

The Village of Fruitvale
Comprehensive Stormwater Management Plan
Update 2010



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1.0 Background

CTQ Consultants Ltd was retained by The Corporation of the Village of Fruitvale (The Village) to update their existing Comprehensive Stormwater Management Plan that was prepared by Urban Systems in March 2000 (CSWMP 2000).

The purpose of this update is to review the improvements that have been made since the CSWMP 2000 was prepared and, in turn, update the stormwater model, associated maps, priority list, and cost estimates. This update will also address new concerns that have developed since 2000 and provide some general recommendations for future stormwater works.

2.0 Summary of Upgrades

This section outlines the identified upgrades that have been completed to the stormwater system since the writing of the CSWMP 2000 report. These upgrades were identified in consultation with the Village of Fruitvale Public Works Superintendent during a site visit. Record drawings were not available for any of the upgrades.

Although the upgrades in this section are within the areas identified in the CSWMP 2000 report, not all of them were completed as per the report. The upgrades include:

- High Priority Upgrades Installed (*Table 4.1a of the CSWMP 2000*)
 - o Portions of Priority 4 – Fruitvale Creek
 - New inlet structure with trash gate at Mountain Avenue
 - Removal of culvert at Park Lane
 - New inlet structure with trash gate at First Avenue
 - New 1200 CSP pipe across First Avenue to existing outlet structure
 - o Portions of Priority 6 – Fruitvale Creek to Nelson Ave.
 - Nelson Avenue – Hwy 3B to Cole Street – Completed
 - Cole Street – Nelson Ave to low point
 - Pipe 10016 installed from Cole St to the Southeast. The pipe runs through private property and dumps into an existing ditch close to Hwy 3B
 - Upgraded manhole and catch basin on Cole St.

- o Portions of Priority 11 – Eastview from Kootenay to Davis and easement to Mountain St.
 - Pipe 10017 installed
 - Manholes installed on Pipe 10017 at Pipe 7730 and 7710
- Other Identified Upgrades Installed (*Table 4.1b of the CSWMP 2000*)
 - o Item 1 – Easement from Davis to Coughlin
 - 600mm PVC Pipe was installed to service the new Seniors Housing development with required manholes. (Pipe 10006, 10007, 10008, 10009, 10010, 10011, 10012)
 - Overbuild Manholes were installed on Pipe 7632 and Pipe 8270

3.0 Recommended Updates

This section updates the recommended upgrades from the CSWMP 2000 report. The priority recommendations are identified first. The priority order has been modified slightly and new priority items have been added. Additionally some of the priorities identified in the CSWMP 2000 report contained multiple items; these have been separated into new priorities. The next section contains an update of the remaining recommendations from the CSWMP 2000.

3.1 High Priority Recommendations

The priority upgrades were rearranged based on information obtained during a site visit in October 2010 where problem areas were identified by the Village's Public Works Superintendent. The priorities with modified recommendations compared to the CSWMP 2000 report are identified below. For the other items, please refer to the CSWMP 2000 report.

- Priority 1.0 – Columbia Gardens Rd (At Beaver Creek)
 - o In order to accommodate flows from the Martin Street intersection, the following was modified:
 - Replaced the CB lead with 250mm PVC storm pipe
 - Added two manholes

- Priority 2.0 – Fruitvale Creek (Park Lane to First Street)
 - o Due to upgrades completed in the last 10 years and the visible condition of the Fruitvale Creek channel, the following was modified:
 - The 1200mm proposed pipe and headwalls were removed and replaced with a budget for channel restoration and armouring
 - New 250mm PVC pipe was added between Park Lane and First Street to accommodate drainage from Park Lane and Park Ave
- Priority 4.0 – Hillcrest Drive
 - o Based on conditions witnessed during the site visit and in based on conversations with the Village of Fruitvale, the following was modified:
 - Addition of curb and gutter
 - Addition of sidewalk
 - Addition of asphalt removal and replacement
- Priority 6.0 – Cole Street (Nelson Ave to low point)
 - o No modifications were made to this recommendation and we wanted to ensure that the Village still maintains this project as a high priority. Pipe 10016 which was installed from Cole St. towards Hwy 3B alleviates some of the overland stormwater flow, but it has been installed on private property in close proximity to buildings. Based on this, the Cole St. upgrades should be completed and Pipe 10016 decommissioned.
- Priority 13.0 – Columbia Gardens Rd (Martin Street to crossfall transition)
 - o This item was previously identified in the CSWMP 2000 report as other Item 30 (Easement on Church property from Kootenay to Columbia Gardens). Based on development that has occurred on the church property, as well as potential issues with the outfall on Kootenay Avenue; the piping for the proposed catch basins has been directed down Columbia Gardens Road,
 - o This item has also been upgraded to a higher priority in order to limit the sheet flow occurring across Columbia Gardens Road.
- Priority 14.0 - Robin Road
 - o Due to development at the west end of Hummingbird, a concrete headwall at the end of Robin Road has been added to this item. This headwall installation will alleviate concerns from minor flows, but the landowner at the west end of Hummingbird should be notified that they are responsible for maintaining natural drainage patterns, or restoring them if they have been modified.

- Priority 16.0 – Easement South of Coughlin Ave. – Seniors Housing
 - o In order to alleviate some of the pressure on the downstream pipes and ditches, the installation of a control structure will ensure that the pond on the Seniors Housing development will function as a detention facility, therefore reducing the peak flow.

Refer to Figure 1 and Figure 2 for more information on the existing and proposed stormwater system. The locations of the high priority items are identified on these drawings.

3.2 Other Items

The remaining identified items from the CSWMP 2000 are shown in Table 2. Note: This table matches the original Table 4.1(b) of the CSWMP 2000. Items completed or moved to high priority are shown with a “strikethrough”.

3.3 Cost Estimates

A detailed cost estimate has been prepared for the high priority upgrades. Refer to Table 3 for more information. Note: These cost estimates include road restoration, 25% contingency, 12% Engineering, and do not include HST. Road restoration was included for the high priority items in the event that the Village has to complete storm upgrades without repaving the entire road.

The Priority 11 and Priority 12 proposed solution has an alternate option of directional drilling through the high points of Davis Street and Mountain Street. Table 4 outlines the cost estimate for these alternate works.

For the other items, the summary shown in Table 2 includes a cost estimate. Since these items are not considered high priority, it is anticipated the works will not be completed for quite some time. Therefore, the scope of this project did not review these estimates in detail. The estimate was based on the CSWMP 2000 estimates with a multiplier of 1.5 applied to the previous estimate.

