 ANCHOR STUDS                     | EACH | EACH |
| 6624 SEALANT                          | L.F. | M    |
| 6636 CABINET & PANEL                  | EACH | EACH |
| 6645 WOOD ROOF SHAKES                 | S.F. | SQ.M |
| 6647 PICNIC TABLES                    | EACH | EACH |
| 6659 EXPANSION JOINT SEALER           | L.F. | M    |
| 6660 EXPANSION JOINT SEALER           | S.F. | SQ.M |
| 6663 BRONZE PLATES & LUBRICANT        | EACH | EACH |
| 6667 FIBERGLASS HOPPER                | EACH | EACH |
| 6690 COUPLINGS (BREAKAWAY SUPPORT)    | EACH | EACH |
| 6698 MASON LIME                       | BAGS | BAGS |
| 6704 SIGN SUPPORTS (BREAKAWAY)        | EACH | EACH |
| 6709 SIGNAL BACK PLATES               | EACH | EACH |
| 6710 CLEANOUTS                        | EACH | EACH |
| 6724 DUCT COMPONENTS                  | TEST | TEST |
| 6725 CABINET                          | EACH | EACH |
| 6727 LAMP                             | EACH | EACH |
| 6728 TIME CLOCK                       | EACH | EACH |
| 6741 ACCESS DOORS & PANELS            | EACH | EACH |
| 6747 WOOD SIGN POSTS                  | L.F. | M    |
| 6749 LUMBER FOR FRAMING               | EACH | EACH |
| 6775 ACOUSTICAL TILE                  | S.F. | SQ.M |
| 6779 GROUND BUSHINGS W/LUGS           | EACH | EACH |
| 6784 ELECTRICAL TAPE                  | CASE | CASE |
| 6795 SLIDE GATE                       | EACH | EACH |
| 6800 VINYL BASE                       | L.F. | M    |
| 6801 HANGERS                          | EACH | EACH |
| 6805 WATER COOLERS                    | EACH | EACH |
| 6820 AUTOMATIC TRANSFER SWITCH        | EACH | EACH |
| 6836 LUMBER (SOUTHERN YELLOW PINE)    | L.F. | M    |
| 6841 ELASTOMERIC JOINT SEALER         | S.F. | SQ.M |
| 6843 TIMBER (TREATED)                 | PCS. | PCS. |
| 6846 DAMPPROOFING                     | S.F. | SQ.M |
| 6851 ARCH UNITS                       | EACH | EACH |
| 6855 TIE ROD                          | L.F. | M    |
| 6868 GATE VALVE                       | EACH | EACH |
| 6869 DISCONNECT SWITCH                | EACH | EACH |
| 6879 WATERSTOP                        | L.F. | M    |
| 6885 PUMPING STATION, MISC. MATERIALS | TEST | TEST |
| 6894 LAG SCREWS                       | EACH | EACH |
| 6903 CONNECTORS                       | EACH | EACH |
| 6908 BOX RAILING (POST)               | EACH | EACH |
| 6909 BOX RAILING (HARDWARE)           | EACH | EACH |
| 6920 DRAIN (FLEX. DOWN)               | L.F. | M    |
| 6921 RAIL & ATTACHMENTS               | L.F. | M    |
| 6923 STAY IN PLACE FORMS              | L.F. | M    |
| 6933 GALVANIZING (HOT DIP)            | L.S. | L.S. |
| 6948 METER CHAMBER                    | EACH | EACH |
| 6956 ELECTRICAL EQUIPMENT             | L.S. | L.S. |
| 6958 SERVICE ENTRANCE                 | EACH | EACH |
| 6960 SIGNS                            | S.F. | SQ.M |
| 6963 PLYWOOD                          | S.F. | SQ.M |
| 6972 SEALANT                          | S.F. | SQ.M |
| 6976 PANELS (ALUMINUM)                | S.F. | SQ.M |
| 6985 STAPLES                          | S.Y. | SQ.M |

|   |      |      |
|---|------|------|
| 6990 GALVANIZING                                      | TEST | TEST |
| 6994 CABINET FLASHER                                  | EACH | EACH |
| 6995 STAPLES  | LBS. | KG   |
| 6996 WIRE - #10                                       | L.F. | M    |
| 7000 WASHERS  | EACH | EACH |
| 7008 U-BOLT   | EACH | EACH |
| 7012 CONCRETE PATCH (FAST SET HIGH STRENGTH MATERIAL) | BAGS | BAGS |
| 7013 BUTTERFLY VALVE                                  | EACH | EACH |
| 7015 STRAND VISE                                      | EACH | EACH |
| 7055 POLYETHYLENE FOAM                                | L.F. | M    |
| 7061 CALL BOX   | EACH | EACH |
| 7067 EXPANSION JOINT - BRIDGE                         | L.F. | M    |
| 7070 FLARES   | EACH | EACH |
| 7074 STRIP SEAL                                       | L.F. | M    |
| 7078 STEEL SLEEVE                                     | L.F. | M    |
| 7087 ANCHOR GUY STRAND                                | L.F. | M    |
| 7123 STYROFOAM INSULATION                             | TEST | TEST |
| 7132 ELASTOMER  | C.I. | CUDM |
| 7133 STUDS  | EACH | EACH |
| 7135 DELINEATORS (FLEXIBLE)                           | EACH | EACH |
| 7137 ALUMINUM EXTRUSION                               | L.F. | M    |
| 7140 LUMBER   | B.F. | CU.M |
| 7143 PIPE INSULATION                                  | L.F. | M    |
| 7145 CATENARY (TEMP.) HOLD DOWN SUPPORT               | EACH | EACH |
| 7148 DYWIDAG BAR                                      | L.F. | M    |
| 7150 CICU UNIT  | EACH | EACH |
| 7152 PUMP   | EACH | EACH |
| 7156 VALVES   | EACH | EACH |
| 7160 DOOR HARDWARE                                    | EACH | EACH |
| 7164 FLOODLIGHTS                                      | EACH | EACH |
| 7166 COPPER TUBING                                    | L.F. | M    |
| 7172 WATER MAIN SUPPORT                               | EACH | EACH |
| 7199 TRAFFIC GUIDES                                   | EACH | EACH |
| 7200 ROAD MARKER                                      | EACH | EACH |
| 7201 TRANSFORMER BASE                                 | EACH | EACH |
| 7206 TOILET PARTITIONS AND HARDWARE                   | L.S. | L.S. |
| 7210 HEATERS  | EACH | EACH |
| 7224 PRIMER FOR ADHESIVE                              | QRT. | L    |
| 7230 VALVE BOX  | EACH | EACH |
| 7231 TAPPING SLEEVE                                   | EACH | EACH |
| 7232 NEOPRENE BEARING PADS                            | EACH | EACH |
| 7238 SHEET METAL                                      | L.S. | L.S. |
| 7241 TIES - RAILROAD                                  | EACH | EACH |
| 7244 BONDING COMPOUND                                 | GALS | L    |
| 7251 SUBGRADE MATERIAL (LAB DENSITY TEST)             | C.Y. | CU.M |
| 7252 AGGREGATE BASE (CRUSHED) - SOURCE                | TEST | TEST |
| 7253 AGGREGATE BASE (CRUSHED)                         | C.Y. | CU.M |
| 7254 AGGREGATE BASE (CRUSHED) - LAB DENSITY TEST      | C.Y. | CU.M |
| 7259 SAND (FOR INERTIAL BARRIER)                      | C.Y. | CU.M |
| 7260 CORPORATION STOPS                                | EACH | EACH |
| 7265 CURB STOPS                                       | EACH | EACH |
| 7269 PIPE - DRAIN                                     | L.F. | M    |
| 7272 STEEL BARRIER SUPPORTS                           | TONS | MTON |
| 7279 BRASS MARKER DISC                                | EACH | EACH |
| 7284 BLOCK WALL REINFORCEMENT                         | L.F. | M    |

