
TECHNICAL MEMORANDUM

DATE: July 15, 2024

TO: **Gib Patterson**

FROM: Jeremy Chouinard, P.Eng.

SUBJECT: **4795 Bank Street Off-Site Sanitary Sewer
Evaluation of Alternative Sanitary Solutions**

OUR FILE: 23-1352

ATTACHMENTS:

- Memo – S-4 Leitrim Expansion Lands Sanitary Sewer Installation on Bank Street, prepared by Arcadis, July 11, 2024
- Email from the City of Ottawa dated June 17, 2024

Per the City of Ottawa's request following its review of DSEL's June 11th Adequacy of Servicing Review memo, DSEL has reviewed alternate sanitary servicing options for the S5 lands.

DSEL's June 11th memo focused on serviceability of the S5 lands via a new gravity sewer along Bank Street connecting to an existing sanitary sewer upstream of the Leitrim Pump Station. This memo will present three (3) additional servicing options:

- 1- New pump station on S5 lands with forcemains discharging into the 375mm inlet pipe at the Leitrim Pump Station.
- 2- Splitting sanitary drainage from the S5 lands, allowing gravity drainage to the existing communities to the North and West of the property.
- 3- Drain all sanitary flows from the S5 lands via gravity North to the existing community.

Furthermore, in the attached email dated June 17th, 2024, the City of Ottawa questioned the land use and whether water services would be required from Bank St. to the S5 lands.

While the street layout for the expansion area S5 is unknown, DSEL has assumed the lands will be dedicated to residential use and has used a metric of 75pop/ha for capacity verifications. Water connections will be required to service the property. It is recommended that water service stubs be brought to the property line as part of the current Bank Street Reconstruction project

Sanitary Servicing Options

The following sanitary servicing alternatives have been reviewed by DSEL:

Option 1) Bank Street Gravity Sewer

The first proposed option for sanitary drainage from the S5 lands was discussed in DSEL's June 11th Adequacy of Servicing Review, where a 420m long 300mm gravity sewer was proposed along Bank Street from the northern limits of the S5 lands to Findlay Creek Drive. Capacity in the downstream pipes was evaluated and found to be consistent with previously approved designs, when considering a total flow of 17.13 l/s from the subject property.

Option 2) New Pump Station on S5 Lands

Alternatively, a pump station and off-site forcemains, as illustrated in **Figure 1**, could replace the gravity sewer. Similar to the previous option, the forcemains would direct flows to the 375mm gravity sewer at the intersection of Bank Street and Findlay Creek Drive. A capacity analysis would yield similar findings as the gravity sewer option.



Figure 1 – Proposed Pump Station

Option 3) Split Drainage

DSEL investigated an option where sanitary drainage is split and sent to existing neighboring communities. **Figure 2** shows an area of 4.78 hectares 1800 294 0985 draining to an existing

manhole on Sora Way on the west side of Bank Street and an area of 10.99 hectares draining to an existing manhole on Shuttleworth Drive through the storm servicing block to the North.

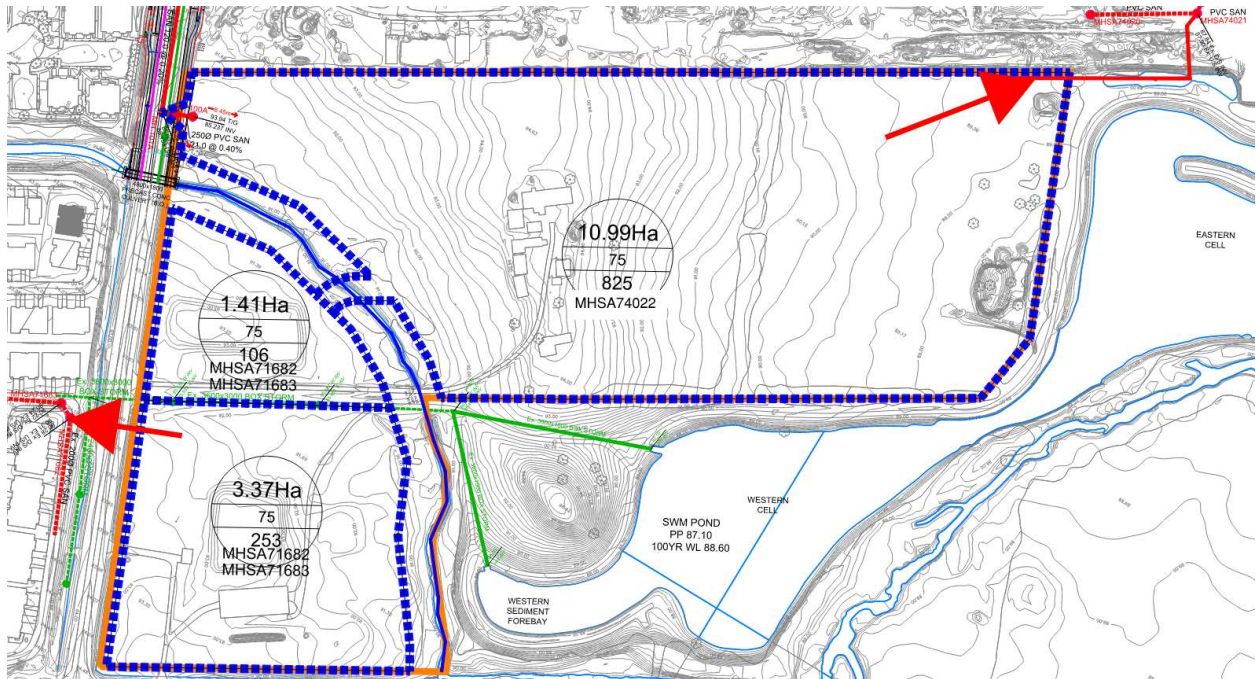


Figure 2 – Proposed Split Drainage

Using the design parameters seen in **Table 1**, design flows for the southern portion of the subject property were calculated to be 5.57 l/s and are proposed to drain to MHA71683 on Sora Way. In addition to the sanitary flows from S5, the S4 lands also propose draining a portion of their lands to this existing sewer. A complete analysis of the residual capacities in exiting sewers and impacts on the sanitary HGL can be found in the attached memo prepared by Arcadis. DSEL completed a similar analysis for the northern 10.99ha area where design flows were calculated to be 12.40 l/s while residual capacities in the existing sewers range from 12.8-40 l/s.

Table 1: Wastewater Design Criteria

Design Parameter	Value
Residential – Single Family	3.4 P/unit
Residential – Townhome	2.7 P/unit
Residential – Back-To-Back	1.8 P/unit
Average Daily Demand	280 L/d/per
Commercial and Institutional	28,000L/day/ha
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon's Corrector Factor 0.8
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Park Flows	0.33 L/s/ha
Parking Peaking Factor	9300 L/ha/d

Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Minimum Service Size	
<i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, and recent residential subdivisions in City of Ottawa (including revisions per ISTB Sewer-2018-01)</i>	

Option 4) All Sanitary Flows to Northern Community

The final option DSEL reviewed contemplated sending all sanitary flows from the 15.77ha parcel to the community to the north. The total design flows based on the parameters in **Table 1** were calculated to be 17.13l/s. In this option, the proposed design flows exceed the theoretical residual capacities in some lengths of sewer along Shuttleworth Drive. This option also introduces additional grade raise and earthworks constraints within the S5 lands.

Conclusion:

After reviewing several sanitary design options, DSEL has concluded that the first three options (Option 1-3) discussed above are feasible for servicing the S5 lands from a downstream sanitary capacity perspective.

Due to the complexity of off-site servicing and future operations/maintenance associated with Options 1 and 2, DSEL recommends further investigation of Option 3. Further analysis and discussions are required with the City of Ottawa to verify capacities of the existing downstream sewers.

Yours Truly,
David Schaeffer Engineering Ltd.



Per: Jeremy Chouinard, P.Eng.

Attachment 1 – Arcadis Bank Street Sanitary Report

SUBJECT

S-4 Leitrim Expansion Lands
Sanitary Sewer Installation on Bank Street

TO

Jeff Shillington
Senior Project Manager, Infrastructure Planning
City of Ottawa

DATE

July 11, 2024

OUR REF

Places Canada – Land Engineering

DEPARTMENT

Land Engineering

PROJECT NUMBER

145172

COPIES TO

Robin Van de Lande, City of Ottawa
John Bougadis, City of Ottawa
Evan Garfinkel, Regional Group

NAME

Ryan Magladry, C.E.T
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Arcadis Professional Services (Canada) Inc. has been retained by Regional Group to provide development consultation and design services for its property located at 4850 Bank Street, also known as area S-4 Leitrim Expansion Lands in the City's new official plan. This memo has been prepared to support the installation of a new sanitary sewer on Bank Street. The purpose of this memo is to provide information on the key design considerations and outline the necessity for installation to coincide with the City's work in the subject area.

1.1 Study Area

The new sanitary sewer would connect to the existing sewer in Labrador Crescent and extend approximately 165 m south along Bank Street, ending just past of the limit of construction of the city's contract. An aerial photo of the subject site location is provided below.



2.1 Project Description

The City of Ottawa S-4 Leitrim Expansion Lands, located to the south of the subject area, will require a sanitary sewer outlet to Bank Street when the land is serviced in future years. The proposed sewer outlet will flow north to the subject area and will connect to the existing infrastructure on Labrador Crescent to the west. The City of Ottawa has contracted to widen Bank Street from Leitrim Road to Blais/Miikana Road. Following discussions with the City of Ottawa and Regional Group, it is in both party's best interest to proceed with the installation of the sanitary sewer in the Bank Street contract limits, prior to a formal development approval. Proceeding with this installation will avoid future intersection disruptions and reinstatement costs, and delays associated with the Bank Street moratorium.

2.1.1 Scope of Work

The project shall include the installation of approximately 190 m of 200 mm diameter PVC pipe, 3 sanitary maintenance holes and a connection to the existing sanitary maintenance hole on Labrador Crescent. The scope of work will also include all excavation, support of existing utilities, backfilling, and compaction of the disturbed areas.

3.1 Existing Conditions

The proposed sanitary sewer will connect to the existing MH793A on Labrador Crescent. Arcadis has reviewed the downstream system from the subject area for theoretical residual capacity.

At the connection, the existing system has an available capacity of 15.60 L/s in a 200 mm diameter sewer, as shown on the as-built Sanitary Sewer Design Sheet prepared by IBI Group in 2017, located in **Appendix A**.

Downstream on Sora Way through Findlay Creek Village Stage 2 – Phase 4C to Cedar Creek Drive, residual capacities range from 14.35 to 7.83 L/s in a 200 mm diameter sewer. Continuing downstream on Sora Way, through Findlay Creek Village Stage 2 – Phase 4B to Kelly Farm Drive, residual capacities range from 21.05 to 5.99 L/s, in a 250 mm diameter sewer. Copies of the as-built sewer design sheets for Findlay Creek Village Stage 2 – Phase 4B and 4C have been included in **Appendix A**.

It should be noted that the existing conditions, as stated above, reflect the initial sewer design sheets prepared by IBI Group in Appendix A. The values in these design sheets were determined using the outdated City of Ottawa Sewer Design Criteria, where 350l/c/d was used for average residential flow and a Harmon Peaking Factor coefficient of 1.0 was used. Similarly, the extraneous flows (infiltration) used a rate of 0.28L/s. As part of the proposed analysis presented in section 3.9, the Sora Way sanitary sewer has been re-evaluated using current City of Ottawa Sewer Design Criteria from its connection on Labrador Crescent to Kelly Farm Drive.