4.0 *Alternative Stormwater Strategies*

In the past, stormwater in general has been portrayed and dealt with as a problem. In most cases, the solution to dealing with runoff is to get it into a conveyance system (either piped or in a ditch) and send it “away”. These conveyance systems do a great job of collecting the runoff to a centralized location and discharging the runoff “downstream”. This can minimize or eliminate the local flooding issues, but at the same time create downstream issues such as erosion, pollution, and flooding.

To minimize the downstream effects, the generally accepted practice was to create large detention storage facilities (stormwater ponds, underground detention facilities, etc) to attenuate the large storm events and release the runoff at a slower, controlled release rate.

Studies have since shown that this method of dealing with stormwater does not provide the best solution for the environment. Using detention storage can still result in erosion and flooding and does not solve issues with pollution. Additionally, by capturing runoff and routing it to a centralized location, the natural system of infiltration, exfiltration and evapotranspiration are interrupted.

The new thinking around stormwater management is to treat stormwater as a resource instead of a problem. This is evident in the ever growing change in nomenclature from stormwater management to rainwater management. The general principles of rainwater management are to encourage development to proceed while attempting to mimic the runoff conditions that were present prior to urbanization. The practices are generally known as Low Impact Development (LID's) and Best Management Practices (BMP's).

The added benefit to the municipality of adopting this principle of rainwater management is to reduce the overall installation and ongoing maintenance costs of the municipal stormwater infrastructure. When done effectively, future growth of a community will not impact the existing system and retrofit applications can actually mitigate or eliminate existing infrastructure deficiencies.

Some examples of BMP's that help to deal with rainwater runoff at the source by storing, infiltrating, and utilizing the rainwater where it hits the ground include:

- Rain Gardens
- Bioswales
- Vegetative strips

- Infiltration basins
- Rain Barrels
- Green Roofs

5.0 Fruitvale Stormwater Policy

Typical municipal drainage section of subdivision bylaws require new developments to control their post development flows to a predevelopment level. An example is requiring the development to control the 1 in 100 year storm event to a 1 in 5 year predevelopment flow rate. A quick review of the Fruitvale Subdivision Bylaw Schedule F – Drainage shows that the current bylaw does not require attenuation of the post development runoff flows. Implementing a policy similar to this will minimize future impacts to downstream existing works as future development and growth of the Village occurs.

Additionally, some municipalities are going one step further and are starting to require new developments to match the post development runoff to the predevelopment runoff conditions for both flow rate and volume of runoff. Although this can be difficult (both physically and economically), utilizing the methods noted in Section 4.0 can help minimize the impacts of development.

Therefore, it is recommended for the Village to review their policy regarding stormwater runoff and drainage to ensure future developments do not create any new drainage issues or compound any existing issues.

6.0 Stormwater Model Updates

This update to the Fruitvale CSWMP 2000 was based on the previous model labeled “Scenario A”. This model was originally based on the existing OCP land uses and has now been updated to include any new developments. Refer to Figure 3 for the updated land use “Scenario A”. The scope of this update did not include a thorough review of the existing model input and design parameters. Instead, it was assumed that the existing model was acceptable and therefore the existing model parameters, storm events, and catchment areas have remained the same other than any developments since 2000 where land use changed from what is shown in the previous “Scenario A”.

7.0 Conclusion

In general, some progress has been made on the Village stormwater system since 2000. That said, significant works need to be constructed to ensure the high priority areas are operating at an acceptable standard to minimize the risk of flooding and property damage.

This update is intended to be used as a guide to aid the Village in deciding which upgrades should have priority and also to provide general guidance on future rainwater management techniques that can be implemented to minimize the impact to the existing infrastructure as well as downstream drainage systems.

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APPENDIX A

Construction Cost Estimates

Table 1 - Summary of High Priority Items

Priority Number	Location	Pipe ID Number	Road Inventory Number	Construction Cost Estimate (2010)
1.0	Columbia Gardens Rd (at Beaver Creek)	7820	59	\$ 36,648.00
2.0	Fruitvale Creek (Park Lane to First Street)	10001, 10002	27	\$ 120,012.00
3.0	Fruitvale Creek (At First Street)	7460, 10013	25	\$ 78,981.00
4.0	Hillcrest Drive	7370, 7380, 7390, 7400	31	\$ 483,439.00
5.0	Hwy 3B (Fruitvale Creek to Nelson Ave)	7500	N/A	\$ 82,885.00
6.0	Cole Street (Nelson Ave to Low Point)	7580, 7590	21	\$ 139,603.00
7.0	Kootenay Ave (Mountain St to Robin Rd)	8320, 8310	15, 16	\$ 94,640.00
8.0	Birch Ave (Columbia Gardens Rd to Muir St)	7250, 7200, 7210, 7220, 7230	61, 77, 83	\$ 298,386.00
9.0	Lane between Beaver and Main east of Laurier	7790, 7780, 7770	50, 52	\$ 60,760.00
10.0	Along BNR from Fruitvale Creek to Kootenay Ave/Hwy 3B	7760, 7750, 7610, 7730	N/A	\$ 340,582.00
11.0	Eastview from Kootenay to Davis and easement to Mountain St.	7730, 10017, 7860, 7850, 7710, 7690,	1, 6	\$ 359,248.00
12.0	Easement between Mountain and Davis (With Meadowlark Connection)	7680, 8480, 7670, 7660, 7620, 7890	3, 19	\$ 230,537.00
13.0	Columbia Gardens Rd (Martin Street to transition)	10014, 10015	59	\$ 59,766.00
14.0	Robin Road	8300, 8290	17	\$ 53,019.00
15.0	Mountain Street (Above Third Street)		N/A	\$ 4,864.00
16.0	Easement South of Coughlin Ave - Seniors Housing	10011, 10012	N/A	\$ 2,055.00
Total Construction Cost Estimate for High Priority Items				\$ 2,445,425.00

