



Sanitary Servicing Study

The City of Calgary

Type of Document:

Final

Project Name:

Franklin Station Area Improvements

Project Number:

CGY-23011705-00

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1. Introduction

The City of Calgary (The City) is pursuing a land use amendment to redevelop the existing Franklin Station Area (Subject Lands) for housing and mixed-use buildings under The City's Transit Oriented Development program. The project site is located to the south of Memorial Drive E in the established communities of Albert Park/Radisson Heights. The subject lands identified for redevelopment include the existing south Park-and-Ride lot associated with the Franklin CTrain station, a nearby green space, and a portion of Radcliffe Drive SE. The development plan is to convert the parking lot into a mixed-market affordable housing complex together with improvements to adjacent public areas.

As part of the application for land use amendment, a sanitary servicing study is required by the City of Calgary in order to estimate the impacts to the existing public sanitary system that is servicing the Franklin Station redevelopment area.

2. Scope and Objectives

EXP Services Inc. was retained B&A Planning Group to conduct a Sanitary Servicing Study to review the impacts to the existing sanitary sewer network as a result of the proposed redevelopment of the Franklin Station lands, evaluating the sewer system's capacity to manage the projected sanitary flows should this redevelopment project be completed. This report will form part of the Land Use Amendment Application for the Franklin Station Area redevelopment.

3. Site Description

The Subject Lands are located on Block 1, Plan 8510947 with the municipal address 2734 Radcliffe DR SE. The Legal Land description for the project site is LSD: 11-16-24-29-W4. Figure 1 shows the proposed project boundary. The proposed development parcel measures approximately 2.13 ha and the adjoining existing areas that comprise the overall sanitary catchment contribute a further 48.55 ha for a total catchment area to be evaluated under this study of 50.58 ha. The proposed development area is currently utilized for C-Train parking, with the asphalt parking lot comprising approximately 1.4 ha of the 2.13 ha total land area. The parking lot drains NW to SE, towards Radcliffe Dr SE and has an overall existing slope of approximately 2.5%. Under redevelopment the subject lands will utilized predominantly for new residential development.



Figure 1 – Franklin Station Area Subject Lands Boundary (from Calgary Imagery 2023)

This study will look at the sanitary system within the existing communities of Albert Park/Radisson Heights. These long-established neighbourhoods are comprised of a mix of low-density residential development, commercial development and two school sites. The study area presented will be measured at a desktop level using electronic drawing information that was provided by The City.

4. Sanitary System

It has been assumed that the sanitary system associated with proposed redevelopment of Franklin Station will connect to the existing 200 mm sanitary main located within Radcliffe Dr SE, to the immediate southeast of the project site. This existing sanitary sewer drains east along Radcliffe Dr SE, increasing in size to 250mm through to Fonda Wy SE, after which it continues south and east before terminating at the 525 mm trunk in 40 St SE. Refer to **Appendix 2 – Franklin Station – Sanitary Servicing Plan** for a diagram of the overall sanitary catchment area and network of sanitary sewers that under evaluation with this study.

Additionally, the **Sanitary Servicing Plan** diagram presents the sub-catchments areas that comprise the overall sanitary catchment being evaluated. The **Plan** provides the network of sanitary sewers including that an existing service extends through the existing Franklin Station parking lot to provide sanitary service to the Franklin C-Train Station as well as an existing Enmax substation that is located on the westernmost corner of the site.

It is understood that upon site redevelopment, new sanitary sewers would be constructed within the subject lands, to service both the new development and continue to service the existing C-Train Station and Enmax Substation. The new sewers would tie into the existing sanitary mains located within the public roads as described on the **Sanitary Servicing Plan**. While the details of the ultimate sanitary layout are not known at the time of this report's writing, the concepts that have been proposed include the base constraints of maintaining service to the C-Train station and the Enmax substation.

5. Sanitary Capacity Analysis

5.1 Overview of Assessment

The sanitary capacity analysis models two separate cases for this study. Those being:

- **Design Case 01** - Pre-development, or current, conditions of the existing sanitary system. And,
- **Design Case 02** – Estimated Post-development conditions of the existing sanitary system.

Both these cases are necessary to help understand the current status of service in the first instance which in turn helps understanding how best to integrate sanitary servicing needs to support the redevelopment.

The study area (**Sanitary Servicing Plan**) being modeled with this analysis was created by mapping the distinct catchments based on their land use and locations using publicly available information on the City of Calgary Development Map. Further, densities were prescribed to each distinct area by land use definitions outlined in the City of Calgary Land Use Bylaw, and enrollment data for the two schools located inside the study area.

