



Department of Public Works Material Testing Policies April 2021

Inspector must be notified 24 hours prior to any testing. Failure to notify Inspector will result in rejection of test results and material being retested. Inspector should be present during all testing. All pipe, fittings, and other construction materials shall be inspected for defects and conformance to City of Mansfield Standards prior to placement.

SECTION 1: Sanitary Sewer

I. Backfill and Density Testing

- a) All trenches shall be backfilled in maximum 12” loose lifts and mechanically compacted with approved vibratory methods (NCTCOG Item 504.5.3.2.1).
- b) Densities shall conform to minimum 95% ASTM D-698 and be at or above optimum moisture unless specified otherwise (NCTCOG Item 504.5.3.2.1). Proctor samples shall be taken for all classifications of soil on site. Atterberg Limits shall be determined on all proctor samples.
- c) Densities shall be taken on every other lift as lifts ascend. No “potholing” or “ramping” will be allowed unless approved by Inspector.
- d) Densities shall be taken at intervals not exceeding 300 feet along the length of sewer mains.
- e) Densities shall be taken on every other sewer service both sides of street within the Right-of-Way.
- f) Backfill adjacent to manholes and structures shall be compacted manually and density tested on every lift.

II. Sewer Line Inspection and Testing

- a) All sewer lines shall be tested with a mandrel for 5% deflection (max.) in accordance with NCTCOG specification, Item 507.5.1.4.1. Inspector or other city representative must be present.
- b) All sewer lines shall be tested by a low pressure air test according to the NCTCOG specifications, Item 507.5.1.3. Inspector or other city representative must be present.
- c) All sewer manholes shall be vacuum tested according to the NCTCOG specifications, Item 502.1.5.2. Inspector or other city representative must be present. Pre-cast manholes shall be vacuum tested free from any secondary materials used for sealing joints. Examples include: pipe patch wiping, ram-neck, GS#5. This is to ensure proper gasket seat and seal.
- d) All sewer lines shall be video inspected. A copy of the video and stationed report shall be submitted to the City prior to any paving activities so failures may be identified and repaired accordingly (NCTCOG Item 507.5.2). All services shall be “panned.”
- e) Mandrel, Air Test, and Video Inspection shall not be performed until all utilities are complete in place and backfilled.

III. Manhole Construction

- a) A concrete mix design must be submitted and approved by City prior to any placement of concrete. See City of Mansfield Standard Construction Details for concrete requirements.
- b) Inspector shall be notified of concrete placement 24 hours in advance for steel and form inspection.
- c) One set of four cylinders (2-7 day, 2-28 day) for cast-in-place manholes shall be made for every day concrete is placed (ASTM C-31). Air, slump, and temperature tests shall be taken for every set of cylinders made. Concrete with a temperature above 95° F will be rejected. Additional cylinders and or tests may be requested at the Inspector or Engineer's discretion. Exterior forms shall not be removed for a minimum of 24 hours unless approved by Inspector or Engineer.
- d) Pre-cast manholes shall be vacuum tested free from any secondary materials used for sealing joints. Examples include: pipe patch wiping, ram-neck, GS#5. This is to ensure proper gasket seat and seal.

SECTION 2: Water

I. Backfill and Density Testing

- a) All trenches shall be backfilled in maximum 12" loose lifts and mechanically compacted with approved vibratory methods (NCTCOG Item 504.5.3.2.1).
- b) Densities shall conform to minimum 95% ASTM D-698 and be at or above optimum moisture unless specified otherwise (NCTCOG Item 504.5.3.2.1). Proctor samples shall be taken for all classifications of soil on site. Atterberg Limits shall be determined on all proctor samples.
- c) Densities shall be taken on every other lift as lifts ascend. No "potholing" or "ramping" will be allowed unless approved by Inspector.
- d) Densities shall be taken at intervals not exceeding 300 feet along the length of water mains.
- e) Densities shall be taken on every other long service under pavement.
- f) Backfill adjacent to hydrants, meter vaults, and other water related structures shall be compacted manually and density tested on every lift.

