

**ROGERS WATER UTILITIES
ROGERS, ARKANSAS**

**SPECIFICATIONS FOR
EXCAVATION/TRENCH BACKFILL
REVISED AUGUST 2007**

1. **SCOPE**

This specification governs the backfilling for water mains, water services, sanitary sewer mains, sanitary sewer services, force mains, sanitary sewer manholes, wet wells and other structures, unless otherwise noted on the project construction plans. All existing utilities and structures shall be protected from damage during the backfilling operation and if damaged, the Contractor at his expense will be responsible for repair the damaged existing utility and/or structures.

2. **MATERIALS**

- a. Granular backfill material shall conform to Section 04-04 Granular Backfill Material of the RWU specification.
- b. Engineered select backfill material shall conform to Section 04-05 Engineered Select Backfill Material of the RWU specification.
- c. Flowable fill material shall conform to Section 04-06 Flowable Fill Material of the RWU specification.

3. **GENERAL**

- a. The trenches shall be backfilled immediately after the pipe is laid and approved by the Engineer and RWU personnel. The Engineer and RWU personnel must also inspect the pipe fitting thrust blocking prior to the trench backfilling. The backfilling of excavation/trenching is required before pipe, sanitary sewer manhole and wet well testing.
- b. Backfill materials for pipe trenches, sanitary sewer manholes and other structures in un-paved areas shall consist of on-site material excavated from excavation and trenches. The on-site material shall be free of large rocks (6 inch diameter or larger in any direction), highly plastic clays, clods or organic matter. The first 2 feet of backfill above the pipe embedment shall be rock free on-site backfill material. If the on-site material that was excavated from the trench is not suitable for backfill, the Contractor shall obtain suitable backfill material elsewhere.

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- On-site material shall be placed in lifts or layers not to exceed 10 inches loose measure and shall be compacted to minimum of 85% of the maximum dry density identified by [ASTM D1557-02 \(Modified\)](#). The field density and moisture content determination shall be made in accordance with [ASTM D2922](#) and [ASTM D3017](#).
- c. Backfill materials for trenches and structures under existing and/or proposed public paved streets, existing public gravel roads and existing private gravel/asphalt/concrete driveways shall be granular backfill, engineered select backfill or flowable fill.
 - d. Backfill material for trenches and structures under existing and/or proposed private paved streets and existing and/or proposed parking lots shall be as directed by the Engineer.
 - e. The Contractor prior to backfill operation shall remove excavation/trenching bracing, sheeting or shoring.
 - f. The trench shoring and/or bracing may be required by the geotechnical firm at the locations of the Quality Assurance tests. Any trench shoring and/or bracing cost associated with the Quality Assurance tests are the sole responsibility of the Contractor.
 - g. Engineered select backfill requires a minimum trench width of 4 foot and is not allowed in the backfilling of water service(s), sanitary sewer service(s) and force main(s).
 - h. Flowable fill material and the aggregate size 67 granular backfill material have no compaction requirements. Aggregate size 67 granular backfill shall be place in horizontal lifts of 2 foot (maximum) and each lift shall be mechanical vibrated compacted.
 - i. Where an excavation/trench has been improperly backfilled or where settlement occurs, the identified section shall be excavated to the depth and length required and then refilled and compacted to final grade.
 - j. The Contactor shall furnish and maintain street plates, barricades and other safety devices as required by local, state and federal permits/ordinances around open excavations to safeguard traffic and pedestrians. The temporary suspension of work does not relieve the Contactor from the responsibility for the above requirements.
 - k. Safety on the construction project is the sole responsibility of the Contractor.

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4. BACKFILL

- a. **TRENCH BACKFILL:** Backfill material shall be placed in lifts and density as specified for the type of material.

Mechanically compacted backfill shall be placed in horizontal lifts. Each lift shall be evenly spread, moistened and/or dried, if necessary, and then tamped and/or rolled until the specified relative compaction has been attained throughout the entire depth of the lift.