For information purposes, the flow data used, based on the understood land use, in this assessment was as follows:

- 315 L/day/person for residential;
- 190 L/day/person for commercial;
- 70 L/day/person for Elementary schools;
- 90 L/day/person for High schools; and,
- An infiltration rate of 0.28 L/s/ha.

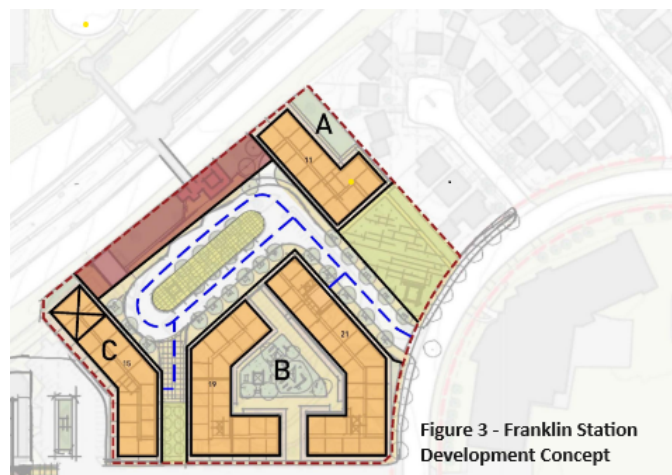
5.2 Pre-Development Conditions

Franklin Station Redevelopment is located within a well established area of the City of Calgary and as a result, understanding the pre-development conditions of the sanitary system is key to estimating the impacts of this redevelopment project on the existing sanitary system. The overall study area was analyzed by mapping the catchment by land use as described by the City of Calgary Development Map and utilizing population densities described in the City of Calgary Land Use Bylaw for the respective land uses. For the school sites, enrollment data published by the City of Calgary was incorporated into this analysis.

Appendix 3 – Sanitary Sewer Design Calculations (Existing Conditions) estimates that under current development conditions the existing 200 mm and 250 mm sanitary mains located within Radcliffe Dr SE have sufficient capacity up to the intersection with Fonda Wy SE, peaking at approximately 80% of pipe capacity. Along Fonda Wy SE and up to 40th Street SE, the existing 250 mm sanitary mains service additional existing residential development areas as shown on the **Sanitary Servicing Plan (Appendix 2)** diagram. Based on this assessment, **Sanitary Sewer Design Calculations (Existing Conditions)** indicates that along this section of Fonda Way, associated population and attributable flows results in *the surcharge the majority of this portion of the existing sanitary network up to 40 St SE*. Understanding that this is a Desktop analysis actual flow conditions may not be actually surcharging and more detailed investigation would be required however, in this section of sanitary main along Fonda Way, should the pipe not be surcharged it is likely near its full capacity. At 40th Street the 250 mm mains merge with the existing 525mm mains and represents the extent of this study's analysis area.

5.3 Post Development Conditions

As introduced previously, Franklin Station is being planned for a new, predominantly residential redevelopment project. Understanding that the development plan has not been fully resolved, Figure 3 provides for a Development Concept for the



future proposed land use. It is expected that under redevelopment approximately 450 residential units, and 10,000 sq feet of commercial/retail development will be created. For sanitary servicing, the final development plan will continue to receive sanitary service utilizing the existing sanitary system described in section 4.0.

In Section 5.2, the existing conditions of the sanitary system servicing the Franklin Station lands was analyzed and it was estimated that portions of the sanitary main along Fonda Way were at capacity. Referring to **Appendix 3 – Sanitary Sewer Design Calculations (Post Development)** additional sanitary flows were added to the existing sanitary system based on the Development Concept. The following parameters summarize the additional contributing sanitary demands as a result of the proposed redevelopment;

- Franklin Station Redevelopment, 450 residential units, 10,000 ft² (939 m²) commercial / retail
- Residential; equivalent people calculated at 2.2 people / unit
- Retail; equivalent people calculated at 1 person / 25 m²

As a result of the additional sanitary loading and referring to the **Sanitary Sewer Design Calculations (Post Development) – Appendix 3**, in addition to the mains along Fonda Way that are at capacity under existing conditions, it is estimated that the 250mm sanitary mains along Radcliffe Drive, from 36th Street to Fonda Way will also be at capacity (or surcharged). Referring to the **Sanitary Servicing Plan (Appendix 2)** the sanitary mains that are estimated to be at capacity (or surcharging), both at existing and post development conditions, have been highlighted along the respective roadways.