Table 2 - Summary of Other Items

Priority Number	Location	Pipe ID Number	Road Inventory Number	Construction Cost Estimate (2000)	Construction Cost Estimate (2010)
1.0	Easement from Davis to Coughlin	7650, 7640,	3	\$ 61,000.00	
2.0	Davis Road		3	\$ 22,000.00	\$ 33,000.00
3.0	Coughlin Road	7630	4	\$ 72,000.00	\$ 108,000.00
4.0	Davis Road north of Coughlin	8252	5	\$ 22,000.00	\$ 33,000.00
5.0	Hummingbird	8322, 8324	18	\$ 16,000.00	\$ 24,000.00
6.0	Mountain Street at Cole Street	7700	6, 7	\$ 37,000.00	\$ 55,500.00
7.0	Mountain Street - Kootenay to Short	7600	8	\$ 54,000.00	\$ 81,000.00
8.0	Kootenay Ave. from Hwy 3B to Mountain Street	8350, 8340,	13, 14	\$ 32,000.00	\$ 48,000.00
9.0	Cole St. - from low point to Schewe Cul de Sac	7570	21	\$ 33,000.00	\$ 49,500.00
10.0	Cole St. - Schewe Cul de Sac to Kootenay		21	\$ 30,000.00	\$ 45,000.00
11.0	Short St. to Schewe Cul de Sac	7550	23	\$ 17,000.00	\$ 25,500.00
12.0	Schewe Cul de Sac	7450, 7530,	Future Schewe Cul de Sac	\$ 30,000.00	\$ 45,000.00
13.0	Duncan Avenue	7520	22	\$ 24,000.00	\$ 36,000.00
14.0	Mountain St. from 1896 to Nelson		9	\$ 43,000.00	\$ 64,500.00
15.0	Mountain St. from Nelson to Hillcrest	8940, 8930,	10	\$ 37,000.00	\$ 55,500.00
16.0	Nelson from Cole to Mountain	7470	24	\$ 57,000.00	\$ 85,500.00
17.0	Park Lane from Nelson to Fruitvale Creek		26	\$ 12,000.00	\$ 18,000.00
18.0	Park Lane from Fruitvale Creek to Park Avenue	7420	27	\$ 10,000.00	\$ 15,000.00
19.0	Park Avenue	7410	28	\$ 39,000.00	\$ 58,500.00
20.0	First St. from Fruitvale Creek to Park Avenue	7460	25	\$ 16,000.00	\$ 24,000.00
21.0	Fourth Street	7360	32	\$ 33,000.00	\$ 49,500.00
22.0	Mackay Lane	7310, 7320	35, 36	\$ 63,000.00	\$ 94,500.00
23.0	Mackay from Hwy 3B to First Street	7340, 7330	37, 38	\$ 32,000.00	\$ 48,000.00
24.0	First Street from Hillcrest to Mackay		27	\$ 16,000.00	\$ 24,000.00
25.0	First Street from Mackay to Evergreen	7350	38	\$ 42,000.00	\$ 63,000.00
26.0	Evergreen	7030, 7040	41, 42	\$ 58,000.00	\$ 87,000.00
27.0	Third Street from Evergreen		43	\$ 18,000.00	\$ 27,000.00
28.0	Easement form Hwy 3B to First Street	7020	40	\$ 29,000.00	\$ 43,500.00
29.0	First Street from Easement to West End	7010	40	\$ 69,000.00	\$ 103,500.00
30.0	Easement on Church property from Kootenay to Columbia Gardens	7830	59	\$ 39,000.00	
31.0	Kootenay Avenue from Beaver to Main Street		79, 50, 56	\$ 13,000.00	\$ 19,500.00

Table 2 - Summary of Other Items

Priority Number	Location	Pipe ID Number	Road Inventory Number	Construction Cost Estimate (2000)	Construction Cost Estimate (2010)
32.0	Cedar Avenue	7840	81	\$ 34,000.00	\$ 51,000.00
33.0	Brookside Cul de Sac	7800, 7810	71, 72, 73	\$ 31,000.00	\$ 46,500.00
34.0	Maple Avenue		70	\$ 34,000.00	\$ 51,000.00
35.0	Elm Ave	7260, 8590	69	\$ 26,000.00	\$ 39,000.00
36.0	Barrett from Walnut to Juniper	7090	63, 64, 65	\$ 22,000.00	\$ 33,000.00
37.0	Outfall to Beaver Creek from Barrett	7110	N/A	\$ 41,000.00	\$ 61,500.00
38.0	Barrett from Juniper to the lane east of Laurel	7100, 7120,	65, 66, 67, 68	\$ 62,000.00	\$ 93,000.00
39.0	Lane from Barrett to Columbia Gardens	7140, 7150	N/A	\$ 94,000.00	\$ 141,000.00
40.0	Easement from Columbia Gardens to Green Rd through the school property	7160, 7170,	N/A	\$ 125,000.00	\$ 187,500.00
41.0	Pine Avenue	7070	76	\$ 40,000.00	\$ 60,000.00
42.0	Columbia Gardens from Walnut to Pine Avenue	7080	61, 62	\$ 20,000.00	\$ 30,000.00
43.0	Forsythia Cul de Sac	7060	74	\$ 10,000.00	\$ 15,000.00
44.0	Hwy 3B Frontage - Memorial Hall to Legion Hall		58	\$ 20,000.00	\$ 30,000.00
45.0	Kootenay Ave. - Beaver Creek to Green Rd	8000, 8002,	59, 60, outside Village Boundary		
46.0	Third St - West of Hillcrest		33	\$ 16,000.00	\$ 24,000.00
Total Construction Cost Estimate for other Priorities					\$ 2,326,500.00

Table 3 - Detailed Cost Estimate of the High Priority Items

Item	Description	Quantity	Units	Unit Price	Amount
1.0	Columbia Gardens Rd (at Beaver Creek)				
1.1	250mm PVC Storm	70	lm	\$ 115.00	\$ 8,050.00
1.2	1050 Manhole	2	ea	\$ 3,500.00	\$ 7,000.00
1.3	Side Inlet Catch Basin (with outlet)	1	ea	\$ 2,500.00	\$ 2,500.00
1.4	Asphalt Removal and Restoration	150	sqm	\$ 60.00	\$ 9,000.00
1.5	Curb Restoration	1	ls	\$ 200.00	\$ 200.00
	Sub Total				\$ 26,750.00
	Contingency			25%	\$ 6,688.00
	Engineering			12%	\$ 3,210.00
	Total				\$ 36,648.00
Pipe ID	7820				
2.0	Fruitvale Creek (Park Lane to First Street)				
2.1	250mm Pipe	85	lm	\$ 115.00	\$ 9,775.00
2.2	1050mm Manholes	2	ea	\$ 3,500.00	\$ 7,000.00
2.3	1800mm Manhole (On 1200mm CSP)	1	ea	\$ 7,900.00	\$ 7,900.00
2.4	Side Inlet Catch Basin	3	ea	\$ 2,000.00	\$ 6,000.00
2.5	200mm PVC Storm (CB Lead)	15	lm	\$ 95.00	\$ 1,425.00
2.6	Restore creek bank with stone or concrete	80	lm	\$ 200.00	\$ 16,000.00
2.7	Asphalt Removal and Restoration	100	sqm	\$ 350.00	\$ 35,000.00
2.8	Landscape Restoration	1	ls	\$ 4,500.00	\$ 4,500.00
	Sub Total				\$ 87,600.00
	Contingency			25%	\$ 21,900.00
	Engineering			12%	\$ 10,512.00
	Total				\$ 120,012.00
Pipe ID	10001 and 10002				
3.0	Fruitvale Creek (At First Street)				
3.1	375mm Pipe	40	lm	\$ 185.00	\$ 7,400.00
3.2	1050mm Manhole	1	ea	\$ 3,500.00	\$ 3,500.00
3.3	Side Inlet Catch Basin	6	ea	\$ 2,000.00	\$ 12,000.00
3.4	200mm PVC Storm (CB Lead)	50	lm	\$ 95.00	\$ 4,750.00
3.5	Asphalt Removal and Restoration	500	sqm	\$ 60.00	\$ 30,000.00
	Sub Total				\$ 57,650.00
	Contingency			25%	\$ 14,413.00
	Engineering			12%	\$ 6,918.00
	Total				\$ 78,981.00
Pipe ID	7460, 10013				
4.0	Hillcrest Drive				
4.1	300mm Pipe	190	lm	\$ 165.00	\$ 31,350.00
4.2	1050mm Manhole	4	ea	\$ 3,500.00	\$ 14,000.00
4.3	1050mm Manhole (Overbuild on existing 300mm pipe)	1	ea	\$ 4,000.00	\$ 4,000.00
4.4	Side Inlet Catch Basin	11	ea	\$ 2,000.00	\$ 22,000.00
4.5	200mm PVC Storm (CB Lead)	120	lm	\$ 95.00	\$ 11,400.00
4.6	Storm Services	12	ea	\$ 900.00	\$ 10,800.00
4.7	French Drain	40	lm	\$ 80.00	\$ 3,200.00
4.8	Concrete Curb and Gutter	800	lm	\$ 75.00	\$ 60,000.00
4.9	Concrete Sidewalk (1.5m Wide)	525	sqm	\$ 65.00	\$ 34,125.00
4.10	Asphalt Removal and Restoration	2700	sqm	\$ 60.00	\$ 162,000.00
	Sub Total				\$ 352,875.00
	Contingency			25%	\$ 88,219.00
	Engineering			12%	\$ 42,345.00
	Total				\$ 483,439.00
Pipe ID	7370, 7380, 7390, 7400				

