ENGINEERING LTD.
2248 Columbia Avenue Castlegar, BC V1N 2X1 e-mail: mail@wsaeng.ca
Tel (250) 365-3696
Fax (250) 365-3607

30 March, 2009

File #: C09166 009

The City of Rossland
1899 Columbia Avenue
P.O. Box 1179
Rossland, BC V0G 1Y0

Attn: Mike Thomas, P.Eng, City Engineer

RE: COLUMBIA AVENUE INFRASTRUCTURE UPGRADING & REPLACEMENT STUDY

WSA Engineering Ltd. would like to thank the City of Rossland for the opportunity to provide them with this study. We trust that the information provided here will be helpful to the City in their planning and grant applications for future infrastructure replacement and upgrading work.

We look forward to working with the City on future engineering projects.

Respectfully submitted,
WSA ENGINEERING LTD.

Ralf Waters, M. Eng., P. Eng.
Senior Civil Engineer

Margaret Whidden, AScT
Technologist

The City of Rossland
Columbia Avenue Infrastructure Upgrade & Replacement Study

Prepared for the City of Rossland by:

WSA ENGINEERING LTD.

2248 Columbia Avenue, Castlegar, BC, V1N 2X1
P: (250) 365-3696
E: mail@wsaeng.ca
F: (250) 365-3607

CONTENTS

1. INTRODUCTION

1.1 Purpose

WSA Engineering Ltd. (WSA), on behalf of the City of Rossland (the City), has completed the following infrastructure upgrade and replacement study to identify upgrades to the City's existing infrastructure on Columbia Ave. (Hwy. 3B/22) between Monita St. and St. Paul St. that may be required within the next 20 years. The Ministry of Transportation (MOT) is planning on resurfacing this stretch of highway in 2010. The City would like to coordinate any required upgrading work to the infrastructure on this stretch of highway with the resurfacing being completed by the MOT.

This study will assess the existing condition of the City's underground infrastructure along Columbia Ave., between Monita St. and St. Paul St., including electrical, domestic water, sanitary sewer, and storm sewer. Surface features such as sidewalks, curb and gutter, and ornamental street lighting will also be assessed. Existing infrastructure details will be summarized and recommendations for upgrades will be provided. Cost estimates for any recommended upgrades will be calculated.

1.2 Method

WSA reviewed existing engineering reports and studies, mapping, and plans in order to determine required upgrades to the Columbia Ave. infrastructure. The "City of Rossland – Master Drainage Plan" prepared by Reid Crowther & Partners Ltd. in 1995 was referred to for the storm water system. The "City of Rossland – Red Mountain Sector Planning Report" prepared by Urban Systems in 2003 was referred to for the sanitary sewer system. The "City of Rossland – Water Model Study" prepared by Urban Systems in 2008 was used to assess domestic water system upgrades. Maps and plans provided by the City were reviewed with a representative from the Public Works Department to gain information about the condition of the existing infrastructure. WSA consulted with City representatives from the Public Works and Engineering Department to establish the City's priorities for infrastructure upgrades.

1.3 Background

The City of Rossland is located at the junction of Highway 22 and Highway 3B in the southern Kootenays, 10 km west of Trail and 10 km north of the US/Canada border on Highway 22 in the Kootenay Boundary Regional District of British Columbia. It is a quiet residential town with a population of approximately 3,600. The City is currently experiencing significant growth and much of its infrastructure is old and in need of replacement and/or upgrading. As a means of

making required infrastructure upgrades more economically feasible, the City recognizes the value of coordinating the works with the MOT resurfacing schedule.

2. ASSESSMENT

2.1 Inventory of Existing Domestic Water System

The existing domestic water system, consisting of mains, service connections, valves and fire hydrants along Columbia Ave. is very old (some piping dates back to 1930) and in need of repairs and upgrades. The City Public Works representative informed WSA that some sections of pipe along Columbia Ave. have greatly reduced capacity due to internal corrosion and deposition and that frequent repairs are required to fix leaks and ruptures.

The water mains and services located between Monita St. and Cliff St. on Upper Columbia Ave. were not assessed as part of this study because Upper Columbia Ave. will not be included in the MOT's resurfacing program. Approximately 115m of 200mm dia. asbestos-cement (AC) water main is located along Lower Columbia Ave. between Monita St. and Cliff St. with 5 services (see Fig. 1 for water system details). A north-south section of 200mm dia. AC main crosses Columbia Ave. at Cliff St. One fire hydrant is fed from this main.

No water mains or services are located on Columbia Ave. between Cliff St. and Davis St. Between Davis St. and Earl St., at 1765 Columbia Ave., a 150mm dia. water main comes from the north and turns east along Columbia Ave. The north-south portion of this main feeds one fire hydrant on Columbia Ave. Approximately 20m of 150mm dia. AC pipe heads down Columbia Ave. and increases to a 200mm dia. AC pipe just west of Earl St.

Between Earl St. and Spokane St., 150m of 200mm dia. AC main continues down Columbia Ave. There are 8 water services fed from this main.

Between Spokane St. and Washington St., the water main consists of 130m of 250mm dia. AC pipe. Seven services and one fire hydrant are fed from this main. This main is paralleled by an abandoned 200mm dia. steel pipe.

A 125m length of 200mm dia. steel main is located along Columbia Ave. from Washington St. to Queen St. Nine services and two fire hydrants are fed from this main.

