

## **SECTION 8. CONSTRUCTION TESTING AND CERTIFICATION**

In order to better document the inspection and certification of public and private infrastructure improvements, the County shall require the following information for all projects approved for construction. Electronic copies of all documentation shall be required prior to final acceptance of sanitary sewer, storm water management systems, water lines, utilities, Portland cement concrete, non-motorized facilities and road improvements within the County right-of-way.

1. The Engineer shall submit one electronic certification package in PDF format to the County certifying that the improvements (i.e.: sanitary sewer, water lines, storm water management systems, utilities and streets) were installed in accordance with the approved plans and specifications. This packet, shall at a minimum include the following items:
  - (a) Certification cover letter
  - (b) All required testing results and dates of acceptance tests for sanitary sewer, waterlines, utilities, roads, pedestrian facilities, and storm water management systems
  - (c) As-built drawings
2. The Engineer shall furnish documentation of lab tests in accordance with methods prescribed by AASHTO or ASTM for theoretical maximum density, optimum moisture content and sieve analysis for the materials to be used in the designed improvements (i.e.: sanitary sewer, water lines, storm water management systems, utilities and streets). Tests up to one (1) year old will be considered acceptable for these material properties.
3. The Engineer shall furnish documentation of in-place field density tests. All trench backfill material for sanitary sewer, waterlines, utilities and storm water management systems in improved areas and all embankments shall be compacted for the fill depth and shall be compacted to 95% of the maximum dry density as determined by AASHTO-T-99 or ASTM D698. In-place density tests for roadways shall, as a minimum, be required at intervals of two hundred (200) feet. Tests for roads and pedestrian facilities shall be provided for sub-grade, sub-base and cushion materials. At a minimum, the top six (6) inches of native sub-grade which will be under a structural section shall be field density tested until the material no longer responds to compactive efforts.
4. The Engineer shall furnish a dated job mix formula, no older than one year, for hot mix bituminous asphaltic concrete which conforms to the procedures of the Asphalt Institute's MS-2 manual. The Engineer shall furnish certified results of a Marshall Test showing the bulk specific gravity determination, stability and flow data and density and void analysis. The Engineer shall furnish a minimum of one "field Marshall Test" in accordance with ASTM D-979 5.2.2 or 5.2.3. One additional field Marshall Test shall be taken for every one thousand (1,000) feet of constructed roadway to check for variations from the job mix formula. Test results are also required indicating that the Tensile Strength Ratio (TSR) as determined by AASHTO T-283 is at least 70%, with the test being performed at  $7.0 \pm 1\%$  air voids and including the freeze cycle. This information shall be required, for all Missoula County approved roadways or pedestrian facilities. If the paving operation cannot be completed in one (1) day, the above field Marshall Test intervals shall be required for each additional day.
5. The Engineer shall furnish asphalt core samples for bituminous pavement. One core sample shall be required for every four hundred (400) feet of road or pedestrian facility

with a minimum of two samples per project or as directed by the County. The Engineer shall provide a certified laboratory report from the samples taken as to thickness and actual density. This information shall be required for all paving projects.

(a) See Section 6.6 for Mat density requirements. Verification of maximum density as determined by ASTM D2041 from plant produced material during production may be required.

(b) The field density and thickness of the pavement is determined by measuring the cores tested. The actual thickness must be no less than one-quarter (1/4) inch under the specified thickness from the approved plans. Asphalt that does not meet thickness requirements shall be overlaid the entire width of the roadway in even station increments. Transitions for any required overlays shall be milled in to the existing asphalt.

6. The Engineer shall furnish Portland cement concrete tests for concrete placed into infrastructure improvements. One set of tests taken by an approved ACT certified concrete technician shall be required for the first fifty (50) cubic yards of concrete placed. One additional set of tests is required for any concrete placed after the fifty (50) cubic yard threshold. If the concrete operations cannot be completed in one (1) day, the above field testing intervals shall be required for each additional day. The concrete shall be sampled in the field and specimens made and compliance determined in accordance with the following:

Sampling Fresh Concrete	ASTM C-172
Slump	ASTM C-143 or AASHTO T119
Air Content	ASTM C-231 or C-173 or C-138 or AASHTO T152, T196 & T199
Compressive Strength	ASTM C-39 or AASHTO T22
Making and Curing Test	ASTM C-31 or AASHTO T23