II. Water Main Testing

- a) Water mains shall be pressure tested according to the NCTCOG spec (Item 506.5). Water mains to be tested at 150 psi for 4 hours, fire mains to be tested at 200 psi for 2 hours.
- b) Water samples shall be taken by City personnel. Sample points shall be hose bibs or faucets brought up to 12" above grade (See COM Standard Detail Sheet W-4). Sample locations shall be determined by Inspector. (Samples may only be taken Monday through Thursday from 8 AM to 12 PM.)
- c) Inspection of water services and main line valves will be done at final walkthrough to ensure services are "hot" and valves are operational and fully open. This will be done by operating each service briefly to verify water flow and operating each valve to a closed position and back to the full open position.
- d) Inspection of fire hydrants will also be done at final walkthrough. The hydrant will be operated with all caps closed to demonstrate no flange seal leakage. Then the hydrant will be operated with one cap removed to demonstrate ease of operation, water flow, and weep-hole performance.

SECTION 3: Storm Sewer

I. Backfill and Density Testing

- a) All trenches shall be backfilled in maximum 12” loose lifts and mechanically compacted with approved vibratory methods (NCTCOG Item 504.5.3.2.1).
- b) Densities shall conform to minimum 95% ASTM D-698 and be at or above optimum moisture unless specified otherwise (NCTCOG Item 504.5.3.2.1). Proctor samples shall be taken for all classifications of soil on site. Atterberg Limits shall be determined on all Proctor samples.
- c) Densities shall be taken on every other lift as lifts ascend. No “potholing” or “ramping” will be allowed unless approved by Inspector.
- d) Densities shall be taken at intervals not exceeding 300 feet along the length of storm sewer mains.
- e) Densities shall be taken on every lateral under pavement.
- f) Backfill adjacent to inlets, headwalls, junction boxes, and other structures shall be compacted manually and density tested on every lift.

II. Connections

- a) Collars, junctions, wyes, and damage repairs will be inspected prior to concrete placement and again prior to final embedment and backfill.

III. Structure Construction

- a) A concrete mix design must be submitted and approved by City prior to any placement of concrete. See City of Mansfield Standard Construction Details for concrete requirements.
- b) Inspector shall be notified of concrete placement 24 hours in advance for steel and form inspection.
- c) One set of four cylinders (2-7 day, 2-28 day) shall be made for every day concrete is placed (ASTM C-31). Air, slump, and temperature tests shall be taken for every set of cylinders made. Concrete with a temperature above 95° F will be rejected. Additional cylinders and or tests may be requested at the Inspector or Engineer’s discretion. Exterior forms shall not be removed for a minimum of 24 hours unless approved by Inspector or Engineer.

SECTION 4: Stabilization

I. Soil Classification and Sampling

- a) Samples shall be taken for all classifications of soils on site. Testing for sulfate presence and lime series tests shall be conducted for all samples. A geotechnical engineer shall submit a recommendation for stabilization to the City for approval. Where lime is recommended, lime content shall be 6% minimum. For soils with a P.I. of less than 10, a minimum of 6% portland cement shall be used. Additional geotechnical testing and recommendations may be required by City as field conditions dictate. Atterberg Limits shall be determined on all Proctor samples.
- b) Lime stabilized sub-grade shall have an initial cure time of not less than 72 hours prior to remixing according to NCTCOG spec (Item 301.2.3.5.1).