This 200mm dia. steel main continues for another 130m along Columbia Ave., between Queen St. and St. Paul St. and feeds four services and one fire hydrant.

2.2 Inventory of Existing Sanitary Sewer System

The existing sanitary sewer system along Columbia Ave. needs some upgrades. According to City representatives, the sanitary sewer mains are in relatively good condition, however, the services need replacement. The City Public Works representative informed WSA that one Columbia Ave. business, Clancey's Cappuccino located at 2042 Columbia Ave., has regular sanitary sewer problems that are believed to be caused by sharing a service with the adjacent business.

The section of sanitary sewer that services Columbia Ave. between Monita St. and Cliff St. is located on Upper Columbia Ave. and has not been included in this assessment as this street is not part of the MOT resurfacing program.

Moving west to east on Columbia Ave. between Cliff St. and Davis St. are several sections of sanitary sewer main (see Fig. 2 for sanitary sewer details). Approximately 45m of 150mm dia. PVC installed in 1988 is followed by 30m of old PVC (age and diameter unknown). Continuing to the east of the old PVC is 45m of 150mm dia. PVC (1988). There are 4 services on this block. None of the services appear to originate from the section of old PVC pipe.

The sanitary sewer main on Columbia Ave. between Davis St. and Earl St. consists of 90m of 150mm dia. PVC pipe and 3 services.

The following block, from Earl St. to Spokane St., consists of 85m of 200mm dia. vitrified clay pipe (VCP) and 3 services.

Between Spokane St. and Washington St. is 130m of 250mm dia. blue brute pipe (1979). There are six services on this block, though one service is shown to be dead on City drawings.

Washington St. to Queen St. is serviced by 110m of 250mm dia. blue brute pipe (1979) followed by 30m of 300mm dia. VCP located within a rock tunnel. There are nine services located on this block of Columbia Ave.

Columbia Ave. from Queen St. to St. Paul St. is serviced by 100m of 250mm dia. blue brute pipe (1985) followed by 10m of 250mm dia. blue brute pushed through an existing 300mm dia. VCP. Eight services are located on this block.

2.3 Inventory of Existing Storm Water System

The existing storm water system along Columbia Ave. consists of various sizes of concrete, PVC, and vitrified clay pipe (VCP) which collect storm water runoff from catch basins and direct it to Washington St. where the storm sewer heads down hill in a southerly direction (see Fig. 3 for storm water system details).

A 200mm dia. concrete pipe comes down St Paul St. and increases to a 380mm dia. as it crosses Columbia Ave. A 450mm dia. concrete pipe continues down Columbia Ave in a westerly direction and increases to a 535mm dia. pipe at Queen St. This storm sewer continues down Columbia Ave. to Washington St. where it is joined by 380mm dia. VCP coming down Washington and a 380mm dia. concrete pipe coming from the west down Columbia. These pipes join in a manhole and a 535mm dia. concrete pipe heads south down Washington St. A 300mm dia. concrete pipe comes from west of Spokane St. and increases to a 380mm dia. pipe as it continues on to the manhole on Washington St. At Spokane St. a 380mm dia. VCP passes under Columbia Ave. and continues south on Spokane St. There is also a small diameter storm sewer on Columbia Ave. between Cliff St. and Davis St. which heads south down Davis St. and a 150mm dia. PVC storm sewer which heads south down Cliff St. A 450mm dia. storm sewer from upper Columbia Ave. crosses Lower Columbia Ave. and heads down Monita St.

On Columbia Ave., from Monita St. to St. Paul St. there are 41 top inlet style catch basins.

The City Public Works representative informed WSA that he suspects that many of the roof leads from the commercial buildings on Columbia Ave. are connected to the sanitary sewer system. The exact location of these cross-connections will be determined by dye testing in the spring of 2009.

2.4 Inventory of Existing Underground Electrical Conduit and Street Lighting

WSA reviewed the City's plans showing existing electrical conduit and street lighting along Columbia Ave. Between Spokane St. and St. Paul St. are approximately 36 lamp standards serviced by 38mm dia. and 50mm dia. underground conduit which runs under the existing sidewalk. Discussions with the City Engineer revealed that there is no need or immediate plan to upgrade the existing electrical conduit or street lighting system. There is no existing electrical ducting crossing under Columbia Ave.

2.5 Inventory of Existing Sidewalks

Columbia Ave., between Spokane St. and St. Paul St. is a wide thoroughfare with sidewalks, angle parking and one lane of traffic in each direction. The sidewalk along this section of

highway is 3m wide in most areas and widens out to 6m to form bump-outs at some intersections. The roadway and angle parking give a combined asphalt width of approximately 24m. The sidewalk on the north side of Columbia Ave. ends at Spokane St. On the south side of Columbia Ave., the sidewalk continues until just west of Davis St. Columbia Ave. narrows west of Spokane St. and splits into Upper Columbia Ave. and Lower Columbia Ave. just east of Cliff St. There are approximately 3000m^2 of paved sidewalk and 960m of curb and gutter on Columbia Ave. between Cliff St. and St. Paul St.

3.0 RECOMMENDED UPGRADES AND COST ESTIMATES

3.1 Domestic Water System Upgrades

Based on our discussions with City personnel, WSA recommends that all water mains, service connections, valves and hydrants be replaced along Columbia Avenue between Monita St. and St. Paul St. The existing infrastructure is in very poor condition and continuing the current approach of spot repairs to this system is not cost effective. All existing service connections should be replaced with a minimum 50mm dia. pipe for buildings with fire sprinklers or larger to match the existing size. For buildings with no sprinkler systems, a minimum 20 mm dia. pipe is required. For the purposes of cost estimation, 50mm services have been assumed from St Paul St. to Spokane St. and 20mm services have been assumed from Spokane St. to Monita St. Each new service is also assumed to be 10m in length.

