



City of Kansas City Missouri

Public Works Department

Materials Testing Requirements

Testing Laboratory

The following is the frequency in which standard testing procedures are to be performed on City inspected projects.

Testing time will vary from project to project and the stated time does not include any travel time. All tests should be requested by calling the 513-8755 at least one day before the testing is needed.

1. EARTHWORK

A. Materials Verification 2102.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--|---|---|---|
| Standard Proctor, Materials Gradation, Atterburg Limits | <p>Test prior to the start of construction activities on each source of material to be utilized in the project.</p> <p>Additional tests will be conducted if the source or character of the material changes.</p> | <p>Request Proctor and Atterburg Limits when fill material is identified.</p> <p>Atterburg Limits will be run first and if they pass or if ok given by inspector, then Proctor will be run.</p> <p>Testing Time: 3 – 5 days</p> | Test report stating Atterburg Limits, Fraction Passing #200 sieve, Natural Moisture, Maximum Dry Density, and Optimum Moisture content. |

B. Embankment or Structural Backfill Placement 2102.6

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--------------------------------------|--|--|---|
| Compaction Test and Moisture Content | <p>One set of 3 tests per lift with a minimum of one set of tests per day.</p> <p>One in place moisture and density for each 25 c.y. or fraction thereof when compacted by hand operated machines with at least three tests for each material type placed each day.</p> <p>Or As deemed necessary by the engineer.</p> | <p>A Proctor test must be run before compaction testing can be done (see 1.A.).</p> <p>Test Time: 10 min./test</p> | Test report stating the calculated maximum dry density and optimum moisture content from the proctor; the location of each test run; the dry density, percent compaction, and percent moisture for each test run. Up to 7 tests may be included on each report. |

C. Subgrade 2201.3

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--------------------------------------|---|--|---|
| Compaction Test and Moisture Content | <p>One set of 3 tests per 300 l.f. of subgrade or fraction thereof, per lane.</p> <p>Two tests per lane for projects less than 300 l.f.</p> <p style="text-align: center;">Or</p> <p>As deemed necessary by the engineer.</p> | <p>A Proctor test must be run before compaction testing can be done (see 1.A.).</p> <p>Test Time: 10 min./test</p> | Test report stating the calculated maximum dry density and optimum moisture content from the proctor; the location of each test run; the dry density, percent compaction, and percent moisture for each test run. Up to 7 tests may be included on each report. |

1. EARTHWORK (Cont.)

D. Trench 2602.3, 2102.6, 2507.3

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--------------------------------------|--|---|---|
| Compaction Test and Moisture Content | One set of 3 tests per 100 l.f. of trench per lift when under roadway. Otherwise one set of three tests per 300 l.f. of trench per lift. | A Proctor test must be run before compaction testing can be done (see 1.A.). Test Time: 10 min./test | Test report stating the calculated maximum dry density and optimum moisture content from the proctor; the location of each test run; the dry density, percent compaction, and percent moisture for each test run. Up to 7 tests may be included on each report. |

2. UNTREATED COMPACTED AGGREGATE

A. Materials Verification 2202.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--|--|---|---|
| Materials gradation, Plasticity Index, Standard Proctor, Source Verification | Test prior to the start of construction activities on each source of material to be utilized in the project. Additional tests will be conducted if the source or character of the material changes. | Gradation, Standard Proctor, and Atterburg Limits will be run. Quarry may be visited. Testing Time: 3 – 5 days | Test report stating the percent passing each of the required sieves and the gradation limits. Test report stating Atterburg Limits, Natural Moisture, Maximum Dry Density, and Optimum Moisture content |

B. Placement, 2202.3

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--------------------------------------|---|---|---|
| Compaction Test and Moisture Content | One test per 150 s.y. per lift placed with a minimum of one test per day. One test per 25 s.y. or fraction thereof when hand operated machines are used. | A Proctor test must be run before compaction testing can be done (see 2.A.). Test Time: 10 min./test | Test report stating the calculated maximum dry density and optimum moisture content from the proctor; the location of each test run; the dry density, percent compaction, and percent moisture for each test run. Up to 7 tests may be included on each report. |

3. Concrete

A. Approved Supplier Plant Verification 2208.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|----------------------------|--|--|--|
| Plant Prequalification | Annually | Plant inspections are done in April of each year | List of prequalified suppliers. |
| Full time plant inspection | Over 250 c.y. produced for City projects in one shift or during major structural concrete placement or when requested by project engineer. | Inspector at plant for entire pour | All materials tickets signed by plant inspector. |

B. Concrete Paving and Pavement Repairs 2208.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|--|--------------------------|--|
| Air Content, Slump, Cylinders/Test Beams, Temperature | One test for each 50 c.y. or part thereof. Additional air content/slump as deemed necessary by the engineer. Additional tests may be required when materials or design mix change. | Total Test Time: 20 min. | Test report will indicate the concrete temperature, slump, air content, compression strength of one cylinder/beam after 7 days of curing, and compression strength of two cylinders/beams after 28 days of curing. Test report will not be sent until all cylinders have been broken. |