6. Conclusion

The results of the assessment undertaken through this sanitary study indicate that there are potential capacity constraints within the existing sanitary system servicing the lands being evaluated under this study. These capacity constraints will then be increased because of Franklin Station being redeveloped. The following summarizes the results of this study;

- ⇒ Under present (existing) conditions, it is estimated that the existing sanitary system is at capacity (or surcharge) along Fonda Way (intersection of Radcliffe Drive / Fonda Way to the intersection of 40th Street / Fonda Way). Approximately 446m of 250mm CON SAN sewer is potentially at capacity.
- ⇒ Under post development conditions, the existing 250mm sanitary sewer along Fonda Way would be further impacted. In addition, as a result of the increased sanitary flows, additional 250mm CON SAN sewer along Radcliffe Drive is estimated to be at capacity or surcharged. Approximately 167m of sewer is impacted between the intersection of Radcliffe Drive / 36th Street and Radcliffe Drive / Fonda Way.

Sanitary flow calculations can be subjective and the accuracy of the results has limitations when reviewed over small catchment areas. The results of this Sanitary Study provide that there is strong potential for the existing sanitary sewers downstream of Franklin Stations to be subject to capacity constraints however, before advancing any sewer upgrades, it is recommended that on-site flow monitoring being completed. A flow monitoring study would allow for an accurate understanding of sanitary flow conditions and of any capacity constraints within the existing sanitary system. This information would provide accurate information for determining the extent of utility upgrades that may be required to support the redevelopment of Franklin Station.

Corporate Authorization

This report entitled, “Franklin Station Area Improvements Sanitary Servicing Study” is prepared by EXP Services Inc. for The City of Calgary. The material in this report reflects the best judgment of EXP Services Inc. based on the information available at the time of preparation. Any use, which a third party makes of this report, or reliance on or decisions made based on it, is the responsibilities of the third party. EXP Services Inc. accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on this report.

Prepared by

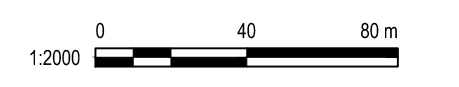
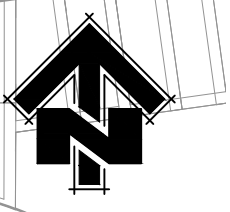
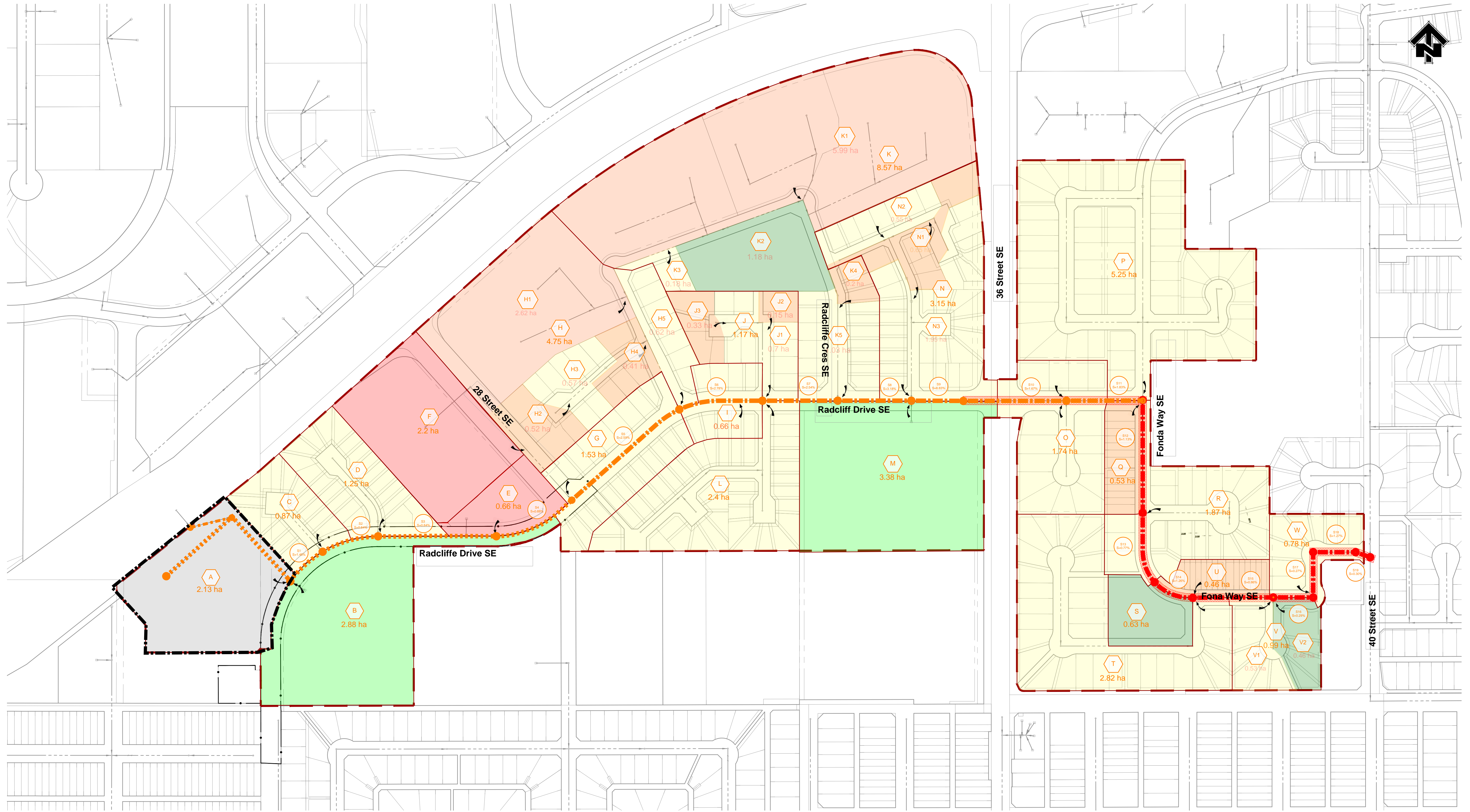
Tyson Gehl, P.Eng.