All six fire hydrants should have the body, full connection and restraints replaced. City representatives stated that they would like a heritage style of fire hydrant to fit in with the heritage look of the street lighting.

It is recommended that all water mains be replaced with equivalent diameter PVC piping and that the old mains and services that are replaced be removed to facilitate efficient installation and future repairs on Columbia Ave.

The results from the Urban Systems 2008 “Water Model Study” were consulted to help identify water system upgrades necessary to provide adequate pressure and fire flows to new housing developments in Rossland. The study recommends increasing the 200mm dia. main coming down Cliff St. and crossing Columbia Ave. to a 250mm dia. The 200mm dia. AC main continuing west on Columbia Ave. is to remain as is but it is recommended to increase it to 250mm dia. after it turns south down Nevada St. WSA recommends that during the upcoming resurfacing, the 200mm dia. main on Columbia Ave. between Cliff St. and Nevada St. also be upgraded to 250mm dia. PVC.

Table 1 shows existing infrastructure details and recommended upgrades along with an estimated cost for the upgrades. Detailed cost estimates for all work required for recommended water system upgrades are included at the end of this report in Appendix A.

Table 1: Recommended Domestic Water System Upgrades

Location	Number of services	Existing pipe material and dia.	Recommended replacement material and dia.	Total estimated cost of replacement
Monita St. to Cliff St.	5x20mm	115m of 200mm AC	115m of 200mm PVC	$41,250.00
North-south section of pipe located west of Earl St.	1x150mm + hydrant	25m of 200mm AC	25m of 200mm PVC	$13,250.00
Davis St. to Earl St.	1x150mm + hydrant	20m of 150mm AC	20m of 150mm PVC	$11,000.00
Earl St. to Spokane St.	8x20mm	150m of 200mm AC	150m of 200mm PVC	$57,500.00
Spokane St. to Washington St.	7x50mm 1x150mm + hydrant	130m of 250mm AC	130m of 250mm PVC	$63,500.00
		130m of abandoned 200mm steel	Remove 130m of 200mm steel	$5,000.00
Washington St. to Queen St.	9x50mm 2x150mm + 2 hydrants	125m of 200mm steel	125m of 200mm PVC	$67,750.00
Queen St. to St. Paul St.	4x50mm 1x150mm + hydrant	130m of 200mm steel	130m of 200mm PVC	$49,500.00

3.2 Sanitary Sewer Upgrades

The sanitary sewer system along Columbia Ave. is in need of upgrades. According to the City Public Works representative, all the services need to be replaced and an additional service must be added at 2042 Columbia Ave. (Clancey's Cappuccino) where there is currently one service for two businesses.

The majority of sanitary sewer mains are composed of PVC pipe installed within the last 20-30 years. However, there are several short sections of main which should be upgraded (see Fig. 2). There is a 30m section of old PVC pipe located between Cliff St. and Davis St. Information

about the age and condition of this pipe is not known, and it should be replaced if found to be degrading. Between Earl St. and Spokane St., the existing 200mm dia. VCP should be upgraded to 200mm dia. PVC pipe. Between Washington St. and Queen St. there is a 30 m section of 300mm dia. VCP located within a rock tunnel that should be replaced.

The "City of Rossland – Red Mountain Sector Planning Report" prepared by Urban Systems in 2003 lists the sanitary main on Columbia Ave. between Washington St. and St. Paul St. as requiring an upgrade. The report recommends that the existing 250mm Blue Brut pipe and the section of 300mm VCP be upgraded to 380mm PVC. Table 2 provides a summary of recommended upgrades and a cost estimate for the work. Detailed cost estimates for all work required for recommended sanitary sewer upgrades are included at the end of this report in Appendix A.

Table 2: Recommended Sanitary Sewer System Upgrades

Location	Number of services	Existing pipe material and dia.	Recommended replacement material and dia.	Total estimated cost of replacement
Cliff St. to Davis St.	4x100mm	30m of old PVC	30m of new 150mm PVC (if required)	$18,000.00
Davis St. to Earl St.	3x100mm			$9,000.00
Earl St. to Spokane St.	3x100mm	85m of 200mm VCP	85m of 200mm PVC	$27,700.00
Spokane St. to Washington St.	6x100mm			$18,000.00
Washington St. at Columbia Ave.		17m of 200mm VCP	17m of 250mm PVC	$5,100.00
Washington St. to Queen St.	9x100mm	110m of 250mm Blue Brute (1979); 30m of 300mm VCP within a rock tunnel	140m of 380mm PVC	$76,000.00
Queen St. to St. Paul St.	8x100mm	100m of 250mm Blue Brute (1985); 10m of 250mm Blue Brute pushed through 300mmVCP	110m of 380mm PVC	$62,500.00
2042 Columbia Ave. (Clancey's Cappuccino)		Single service for two businesses	Add an additional 100mm service connection	$3,000.00

3.3 Storm Water Sewer Upgrades

Most of the existing storm sewer pipes along Columbia Ave. are functioning well and do not need to be replaced. The City of Rossland's "Master Drainage Plan" prepared by Reid Crowther & Partners Ltd. in 1995 gives some recommendations for future upgrades to the storm sewer system. Two of these upgrades are in the vicinity of Columbia Ave. and WSA recommends that the portion of these upgrades that cross Columbia Ave. be completed during the highway resurfacing (see Fig. 3). The first of these is a medium priority upgrade to increase the size of the vitrified clay storm water pipe coming down Spokane St. and crossing Columbia Ave. from a 380mm to a 525mm. During the resurfacing, the portion of this clay pipe crossing Columbia Ave. should be replaced with a 525mm PVC pipe.

