

G

Roundhouse at Bayview Rezoning

File No: REZ00729

**Final Submission** 

September 9, 2022

# Appendix G: Site Servicing

- 01 Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 1 . . G-2
- \* drawings are resized to fit document and are not to scale

FILE: app-G-site-servicing-REZ00729-20220909.indd

DATE: SEPTEMBER 9, 2022 | FILE: APP-G-SITE-SERVICING-REZ00729-20220909.INDD



Stantec Consulting Ltd. 400-655 Tyee Road Victoria BC V9A 6X5

Sept 7, 2022

Project/File: 112610210

Deb Becelaere - Engineering Technologist - Land Development City of Victoria Engineering Department #1 Centennial Square, Victoria, B.C. V8W 1P6

Dear Ms. Becelaere

Reference: Roundhouse at Bayview Place Development: Sewage Attenuation Calculations – Rev 4

Appendix G | 01 Sewage Attenuation Calculations

Stantec has prepared the following letter to summarize the findings of our recent investigation into the sewage attenuation requirements for the proposed Roundhouse at Bayview Place Development in Victoria,

The City of Victoria has a policy in place concerning new development applications. All applications for rezoning which result in a potentially larger sewage flow than the original zoning must attenuate the additional flow on-site and release to the municipal system at a rate no higher than the maximum possible peak flow with the original zoning designation. The revised zoning to the Roundhouse site would potentially result in an increased density, and as such, sewage attenuation must be considered.

Calculations of the original sewage flows (pre-development calculations) were performed by Stantec and summarized in a technical report "Roundhouse Development: Sewage Attenuation Calculations" sent to the City of Victoria on April 10, 2012 and attached as reference with this report. Using the applicable standards at the time, the 2012 report calculations estimated that the sewage Peak Dry Weather Flow (PDWF) for the site was 33.14 L/s. Details of the calculations can be found in the attached report.

The remainder of this report outlines the calculations for the post-development flows based on the square footage and the various uses planned for the development.

Sept 7, 2022

Deb Becelaere – Engineering Technologist – Land Development

Page 2 of 6

Reference: Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 4

## 1. Post-Development Sewage Flow Calculations

During this investigation, Stantec used design criteria from the 2014 Master Municipal Construction Documents (MMCD) Guidelines and the Sewerage System Standard Practice Manual Version 3 in the following calculations. The design criteria and process for calculating post-development sewage flows are summarized below:

#### **AVERAGE DRY WEATHER FLOW CRITERIA**

Residential and Rental Average Dry Weather Flow (rADWF) /capita = 240 L/day/capita.

The rADWF is calculated by multiplying the population equivalent with a flow/capita/day value. Sanitary flow per person has been gradually decreasing over the last 10 years with the introduction of low flow fixtures and more public awareness surrounding water conservation. 2014 MMCD recommends a value for ADWF of 240L/cap/day for metered systems.

• Hotel Average Dry Weather Flow (hADWF)/capita = 200 l/d/capita.

For hotels we used the Sewerage System Standard Practice Manual Version 3 which recommends a value of 200 l/d/capita.

• Commercial and Heritage zoning ADWF (cADWF) = 5/l/day/m² (Sewerage System Standard Practice Manual Version 3). The flow for commercial and heritage developments uses the gross floor area of the development to estimate the ADWF.

The ADWF per section of development is then calculated as follows:

#### **POPULATION DENSITY CRITERIA**

To calculate the population equivalent in the development, we used the following assumptions:

Residential and Rental Development Density: 1-person equivalent per 450 ft² (approximately 42m²). We used a 900 ft² condo size as an average size, estimated unit numbers based on this assumption, and estimated 2 People per Condo unit. This is likely a conservative population density estimate.

rOccupancy = 1 person/450 ft<sup>2</sup>

Hotel Density: the same factor as for residential zoning was used, assuming 1 person per 450 ft<sup>2</sup>

hOccupancy = 1 person/450 ft<sup>2</sup>

Note that currently the area of the development designated as hotel is unknown, so the hotel areas have conservatively been included in the Residential flow calculations.

## **AVERAGE DRY WEATHER FLOW CALCULATIONS**

For each section of the roundhouse development the ADWF is then calculated as follows:

ADWF (L/d) = (rADWF \* rOccupancy \* residential and rental Gross floor Area) + (hADWF \* hOccupancy \* hotel Gross floor Area) + (cADWF \* commercial and heritage gross floor area).

The ADWF is then converted into L/s which is more commonly used to illustrate peak instantaneous flows in a system.

Appendix G | 01 Sewage Attenuation Calculations

Sept 7, 2022
Deb Becelaere – Engineering Technologist – Land Development
Page 3 of 6

Reference: Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 4

#### PEAKING FACTOR AND PEAK DRY WEATHER FLOW CALCULATIONS

2014 MMCD recommends a peaking factor as follows:

- Peaking Factor (PF) = 3.2 if population served <1000 people
- or PF = 3.2/((population served/1000)^0.105) if population served > 1000 people

Sanitary flow through a municipal system is not constant throughout the day, and peaks during certain periods (typically morning rush times and evening rush times, with a less pronounced peak around noon) with other off-peak periods, notably at night. To allow for these peaks when designing a system, a peaking factor is applied to the ADWF calculated previously. The peaking factor is directly related to the population connected to a system; the larger the system, the less pronounced the peak is relative to the ADWF. We looked at the Roundhouse development as a whole with an estimated population equivalent of 4260 to calculate the total Peaking Factor.

Appendix G | 01 Sewage Attenuation Calculations

Peak Dry Weather Flow (PDWF in L/s) = PF \* ADWF (in L/s)

#### **INFLOW AND INFILTRATION CALCULATIONS**

Inflow and Infiltration (I&I) = 0.06 l/s/ha

I & I is an allowance for storm water migrating into the sanitary system and therefore reducing available capacity within the collection system and the treatment system. If system designs neglect to include this allowance, they inevitably become overloaded during heavy winter rainfall events. Although older systems have far higher I & I values, even new systems experience some level of infiltration through manhole lids and minor inflow through pipe joints. Using the estimate from MMCD for pipes above the groundwater table, an I and I allowance of 0.06 L/s/ha has been made in these calculations.

#### **PEAK WET WEATHER FLOW CALCULATIONS**

The Peak wet Weather flow is then calculated as follows:

Peak wet Weather Flow (PWWF, in I/s) = PDWF + I&I

Sept 7, 2022 Deb Becelaere - Engineering Technologist - Land Development Page 4 of 6

Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 4 Reference:

## 2. Proposed Zoning

Figure 1 below illustrates the proposed subdivision site plan:

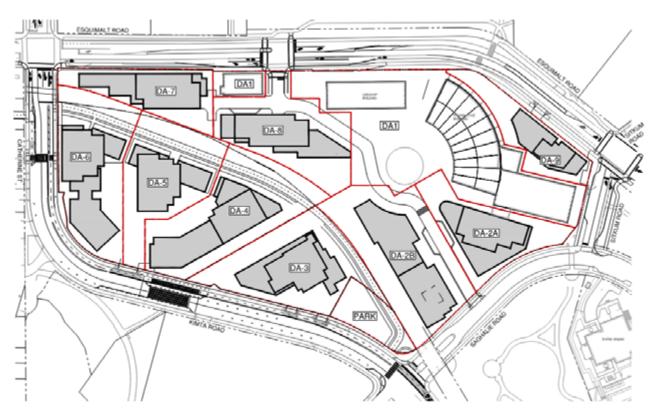


Figure 1. Bayview Site Plan

For the purposes of the sewage attenuation analysis the site has been split into Esquimalt Road and Kimta Road catchments. The proposed composition is described in the table below:

Table 1. Proposed composition of the site post development

Site	Land Use Description						
ESQUIMALT ROAD CATCHMENT							
DA-7	Affordable Housing						
DA-8	Rental						
DA-9	Condo						
DA-1	Stores Building						
DA-1	Roundhouse + Backshop + Carshop (extension)						
KIMTA ROAD CA	TCHMENT						
DA-6	Condo						
DA-2A	Condo						
DA-2B	Condo/Hotel						
DA-3	E&N Tower						
DA-4	Condo/Hotel						
DA-5	Condo/Hotel						

Appendix G | 01 Sewage Attenuation Calculations

Sept 7, 2022
Deb Becelaere – Engineering Technologist – Land Development
Page 5 of 6

Reference: Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 4

## 3. Results

The Average Dry Weather Flow (ADWF), Peak dry Weather Flow (PDWF) and Peak Wet Weather Flow PWWF) for the above lots was estimated using the design criteria and calculations described earlier in this report. The following table summarizes the flows for the proposed lots of the Roundhouse Development, as well as for the whole site.

Appendix G | 01 Sewage Attenuation Calculations

Table 2. Summary of Sanitary flow calculations for the Post Development Site

Site	Land Use Desctiption	Site Area	Residential/H	Rental (SF)	Commercial	Total - Gross	ADWF	ADWF	POP Eq.	Peaking	PDWF	1&1	PWWF
		(Ha)	otel (SF)		(SF)	Floor Area (sqf)	(L/day)	(L/sec)		Factor	(L/sec)	(L/sec)	(L/sec)
										(PF)			
DA-7	Affordable Housing	0.212		150,700	4,500	155,200	82,464	0.954	345	3.20	3.05	0.01	3.07
DA-8	Rental	0.315		146,700	11,750	158,450	83,698	0.969	352	3.2	3.10	0.02	3.12
DA-9	Condo	0.190	161,200		300	161,500	86,113	0.997	359	3.2	3.19	0.01	3.20
DA1	Stores Building	0.045			2,924	2,924	1,358	0.016	6	3.2	0.05	0.00	0.05
	Roundhouse + Carshop												
DA1	(extension) + backshop	0.802			32,809	32,809	15,240	0.176	73	3.2	0.56	0.05	0.61
Subtota	l Esquimalt Road Catchment	1.56	161,200	297,400	52,283	510,883	268,873	3.1	1,135	3.2	9.83	0.09	9.92
DA-6	Condo	0.361	197,600		2,500	200,100	106,548	1.2	445	3.2	3.95	0.02	3.97
DA-2A	Condo	0.255	217,300		10,050	227,350	120,562	1.4	505	3.2	4.47	0.02	4.48
DA-2B	Condo/Hotel	0.449	232,400		10,000	242,400	128,592	1.5	539	3.2	4.76	0.03	4.79
DA-3	E&N Tower	0.357	205,162		8,611	213,773	113,420	1.3	475	3.2	4.20	0.02	4.22
DA-4	Condo/Hotel	0.410	266,900		14,600	281,500	149,129	1.7	626	3.2	5.52	0.02	5.55
DA-5	Condo/Hotel	0.320	211,000		8,000	219,000	116,249	1.3	487	3.2	4.31	0.02	4.32
Subtota	l Kimta Road Catchment	2.15	1,330,362	-	53,761	1,384,123	734,499	8.5	3,076	2.8	24.18	0.13	18.88
Total		3.72	1,491,562	297,400	106,044	1,895,006	1,003,372	11.6	4,211	2.8	31.95	0.22	32.18
								the Highli	ghted num	bers are p	eaked base	d on the v	vhole site

The Total Post-Development Peak Dry Weather Flow is therefore estimated as **31.95** L/s and the Peak Wet Weather Flow is calculated as **32.18** L/s.

Sept 7, 2022
Deb Becelaere – Engineering Technologist – Land Development
Page 6 of 6

Reference: Roundhouse at Bayview Place Development: Sewage Attenuation Calculations - Rev 4

#### 4. Conclusion

As per the requirements of the City of Victoria, if development of a site results in post-development sewage flows being higher than the pre-development flows, it is the developer's responsibility to attenuate the post-development flows to not exceed the pre-development flows.

The 2012 sewage attenuation report outlined an original pre-development PDWF of **33.14 L/s**, based on the assumptions of the land use in accordance with the zoning bylaws at the time of writing the report. The 2012 report did not define pre-development PWWF. When applying the I&I calculations defined in this report (0.06 L/s/ha) to the pre-development area of 35,790m², the pre-development PWWF is estimated at **33.36 L/s**.

The calculations in this report estimate a PDWF of **31.95** L/s and a PWWF of **32.18** L/s. Therefore, the calculated post-development flows are less than the pre-development flows estimated in 2012. As there have been many assumptions built into these calculations and because circumstances may change as the development gets built out, we recommend that sewage attenuation requirements be evaluated as each property is designed and developed.

If you have any questions concerning the above, please contact the undersigned.

Regards,

Stantec Consulting Ltd.

Shaun Swarbrick P.Eng.

Civil Engineer

Phone: 250 389 2545

Shaun.Swarbrick@stantec.com

Nicolas Tardy EIT Civil Designer

Phone: 250 389 2337 nicolas.tardy@stantec.com

Attachments: Roundhouse Development: Sewage Attenuation Calculations, April 10, 2012

Appendix G | 01 Sewage Attenuation Calculations



April 10, 2012 File: 112610210

City of Victoria Engineering Department, #1 Centennial Square, Victoria, B.C. V8W 1P6

Attention: Steven Fifield, Manager of Underground Utilities

Dear Mr Fifield:

Reference: Roundhouse Development: Sewage Attenuation Calculations

Stantec has prepared the following letter to summarize the findings of our recent investigation into the sewage attenuation requirements for the proposed Roundhouse Development in Victoria, BC.

The City of Victoria has a policy in place concerning new development applications. All applications for rezoning which result in a potentially larger sewage flow than the original zoning must attenuate the additional flow on-site and release to the municipal system at a rate no higher than the maximum possible peak flow with the original zoning designation. The revised zoning to the Roundhouse site would potentially result in an increased density, and as such sewage attenuation must be considered.

The site was originally divided into four different zoning designations:

- M1 Zone, Limited Light Industrial. Area = 7,150m<sup>2</sup>
- M2 Zone, Light Industrial. Area = 20,475m<sup>2</sup> (plus 4,895m<sup>2</sup> of rail easement also zoned M2)
- M3 Zone, Heavy Industrial. Area = 3,270m<sup>2</sup>
- SRS Zone, Songhees Single Family Residential District. Area = 1,570m<sup>2</sup>
- TOTAL SITE AREA = 37,360m<sup>2</sup>

Figure 1 on the following page shows the original parcels and zoning designations on the Roundhouse site:

ESQUIMALT ROAD

DATE: SEPTEMBER 9, 2022 | FILE: APP-G-SITE-SERVICING-REZ00729-20220909.INDD

112610210

Appendix G | 01 Sewage Attenuation Calculations

## Stantec

April 10, 2012 Steven Fifield, Manager of Underground Utilities Page 3 of 7

Reference: Roundhouse Development: Sewage Attenuation

To calculate the total amount of required retention, it is necessary to first calculate the potential flow from the existing site with the original zonings. The below summary details a method of calculating the original zoning sewage flow by using the maximum allowable FSR and allowable occupancies under the applicable zoning designations.