|      |                             |      |      |
|------|-----------------------------|------|------|
| 7285 | TIMBER LAGGING              | S.F. | SQ.M |
| 7291 | WOOD BACKING RAIL           | L.F. | M    |
| 7294 | HANDRAIL                    | EACH | EACH |
| 7297 | DOOR - OVERHEAD             | EACH | EACH |
| 7298 | DOOR & FRAME                | EACH | EACH |
| 7309 | TUBING & PIPE (COPPER)      | L.F. | M    |
| 7313 | PIPE SLEEVE                 | L.F. | M    |
| 7317 | STEEL ROD                   | EACH | EACH |
| 7318 | FANS                        | EACH | EACH |
| 7319 | INSULATION MATERIALS        | L.S. | L.S. |
| 7323 | HOLLOW METAL DOORS & FRAMES | EACH | EACH |
| 7325 | FLUSH VALVE                 | EACH | EACH |
| 7336 | SIGN MODIFICATION           | EACH | EACH |
| 7342 | HOT WATER HEATER            | EACH | EACH |
| 7355 | TUBING - PLASTIC            | EACH | EACH |
| 7357 | LUMBER - TREATED            | L.S. | L.S. |
| 7366 | HYDRANT                     | EACH | EACH |
| 7369 | PILE POINT REINFORCEMENT    | EACH | EACH |
| 7370 | POST (FOR PROTECTIVE FENCE) | L.F. | M    |
| 7371 | BOILER                      | EACH | EACH |
| 7392 | BOLT - STAINLESS STEEL      | EACH | EACH |
| 7393 | CONCRETE BONDING COMPOUND   | TEST | TEST |
| 7401 | HYDRANT ASSEMBLY            | EACH | EACH |
| 7412 | METERED SERVICE             | L.S. | L.S. |
| 7420 | PLATES - TIE                | EACH | EACH |
| 7422 | BOLTS - LAG                 | EACH | EACH |
| 7432 | TERRA-TACK                  | GALS | L    |
| 7434 | JOINT FILLER (POLYETHYLENE) | L.F. | M    |
| 7435 | EXPANSION JOINT STRIP       | L.F. | M    |
| 7437 | BENCH AND PEDESTAL          | L.S. | L.S. |
| 7440 | STRIP - NEOPRENE            | L.F. | M    |
| 7447 | SEALANT - POURABLE          | GALS | L    |
| 7450 | POLES - (WOOD)              | L.F. | M    |
| 7459 | GLARE SCREEN (TEMPORARY)    | EACH | EACH |
| 7460 | SWEEPS & FITTINGS           | EACH | EACH |
| 7461 | RAIL                        | L.F. | M    |
| 7462 | RAIL ANCHORS                | EACH | EACH |
| 7466 | SHEET PILE (TEMPORARY)      | L.F. | M    |
| 7470 | WEATHERHEAD                 | EACH | EACH |
| 7481 | SEALS                       | EACH | EACH |
| 7483 | STAIRS                      | EACH | EACH |
| 7485 | EROSION CONTROL LINING      | S.Y. | SQ.M |
| 7507 | ELASTOMERIC SEAL & ADHESIVE | L.F. | M    |
| 7523 | REDUCER & FITTINGS          | EACH | EACH |
| 7530 | BOX BEAM END ASSEMBLY       | EACH | EACH |
| 7536 | BASE ASSEMBLY               | EACH | EACH |
| 7558 | MANHOLE ACCESS.             | PCS. | PCS. |
| 7560 | ROD - THREADED              | EACH | EACH |
| 7572 | LIGHT - EDGE                | EACH | EACH |
| 7577 | MOTOR ASSEMBLY              | EACH | EACH |
| 7581 | THREADED INSERTS            | EACH | EACH |
| 7598 | STEEL BRACKET               | L.S. | L.S. |
| 7600 | PROBES & CHARGES            | TEST | TEST |
| 7610 | INSULATORS                  | EACH | EACH |
| 7611 | HARDWARE                    | EACH | EACH |
| 7627 | REINFORCED EARTH WALL       | PCS. | PCS. |

|  |      |      |
|--|------|------|
| 7640 PLYWOOD                           | L.S. | L.S. |
| 7642 POST SUPPORT                      | L.F. | M    |
| 7645 LUMINAIRE                         | EACH | EACH |
| 7650 BOND BREAKER                      | L.F. | M    |
| 7654 ANCHORAGE ASSEMBLIES              | EACH | EACH |
| 7658 JUTE MESH - HOG RINGS             | EACH | EACH |
| 7673 REINFORCING STRIPS                | L.S. | L.S. |
| 7679 CONCRETE PAVERS                   | S.F. | SQ.M |
| 7684 LIGHT BASE                        | EACH | EACH |
| 7687 COMMUNICATION CABLE HARDWARE      | L.F. | M    |
| 7695 ANCHORS - MASONRY                 | EACH | EACH |
| 7718 MOTOR                             | EACH | EACH |
| 7721 ELECTRICAL BOXES & ASST. HARDWARE | L.S. | L.S. |
| 7729 MANHOLE - RISER RINGS             | EACH | EACH |
| 7730 ASPHALT PLANK                     | S.Y. | SQ.M |
| 7737 ANCHOR ROD W/NUT FOR WOOD POLE    | EACH | EACH |
| 7741 PANELS (MISCELLANEOUS)            | S.F. | SQ.M |
| 7743 ANCHOR - HILTI ADHESIVE           | EACH | EACH |
| 7745 ELASTOMER                         | L.F. | M    |
| 7748 COVERS -PLASTIC                   | EACH | EACH |
| 7762 SHEET PILING                      | L.S. | L.S. |
| 7768 SPLICING KIT                      | EACH | EACH |
| 7778 REGULATOR                         | EACH | EACH |
| 7797 TIE WIRE                          | L.F. | M    |
| 7798 BREAKAWAY SIGN BASE               | EACH | EACH |
| 7799 IMPACT ATTENUATOR PARTS/DEVICES   | EACH | EACH |
| 7800 TEMPORARY BARRIER                 | L.F. | M    |
| 7801 ROOF DECKING                      | L.S. | L.S. |
| 7807 SAW BLADES                        | EACH | EACH |
| 7816 NEOPRENE                          | EACH | EACH |
| 7820 TYPE III BARRICADES               | EACH | EACH |
| 7821 NOISE BARRIER WALL (STRUCTURE)    | L.F. | M    |
| 7822 NOISE BARRIER WALL                | S.F. | SQ.M |
| 7832 SILICONE SEALANT                  | TUBE | TUBE |
| 7848 KELI GROUT                        | L.F. | M    |
| 7850 FIBERGLASS CATCHMENT              | EACH | EACH |
| 7852 ROOF & FLOOR DECKING              | L.S. | L.S. |
| 7856 ANCHOR PLATE                      | EACH | EACH |
| 7858 MESH (GALVANIZED)                 | S.F. | SQ.M |
| 7865 FILTER CLOTH                      | S.F. | SQ.M |
| 7887 NAILS                             | LBS. | KG   |
| 7888 CONCRETE - LATEX MODIFIED         | GALS | L    |
| 7907 SCREW FASTENERS                   | L.S. | L.S. |
| 7935 CATHODIC PROTECTION SYSTEM        | L.S. | L.S. |
| 7936 GLARE SCREEN                      | L.F. | M    |
| 7938 STEEL FOR WELD PLATE              | SET  | SET  |
| 7947 POLYETHYLENE SALT COVER           | EACH | EACH |
| 7959 LEAD WOOL                         | C.Y. | CU.M |
| 7961 LUBRICANT                         | EACH | EACH |
| 7966 HARDWARE - DELINEATOR             | EACH | EACH |
| 7967 STEEL BAND                        | L.F. | M    |
| 7968 LUMBER - PRESSURE TREATED         | L.F. | M    |
| 7983 ANCHOR - BARRIER                  | EACH | EACH |
| 7986 ANCHORS - STEEL FOR SIGN          | TONS | MTON |
| 7991 MOLDED PAD                        | EACH | EACH |
| 7993 PIPE - FIBERGLASS                 | L.F. | M    |

|      |                                    |      |      |
|------|------------------------------------|------|------|
| 7995 | STEEL GRATING                      | S.F. | SQ.M |
| 7998 | STEEL SHELL                        | TONS | MTON |
| 7999 | WIRE MESH                          | S.F. | SQ.M |
| 8002 | STAINLESS STEEL                    | EACH | EACH |
| 8004 | PIN                                | EACH | EACH |
| 8009 | WIRE - LOOP VEHICLE DETECTOR       | L.F. | M    |
| 8010 | EXPANSION JOINT - ASPHALTIC PLUG   | L.F. | M    |
| 8017 | ROD - FOAM                         | L.F. | M    |
| 8022 | BOLT (HIGH STRENGTH), NUT & WASHER | EACH | EACH |
| 8023 | ROD - THREADED                     | L.F. | M    |
| 8025 | TUBE - (POROUS) POLYVINYL CHLORIDE | EACH | EACH |
| 8026 | CONCRETE MIX TRUCK INSPECTION      | EACH | EACH |
| 8027 | CONCRETE MIX PLANT INSPECTION      | EACH | EACH |
| 8028 | CONCRETE - (PLASTIC) YIELD TEST    | TEST | TEST |
| 8029 | CONCRETE - ZIM MIXER INSPECTION    | EACH | EACH |
| 8031 | TO BE DETERMINED                   | None | None |
| 8032 | SAND ( WASHED )                    | C.Y. | CU.M |
| 8033 | SAND ( NATURAL )                   | C.Y. | CU.M |
| 8034 | STONE ( BROKEN/CRUSHED )           | C.Y. | CU.M |
| 8035 | GRAVEL ( CRUSHED )                 | C.Y. | CU.M |
| 8036 | RECLAIMED MISC. AGGREGATE          | C.Y. | CU.M |
| 8037 | RECLAIMED WASTE                    | C.Y. | CU.M |
| 8038 | SUBGRADE                           | SQYD | SQ.M |
| 8039 | EMBANKMENT MATERIAL                | C.Y. | CU.M |
| 8040 | CONCRETE - READY MIXED             | CY   | CU.M |
| 8041 | NUCLEAR DENSITY - ASSURANCE TEST   | TEST | TEST |
| 8042 | PULL BOX - PRECAST CONCRETE        | EACH | EACH |
| 8045 | PIPE - LINER                       | LF   | M    |
| 8043 | TRAFFIC CONTROL EQUIPMENT          | EACH | EACH |
| 8044 | RETAINING WALL - PRECAST           | L.S. | L.S. |
| 8046 | CAMERA VIDEO DETECTION SYSTEM      | EACH | EACH |
| 8047 | CAMERA CABLE                       | LF   | M    |
| 8048 | CONTROLLED LOW STRENGTH MATERIAL   | C.Y. | CU.M |
| 8049 | VALVE CHAMBER ACCESS DOOR          | EACH | EACH |
| 8050 | MONUMENT                           | EACH | EACH |
| 8051 | LAWN SPRINKLER SYSTEM              | L.S. | L.S. |

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CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING AND HIGHWAY OPERATIONS  
DIVISION OF MATERIALS TESTING

CRITERIA FOR ACCEPTANCE OF PORTLAND CEMENT BY CERTIFICATION

Before a mill can be granted permission to ship cement on the basis of certification, an authorized representative of the applying mill shall agree to and comply with the conditions listed herein:

A. QUALIFICATION

1. The mill shall demonstrate to the satisfaction of the Director of Research and Materials that the production of cement is regulated by an effective program of quality control. The mill shall submit a detailed account of the control methods employed, including such information as sampling and testing frequency, control strips, etc., and agree to provide to the Director of Research and Materials, on request, records of data accumulated by these methods.
2. The control laboratory of the mill shall be inspected regularly by the Cement and Concrete Reference Laboratory. Copies of the two (2) latest inspection reports shall be submitted for review to the Director of Research and Materials. Copies of the reports of subsequent inspections shall also be submitted.
3. The mill shall certify the quality of the cement supplied as conforming to the requirements of the applicable specifications, and shall provide, as required, certified test reports documenting this conformance.
4. The mill shall participate in a cooperative testing program with the Connecticut Department of Transportation, Division of Materials Testing, to determine the uniformity and precision of testing techniques, when so requested.

