Guidance for Areas Requiring Mitigation for Water and Sewer Separation

Edition 1.0

Updated June 2018

Bureau of Safe Drinking Water

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TABLE OF CONTENTS

Abstract

This draft guidance document is a compilation of mitigation options listed in the Technical Summary and Bulletins to address specific water-sewer separation and crossing requirements in NAC 445A.67155 to NAC 445A.6718. The Nevada Division of Environmental Protection (NDEP) is facilitating public workshops to solicit feedback from the regulated community and stakeholders prior to finalizing this document. The final draft will be presented to the State Environmental Commission for comments, and the final guidance will be available to the regulated community on NDEP's website and as requested.

Intended Use

This guidance document was developed to assist design/professional engineers to identify options in addressing conditions where separation requirements for water and sewer lines cannot be achieved – either fully or partially - due to site constraints, existing construction conditions, operational considerations, etc. In selecting options for mitigation, the professional engineers are responsible to ensure that their implementation will not conflict with reasonable assurance for provisions of safe drinking water while protecting public health and welfare under NAC 445A.66615.

In the rare occasions that a field engineer discovers unforeseen conditions requiring mitigation(s), NDEP may consider approval for the use of options in this guidance as the design engineer deems appropriate while complying with NAC 445A.66615. NOTE: The design/professional engineer must submit stamped as-built plans upon completion to the Division, or the appropriate district board of health, for final approval.

Disclaimer

This draft guidance was developed using options and techniques previously presented to, and reviewed by, NDEP staff through engineering submittals, trainings, field observations from water suppliers, etc. This guidance is not all inclusive, and engineers are encouraged to evaluate options within as well as explore new technologies, techniques, and materials as appropriate. This guidance is intended to be a living document; future revisions may occur as more cases are evaluated.

Mitigation Summary

- **Conditions Requiring Mitigations for Horizontal and Vertical Separation between Water and Sewer Lines under NAC C 445A.**

  NDEP requires mitigation(s) of new and existing **potable and non-potable** waterlines in locations where the separation requirements of NAC 445A.67155 to 445A.67175 cannot be maintained. The following is summary of conditions that require mitigations to the sewer or water lines to ensure provision of safe drinking water and protection of public health and welfare.

  1. Sewer main parallel to water main or water service lateral – less than 6 feet horizontal and/or 18 inches vertical separation.
  2. Sewer service lateral parallel to water main or water service lateral – less than 4 feet horizontal and/or 12 inches vertical separation.
  3. Sewer main crossing water main or water service lateral – sewer above water by any distance or sewer below water by less than 18 inches. Please note that a minimum vertical separation of at least 6 inches must be maintained.
  4. Sewer service lateral crossing water main or water service lateral – sewer above water by any distance or sewer below water by less than 12 inches.

- **NDEP Approved Water and Sewer Mitigation Methods**

  The following Table summarizes NDEP's approved methods for mitigating sewer and/or water lines when the required separation distances are not met.

Water	Sewer
a. Pipe Sleeve with Water-tight End Seals b. Jointless Pipe (Fused or Welded) c. Mechanically Restrained Joints d. Polyethylene Wrapped and Slurry Encased Joints e. Relocation	a. Pipe Sleeve with Water-tight End Seals b. Jointless Pipe (Fused or Welded) c. Mechanically Restrained Joints d. Polyethylene Wrapped and Slurry Encased Joints e. Relocation f. AWWA Water Quality Pipe-Manhole to Manhole g. Internal/External Joint Sealant

Additional Recommendations:

The following sections contain NDEP Engineering Technical Bulletins (1-5), which provide examples of specific conditions and mitigation options for specific NACs.

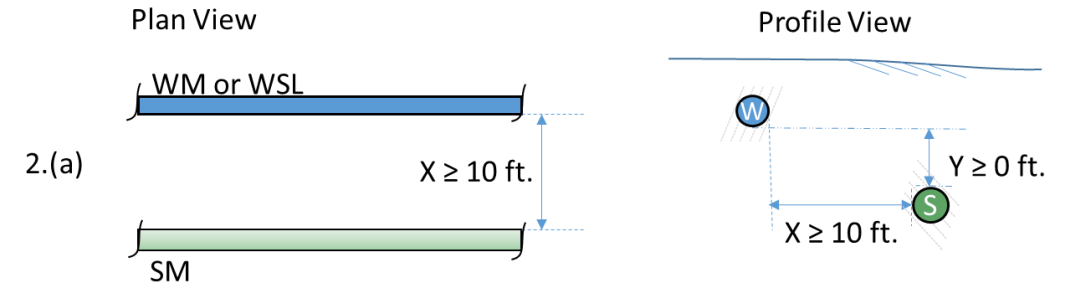
NDEP Engineering Technical Bulletin 1.0: Horizontal Separation

