# 2026

# City of Duluth, Minnesota Construction Standards

# APPENDIX B

## Schedule for Materials Testing

**Public Works & Utilities**
**Engineering Division**
**Duluth, MN**

# SCHEDULE FOR MATERIALS TESTING
# CITY OF DULUTH STREET AND UTILITY IMPROVEMENT PROJECTS

The Engineer will perform materials testing for acceptance and quality assurance at these minimum rates on local projects. Material testing on projects with State or Federal funding will be performed as required in the current MnDOT Schedule of Materials Control. When deemed appropriate, the Engineer will perform additional testing to determine acceptance. Additional testing and retesting shall be at the Contractor's expense.

**Table 1: Base Construction**

| Specification | Specified Method | Sampling & Testing | Sampling Notes | Compaction Testing | Compaction Notes |
|---|---|---|---|---|---|
| City of Duluth 2451 Excavation, Backfill, and Compaction for Utilities | Specified Density | One sieve and ASTM D698 standard proctor for each backfill borrow material at source and one for each different classification of onsite native material. | Materials to be tested:<br>• Course filter aggregate<br>• Granular backfill<br>• Native material from site<br>Note:<br>If material looks like it changed, test again | • Take moisture of native material on first day of utility work.<br>• Take densities at rate of; One per each 200' of mainline pipe, One per each 4 service laterals, and One per each 4 manholes at every 3 feet in depth.<br>• Required compaction is 100% around manholes full depth; 100% in the top 3 feet of utility trench below top of subgrade; 95% in utility trench below the top 3 feet. | • The maximum loose thickness of each backfill layer shall be 8 inches. Additional tests where inspector notes rutting or pumping; additional moistures after wet weather<br>• Most common problem is too much moisture in native backfill; may require granular borrow backfill to be used.<br>• Retest at Contractor's cost. |

| Specification | Specified Method | Sampling & Testing | Sampling Notes | Compaction Testing | Compaction Notes |
|---|---|---|---|---|---|
| City of Duluth 2106 Select Granular Embankment | Specified Density | One sieve and ASTM D698 standard proctor for each backfill borrow material at source. | Take additional samples if material or source changes, at Contractor's cost. | • Take densities at rate of four per block prior to Class 5.<br>• Compact in 8" layers or less.<br>• Required density is 100%. | • Take additional densities where rutting is noted.<br>• The most common problem with select granular is not enough moisture or more than 7% passing the No. 200 sieve.<br>• Retest at contractor's cost. |
| City of Duluth 2211 Aggregate Base<br>MnDOT 2221 Shoulder Base Aggregate | Specified Density | One sieve and ASTM D698 standard proctor at source. | Take additional samples if material or source changes, at Contractor's cost. | • Take densities at rate of two per block prior to curb and gutter and/or paving.<br>• Test in areas with greatest rutting or deflection and at least 1 foot from an unconfined edge.<br>• Required density is 100%. | • Excavate and re-compact areas where visible rutting.<br>• Most common problem is segregation of aggregates; replacement/blending as directed by the Engineer.<br>• Retest at contractor's cost. |

**Table 2: Concrete Curb & Gutter, Sidewalk, and Aprons**

| Field Testing | Cylinders | Plant Inspection | Concrete Aggregate Gradations |
|---|---|---|---|
| • Test the first truck of the day for air and slump, test additional trucks as needed if results do not meet specifications or material visibly changes.<br>• Test air and slump two times per block, one on each side.<br>• Note: Testing may be waived at the Engineer's discretion if less than 200 feet of curb or 800 square feet of sidewalk or apron is planned<br>• | • Two sets per block, one on each side. | • One inspection per project on either curb and gutter or sidewalk. | • One test/aggregate pile for the mix placed during the plant inspection. |

**Table 3: Bituminous**

| Quality Assurance Testing<br>(Owner's Testing Agency) | Quality Control Testing<br>(Supplier's Testing) |
|---|---|
| • One companion sample (split with contractor) per mix placed per project. Test for asphalt content, gradation, and air voids.<br>• No plant inspection required by owners testing agency on local projects.<br>• One companion core for density from contractor per lot per lift. One lot for 300-600 tons, two lots for 601-1000 tons, three lots for 1001-1600 tons, four lots for 1601-3600 tons. | • Percent crushing - two per/mix/day at start-up, then sample daily, test minimum of one weekly.<br>• Plant aggregate gradation – one/1000 tons at start-up, then one/2000 tons.<br>• Asphalt content and air voids– one/500 tons/mix for first 2000 tons, then one/1000 tons.<br>• Core density – four cores per lot per lift (see QA for lot determination). Two tested by supplier and one forwarded to owner's testing agency with the fourth core retained by the Engineer for verification. |

Table 3 Notes:
Cores for Bituminous Quality Assurance Testing shall be provided by the Contractor.