Table 3 - Detailed Cost Estimate of the High Priority Items

Item	Description	Quantity	Units	Unit Price	Amount
5.0	Hwy 3B (Fruitvale Creek to Nelson Ave)				
5.1	450mm Pipe	60	lm	\$ 210.00	\$ 12,600.00
5.2	1800mm Manhole	1	ea	\$ 7,900.00	\$ 7,900.00
5.3	1050mm Manhole (Overbuild on existing 450mm pipe)	1	ea	\$ 4,000.00	\$ 4,000.00
5.4	Side Inlet Catch Basin	2	ea	\$ 2,000.00	\$ 4,000.00
5.5	200mm PVC Storm (CB Lead)	20	lm	\$ 95.00	\$ 1,900.00
5.6	Traffic Control	1	ls	\$ 8,500.00	\$ 8,500.00
5.7	Asphalt Removal and Restoration	360	sqm	\$ 60.00	\$ 21,600.00
	Sub Total				\$ 60,500.00
	Contingency			25%	\$ 15,125.00
	Engineering			12%	\$ 7,260.00
	Total				\$ 82,885.00
Pipe ID	7500				
6.0	Cole Street (Nelson Ave to Low Point)				
6.1	450mm Pipe	130	lm	\$ 210.00	\$ 27,300.00
6.2	1050mm Manhole	2	ea	\$ 3,500.00	\$ 7,000.00
6.3	Side Inlet Catch Basin	6	ea	\$ 2,000.00	\$ 12,000.00
6.4	200mm PVC Storm (CB Lead)	40	lm	\$ 95.00	\$ 3,800.00
6.5	Storm Services	4	ea	\$ 900.00	\$ 3,600.00
6.6	French Drain	40	lm	\$ 80.00	\$ 3,200.00
6.7	Asphalt Removal and Restoration	750	sqm	\$ 60.00	\$ 45,000.00
	Sub Total				\$ 101,900.00
	Contingency			25%	\$ 25,475.00
	Engineering			12%	\$ 12,228.00
	Total				\$ 139,603.00
Pipe ID	7580, 7590				
7.0	Kootenay Ave (Mountain St to Robin Rd)				
7.1	Remove existing catch basins	5	ea	\$ 300.00	\$ 1,500.00
7.2	Side Inlet Catch Basin	5	ea	\$ 2,000.00	\$ 10,000.00
7.3	200mm PVC Storm (CB Lead)	40	lm	\$ 95.00	\$ 3,800.00
7.4	Storm Services	15	ea	\$ 900.00	\$ 13,500.00
7.5	French Drain	185	lm	\$ 80.00	\$ 14,800.00
7.6	Asphalt Removal and Restoration	400	sqm	\$ 60.00	\$ 24,000.00
7.7	Landscape Restoration	1	ls	\$ 1,480.00	\$ 1,480.00
	Sub Total				\$ 69,080.00
	Contingency			25%	\$ 17,270.00
	Engineering			12%	\$ 8,290.00
	Total				\$ 94,640.00
Pipe ID	8320, 8310				
8.0	Birch Ave (Columbia Gardens Rd to Muir St)				
8.1	250mm Pipe	280	lm	\$ 115.00	\$ 32,200.00
8.2	1050 Manholes	8	ea	\$ 3,500.00	\$ 28,000.00
8.3	Side Inlet Catch Basin	11	ea	\$ 2,000.00	\$ 22,000.00
8.4	200mm PVC Storm (CB Lead)	80	lm	\$ 95.00	\$ 7,600.00
8.5	Asphalt Removal and Restoration	2100	sqm	\$ 60.00	\$ 126,000.00
8.6	Landscape Restoration	1	ls	\$ 2,000.00	\$ 2,000.00
	Sub Total				\$ 217,800.00
	Contingency			25%	\$ 54,450.00
	Engineering			12%	\$ 26,136.00
	Total				\$ 298,386.00
Pipe ID	7250, 7200, 7210, 7220, 7230				