Water and Sewer Mitigations in Areas of Required Special Construction for Parallel Lines

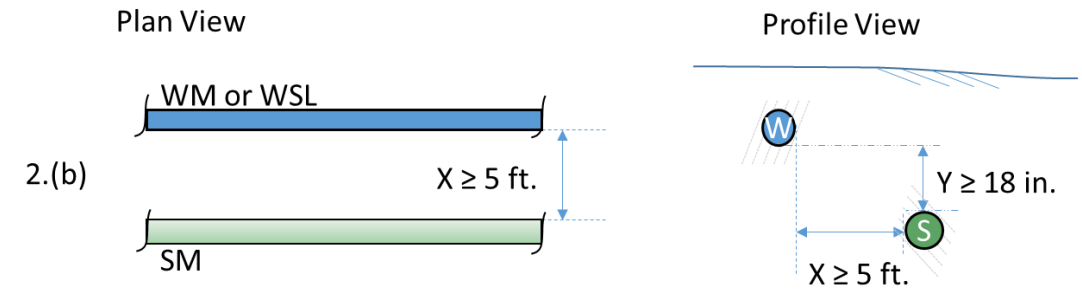
NAC 445A.67155 Sewer main parallel to water main or water service lateral

- **Whenever possible, the sewer main (SM) must be located lower than the water main (WM) or water service lateral (WSL).**
- **The SM must be in a separate trench from the WM, or WSL; and**
- **The minimum horizontal separation distance between the SM and WM, or WSL, of 10 feet is preferred;**
- **If compliance with the above is impracticable, the SM must be located:**
  - (1) In a separate trench from the water main, or water service lateral; and
  - (2) At least 5 feet away from the water main or water service lateral, as measured horizontally from the exterior walls of the pipes; and
  - (3) At least 18 inches lower than the water main or water service lateral, as measured vertically from the exterior walls of the pipes.
- **If compliance with the above is impracticable, the mitigation measures outlined below are required.**
  - Minimum horizontal separation of 6 feet between water lines and sewer main should be maintained if possible.
- **Illustration:**

<u>No mitigation</u>

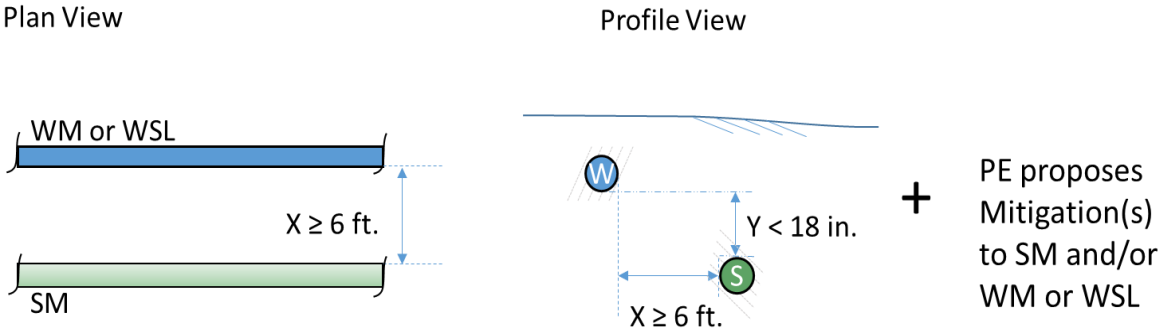


Or



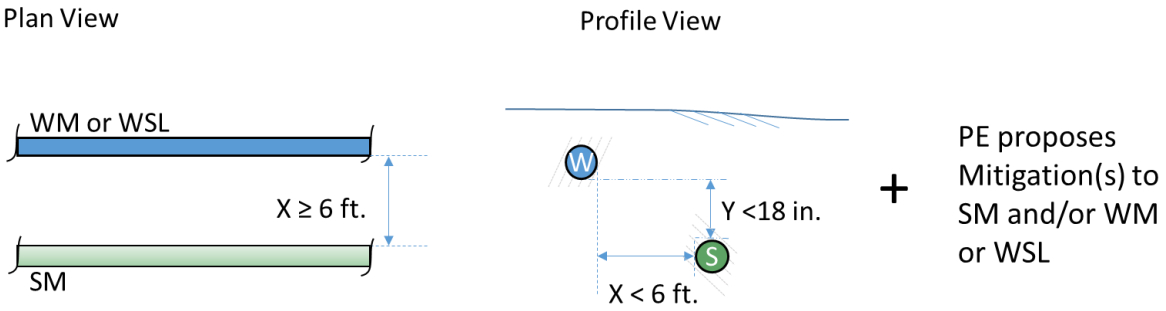
Mitigation conditions

2.(c)



Or

3.