B. OPERATIONAL PROCEDURE

1. Three (3) certified copies of the test reports for all cement being supplied under the program shall be furnished by the mill to the Director of Research and Materials, 280 West Street, Rocky Hill, Connecticut 06067.
2. Each shipment shall be accompanied by a certified document stating that the cement being shipped complies with all the requirements of the applicable specifications. The Certificate shall include the following information:

- a. Producer's Name
- b. Mill Location
- c. Cement Carrier Number
- d. Date Loaded
- e. Weight of Material Contained in Carrier
- f. Silo, Bin or Lot Number of Cement, Terminals
- g. Consignee
- h. Destination
- i. Cement Type

Further, a seal to be supplied by the mill shall be affixed to each carrier, and the seal identification shall be listed on the accompanying Certificate. Certificates shall also be signed by an authorized representative of the mill. A duplicate copy of each certificate shall be forwarded to the Director of Research and Materials at the address noted above.

3. Random samples of the cement supplied shall be selected and tested by the Connecticut Department of Transportation, Division of Materials Testing. Results of tests on these samples shall be compared with the certified test values provided by the mill. If the test results, as determined by the Division of Materials Testing, fail to agree consistently with the certified test values, the mill shall be required to engage in a cooperative test program with the Division of Materials Testing to determine the reason for the variance.

Frequency of sampling will be on a quarterly basis with additional sampling in the months of May, June, and September.

4. Results from bulk cement testing will also apply to bagged material from the same source.

Failure of the mill to supply cement which consistently meets the requirements of the pertinent specifications, or failure to comply with the requirements of the operational procedure, may be considered grounds for the rescinding the approval of the mill to provide cement on the basis of certification.

The procedure outlined above is intended to establish general guidelines for the operation of this program under which cement will be accepted on the basis of producer certification. However, the Connecticut Department of Transportation reserves the right to modify or to alter any of the above requirements if, in the judgment of the Director of Research and Materials, the best interest of the Department is served thereby.

## Appendix F – Connecticut Reference File (CRF) Specifications

The following CRF's are active.

| File # | Title/Description                                    |
|--------|--|
| 25     | Black Enamel Paint                                   |
| 104    | Burnt Orange Enamel Paint For Trucks                 |
| 126    | Grade Number Two (D2) Diesel Fuel Oil                |
| 139    | Sodium Chloride (Rock salt)                          |
| 161    | Non-reflective Plastic Sheeting                      |
| 163    | Processed Aggregate                                  |
| 179    | Sand for Airports                                    |
| 180    | Reflective Sheeting Type I                           |
| 182    | Cover Sand For Snow and Ice Control                  |
| 191    | Grits  |
| 194    | Premixed Sodium Chloride (Salt) And Calcium Chloride |
| 199    | Epoxy Resin Pavement Markings, Symbols and Legends   |

### BLACK ENAMEL PAINT

#### REFERENCE FILE NO. 25—G

Issued March 10, 1953

Revised November 2, 1981

GENERAL — This material shall be shipped in regulation 1—gallon metal pails. Each container shall be marked with the following: name and type of paint, net weight, batch number, date of manufacture and State of Connecticut reference file and purchase order numbers, together with name and address of the manufacturer. When so requested, samples and analyses of all pigments, oils, resins, thinners and driers used for the enamel furnished shall be supplied by the manufacturer within ten days after request is made therefore.

A certified test report containing the physical and chemical properties of the material shall be submitted with each batch shipment.

The enamel shall consist of pigments and composition ground in the required vehicle by a suitable grinding machine to the required fineness. All pigments, oils, resins, thinners and driers used shall be of the best quality, free from adulterants of any kind and shall comply with the specific requirements given below. The enamel shall not contain any lead or lead by products.

The material desired under this specification is an extremely durable, highest quality black enamel for use on highway signs, and shall be resistant to air, sun and water.

COLOR — The color shall be jet black, conforming to Federal Standard No. 595, Color No. 17038.

ENAMEL COMPOSITION

|  | MIN. | MAX. |
|--|------|------|
| Carbon Black, %  | 3    | 4    |
| Total solids, % by weight                                  | 42   | -    |
| Coarse particles retained on #325 screen based on paint, % | -    | 0.5  |
| Weight per gallon, lb.                                     | 7.5  | --   |
| Viscosity, Krebs units at 77°F.                            | 67   | 77   |
| Fitness of grind (North Standard)                          | 7    | --   |

PIGMENT COMPOSITION — The pigment shall be carbon black only.

VEHICLE - The vehicle shall consist of a phthalic alkyd resin conforming to the requirements of Federal Specification TT—R-266, Type 3, of latest issue, with the following exceptions: Viscosity - Z maximum; Compatibility — delete raw linseed oil and mineral spirits dilution tests. The necessary quantities of suitable aliphatic, aromatic or terpene thinners and driers shall be added to yield a product conforming to all the requirements of this specification.

SPECULAR GLOSS - The enamel shall be flowed on a tin panel and allowed to dry for 24 hours before measuring. The specular gloss at 60° angle of incident, ASTM designation D523 of latest issue, shall be not less than 85.

SETTING AND DRYING TIME — This enamel shall air dry dust free within 2 hours, dry hard within 8 hours and reach full hardness within 48 hours.

DRY OPACITY — This enamel shall have a contrast ratio of at least 0.99 when spread at the rate of 630 sq. ft. per gallon (0.0025—inch wet film thickness).

WATER RESISTANCE — A film of enamel 0.002 inch thick shall be allowed to air dry for 96 hours, and then immersed in distilled water for 16 hours. It shall show no blistering or wrinkling immediately upon removal and no more than slight dulling or whitening after 2 hours recovery. After 24 hours, the gloss of the immersed portion shall be at least 90 percent of a comparison panel, which was not immersed.

FLEXIBILITY - A film of enamel 0.002 inch thick shall be allowed to dry for 18 hours, then baked for 72 hours at 105± 2°C, allowed to cool for 1/2 hour at 25°C (77°F), then bent over an 1/8—inch mandrel. There shall be no visible cracks when examined in a strong light at a 7—diameter magnification.

SKINNING — The enamel shall not skin within 48 hours in a three—quarter filled, closed container. Small amounts of anti—skinning agents, wetting agents, suspension agents and anti—drier agents may be added at the discretion of the manufacturer.

WORKING PROPERTIES — The enamel shall be well ground and shall show no more settling or caking than may be easily redispersed with a paddle to a homogeneous state. It shall be of good brushing consistency and shall dry to a smooth, glossy, uniform film, free from running, sagging or streaking.

## BURNT ORANGE ENAMEL PAINT FOR TRUCKS (LEAD FREE)

### REFERENCE FILE NO. 104-P

Issued May 17, 1945

Revised January 25, 1999

INTENDED USE – This specification covers a lead-free high-grade, synthetic-type high gloss enamel intended for use on trucks and other metallic motorized mechanical equipment. It is highly weather-resistant and is characterized by excellent color and gloss-retention, good drying, flexibility and freedom from aftertack. This enamel may be applied by brush or spray. It fails by mild chalking rather than by checking or cracking. The application of wax at periodic intervals will retard chalking and improve the appearance of the finish.

GENERAL – This material shall consist of pigments of the required fineness and composition, ground in the specified vehicle by a suitable grinding machine to the required fineness. All pigments, oils, resins, thinners and driers shall comply with the requirements below.

This enamel shall be shipped in regulation one-or five-gallon metal pails, as specified by the Purchasing Department. Each container shall be marked with the following: name and type of paint, net weight, batch number, date of manufacture and State of Connecticut Reference File and Purchase Order Numbers, together with the name and address of the manufacturer. When so requested, samples and, analyses of all pigments, oils, resins, thinners, and driers used shall be supplied by the manufacture within ten (10) days after request is made.

COLOR – Standard color chips may be viewed at the Connecticut Department of Transportation, Research and Materials Testing Laboratory, 280 West Street, Rocky Hill, Connecticut 06067. The color shall essentially match that of color Omaha Orange, DuPont #082.

VEHICLE - The vehicle for this air-drying enamel shall consist of a phthalic alkyd resin.

