Department of Health & Human Services
DHHS
NEBRASKA

Design and Installation Guide for Water Main and Sanitary/Storm Sewer Separations

The Department recognizes the challenges and difficulties in designing and installing distribution mains, especially in areas fraught with existing utilities. This guide was developed to assist design engineers with sanitary/storm sewer and water main separation design and installation. In the design and installation of water mains, design engineers must strive to achieve the separation distances required for water mains and fire hydrants from sanitary sewers, storm sewers and other potential sources of contamination as per the *Recommended Standards for Water Works*, 2007 Edition (Standards). In cases where it is impractical to achieve those separation distances required in the Standards, the protocols provided in this document must be followed to be considered in substantial conformance by the Department.

A. Sanitary Sewer and Water Main Separations

1. Sanitary Sewer and Water Main Horizontal Separations for Parallel Installations

a. **Scenario 1.** A 10 foot radial separation is considered equivalent to the 10 foot horizontal separation requirement if the water main is above the sanitary sewer and not within 5 feet horizontally.

b. **Scenario 2.** If the horizontal separation is **greater than 8 feet but less than 10 feet**, the installation would be acceptable if the following is provided:
   1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
   2) Reasons are provided as to why it is not practical to provide the 10 foot separation.

c. **Scenario 3.** If the horizontal separation is **greater than 4 feet but less than 8 feet**, the installation would be acceptable if the following is provided:
   1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
   2) Reasons are provided as to why at least 8 feet of separation cannot be provided; and
      (a) The water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sanitary sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sanitary sewer; or
      (b) The engineer may encase the water main or sanitary sewer pipe for protection (rigid welded piping or cement/concrete at least 4 to 6 inches thick, etc.) at locations where the separation cannot be met; or
      (c) The sanitary sewer pipe needs to be water works grade 150 psi pressure rated meeting AWWA Standards and pressure tested to ensure water tightness; or
      (d) An alternate method of protection with approval from the Department prior to construction.

d. **Scenario 4.** If the horizontal separation is less than 4 feet, the installation must not proceed prior to consulting and obtaining written approval from the Department.

2. Sanitary Sewer and Water Main Vertical Separations at Crossings

a. **Scenario 1.** If the water main **is above** the sanitary sewer pipe and the vertical separation is **greater than 12 inches but less than 18 inches**, the installation would be acceptable if the following is provided:
   1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
   2) Reasons are provided as to why the 18-inch separation cannot be met; and
   3) One full length of water pipe needs to be located so that both joints will be as far from the sanitary sewer crossing as possible.

b. **Scenario 2.** If the water main **is above** the sanitary sewer pipe and the vertical separation is **greater than 6 inches but less than 12 inches**, the installation would be acceptable if the following is provided:

1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why at least 12 inches of separation cannot be met; and
3) One full length of water pipe needs to be located so that both joints will be as far from the sanitary sewer crossing as possible; and
4) Proper support is provided to prevent settlement and breaking pipe; and
   (a) The engineer may encase either the water main or sanitary sewer pipe for protection (rigid welded piping or cement/concrete at least 4 to 6 inches, etc.) for at least 10 feet on each side of the crossing with the ends properly sealed; or
   (b) The sanitary sewer pipe needs to be water works grade 150 psi pressure rated meeting AWWA Standards and be pressure tested to ensure water tightness; or
   (c) An alternate method of protection with approval from the Department prior to construction.

c. **Scenario 3.** If the water main **is below** the sanitary sewer, the vertical separation is **greater than 6 inches but less than 18 inches**, the installation would be acceptable if the following is provided:
1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why at least 18 inches of separation cannot be met; and
3) One full length of water pipe needs to be located so that both joints will be as far from the sanitary sewer crossing as possible; and
4) Proper support is provided to prevent settlement and breaking pipe; and
   (a) The engineer may encase either the water main or sanitary sewer pipe for protection (rigid welded piping or cement/concrete at least 4 to 6 inches thick, etc.) for at least 10 feet on each side of the crossing with the ends properly sealed; or
   (b) The sanitary sewer pipe needs to be water works grade 150 psi pressure rated meeting AWWA Standards and be pressure tested to ensure water tightness; or
   (c) An alternate method of protection with approval from the Department prior to construction.

d. **Scenario 4.** If the vertical separation between the sanitary sewer line and the water main will be less than 6 inches, the installation must not proceed prior to consulting and obtaining written approval from the Department.

B. **Storm Sewer and Water Main Separations.** In general, the pollution hazards from a storm sewer are not as significant as a sanitary sewer since the storm sewer does not have flow in it year round. However, during rainstorm events, it may carry surface runoff which contains chemical pollutants but the pathogenic microbial impact is likely to be less than that of a sanitary sewer. For storm sewer and water main separations, the protocols provided in Section B.1 or B.2 must be followed.

1. **Storm Sewer and Water Main Horizontal Separations for Parallel Installations AND Storm Sewer and Water Main Joints Horizontal Separations at Crossings**

a. **Scenario 1.** If the horizontal separation is **greater than 4 feet but less than 10 feet**, the installation would be acceptable if the following is provided:
1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why the 10 foot separation cannot be met; and if necessary
3) Additional protection deemed necessary by the design engineer.

b. **Scenario 2.** If the horizontal separation will be **less than 4 feet**, the installation must not proceed prior to consulting and obtaining written approval from the Department.