- Where mitigation is required, the professional engineer shall demonstrate reasonable assurance that the proposed mitigation options for water and/or sewer lines are adequate to protect public health based on the conditions applicable.
- The SM must be in a separate trench from the WM, or WSL; and
- Mitigation options for SM or WM/WSL must consider if the SM, WM, or WSL, exists prior to installation of new SM or water lines.

- **Mitigation options within the Area of Special Construction:**

New or Existing Sanitary/Storm Sewer Main		**New or Existing Water Main/Lateral**
Mitigation • Jointless Pipe[1] Manhole to Manhole, or • Water Quality Pipe[2] Manhole to Manhole	**And**	**No Mitigation Required**

New or Existing Sanitary Sewer Main **Mitigation** • SDR 35 – Greater than or equal to six feet of horizontal separation	**And**	**Existing Water Main/Lateral** **Mitigation** **No Mitigation Required**
New or Existing Sanitary Sewer Main **Mitigation** • SDR 35 – Less than six feet of horizontal separation	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Sanitary Sewer Main (Non SDR 35) **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Storm Sewer Main **Mitigation** • Internal/External Joint Sealant, or • Water-tight Joints, or • Plastic pipe with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints • Plastic pipe with D3212 joints	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
New Storm Sewer Main **Mitigation** • Internal/External Joint Sealant, or • Water-tight Joints, or • Plastic pipe with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**Existing Water Main/Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
Existing Storm Sewer Main (RCP) **Mitigation** • Internal/External Joint Sealant, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Pressurized Sewer Main **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**Existing Water Main/Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New Pressurized Sewer Main **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Pressurized Sewer Main **Mitigation** **Do not Disturb Existing Utility**	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

[1] Jointless pipe may be solid, welded, or fused pipe.

[2] Pipe conforming to AWWA requirements.

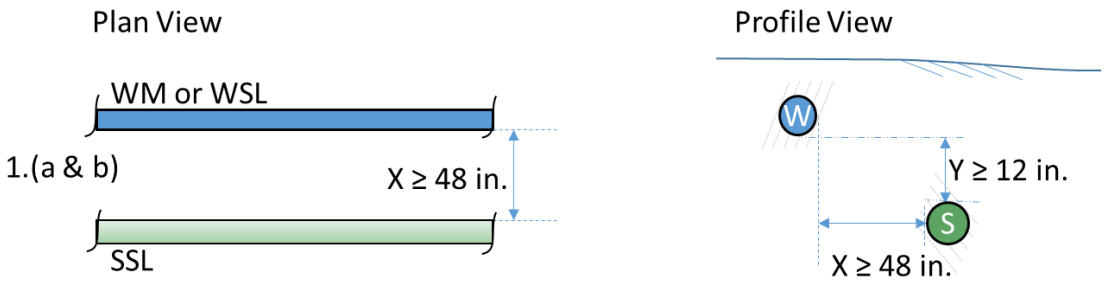
NDEP Engineering Technical Bulletin 2.0: Horizontal Separation

Water and Sewer Mitigations in Areas of Required Special Construction for Parallel Lines

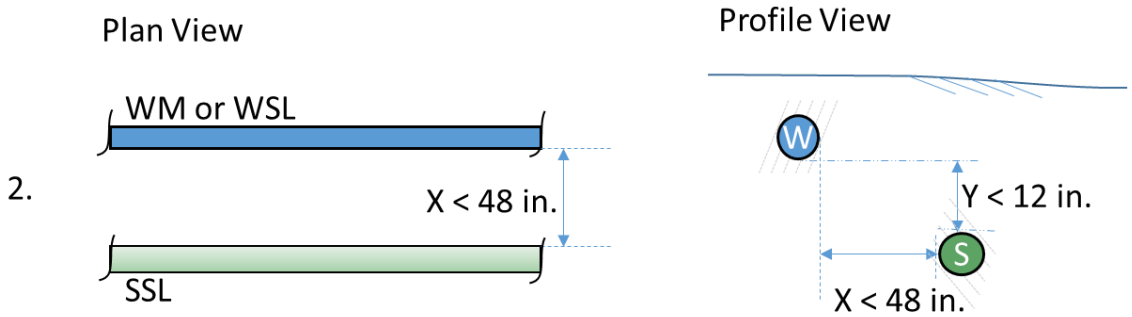
NAC 445A.6716 Sewer service lateral parallel to water main or water service lateral