II. Sub-grade Testing

- a) Gradations for lime treated sub-grade shall be taken at intervals not exceeding 300 feet along road and must pass 100% through a 1 3/4" sieve and 60% through a #4 sieve according to NCTCOG spec (Item 301.2.3.5.1).
- b) Gradations for Portland Cement treated sub-grade shall be taken prior to placement of cement and at intervals not exceeding 300 feet along road and must pass 100% through a 1" sieve and 80% through a #4 sieve according to NCTCOG spec (Item 301.3.3.2).
- c) Lime sub-grade shall be tested for depth at intervals not exceeding 300 feet along road. Tests will be performed by excavating deeper than lime treatment and administering a phenolphthalein indicator.
- d) Densities shall be taken on sub-grade at intervals not exceeding 300 feet along road and conform to minimum 95% ASTM D-698 (NCTCOG Item 301.2.3.6). Moisture content shall be at or above optimum moisture.
- e) All sub-grade shall be visually 'proof rolled' after it is trimmed and prior to placement of steel.
- f) Densities shall be taken within 72 hours of concrete placement (NCTCOG Item 303.5.1). If more than 72 hours elapses, densities must be retaken unless an approved emulsion sealant is used (NCTCOG Item 302.3.5).
- g) Locations for densities, gradations, and depth checks shall be at the discretion of the Inspector and shall be representative of the entire cross section of sub-grade.
- h) Sub-grade failures shall be defined by Inspector or Engineer. Repair method will be discussed with Inspector or Engineer and approved prior to beginning repair work.
- i) At all testing location intervals, multiple tests may be required across width of right-of-way.

III. Sulfate Mitigation Procedure

In the event sulfates are discovered during testing, lime treatment shall be modified as follows:

Procedure: The ground will be scarified and enough water added to get as much of the sulfate to dilute as possible. Lime will be applied in a double application, where half of the prescribed amount is placed, then a [*see below (3, 5, or 7)*] day mellowing period will be observed. Where sulfate ranges are widely varied in close proximity to each other, specific mellow period will be at the discretion of the City Engineer. The second half of the prescribed amount of lime will be placed after the mellow period expires. The standard seventy two (72) hour cure time will then be observed, followed by standard remix and gradation testing procedures. During all phases of lime treatment the treated material must be kept continuously wet to ensure as much dilution of the sulfate as possible.

- 0 ppm – 999 ppm: No modifications required
- 1000 ppm – 2999 ppm: Three (3) Day Mellow period
- 3000 ppm – 4999 ppm: Five (5) Day Mellow period
- 5000+ ppm: Seven (7) Day Mellow period

All treated areas will be closely monitored during mellowing and curing for reactions and reported to Inspector. Additional action(s) may be required depending upon size and range of reactions as directed by the City Engineer.

SECTION 5: Concrete Pavement

I. Concrete Testing

- a) A concrete mix design must be submitted and approved by City prior to any placement of concrete. See City of Mansfield Standard Construction Details for concrete requirements.
- b) Inspector shall be notified of concrete placement 24 hours in advance for steel and form inspection.
- c) One set of 4 cylinders (2-7day & 2-28 day) shall be made for every 150 cubic yards of concrete that is placed for pavement, sidewalk, ramps, and or retaining walls (ASTM C-31).
- d) Air, slump, and temperature tests shall be taken for every set of cylinders made. Concrete with a temperature above 95° F will be rejected.
- e) Additional cylinders and or tests may be requested at the Inspector or Engineer's discretion.

II. Cure Time, Cores, & Form Removal

- a) Forms shall not be removed from pavement, sidewalks, ramps, or retaining walls for 24 hours minimum, and shall not be backfilled less than 72 hours after concrete placement.
- b) Pavement shall have a minimum cure time of 7 days, but may be opened to traffic earlier at the discretion of the Inspector or Engineer only after review of compressive strength data. Temporary perpendicular crossings may be made after 72 hours by ramping soil over the new pavement at a depth of not less than 18" and a width of not less than 10'.
- c) Prior to grout wiping any concrete, contractor shall demonstrate method of surface preparation to ensure adhesion of grout.
- d) Paving contractor, at their cost, shall core all streets to verify proper pavement thickness prior to acceptance. Cores shall be 2" diameter and taken at intervals not exceeding 300 feet. Locations will be approved by the City. Multiple cores may be required at each interval to represent entire cross section. Evaluation of cores will be in accordance with NCTCOG spec (Item 303.8.2). All replacement shall be in full panel increments.

This information is an explanation of basic testing procedures and is meant to be used in conjunction with the City of Mansfield Standard Construction Details and the North Central Texas Council of Governments Standard Specifications for Public Works Construction, 5th Edition.