Necessary quantities of suitable aliphatic, aromatic or terpene thinners and driers, or mixture thereof, shall be added to yield a product conforming to all the requirements of this specification. Small amounts of antiskinning agents, wetting agents, suspension agents and antidrier absorption agents may be added at the discretion of the manufacturer.

| QUANTITATIVE REQUIREMENTS  | Min. | Max. |
|--|------|------|
| Pigment, % by weight   | 16   |      |
| Vehicle, % by weight   | --   | 84   |
| Volatile matter in vehicle, % by weight                                      | --   | 55   |
| Coarse particles and skins retained on<br>#325 sieve, % by weight of pigment | --   | 0.5  |
| Viscosity, Krebs units at 77°F.  | 75   | 85   |
| Specular gloss (without correction for<br>diffuse reflectance)               | 85   |      |
| Fineness of grind (North Standard)   | 6    |      |
| Dry opacity (540 sq. ft. per gallon)   | 0.52 |      |
| Weight per gallon, lbs.  | 8.0  |      |
| Drying time: Dust-free setting time, hours                                   | --   | 1    |
| Dry hard, hours  | --   | 8    |
| Full hardness, hours   | --   | 48   |

BRUSHING PROPERTIES – As received, this enamel shall be ready-mixed for use. It shall be of good brushing consistency in the packaged condition. When tested as described below, laps shall be picked up without pulling under the brush; and the enamel shall dry to a smooth, glossy, uniform film, free from running, sagging or streaking.

Brush the evenly mixed enamel on a thoroughly cleaned, rust-free, smooth, cold-rolled steel or aluminum panel (2 ft. square) with a 2-1/2 inch paint brush, applying the enamel uniformly at an approximately spreading rate of 500 square feet per gallon. Place the panel in a nearly vertical position, allow to air dry for 24 hours and examine for defects described above.

DRYING TIME – A wet film, 0.0015-inch thick, shall set to a dust-free condition within one hour, dry hard and tack-free within 8-hours and reach full hardness within 48 hours.

FILM FOR FLEXIBILITY, WATER-RESISTANCE AND GASOLINE-RESISTANCE – Tin panels, measuring 4 by 6 inches and weighing 19 to 25 grams per square centimeter, will be used for this test. They will be thoroughly cleaned with a suitable solvent and lightly buffed with steel wool immediately before using. Apply the film with a 0.002-inch (approximately 0.004-inch gap clearance). Bird Film Applicator or any other doctor blade which produces a film of the same thickness as that produced by the Bird blade.

FLEXIBILITY – Films prepared as above shall be allowed to air dry in a horizontal position for 18 hours, then baked for 168 hours at  $105 \pm 2^{\circ}\text{C}$  ( $221 \pm 4^{\circ}\text{F}$ ). After baking, condition the panel for one-half hour at  $23 \pm 1^{\circ}\text{C}$  ( $73.4 \pm 2^{\circ}\text{F}$ ) and relative humidity 50% - 4%. Bend over a 1/8 inch mandrel. Examine the coating for cracks over the area of the bend in a strong light at a 7-diameter magnification. The film of the enamel shall show no cracking.

APPEARANCE OF FILM AFTER BAKING – After drying and baking the panel for flexibility, the enamel film shall retain at least 75 percent of the original secular gloss value.

ADHESION – In testing for adhesion, use the flat portion of the panel from the flexibility test. Cut a narrow ribbon of the film from the panel by use of the sharp knife blade held at about 30 degrees from the panel. The film should cut loose in the form of a ribbon without flaking or cracking.

COLOR WATER RESISTANCE – After drying for 96 hours, place one of the test panels in a beaker containing approximately 2-1/2 inches of distilled water at room temperature ( $21$  to  $32^{\circ}\text{C}$ ), and allow to remain for 16 hours. Remove and allow to dry. The film shall show no blistering or wrinkling immediately upon removal from the water. There shall be no more than a slight dulling or whitening when examined 2 hours after removal of the panels and after 24 hours of air drying, the gloss of the immersed portion shall be at least 90 percent of the gloss of a comparison panel which was not immersed. The immersed and comparison panel shall be indistinguishable with regard to film hardness after the 24 hours of air drying.

GASOLINE RESISTANCE – After drying for 96 hours, place one of the panels in a beaker containing approximately 2-1/2 inches of gasoline conforming to Federal Specification VVG-1690, cover with a watch glass and allow to remain at room temperature ( $21$  to  $32^{\circ}\text{C}$ ), for 16 hours. Remove and allow to dry. The film shall show no blistering or wrinkling immediately upon removal of the panel, and any softening or whitening effect that may remain two hours after removal shall have completely disappeared after air drying for 24 hours. The immersed portion shall retain at least 50 percent of the gloss of a comparison panel which was not immersed.

DRY OPACITY – At a spreading rate of 540 square feet per gallon, this enamel shall have a minimum dry-film contrast ratio of not less than 0.98.

MISCIBILITY WITH MINERAL SPIRITS – Mix thoroughly one part of mineral spirits conforming to Grade I of Federal Specification AA-2904 with eight parts of enamel by slowly adding the mineral

spirits to the enamel with constant stirring. The enamel shall be completely missible with mineral spirits. After standing 24 hours there shall be no curdling or precipitation of the vehicle. Any settling of the pigment shall be disregarded.

SKINNING – The enamel shall not skin within 48 hours in a three-quarters filled, closed container.

RESIN – Resin and resin derivatives shall be absent.

RECOATING – Recoating after 24 hours air drying shall produce no film irregularity.

ODOR – The odor of the wet enamel and of the dry film shall not be obnoxious.

TOXICITY – The enamel shall contain no benzol or chlorinated solvents.

PARTIALLY FILLED CONTAINER – After standing 30 days at a temperature between 21 and 32°C, a three-quarters filled, closed 8-ounce glass jar of the enamel shall show no livering, curdling, hard settlement or caking. Any skin formed shall be continuously and easily removed, and the enamel shall mix readily to a smooth, homogeneous state.

FULL CONTAINER - Upon being opened after six months of storage under warehouse storage conditions, a full, closed container shall show no livering or curding of the enamel and no more settling than can be redispersed with a paddle to a homogeneous state. There shall be no hard settlement or caking and no skinning. The viscosity shall not have increased more than an equivalent of 10 K.U. during the storage period. The enamel shall have retained its drying properties and shall dry to a full gloss finish, free from grit and seediness.

APPLICABLE FEDERAL SPECIFICATIONS AND STANDARDS –

|           |   |
|-----------|---|
| A-A2504   | Thinners; Paint, Volatile Mineral Spirits   |
| VV-3-1690 | Gasoline, Automotive  |
| 141       | Paint, Varnish, Lacquer and Related Materials;<br>Methods of Inspection, Sampling and Testing |

## GRADE NUMBER TWO (D2) DIESEL FUEL OIL

REFERENCE FILE NO. 126-H

Issued November 15, 1950

Revised April 14, 1998

Scope: This specification covers the requirements for grade number two (D2) Diesel Fuel oil.

General Requirements: The Grade Number Two (D2) Diesel Fuel Oil Specified herein shall be hydrocarbon oil, free from acid, grit, salt water and fibrous or other foreign matter, and shall conform to the requirements of ASTM D 975 ammended as follows:

|   |                           |
|---|---------------------------|
| API GRAVITY, AT 15.6 °C                         | MINIMUM : 34 MAXIMUM : 36 |
| CETANE INDEX (Minimum)                          | 46                        |
| CLOUD POINT                                     | AS REQUIRED               |
| POUR POINT                                      | AS REQUIRED               |
| FLASH POINT                                     | LEGAL LIMIT               |
| KINEMATIC VISCOSITY mm <sup>2</sup> /S at 40 °C | 1.9 to 4.1                |
| WATER AND SEDIMENT (Maximum %)                  | 0.10                      |
| ASH (Maximum %)                                 | 0.02                      |
| TOTAL SULFUR (Maximum %)                        | 0.05                      |
| CONRADSON CARBON                                |                           |
| IN 10% RESIDUUM (Max %)                         | 0.02                      |
| OXIDATION STABILITY                             | MINIMAL                   |
| DISTILLATION °C                                 |                           |
| INITIAL BOILING POINT (Min.)                    | 160 °C                    |
| 50% Distilled (Max.)                            | 266 °C                    |
| 90% DISTILLED (Max.)                            | 310 °C                    |
| END POINT                                       | 343 °C                    |
| COPPER STRIP CORROSION                          | #3                        |
| BIOLOGICAL                                      | NEGATIVE                  |

This specification represents the average for a 12-month period and should vary only according to the specific local demands for blending to achieve the REQUIRED POUR POINT AND CLOUD POINT LEVELS.

The specifications of the BLENDING PRODUCT must conform to the BASE FUEL to ensure normal combustion and flame propogation.

## SODIUM CHLORIDE (ROCK SALT)

REFERENCE FILE NO. 139R

Issued July 7, 1955

Revised June 1, 2002

Scope: This specification prescribes the composition, storage, inspection, acceptance and delivery of road salt obtained from (natural deposits/artificially produced) which is to be used for snow & ice control on highways and bridges.

**Requirements:** All road salt shall conform to AASHTO M 143 (ASTM D—632) Type 1, with the exceptions and additions stated herein. When material is not in conformance as stated herein, and the state formally agrees to accept such material, payment reduction shall apply and will be the sum of the individual reductions based on the bid price.

**Inspection & Testing:** At the vendor’s location the stockpile shall be covered as required and the road salt shall be tested by Division of Materials Testing. The Bureau of Finance and Administration shall accept the material prior to any shipment to the State. Road salt from different origins (natural deposits/artificially produced) shall be stockpiled separately. If at any time, the purity of road salt is less than 95 percent sodium chloride, the vendor shall maintain this material in a physically separated stockpile. Once the stockpile has been accepted, material shall not be added to the stockpile without prior notification to and additional testing by the State. Failure to properly control these stockpiles may result in revocation of the award.

**Material acceptance:**

**PURITY:** The road salt requirements for material acceptance shall be as stated in AASHTO M—143 (ASTM D—632) Type 1, except sections 9.1.2 and 11.2 will not apply. It is intended that only products meeting the specified sodium chloride content (95.0 percent or greater) will be accepted; however, at the sole discretion of the Department of Transportation, road salt having a purity of less than 95.0 percent sodium chloride content may be accepted with an adjustment in payment in accordance with Table 1.