2. **Storm Sewer and Water Main Vertical Separations at Crossings**

a. **Scenario 1.** If the water main **is above** the storm sewer pipe and the vertical separation is **greater than 6 inches but less than 18 inches**, the installation would be acceptable if the following is provided:
1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why the 18-inch separation cannot be met; and

3) One full length of water pipe needs to be located so that both joints will be as far from the storm sewer crossing as possible. Preference shall be given to keep joints further from any sanitary sewer than a storm sewer.
4) Proper support is provided to prevent settlement and breaking pipe.

b. **Scenario 2.** If the water main **is below** the storm sewer pipe and the vertical separation is **greater than 6 inches but less than 18 inches**, the installation would be acceptable if the following is provided:
1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why the 18-inch separation cannot be met; and
3) One full length of water pipe needs to be located so that both joints will be as far from the storm sewer crossing as possible. Preference shall be given to keep joints further from any sanitary sewer than a storm sewer; and
4) Proper support is provided to prevent settlement and breaking pipe; and
(a) The engineer may encase either the water main or storm sewer pipe for protection (rigid welded piping or cement/concrete at least 4 to 6 inches, etc.) for at least 10 feet on each side of the crossing with the ends properly sealed; or
(b) The storm sewer pipe needs to be water works grade 150 psi pressure rated meeting AWWA Standards and be pressure tested to ensure water tightness (the storm sewer pipe needs to be watertight when pressure tested to at least 10 psi); or
(c) An alternate method of protection with approval from the Department prior to construction.

c. **Scenario 3.** If the vertical separation between the storm sewer and the water main will be less than 6 inches, the installation must not proceed prior to consulting and obtaining written approval from the Department.

C. **Sanitary Sewer Force Main Separations**
1. At least **10 feet of horizontal separation** between water mains and sanitary sewer force mains must be provided. There must be **at least 18 inches of vertical separation** at crossings between water mains and sanitary sewer force mains and one full length of water pipe shall be located so both joints will be as far from the sewer as possible at the crossing.
2. Where it is impossible to meet these separation requirements for sanitary sewer force mains, the installation must not proceed prior to consulting and obtaining written approval from the Department.

D. **Fire Hydrants Separations**
1. **Fire Hydrant and Sanitary Sewer Separations**
a. Hydrant drains must not be connected to, or located with 10 feet of sanitary sewers.
b. Where it is impossible to meet the 10 foot horizontal separation between sanitary sewers and fire hydrant drains, the installation must not proceed to consulting and obtaining written approval from the Department.
2. **Fire Hydrant and Storm Sewer Separations**
a. Where it is impossible to meet the 10 foot horizontal separation requirement for storm sewers and hydrant drains, a less than 10 foot horizontal separation would be acceptable if the following is provided:
1) Engineer's professional opinion that the water quality in the water main will not be impacted based on an evaluation of the proposed installation and soil conditions; and
2) Reasons are provided as to why the 10 foot horizontal separation cannot be met; and
3) At least 5 feet of horizontal separation is provided.
b. Where it is impossible to provide at least 5 feet of horizontal separation of storm sewers to hydrant drains, the installation must not proceed prior to consulting and obtaining written approval from the Department.

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Water Main Separation from

A. Sanitary Sewer Parallel	paragraph	A 1 a	A 1 b	A 1 c	A 1 d	B. Storm Sewer	B 1 a	B 1 b
	Senario	1	2	3	4		1	2
	horizontal separation	10' radial	8' to 10'	4' to 8'	< 4"		4' to 10'	<4'
1	Engineer' Opinion = no impact (EO) &	> 5' horiz	EO	EO			EO	
2	Reasons why not practical (Why) &		Why	Why			Why	
2a	Separate Trench & 18" above (ST) or			ST				
2b	Encased in steel or concrete (Encase) or			Encase				
2c	150 psi rated AWWA pipe for sanitary sewer (AWWA) or			AWWA				
2c	10 psi tested storm sewer pipe (PT) or							
2d	Alternative Method (AM)			AM				
3	Additional Protection Necessary (AP)						AP	
	NDHHS Written Approval (WA)				WA			WA

A. Sanitary Sewer Crossings	paragraph	A 2 a	A 2 b	A 2 c	A 2 d	B. Storm Sewer	B 2 a	B 2 b	B 2 c
	Senario	1	2	3	4		1	2	3
	vertical separation	+12'" to +18"	+6 to +12"	-6" to -18"	< 6"		+6" to +18"	-6" to -18"	< 6"
1	Engineer' Opinion = no impact (EO) &	EO	EO	EO			EO	EO	
2	Reasons why not practical (Why) &	Why	Why	Why			Why	Why	
3	Full length water centered on sewer (FLC) &	FLC	FLC	FLC			FLC	FLC	
4	Proper Support - min 6" separation (PS) &		PS	PS			PS	PS	
4a	Encased in steel or concrete 10' each way (Encase) or		Encase	Encase				Encase	
4b	150 psi rated AWWA pipe for sanitary sewer (AWWA) or		AWWA	AWWA				PT	
4c	Alternative Method (AM)		AM	AM				AM	
	NDHHS Written Approval (WA)				WA				WA

C. Sanitary Sewer Fo	paragraph	C 1	C 2
1	Horizontal Separation &	10'	
1	Vertical Separation &	18"	
1	Full length water centered on sewer (FLC)	FLC	
2	NDHHS Written Approval (WA)	Fail any of above	WA

D. Fire Hydrant Drain Separation from

1. Sanitary Sewer	paragraph	D 1	2. Storm Sewer	D 2 a	D 2 b
	horizontal separation	< 10'		5" to 10'	< 5'
1	Engineer' Opinion = no impact (EO) &			EO	
2	Reasons why not practical (Why) &			Why	
3	At least				
	NDHHS Written Approval (WA)	WA			WA