## Calculation of the Original Zoning Sewage Flows

During this investigation, we have used figures quoted in the following publications:

- MMCD Design Guideline Manual, 2005
- The BC Sewerage Standard Practice Manual Version 2 (September 2007).
- City of Victoria Zoning Bylaw.

## Calculation by Worst Case Scenario Based on FSR and Acceptable Uses

A potential method of calculating the potential sewage flows as per the existing zoning is by applying the allowable uses and FSR permitted in the zoning bylaw for each zoning designation. This method allows for an infinite number of potential scenarios based on what combination of the allowable uses was used to calculate the flow. Some of these potential scenarios may not be a realistic proposition, but the zoning bylaw allows these potentially unrealistic scenarios to be built.

We calculated the flows for a given scenario in which the areas zoned as M1, M2, M3 had various high sanitary use businesses on-site, such as car washes, gas stations, restaurants, manufacturing plants, dry cleaners/Laundromats etc. as allowed in the zoning bylaw. Although the scenarios may not be realistic, the exercise proved that it is possible to estimate very large flows for the original zoning designation by this method, to the point where the flows as per the original zoning designation can match and exceed the post-development sewage flows.

This method is typically used to calculate flows when the actual uses and the size of the non-residential units on a site are better defined. Using it in this instance, as mentioned earlier, can result in an infinite number of potential scenarios.

One potential scenario with its resultant original zoning flow is outlined below:

- The maximum allowable FSR allowed by Industrial zones M1, M2 and M3 is 3:1, and an allowable occupancy of all the zonings is a restaurant. This scenario assumes all zones designated as industrial are to be used exclusively as a large scale restaurant complex.
- The total area of the industrial zones on the site is 35,790m2. With a FSR of 3:1, this results in total floor space on the site being 107,370m2.
- It is assumed for this scenario that 2/3 of that space is restaurant seating area, with the other 1/3 being for other uses. Assuming dense table spacing, it is assumed that the density is 1 table of 4 per 9m2. This results in there being a number of 7,953 tables with 31,812 seats.

#### **Stantec**

April 10, 2012 Steven Fifield, Manager of Underground Utilities Page 4 of 7

Reference: Roundhouse Development: Sewage Attenuation

- The BC Sewerage SPM quotes a recommended figure for estimating sanitary loading of 90L/day/seat, which results in a total flow of 2,863,080L/day = **33.14L/s**.

While it is acknowledged that the scenario presented here is a very unlikely one in practicality, it is a possibility under current applicable zoning bylaw regulations.

Detailed calculations for the above described flows are provided at the end of this report.

A more practical example may be that of a brewery being placed on the site. The M3 zone allows for breweries to be built, and with a FSR of 3:1, the total area on the M3 portion of the site would be just over a hectare (the M3 portion of the site is less than 10% of the total site area). Stantec have in recent years performed sewage discharge reviews for breweries in BC and Ontario, and found the discharge rate to be approximately 1 Million L/day/hectare. If these numbers were applied to the original zoning on the Roundhouse Site, approximately 1 Million L/day could be generated from the M3 parcel alone. This is an example of the potentially high sanitary discharges from uses such as breweries and distilleries.

The below table summarizes the existing sewage flows and projected sewage flows from a brewery located on a 2 hectare site on the BC mainland, as determined through Stantec's investigations:

Existing and Projected Flows from a 2 Hectare Brewery – BC Mainland							
Year	2010	2011	2012	2013	2014	2015	
Production Increase from 2010 Levels	0	0.2%	0.2%	9%	13%	23%	
Average Sanitary Flow (m³/day)	1,925	1,928	1,928	2,096	2,181	2,375	

## Calculation of the Post-Development Sewage Flows

The following design criteria were used during this investigation:

- Average Sewage Flow per person = 300L/day
- Peaking Factor = Harmons Equation
- Residential Condo size = 900ft<sup>2</sup> (approximately 83m<sup>2</sup>)
- People per Condo unit = 2

Figure 2 on the following page illustrates the current zoning on the site:

Ω

### Stantec

April 10, 2012 Steven Fifield, Manager of Underground Utilities Page 6 of 7

Reference: Roundhouse Development: Sewage Attenuation

The proposed development at the Roundhouse site is divided into 5 separate parcels. The proposed composition of the units for the parcels, which the following calculations are based upon, is as follows:

- Lot 1: Retail and Public Use (Existing heritage buildings)
- Lot 2: 18 Storey Hotel with 1 Storey Retail.
- Lot 3: 20 Storey Condo Building
- Lot 4: 16 Storey Condo Building
- Lot 5: 12 Storey Condo Building and 6 Storey Live/Work Space Building

The Average Dry Weather Flow (ADWF) for the above lots was calculated using the design criteria quoted earlier in this report. In the absence of more complete data for the commercial units, the Equivalent Population of 120 people/ha was used to estimate the sewage flows for those units.

The following table summarizes the ADWF for proposed Lots 1-5 of the Roundhouse Development:

ADWF (L/day)				
65,100L/day				
133,795L/day				
105,000L/day				
108,600L/day				
123,600L/day				
536,095L/day (6.2L/s)				

Applying the Peaking Factor as per Harmons equation, the Total Post-Development Peak Dry Weather Flow is calculated as 22.44L/s.

Detailed calculations for the above post-development flow summary are provided at the end of this report.

## Sewage Attenuation Options and Volumes

As per the requirements of the City of Victoria, if development of a site results in post-development sewage flows being higher than the pre-development flows, it is the developer's responsibility to attenuate the post-development flows to not exceed the pre-development flows.

It should be noted that Inflow and Infiltration has not been allowed for in either the original zoning or Post-Development flow calculations for storage.

FOCUSEQUITIES KW MARIASH SR. MASTER PLAN COMMUNITY

## Stantec

April 10, 2012 Steven Fifield, Manager of Underground Utilities Page 7 of 7

Reference: Roundhouse Development: Sewage Attenuation

Sewage Attenuation Required when Original Flows Calculated Using FSR and Allowable Occupancies

Appendix G | 01 Sewage Attenuation Calculations

PDWF Pre-Development = 33.14L/s (our demonstrated scenario).

PDWF Post-Development = 22.44L/s.

As was noted earlier in this report, the method of calculating the original zoning sewage flows by Allowable Occupancies as per the Zoning bylaw results in an infinite number of potential scenarios which result in an infinite number of different sewage flows. Our calculations proved that the Post-Development flows could be matched by using the higher sanitary use allowable occupancies under the zoning bylaw and maximizing the FSR, to calculate the original zoning Flows.

In this case, no attenuation would be required.

If you have any questions concerning the above, please contact the undersigned.

Respectfully,

Stantec Consulting Ltd.