TABLE 1: Adjustment in Payment for Purity of Sodium Chloride

| Percent of Sodium Chloride | Percent Payment of Unit Bid Price |
|----------------------------|-----------------------------------|
| 95.0% to 100%              | 100                               |
| 93.0% to 94.9%             | 95                                |
| 91.0% to 92.9%             | 90                                |
| 90.9% & below              | 73                                |

**Grading:** The gradation requirements for material acceptance shall be as stated below. Failure to conform to these requirements may result in rejection of the stockpile. If non-conforming material is accepted, a reduction in payment of 2 percent per screen shall be assessed for deviations in the gradation.

| Sieve Size       | Percent Passing by Weight |
|------------------|---------------------------|
| 12.5 mm (1/2in.) | 100                       |
| 9.5 mm (3/8in.)  | 95 to 100                 |
| 4.75 mm (No.4)   | 20 to 90                  |
| 2.36 mm (No.8)   | 10 to 60                  |
| 600 µm (No.30)   | 0 to 15                   |

**Moisture:** Full payment will apply to the road salt when its moisture content does not exceed two (2.0) percent. Road salt with a moisture content greater than (2.0) percent may be accepted at the discretion of the Department, with an adjustment in weight for moisture content over 2.0 percent.

**Anticaking Agent:** Road salt furnished under this contract shall be free flowing and granular. All bulk road salt shall be treated with an approved conditioner, such as sodium ferrocyanide, to prevent caking while in storage. This treatment shall be prior to shipping product from the origin (natural deposits/artificially produced). This conditioner shall be visible and introduced uniformly throughout the road salt at a maximum rate of 50 parts per million or 0.0050 percent.

## **NON-REFLECTIVE PLASTIC SHEETING**

### **REFERENCE FILE NO. 161-D**

**Issued October 19, 1962**

**Revised June 10, 1983**

Description: The material shall consist of a flexible, pigmented plastic film, completely pre-coated with a solvent or heat-activated tack-free adhesive. The adhesive shall be protected by a paper liner, which shall be removable without soaking in water or other solvents.

#### Property Requirements:

A. Thickness: The thickness of the plastic film with adhesive shall be a minimum of 0.003 inches and a maximum of 0.0045 inches.

B. Film: The unapplied and/or applied film shall be readily processed with, and ensure adequate adhesion of, process inks recommended by the manufacturer.

1. Flexibility: The material shall be sufficiently flexible to permit application over and conform to moderately contoured surfaces.

2. Gloss: The film shall have an initial 60-degree gloss value of 35 (minimum), when tested in accordance with ASTM Method D 523, measuring at least three portions of the film to obtain uniformity.

C. Adhesive: The pre-coated adhesive shall form a durable bond to smooth, clean, corrosion- and weather-resistant surfaces, shall be of uniform thickness, non-corrosive to applied surfaces and shall have no staining effect on the film.

Adhesion: The material, applied according to Paragraph I "Preparation of Test Panels" shall have sufficient bond to prevent removal from the panel in one piece without the aid of a physical tool.

D. Exterior Exposure: The material shall withstand three years' vertical, south-facing exterior exposure in Texas, showing no appreciable discoloration, cracking, crazing, blistering, delamination or loss of adhesion. A slight amount of caulking is permissible.

E. Dimensional Stability: The material shall show no more than 1/64" shrinkage in any direction from edge of the panel when prepared in accordance with Paragraph I after being subjected to a temperature of 150° F for 48 hours.

F. Heat Resistance: The material applied according to Paragraph I, shall be heat-resistant enough to retain adhesion after one week at 150° F.

G. Solvent and Chemical Resistance: The material, when prepared in accordance with Paragraph I, shall withstand immersion in the following liquids at 70°-90° F, showing no appreciable

decrease in adhesion, color or general appearance.

**Liquids**

|  |   | Time,<br>Hours |
|--|---|----------------|
| Reference Fuel (MIL-F-8799A) (15 parts xylol – 85 parts mineral spirits by weight) | 1 |                |
| Distilled Water  |   | 24             |
| SAE #20 Motor Oil  |   | 24             |

H. Opacity: when applied, the material shall be sufficiently opaque to hide a contrasting black printed legend and white surface.

I. Preparation of Test Panels: Test panel shall be prepared using a 6 ½" x 6 ½" piece of the plastic film, applied to a clean 6" x 6" aluminum panel, pre-masked or as recommended by the manufacturer, trimmed evenly at the edge of the panel, and aged for 48 hours at 70-90°F.

J. Shelf Life Storage: The material shall withstand one year's shelf life when stored in a clean area free from exposure to excessive heat, moisture, and direct sunlight.

K. General Characteristics and Packaging: The plastic film shall be furnished in rolls, cut sheets or characters as may be specified. The film, as supplied, shall be free from ragged edges, streaks, blisters, foreign matter, or other surface imperfections which would make it unsuitable for the intended usage, and shall be readily cut with scissors, knife, blade, shears, or other production tools. Complete and detailed instructions for mounting the plastic film shall be supplied with each package of material.

Rolls, sheets or letters shall be individually packaged in suitable containers and in such a manner that no damage or defacement may occur to the plastic film during transport to destination.

Quality Assurance: The vendor shall furnish a Certified Test Report conforming to the requirements stated herein below for all materials supplied under this specification.

1. A Certified Test Report is a document containing a list of the dimensional, chemical, and physical results obtained by an approved testing organization from an actual test of the material involved. It shall also certify that the materials meet the requirements of the specifications and shall include the following information:

- a. Description of material
- b. Connecticut Department of Transportation purchase order number.
- c. Date of manufacture.
- d. Date of testing.
- e. Name of organization to which the material is consigned.
- f. Quantity of material represented.
- g. Means of identifying consignment such as label, marking, lot number, etc.
- h. Date and method of shipment.
- i. Name of organization performing the tests.

EACH SHIPMENT SHALL BE ACCOMPANIED BY A CERTIFIED TEST REPORT. THIS REPORT SHALL STATE THAT MATERIAL FURNISHED WILL CONFORM TO THE SPECIFICATIONS IN EVERY DETAIL. The Certified Test Report shall be signed by an authorized and responsible agent for the organization supplying the material. The certificate MUST be notarized.

## PROCESSED AGGREGATE

### REFERENCE FILE NO. 163-J

Issued: March 4, 1963

Revised: June 26, 2001

Description: The materials shall conform to the following requirements:

Gradation: Coarse and fine aggregates shall be combined and mixed by approved methods so that the resulting material shall conform to one of the following gradation requirements as specified:

| PERCENT PASSING BY WEIGHT |        |        |
|---------------------------|--------|--------|
| Square Mesh Sieves (in.)  | Medium | Coarse |
| 2 1/2                     | -      | 100    |
| 2                         | -      | 95-100 |
| 1 1/2                     | 100    | -      |
| 1                         | 90-100 | -      |
| 3/4                       | 75-100 | 50-75  |
| 1/4                       | 30-60  | 25-45  |
| #40                       | 5-25   | 5-20   |
| #100                      | 3-12   | 2-12   |

**Coarse Aggregate:** Coarse aggregate shall be either gravel or broken stone, at the option of the ConnDOT; however, only one type of coarse aggregate shall be used for one order. When tested by means of the Los Angeles Machine using AASHTO Method T 96, the coarse aggregate shall have a loss of not more than 50 percent.

- (a) If gravel is used for the coarse aggregate, it shall consist of sound tough, durable particles of crushed or uncrushed gravel or a mixture thereof, free from soft, thin, elongated or laminated pieces, lumps of clay, loam, and vegetable or other deleterious substance.
- (b) If broken stone is used for the coarse aggregate, it shall consist of sound, tough, durable fragments of rock of uniform quality throughout. It shall be free from soft, disintegrated pieces, mud, dirt, organic or other injurious material.
- (c) **Soundness for Gravel, Broken Stone:** When tested by magnesium sulfate solution for soundness using AASHTO Method T 104, the coarse aggregate shall show a loss of not more than 15 percent at the end of five cycles.

**Fine Aggregate:** The fine aggregate shall be natural sand, stone sand, screenings or any combination thereof. The fine aggregate shall be limited to material 95 percent of which passes No. 4 sieve having a square opening and not more than 8 percent of which passes a No. 200 sieve. The material shall be free from clay, loam and deleterious materials.

**Plasticity:** when natural sand is used, the following requirements shall apply.

- (a) When the fraction of the dry sample passing the No. 100 mesh sieve is 4 percent or less by weight, no plastic limit test will be made.

- (b) When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 4 percent but not greater than 8 percent by weight, that fraction shall not have sufficient plasticity to permit performance of the plastic limit test using AASHTO Method T 90.
- (c) When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 8 percent by weight, the sample shall be washed; and additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that No. 100 mesh sieve shall be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that have passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

Plasticity: When screenings or any combination of screenings and natural sand are used, the following requirement shall apply:

- (a) When the fraction of the dry sample passing the No. 100 mesh sieve is 6 percent or less by weight, no plastic limit test will be made.
- (b) When the fraction of the dry sample passing No. 100 mesh sieve is greater than 6 percent but not greater than 10 percent by weight, that fraction shall not have sufficient plasticity to permit performance of the plastic limit test using AASHTO Method T 90.
- (c) When the fraction of the dry sample passing the No. 100 mesh sieve is greater than 10 percent by weight, the sample shall be washed; and, additional material passing the No. 100 mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 mesh sieve shall be substituted for the No. 40 mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that have passed the No. 100 mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

## SAND FOR AIRPORTS

### REFERENCE FILE NO. 179E

Revised: September 2003

**SCOPE:** This specification applies to friction improving mineral sand to be used for airport movement surfaces.

### **SAND<sup>1</sup>:**

Friction improving materials applied to airport movement surfaces shall consist of washed granular mineral sand particles free of stones, clay, debris, slag, and chloride salts and other corrosive substances. The pH of the water solution containing the material shall be neutral (pH  $\approx$  7).