Authenticating Engineer – Greg Bodnarchuk, P.Eng.

Permit Stamp

Appendix 2 Sanitary Servicing Plan

Plan Date: Jan 23, 2024 - 07:38:23am Prepared by: GdHT
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 CGY-23011705-00 - Legal Review.dwg
 CGY-23011705-00 - Sanitary Sewers.dwg
 CGY-23011705-00 - Storm Sewers.dwg
 CGY-23011705-00 - Surface Conditions.dwg



LEGEND SANITARY CATCHMENT BOUNDARIES PROJECT AREA SANITARY SEWERS (150 mm) SANITARY SEWERS (200 mm) SANITARY SEWERS (250 mm)	SANITARY SEWERS (250 mm) SURCHARGED UNDER EXISTING CONDITIONS SANITARY SEWERS (250 mm) SURCHARGED UNDER POST DEVELOPMENT CONDITIONS	SANITARY CATCHMENT LABEL SANITARY SUB-CATCHMENT LABEL SANITARY PIPE SEGMENT LABEL	S-CRI (PARKING LOT) LOW DENSITY RESIDENTIAL (R-C1/R-C2) MULTI RESIDENTIAL RESIDENTIAL (M-CG) COMMERCIAL (C-C1)	MULTI-RESIDENTIAL (M-C1) PARKS (S-SPR) SCHOOLS (S-SPR)
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PROJECT NAME: **FRANKLIN STATION**
 PROJECT NO: CGY-23011705-00 DATE: 2024.01.16 SCALE: 1:2000
 TITLE: **SANITARY SERVICING PLAN** FIGURE NO: **02**

Appendix 3 Sanitary Area Design Calculations

Subdivision Name
Project No.
Phase
Designed by
2024-05-28

SANITARY SEWER DESIGN CALCULATIONS - EXISTING CONDITIONS

Pipe Criteria

Manning n PVC: 0.013
Manning n Concrete: 0.013

$$Q_{PDW} = \frac{G \times P \times P_f}{86,400}$$

$$P_f = 1 + \frac{14}{4 + \sqrt{P}}$$

Per Capita Avg Daily Flow

Infiltration (L/s/ha): 0.28
Residential (L/day/person): 315.0
Commercial (L/day/person): 190.0
Industrial (L/day/person): 190.0
P_f: Peaking of Harmon

$$I_A = 0.28 \frac{L}{s} / ha \times A_C$$

$$Q_{PWW} = Q_{PDW} + I_A$$

Population Data By Land Use - See notes for References

	Population	Units / Ha	Ppl / Unit	Ppl / Ha	L / Day
Low Density Residential				55.0	315.0
M-C1	148.00	2.17	321.2	315.0	
M-CG	111.00	2.17	240.9	315.0	
S-PR (Elementary School)	295.00				70.0
S-PR (High School)	1170.00				90.0
S-CRI	0.00	0.00	0.0	0.0	315.0
Commercial				200.0	190.0
S-SPR (Park)	0.00	0.00	0.00	0.00	315.0