- **Wherever possible, the sewer service lateral (SSL) must be lower than the water main (WM) or water service lateral (WSL), and must be located in a separate trench from the water main (WM) or water service lateral (WSL).**
- **The minimum required separation distances between the SSL and the WM or WSL are:**
  - **Horizontal separation of 48 inches,** as measured horizontally from the exterior walls of the pipes; and
  - **Vertical separation of 12 inches,** as measured vertically from the exterior walls of the pipes.
- **If compliance with the above is impracticable, the mitigation measures outlined below are required.**
- **Illustration:**

<u>No mitigation</u>



<u>Mitigation conditions</u>



- Where mitigation is required, the professional engineer shall demonstrate reasonable assurance that the proposed mitigation options for water and/or sewer lines are adequate to protect public health based on the conditions applicable.
- Mitigation options for SSL or WM/WSL must consider if the SSL, WM, or WSL exists prior to installation of new SSL or water lines.

- **Mitigation options within the Area of Special Construction:**

New or Existing Sewer Lateral **Mitigation** • Jointless Pipe[1] Manhole to Manhole, or • Water Quality Pipe[2] Manhole to Manhole	**And**	**New or Existing Water Main/Lateral** **No Mitigation Required**
New or Existing Sewer Lateral **Mitigation** • SDR 35 – Greater than or equal to four feet of horizontal separation	**And**	**New or Existing Water Main/Lateral** **Mitigation** **No Mitigation Required**
New or Existing Sewer Lateral **Mitigation** • SDR 35 – Less than four feet of horizontal separartion	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Sewer Lateral (Non SDR 35) **Mitigation** • Restrain Exposed Joints Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Pressurized Sewer Lateral **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**Existing Water Main/Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New Pressurized Sewer Lateral **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or

		• Concrete Encase Joints
Existing Pressurized Sewer Lateral **Mitigation** **Do not Disturb Existing Utility**	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

[1] Jointless pipe may be solid, welded, or fused pipe.

[2] Pipe conforming to AWWA requirements.

NDEP Engineering Technical Bulletin 3.0: Vertical Crossing Conflict

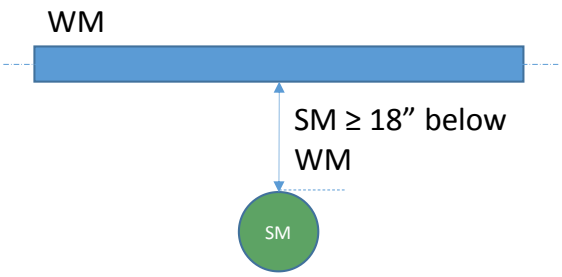
Water and Sewer Mitigations in Areas of Required Special Construction

NAC 445A.67165 Separation of Lines: Sewer main crossing water main.

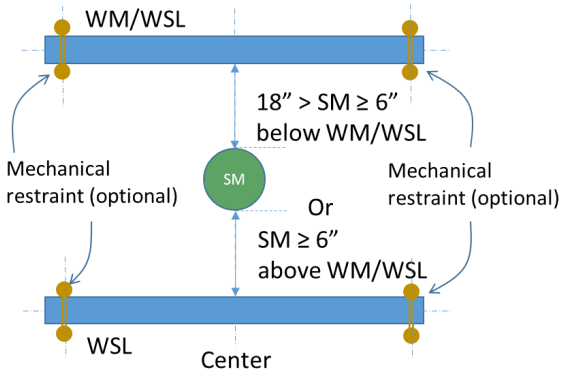
- **Wherever possible, the sewer main (SM) 18” below the water main (WM), as measured vertically from the exterior walls of the pipes.**
- **If compliance with the above requirement is impracticable:**
  - A minimum separation of 6” between water main and sewer main, as measured vertically from the exterior walls of the pipes, shall be maintained.
  - A reasonable effort to center water and sewer pipes at the crossing point shall be made.
  - Additional mitigation measures as outlined below must be used.