The second recommendation is a low priority upgrade to increase the size of the vitrified clay storm water pipe coming down Washington St. from a 380mm to a 525mm. The portion of this clay pipe crossing Columbia Ave. should be replaced with a 525mm PVC pipe during the resurfacing.

According to the City, the current number (33) and spacing of catch basins is adequate for storm water removal and no additional catch basins are recommended. However, City representative stated that the existing top inlet catch basins should be upgraded to top and side inlet catch basins to increase storm water capture.

In order to eliminate the cross connections from the roof leads along Columbia Ave. to the sanitary sewer, the following recommendations are given. The City should conduct dye testing to confirm which roofs actually drain into the sanitary sewer. It is believed that the roof leads for the buildings go down into the basements and connect to the sanitary services. Since the existing storm sewer on Columbia Ave. is relatively shallow (76 cm – 200 cm deep), a new storm water collection pipe will need to be installed at a greater depth in order to attach the new storm water services. This collection main has been sized to have the capacity to carry the 25-year storm event. It will run from west of Spokane St. to Washington St. and east of St Paul St. to Washington St. The new main will then head south down Washington until it can connect to the existing 525mm storm sewer. Table 3 lists the proposed storm sewer upgrades showing pipe sizes, lengths, and estimated costs. Detailed cost estimates for all work required for recommended storm water system upgrades are included at the end of this report in Appendix A.

Table 3: Recommended Storm Water System Upgrades					
Location	**Number of CBs (to be replaced with side inlet CBs and 200mm lead)**	**Number of new services required**	**Existing pipe material, dia., and length**	**Recommended replacement pipe length, material, and dia.**	**Total estimated cost of replacement**
Monita St. at Columbia Ave.	1				$3,000.00
Cliff St. to Davis St.	8				$24,000.00
Earl St. to Spokane St.	3	2	N/A	115 m of 150mm PVC	$36,700.00
Spokane St. to Washington St.	6	3	N/A	65 m of 200mm PVC	$41,500.00
Spokane St. at Columbia Ave.		N/A	30 m of 380mm Clay	30 m of 525mm PVC	$10,500.00
Washington St. at Columbia Ave.		N/A	20 m of 380mm Clay	20 m of 525mm PVC	$7,000.00
Washington St. to Queen St.	7	11	N/A	140 m of 250mm PVC	$94,500.00
Queen St. to St. Paul St.	8	6	N/A	115 m of 200mm PVC	$68,000.00

3.4 Underground Electrical Upgrades

As discussed in section 2.4, the existing underground electrical conduit and street lighting meets all current and anticipated future needs. However, due to the infrastructure service upgrades, portions of the electrical conduit system that run under the sidewalk will need to be excavated around and some lamp standards will need to be temporarily removed and re-installed. This will increase the sidewalk removal and replacement costs at theses specific locations. Based on our recommended upgrades, approximately 520 lineal metres of electrical conduit will be affected. The additional cost for excavating around the existing electrical conduit has been included in the sanitary, storm and water service replacements unit costs. The cost of removing and re-installing approximately five lamp standards is estimated to be $1000.00 per lamp standard for a total of $5000.00.

3.5 Sidewalk, Curb and Gutter, and Bump-out Upgrades

Some of the existing sidewalk, curb and gutter and bump-outs will need to be removed and replaced to facilitate water, sanitary and storm service upgrades. City representative informed WSA that they would like to take this opportunity to replace all the sidewalk, curb and gutter and bump-outs on the north (uphill) side of Columbia Ave. between Spokane St. and St. Paul St., and on the south (downhill) side of Columbia Ave. between Queen St. and St. Paul St. In other areas, only sections of sidewalk, curb and gutter and bump-outs affected by service upgrades will be removed and replaced. It is estimated that approximately 520 lineal metres of curb and gutter and 1500m^2 of sidewalk and bump-outs will need to be removed and replaced during the service upgrading.

4.0 CONCLUSION

WSA's assessment of the City of Rossland's infrastructure along Columbia Ave. indicates that, although some sections are in good conditions and appear to be functioning well, there are significant sections that need replacement or upgrading.

The domestic water system is old and in poor condition and all mains and services are recommended for replacement. All hydrant bodies, connections and restraints should be replaced. There are also pipe sizing upgrades which have been identified in previous studies which should be completed during the resurfacing. The total cost for the recommended water system upgrades is estimated at $336,750.00.

The sanitary sewer system needs some upgrades to the mains and services. It is recommended that all services be replaced with new 100mm dia. PVC services. An additional 100mm service is required where one service currently serves two businesses. Sections of the sanitary sewer system have been identified in previous studies as requiring upgrades. We recommend that these upgrades along with our current recommendations be completed during the resurfacing at a total estimated cost of $239,300.00.

