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Public Health Engineering Guidelines
Sewer - Watermain Conflicts

1.0 Normal Construction

These guidelines are founded on the public health need for sanitary protection of watermains from contaminant sources, including sewers carrying domestic or storm sewage. Standards for water works throughout BC are generally consistent with *Ten States Standards for Water Works Construction* (http://10statesstandards.com/waterstandards.html). The basic rule is: the Water Supplier shall ensure that no sanitary sewer or storm sewer is constructed within 3.0 metres (10 feet), measured horizontally, or 450 mm (18 inches), measured vertically, of the watermain without the approval of Northern Health.

Parallel Installation: Watermains should be laid at least 3 m (10 ft) horizontally from any sanitary or storm sewer. The bottom of the watermain should be above the top of the sewer.

Crossings: Where a watermain crosses a sanitary or storm sewer, the watermain should be laid a minimum 450 mm (18 inches) ***above*** the sewer with the nominal centre of the pipe lengths located at the crossing to maximize the separation distance between joints.

Years of practice have demonstrated that these separations are usually achievable, and are successful in protecting the safety of potable water supply systems from contamination by sewers. Exceptions to these guidelines for normal construction will be considered only where the Water Supplier can demonstrate that all reasonable efforts have been made to avoid the conflict. Where approval timelines are tight, applicants are strongly encouraged to avoid proposing exceptions, as the additional review will inevitably delay the approval process somewhat, and exceptions may be rejected if the Public Health Engineer decides that public health is not being adequately protected.

2.0 General Exceptions

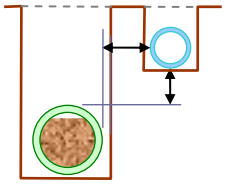
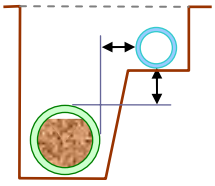
These guidelines generally apply to construction of new or modified watermains and sewers, and not to the operation of existing works, unless the existing works constitute a health hazard. Flexibility will always be given considering the need to connect the new mains to the existing pipe network. However, differences in the minimum depth required for frost protection of watermains and sewers will not be considered a sufficient reason for locating sewers above watermains without due protective measures.

If the design engineer can show that there is adequate structural support for the pipes at crossings, Northern Health may permit the watermain to cross *above* the sewer with a minimum of only 150 mm (6 inches) of vertical separation. Washington State guidelines (*Pipeline Separation Design and Installation Reference Guide*, www.doh.wa.gov/ehp/ts/ww/wp-pipeline.pdf) may also be referenced.

3.0 Specific Exceptions

Examples of situations for parallel construction and crossings are outlined in the tables and footnotes below. **Each exception** to normal construction must be noted in an attachment to the ***Application for a Waterworks Construction Permit*** with an explanation of why meeting the normal separation guidelines is not feasible. Designer should submit a schedule of **a)** locations (street name, stations) where normal separations cannot be met, along with **b)** horizontal clear separation, **c)** vertical clear separation (elevation of bottom of sewer – elevation of top of watermain), and **d)** protective measures at each location – see **Schedule A** below.

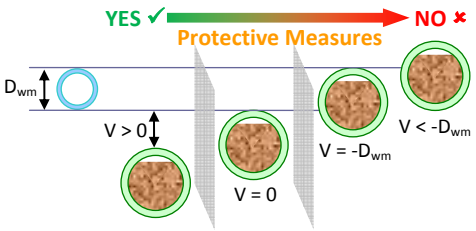
3.1 Parallel Lines

		Horizontal separation [1]	Vertical separation [2]
Separate Trenches [3]		**>3 m (horizontal) , >450 mm (vertical) — no special protection required**	
		1. >3 m	-D_{WM} to +450 mm [4]
		2. 1 to 3 m [5]	> 450 mm
		3. 1 to 3 m [5]	-D_{WM} to +450 mm [4]
Common Trench		4. > 1.0 m [5]	> 450 mm
		5. > 1.0 m [5]	0 to 450 mm

Preferred

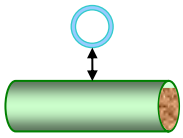
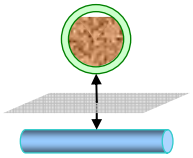
Not Generally Accepted

- [1] Horizontal separation less than 1.0 m is not allowed.
- [2] Vertical separation (V) = elevation of bottom of the watermain *minus* the elevation of the top of the sewer. See diagram to right. V > 0 implies positive hydraulic separation between the watermain and sewer and is always preferred. Any overlap (V<0) will require protective measures to block any leaked sewage.