Material for use at Connecticut airports shall meet the following FAA Federal Aviation Administration) recommended gradation.

### **SAND GRADATION REQUIRED FOR CONNECTICUT AIRPORTS** (USA Standard Sieves – ASTM E11)

| SIEVE DESIGNATION | PERCENT BY WEIGHT PASSING |
|-------------------|---------------------------|
| #8                | 100                       |
| #30               | 20-50                     |
| #80               | 0-2                       |

## COVER SAND FOR SNOW AND ICE CONTROL

### REFERENCE FILE NUMBER 182-G

Issued March 12, 1976

Revised June 15, 2001

**SCOPE:** This specification applies to Sand for snow and ice control.

**DESCRIPTION:** This sand shall consist of clean, hard durable and uncoated particles of quartz or other rock and shall be free from lumps of clay, soft or flaky material, loam or other detrimental material. It shall contain no more than five percent (5%) of material finer than the #200 sieve, using AASHTO Method T 11 and shall conform to the following gradation requirements:

| Square Mesh Sieve      | (inches) | % of Passing By Mass |
|------------------------|----------|----------------------|
|                        | 3/8      | 100                  |
|                        | #4       | 70-100               |
|                        | #50      | 0-40                 |
|                        | #100     | 0-15                 |
| Material<br>Finer than | #200     | 0-5                  |

Washed Sand: If washed sand is supplied, it shall be stockpiled at least twenty-four (24) hours before use.

<sup>1</sup> Federal Aviation Administration, Change 3 to Airport Winter Safety and Operations, Advisory Circular No. 150/5200-30A

In no case shall sand be used that contains frozen lumps or other detrimental material.

## GRITS

### REFERENCE FILE NO. 191-E

Issued January 14, 1980

Revised June 29, 2001

**DESCRIPTION:** Grits shall consist of sound, tough, durable particles of crushed or uncrushed screened stone or gravel, and shall be free from lumps of clay, soil, loam or organic matter. All plus No. 8 material shall not contain more than 15 percent of flat or elongated pieces, the longest dimensions of which exceed three times the maximum thickness.

**MATERIALS REQUIREMENTS:** Grit material shall conform to requirements as follows:

1. **Soundness:** When tested for soundness with a magnesium sulfate solution using AASHTO Method T 104, the plus No. 4 fraction shall show a loss of not more than 10 percent at the end of five cycles.
2. **Loss on Abrasion:** When tested by means of the Los Angeles Machine using AASHTO Method T 96, the plus No. 8 fraction shall show a loss on abrasion of not more than 40 percent.
3. **Grading:** The grit material shall conform to one of the gradations shown below. The grit material shall be specified on the purchase order.

|                     | Grading A       | Grading B       |
|---------------------|-----------------|-----------------|
| Sieve Size (inches) | Percent Passing | Percent Passing |
| 3/8 mm              | 100             | 100             |
| #4                  | 40-90           | 85-100          |
| #8                  | 0-30            | 10-40           |
| #16                 | ---             | 0-10            |
| #50                 | 0-10            | 0-5             |
| #100                | 0-3             | ---             |

## **PREMIXED SODIUM CHLORIDE (Salt) AND CALCIUM CHLORIDE**

### **REFERENCE FILE NUMBER 194-E**

**Issued March 12, 1976**

**Revised June 1, 1998**

#### SCOPE:

This specification covers a premixed blend of sodium chloride (rock salt) and calcium chloride to be used for ice control on highways and bridges.

#### DESCRIPTION:

Sodium Chloride: The sodium chloride shall conform to the requirements of Reference File 139, latest revision.

Calcium Chloride: The calcium chloride shall conform to the requirements of AASHTO M 144, Type I.

#### MIXTURE:

The premix for the CONTNDOT shall be a completely uniform and free-flowing mixture of three parts sodium chloride by weight to one part flake calcium chloride by weight.

#### SAMPLES FOR TEST:

Before a purchase order is issued, vendor(s) awarded the contract must forward, UNBLENDED, a thirty-pound bag of sodium chloride and a ten-pound bag of calcium chloride to be used for test to the Director of Research and Materials, 280 West St., Rocky Hill, CT 06067.

#### GENERAL:

The State reserves the right to inspect or sample material at the place of manufacture or stockpile, or to test materials before accepting delivery.

## **EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS**

### **REFERENCE FILE NO. 199-C**

**Issued: November 1, 1985**

**Revised: October 30, 1995**

DESCRIPTION: This specification covers reflectorized white and yellow two component epoxy resin to be used for pavement marking on both asphaltic and Portland cement concrete pavement surfaces. It is to be used in conjunction with a surface application of glass beads and in accordance with these requirements. Upon curing, it produces an adherent reflectorized stripe of specified thickness and width capable of resisting wear from traffic.

CLASSIFICATION: This specification provides for the classification of epoxy resin pavement marking system by type.

- |         |   |
|---------|---|
| Type I  | A fast—cure material suitable for centerline, skipline and edgeline use under traffic conditions                                  |
| Type II | A slow—cure material suitable for centerline, skipline and edgeline use under minimal traffic conditions; e.g., unopened roadways |

Type III            A medium—cure material suitable for pavement marking message and transverse line work

**MATERIALS -GENERAL REQUIREMENTS:**

Standards - All standards herein are minimum standards.

Identification: Each container must bear a label with the following information thereon: Name and address of manufacturer, shipping point, grade production batch number, date of manufacture, shipping point, grade name and/or identification number, type of material, number of gallons, contract number, use intended, directions for application, and formula. Improperly labeled samples and deliveries will be rejected.

Qualification of Manufacturer: No material will be considered unless the firm submitting the material can meet the following conditions (these qualifications must be provided to approve a subcontractor for this work):

- a:        that it has in operation a factory adequate for and devoted to manufacturer of the pavement marking material that it proposes to furnish;
- b.        that it is capable of predicting batch sizes consistent with the quantities to be delivered;
- c.        that it maintains a laboratory to scientifically control the product bid on to ensure accuracy and quality of formulation; and
- d.        that it has produced pavement marking material over the past two (2) years with a successful application record.

Certification: The manufacturer shall furnish a certified test report by an independent testing laboratory prior to the start of work indicating that the material as specified has been tested in accordance with ASTM or ACI testing procedures noted in this specification. The certified test report shall indicate the results of testing for the following criteria:

Composition, Color, Adhesion Capabilities, Abrasion Resistance, Hardness, Tensile Strength, and Compressive Strength.

Additionally, infrared spectrophotometer plots for both components of the test material shall be included by the independent laboratory in the certified test report.

The manufacturer shall furnish certified test reports for each batch delivered for application at the project site. Certified test reports shall be in accordance with the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Section 1.06.07 of the latest edition,

**MATERIALS - DETAILED REQUIREMENTS:**

Epoxy Resin Material: The material shall be composed of epoxy resins and pigments only. No solvents to be given off to the environment upon application to the pavement surface, nor fillers, will be allowed.

|                     |   |  |
|---------------------|---|--|
| <u>Composition:</u> | WHITE (percent by weight) 20 ± 2 Titanium Dioxide (ASTM D 476 Type III) 80 ± 2 Epoxy Resins | YELLOW (percent by weight) 20 ± 2 Chrome Yellow (ASTM D211 Type III) 75 ± 2 Epoxy Resins |
|---------------------|---|--|

Color: The color of the WHITE material shall be no darker or yellower than color chip 17778 of Federal Standard No. 595a of the latest issue, when the material is placed in a Type EH weatherometer for a period of 500 hours and weathered according to ASTM F 42. The color of

the YELLOW shall be reasonably close to color chip 13538 of the Federal Standard No. 595a of the latest issue.

Adhesion Capabilities: When the adhesion of the material to Portland cement concrete (the concrete shall have a minimum of 300 psi tensile strength) is tested according to American Concrete Institute Committee 503R testing procedure, the failure of the system must take place in the concrete. The concrete shall be 32 °C when the material is applied, after which the material shall be allowed to cure for 72 hours at 23 ± 2 °C.

Abrasion Resistance: When the abrasion resistance of the material is tested according to ASTM C 501 with a CS-17 wheel under a load of 1000 grams for 1000 cycles, the wear index shall be no greater than 82. (The index is the weight in milligrams that is abraded from the sample under the test conditions)

Hardness: The Type D durometer hardness of the material shall be not less than 75 or more than 90 when tested according to ASTM D 2240 after the material has cured for 72 hours at 23 ± 2 °C.

Compressive Strength: The compressive strength of the material, when tested according to ASTM D 695, shall not be less than 12,000 psi after 72 hours cured at 23 ± 2 °C.

Shelf Life: The individual components shall not require mixing prior to use when stored for a period of 12 months.

Glass Beads: The moisture resistant glass beads shall meet the requirements of AASHTO M 246, except that glass spheres shall meet the gradation requirements as follows:

| <u>Grading "A"</u> |                | <u>Grading "B"</u> |                |
|--------------------|----------------|--------------------|----------------|
| <u>Sieve Size</u>  | <u>Percent</u> | <u>Sieve Size</u>  | <u>Percent</u> |
| % Passing #20      | 100            | % Retained #10     | 0              |
| % Passing #30      | 80—95          | % Retained #12     | 0—5            |
| % Passing #50      | 9—42           | % Retained #14     | 5—20           |
| % Passing #80      | 0—10           | % Retained #16     | 40—80          |
|                    |                | % Retained #18     | 10—40          |
|                    |                | % Retained #20     | 0—5            |
|                    |                | % Retained Pan     | 0—2            |

Glass beads conforming to the requirements of Grading "A" shall be applied at a rate of 25 pounds per gallon of epoxy pavement marking material.