The storm water system appears to be operating well. Previous studies have indicated that some size upgrades are required along Columbia Ave. All of the identified cross connections between the roof drains and the sanitary sewer should be removed and a new storm water collection pipe should be installed to transport the roof runoff to an existing storm water main on Washington St. All top inlet catch basins should be replaced with combination inlet models. The total cost for these upgrades is estimated at $309,700.00.

Several sections of sidewalk and curb and gutter are recommended for complete replacement and other small sections will need to be replaced due to the recommended infrastructure service upgrade work. Some of the sidewalk removal will occur in areas where there are existing electrical conduits. Working around the electrical conduits will add to the cost of the sidewalk replacement, but has been accounted for in the cost of individual service installations. The total cost of the sidewalk upgrades is estimated at $241,520.00.

The cost estimates listed above do not include the anticipated roadway excavation costs associated with this work. Work such as asphalt and concrete saw cutting and asphalt removal is included in the detailed cost estimate in Appendix A. The total of these extra roadway excavation costs is estimated at $75,950.00.

A miscellaneous category is also included in the detailed cost estimate (Appendix A) and includes tree replacement, removing and re-installing lamp standards, traffic control, duck-boards, signage, and barriers. The cost for these miscellaneous items is estimated at $42,500.00.

Due to the limited scope of this study and the possibility of additional costs being incurred during this work that are unaccounted for in this study, a contingency of thirty-five percent ($436,002.00) has been added on to the total cost of the works listed above. Ten percent ($124,572.00) has been added for engineering design services that will be required to complete the upgrade and replacement work. The total cost estimate for the recommended work in this report, including contingency and engineering is $1,806,294.00.

APPENDIX A – SCHEDULE OF QUANTITIES AND PRICES

Appendix A

City of Rossland - Columbia Avenue Infrastructure Upgrade & Replacement Study

SCHEDULE OF QUANTITIES AND PRICES

ITEM NO.	MMCD REF.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
		ROADWAY EXCAVATION				
1	**02224** 1.8.4	Remove existing asphalt - 10,098m² - as a separate operation (estimated quantity based on location of recommended upgrades under Columbia Ave.)	Cubic metre	1010	$70.00	$70,700.00
2	**02512** 1.5.7	Sawcutting of asphalt and concrete	Lineal metre	750	$7.00	$5,250.00
3	**02224** 1.8.4	Remove and dispose of concrete curbs and gutters as separate item (in areas affected by service upgrades only)	Lineal metre	520	$6.00	$3,120.00
4	**02224** 1.8.4	Remove and dispose of concrete sidwalks as a separate operation (in areas affected by service upgrades only)	Square metre	1680	$10.00	$16,800.00
5	**02523** 1.4.3	Curb and gutter (in areas affected by service upgrades only)	Lineal metre	520	$80.00	$41,600.00
6	**02523** 1.4.5	Sidewalk, or walkway including ramps, 100mm thick, c/w granular base (in areas affected by service upgrades only).	Square metre	1500	$120.00	$180,000.00
					ROADWAY SUBTOTAL	**$317,470.00**
		WATER WORKS				
1	**02666** 1.8.1/2	Pipe - 150mm diam PVC, imported backfill	Lineal metre	20	$200.00	$4,000.00
2	**02666** 1.8.1/2	Pipe - 200mm diam PVC, imported backfill	Lineal metre	545	$250.00	$136,250.00
3	**02666** 1.8.1/2	Pipe - 250mm diam PVC, imported backfill	Lineal metre	130	$300.00	$39,000.00
4	**02666** 1.8.13	Tie-in - all sizes	Each	14	$2,000.00	$28,000.00
5	**02666** 1.8.5	Service connection - 20mm diam., all lengths	Each	13	$2,500.00	$32,500.00
6	**02666** 1.8.5	Service connection - 50mm diam., all lengths	Each	20	$2,500.00	$50,000.00
7	**02666** 1.8.4	Hydrant assembly - Heritage Style	Each	6	$3,500.00	$21,000.00
8	**02666** 1.8.5	Hydrant lead 150mm - c/w tee and isolating valve	Each	6	$3,500.00	$21,000.00
9		Remove old unused pipe	Lump Sum	1	$5,000.00	$5,000.00
					WATER SUBTOTAL	**$336,750.00**