Table 3 - Detailed Cost Estimate of the High Priority Items

Item	Description	Quantity	Units	Unit Price	Amount
9.0	Lane between Beaver and Main east of Laurier				
9.1	250mm Pipe	100	lm	\$ 115.00	\$ 11,500.00
9.2	1050 Manholes	3	ea	\$ 3,500.00	\$ 10,500.00
9.3	Side Inlet Catch Basin	4	ea	\$ 2,000.00	\$ 8,000.00
9.4	200mm PVC Storm (CB Lead)	30	lm	\$ 95.00	\$ 2,850.00
9.5	Outfall Rip Rap	1	ls	\$ 1,000.00	\$ 1,000.00
9.6	Asphalt Removal and Restoration	150	sqm	\$ 60.00	\$ 9,000.00
9.7	Landscape Restoration	1	ls	\$ 1,500.00	\$ 1,500.00
	Sub Total				\$ 44,350.00
	Contingency			25%	\$ 11,088.00
	Engineering			12%	\$ 5,322.00
	Total				\$ 60,760.00
Pipe ID	7790, 7780, 7770				
10.0	Along BNR from Fruitvale Creek to Kootenay Ave/Hwy 3B				
10.1	1200mm Pipe	330	lm	\$ 500.00	\$ 165,000.00
10.2	200mm Pipe	30	lm	\$ 95.00	\$ 2,850.00
10.3	1050 Manholes	3	ea	\$ 3,500.00	\$ 10,500.00
10.4	Outfall Structure with Rip Rap	1	ea	\$ 10,000.00	\$ 10,000.00
10.5	Dewatering	1	ls	\$ 5,000.00	\$ 5,000.00
10.6	Railway Crossing - Boring complete with casing	20	lm	\$ 1,200.00	\$ 24,000.00
10.7	Traffic Control	1	ls	\$ 11,500.00	\$ 11,500.00
10.8	Asphalt Removal and Restoration	140	sqm	\$ 75.00	\$ 10,500.00
10.9	Pipe Foundation in wet area	190	cum	\$ 25.00	\$ 4,750.00
10.10	Landscape Restoration	1	ls	\$ 4,500.00	\$ 4,500.00
	Sub Total				\$ 248,600.00
	Contingency			25%	\$ 62,150.00
	Engineering)			12%	\$ 29,832.00
	Total				\$ 340,582.00
Pipe ID	7760, 7750, 7610, 7730				
11.0	Eastview from Kootenay to Davis and easement to Mountain St.				
11.1	1200mm Pipe	185	lm	\$ 500.00	\$ 92,500.00
11.2	600mm Pipe	150	lm	\$ 350.00	\$ 52,500.00
11.3	250mm Pipe	175	lm	\$ 115.00	\$ 20,125.00
11.4	1050 Manholes	5	ea	\$ 3,500.00	\$ 17,500.00
11.5	1800 Manholes	3	ea	\$ 7,900.00	\$ 23,700.00
11.6	Catch Basins	10	ea	\$ 2,000.00	\$ 20,000.00
11.7	200mm PVC Storm (CB Lead)	80	lm	\$ 95.00	\$ 7,600.00
11.8	Storm Services	12	ea	\$ 900.00	\$ 10,800.00
11.9	Landscape Restoration	1	ls	\$ 11,500.00	\$ 11,500.00
11.10	Asphalt Removal and Restoration	100	sqm	\$ 60.00	\$ 6,000.00
	Sub Total				\$ 262,225.00
	Contingency			25%	\$ 65,556.00
	Engineering			12%	\$ 31,467.00
	Total				\$ 359,248.00
Pipe ID	7730, 10017, 7860, 7850, 7710, 7690, 7940				
12.0	Easement between Mountain and Davis (With Meadowlark Connection)				
12.1	1200mm Pipe	100	lm	\$ 500.00	\$ 50,000.00
12.2	450mm Pipe	180	lm	\$ 210.00	\$ 37,800.00
12.3	250mm Pipe	125	lm	\$ 115.00	\$ 14,375.00
12.4	1050 Manholes	10	ea	\$ 3,500.00	\$ 35,000.00
12.5	Catch Basins	8	ea	\$ 2,000.00	\$ 16,000.00
12.6	200mm PVC Storm (CB Lead)	60	lm	\$ 95.00	\$ 5,700.00
12.7	Storm Services	6	ea	\$ 900.00	\$ 5,400.00
12.8	Landscape Restoration	1	ls	\$ 1,000.00	\$ 1,000.00
12.9	Asphalt Removal and Restoration	50	sqm	\$ 60.00	\$ 3,000.00
	Sub Total				\$ 168,275.00
	Contingency			25%	\$ 42,069.00
	Engineering			12%	\$ 20,193.00
	Total				\$ 230,537.00
Pipe ID	7680, 8480, 7670, 7660, 7620, 7890				

Table 3 - Detailed Cost Estimate of the High Priority Items

Item	Description	Quantity	Units	Unit Price	Amount
13.0	Columbia Gardens Rd (Martin Street to transition)				
13.1	250mm Pipe	85	lm	\$ 115.00	\$ 9,775.00
13.2	1050 Manholes	2	ea	\$ 3,500.00	\$ 7,000.00
13.3	Catch Basins	3	ea	\$ 2,000.00	\$ 6,000.00
13.4	200mm PVC Storm (CB Lead)	30	lm	\$ 95.00	\$ 2,850.00
13.5	Asphalt Removal and Restoration	300	sqm	\$ 60.00	\$ 18,000.00
	Sub Total				\$ 43,625.00
	Contingency			25%	\$ 10,906.00
	Engineering			12%	\$ 5,235.00
	Total				\$ 59,766.00
Pipe ID	10014, 10015				
14.0	Robin Road				
14.1	Storm Services (High side only)	9	ea	\$ 1,100.00	\$ 9,900.00
14.2	Install Headwall at the top of Robin Road	1	ls	\$ 2,500.00	\$ 2,500.00
14.3	Asphalt Removal and Restoration (Service Install)	145	sqm	\$ 60.00	\$ 8,700.00
14.4	100mm French Drain	200	lm	\$ 80.00	\$ 16,000.00
14.5	Landscape restoration	1	ls	\$ 1,600.00	\$ 1,600.00
	Sub Total				\$ 38,700.00
	Contingency			25%	\$ 9,675.00
	Engineering			12%	\$ 4,644.00
	Total				\$ 53,019.00
Pipe ID	8300,8290				
15.0	Mountain Street (Above Third Street)				
15.1	Plug Culvert in Manhole	1	ls	\$ 200.00	\$ 200.00
15.2	400mm CSP from Manhole to Ditch	10	lm	\$ 160.00	\$ 1,600.00
15.3	Manhole Tie In	1	ls	\$ 250.00	\$ 250.00
15.4	Driveway restoration	1	ls	\$ 1,500.00	\$ 1,500.00
	Sub Total				\$ 3,550.00
	Contingency			25%	\$ 888.00
	Engineering			12%	\$ 426.00
	Total				\$ 4,864.00
16.0	Easment South of Coughlin Ave - Seniors Housing				
16.1	Install flow control device in the existing manhole	1	ls	\$ 1,500.00	\$ 1,500.00
	Sub Total				\$ 1,500.00
	Contingency			25%	\$ 375.00
	Engineering			12%	\$ 180.00
	Total				\$ 2,055.00
Pipe ID	10011, 10012				
Total Construction Costs - High Priority Works					\$ 2,445,425.00