At Kelly Farm Drive, flows continue north in a 375 mm diameter sewer to Findlay Creek Drive and head east to the Findlay Creek Sanitary Pumping Station.

3.2 Design Criteria

The sanitary flows for the subject lands were determined using on current City of Ottawa Sewer Design Criteria and the population densities established in the MSS, which include, but is not limited to the following:

3.2.1 Design Flow

- Population density = 60ppl/ha
- Average residential flow = 280 l/c/d
- Peak residential flow factor = (Harmon Formula) x 0.80
- Inflow and Infiltration Rate = 0.33 l/s/ha

- Minimum Full Flow Velocity = 0.60 m/s
- Maximum Full Flow Velocity = 3.0 m/s
- Minimum Pipe Size = 200 mm diameter
- Minimum Design Slope = 0.32%

3.5 Proposed Wastewater Disposal System

The S-4 Leitrim Expansion Lands are proposed to discharge into a future wastewater disposal system on Bank Street. The wastewater will flow north to the subject area and tie into the existing infrastructure on Labrador Crescent. The wastewater will then enter the existing Findlay Creek Village Stage 2 – Phase 4C sewer system and flow west on Sora Way to Kelly Farm Drive, continuing north on Kelly Farm Drive to Findlay Creek Drive. At Findlay Creek Drive, the flow will head east into the Findlay Creek Sanitary Pumping Station.

Proposed Sanitary sewers will consist of 200 mm dia. PVC pipe, constructed to current City of Ottawa design standards. A detailed sanitary sewer design sheet, plan and profile drawings **145172-100/101** and a Sanitary Drainage Area Plan **Figure 1** are provided in **Appendix B**. They demonstrate the sewers have been designed to meet City of Ottawa sewer design criteria and MECP guidelines.

3.6 Proposed Peak Flow Calculations

As previously noted, the concept development plan is not completed and therefore an approximated population density, based on the OSDG of 60 ppl/Ha has been used. The total anticipated design population tributary to Labrador Crescent is indicated below.

AREA	POPULATION DENSITY	POPULATION
8.47 Ha	60 ppl/ ha	508

Using the population design calculated above, the peak design flow inclusive of extraneous flows (infiltration), has been demonstrated below.

POPULATION	280L/POP/DAY	PEAK FAFACTOR	PEAK FLOW (L/s)	AREA (ha)	EXT. FLOW (L/s)	TOTAL FLOW (L/s)
508	280	3.38	5.56	8.47	2.80	8.36
N/A				2.25	0.74	0.74
N/A				0.66	0.22	0.22
Total:				11.38	3.76	9.32

The approximated flow, calculated from the future S-4 Expansion Lands inclusive of an infiltration allowance on Bank Street, is **9.32 L/s**. This was determined using the current Ottawa Sewer Design Criteria, as depicted in section 3.2 of this memo.

3.7 Additional Flows From S-5 Lands

Subsequent to initial discussions with the City, David Schaeffer Engineering Ltd. (DSEL) has contacted Arcadis to consider the south-western portion of the S-5 Leitrim Expansion Lands in the Sora Way sanitary sewer analysis.

DSEL has provided preliminary wastewater flows for approximately 4.78 ha of future development land south of the existing Findlay Creek. The estimated peak flows provided by DSEL are **5.57 L/s**, using a population density of 75 people/ha. Correspondence from DSEL has been provided in **Appendix C**.

3.8 Total Flows to Sora Way

As mentioned in sections 3.6 and 3.7, the estimated peak flows from the S-4 Leitrim Expansion Lands are **9.32 L/s**, and the estimated peak flows from the S-5 Leitrim Expansion Lands are **5.57 L/s**. Therefore, the total additional estimated flows to Sora Way are **14.89 L/s**.

3.9 Verification of Residual Capacity

As noted in section 3.1, using the current City of Ottawa Sewer Design Criteria, Arcadis has reviewed the downstream sewer system from the connection point on Labrador Crescent to Kelly Farm Drive. The calculations are provided on the Sewer Design sheet in **Appendix B** and summarized below.

U/S MH ID	D/S MH ID	Combined Peak Design Flow Q_p (L/s)	Pipe Capacity (L/s)	Residual Capacity (L/s)
735A	730A	34.19	46.84	12.65
740A	735A	33.87	31.63	-2.24
750A	740A	33.59	31.02	-2.57
760A	750A	31.85	31.02	-0.83
770A	760A	30.72	31.02	0.30
780A	770A	22.42	19.66	-2.76
790A	780A	20.60	20.24	-0.36
791D	790A	17.80	19.66	1.86
791A	791D	12.99	19.66	6.67
792A	791A	12.92	21.09	8.17
793A	792A	12.59	19.95	7.36

Based on the current City of Ottawa Sewer Design Criteria, the proposed design flows exceed the theoretical residual capacity at several locations along Sora Way. The net result is that some localized minor surcharging to the existing system may occur during theoretical peak conditions.

A static HGL analysis has been completed for Sora Way to determine the estimated surcharging effect on the existing sewer. The calculations are included in Appendix B and summarized in the table below.

MH ID	Sewer Obvert Elevation (m)	Static HGL (m)	Height of Surcharge (m)	Low USF (m)	Freeboard (m)
730A	88.330	88.330*		N/A	N/A
735A	88.934	88.847	-0.088	92.10	3.25
740A	89.066	89.066	0	92.45	3.38
750A	89.330	89.367	0.037	92.20	2.83
760A	89.539	89.600	0.061	N/A	N/A
770A	89.752	89.820	0.068	N/A	N/A
780A	89.812	90.198	0.386	92.28	2.08
790A	90.265	90.425	0.160	92.43	2.00
791D	90.413	90.546	0.133	92.58	2.03
791A	90.472	90.563	0.091	92.58	2.02
792A	90.820	90.736	-0.084	92.68	1.94
793A	91.091	91.007	-0.084	92.73	1.72

*For calculation purposes only, the downstream HGL at Kelly Farm Drive has been assumed to be equal to the pipe obvert.

We have also reviewed the existing house footing elevations; generally, the USF elevations range from 92.10 to 92.63 on Sora Way (from Kelly Farm to Labrador), and 92.58 to 92.73 on Labrador Crescent. The elevation of the existing sanitary sewer on Sora Way ranges from invert 88.210 to 90.275 (from Kelly Farm to Labrador), and from 90.472 to 91.091 on Labrador Crescent. The freeboard in this system ranges from 3.4m to 1.7m. Therefore, the minor localized surcharging resulting from the additional flows will not impact existing houses in the area.

Mr. Jeff Shillington
City of Ottawa
July 11, 2024

3.10 Conclusions

This memo and the accompanying working drawings indicate that the proposed sanitary sewer meets the requirements of the stakeholder regulators, including the City of Ottawa, provincial MECP and SNC.

The design will be subject to governmental approval prior to construction, including but not limited to the following:

- Commence Work Notification: City of Ottawa
- Municipal Consent Circulation
- Addition to the City of Ottawa's CLI ECA

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Demetrius Yannouloupoulos, P.Eng
Director | Office Lead

Angela Soward, EIT
Engineer in Training

Mr. Jeff Shillington
City of Ottawa
July 11, 2024

Appendix A

FCV ST2 – PH4A – Sanitary Sewer Design Sheet

FCV ST2 - PH4B – Sanitary Sewer Design Sheet

FCV ST2 – PH4C – Sanitary Sewer Design Sheet

CUMMING COCKBURN LIMITED
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C 0P8

Project: Findlay Creek Village Phase 4
Location: City of Ottawa
Owner: Findlay Creek Properties Ltd. And
1374537ontario Limited (Tartan)

SANITARY SEWER DESIGN SHEET

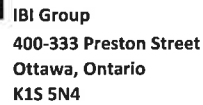
Date: 26-Sep-05
Design: JIM Review: RK

LOCATION			INDIVIDUAL RESIDENTIAL						CUMULATIVE RESID'L FLOW			CUMULATIVE ICI FLOW			INFILTRATION ALLOWANCE			TOTAL	PROPOSED SEWER DESIGN						
Street	From MH	To MH	Residential Units			Area (Ha.)	Population	ICI Area (Ha.)	Population	Peaking Factor	Peak Flow (l/s)	Area	Pk. Fact.	Pk. Flow (l/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (l/s)	FLOW (l/s)	Capacity (l/s)	Pipe Size (mm)	Length (M)	Slope (%)	Velocity(f) M/sec	Avail. Cap. (%)	
			Sing/Semi	Towns	Mixed Use																				
Findlay Creek Drive	290 A	280 A				0.28	0		0	4.00	0.00			0.00	1.58	1.58	0.44	0.44	21.64	200	106.2	0.40	0.67	97.96	
Findlay Creek Drive	280 A	265A				0.26	0	0.31	0	4.00	0.00	0.31	1.50	0.47	0.57	2.15	0.60	1.07	21.64	200	103.9	0.40	0.67	95.07	
Netley Circle	323A	322A	10			0.81	32		32	4.00	0.52			0.00	0.81	0.81	0.23	0.75	27.59	200	99.2	0.65	0.85	97.29	
	322A	265A	15			1.21	48		80	4.00	1.30			0.00	1.21	2.02	0.57	1.87	39.24	250	140.0	0.40	0.77	95.25	
Findlay Creek Drive	265 A	250A				0.26	0		80	4.00	1.30	0.31	1.50	0.47	0.26	4.43	1.24	3.01	39.24	250	102.1	0.40	0.77	92.34	
	323A	327A	13			1.11	42		42	4.00	0.67			0.00	1.11	1.11	0.31	0.98	27.59	200	185.5	0.65	0.85	96.45	
Netley Circle	327A	250A	17			1.35	54		96	4.00	1.56			0.00	1.35	2.46	0.69	2.25	39.24	250	146.0	0.40	0.77	94.27	
Findlay Creek Drive	250 A	235 A				0.23	0		176	4.00	2.85			0.00	0.23	7.12	1.99	4.84	39.24	250	70.8	0.40	0.77	87.66	
Cedar Creek Drive	341A	320A	3	4		0.25	19		19	4.00	0.31			0.00	0.25	0.25	0.07	0.38	34.22	200	50.0	1.00	1.06	98.89	
Block 120	Bulkhead	320A			60	1.04	114		114	4.00	1.85			0.00	1.04	1.04	0.29	2.14	39.24	250	13.0	0.40	0.77	94.54	
Cedar Creek Drive	320A	319A	11			0.52	35		168	4.00	2.73			0.00	0.52	1.81	0.51	3.24	39.24	250	89.5	0.40	0.77	91.75	
Hillman Marsh Way	313A	310A	11	9		0.68	57		57	4.00	0.92			0.00	0.68	0.68	0.19	1.11	27.59	200	72.0	0.65	0.85	95.98	
Hillman Marsh Way	313A	315A	5	8		0.58	35		35	4.00	0.57			0.00	0.58	0.58	0.16	0.73	27.59	200	83.4	0.65	0.85	97.35	
Old Crow Way	Ex MH	315A	4	8		0.48	32		32	4.00	0.52			0.00	0.48	0.48	0.13	0.65	28.63	200	102.8	0.70	0.88	97.71	
Hillman Marsh Way	315A	319A	12	8		0.77	58		125	4.00	2.02			0.00	0.77	1.83	0.51	2.53	39.24	250	159.3	0.40	0.77	93.55	
Cedar Creek Drive	319 A	Ex Stub	4	8		0.51	32		325	4.00	5.27			0.00	0.51	4.15	1.16	6.43	39.24	250	96.0	0.40	0.77	83.61	
Kelly Farm Drive (External)		700A				31.50	1890								31.50										
Kelly Farm Drive (External)		700A				56.00	3360								56.00	87.50									
	700A	333A	0	0		0.00	0		5250	3.23	68.59				0.00	87.50	24.50	93.09	115.68	375	182.3	0.40	1.02	19.53	
High Level Sewer																									
Kelly Farm Drive	333B	333B	16	16		1.18	96		96	4.00	1.49			0.00	1.18	1.18	0.33	1.78	28.63	200	139.7	0.70	0.88	93.77	
	335B	333B	16	17		1.18	92		92	4.00	1.49			0.00	1.18	1.18	0.33	1.82	28.63	200	139.7	0.70	0.88	93.64	
Alasken Drive		Bulkhead				8.32	499		499						8.32										
	Bulkhead	333B		8		0.27	19		518	3.97	8.33				0.27	8.59	2.41	10.74	55.26	300	38.0	0.30	0.76	80.57	
	333B	333A	0	0		0	0		700	3.89	11.04				0.00	10.96	3.07	14.11	55.26	300	7.3	0.30	0.76	74.47	
Kelly Farm Drive	333A	331A	0	0		0	0		5950	3.17	76.51				0.00	98.46	27.57	104.08	115.68	375	135.7	0.40	1.02	10.03	

