



Table 5.4: Summary of Work Completed by the City of Fernie to Manage Inflow and Infiltration

Date	Work Completed
1978	Flushing, TV Inspection, Flow Monitoring and Smoke Testing conducted on entire Sanitary Sewer network.
1980	Rehabilitation work undertaken including main replacement, main relining, chemical grouting in mains and manholes, and manhole replacements were undertaken to reduce the influence of infiltration.
	316 m of pipe replacement, sealing of sewer mains, 164 manholes sealed, 600 m grease removal, 600 m of root treatment, 32 manhole rims raised, 270 manholes bolted, 11 catch basin disconnections.
1984	City of Fernie – Bylaw # 1370 (4) States: No owner or occupant of real property shall permit stormwater drainage to enter the City’s sanitary sewer system, where no connecting pipe to the City’s stormwater drainage system is provided, stormwater shall be dispersed from a parcel on the surface of the ground only.
1986	Downtown Roof Drain Diversion – Storm Main Installations and servicing of existing roof drain / sanitary connections.
1992	Ridgemont Sump Pump Survey – Household door to door reconnaissance investigation of roof leader and sump pump connections to sanitary service.
1995 to present	Elk River and Coal Creek water level monitoring during freshet, and or other high flow times, in order to draw correlations with infiltration.
	Weather Record correlations in order to draw correlations with I/I.
1996	Sanitary Sewer Trunkmain and Siphon Upgrade – 1340 m of 525 mm diameter PVC sewermain, 17 manholes, 130 m twin 250 mm diameter twin siphons (Elk River crossing).
1998	Sanitary Sewer System Analysis – Flow monitoring at main sewage lift station.
2001	Ghostrider Service Commercial Area – Sanitary manhole rim elevation raising, to eliminate inflow.
2002	Manhole flow monitoring Compound Weirs installed - April 18 to May 2, 2002. Site #1 – Pine Ave. and Ridgemont Drive (250 mm diameter pipe, MH#119, Site #2 – Main Lift Station (575 mm diameter pipe, MH#537), Site#3 – 4 th St. 6 th A Ave. (475 mm diameter pipe, MH#25, Site# 4- 4 th St. 8 th Ave. (360 mm diameter pipe, MH#164, Site #5 – 7 th St.-5 th 6 th Ave. Lane (375 mm diameter pipe, MH#40).
	West Fernie Trunkmain Upgrade – Replacement of 700 m of 375 mm diameter AC Sanitary main with 600 mm diameter PVC.



Table 5.4: Summary of Work Completed by the City of Fernie to Manage Inflow and Infiltration (continued...)

Date	Work Completed
2003	Piezometer Monitoring (Annex) – 5 – Testholes installed and groundwater level monitoring. City-wide Sump Pump Survey Questionnaire - Information regarding use of sump pumps, frequency of pumping, point of discharge, and comments were solicited.
2003 to present	Roof Drain Connection to Sanitary – Dye Testing Investigation (downtown and highway corridor).
2004	Catchbasin Cross – Connection / Reconnection to Storm Sewer – (10 th St. 9 th -10 th Ave. and 9 th St. 8 th -9 th Ave.). Old High School Roof Drain Re-connection to Storm Sewer on 9 th St.
2005 to present	Manhole rim plugging to reduce surface inflow. Roof Drain Cross-Connection Investigation – Dye testing and Storm sewer service extensions.
2006	Storm sewer main extended in 1 st -2 nd Ave lane between 5 th and 6 th St. with storm sewer services provided to the Royal Hotel (501 1 st Ave.) and Royal Canadian Legion (561 1 st Ave), where previous connections to sanitary are disconnected.
2007	Storm sewer service provided to 351 5 th Ave. where sump pump previously discharged groundwater to sanitary sewer service.
2008	City purchases 3 - area velocity flow monitors and begins data logging of flows in Manhole #s 52, 59, 630 on April 11 th . Trends in flow versus precipitation events are charted for future analysis, and development of an inflow / infiltration reduction strategy. The flow monitoring locations were chosen with the intention of determining areas of major influence, where a more detailed focus can be initiated.

As indicated in Table 5.4, above, the City’s most recent initiative is a further assessment on the inflow/infiltration flows, using monitoring equipment located strategically throughout the City. The City has purchased meters which can be used to measure flows in the sewer system. In addition to this, further information can be collated through assessing the pump run times at the existing lift stations.

Areas which have been the focus for monitoring are summarised in Figure 5.2. Five sites were monitored during the 2002 Sanitary Sewer Flow Study (by Southwestern Flowtech and Environmental Ltd.). These sites were:

Site 1: Pine Avenue and Ridgemont Drive



Site 2: Lift Station Inlet

Site 3: 4th Street and 6th Avenue

Site 4: 4th Street and 8th Avenue

Site 5: 7th Street Alley between 4th and 5th Avenue

A further 6 strategic locations were identified in 2006 as potential locations where monitoring should be conducted (Figure 5.2). The completion of this monitoring will help in understanding the origin of the flows, which is still largely unknown. Once the flow magnitude and origins are known, this can be used to develop a strategic plan where I/I can be addressed in a logical and cost effective manner.

In the future, the City plans the following activities to further reduced I/I:

- Flow monitoring in manholes;
- Dye testing of suspect roof drain connections;
- Sanitary manhole rim inflow inspection;
- Sanitary manhole replacement;
- Sump pump investigations (follow up to the collated survey information);
- Sanitary main pipe camera inspection;
- Review of past rehabilitated pipes and manholes;
- Smoke testing program; and
- Storm sewer system extensions and servicing program.