If specified, glass beads conforming to the requirements of Grading "B" shall be applied at a rate of 12 pounds per gallon of epoxy pavement marking material, immediately followed by a scanned drop of glass beads conforming to the requirements of Grading "A" applied at a rate of 12 pounds per gallon of epoxy pavement marking material.

Traffic cones or any other acceptable method shall be used to protect the pavement marking until cured.

Time To No—Track: The Type I material shall be in "no—tracking" condition in 60 seconds or less.

The no-tracking condition shall be determined by actual application on the pavement of the pigmented binder at 20 mils wet, covered with glass spheres at a rate of 25 pounds per gallon. The lines for this test shall be applied with the specialized striping equipment operated so as to have the material at the manufacturer's recommended application temperature. This maximum no—tracking time shall not be exceeded when the pavement temperature varies from 50 °F to 120 °F, and under all humidity conditions, provided the pavement is surface dry.

The no-tracking time shall be determined by passing over the line with a passenger car or pickup truck in the simulated passing maneuver. A line showing no visual deposition of the material to the pavement surface when viewed from a distance of 50 feet shall be considered as showing "no— tracking" and conforming to this requirement for time to no-track.

## **Appendix G – Connecticut Test Procedures**

### **Field Inspection of Metal and Aluminum Pipe and Pipe Arches**

The following will be checked:

1. Overall size and length
2. Condition of material, checking for damage due to shipping and handling
3. Condition of coating (if applicable)
4. Measurement of coating thickness (if applicable)
5. Storage of material so that it is not damaged by nearby construction activity or by the weight of material(s) stored above it.
6. Any markings on the material should be documented.

### ***Coarse and fine aggregate used in PC Concrete***

Test shall include:

1. Gradation: AASHTO T 27
2. Soundness: AASHTO T 104 (using a solution of magnesium sulfate)
3. Loss of Abrasion: AASHTO T 96
4. Unit weight of coarse aggregate: AASHTO T 19
5. Flat and elongated pieces – Coarse aggregate of a size retained on 25 mm square opening sieve should be measured to determine the percent of pieces whose longest dimension exceeds five times their maximum thickness.
6. Material finer than 75  $\mu$ m sieve or dust: AASHTO T 11
7. Organic impurities in fine aggregate – AASHTO T 21. If colorimetric test produces a color darker than Gardner Color Standard No. 11, then aggregate shall be tested in accordance with AASHTO T 71.

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## Appendix H – Assurance Test Requirements (DMT)

**IN-HOUSE ASSURANCE TESTING** The assurance testing requirements that follow are in house tests not directly associated with the project. Although required as specified in the minimum schedule, these assurance requirements do not affect the Final Certification process on a project-to-project basis.

1. Assurance Verification of HMA Field Inspectors – for gradation testing and marshal molds fabricated in contractor field laboratories. This is performed as a minimum of one per inspector per month & one per plant per month for plants producing over 4000 tons/month. Program currently maintained by Andrew Bednar.
2. Bulk Cement Certification Program– Random samples are selected and tested to assure compliance with our cement certification program. Program currently maintained by Roberto Rodrigues.
3. Assurance Testing of Sand and Stone Aggregates for PC Concrete – All PC Concrete supplier aggregate stockpiles are randomly sampled every two weeks for compliance on a plant to plant basis, and assurance tests are required every ten tests for verification of satellite laboratories personnel and equipment. Program currently maintained by Charles Gardon.

LISTED BELOW ARE ALL ACCEPTANCE TESTING ITEMS THAT REQUIRE  
MINIMUM ASSURANCE TESTING (with example quantities) \*\* requires updating of testing verification process

## **Hot Mix Asphalt Mixtures – Class 1**

**Testing Needed for:** Gradations run (and molds made) at the plant for acceptance of the material.

**Example Quantity:** 2000 Tons

**Who tests and where?** DMT Field Inspectors at the producers plants

**Frequency Required:** Minimum 3 gradations a day (for 300 tons a day or more/day) or based on plant performance and tonnage. Generally the molds are made with each gradation and are run in the lab as part of the acceptance process.

**Tests Required:** At least 3 tests should be run by the inspector that day. The HMA Section handles test coverage and will post results for the item and material quantities after testing is complete.

**How to find out if testing is completed:** This information is posted on the computer and a status and quantity will be posted for the item. If the total job item quantity is 3000 tons of Class 1, then 3000 tons of material quantity will have to be approved for adequate test coverage.

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Testing Needed for:** Density Testing for material placed in the field (Nuclear)

**Example Quantity:** 2000 Tons

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Minimum of 1 test per day for 2000 tons for thickness over 1-1/2”.

**Tests Required:** At least 1 set of field nuclear density tests for the production day should be performed and forwarded to the DMT.

**How to find out if testing is completed:** If received from the projects, copies of field density testing are filed in the basement project files. Currently, the information must be manually obtained and reviewed for verification of required field density testing. **\*\*Could field density testing be reviewed by HMA personnel and become part of the acceptance process prior to posting results?**

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Notes:** \*\* For computer access to field nuclear density testing HMA Lab Personnel would have to enter these tests into the computer system in a traceable format (query), along with material quantities and a specific material number designated for a field nuclear density test. Another option would be to require project inspection forces to submit field nuclear density tests along with a MAT-100 containing the pertinent information, which HMA Lab Personnel would review, code, and later post status of (information) in the computer.

**Testing Needed for:** Assurance Density Testing for HMA material placed in the field (Nuclear)

**Example Quantity:** 2000 Tons

**Who tests and where?** Lab Field inspectors at the project sites upon notification by the projects.

**Frequency Required:** 1 test per 20,000 tons, or 1 per project per year for projects with 4000 to 20,000 tons per year.

**Tests Required:** No tests are required for the example project, but if was over 4000 tons for the year, project would require 1 nuclear density assurance test

**How to find out if testing is completed:** This information is posted on the computer for Site Manager jobs with a project number and the material number 08041. Info should be available by query report. **\*\*For CMR and Matdaps info must be obtained manually from the project files and reviewed for adequate coverage.**

**Required status:** Information for Site manager jobs.

Completed Y/N \_\_\_\_

**Notes:** \*\*CMR and Matdaps could be entered in the same format as Site Manager making the test information and material quantities available by query as related to project and this material number. Otherwise, as stated in the previous column, info must be manually obtained and reviewed.

## **Borrow and Earth Embankment**

**Testing Needed for:** Lab Density Test (proctor density)

**Example Quantity:** 25,000 cu.yd

**Who tests and where?** District Lab personnel at the District Labs.

**Frequency Required:** Each soil type/ each 50,000 cu.yd.

**Tests Required:** 1 lab density test would be required for this project. If the material type changed there would be additional tests in the system.

**How to find out if testing is completed:** Material and item quantities tested for lab density are posted in the computer system under the specific item for the project. Borrow items start with 207 and Earth Embankment items start with 202.

**Required status:** Information

Completed Y/N \_\_\_\_

**Testing Needed for:** Field Density Test (proctor density)

**Example Quantity:** 25,000 cu.yd

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Each soil type/ each 5,000 cu.yd.

**Tests Required:** At least 5 sets of field nuclear density tests should be run by the project and forwarded to the Lab. If the material type changed additional tests would also be sent in.

**How to find out if testing is completed:** If received from the projects, copies of field density testing are filed in the basement project files. Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status:** Information

Completed Y/N \_\_\_\_

**Testing Needed for:** Field Density Test (Nuclear)

**Example Quantity:** 25,000 cu.yd

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Each soil type/ each 5,000 cu.yd.

**Tests Required:** At least 5 sets of field nuclear density tests should be run by the project and forwarded to the Lab. If the material type changed additional tests would also be sent in.

**How to find out if testing is completed:** If received from the projects, copies of field density testing are filed in the basement project files. Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status:** Information

Completed Y/N \_\_\_\_

**Notes:** \*\* For computer access to field nuclear density testing District Lab personnel or density personnel would have to enter these tests into the computer system in a traceable format (query), along with item and material quantities and a specific material number designated for earth embankment/borrow field density test. Another option would be to require project inspection forces to submit field nuclear density tests along with a MAT-1 containing the pertinent information, which Lab personnel would review, code, and later post status of information in the computer.

**Testing Needed for:** Assurance Density Testing for borrow /earth embankment material placed in the field (Nuclear)

**Example Quantity:** 25,000 cu.yd

**Who tests and where?** Lab Field inspectors at the project sites upon notification by the projects.

**Frequency Required:** Each 50,000 cu.yd.

**Tests Required:** Because it is not specified currently that a minimum of one assurance test is required, the project may not have requested any assurance testing being of a quantity less than 50,000 cu.yd. \*\*Minimum schedule should be revised to require at least one per project.

**How to find out if testing is completed:** \*\*Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status:** Information

Completed Y/N \_\_\_\_

**Notes:** \*\*These tests could be entered in the same format as nuclear density assurance testing for Site Manager, making the test information and material quantities available by query as related to project and specific material number for nuclear density assurance test for borrow/ earth embankment. A new material number would be required for this assurance test because the material number 08041 is not HMA or borrow/earth embankment specific. Otherwise, as stated in the previous column, info must be manually obtained from the basement project files and reviewed.