Population Per Unit: 3.2 For Singles/Semi's
2.4 Townhouses
1.9 Mixed Use
Avg. Per Capita Flow Rate: 350 l/day
Infiltration Allowance: 0.28 l/sec/Ha
Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = pop'n in thousands
Avg. Commercial/Institutional: 50000 l/Ha/day with Peaking Factor = 1.5
Avg. Pop'n Density Other Lands: 60 persons/Ha

Assumed pipe loss coefficient = 0.013

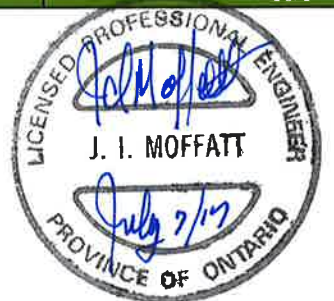
Revisions: No. 1 03-Nov-05



PROJECT: FINDLAY CREEK VILLAGE STAGE 2 PHASE 4C
LOCATION: CITY OF OTTAWA
CLIENT: FINDLAY CREEK PARTNERSHIP

LEGEND	
Black text	5 year event curve design
Dark Red	As-Built Length and Slope
Grey Text	Existing Sewer Length and Slope

should read 2.00





IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: FINDLAY CREEK VILLAGE STAGE 2 PHASE 4B
LOCATION: CITY OF OTTAWA
CLIENT: FINDLAY CREEK PARTNERSHIP

LOCATION				RESIDENTIAL								ICI AREAS								INFILTRATION ALLOWANCE			TOTAL	PROPOSED SEWER DESIGN						
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	INSTITUTIONAL		AREA (Ha)		INDUSTRIAL		PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM								L/s	%
HELEN RAPP WAY	705Ab	EX. 705A	738A	5				0.34	16.0	16.0	4.00	0.26							0.00	0.34	0.34	0.10	0.35	27.16	80.06	200	0.63	0.837	26.80	98.69%
HELEN RAPP WAY	735Aa	735A	736A	2				0.20	6.4	6.4	4.00	0.10							0.00	0.20	0.20	0.06	0.16	26.06	9.61	200	0.58	0.804	25.90	99.39%
HELEN RAPP WAY	736A	736A	737A	12				0.65	38.4	44.8	4.00	0.73							0.00	0.65	0.85	0.24	0.96	28.42	74.63	200	0.69	0.876	27.46	96.61%
HELEN RAPP WAY	737A	737A	738A	6				0.36	19.2	64.0	4.00	1.04							0.00	0.36	1.21	0.34	1.38	19.95	67.66	200	0.34	0.615	18.58	93.10%
MABERLY WAY	738A	738A	731A	9				0.52	28.8	108.8	4.00	1.76							0.00	0.52	2.07	0.58	2.34	22.17	73.95	200	0.42	0.684	19.83	89.44%
HELEN RAPP WAY	735Ab	735A	734A	5				0.28	16.0	16.0	4.00	0.26							0.00	0.28	0.28	0.08	0.34	28.01	65.02	200	0.67	0.864	27.67	98.79%
HELEN RAPP WAY	734A	734A	733A	2				0.18	6.4	22.4	4.00	0.36							0.00	0.18	0.46	0.13	0.49	37.48	9.95	200	1.20	1.156	36.99	98.69%
HELEN RAPP WAY	733A	733A	732A	11				0.54	35.2	57.6	4.00	0.93							0.00	0.54	1.00	0.28	1.21	26.72	72.44	200	0.61	0.824	25.51	95.46%
HELEN RAPP WAY	732A	732A	731A	6				0.33	19.2	76.8	4.00	1.24							0.00	0.33	1.33	0.37	1.62	19.95	70.36	200	0.34	0.615	18.33	91.90%
MABERLY WAY	731A	731A	EX. STUB	9				0.51	28.8	214.4	4.00	3.47							0.00	0.51	3.91	1.09	4.57	39.46	75.19	200	1.33	1.217	34.89	88.42%
MABERLY WAY		EX. STUB	EX. 730A						0.0	214.4	4.00	3.47							0.00	0.00	0.00	0.00	3.47	20.24	5.00	200	0.35	0.624	16.77	82.84%
KELLY FARM DRIVE	RES., COM., INST.		647A					61.75	3668.8	3668.8	3.37	50.04	2.46	2.46	7.12	7.12			8.32	75.67	75.67	21.19	79.54							
KELLY FARM DRIVE	647A	647A	742A		5			0.28	12.0	3680.8	3.37	50.18		2.46		7.12			8.32	0.28	75.95	21.27	79.76	101.84	80.31	375	0.31	0.893	22.08	21.68%
KESTREL STREET	FUT.	BULKHEAD	751A			22		0.65	52.8	52.8	4.00	0.86							0.00	0.65	0.65	0.18	1.04	31.55	18.75	200	0.85	0.973	30.51	96.71%
KESTREL STREET	751A	751A	745A			4		0.12	9.6	62.4	4.00	1.01							0.00	0.12	0.12	0.03	1.04	29.83	25.77	200	0.76	0.920	28.78	96.50%
KESTREL STREET	745A, PARK	745A	742A			11		0.37	26.4	88.8	4.00	1.44							0.00	0.37	1.02	0.29	1.72	28.22	88.63	200	0.68	0.870	26.49	93.89%
KELLY FARM DRIVE	742A	742A	741A			11		0.39	26.4	3796.0	3.35	51.57		2.46		7.12			8.32	0.39	77.36	21.66	81.55	96.79	74.52	375	0.28	0.849	15.24	15.75%
KELLY FARM DRIVE	741A	741A	EX. 730A			5		0.28	12.0	3808.0	3.35	51.71		2.46		7.12			8.32	1.50	78.86	22.08	82.11	114.23	73.37	375	0.39	1.002	32.12	28.12%
REDPOLL WAY	FUT.	BULKHEAD	772A	12				0.70	38.4	38.4	4.00	0.62							0.00	1.92	1.92	0.54	1.16	19.66	14.30	200	0.33	0.606	18.50	94.10%
CEDAR CREEK DRIVE	772A	772A	771A			16		0.57	38.4	76.8	4.00	1.24							0.00	1.79	3.71	1.04	2.28	19.95	71.89	200	0.34	0.615	17.67	88.56%
CEDAR CREEK DRIVE	771A	771A	770A			18		0.56	43.2	120.0	4.00	1.94							0.00	1.78	5.49	1.54	3.48	20.81	74.46	200	0.37	0.642	17.33	83.27%
CEDAR CREEK DRIVE	FUT.	777A	770A			161		4.75	386.4	386.4	4.00	6.26							0.00	4.75	4.75	1.33	7.59	19.66	25.14	200	0.33	0.606	12.06	61.38%
SORA WAY	FUT., COM.	BULKHEAD	770A	24		65	48	5.29	324.0	324.0	4.00	5.25			3.41	3.41			2.96	8.70	8.70	2.44	10.65	19.95	18.39	200	0.34	0.615	9.31	46.64%
SORA WAY	770A	770A	760A	3				0.27	9.6	840.0	3.85	13.09			3.41				2.96	0.27	19.21	5.38	21.43	31.02	82.14	250	0.25	0.612	9.59	30.91%
SAGEBUSH CRESCENT	FUT.	BULKHEAD	760A	16				0.97	51.2	51.2	4.00	0.83							0.00	0.97	0.97	0.27	1.10	24.19	18.00	200	0.50	0.746	23.09	95.45%
SORA WAY	760A	760A	750A	6				0.37	19.2	910.4	3.83	14.11			3.41				2.96	0.37	20.55	5.75	22.82	31.02	81.07	250	0.25	0.612	8.20	26.42%
SAGEBUSH CRESCENT	FUT.	BULKHEAD	750A	22				1.46	70.4	70.4	4.00	1.14							0.00	1.46	1.46	0.41	1.55	22.70	18.00	200	0.44	0.700	21.15	93.17%
SORA WAY	750A	750A	740A	13				0.68	41.6	1022.4	3.79	15.71			3.41				2.96	0.68	22.69	6.35	25.03	31.02	94.16	250	0.25	0.612	5.99	19.32%
SORA WAY	740A	740A	735A	6				0.31	19.2	1041.6	3.79	15.99			3.41				2.96	0.31	23.00	6.44	25.39	31.63	40.58	250	0.26	0.624	6.25	19.75%
SORA WAY	735A	735A	EX. 730A	6				0.46	19.2	1060.8	3.78	16.26			3.41				2.96	0.46	23.46	6.57	25.79	46.84	105.34	250	0.57	0.924	21.05	44.95%
SILVERBELL CRESCENT	714Aa	714A	715A	1				0.11	3.2	3.2	4.00	0.05							0.00	0.11	0.11	0.03	0.08	30.60	10.68	200	0.80	0.944	30.52	99.73%
SILVERBELL CRESCENT	715A	715A	716A	5	3	4		0.55	32.8	36.0	4.00	0.58							0.00	0.55	0.66	0.18	0.77	26.28	70.03	200	0.59	0.810	25.51	97.08%
SILVERBELL CRESCENT	716A	716A	EX. 717A	3	4			0.29	19.2	55.2	4.00	0.89							0.00	0.29	0.95	0.27	1.16	21.91	33.95	200	0.41	0.676	20.75	94.70%
SILVERBELL CRESCENT	717A	EX. 717A	EX. 720A	2	1			0.19	8.8	64.0	4.00	1.04							0.00	0.19	1.14	0.32	1.36	20.24	31.48	200	0.35	0.624	18.89	93.30%
SILVERBELL CRESCENT	714Ab	714A	713A	5				0.36	16.0	16.0	4.00	0.26							0.00	0.36	0.36	0.10	0.36	27.37	61.34	200	0.64	0.844	27.01	98.68%
SILVERBELL CRESCENT	713A	713A	712A	1				0.08	3.2	19.2	4.00	0.31							0.00	0.08	0.44	0.12	0.43	31.73	11.53	200	0.86	0.978	31.30	98.63%
SILVERBELL CRESCENT	712A	712A	EX. 711A			9		0.38	21.6	40.8	4.00	0.66							0.00	0.38	0.82	0.23	0.89	27.59	79.63	200	0.65	0.851	26.70	96.77%
SILVERBELL CRESCENT	711A	EX. 711A	EX. 700A			3		0.14	7.2	48.0	4.00	0.78							0.00	0.14	0.96	0.27	1.05	20.24	31.60	200	0.35	0.624	19.20	94.83%
KELLY FARM DRIVE		EX. 700A	EX. 334A						0.0	5304.0	3.22	69.21		2.46		10.53			11.28	0.00	111.04	31.09	111.58	121.33	89.60	375	0.44	1.064	9.75	8.04%
Design Parameters:				Notes:								Designed: P.K.				No.				Revision				Date						
Residential				1. Mannings coefficient (n) = 0.013												1.				SUBMISSION #1 FOR CITY REVIEW				21/11/2014						
ICI Areas				2. Demand (per capita): 350 L/day												2.				SUBMISSION #2 FOR CITY REVIEW				28/04/2015						
Peak Factor				3. Infiltration allowance: 0.28 L/s/Ha												3.				RE-SUBMISSION #2 FOR CITY REVIEW				31/07/2015						
SF 3.2 p/p/u				4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = population in thousands												4.				A5-BUILT (Silverbell, Maberly and Helen Rapp (MH705A to MH 734A))				7/3/2016						
TH/SD 2.4 p/p/u																5.				A5-BUILT				8/8/2016						
APT 1.9 p/p/u																														
Other 60 p/p/Ha																														
INST 50,000 L/Ha/day																														
COM 50,000 L/Ha/day																														