Segment	Drainage Area(s)	Land Use	Area Design										Pipe Design								Capacity Check					
			Incremental Area (ha)	Cumulative Area (ha)	Per Capita Avg Daily Flow (L/person/day)	Population Density (person/ha)	Incremental Population (person)	Cumulative Population (person)	Incremental Dry Weather Flow (L/s)	Q _{PDW} Peak Dry Weather Flow (L/s)	P _f Peaking Factor	I _A Infiltration Allowance (L/s)	Q _{PWW} Total Peak Wet Weather Flow (L/s)	Pipe Run Length (m)	Pipe Slope (%)	Nominal Pipe Diameter (mm)	Actual Pipe Diameter (mm)	Pipe Material	Manning n	Pipe Capacity (L/s)	Spare Capacity (L/s)	Velocity (m/s)	Design / Cap. Ratio	Pipe OK or SURCHARGED		
1	A	S-CRI	2.130	2.130	315.0	0.0	0	0	0.0	0.0	4.500	0.596	0.6													
	B	S-PR (Elementary School)	2.880	5.010	70.0	0.0	295	295	0.2	0.2	4.082	1.403	2.4	48.530	1.450%	200	203.0	CON	0.013	41.1	38.7	1.27	0.06	OK		
2	C	Low Density Residential	0.870	5.880	315.0	55.0	48	343	0.2	0.4	4.053	1.646	3.3	64.050	0.840%	200	203.0	CON	0.013	31.3	28.0	0.97	0.11	OK		
3	D	Low Density Residential	1.250	7.130	315.0	55.0	69	412	0.3	0.7	4.016	1.996	4.7	130.220	0.727%	200	203.0	CON	0.013	29.1	24.4	0.90	0.16	OK		
4	E	Commercial	0.660	7.790	190.0	200.0	132	544	0.3	1.0	3.955	2.181	6.0	94.970	0.877%	200	203.0	CON	0.013	32.0	26.0	0.99	0.19	OK		
5	F	Commercial	2.200	9.990	190.0	200.0	440	984	1.0	1.9	3.805	2.797	10.1													
	G	Low Density Residential	1.530	11.520	315.0	55.0	84	1068	0.3	2.2	3.781	3.226	11.7	155.260	2.591%	250	254.0	CON	0.013	99.9	88.2	1.97	0.12	OK		
6	H1	M-C1	2.620	14.140	315.0	321.2	841	1909	3.1	5.3	3.601	3.959	23.0													
	H2, H4	M-CG	0.930	15.070	315.0	240.9	224	2133	0.8	6.1	3.564	4.220	26.0													
	H3, H5	Low Density Residential	1.190	16.260	315.0	55.0	65	2199	0.2	6.4	3.553	4.553	27.1													
	I	Low Density Residential	0.660	16.920	315.0	55.0	36	2235	0.1	6.5	3.548	4.738	27.7	92.820	2.776%	250	254.0	CON	0.013	103.4	75.6	2.04	0.27	OK		
7	J1	Low Density Residential	0.700	17.620	315.0	55.0	39	2273	0.1	6.6	3.542	4.934	28.4													
	J2, J3	M-CG	0.480	18.100	315.0	240.9	116	2389	0.4	7.0	3.524	5.068	29.9													
	L	Low Density Residential	2.400	20.500	315.0	55.0	132	2521	0.5	7.5	3.505	5.740	32.1	82.930	2.541%	250	254.0	CON	0.013	98.9	66.8	1.95	0.32	OK		
8	K1	M-C1	5.990	26.490	315.0	321.2	1924	4445	7.0	14.5	3.292	7.417	55.3													
	K2	S-SPR (Park)	1.180	27.670	315.0	0.0	0	4445	0.0	14.5	3.292	7.748	55.6													
	K3,K5	Low Density Residential	1.210	28.880	315.0	55.0	67	4511	0.2	14.8	3.286	8.086	56.7													
	K4	M-CG	0.200	29.080	315.0	240.9	48	4560	0.2	15.0	3.282	8.142	57.2	81.030	3.178%	250	254.0	CON	0.013	110.6	53.4	2.18	0.52	OK		
9	M	S-PR (High School)	3.380	32.460	90.0	0.0	1170	5730	1.2	16.2	3.190	9.089	60.7													
	N2, N3	Low Density Residential	2.500	34.960	315.0	55.0	138	5867	0.5	16.7	3.180	9.789	62.8													
	N1	M-CG	0.650	35.610	315.0	240.9	157	6024	0.6	17.3	3.169	9.971	64.6	56.889	6.833%	250	254.0	CON	0.013	162.2	97.5	3.20	0.40	OK		
10	O	Low Density Residential	1.740	36.700	315.0	55.0	96	6119	0.3	17.6	3.163	10.276	65.9	113.520	1.668%	250	254.0	CON	0.013	80.1	14.2	1.58	0.82	OK		
11	O	Low Density Residential	1.740	37.350	315.0	55.0	96	6215	0.3	17.9	3.156	10.458	67.1	84.120	1.834%	250	254.0	CON	0.013	84.0	16.9	1.66	0.80	OK		
12	P	Low Density Residential	5.250	42.600	315.0	55.0	289	6504	1.1	19.0	3.137	11.928	71.5													
	Q	M-CG	0.530	43.130	315.0	240.9	128	6631	0.5	19.5	3.129	12.076	73.0	124.120	1.131%	250	254.0	CON	0.013	66.0	-7.0	1.30	1.11	Not Acceptable		
13	R	Low Density Residential	1.870	45.000	315.0	55.0	103	6734	0.4	19.8	3.123	12.600	74.6	79.690	0.766%	250	254.0	CON	0.013	54.3	-20.3	1.07	1.37	Not Acceptable		
14	S	S-SPR (Park)	0.630	45.630	315.0	0.0	0	6734	0.0	19.8	3.123	12.776	74.7	46.900	1.259%	250	254.0	CON	0.013	69.6	-5.1	1.37	1.07	Not Acceptable		
15	T	Low Density Residential	2.820	48.450	315.0	55.0	155	6889	0.6	20.4	3.113	13.566	77.1													
	U	M-CG	0.460	48.910	315.0	240.9	111	7000	0.4	20.8	3.107	13.695	78.3	88.660	0.863%	250	254.0	CON	0.013	57.6	-20.7	1.14	1.36	Not Acceptable		
16	V1	Low Density Residential	0.530	49.440	315.0	55.0	29	7029	0.1	20.9	3.105	13.843	78.8													
	V2	S-SPR (Park)	0.460	49.900	315.0	0.0	0	7029	0.0	20.9	3.105	13.972	78.9	43.830	0.291%	250	254.0	CON	0.013	33.5	-45.4	0.66	2.36	Not Acceptable		
17	W	Low Density Residential	0.780	50.680	315.0	55.0	43	7072	0.2	21.1	3.102	14.190	79.6	49.820	0.268%	250	254.0	CON	0.013	32.1	-47.4	0.63	2.48	Not Acceptable		
18				50.680	315.0	0.0	0	7072	0.0	21.1	3.102	14.190	79.6	46.710	1.269%	250	254.0	CON	0.013	69.9	-9.7	1.38	1.14	Not Acceptable		
19				50.680	315.0	0.0	0	7072	0.0	21.1	3.102	14.190	79.6	16.930	0.299%	250	254.0	CON	0.013	33.9	-45.6	0.67	2.35	Not Acceptable		