- b. **STRUCTURE BACKFILL:** Backfill of sanitary sewer manholes, wet wells and other structure(s) shall not be placed until the Engineer and RWU personnel have inspected the structure. No backfill shall be placed against sanitary sewer manhole for at least 48 hours and at least 7 days for all other structures.

Backfill around sanitary sewer manholes, wet wells and other structures shall be placed in lifts and density as specified for the type of material. The backfill operation shall be conducted so that the backfill is always at approximately the same elevation on all sides of the structure.

Mechanically compacted backfill shall be placed in horizontal lifts. Each lift shall be evenly spread, moistened and/or dried, if necessary, and then tamped and/or rolled until the specified relative compaction has been attained throughout the entire depth of the lift.

- c. **FINAL RESTORATION:** The surface of the backfilled trench and/or structure shall be restored to match the previous grade and existing condition. This shall include final grading, placement of topsoil and seeding, placement of sod (such as at homes or businesses that have maintained lawns) or unprepared and prepared surfaces.

Trenches and structure backfill in paved public street(s) shall be covered with a temporary all-weather surface to allow for vehicular traffic until the final asphalt/concrete paving is complete. This surface shall be a minimum 4 inches compacted and rolled asphalt black base, either hot-mix or cold-mix applied. It is the Contractor's responsibility to maintain this surface until the final street restoration is complete. The Engineer and/or the City of Rogers may also require temporary street striping. The Contractor shall also replace any curbs and/or sidewalks damaged or removed during the project construction.

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5. COMPACTION METHODS

Backfill shall be mechanically compacted by means of tamping rollers, sheep foot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers. Jetting or flooding shall not be allowed.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will achieve the required compaction results or will not result in damage to adjacent ground, existing utilities or improvements installed under this construction project. The Contractor shall make his own determination in this regard.

6. COMPACTION

- a. **COMPACTION REQUIREMENTS:** Trench and structure backfill shall be placed to the density requirements as listed below of which vary with the location and depth of the excavation/trench. The percentage of compaction requirements for the various locations is minimum densities of which will be accepted. All densities specified herein are based on the maximum dry density of the material obtained by the Standard Method of Test for the Compaction and Density of Soils as determined by ASTM [D1557-02](#) (Modified). The field density and moisture content determination shall be made in accordance with ASTM [D2922](#) and ASTM [D3017](#).

<u>Location</u>	<u>Percent Compaction</u>
Unpaved areas	Density equal to adjacent undisturbed soil, but not less than 85%
Existing/proposed public street(s) & existing private driveway(s)	95%
Existing/proposed private street(s) & existing/proposed private parking lot(s)	As directed by Engineer

When conflicts exist between these densities requirements due to location or depth of excavation/trench, the higher density specified shall be obtained.

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The minimum frequency of the compaction tests shall be in accordance with the following schedule excluding water mains, sanitary sewer mains and force mains within existing/proposed public streets and un-paved areas:

<u>Backfill Depth (ft.)</u>	<u>Number of Tests per 400 Linear Feet</u>
0-6	3
0-12	5
0-24	7 or as directed by Engineer

All backfill for water mains, sanitary sewer mains and force mains that cross and/or located within the existing/proposed public streets shall have compaction tests performed based upon the backfill depth schedule. The Engineer and RWU personnel will determine the depth of each test per 400 Linear Feet test interval.

At least fifty percent (50%) of the total water and sanitary sewer service crossings of the existing/proposed public streets within the construction project shall have compaction tests performed based upon the backfill depth schedule. The service crossings to receive backfill compaction tests shall be selected by the Engineer.

- b. **COMPACTION TESTS:** The Contractor is responsible for Quality Assurance testing during material production and placement operations and for necessary adjustments to material production and placement operations to produce work that conforms to these specifications.

Material or workmanship that fails to meet the RWU specification requirements, as determined by the Quality Assurance tests, shall be either replaced or reworked to meet these specification requirements. The cost of the Quality Assurance tests is the sole responsibility of the Contractor.

Copies of the compaction reports shall be distributed to the Engineer and RWU. Copies of the compaction reports shall also be distributed to the City of Rogers if test results are performed under existing/proposed public streets/sidewalks.