Mr. Jeff Shillington
City of Ottawa
July 11, 2024

Appendix B

Sanitary Sewer Design Sheet

Figure 1 – Sanitary Drainage Area Plan

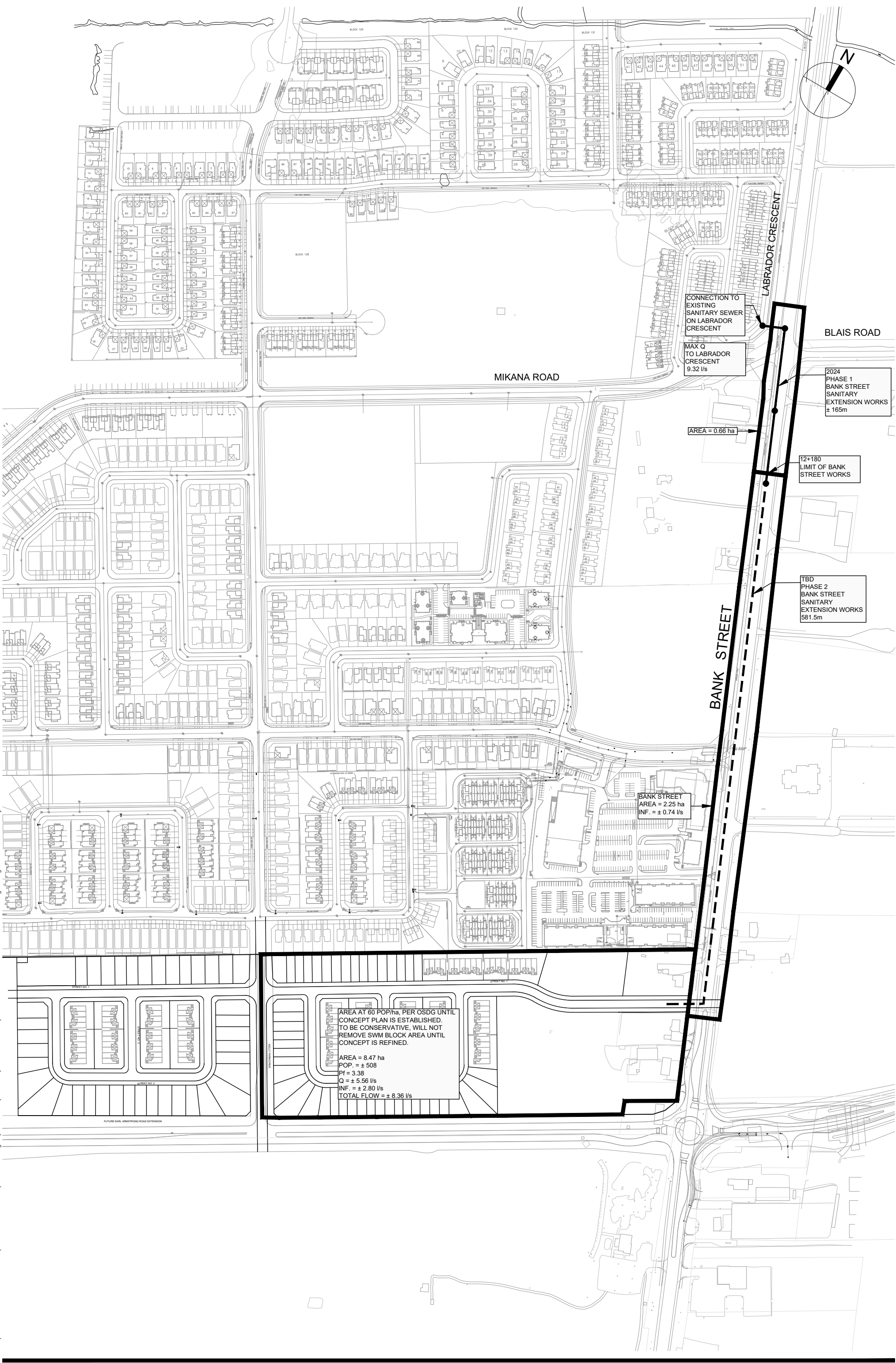
Sanitary Hydraulic Grade Line Design Sheet

145172 – DWG100_Plan and Profile

145172 – DWG101_Plan and Profile

LOCATION				RESIDENTIAL										ICI AREAS						INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	CAPACITY			PROPOSED SEWER DESIGN			AVAILABLE CAPACITY								
STREET	AREA ID	FROM MH	TO MH	AREA w/ Units (Ha)	SF	TH/SD	1Bed APT	2 Bed APT	AREA w/o Units (Ha)	IND	CUM	RES PEAK FACTOR	PEAK FLOW (L/s)	INSTITUTIONAL		AREA (Ha) COMMERCIAL		INDUSTRIAL		ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha) FLOW		IND	CUM	(L/s)	(L/s)	(L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (ft/ll) (m/s)	L/s	(%)						
S-4 Leitrin Expansion Lands	Future	S-4	Bank						8.47	508.2	508.2	3.38	5.56		0.0		0.0		0.0	1.00	0.00	8.47	8.47	2.80		0.0	8.36	20.24	0.00	200	0.35	0.624	11.89	58.72%						
Bank Street	Future	Bank	MH300A						2.25	0.0	508.2	3.38	5.56		0.0		0.0		0.0	1.00	0.00	2.25	10.72	3.54		0.0	9.10	20.24	0.00	200	0.35	0.624	11.14	55.05%						
Bank Street_San	Proposed	MH300A	MH200A							0.0	508.2	3.38	5.56		0.0		0.0		0.0	1.00	0.00	0.00	10.72	3.54		0.0	9.10	20.24	71.44	200	0.35	0.624	11.14	55.05%						
Bank Street_San	Proposed	MH200A	MH100A						0.66	0.0	508.2	3.38	5.56		0.0		0.0		0.0	1.00	0.00	0.66	11.38	3.76		0.0	9.32	20.24	92.12	200	0.35	0.624	10.93	53.98%						
Bank Street_San	Proposed	MH100A	MH793A							0.0	508.2	3.38	5.56		0.0		0.0		0.0	1.00	0.00	0.00	11.38	3.76		0.0	9.32	24.19	24.98	200	0.50	0.746	14.88	61.49%						
Labrador Crescent	Existing	Blk794AS	MH794A						0.49	0.0	0.0	3.80	0.00		0.0	3.41	3.41		0.0	1.50	1.66	3.90	3.90	1.29		0.0	2.94	19.66	33.00	200	0.33	0.606	16.71	85.02%						
Labrador Crescent	Existing	MH794A	MH793A						0.00	0.0	0.0	3.80	0.00		0.0		3.41		0.0	1.50	1.66	0.00	3.90	1.29		0.0	2.94	19.66	19.60	200	0.33	0.606	16.71	85.02%						
Labrador Crescent	Existing	MH793A	MH792A	0.26						24.0	532.2	3.37	5.81		0.0		3.41		0.0	1.50	1.66	0.26	15.5	5.13		0.0	12.59	19.95	73.40	200	0.34	0.615	7.36	36.87%						
Labrador Crescent	Existing	MH792A	MH791A	0.23						24.0	556.2	3.36	6.06		0.0		3.41		0.0	1.50	1.66	0.23	15.8	5.20		0.0	12.92	21.09	86.10	200	0.38	0.650	8.17	38.75%						
Labrador Crescent	Existing	MH791A	MH791D	0.08						4.8	561.0	3.36	6.11		0.0		3.41		0.0	1.50	1.66	0.08	15.9	5.23		0.0	12.99	19.66	9.50	200	0.33	0.606	6.66	33.89%						
Potential S-5 Lands	Potential	S-5	MH791D	4.78						359.0	359.0	3.44	4.00		0.0		0.00		0.0	1.00	0.00	4.78	4.8	1.58		0.0	5.57													
Sora Way	Existing	MH791D	MH790A	0.17						12.0	932.0	3.26	9.83		0.0		3.41		0.0	1.00	1.11	0.17	20.8	6.86		0.0	17.80	19.66	40.85	200	0.33	0.606	1.85	9.43%						
Labrador Crescent West	Existing	Labrador	MH790A	2.00						175.2	175.2	3.53	2.01		0.0		0.00		0.0	1.00	0.00	2.00	2.0	0.66		0.0	2.67	21.37	10.62	200	0.39	0.659	18.70	87.52%						
Sora Way	Existing	MH790A	MH780A	0.39						31.2	1138.4	3.21	11.84		0.0		3.41		0.0	1.00	1.11	0.39	23.2	7.65		0.0	20.60	20.24	57.35	200	0.35	0.624	-0.36	-1.77%						
Eric Maloney Way	Existing	Eric Maloney	MH780A	1.45						103.2	103.2	3.59	120		0.0		0.00		0.0	1.00	0.00	1.45	1.5	0.48		0.0	1.68	19.95	67.17	200	0.34	0.615	18.27	91.58%						
Sora Way	Existing	MH780A	MH770A	0.36						24.0	1265.6	3.19	13.06		0.0		3.41		0.0	1.00	1.11	0.36	25.0	8.25		0.0	22.42	19.66	80.63	200	0.33	0.606	-2.76	-14.06%						
Cedar Creek Drive	Existing	Cedar Creek	MH770A	5.49						120.0	120.0	3.58	1.39		0.0		0.00		0.0	1.00	0.00	5.49	5.5	1.81		0.0	3.20	20.81	74.46	200	0.37	0.642	17.61	84.61%						
Cedar Creek Drive	Existing	BULKHEAD	MH770A	4.75						386.4	386.4	3.42	4.29		0.0		0.00		0.0	1.00	0.00	4.75	4.8	1.57		0.0	5.85	19.66	25.14	200	0.33	0.606	13.80	70.22%						
Sora Way	Existing	MH770A	MH760A	0.27						9.6	1781.6	3.10	17.90		0.0		3.41		0.0	1.00	1.11	0.27	35.5	11.72		0.0	30.72	31.02	82.14	250	0.25	0.612	0.30	0.97%						
Sagebush Cresc. East	Existing	Sagebush	MH760A	1.02						54.4	54.4	3.65	0.64		0.0		0.00		0.0	1.00	0.00	1.02	1.0	0.34		0.0	0.98	27.59	107.80	200	0.65	0.851	26.61	96.45%						
Sora Way	Existing	MH760A	MH750A	0.37						19.2	1855.2	3.09	18.57		0.0		3.41		0.0	1.00	1.11	0.37	36.9	12.18		0.0	31.85	31.02	81.07	250	0.25	0.612	-0.83	-2.69%						
Sagebush Cresc. West	Existing	Sagebush	MH750A	1.41						73.6	73.6	3.62	0.86		0.0		0.00		0.0	1.00	0.00	1.41	1.4	0.47		0.0	1.33	20.24	108.40	200	0.35	0.624	18.91	93.43%						
Sora Way	Existing	MH750A	MH740A	0.68						41.6	1970.4	3.07	19.62		0.0		3.41		0.0	1.00	1.11	0.68	39.0	12.87		0.0	33.59	31.02	94.16	250	0.25	0.612	-2.57	-8.29%						
Sora Way	Existing	MH740A	MH735A	0.31						19.2	1989.6	3.07	19.79		0.0		3.41		0.0	1.00	1.11	0.31	39.3	12.97		0.0	33.87	31.63	40.58	250	0.26	0.624	-2.24	-7.07%						
Sora Way	Existing	MH735A	MH730A	0.46						19.2	2008.8	3.07	19.97		0.0		3.41		0.0	1.00	1.11	0.46	39.8	13.12		0.0	34.19	46.84	105.34	250	0.57	0.924	12.64	26.99%						
										2008.8	TRUE					3.4	TRUE					39.8	TRUE																	
Design Parameters: Residential SF 3.2 p/p/u TH/SD 2.4 p/p/u 1Bed 1.4 p/p/u 2Bed 2.1 p/p/u Other 60 p/p/Ha				Notes: 1. Mannings coefficient (n) = 0.013 2. Demand (per capita): 280 L/day 3. Infiltration allowance: 0.33 L/s/Ha 4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8 where K = 0.8 Correction Factor 5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0										Designed: AS/RM Checked: RM/DY Dwg. Reference: 145172-100										No.	Revision										Date					
																								1.	Bank Street Sanitary Sewer (S-4 Leitrin Expansion Lands - Sanitary Sewer Installation on Bank Street Memo) - Submission No. 1										2024-07-09					
																								File Reference: 145172-6.04.03			Date: 2024-07-04			Sheet No: 1 of 1										