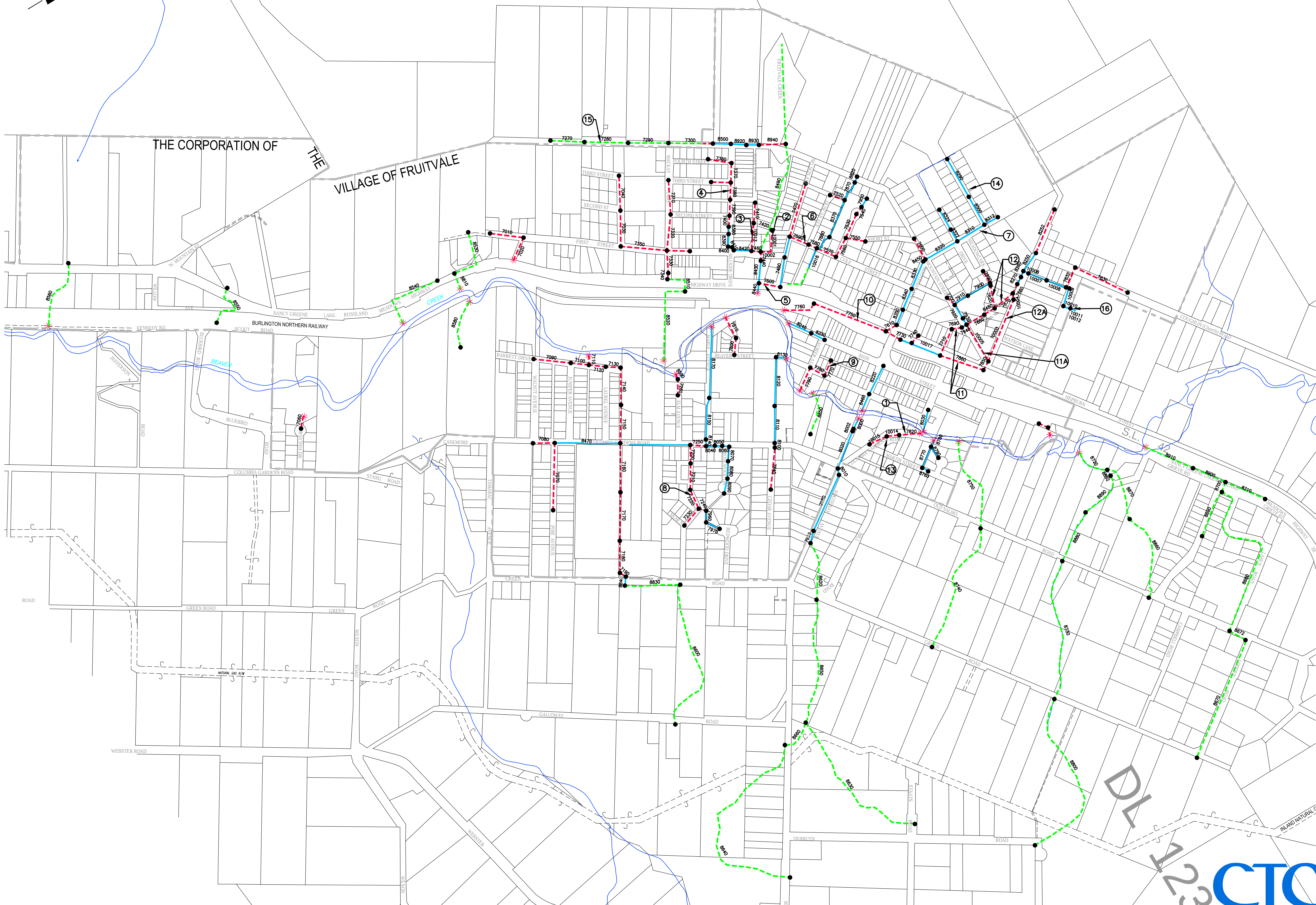
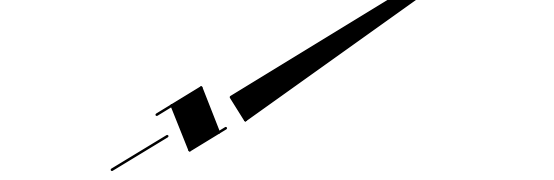
Table 4 - Detailed Estimates for Directional Drilling Options

Item	Description	Quantity	Units	Unit Price	Amount
11.a	Mountain Street (Directional Drilling)				
11a.1	450mm Pipe	112	lm	\$ 210.00	\$ 23,520.00
11a.2	1200mm Pipe	185	lm	\$ 500.00	\$ 92,500.00
11a.3	Boring (Complete with casing)	112	lm	\$ 1,100.00	\$ 123,200.00
11a.4	1800 Manholes	3	ea	\$ 7,900.00	\$ 23,700.00
11a.5	Side Inlet Catch Basins	10	ea	\$ 2,000.00	\$ 20,000.00
11a.6	200mm PVC Storm (CB Lead)	80	lm	\$ 95.00	\$ 7,600.00
11a.7	Landscape Restoration	1	ls	\$ 2,000.00	\$ 2,000.00
11a.8	Asphalt Removal and Restoration	200	sqm	\$ 75.00	\$ 15,000.00
	Sub Total				\$ 307,520.00
	Contingency			25%	\$ 76,880.00
	Engineering			12%	\$ 36,902.00
	Total				\$ 421,302.00
	Pipe ID 10005, 7860, 7850				
12.a	Davis Avenue (Directional Drilling)				
12a.1	600mm Pipe	170	lm	\$ 265.00	\$ 45,050.00
12a.2	450mm Pipe	200	lm	\$ 210.00	\$ 42,000.00
12a.2	250mm Pipe	85	lm	\$ 115.00	\$ 9,775.00
12a.3	Boring (Complete with casing)	185	lm	\$ 1,100.00	\$ 203,500.00
12a.4	1050 Manholes	2	ea	\$ 3,500.00	\$ 7,000.00
12a.5	1800 Manholes	3	ea	\$ 7,900.00	\$ 23,700.00
12a.6	Asphalt Removal and Restoration	140	sqm	\$ 75.00	\$ 10,500.00
12a.7	Landscape Restoration	1	ls	\$ 4,500.00	\$ 4,500.00
	Sub Total				\$ 346,025.00
	Contingency			25%	\$ 86,506.00
	Engineering			12%	\$ 41,523.00
	Total				\$ 474,054.00
	Pipe ID 10003,10004				

APPENDIX B

Maps

ORIGINAL BASE PLAN
FROM URBAN SYSTEMS
CSWMP 2000 REPORT



- LEGEND**
- CONTROL POINTS / MH'S**
- MAJOR SYSTEM INLET
 - MANHOLE/CONTROL POINT
 - * OUTFALL
- PIPES AND CHANNELS**
- CHANNEL - EXISTING
 - PIPE-EXISTING (RE-USE PIPE)
 - PIPE-PROPOSED (REPLACE EXISTING OR INSTALL A NEW PIPE)