C. Concrete Sidewalks/Driveways/Curbs/ Non-Structural 2301.2, 2209.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|--|--------------------------|--|
| Air Content, Slump, Cylinders/Test Beams, Temperature | One test per 100 c.y. or part thereof. Additional tests conducted as deemed necessary by the engineer. Additional tests may be required when the source of materials or design mix changes. | Total Test Time: 20 min. | Test report will indicate the concrete temperature, slump, air content, compression strength of one cylinder/beam after 7 days of curing, and compression strength of two cylinders/beams after 28 days of curing. Test report will not be sent until all cylinders have been broken. |

3. CONCRETE (cont.)

D. Concrete-Structural 2703.3, 2703.4, 2703.7

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|---|-----------------------------|---|
| Air Content, Slump, Cylinders/Test Beams, Temperature | One test for each 50 c.y. or part thereof during each pour. Additional tests as deemed necessary by the engineer. Additional tests may be required when the source of materials or design mix changes.. | Total Testing Time: 20 min. | Test report will indicate the concrete temperature, slump, air content, compression strength of one cylinder/beam after 7 days of curing, and compression strength of two cylinders/beams after 28 days of curing. Test report will not be sent until all cylinders have been broken. |

4. HOT MIX ASPHALT

A. Approved Supplier Plant Verification 2205.3

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|-----------|---|---------------------------------|
| Review of plant type, equipment, weighing devices, material source verification | Annually | Plant inspections are done in April each year | List of prequalified suppliers. |

B. Paving Operation 2205.3, 2205.8

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|---|-----------------------------|---|
| Materials gradation, asphalt content, bulk and maximum specific gravity, Marshall stability and flow, design mix verification | Minimum of one test per each 1000 tons or parts thereof until 4 consecutive tests pass. Then a minimum one test per each 3000 tons or part thereof per day. | Test Time: 4hrs. per sample | One test report will indicate the asphalt content of the mix, the range of asphalt content allowed, the gradation of the aggregate in the mix, the range of gradation allowed, the theoretical maximum specific gravity and density, and the percent of air voids. The other test report will indicate the bulk specific gravity and density, the Marshall stability and flow, and the allowed range for the Marshall stability and flow. |
| Compaction test | One test for each 1000 tons or parts thereof when more than 1000 tons placed in one shift or as deemed necessary by the engineer. | Test Time: 10 min./test | Test report stating the calculated maximum bulk density, the location of each test run; the density, and percent compaction for each test run. Up to 7 tests may be included on each report. |
| Drilled cores | As deemed necessary by the engineer to verify thickness, degree of compaction or other characteristics of the finished product. | Test Time: 1hr./core | Test report will indicate the location of each core, thickness of each core, and bulk density of each core. |

6. PRECAST AND PRESTRESSED CONCRETE PRODUCTS

A. Approved Supplier Plant Verification 2510.3, 2604.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|--|--|---------------------------------|
| Review of plant manufacturing methods, weighing devices, and material certification | Annually for those plants that continuously supply products to the City or as needed for those plants that occasionally supply products to the City. | Plant inspections are done in October of each year | List of prequalified suppliers. |

B. Prestressed Bridge Beams or Other Major Structural Members 2702.1, 2702.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--|---|---|--|
| Source of Materials, Materials Certification, Slump, Air Content, Test Cylinders, Temperature, Shop Drawing Verification | City representative present prior to placing concrete to verify source of materials, etc. Also present during actual concrete placing operations. Test frequency in accordance applicable specifications. | Inspector present during entire production time | Test report indicating results of all tests, if material certifications were correct or not, and verification of reinforcement tensioning. |

C. Manholes, Catch Basins, Pipe of Routine Manufacture 2510.6, 2604.2

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|--|--|------------------------------|------------------------------------|
| Plant site verification of continuing operations, source of materials, materials certification, fabrication process, and review of slump air content, test cylinder strengths, and reinforcing steel strength test conducted by producers. | Randomly while producing products for City projects. | Total Time: 8 hrs. | None to inspectors. |
| Visual inspection for physical damage and structural integrity | Each piece visually inspected prior to job site delivery | Inspection Time: 5 min/piece | City stamp on each approved piece. |

6. PRECAST AND PRESTRESSED CONCRETE PRODUCTS (cont.)

D. Precast concrete appurtenances certifications

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|---|---|--|--------------------|
| Manufacture certification attesting that the design and manufacture of the produced products meet the appropriate specifications. | One certification for each type of product per contract | Certification verification Verification Time: 10 min./cert. | None to inspector. |

E. Precast concrete special items of uncommon manufacture or not of a common inventory stock OR Items of common manufacture that are modified for other than standard pipe openings.

| TEST PROCEDURES | FREQUENCY | TEST TIMEFRAME | OUTPUT |
|----------------------|---|--|--------------------------------------|
| Review Shop drawings | Shall be furnished at time of on-site inspection. <u>AND</u> Inspection will be conducted in the most appropriate manner as listed in 6, A.,B., or C. | Review Time: 10 min. See 6.A., 6.B., and 6.C. | None to inspector. See above. |