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Project Title

Drawing Title

Sheet No.



CATTAZONE-BANK STREET
SANITARY SEWER

SANITARY
DRAINAGE AREA PLAN

FIGURE 1
JULY 2, 2024



ARCADIS PROFESSIONAL SERVICES (CANADA) INC.

500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
arcadis.com

SANITARY HYDRAULIC GRADE LINE DESIGN SHEET

Bank Street Sanitary Sewer | Regional Group
145172-6.0 | Rev #2 | 2024-07-09
Prepared By: AS | Checked By: RM

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL													
Sora Way	730A	735A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)							
INVERT ELEVATION (m)	88.080	88.684		0.25	0.05	0.79	0.573	0.06	0.92	45.01							
OBVERT ELEVATION (m)	88.330	88.934		HYDRAULIC SLOPE = 0.49%													
DIAMETER (mm)	250			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 0.760													
LENGTH (m)	105.34			DESIGN FLOW DEPTH = 0.163													
FLOW (l/s)	34.19			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.70 m/s HL = K_L * V^2/ 2g													
HGL (m) ***	88.330	88.679	0.349														
MANHOLE COEF K= 0.02	LOSS (m)	0.000															
TOTAL HGL (m)		88.847															
MAX. SURCHARGE (mm)		-88															

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way	735A	740A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)	88.711	88.816		0.25	0.05	0.79	0.259	0.06	0.62	30.23
OBVERT ELEVATION (m)	88.961	89.066		HYDRAULIC SLOPE = 0.54%						
DIAMETER (mm)	250			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 1.120						
LENGTH (m)	40.58			DESIGN FLOW DEPTH = 0.250						
FLOW (l/s)	33.87			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.69 m/s HL = K_L * V^2/ 2g						
HGL (m) ***	88.847	88.978	0.132							
MANHOLE COEF K= 0.02	LOSS (m)	0.000								
TOTAL HGL (m)		89.066								
MAX. SURCHARGE (mm)		0								

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way	740A	750A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)	88.847	89.080		0.25	0.05	0.79	0.247	0.06	0.60	29.57
OBVERT ELEVATION (m)	89.097	89.330		HYDRAULIC SLOPE = 0.32%						
DIAMETER (mm)	250			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 1.136						
LENGTH (m)	94.16			DESIGN FLOW DEPTH = 0.250						
FLOW (l/s)	33.59									
HGL (m) ***	89.066	89.367	0.301	Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.68 m/s HL = K_L * V^2/ 2g						
MANHOLE COEF K= 0.02	LOSS (m)	0.000								
TOTAL HGL (m)		89.367								
MAX. SURCHARGE (mm)		37								



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SANITARY HYDRAULIC GRADE LINE DESIGN SHEET

Bank Street Sanitary Sewer | Regional Group
145172-6.0 | Rev #2 | 2024-07-09
Prepared By: AS | Checked By: RM

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way	750A	760A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)	89.086	89.289		0.25	0.05	0.79	0.250	0.06	0.61	29.74
OBVERT ELEVATION (m)	89.336	89.539		HYDRAULIC SLOPE = 0.29%						
DIAMETER (mm)	250			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 1.071						
LENGTH (m)	81.07			DESIGN FLOW DEPTH = 0.225						
FLOW (l/s)	31.85									
HGL (m) ***	89.367	89.600	0.233	Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.65 m/s HL = K_L * V^2/ 2g						
MANHOLE COEF K= 0.02	LOSS (m)	0.000								
TOTAL HGL (m)		89.600								
MAX. SURCHARGE (mm)		61								

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way	760A	770A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)	89.294	89.502		0.25	0.05	0.79	0.253	0.06	0.61	29.91
OBVERT ELEVATION (m)	89.544	89.752		HYDRAULIC SLOPE = 0.27%						
DIAMETER (mm)	250			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 1.027						
LENGTH (m)	82.14			DESIGN FLOW DEPTH = 0.210						
FLOW (l/s)	30.72									
HGL (m) ***	89.600	89.820	0.219	Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.63 m/s HL = K_L * V^2/ 2g						
MANHOLE COEF K= 0.02	LOSS (m)	0.000								
TOTAL HGL (m)		89.820								
MAX. SURCHARGE (mm)		68								

FRICTION LOSS	FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL								
Sora Way	770A	780A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)		
INVERT ELEVATION (m)	89.349	89.612		0.2	0.03	0.63	0.326	0.05	0.60	18.72		
OBVERT ELEVATION (m)	89.549	89.812		HYDRAULIC SLOPE =						0.47%		
DIAMETER (mm)	200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) =						1.197		
LENGTH (m)	80.63			DESIGN FLOW DEPTH =						0.200		
FLOW (l/s)	22.42			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends Velocity = Flow / Area = HL = $K_L * V^2 / 2g$ K_L=0.02 0.71 m/s								
HGL (m) ***	89.820	90.197	0.377									
MANHOLE COEF K= 0.02	LOSS (m)	0.001										
TOTAL HGL (m)		90.198										
MAX. SURCHARGE (mm)		386										



FRICTION LOSS			FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way			780A	790A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)			89.867	90.065		0.2	0.03	0.63	0.345	0.05	0.61	19.26
OBVERT ELEVATION (m)			90.067	90.265		HYDRAULIC SLOPE = 0.40%						
DIAMETER (mm)			200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 1.069						
LENGTH (m)			57.35			DESIGN FLOW DEPTH = 0.180						
FLOW (l/s)			20.60			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends KL=0.02 Velocity = Flow / Area = 0.66 m/s HL = KL * V^2/ 2g						
HGL (m) ***			90.198	90.424	0.226							
MANHOLE COEF K= 0.02			LOSS (m)	0.000								
TOTAL HGL (m)				90.425								
MAX. SURCHARGE (mm)				160								

FRICTION LOSS			FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way			790A	791D		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)			90.080	90.213		0.2	0.03	0.63	0.326	0.05	0.60	18.71
OBVERT ELEVATION (m)			90.280	90.413		HYDRAULIC SLOPE = 0.30%						
DIAMETER (mm)			200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 0.952						
LENGTH (m)			40.85			DESIGN FLOW DEPTH = 0.154						
FLOW (l/s)			17.80			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends KL=0.02 Velocity = Flow / Area = 0.57 m/s HL = KL * V^2/ 2g						
HGL (m) ***			90.425	90.545	0.120							
MANHOLE COEF K= 0.02			LOSS (m)	0.000								
TOTAL HGL (m)				90.546								
MAX. SURCHARGE (mm)				133								

FRICTION LOSS			FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL						
Sora Way			791D	791A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
INVERT ELEVATION (m)			90.241	90.272		0.2	0.03	0.63	0.326	0.05	0.60	18.73
OBVERT ELEVATION (m)			90.441	90.472		HYDRAULIC SLOPE = 0.18%						
DIAMETER (mm)			200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) = 0.694						
LENGTH (m)			9.50			DESIGN FLOW DEPTH = 0.122						
FLOW (l/s)			12.99			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends KL=0.30 Velocity = Flow / Area = 0.41 m/s HL = KL * V^2/ 2g						
HGL (m) ***			90.546	90.560	0.015							
MANHOLE COEF K= 0.30			LOSS (m)	0.003								
TOTAL HGL (m)				90.563								
MAX. SURCHARGE (mm)				91								