FIGURE 1
FRUITVALE STORMWATER
PROPOSED SYSTEM
CONFIGURATION AND PIPE ID
NUMBERS
PROJECT No.10025
SCALE 1:5000
December 13, 2010



ORIGINAL BASE PLAN
FROM URBAN SYSTEMS
CSWMP 2000 REPORT

LEGEND

- CHANNEL - EXISTING
- PIPE - EXISTING
- PIPE - PROPOSED
- 10 PRIORITY ITEM

L:\General Data\Projects-2010\10025-FRUITVALE STORM PLAN\4-CAD\STORM FIGURES\10025-FIG2-1&2.dwg December 20, 2010 Haruko Kogami

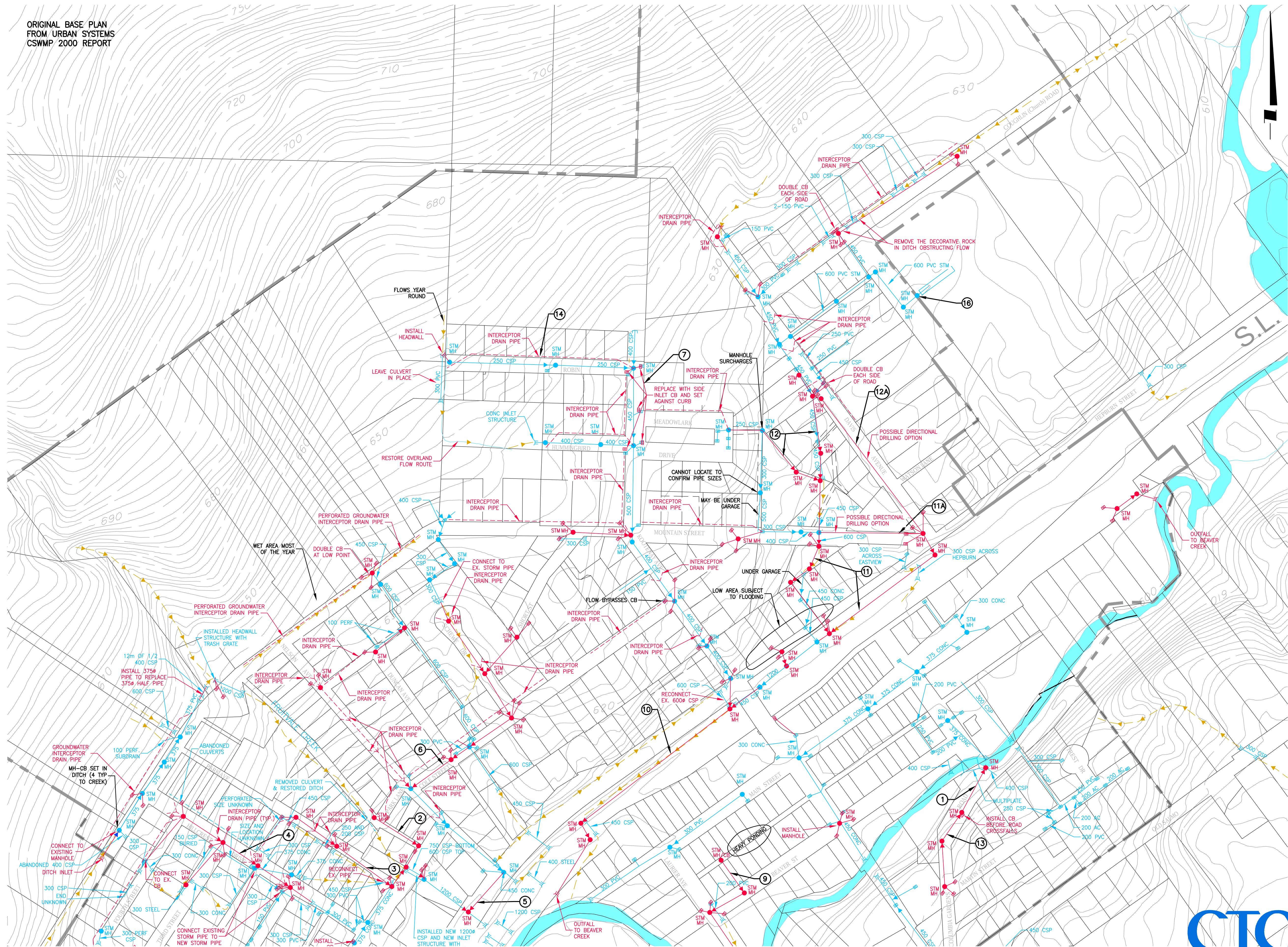


FIGURE 2 - SHEET 1 OF 2
COMPREHENSIVE STORMWATER
MANAGEMENT PLAN
PROJECT No.10025