## **Concrete Pavement/Concrete Structures**

**Testing Needed for:** Concrete, Compressive Strength

**Example Quantity:** 300 cu.yd

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Each 75 cu. Yd., minimum of one set of cylinders each day. (Slump and air content tests are required each 50 cu.yd. minimum of one per day. Test info is generally included on the cylinder card and does not require review for Final Certification. Review of this data is done by the Concrete Section prior to posting the status of the strength specimens, which now represent item and material test quantities )

**Tests Required:** There should be at least four sets of strength specimens submitted for testing, including other applicable test data.

**How to find out if testing is completed:** This information is posted on the computer and a status and quantity will be posted for the specific item. If the total job item quantity is 300 cu.yd. of Concrete, then 300 cu.yd. of material quantity will have to be approved via cylinder breaks for adequate test coverage.

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Testing Needed for:** Assurance Test for Concrete, Compressive Strength Cylinders, (and Slump & Air Content)

**Example Quantity:** 300 cu.yd

**Who tests and where?** Lab Field inspectors at the project sites upon notification by the projects.

**Frequency Required:** 1 per 50 sets of cylinders, minimum of 2 per year per project.

**Tests Required:** Most projects would require at least 2 assurance tests annually according to the previous column, and possibly more as related to structures vs. pavement.

**How to find out if testing is completed:** Assurance tests for concrete specimens (and slump and air content) are posted on the computer with the acceptance testing quantities for the specific item and identifiable via CP sample numbers. These tests can also be identified by query of project numbers and the material number 8028 (District Lab CP).

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Notes:** Concrete specimen test status, including samples designated as CP's, would be posted as either acceptance or rejection, which is not applicable to the assurance test. The District Lab CP Form for the particular assurance test would be entered with a status of **Information**.

## **Processed Aggregate Base**

**Testing Needed for:** Gradation Note: Review of other required testing as related to the specifications are the responsibility of the District Labs and are included in the posting status of the gradation.

**Example Quantity:** 15,000 tons

**Who tests and where?** District Lab personnel at the District Labs.

**Frequency Required:** Each new source and each 5,000 tons..

**Tests Required:** There should be at least three tests submitted by the projects and tested by the District Labs.

**How to find out if testing is completed:** This information is posted on the computer and a status and quantity will be posted for the specific item.

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Testing Needed for:** Gradation Assurance Test

**Example Quantity:** Each 30,000 tons, minimum of one per project.

**Who tests and where?** District Lab personnel witness sampling at the project sites upon notification by the projects, then tests are performed at the District Labs

**Frequency Required:** There should be at least one assurance test for gradation.

**Tests Required:** There should be at least three tests submitted by the projects and tested by the District Labs.

**How to find out if testing is completed:** Assurance tests for gradation are posted on the computer with the acceptance testing quantities for the specific item and identifiable via CP sample numbers. The split half of the sample, which is an in house test, can also identify project related assurance testing by query because tests are entered into the computer system with project and sample numbers via In house Code 8.

**Required status: Information.**

Completed Y/N \_\_\_\_

**Notes:** Gradation status, including samples designated as CP's, would be posted as either acceptance or rejection, which is not applicable to the assurance test. The District Lab split sample for the particular assurance test would be entered with a status of **Information.**

**Testing Needed for:** Lab Density Test (proctor density)

**Example Quantity:** 15,000 tons.

**Who tests and where?** Each new source and each 20,000 tons.

**Frequency Required:** 1 lab density test would be required for this project. If the material type/source changed there would also be additional tests in the system.

**Tests Required:** 1 lab density test would be required for this project. If the material type/source changed there would also be additional tests in the system.

**How to find out if testing is completed:** Material and item quantities tested for lab density are posted in the computer system under the item for the project, and are identifiable also by the status of Information posted for the item.

**Required status: Information.**

Completed Y/N \_\_\_\_

**Testing Needed for:** Field Density Test (Nuclear)

**Example Quantity:** 15,000 tons.

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Each soil type / each 3,000 tons

**Tests Required:** At least 5 sets of field nuclear density tests should be run by the project and forwarded to the Lab. If the material type changed additional tests would also be sent in.

**How to find out if testing is completed:** If received from the projects, copies of field density testing are filed in the basement project files. Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status: Information.**

Completed Y/N \_\_\_\_

**Notes:** \*\* For computer access to field nuclear density testing District Lab personnel or density personnel would have to enter these tests into the computer system in a traceable format (query), along with item and material quantities and a specific material number designated for processed aggregate base field density test. Another option would be to require project inspection forces to submit field nuclear density tests along with a MAT-1 containing the pertinent information, which Lab personnel would review, code, and later post status of information in the computer.

**Testing Needed for:** Assurance Density Testing for Processed Aggregate Base material placed in the field (Nuclear)

**Example Quantity:** 15,000 tons.

**Who tests and where?** Lab Field inspectors at the project sites upon notification by the projects.

**Frequency Required:** One each 30,000 tons, minimum of one per project.

**Tests Required:** At least one assurance nuclear density test should be requested by the project and then performed by the Lab.

**How to find out if testing is completed:** \*\*Currently, the information must be manually obtained and reviewed for verification of required field density assurance testing.

**Required status:** Information.

Completed Y/N \_\_\_\_

**Notes:** \*\*These tests could be entered in the same format as HMA nuclear density assurance testing for Site Manager, making the test information and material quantities available by query as related to project and specific material number for nuclear density assurance test for processed aggregate base. A new material number would be required for this assurance test because the material number 08041 is not density assurance test specific. Otherwise, as stated in the previous column, info must be manually obtained from the basement project files and reviewed.

## **Subbase**

**Testing Needed for:** Gradation Note: Review of other required testing as related to the specifications are the responsibility of the District Labs and are included in the posting status of the gradation.

**Example Quantity:** 15,000 cu.yd.

**Who tests and where?** District Lab personnel at the District Labs.

**Frequency Required:** Each new source and each 5,000 cu.yd.

**Tests Required:** There should be at least three tests submitted by the projects and tested by the District Labs.

**How to find out if testing is completed:** This information is posted on the computer and a status and quantity will be posted for the specific item.

**Required status:** Acceptance

Completed Y/N \_\_\_\_

**Testing Needed for:** Gradation - Assurance Test

**Example Quantity:** 15,000 cu.yd.

**Who tests and where?** District Lab personnel witness sampling at the project sites upon notification by the projects, then tests are performed at the District Labs.

**Frequency Required:** Each 50,000 cu.yd., minimum of one per project.

**Tests Required:** There should be at least one assurance test for gradation.

**How to find out if testing is completed:** Assurance tests for gradation are posted on the computer with the acceptance testing quantities for the specific item and identifiable via CP sample numbers. The split half of the sample, which is an in house test, can also identify project related assurance testing by query because tests are entered into the computer system with project and sample numbers via In house Code 8.

**Required status:** Information

Completed Y/N \_\_\_\_

**Notes:** Gradation status, including samples designated as CP's, would be posted as either acceptance or rejection, which is not applicable to the assurance test. The District Lab split sample for the particular assurance test would be entered with a status of **Information**.

**Testing Needed for:** Lab Density Test (proctor density)

**Example Quantity:** 15,000 cu.yd.

**Who tests and where?** District Lab personnel at the District Labs.

**Frequency Required:** Each new source and each 20,000 cu.yd.

**Tests Required:** 1 lab density test would be required for this project. If the material type/source changed there would also be additional tests in the system.

**How to find out if testing is completed:** Material and item quantities tested for lab density are posted in the computer system under the item for the project, and are identifiable also by the status of Information posted for the item.

**Required status: Information**

Completed Y/N \_\_\_\_

**Testing Needed for:** Field Density Test (Nuclear)

**Example Quantity:** 15,000 cu.yd.

**Who tests and where?** Project Inspection Forces at the project sites.

**Frequency Required:** Each soil type / each 3,000 cu.yd.

**Tests Required:** At least 5 sets of field nuclear density tests should be run by the project and forwarded to the Lab. If the material type changed additional tests would also be sent in.

**How to find out if testing is completed:** If received from the projects, copies of field density testing are filed in the basement project files. Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status: Information**

Completed Y/N \_\_\_\_

**Notes:** \*\* For computer access to field nuclear density testing District Lab personnel or density personnel would have to enter these tests into the computer system in a traceable format (query), along with item and material quantities and a specific material number designated for subbase field density test. Another option would be to require project inspection forces to submit field nuclear density tests along with a MAT-1 containing the pertinent information, which Lab personnel would review, code, and later post status of information in the computer.

**Testing Needed for:** Assurance Density Testing for Subbase material placed in the field (Nuclear)

**Example Quantity:** 15,000 cu.yd.

**Who tests and where?** Lab Field inspectors at the project sites upon notification by the projects.

**Frequency Required:** One each 30,000 cu.yd, minimum of one per project.

**Tests Required:** At least one assurance nuclear density test should be requested by the project and then performed by the Lab.

**How to find out if testing is completed:** \*\*Currently, the information must be manually obtained and reviewed for verification of required field density testing.

**Required status: Information**

Completed Y/N \_\_\_\_

**Notes:** \*\*These tests could be entered in the same format as HMA nuclear density assurance testing for Site Manager, making the test information and material quantities available by query as related to project and specific material number for nuclear density assurance test for Subbase. A new material number would be required for this assurance test because the material number 08041 is not density assurance test specific. Otherwise, as stated in the previous column, info must be manually obtained from the basement project files and reviewed.

## **Other Items**

For all other items that do not require assurance testing, adequate test coverage is required and is traceable via the computer system (Sitemanager). Material quantities tested, accepted, and posted should be greater than or equal to the required item quantities used on the project.