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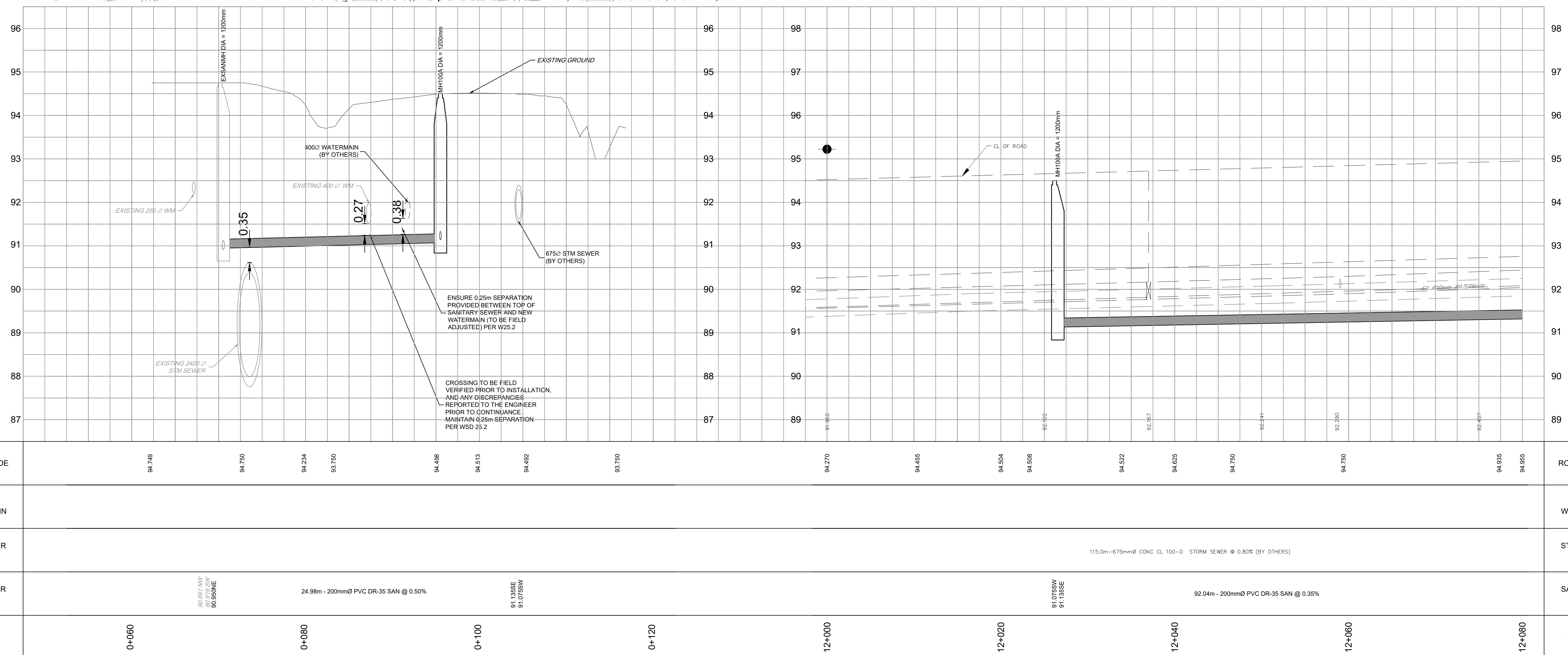
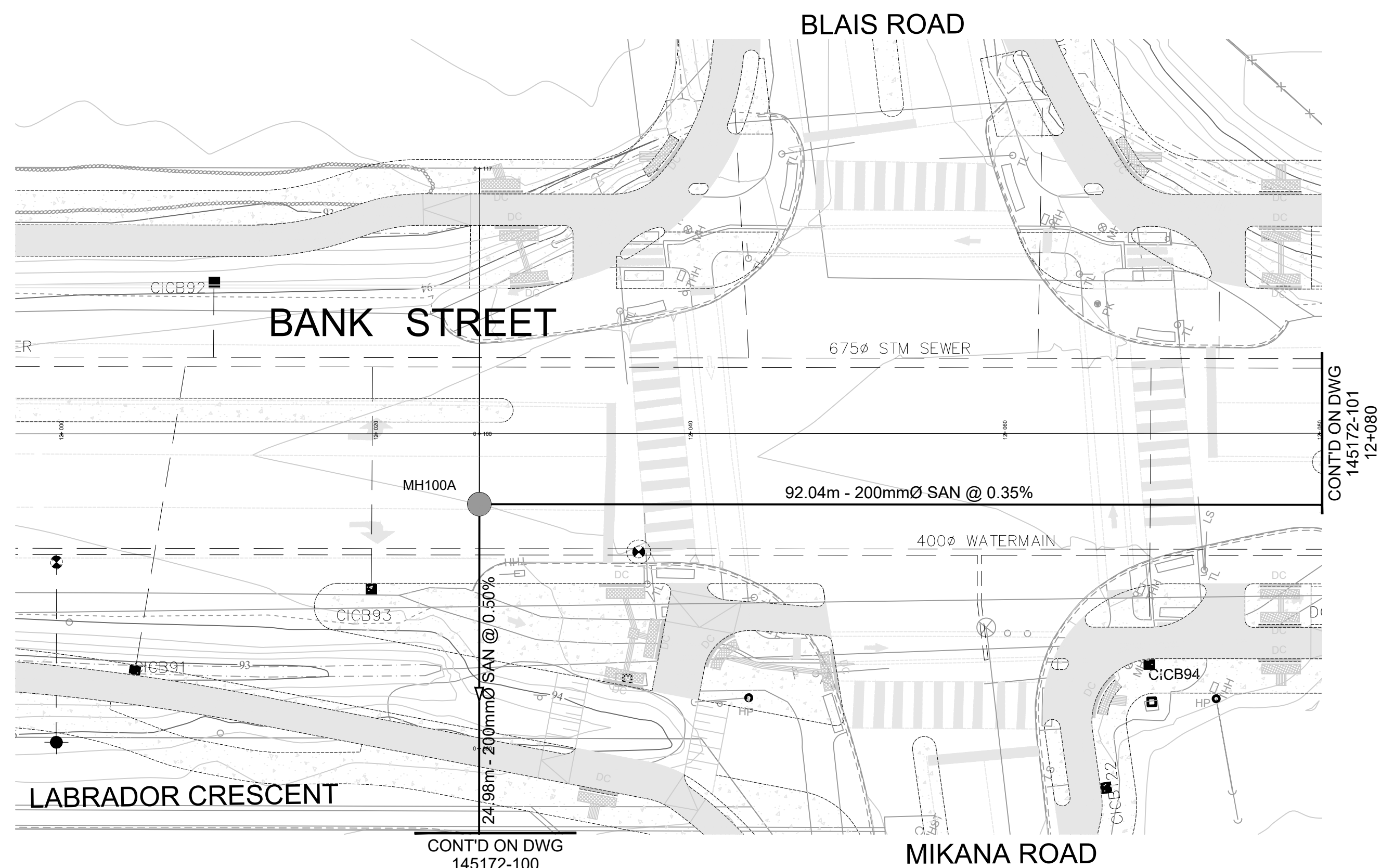
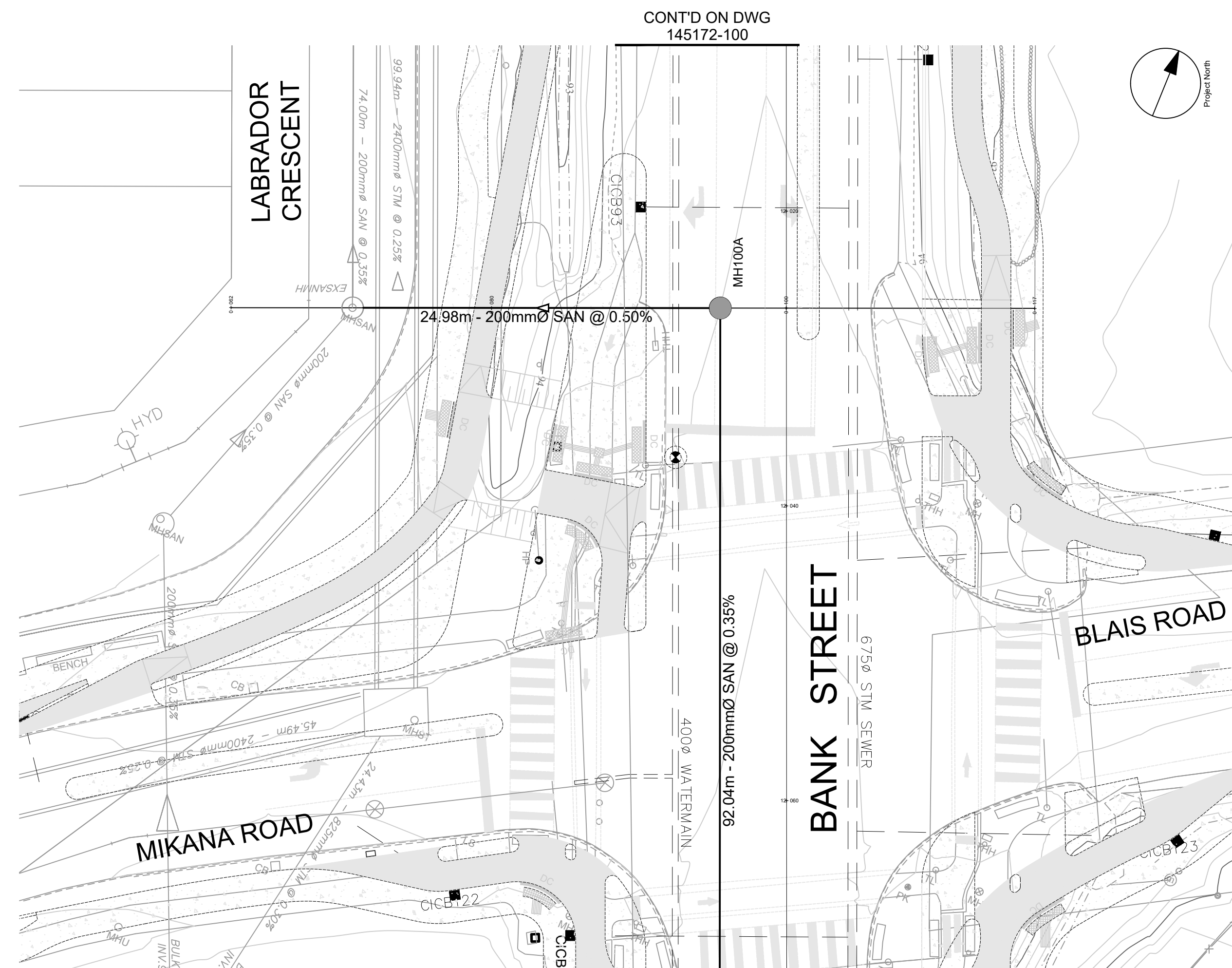
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SANITARY HYDRAULIC GRADE LINE DESIGN SHEET

Bank Street Sanitary Sewer | Regional Group
145172-6.0 | Rev #2 | 2024-07-09
Prepared By: AS | Checked By: RM

FRICTION LOSS		FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL							
Labrador Crescent		791A	792A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)	
INVERT ELEVATION (m)		90.296	90.620		0.2	0.03	0.63	0.376	0.05	0.64	20.11	
OBVERT ELEVATION (m)		90.496	90.820		HYDRAULIC SLOPE =					0.20%		
DIAMETER (mm)		200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) =					0.642		
LENGTH (m)		86.10			DESIGN FLOW DEPTH =					0.116		
FLOW (l/s)		12.92			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.41 m/s HL = K_L * V^2/ 2g							
HGL (m) ***		90.563	90.697	0.134								
MANHOLE COEF K= 0.02		LOSS (m)	0.000									
TOTAL HGL (m)			90.736									
MAX. SURCHARGE (mm)			-84									

FRICTION LOSS		FROM MH	TO MH	PIPE ID	MANNING FORMULA - FLOWING FULL							
Labrador Crescent		792A	793A		DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)	
INVERT ELEVATION (m)		90.638	90.891		0.2	0.03	0.63	0.345	0.05	0.61	19.25	
OBVERT ELEVATION (m)		90.838	91.091		HYDRAULIC SLOPE =					0.37%		
DIAMETER (mm)		200			DESIGN FLOW TO FULL FLOW RATIO (Q/Qf) =					0.654		
LENGTH (m)		73.40			DESIGN FLOW DEPTH =					0.116		
FLOW (l/s)		12.59			Head loss in manhole simplified method p. 71 (MWDM) fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.02 Velocity = Flow / Area = 0.40 m/s HL = K_L * V^2/ 2g							
HGL (m) ***		90.736	90.844	0.108								
MANHOLE COEF K= 0.02		LOSS (m)	0.000									
TOTAL HGL (m)			91.007									
MAX. SURCHARGE (mm)			-84									



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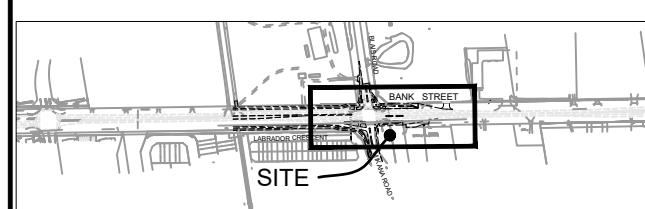
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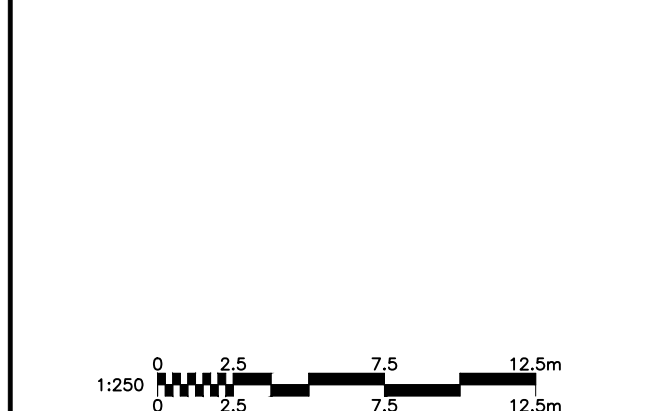
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ISSUES		
No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-07-04
2		
3		
4		

KEY PLAN



CONSULTANTS



SEAL



PRIME CONSULTANT



PROJECT

S-4 LEITRIM EXPANSION
LANDS - BANK STREET
SANITARY EXTENSION
PHASE 1

PROJECT NO:

145172

CHECKED BY:
R.M.

