

**DISTRICT OF COLUMBIA
WATER AND SEWER AUTHORITY
(DC Water)**



"SERVING THE PUBLIC - PROTECTING THE ENVIRONMENT"

**SUPPLEMENTAL
PROJECT DESIGN MANUAL
VOLUME 3
LINEAR INFRASTRUCTURE DESIGN
REV A**

November 2018


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AUTHORIZATION FORM
Supplemental
Project Design Manual
For
Volume 3 Linear Infrastructure Design

LOG OF REVISIONS

Revision Number	Issue Date	Brief Description of Revision
A	November 2018	List of Tables – Added Reference to Table 6-1 Paragraph 4.2.1.1 Table 4-2 – Replaced Paragraph 4.3.5, 2 nd bullet - Replaced Paragraph 4.4.2 - Revised Safety Factor in Table 4.3 Section 4.8 – Replaced Section 6.1 – Replaced Appendix A, Pressure Zone Map – Replaced

This Supplemental Project Design Manual for Volume 3 – Linear Infrastructure Design is authorized by:



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DC Water

11-27-18
Date

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**SUPPLEMENTAL
PROJECT DESIGN MANUAL
FOR
VOLUME 3 – LINEAR INFRASTRUCTURE DESIGN**

1. INTRODUCTION

This Supplemental Project Design Manual for Volume 3 Linear Infrastructure Design contains revisions to the Project Design Manual – Volume 3 Linear Infrastructure Design issued July 2018. The revisions identified in this document are effective the date of the revision shown in the Log of Revisions.

2. LIST OF TABLES

2.1 *List of Tables* – Add Table 6-1 to List of Tables as follows:

Table 6-1: Soil Support Combining Factor (S).....3-6-1

3. CHAPTER 4 – WATER MAINS

3.1 *Paragraph 4.2.1.1* – Delete Table 4-2 in Paragraph 4.2.1.1 and replace with the following:

Table 3-1: Overflow and Ground Elevations for Pressure Zones East of the Anacostia

Datum Point	Pressure Zone			
	Low	Anacostia 1st High	Anacostia 2nd High	Anacostia 3rd High
Overflow Elevation (ft.)	172	258	310	382
Ground Elevation (ft.)	0-70	70-170	170-Above	170-Above

3.2 *Paragraph 4.3.5* – Delete 2nd bullet and replace with the following:

Profiles for all water mains eight (8) inches in diameter and greater. For permit submissions profiles are required for all water lines and services with pipe greater than 2” in diameter

3.3 *Paragraph 4.4.2* – Revise thrust restraining design criteria Safety Factor shown in Table 4-3 in Paragraph 4.4.2 from “Two (2)” to “1.5”

3.4 *Section 4.8* – Delete Section 4.8 and replace with the following:

4.8 CUSTOMER SERVICE LINES

4.8.1 Service Lines

A customer service line (or “service line”) is the pipe from the water main to a house or similar building. The design and construction of customer service lines is governed by the DC Plumbing Code. The minimum size of service line is one (1) inch but shall be greater if water demand requires.

Service lines are installed by the developer or owner of the property, and they are owned by the property owner. However, in accordance with D.C. Law 1-98, “*Water and Sewer Repair and Compensation Act of 1976*”, DC Water is responsible for the maintenance and replacement, if necessary, of the service lines in public space, up to the property line or approved projection.

To distinguish between small and large water services, DC Water uses the following definitions:

- Water service line - When the size of the pipe between the public water main and the structure is two (2) inch or smaller diameter, the service is defined by DC Water as small and referred to as a water service line. These are copper tube and typically supply water to individual houses or townhouses.
- Water connection - When the size of the pipe between the water main and the structure is larger than two (2) inch diameter, the service is defined by DC Water as large and referred to as a water connection. Typically, these are ductile iron pipe and service properties requiring a large water supply, like commercial, industrial and apartment buildings for domestic and/or fire service.

Perform calculations to determine the size of service line in accordance with IPC sizing criteria and demonstrate that it will provide sufficient head and flow to meet the demands of the intended service. Small (water service lines) may be sized using Appendix E of the International Plumbing Code.

4.8.2 Service Line Replacement

When a water main is replaced, design shall include the replacement of all lead, galvanized, or undersized water service lines in public space. Undersized water service lines are any pipe smaller than one (1) inch.

