

# METROPOLITAN UTILITIES DISTRICT

No. 1.11.1  
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Effective: 1-22-08

**CONSTRUCTION STANDARD FOR:** Backfill and Compaction for 16" and Smaller  
Water Main Trenches

Prepared by: WRT  
Approved by: JGL

Supersedes: 3-14-05

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## A. General

This standard covers the pipe embedment material and compaction of trench backfill and for 16" and smaller water mains.

## \* B. Backfill Material

Backfill shall be free of frozen material, concrete, brick, stone, refuse, cinder ashes, organic matter or other material deemed unsuitable by the Engineer. Excavated material from the pipe trench shall be used for backfill as approved by the Engineer. Saturated soil shall not be used for backfill.

## C. Compaction Method

### 1. Hand Methods

- a. Manual weighted tamp
- b. Pneumatic tamp
- c. Vibratory walk behind sheepsfoot roller

Backfill shall be placed in 6" lifts and compacted to density specified.

### 2. Mechanical Methods

- a. Drop tamp
- b. Vibratory Sheepsfoot Roller

Backfill shall be placed in a minimum of three lifts and compacted to density specified.

Compaction of backfill by flooding of the trench shall not be permitted.

## D. Compaction Requirements

Compaction of backfill shall satisfy the minimum requirements listed below. If more stringent compaction standards are specified by the permit authority or stated otherwise on construction drawings, those requirements shall be adhered to.

\* Papio-Missouri River Natural Resources District

95% of Standard Proctor Test (ASTM D 698) with Moisture Content within 4% of Optimum Moisture Content – Entire trench. Backfill shall be installed in 6" lifts.

\* Denotes Change

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\* City of Omaha, Douglas County and Sarpy County

92% of Standard Proctor Test (ASTM D 698) with Moisture Content between -3% and +4% of Optimum Moisture Content - top 12" of trench.

95% of Standard Proctor Test (ASTM D 698) with Moisture Content between -3% and +4% of Optimum Moisture Content - below top 12" of trench.

\* Nebraska Department of Roads Projects in Public R.O.W.

95% of Standard Proctor Test (ASTM D 698) with Moisture Content within 4% of Optimum Moisture Content - Entire trench (under pavement and street R.O.W.)

## **E. Density Tests**

### 1. Standard Method

Maximum densities shall be determined in accordance with ASTM D 698, "Test-Methods for Moisture-Density Relations of Soils and Soils-Aggregate Mixtures". Field densities of natural soils and compacted backfill shall be determined in accordance with one of the following:

ASTM D 2937 Cylinder Drive Method, Test

ASTM D 2922 Nuclear Methods, Shallow Depth, Test

ASTM D 1556 Sand Cone Method, Test

### 2. Location of Tests

Tests for the determination of the natural soil density and the density of compacted backfill shall be made at the locations and depths required by the Project Engineer.

\* Denotes Change