APPROVED BY
D.G.Y.

SHEET TITLE

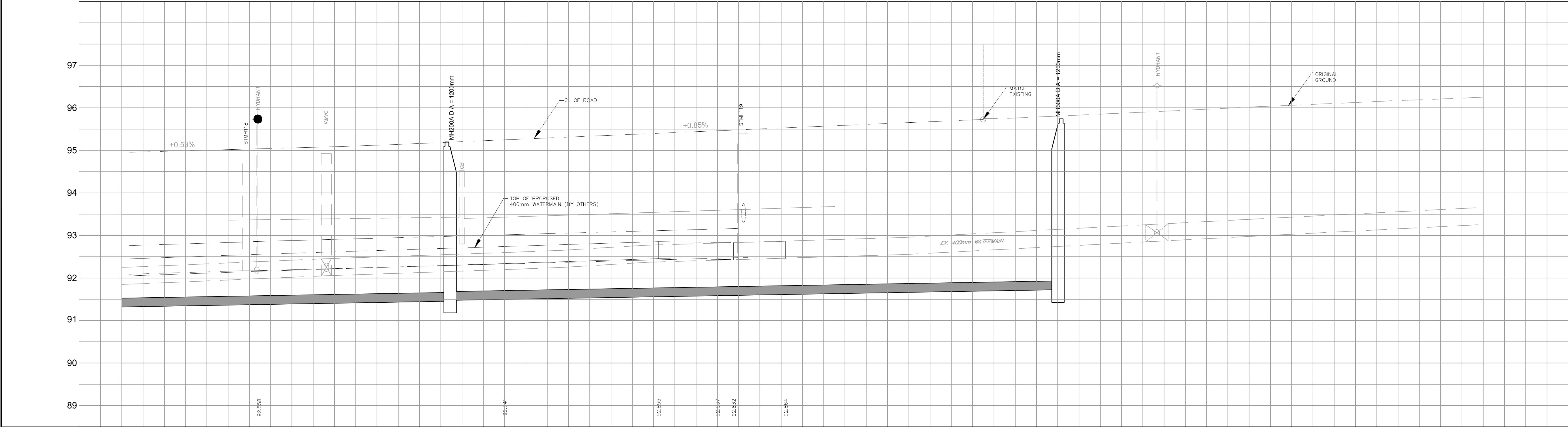
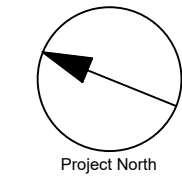
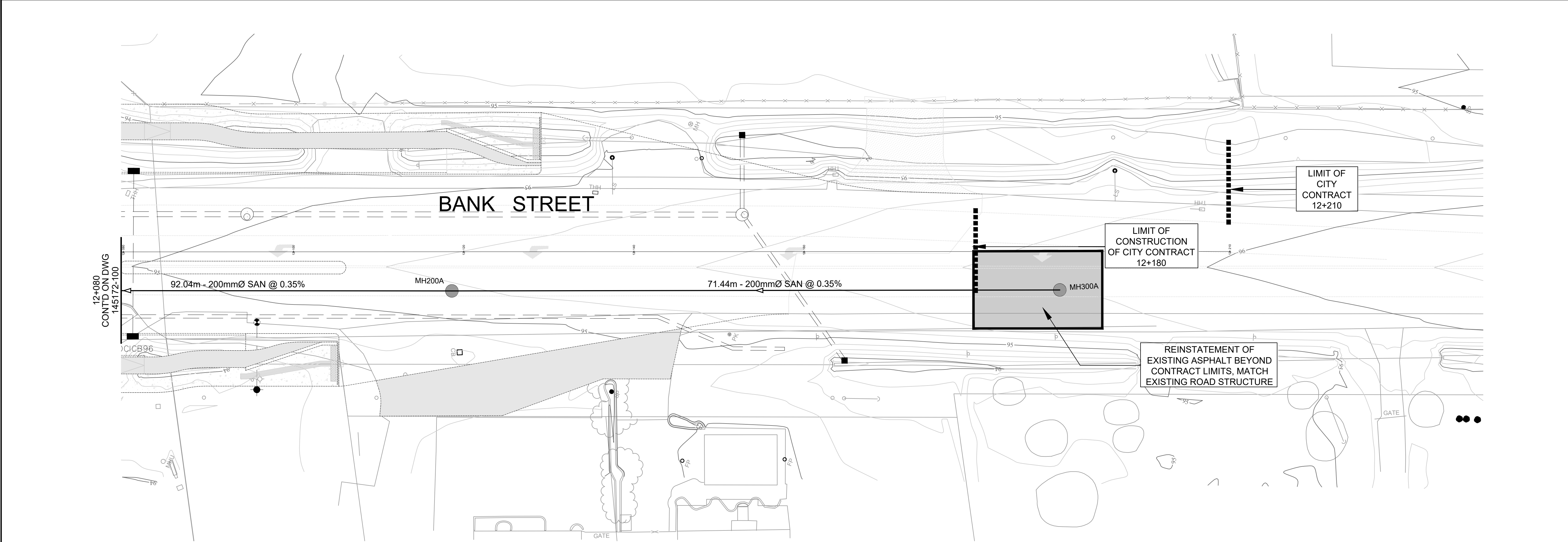
BANK STREET SANITARY
SEWER

SHEET NUMBER

100

ISSU

1



ROAD GRADE	94.955 95.000 95.000 95.000 95.188 95.250 95.273 95.301 95.500 95.507 95.513 95.682 95.697 95.773 95.810 95.937	ROAD GRADE
TOP OF WATERMAIN		TOP OF WATERMAIN
STM SEWER INVERT	92.162 92.170 58.2m - 675mm Ø CONC CL 100-D STORM SEWER @ 0.54% (BY OTHERS) 92.478	STM SEWER INVERT
SAN SEWER INVERT	92.04m - 200mm Ø PVC DR-35 SAN @ 0.35% 91.457NW 91.475SE 71.44m - 200mm Ø PVC DR-35 SAN @ 0.35% 91.727NW	SAN SEWER INVERT
STATION	12+080 12+100 12+120 12+140 12+160 12+180 12+200 12+220	STATION

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ISSUES		
No.	DESCRIPTION	DATE
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2		
3		
4		

NOT FOR CONSTRUCTION

KEY PLAN

CONSULTANTS

1:250
0 2.5 7.5 12.5m
0 2.5 7.5 12.5m

SEAL

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Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT
S-4 LEITRIM EXPANSION
LANDS - BANK STREET
SANITARY EXTENSION
PHASE 1

PROJECT NO: 145172	
DRAWN BY: M.M.	CHECKED BY: R.M.
PROJECT MGR: R.M.	APPROVED BY: D.G.Y.

SHEET TITLE
BANK STREET SANITARY
SEWER

SHEET NUMBER 101	ISSUE 1
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Mr. Jeff Shillington
City of Ottawa
July 11, 2024

Appendix C

Email Correspondence from DSEL

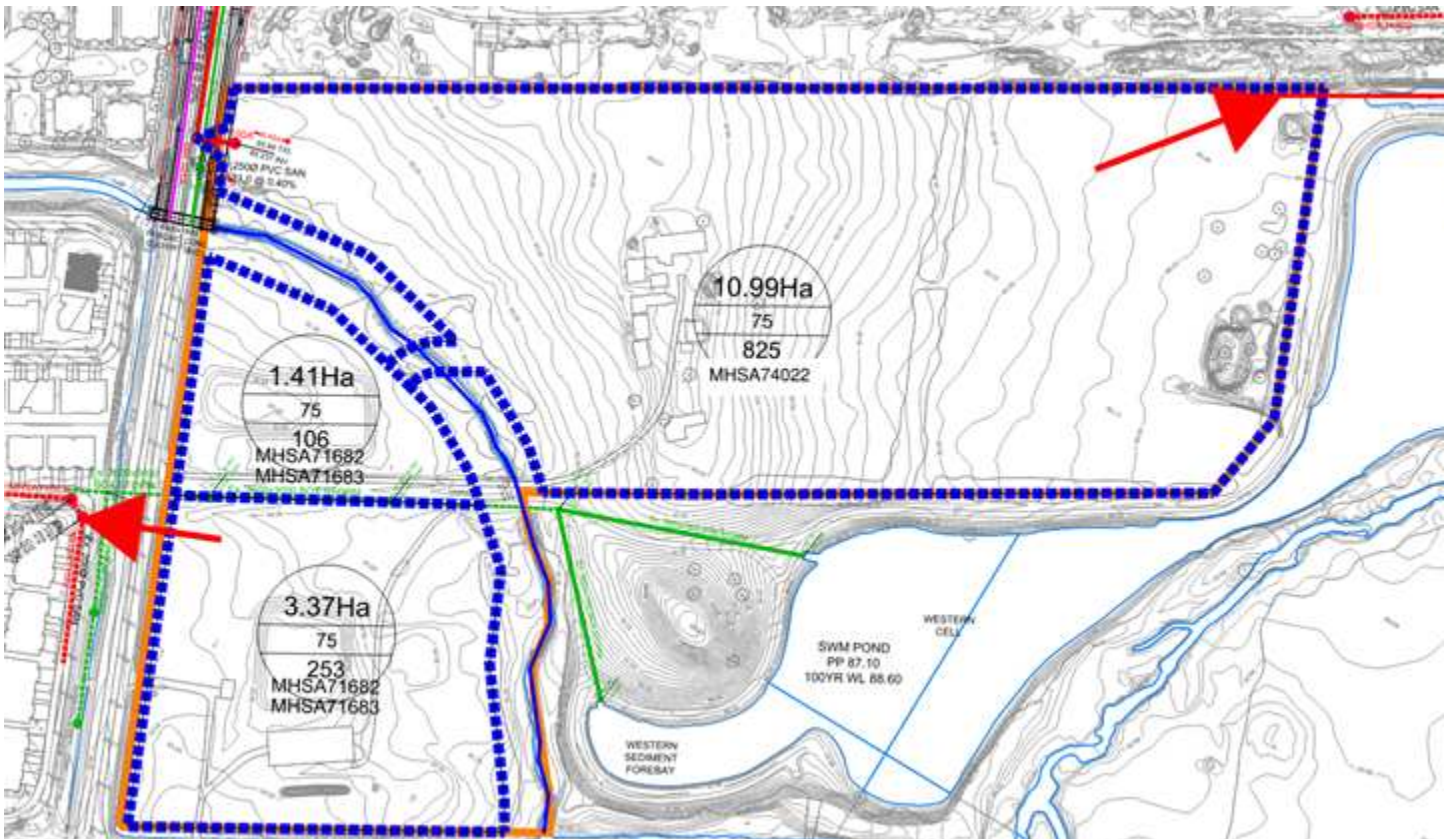
Soward, Angela

From: Jeremy Chouinard <JChouinard@dsel.ca>
Sent: Thursday, June 27, 2024 9:19 AM
To: Magladry, Ryan; Soward, Angela; Marc Pichette
Subject: RE: Bank Street Sanitary - Labrador and Sora Way As-builts

Arcadis Warning: Exercise caution with email messages from external sources such as this message. Always verify the sender and avoid clicking on links or scanning QR codes unless certain of their authenticity.