SCALE 1:2000
December 17, 2010

ORIGINAL BASE PLAN
FROM URBAN SYSTEMS
CSWMP 2000 REPORT

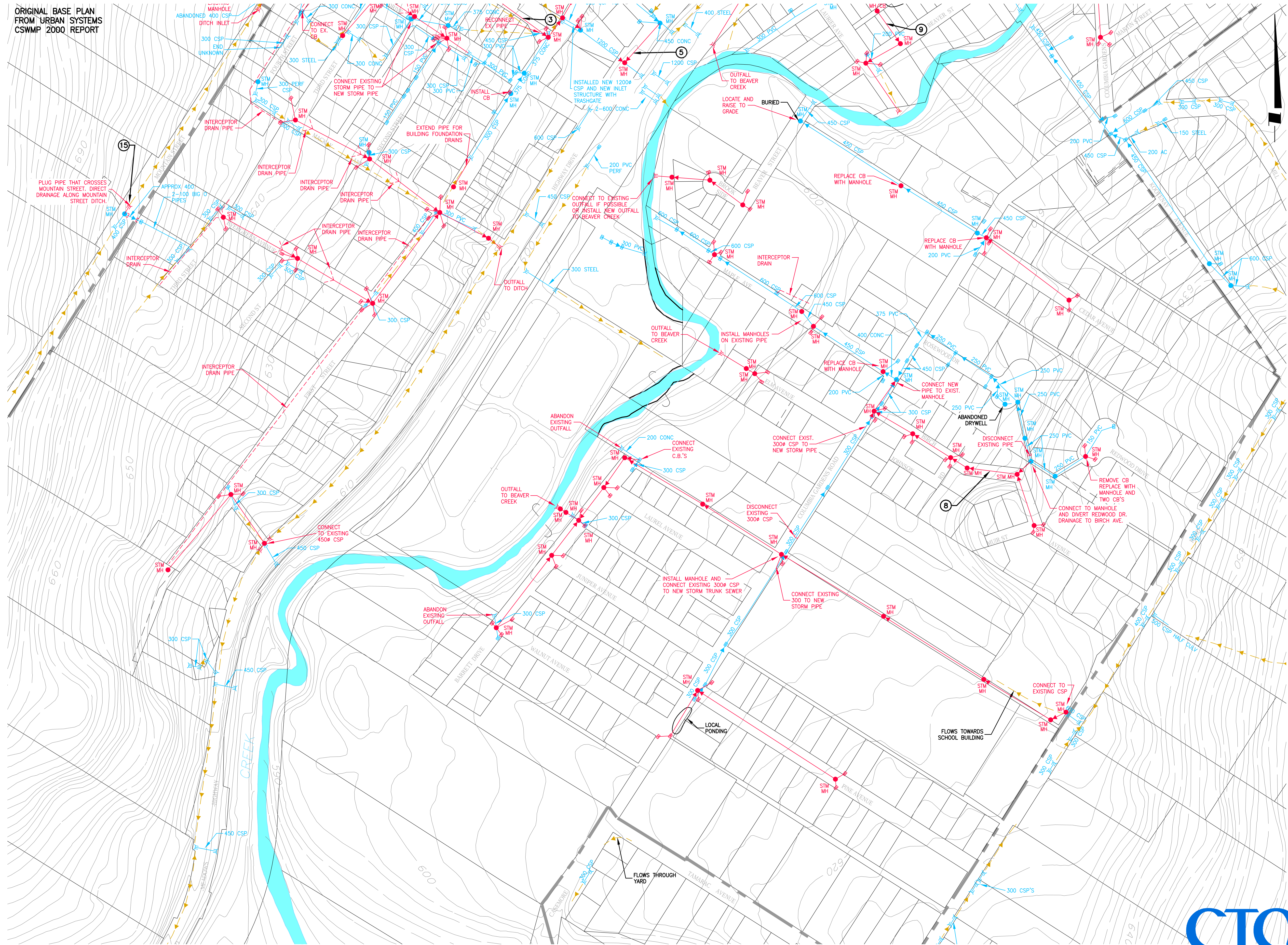


FIGURE 2 - SHEET 2 OF 2
COMPREHENSIVE STORMWATER
MANAGEMENT PLAN
PROJECT No.10025
SCALE 1:2000
December 17, 2010

ORIGINAL BASE PLAN
FROM URBAN SYSTEMS
CSWMP 2000 REPORT

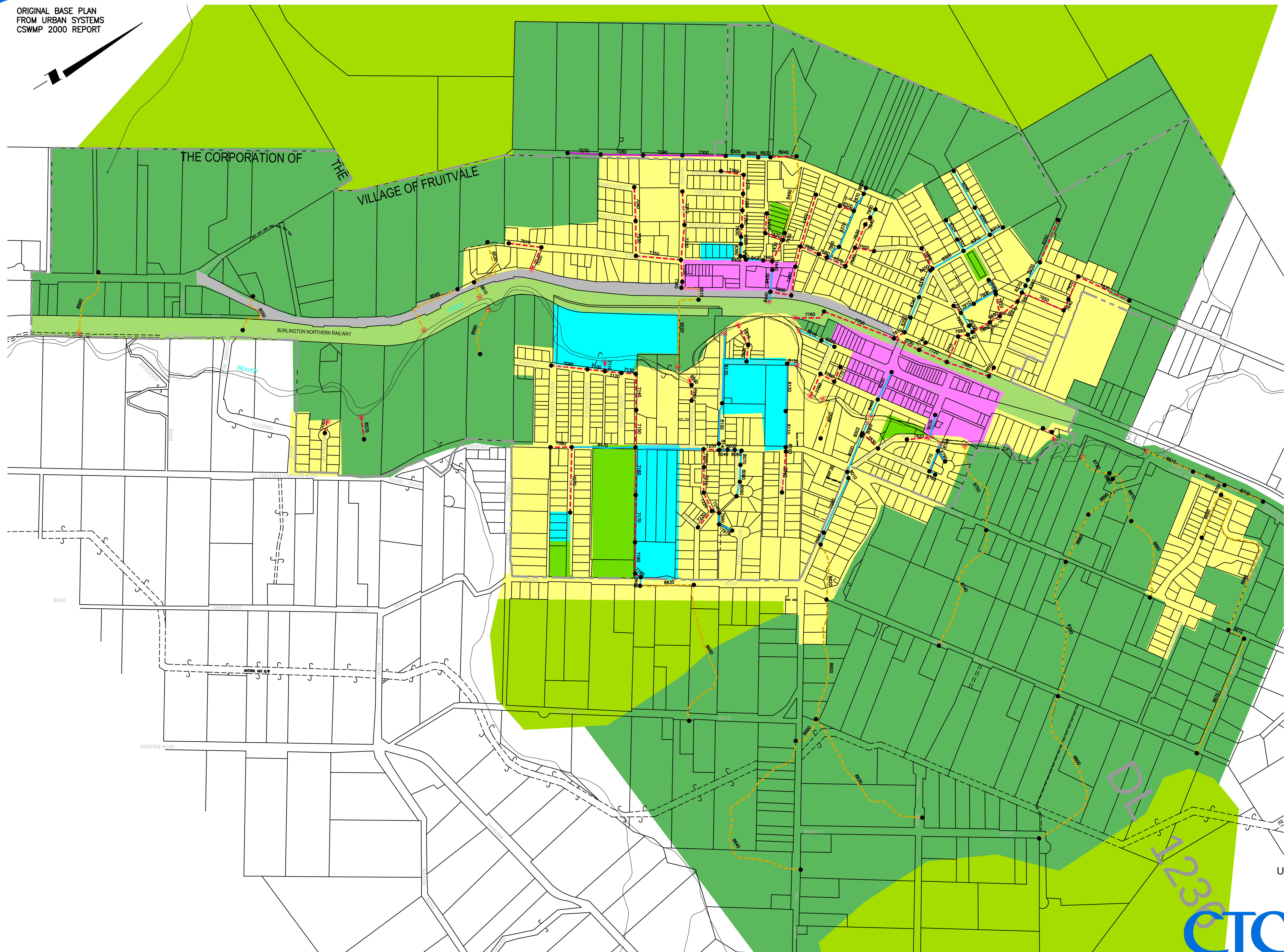


FIGURE 3
FRUITVALE STORM PLAN
UPDATED LAND USE SCENARIO "A"
PROJECT No.10025

SCALE 1:5000
December 17, 2010

CTO

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