Notes

- M-C1 Population density from City of Calgary Land use bylaw (<https://www.calgary.ca/planning/land-use/online-land-use-bylaw.html?part=6&div=3>)
- M-CG Population density from City of Calgary Land use bylaw (<https://www.calgary.ca/planning/land-use/online-land-use-bylaw.html?part=6&div=2>)
- School Populations from Government of Alberta School Enrollment Data: (https://www.alberta.ca/system/files/custom_downloaded_images/educ-school-enrolment-data-2022-2023.xlsx)
- Commercial population density from City of Calgary Municipal Development Plan, 2020 (<https://publicaccess.calgary.ca/ldm01/livelink.exe?func=ccpa.general&msgID=OTTKcgyTerX&msgAction=Download>)
- School per-capita water usage values taken from Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems - Part 4 Wastewater Systems Guidelines for Design, Operating and Monitoring of a Total of 5 Parts (<https://open.alberta.ca/dataset/5f7ec02-7de8-4985-b948-dcf5e2664aee/resource/b90bd6e7-2747-4ea6-b033-b6fc3d248935/download/part4-wastewatersystemsguidelines-2013.pdf>)

SANITARY SEWER DESIGN CALCULATIONS - POST DEVELOPMENT CONDITIONS

Pipe Criteria

Per Capita Avg Daily Flow

Infiltration (L/s/ha): 0.28

Manning n PVC: 0.013

Manning n Concrete: 0.013

Residential (L/day/person): 315.0

Commercial (L/day/person): 190.0

Industrial (L/day/person): 190.0

P_f: Peaking of Harmon

$$Q_{PDW} = \frac{G \times P \times P_f}{86,400}$$

$$I_A = 0.28 \frac{L}{s} / ha \times A_c$$

$$P_f = 1 + \frac{14}{4 + \sqrt{P}}$$

$$Q_{PWW} = Q_{PDW} + I_A$$

Population Data By Land Use - See notes for References					
	Population	Units / Ha	Ppl / Unit	Ppl / Ha	L / Day
Franklin Station Residential	990.00				315.0
Franklin Station Commercial	37.00				190.0
Low Density Residential				55.0	315.0
M-C1		148.00	2.17	321.2	315.0
M-CG		111.00	2.17	240.9	315.0
S-PR (Elementary School)	295.00				70.0
S-PR (High School)	1170.00				90.0
S-CRI		0.00	0.00	0.0	315.0
Commercial				200.0	190.0
S-SPR (Park)		0.00	0.00	0.00	315.0