Hi Ryan,

As discussed, please see sketch below of what we're proposing for sanitary design. The flows from the south-west would be 5.57 l/s assuming 75pop/ha, 4.78 ha and current design guidelines. We'd be tying in to MHS71682.



Let me know if you have any questions, thanks,

Jeremy Chouinard, P.Eng.,
Project Manager

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

Attachment 2 – City of Ottawa Email

Jeremy Chouinard

From: Marc Pichette
Sent: June 17, 2024 4:12 PM
To: Adam Fobert; Jeremy Chouinard
Subject: FW: 4795 Bank - Bank Street Reconstruction Drawings

FYI – lets discuss tomorrow morning.

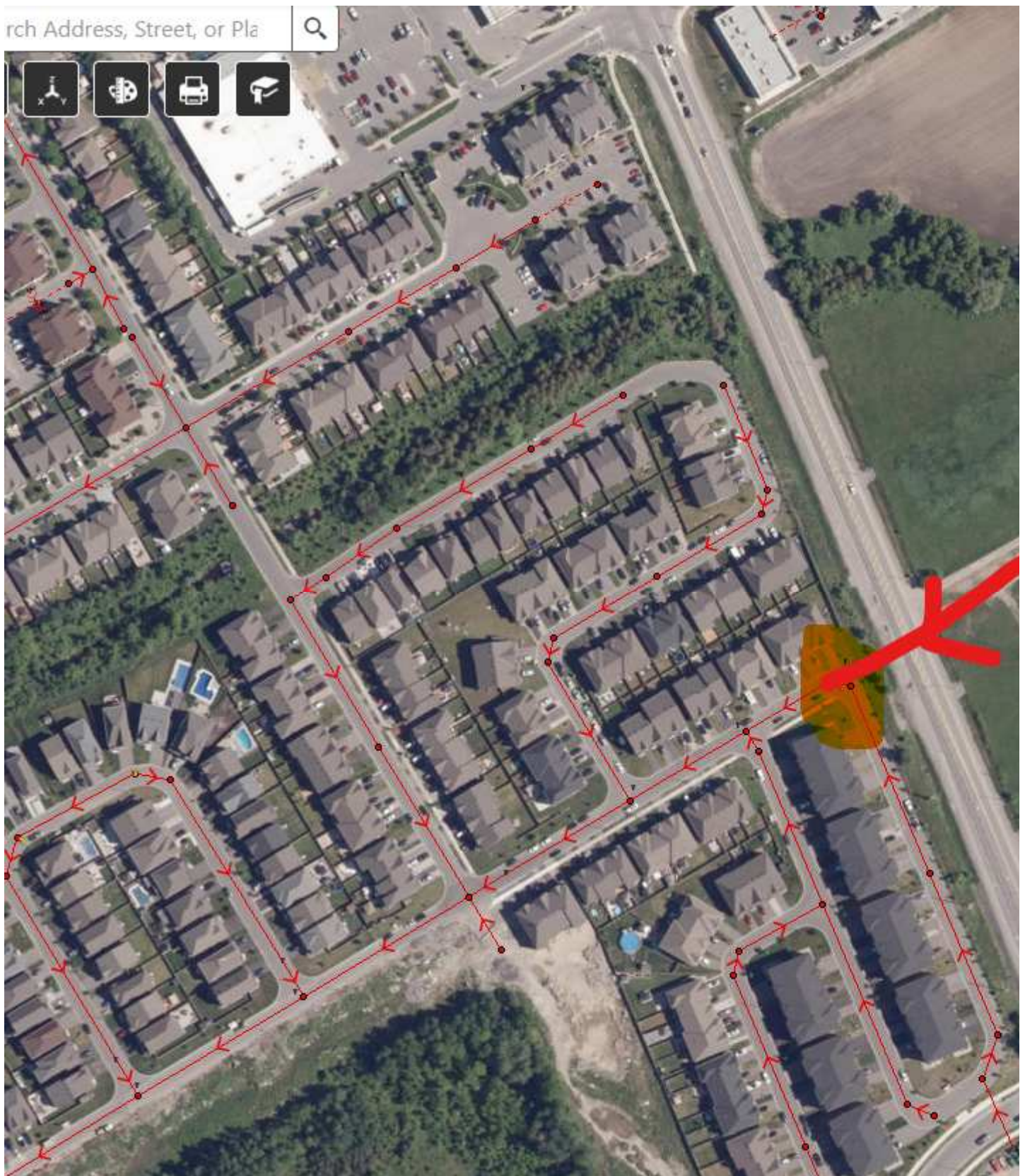
From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Sent: June 17, 2024 3:54 PM
To: Marc Pichette <MPichette@dsel.ca>
Cc: Bougadis, John <John.Bougadis@ottawa.ca>; Xu, Lily <Lily.Xu@ottawa.ca>; Sharif, Golam <sharif.sharif@ottawa.ca>; van de Lande, Robin <Robin.vandeLande@ottawa.ca>; Rogers, Christopher <Christopher.Rogers@ottawa.ca>; Moodie, Derrick <Derrick.Moodie@ottawa.ca>
Subject: Re: 4795 Bank - Bank Street Reconstruction Drawings

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Hi Marc,

We have the following comments on your memo:

- Can DSEL provide more detailed information on the land use types and street layout for expansion area S5?
- Is it possible to direct sanitary flow from the S5 lands south of Findlay Creek to the existing 200 mm sewer on Sora Way to avoid a deep crossing of Findlay Creek?



- The City needs evidence that alternatives have been evaluated to ensure that impact to the project is minimized. This would be a normal requirement for a Master Servicing Study for new urban expansion areas. Is constructing a new sewer on Bank Street the only viable option to service the S5 lands?

- Please confirm if a connection to the Bank Street watermain is required for capacity and redundancy.
- Has the need for watermain connections from the Bank Street watermain to the new expansion areas been considered?

Please let us know if you would like to discuss or require clarification.

Jeff Shillington, P. Eng.

Senior Project Manager, Development Review, South Branch

Planning, Infrastructure and Economic Development

City of Ottawa

tel: 580-2424 x 16960

email: jeff.shillington@ottawa.ca

From: Marc Pichette <MPichette@dsel.ca>

Sent: Monday, June 17, 2024 2:14 PM

To: Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Bougadis, John <John.Bougadis@ottawa.ca>

Subject: RE: 4795 Bank - Bank Street Reconstruction Drawings

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Thanks Jeff. I believe Ted has a follow-up meeting with the City setup for tomorrow (not sure who with), would be great to get any preliminary thoughts in advance of that if possible.

From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>

Sent: June 14, 2024 10:02 AM

To: Marc Pichette <MPichette@dsel.ca>; Bougadis, John <John.Bougadis@ottawa.ca>

Subject: Re: 4795 Bank - Bank Street Reconstruction Drawings

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Hi Marc,

Yes we've received it and will have some comments for you early next week.

Jeff

From: Marc Pichette <MPichette@dsel.ca>

Sent: Thursday, June 13, 2024 2:59 PM

To: Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Bougadis, John <John.Bougadis@ottawa.ca>

Subject: RE: 4795 Bank - Bank Street Reconstruction Drawings

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Just following up to confirm receipt.

I'm out of the office tomorrow afternoon but can otherwise work around your schedules to find a time to review quickly.

From: Marc Pichette

Sent: June 11, 2024 10:00 PM

To: 'Shillington, Jeffrey' <jeff.shillington@ottawa.ca>; 'Bougadis, John' <John.Bougadis@ottawa.ca>

Cc: 'stephen.gallagher@ottawa.ca' <stephen.gallagher@ottawa.ca>; 'ted@dilligafproperties.com' <ted@dilligafproperties.com>; Jeremy Chouinard <JChouinard@dsel.ca>; Steve Pichette <SPichette@dsel.ca>

Subject: FW: 4795 Bank - Bank Street Reconstruction Drawings

Importance: High

Hi Jeff and John,

Please find attached memo which includes our functional design figure for the proposed sanitary sewer on Bank St. as well a review of the capacity of the downstream sewers. I think it would be helpful to have a quick meeting to present our analysis and ensure you have all information you need at this stage in order for us (or Robinson depending on the City's direction) to begin a detailed design ASAP.

Let me know your availability Wednesday/Thursday.

Thanks,

Marc

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: May 30, 2024 3:36 PM
To: Jeremy Chouinard <JChouinard@dsel.ca>
Cc: Xu, Lily <Lily.Xu@ottawa.ca>
Subject: RE: 4795 Bank (not 1352) - Bank Street Reconstruction Drawings

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Hi Jeremy,

I am following up on the email you sent to Stephen. We have discussed internally with different units of the City and these are the steps discussed:

1. Landowners should contact Robyn to coordinate the secondary planning for the S5 lands and organize a meeting to review the scope of work and servicing needs.
2. S4 and S5 landowners should prepare an adequacy of servicing report for their lands, including a design brief for the local sanitary sewer required on Bank Street. The report should also identify connections to the existing watermain on Bank Street and ensure that post-development stormwater runoff to Bank Street matches pre-development rates.
3. Circulate the design brief, including functional level plan and profile drawings of the sewer, to other City groups for approval.
4. Transfer the design brief and drawings to Stephen/Robinson to incorporate into the design of Bank Street.
5. Begin work on legal agreements and cost-sharing arrangements for the design and construction of sewers benefiting S4 and S5. This discussion can happen now.
5. A Third-Party Infrastructure Agreement will be required, and in the cases here, would require Council approval since it will likely be over the upset limit of \$350,000 under the delegated authority.

There is no specific category of application intake for this type of work within our usual City system. However, we will setup up this work/ application under a category and go through all the necessary steps discussed above. Let me know if you have any question. I have also cc'd Lily Xu, Manager of DR South here.

Regards,

Sharif

Golam Sharif, P.Eng., M.Eng.

Senior Project Manager (A), Infrastructure Projects

Development Review South

Planning, Development and Building Services Department (PDBS) Department |

Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste **20763**, fax/téléc:613-580-2576, sharif.sharif@ottawa.ca

From: Jeremy Chouinard <JChouinard@dsel.ca>

Sent: Monday, May 27, 2024 9:53 AM

To: Gallagher, Stephen <stephen.gallagher@ottawa.ca>

Subject: RE: 1352 - Bank Street Reconstruction Drawings

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Good morning,

Please find attached the sketches we reviewed last Thursday.

Regards,

Jeremy Chouinard, P.Eng.,

Project Manager

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

Cell: 613-668-2585

e-mail: jchouinard@DSEL.ca

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