Ken French Associate

Tel: (250) 389-2345 Fax: (250) 382-0514 ken.french@stantec.com

Attachment:

cc. Ally Dewji

sls v:\1126\active\112610210\report\20120106\_sewage\_attenuation\roundhouse\tet\_ss\_20120405\_sewage\_attenuation\_roundhouse\_final.docx



January 25th, 2012 112610210 Task 802 Roundhouse Dev. Sewage Attenuation Original Zoning (Pre-Development) Flows

Max Servage Plass By Allowable Occupancies (Original Zoning):

MI Area = 7,150m². Zoned Limited Light Industrial.

M2 Area = 20,475m². Zoned Light Industrial.

M3 Area = 3,270m². Zoned Heavy Industrial.

Scenario 1: Whole of the site is a restaurant.

An allowable use for M1, M2, M3 is a restournt. The following calcs assure the entire noundhouse site could be used as a large restournt complex (except for the SPS Zone):

- Area of MI, M2 and M3 zones = 35,790n2. - Max Allasable FSR = 3:1. Total floor area = 35,790×3 = 107,370n2

- Assure 213 of total area = Restaurant Seating Area.
- Assure dense table spacing of I table of 4 per 902.
: 157,370 × 2 = 71,580m² (Restaurant Seating Area)

 $\frac{71,580}{9} = \frac{7,953.3}{7,953} \approx 7,953$  Tables

- As per BC Severage Manual, assure 901 Iday/sour.

Total Estimated Flow = 31,812 seats x 901 Iday
= 2,863,080 Llday = 33.141s

Designed by:

Chacked but

PSC FEG\* C101537

Printed on LSCs conded and 100 percent recycled foracontainer waste paper

G | 01 Sewage Attenuation Calculations



January 6th, 2012 112610210 Task 302 Royalhaise Dev. Sevage Attenuarion

3

Proposed Flows (By Parce)

CONFIRM THESE NUMBERS WITH ALI DEWN (388-9924)

No new Buildings being added. Simply relaining existing hartage

As per discussion with Mi Devija (clieb), in the absence of more definitive information on regravant size, and other retail uses use will use MMCD Equivalent apprehim for Commercial buildings of 120 people the clave.

Total Floor space of existing bilding = 2860+ 735+27012

Total Area of lot = Ff. 18,082m²
Egnivaled Population = 1.8082 x 120
= 216.98 % ~ 217 people

ADWF = 217 x 300 Llday / cap = 65,100 Llday

Designed by

Checked by

Paper
PSC FSC C101537





January 6th, 2012 112610210 Maske 302 Roundbarse Dev Sewage Attempton

Lot 2: 18 Storey Hotel with I storey Relait. Approx 18,500m2 floor space - 17 store Residential. 17 x 18,500 = 17,475 n2 Residential.

Assure (unt = 900ft? (\$ 288n²) # of units = 17,475 = 210.5 units 2 211 units.

Assure 2 people per rondo: 211 x 2 = 422 es people. ADWF from Lot 2 (Residential) = 422 x 300Llday/copina = 126,600 Llday

1 storey retail (Assume General Wail i.e. no caté or restaurant)

"BC Severage BPM sets provides figure of 7 Lldaylm" of Hoor space for shopping centre (excluding rate or lauraly).

.: Estimated ADWF For relail = ( x 18,500) x 7L/day

= 7,194.44 m 27,195 Lldag Total ADUF from both residerial and retail = 133,795 Lldan

App



January 6th, 2012 112610210, Task 302 Rondlasse Dev. Serge Attention

(7)

Lot 3: 20 Storey Condo Building

Floor Space = 14,500m²: # of units @ 83m² each
= 174.69 2175 units

By Population @ 2 people per unit = 175×2 = 350 people

: ADWF = 350 x 3002/day/c = 105,000/day.

Lot 4: 16 Storey Cordo Building

Floor Space = 15,000m2 : # of units @ 83m2 each = 160.72 & 2 181 units.

: Population @ 2 people per unit = 181 x 2 = 362 people

... ADWF = 362 x 800/ldayle = 108,600/lday

Lot 5: 12 Storey Condo Building + 6 Storey Live work Space

12 Storey Condo: Floor space = 12,000m2: # of units = 144.57 units.

Ropulation @ 2 people per condo = 145x2=290 people

Total Lot 5 Equiv Pap = 122 + 290 = 412 Reple ADWF = 412 x 300 Llday Cap = 123,600 Llday

RECYCLED Popor

Prince up FOC -consect and 100 percent recycled productions while page



Danuary 6th, 2012 112610210 Task 302 Roundhause Dav: Sevage Attendoor

POST- DEVELOPMENT FLOW:

Lor = 65,100 Llday Lot 2 = 133,795 Llday Lot 3 = 105,000 Llday Lot 4 - 108,600 Llday Lot 5 = 123,600 Llday 536,09521day = 6.2Lls (ADWF) (Eq. Pop=1,786-98)

PF = 1+ 14 (Harrons)