Segment	Drainage Area(s)	Land Use	Area Design											Pipe Design								Capacity Check						
			Incremental Area (ha)	Cumulative Area (ha)	Per Capita Avg Daily Flow (L/person/day)	Population Density (person/ha)	Incremental Population (person)	Cumulative Population (person)	Incremental Dry Weather Flow (L/s)	Peak Dry Weather Flow (L/s)	Peaking Factor	Infiltration Allowance (L/s)	Total Peak Wet Weather Flow (L/s)	Pipe Run Length (m)	Pipe Slope (%)	Nominal Pipe Diameter (mm)	Actual Pipe Diameter (mm)	Pipe Material	Manning n	Pipe Capacity (L/s)	Spare Capacity (L/s)	Velocity (m/s)	Design / Cap. Ratio	Pipe OK or SURCHARGED				
1	A	Franklin Station Residential	2.130	2.130	315.0	0.0	990	990	3.6	3.6	3.803	0.596	14.3															
	A	Franklin Station Commercial		2.130	190.000	0.000	37	1027	0.081	3.691	3.793	0.596	15															
	B	S-PR (Elementary School)	2.880	5.010	70.0	0.0	295	1322	0.2	3.8	3.719	1.403	15.7	48.530	1.450%	200	203.0	CON	0.013	41.1	25.4	1.27	0.38	OK				
2	C	Low Density Residential	0.870	5.880	315.0	55.0	48	1370	0.2	4.0	3.708	1.646	16.6	64.050	0.840%	200	203.0	CON	0.013	31.3	14.7	0.97	0.53	OK				
3	D	Low Density Residential	1.250	7.130	315.0	55.0	69	1439	0.3	4.3	3.693	1.996	17.8	130.220	0.727%	200	203.0	CON	0.013	29.1	11.3	0.90	0.61	OK				
4	E	Commercial	0.660	7.790	190.0	200.0	132	1571	0.3	4.6	3.665	2.181	18.9	94.970	0.877%	200	203.0	CON	0.013	32.0	13.1	0.99	0.59	OK				
5	F	Commercial	2.200	9.990	190.0	200.0	440	2011	1.0	5.5	3.584	2.797	22.6															
	G	Low Density Residential	1.530	11.520	315.0	55.0	84	2095	0.3	5.8	3.570	3.226	24.1	155.260	2.591%	250	254.0	CON	0.013	99.9	75.8	1.97	0.24	OK				
	H1	M-C1	2.620	14.140	315.0	321.2	841	2936	3.1	8.9	3.450	3.959	34.7															
6	H2, H4	M-CG	0.930	15.070	315.0	240.9	224	3160	0.8	9.7	3.423	4.220	37.5															
	H3, H5	Low Density Residential	1.190	16.260	315.0	55.0	65	3226	0.2	10.0	3.415	4.553	38.6															
	I	Low Density Residential	0.660	16.920	315.0	55.0	36	3262	0.1	10.1	3.411	4.738	39.2	92.820	2.776%	250	254.0	CON	0.013	103.4	64.2	2.04	0.38	OK				
7	J1	Low Density Residential	0.700	17.620	315.0	55.0	39	3300	0.1	10.2	3.407	4.934	39.8															
	J2, J3	M-CG	0.480	18.100	315.0	240.9	116	3416	0.4	10.7	3.394	5.068	41.2															
	L	Low Density Residential	2.400	20.500	315.0	55.0	132	3548	0.5	11.1	3.379	5.740	43.4	82.930	2.541%	250	254.0	CON	0.013	98.9	55.5	1.95	0.44	OK				
8	K1	M-C1	5.990	26.490	315.0	321.2	1924	5472	7.0	18.2	3.208	7.417	65.7															
	K2	S-SPR (Park)	1.180	27.670	315.0	0.0	0	5472	0.0	18.2	3.208	7.748	66.0															
	K3,K5	Low Density Residential	1.210	28.880	315.0	55.0	67	5538	0.2	18.4	3.204	8.086	67.0															
	K4	M-CG	0.200	29.080	315.0	240.9	48	5587	0.2	18.6	3.200	8.142	67.6	81.030	3.178%	250	254.0	CON	0.013	110.6	43.0	2.18	0.61	OK				
9	M	S-PR (High School)	3.380	32.460	90.0	0.0	1170	6757	1.2	19.8	3.121	9.089	70.9															
	N2, N3	Low Density Residential	2.500	34.960	315.0	55.0	138	6894	0.5	20.3	3.113	9.789	72.9															
	N1	M-CG	0.650	35.610	315.0	240.9	157	7051	0.6	20.9	3.104	9.971	74.7	56.889	6.833%	250	254.0	CON	0.013	162.2	87.5	3.20	0.46	OK				