Appendix A

City of Rossland - Columbia Avenue Infrastructure Upgrade & Replacement Study

SCHEDULE OF QUANTITIES AND PRICES

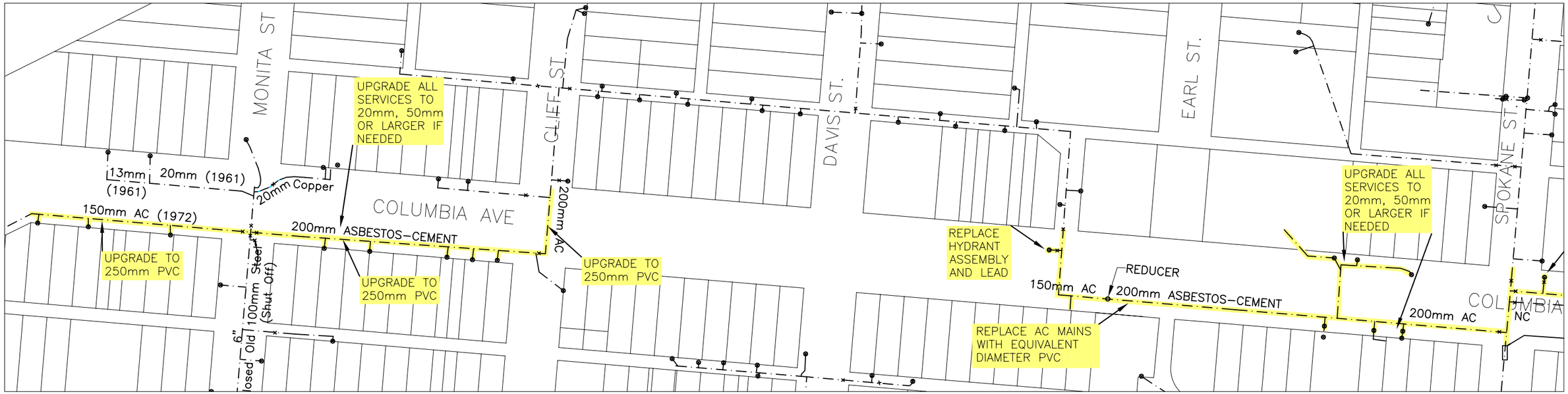
		SANITARY SEWER				
1	**02731** 1.6.1/2	Pipe - 150mm diam. PVC, imported backfill.	Lineal metre	30	$200.00	$6,000.00
2	**02731** 1.6.1/2	Pipe - 200mm diam. PVC at __ to __m depth,, imported backfill.	Lineal metre	85	$220.00	$18,700.00
3	**02731** 1.6.1/2	Pipe - 250mm diam. PVC, imported backfill.	Lineal metre	17	$300.00	$5,100.00
4	**02731** 1.6.1/2	Pipe - 380mm diam. PVC, imported backfill.	Lineal metre	250	$350.00	$87,500.00
5	**02731** 1.6.7	Tie-in -all sizes to sewer or existing manhole	Each	10	$2,000.00	$20,000.00
6	**02731** 1.6.3	Service connection - 100mm diam., all lengths	Each	34	$3,000.00	$102,000.00
					SANITARY SUBTOTAL	**$239,300.00**
		STORM WATER				
1	**02721** 1.6.1/2	Pipe - 150mm diam. PVC, imported backfill.	Lineal metre	115	$180.00	$20,700.00
2	**02721** 1.6.1/2	Pipe - 200mm diam. PVC, imported backfill.	Lineal metre	180	$200.00	$36,000.00
3	**02721** 1.6.1/2	Pipe - 250mm diam. PVC, imported backfill.	Lineal metre	170	$250.00	$42,500.00
4	**02721** 1.6.1/2	Pipe - 525mm diam. PVC, imported backfill.	Lineal metre	50	$350.00	$17,500.00
5	**02721** 1.6.3	Service connection 150mm diam., all lengths	Each	22	$3,500.00	$77,000.00
6	**02721** 1.6.9	Tie-in - all sizes to sewer or existing manhole	Each	6	$2,000.00	$12,000.00
7	**02725** 1.5.1.1	Manhole base, lid, slab, cover and frame 1050mm diam.	Each	1	$5,000.00	$5,000.00
8	**02725** 1.6.3	Catch basin - side inlet c/w lead	Each	33	$3,000.00	$99,000.00
					STORM SUBTOTAL	**$309,700.00**
		MISCELLANEOUS				
1		Remove then replace existing lamp standards (in areas affected by service upgrades only)	Each	5	$1,000.00	$5,000.00
2		Replace damaged trees	Each	5	$500.00	$2,500.00
3		Temporary duck-boards, signage, barriers (to be provided by contractor)	Lump Sum	1	$20,000.00	$20,000.00
4		Traffic control	Day	30	$500.00	$15,000.00
					MISC. SUBTOTAL	**$42,500.00**

REPLACEMENT AND UPGRADE WORK SUBTOTAL: $1,245,720.00

CONTINGENCY + 35%: $436,002.00
ENGINEERING + 10%: $124,572.00

TOTAL: $1,806,294.00

FIGURES



COLUMBIA AVE. DOMESTIC WATER SYSTEM FROM MONITA ST. TO SPOKANE ST.

COLUMBIA AVE. DOMESTIC WATER SYSTEM FROM SPOKANE ST. TO ST. PAUL ST.

LEGEND

- EXISTING DOMESTIC WATER MAINS AND SERVICES
- EXISTING VALVE
- EXISTING HYDRANT
- EXISTING SERVICE
- RECOMMENDED WATER SYSTEM UPGRADES AND REPLACEMENTS