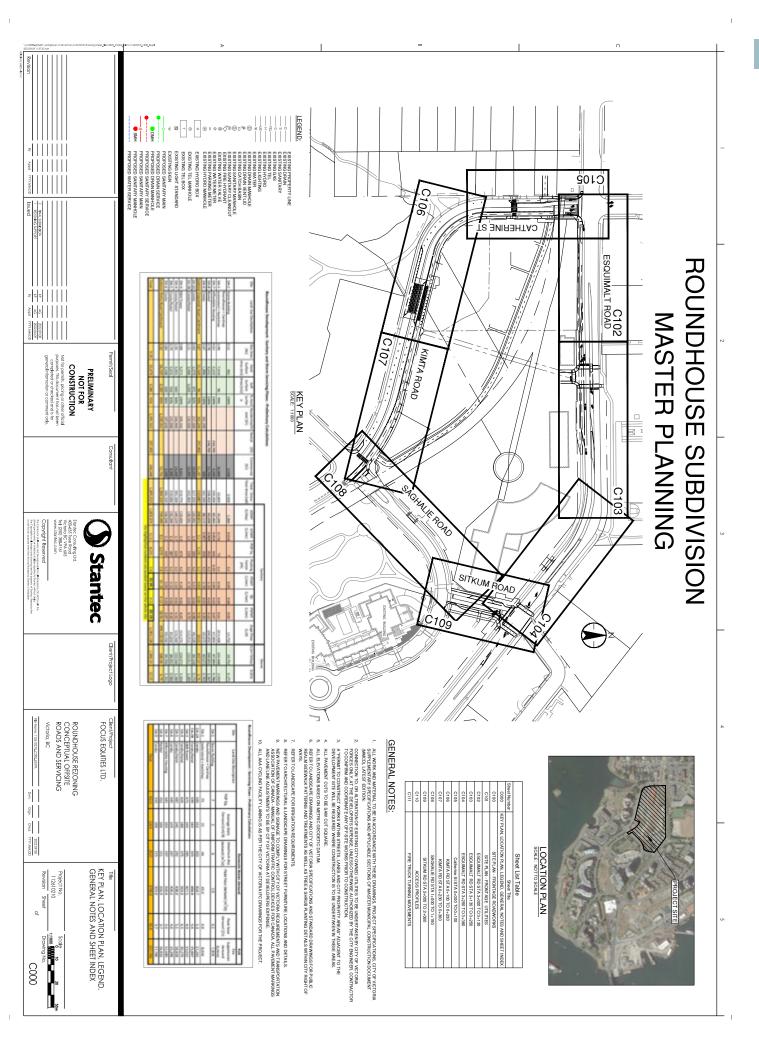
= 1+ 14 = 3.62

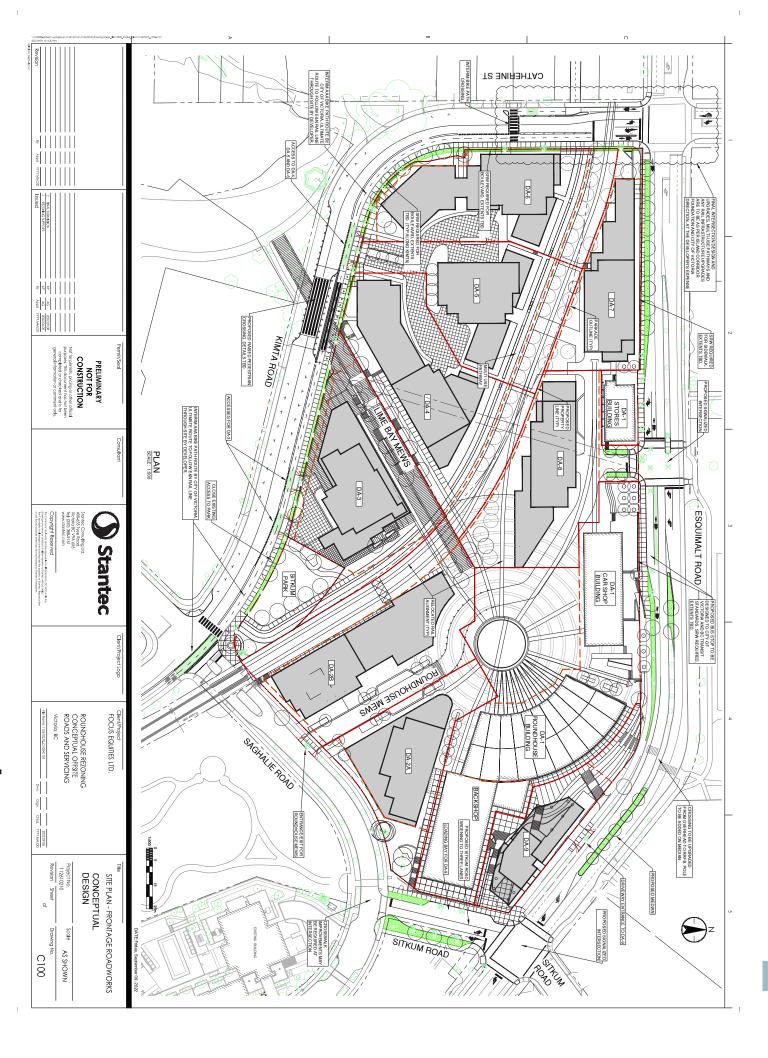
.. PDWF= 3.62 x 6.2 = 22.44Lls

(Realing Factor boxed on eather site, not individual porcels)

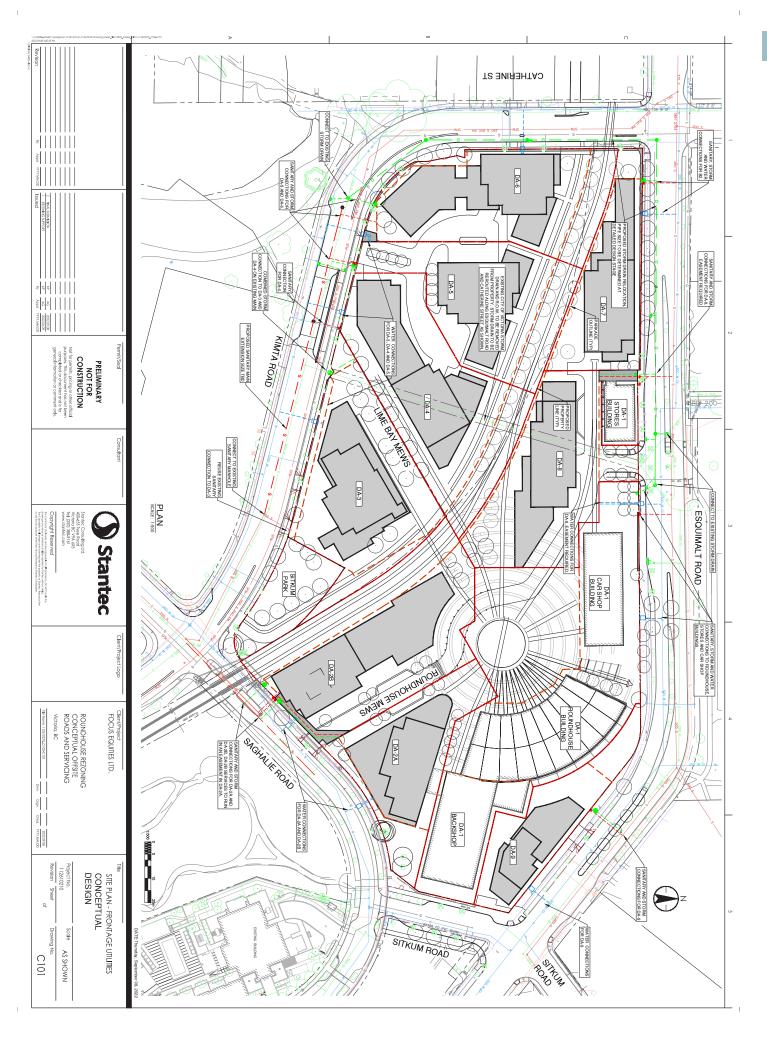
and I allowonce (MMCD = 0.17 L/s/hecture) = 3.786 x 0.17 = 54,874 L/day = 0.635 L/s (Same as pre-development)

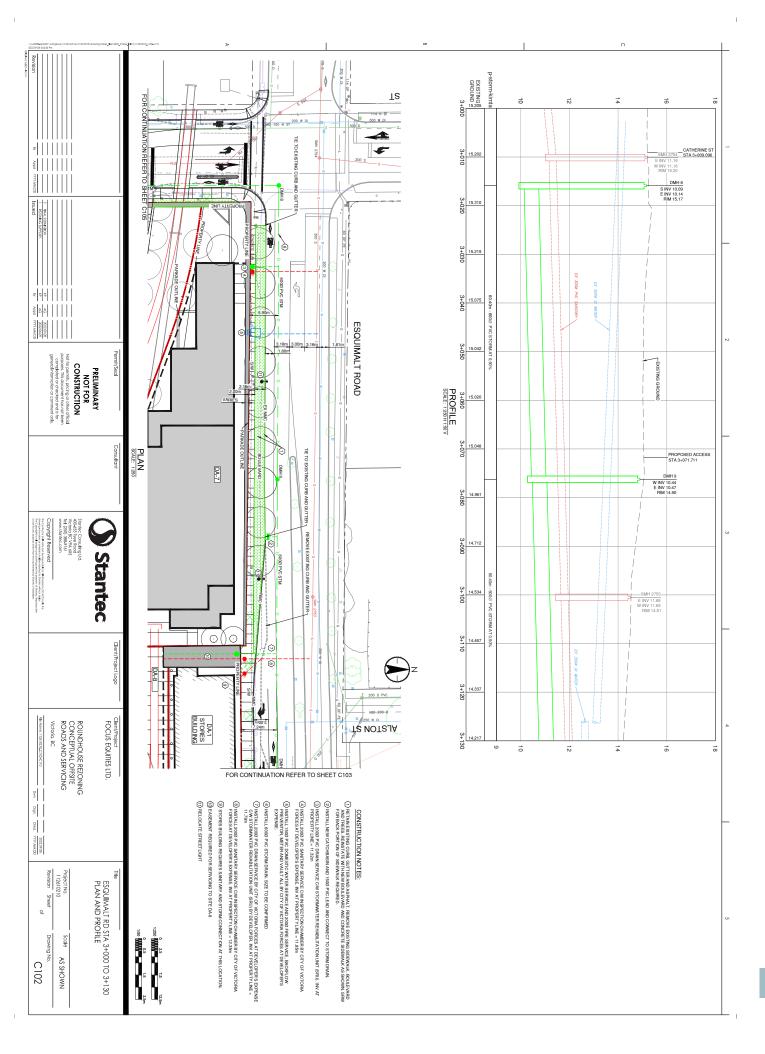
TOTAL POST - DEVELOPMENT FLOW = 22.44 + 0.635