During the preliminary design phase of a water main replacement project, identify the location and size, if possible, of all existing water service lines affected by the replacement by:

- Searching records at DC Water's Permit Operations.
- Searching records at DC Water's Technical Information Center (TIC).
- Searching GIS records.
- Performing a field survey and subsurface utility evaluation.

Large (water connections) shall be made with a Tee connection to a water main shall and shall have a side stop valve six (6) inches in diameter or greater. Large water connections smaller than six (6) inches in diameter, therefore, shall include a tee with a six (6) inch or greater branch, a six (6) inch or greater valve, and a reducer to downsize to the required water connection pipe size.

The nominal depth of cover required for customer service lines is four (4) feet. When the water main is designed with over four (4) feet of cover, special considerations (*i.e.*, raising the water connection and providing elevations on the drawings), may be required.

Customer service lines shall not be located in driveways, building entrances, or under projections.

4.8.3 Combination Customer Service Lines

A small single water service line branching into a fire and a domestic service is permitted by the D.C. Fire Code. The combined service shall be capable of supplying the simultaneous domestic demand and sprinkler demand for the facility. The combined service line must be approved by DC Water and a backflow preventer assembly/ device must be installed in accordance with DC codes.

The size of the small water service line can be determined using the IPC Appendix E. Small diameter combined service lines, two (2) inch diameter and smaller, serving residential properties may be sized for the service with the greatest demand if it is approved by the District Department of Regulatory Affairs (DCRA).

4.8.4 Water Meters

Water meters two (2) inch and smaller are classified as small water meters and shall be positive displacement type. Locate small water meters in the sidewalk or tree space and house them in a meter pit in accordance with DC Water's standard details. Meter yoke or meter pit fittings shall include an ASSE 1024 backflow prevention device.

Water meters larger than two (2) inches are classified as large water meters and shall be type II compound meters unless otherwise determined by DC Water. Large meters shall be located outside the building in a meter vault (in public space where possible).

When no sidewalk or tree space is available, locate the meter pit or vault in an accessible location in public space. Meter pits and vaults shall not be located behind any retaining walls or similar obstructions. Install water meters away from existing trees.

Meter housings and lids installed in traffic areas shall be rated for H-20 loading.

During installation of a new or replacement water main, water meters located inside a building or in private property shall be relocated to public space. No premise (address) shall have more than one (1) meter monitoring/tracking water consumption.

4.8.5 Temporary Water Services

When shutdown of a water main is required for replacement or rehabilitation, the design shall require temporary water service, including fire protection, be provided to all customers.

4. CHAPTER 6 – EARTH BACKFILL AND LATERAL SUPPORT FOR BURIED PIPES

4.1 *Section 6.1* – Delete Section 6.1 and replace with the following:

6.1 MODULUS OF SOIL REACTION (E')

The E' of the in-situ material shall be estimated in the field by conducting standard penetration per ASTM D1586, cone penetrometer test per ASTM D3441 or D5778, or dilatometer tests per ASTM D6635. In the absence of field tested data to define E', assume the in-situ E' is 100 psi.

If the E' value of the in-situ soil is higher than the E' value of the backfill, use the E' value of the backfill.

If the E' value of the in-situ soil is lower than the E' value of the backfill, use the following methodology to calculate a composite E'.

Step 1: Calculate ratio of $E'_{INSITU} / E'_{BACKFILL}$. Note: If E'_{INSITU} is greater than $E'_{BACKFILL}$, use $E'_{BACKFILL}$.

Step 2: Calculate ratio of W / D; where W is trench width at springline and D is nominal pipe diameter.

Step 3: Identify appropriate value of the Soil Support Combining Factor, S from Table 6-1.