- [3] Separately dug trenches in undisturbed soil with granular bedding around pipes.
- [4] If clear vertical separation is less than zero (bottom of watermain *below* top of sewer), a continuous hydraulic barrier (e.g. clay soil, geomembrane) or equivalent is required between the sewer and watermain.
- [5] Increase the pipe strength of watermain or sewers, or both, by a class, or wrap watermain joints. HDPE pipe may be required with fusion welded joints. Not applicable to sewer forcemains.

3.2 Crossings [6]

		>450 mm clear vertical separation – no special protection required
Watermain ***above*** sewer		1. 150 to 450 mm clear vertical separation – watermain joints to be protected [7] – additional bedding structural support required
Watermain ***below*** sewer [8,9]		2. >450 mm clear vertical separation – both watermain and sewer joints to be protected [7]
		3. 150 to 450 mm clear vertical separation – both watermain and sewer joints to be protected [7] – additional bedding structural support required

Preferred

Not Generally Accepted

- [6] Watermain to be laid ***above*** the sewer if possible, with the centre of the pipe located at the crossing to maximise the separation distance between joints. Vertical separation less than 150 mm not allowed.
- [7] Distance for protective measures is measured normal (perpendicular) to the sewer. See **Table 1** below for precautions to reduce the risk of sanitary and storm sewage entering watermains that may be considered.
- [8] Provide a hydraulic barrier in trench between sewer and watermain. Barrier must extend at least 300 mm (1 foot) beyond outer edge of watermain on both sides.
- [9] Not applicable to sewer forcemains.

Table 1. Example protective measures to be considered (more than one measure may be required)

▪ Protect watermain joints and sewer joints with shrink-wrap, petrolatum tape, or other equivalent pipeline protection products. For existing sewers, the distance for protective measures may be reduced to 1.5 m (5 feet) from the new watermain to avoid excessive excavation (see **Figure 1** below).
▪ Construct sewer of equivalent class pressure pipe or reinforced concrete pipe using flexible gaskets.
▪ Encase either watermain or sewer inside casing pipe sleeve. The casing pipe must be a material that is approved for use as watermain.

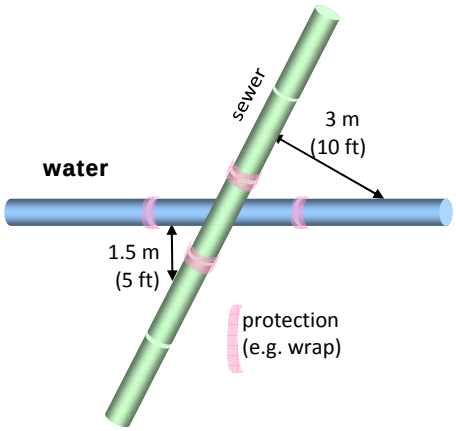


Figure 1. Joint wrapping where required.

4.0 Other Pipelines

Consideration must also be given to protecting potable water lines from other conveyance devices that may act as potential contaminant sources. Examples include, but are not limited to:

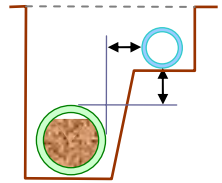
- raw water / fire protection / irrigation lines
- hydrocarbon transmission lines.

These should be treated as analogous to sanitary and storm sewers, with reasonable protective measures to be proposed on a case-by-case basis.

5.0 Manholes and Service Connections

Wherever possible, these construction practices should also apply to service connections. Locate water service taps on a watermain so that ***either*** the 3 m (10 foot) horizontal separation or 450 mm (18 inch) vertical separation above sanitary sewers, storm sewers, combined sewers, drains, and sewer service connections is provided. Where the normal separation distances are not possible, the bottom portion of manholes, manhole connections to sewers, service connections to sewers and joints in sewage service connections should all be designed not to leak. The watermain must not contact a manhole.

Dave Tamblyn
Regional Public Health Engineer
Northern Health Authority
Reviewed: March 2012



Schedule A: List of Sewer - Watermain Conflicts and Proposed Protective Measures

#	Street Name	Station (0+000)	Type [a] (X , 1 , 2)	Horizontal Separation (m)	Vertical Separation [b] (mm)	Proposed Protective Measures
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

[a] conflict types: **X** = crossing, **1** = parallel lines with single common trench for watermain and sewer(s), **2** = parallel lines with separate trenches for watermain and sewer(s)

[b] vertical separation = elevation of bottom of ***sewer*** – elevation of top of ***watermain***