- **Illustration:**

No Mitigation



Mitigation Required



Mitigation conditions:

- Where mitigation is required, the professional engineer shall demonstrate reasonable assurance that the proposed mitigation options for water and/or sewer lines are adequate to protect public health based on the conditions applicable.

- **Mitigation options within the Area of Special Construction:**

New or Existing Sanitary/Storm Sewer Main **Mitigation** • Jointless Pipe[1] Manhole to Manhole, or • Water Quality Pipe[2] Manhole to Manhole	**And**	**New or Existing Water Main** **Mitigation** **No Mitigation Required**
New or Existing Sanitary Sewer Main **Mitigation** • SDR 35	**And**	**Existing Water Main** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New or Existing Sanitary Sewer Main **Mitigation** • SDR 35	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Sanitary Sewer Main (Non SDR 35) **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
New Storm Sewer **Mitigation** • Internal/External Joint Sealant, or • Water-tight Joints, or • HDPE with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
New Storm Sewer **Mitigation** • Internal/External Joint Sealant, or	**And**	**Existing Water Main** **Mitigation** • Restrain Exposed Joints, or

• Water-tight Joints, or • HDPE pipe with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints		• Concrete Encase Exposed Joints
Existing Storm Sewer Main (RCP) **Mitigation** • Internal/External Joint Sealant, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Pressurized Sewer **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**Existing Water Main** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New Pressurized Sewer **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Pressurized Sewer **Mitigation** **Do not Disturb Existing Utility**	**And**	**New Water Main** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

[1] Jointless pipe may be solid, welded, or fused pipe.

[2] Pipe conforming to AWWA requirements.

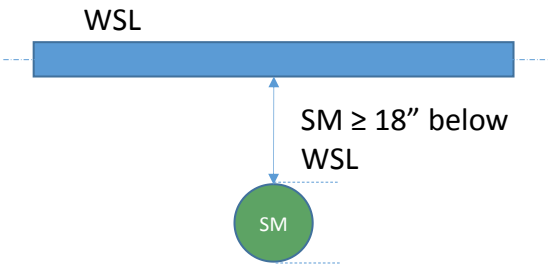
NDEP Engineering Technical Bulletin 4.0: Vertical Crossing Conflict

Water and Sewer Mitigations in Areas of Required Special Construction

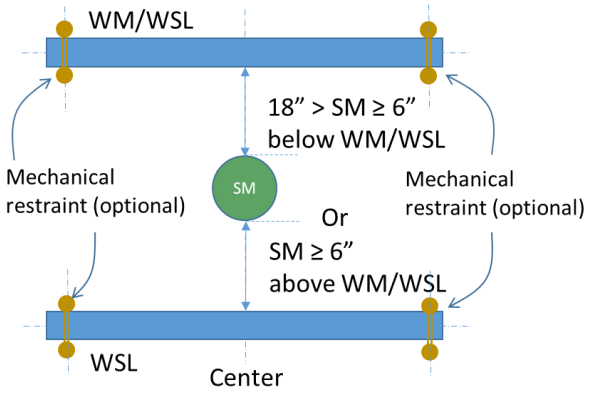
NAC 445A.6717 Separation of Lines: Sewer main crossing water service lateral.

- **Wherever possible, the sewer main (SM) 18” below the water service lateral (WSL), as measured vertically from the exterior walls of the pipes.**
- **If compliance with the above regulation is impracticable:**
  - A minimum vertical separation of 6” between water and sewer, as measured vertically from the exterior walls of the pipes, shall be maintained.
  - A reasonable effort to center water and sewer pipes at the crossing point shall be made.
  - Additional mitigation measures as outlined below must be used.
- **Illustration:**

No mitigation



Mitigation Required



- Where mitigation is required, the professional engineer shall demonstrate reasonable assurance that the proposed mitigation options for water and/or sewer lines are adequate to protect public health based on the conditions applicable.