Step 4: Calculate the composite E' using the formula: $E'_{COMPOSITE} = S * E'_{BACKFILL}$

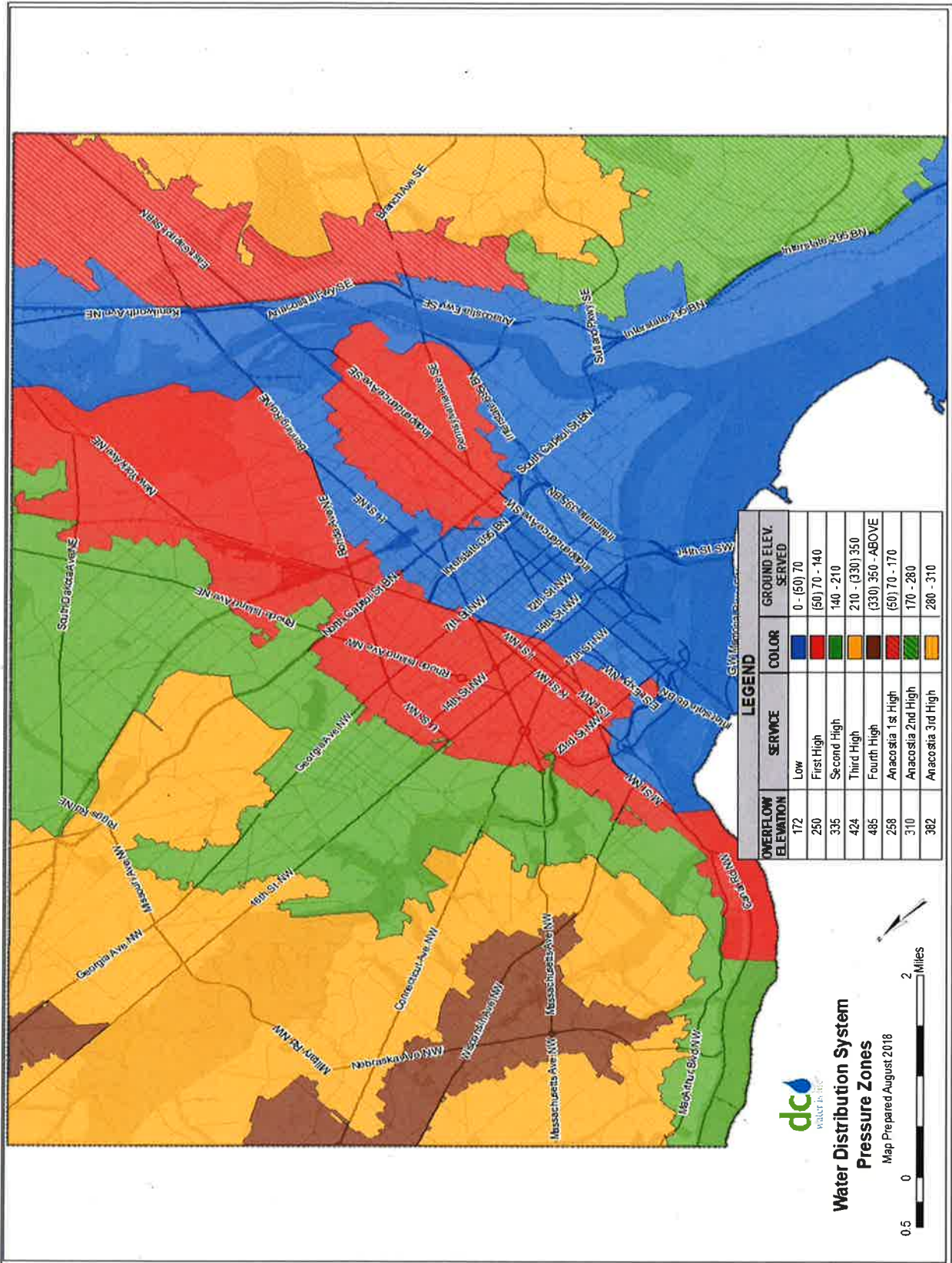
Table 6-1: Soil Support Combining Factor (S)

E'INSITU / E'BACKFILL	W / D Trench Width at Springline / Nominal Pipe Diameter					
	1.5	2.0	2.5	3.0	4.0	5.0
0.1	0.15	0.30	0.60	0.80	0.90	1.00
0.2	0.30	0.45	0.70	0.85	0.92	1.00
0.4	0.50	0.60	0.80	0.90	0.95	1.00
0.6	0.70	0.80	0.90	0.95	1.00	1.00
0.8	0.85	0.90	0.95	0.98	1.00	1.00
1.0	1.00	1.00	1.00	1.00	1.00	1.00

Note: Table adapted from Pipeline Installation by Amster Howard, copyright 1996.

5. APPENDIX A – PRESSURE ZONE MAP

5.1 *Pressure Zone Map* – Delete Pressure Zone Map and replace with the following:



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