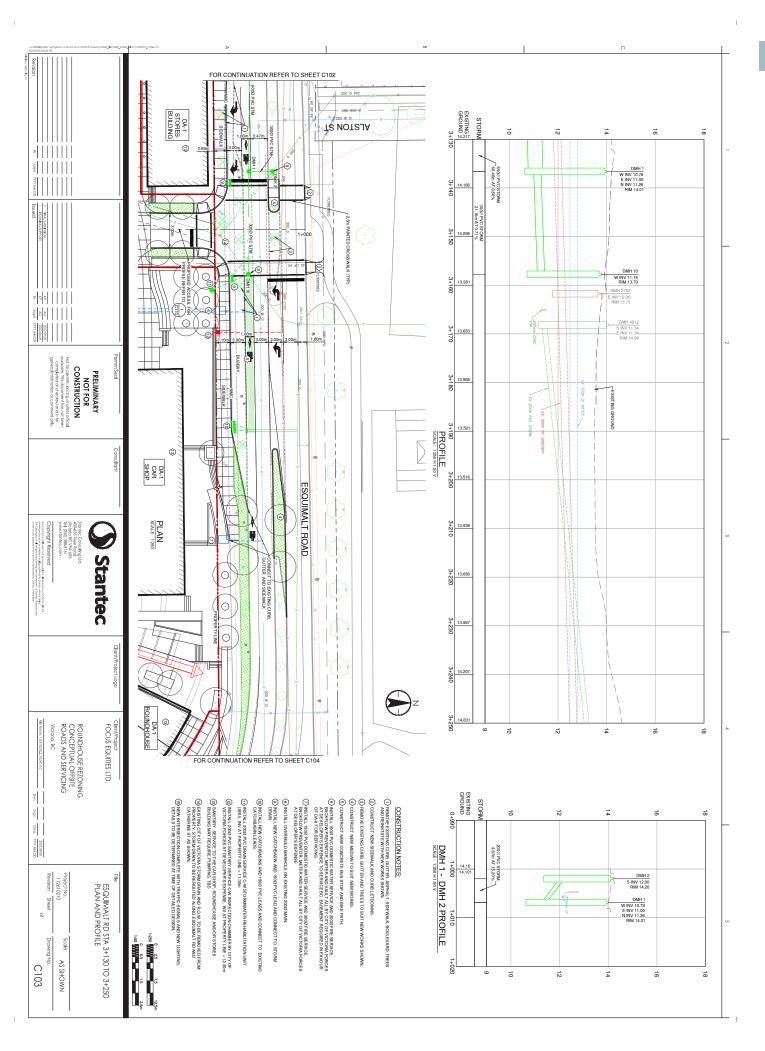


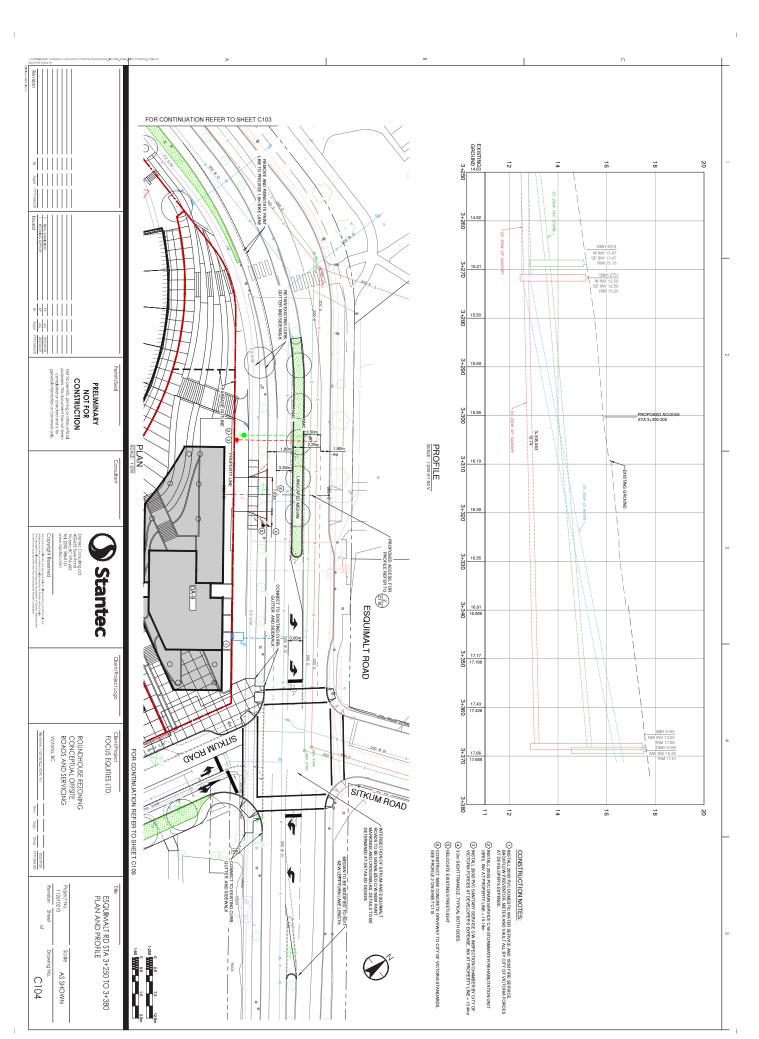
**(**)