- **Mitigation options within the Area of Special Construction:**

New or Existing Sanitary/Storm Sewer Main **Mitigation** • Jointless Pipe[1] Manhole to Manhole, or • Water Quality Pipe[2] Manhole to Manhole	**And**	**New or Existing Water Lateral** **No Mitigation Required**
New or Existing Sanitary Sewer Main	**And**	**Existing Water Lateral** **Mitigation**

Mitigation • SDR 35		• Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New or Existing Sanitary Sewer Main **Mitigation** • SDR 35	**And**	**New Water Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Sanitary Sewer Main (Non SDR 35) **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Storm Sewer **Mitigation** • Internal/External Joint Sealant, or • Water-tight Joints, or • HDPE pipe with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Lateral** **Mitigation option** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
New Storm Sewer **Mitigation** • Internal/External Joint Sealant, or • Water-tight Joints, or • HDPE pipe with D3212 joints, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**Existing Water Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
Existing Storm Sewer **Mitigation** • Internal/External Joint Sealant, or • Restrain Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Pressurized Sewer Main **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**Existing Water Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints

New Pressurized Sewer Main **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**New Water Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Pressurized Sewer Main **Mitigation** **Do not Disturb Existing Utility**	**And**	**New Water Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

[1] Jointless pipe may be solid, welded, or fused pipe.

[2] Pipe conforming to AWWA requirements.

NDEP Engineering Technical Bulletin 5.0: Vertical Crossing Conflict

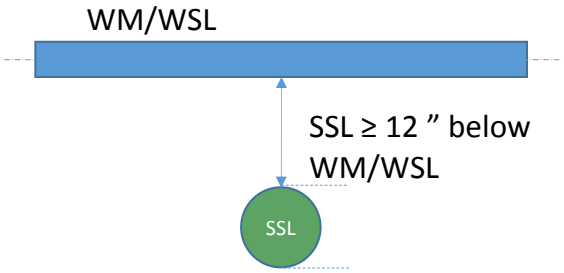
Water and Sewer Mitigations in Areas of Required Special Construction

NAC 445A.67175 Sewer service lateral crossing water main or water service lateral.

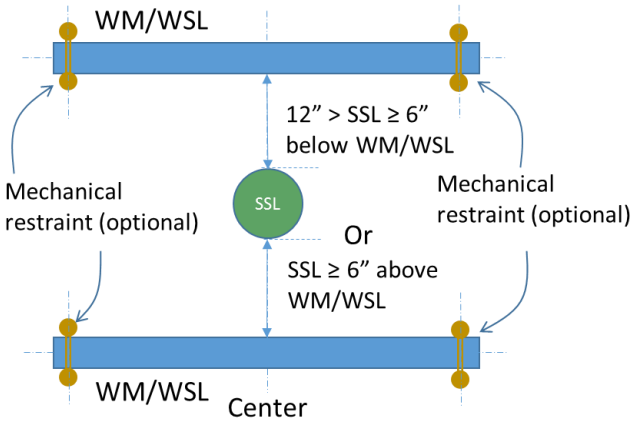
- **Wherever possible, the sewer service lateral (SSL) 12” below the water main (WM) or water service lateral (WSL), as measured vertically from the exterior walls of the pipes.**
- **If compliance with the above regulation is impracticable:**
  - A minimum vertical separation of 6” between water and sewer, as measured vertically from the exterior walls of the pipes, shall be maintained.
  - A reasonable effort to center water and sewer pipes at the crossing point shall be made.
  - Additional mitigation measures as outlined below must be used.

- **Illustration:**

No mitigation



Mitigation required



- Where mitigation is required, the professional engineer shall demonstrate reasonable assurance that the proposed mitigation options for water and/or sewer lines are adequate to protect public health based on the conditions applicable.

- **Mitigation options within the Area of Special Construction:**

New or Existing Sanitary Sewer Lateral **Mitigation** • Jointless Pipe[1] Main to Service Connection, or • Water Quality Pipe[2] Main to Service Connection	**And**	**New or Existing Water Main/Lateral** **No Mitigation Required**
New or Existing Sanitary Sewer Lateral **Mitigation** • SDR 35	**And**	**Existing Water Main/Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New or Existing Sanitary Sewer Lateral **Mitigation** • SDR 35	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Sanitary Sewer Lateral (Non SDR) **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

New Pressurized Sewer Lateral **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**Existing Water Main/Lateral** **Mitigation** • Restrain Exposed Joints, or • Concrete Encase Exposed Joints
New Pressurized Sewer Lateral **Mitigation** • Jointless Pipe[1], or • Water Quality Pipe[2] with Restrained Joints, or • Glued PVC Sewer Joints with Pipe Sleeve	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints
Existing Pressurized Sewer Lateral **Mitigation** **Do not Disturb Existing Utility**	**And**	**New Water Main/Lateral** **Mitigation** • Jointless Pipe[1], or • Pipe Sleeve with Water-tight End Seals, or • Restrain Joints, or • Concrete Encase Joints

[1] Jointless pipe may be solid, welded, or fused pipe.

[2] Pipe conforming to AWWA requirements.