10	O	Low Density Residential	1.740	36.700	315.0	55.0	96	7146	0.3	21.2	3.098	10.276	76.0	113.520	1.668%	250	254.0	CON	0.013	80.1	4.1	1.58	0.95	Not Acceptable				
11	O	Low Density Residential	1.740	37.350	315.0	55.0	96	7242	0.3	21.6	3.092	10.458	77.1	84.120	1.834%	250	254.0	CON	0.013	84.0	6.9	1.66	0.92	Not Acceptable				
12	P	Low Density Residential	5.250	42.600	315.0	55.0	289	7531	1.1	22.6	3.076	11.928	81.5															
	Q	M-CG	0.530	43.130	315.0	240.9	128	7658	0.5	23.1	3.069	12.076	82.9	124.120	1.131%	250	254.0	CON	0.013	66.0	-16.9	1.30	1.26	Not Acceptable				
13	R	Low Density Residential	1.870	45.000	315.0	55.0	103	7761	0.4	23.5	3.063	12.600	84.4	79.690	0.766%	250	254.0	CON	0.013	54.3	-30.1	1.07	1.55	Not Acceptable				
14	S	S-SPR (Park)	0.630	45.630	315.0	0.0	0	7761	0.0	23.5	3.063	12.776	84.6	46.900	1.259%	250	254.0	CON	0.013	69.6	-15.0	1.37	1.22	Not Acceptable				
15	T	Low Density Residential	2.820	48.450	315.0	55.0	155	7916	0.6	24.0	3.055	13.566	86.9															
	U	M-CG	0.460	48.910	315.0	240.9	111	8027	0.4	24.4	3.049	13.695	88.1	88.660	0.863%	250	254.0	CON	0.013	57.6	-30.5	1.14	1.53	Not Acceptable				
16	V1	Low Density Residential	0.530	49.440	315.0	55.0	29	8056	0.1	24.5	3.047	13.843	88.6															
	V2	S-SPR (Park)	0.460	49.900	315.0	0.0	0	8056	0.0	24.5	3.047	13.972	88.7	43.830	0.291%	250	254.0	CON	0.013	33.5	-55.2	0.66	2.65	Not Acceptable				
17	W	Low Density Residential	0.780	50.680	315.0	55.0	43	8099	0.2	24.7	3.045	14.190	89.3	49.820	0.268%	250	254.0	CON	0.013	32.1	-57.2	0.63	2.78	Not Acceptable				
18				50.680	315.0	0.0	0	8099	0.0	24.7	3.045	14.190	89.3	46.710	1.269%	250	254.0	CON	0.013	69.9	-19.5	1.38	1.28	Not Acceptable				
19				50.680	315.0	0.0	0	8099	0.0	24.7	3.045	14.190	89.3	16.930	0.299%	250	254.0	CON	0.013	33.9	-55.4	0.67	2.63	Not Acceptable				

Notes

- M-C1 Population density from City of Calgary Land use bylaw (<https://www.calgary.ca/planning/land-use/online-land-use-bylaw.html?part=6&div=3>)
- M-CG Population density from City of Calgary Land use bylaw (<https://www.calgary.ca/planning/land-use/online-land-use-bylaw.html?part=6&div=2>)
- School Populations from Government of Alberta School Enrollment Data: (https://www.alberta.ca/system/files/custom_downloaded_images/educ-school-enrolment-data-2022-2023.xlsx)
- Commercial population density from City of Calgary Municipal Development Plan, 2020 (<https://publicaccess.calgary.ca/lldm01/livelink.exe?func=ccpa.general&msgid=OTTKcgyTerX&msgAction=Download>)
- School per-capita water usage values taken from Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems - Part 4 Wastewater Systems Guidelines for Design, Operating and Monitoring of a Total of 5 Parts (<https://open.alberta.ca/dataset/f57fec02-7de8-4985-b948-dcf5e2664aee/resource/b90bd6e7-2747-4ea6-b033-b6fc3d248935/download/part4-wastewatersystemsguidelines-2013.pdf>)
- Population for Franklin Station from Franklin Station: Transit Oriented Development, Concept Design Presentation (B&A Planning Group, 2024)

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