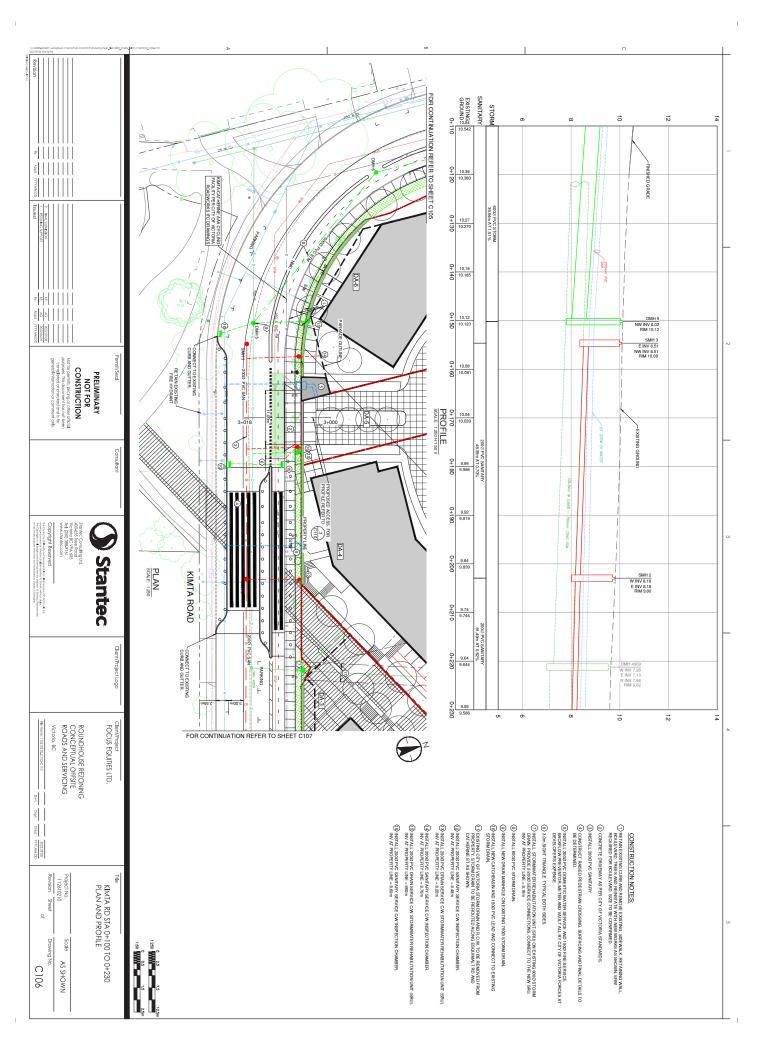


Ω

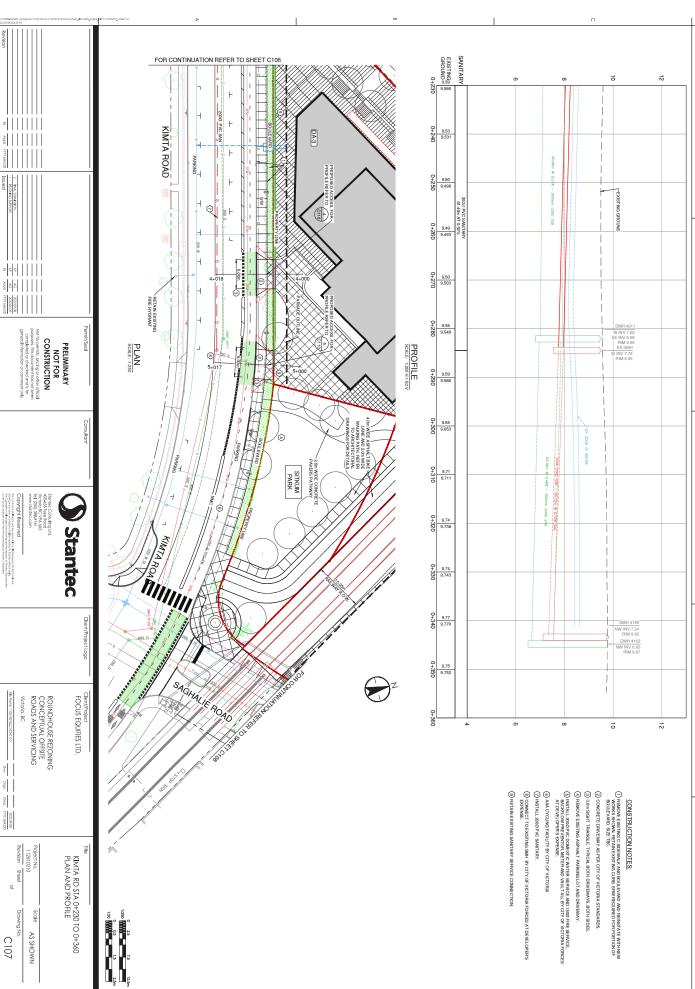


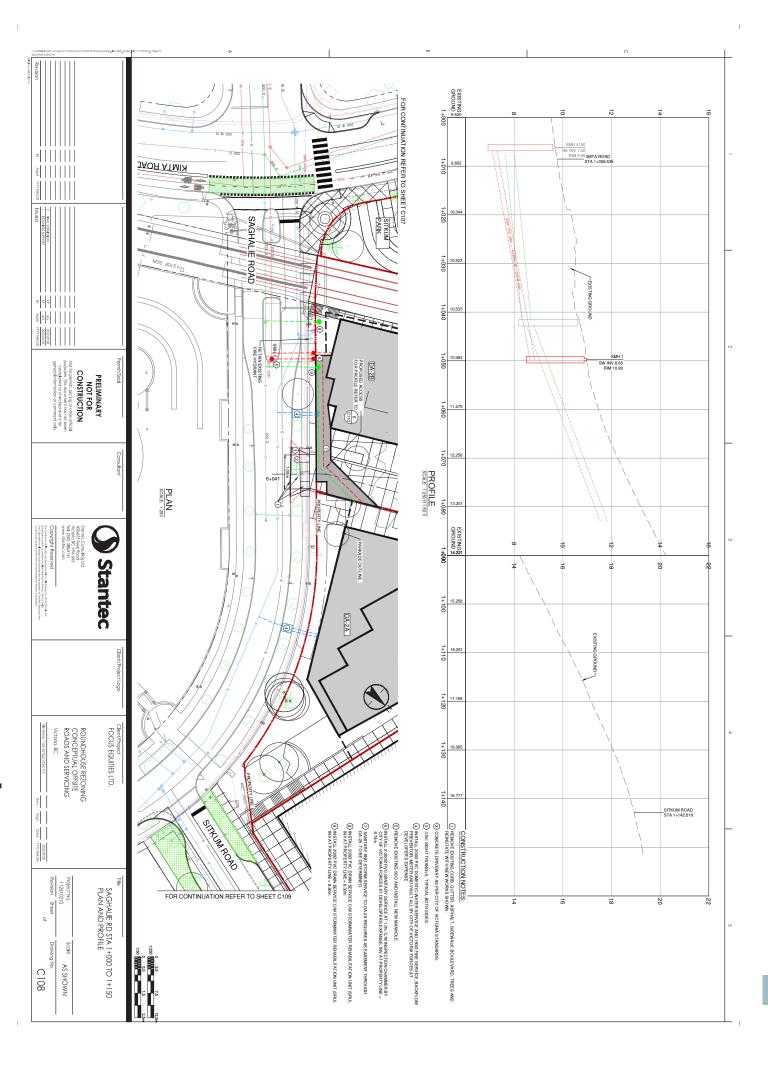


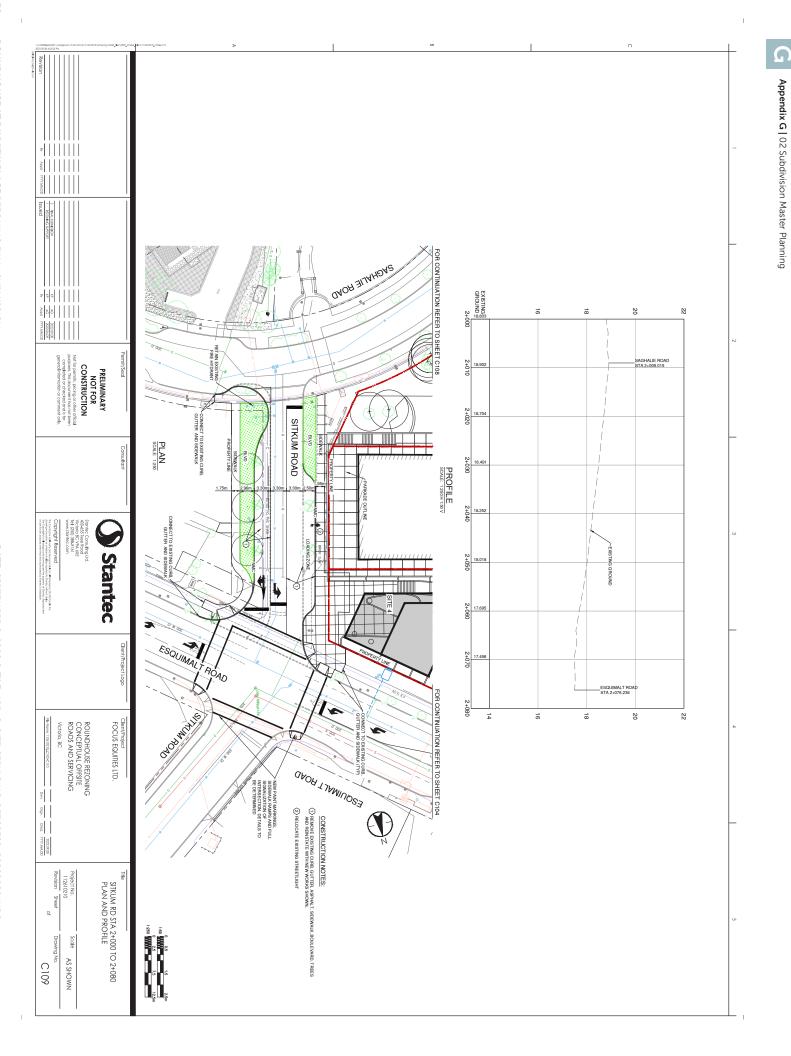