NO.	DATE	ISSUES	BY	APP'D

NO.	DATE	REVISIONS	BY	APP'D

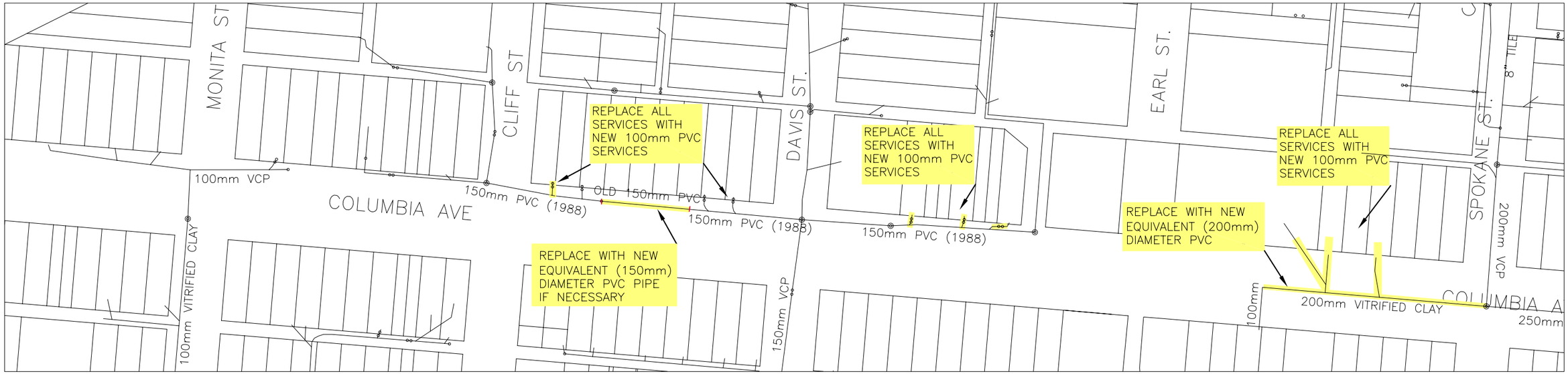
WSA ENGINEERING LTD.
WOODS SAHLSTROM ASSOCIATES
Geotechnical • Civil • Structural • Materials Testing
2248 Columbia Ave. Castlegar, B.C. V1N 2X1 Ph: (250) 365-3696

DSGN:	–
DWN:	MW
CHK:	RW
DATE DWN.	30-MAR-09

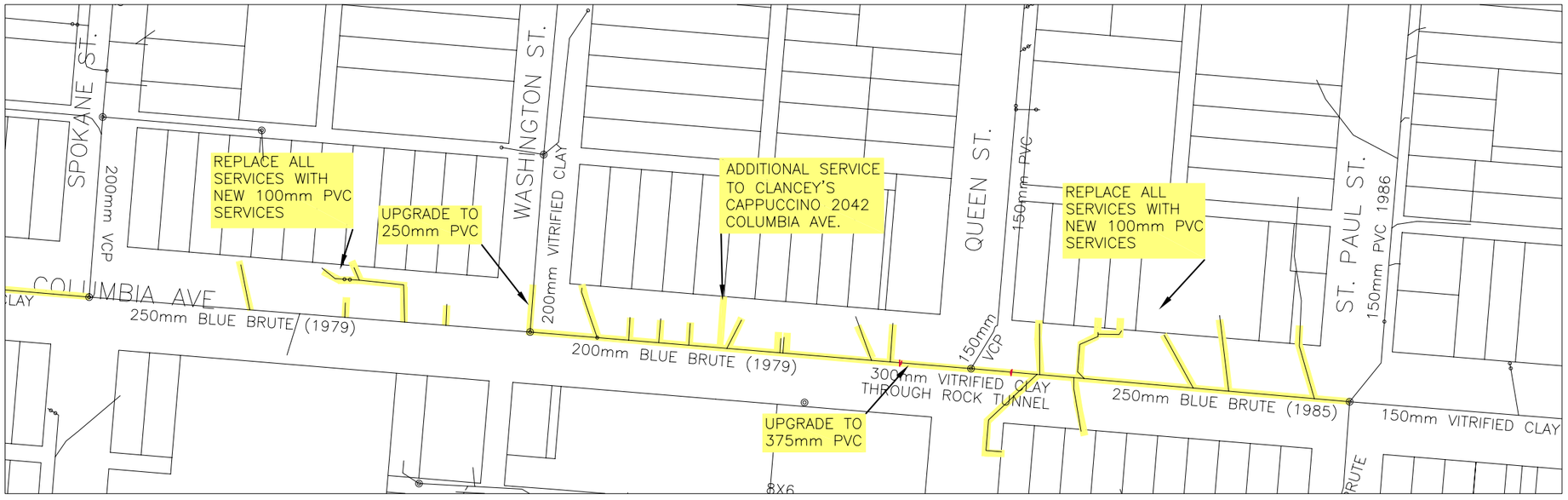
THE CITY OF ROSSLAND INFRASTRUCTURE UPGRADE & REPLACEMENT STUDY

COLUMBIA AVENUE EXISTING DOMESTIC WATER SYSTEM & RECOMMENDED UPGRADES

SCALE:	1:1500
CAD FILE:	–
JOB #	C09166-009
SHEET #	1 of 1



COLUMBIA AVE. SANITARY SEWER FROM MONITA ST. TO SPOKANE ST.



LEGEND

- EXISTING SANITARY SEWER
- EXISTING MANHOLE
- RECOMMENDED SANITARY SEWER UPGRADES AND REPLACEMENTS

COLUMBIA AVE. SANITARY SEWER FROM SPOKANE ST. TO ST. PAUL ST.