Ω

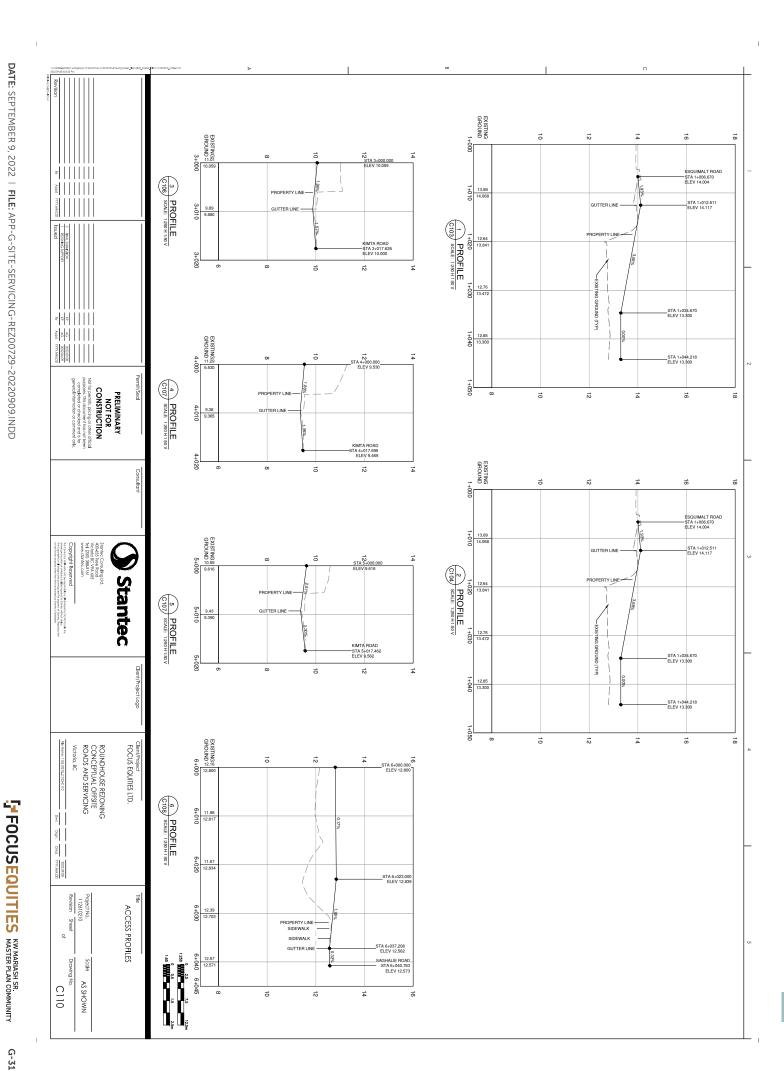


**(**)

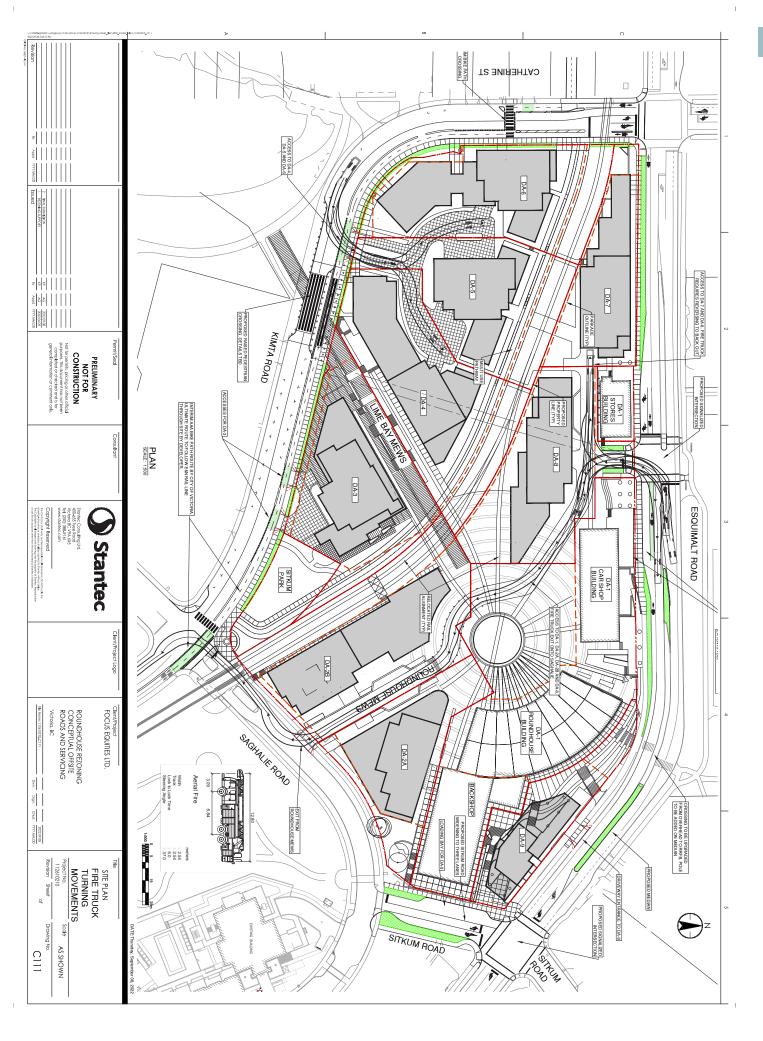








Ω



This page left intentionally blank