NO.	DATE	ISSUES	BY	APP'D

NO.	DATE	REVISIONS	BY	APP'D

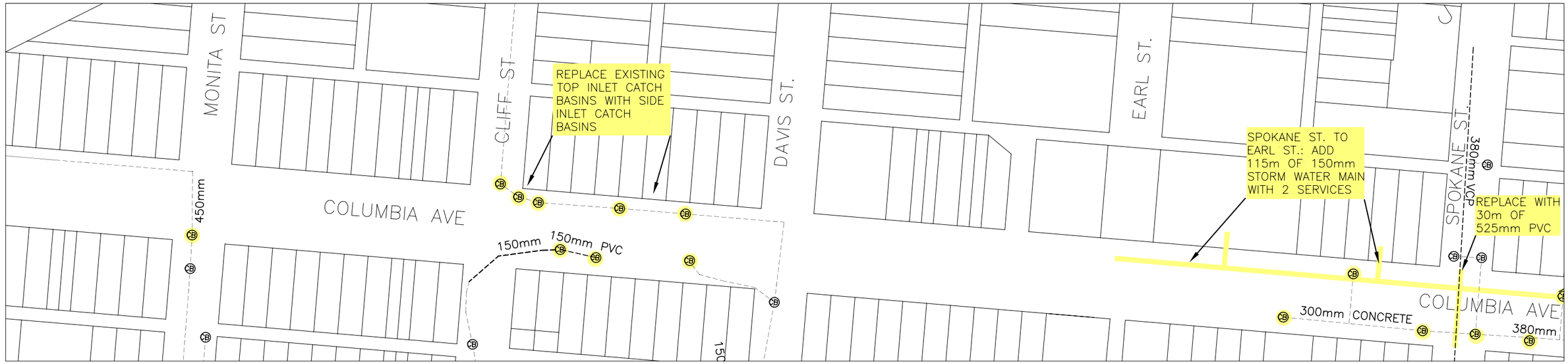
WSA ENGINEERING LTD.
WOODS SAHLSTROM ASSOCIATES
Geotechnical • Civil • Structural • Materials Testing
2248 Columbia Ave. Castlegar, B.C. V1N 2X1 Ph: (250) 365-3696

DSGN:	–
DWN:	MW
CHK:	RW
DATE DWN.	30–MAR–09

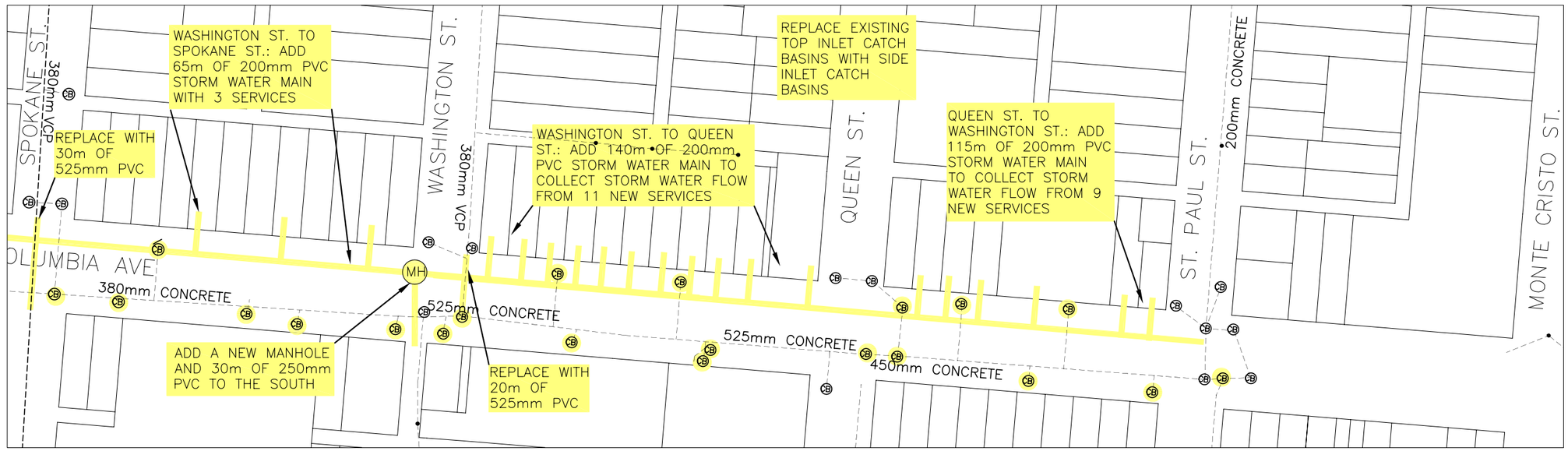
THE CITY OF ROSSLAND INFRASTRUCTURE UPGRADE & REPLACEMENT STUDY

COLUMBIA AVENUE EXISTING SANITARY SYSTEM & RECOMMENDED UPGRADES

SCALE:	1:1500
CAD FILE:	–
JOB #	C09166–009
SHEET #	2 | 1



COLUMBIA AVE. STORMWATER SYSTEM FROM MONITA ST. TO SPOKANE ST.



COLUMBIA AVE. STORM WATER SYSTEM FROM SPOKANE ST. TO ST. PAUL ST.

LEGEND

- EXISTING STORM WATER SYSTEM
- EXISTING CATCH BASIN
- RECOMMENDED STORM WATER SYSTEM UPGRADES & REPLACEMENTS

NO.	DATE	ISSUES	BY	APP'D

NO.	DATE	REVISIONS	BY	APP'D

WSA ENGINEERING LTD.
WOODS SAHLSTROM ASSOCIATES
Geotechnical • Civil • Structural • Materials Testing
2248 Columbia Ave. Castlegar, B.C. V1N 2X1 Ph: (250) 365-3696

DSGN:	–
DWN:	MW
CHK:	RW
DATE DWN.	30–MAR–09

THE CITY OF ROSSLAND INFRASTRUCTURE UPGRADE & REPLACEMENT STUDY

COLUMBIA AVENUE EXISTING STORM WATER SYSTEM & RECOMMENDED UPGRADES

SCALE:	1:1500
CAD FILE:	–
JOB #	C09166–009
SHEET #	3 | 1