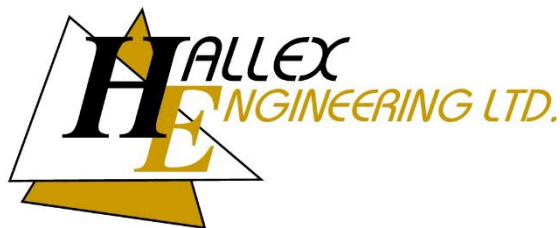# GUIDO DE BRES CHRISTIAN HIGH SCHOOL
350 ALBRIGHT ROAD, HAMILTON

FUNCTIONAL SERVICING DESIGN BRIEF
EXISTING SANITARY AND WATER SERVICES

REV 1 – April 15, 2023

PREPARED BY:

HALLEX PROJECT #221119

Guido de Bres Christian High School
350 Albright Road, Hamilton
Issued for Site Plan Approval

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1. INTRODUCTION

The proposed Guido de Bres Christian High School development consists of the construction of a new gymnasium addition, complete with renovations within the existing building, asphalt laneway & parking areas and grass areas. This development is located at 350 Albright Road, which is west of the Albright Road and Harrisford Street intersection in the City of Hamilton, ON.

The purpose of the service assessment is to determine the functional sizing of the existing sanitary and water services in addition to the post-development flows from the site to determine the impact on the existing onsite and municipal infrastructure.

2. EXISTING MUNICIPAL INFRASTRUCTURE

2.1   SANITARY SEWER

The existing site is currently serviced with a 200mm sanitary lateral connection towards the Red Hill Neighbourhood Park as the site consists of the existing school. The existing sanitary infrastructure at Red Hill Neighbourhood Park consists of a 600mm municipal sanitary sewer which drains northerly through the property.

2.2   WATERMAIN

The existing site is currently serviced with a 150mm fire water service to a private hydrant located north of the existing school and a 100mm domestic water service to a water meter chamber near the south property line. The services are combined at the water meter chamber and connects to municipal infrastructure at Albright Road with a 150mm water service connection. The existing watermain infrastructure at Albright Road consists of a 150mm municipal watermain.

3. SANITARY SEWER SYSTEM

Given the proposed Guido de Bres Christian High School development consists of the addition and interior renovation of the existing building, the intent of this analysis is to compare the pre- and post-development sanitary flow rates to determine whether there will be an increase or a decrease in wastewater flows to ensure the existing servicing would be sufficient to service the post-development building.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #1 are existing.

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- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #2 are assumed and may not represent the final building plumbing design.

The peak drainage rate for the existing school is determined to be 478.3 L/min based on the fixtures and fixture units shown in Exhibit #1, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the probable peak drainage rate for the total fixture units.

The peak drainage rate for the proposed school is determined to be 418.6 L/min based on the fixtures and fixture units shown in Exhibit #2, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the probable peak drainage rate for the total fixture units.

The post-development sanitary peak flow for the subject site will decrease by 59.6 L/min from the pre-development sanitary peak flow. Given this reduction in peak flow, the existing sanitary sewer should be sufficiently sized for the development provided it is a minimum 200mm diameter sanitary sewer @ 0.5% and it is in good working condition. The owner is responsible for having the sewer to be reused video inspected prior to the renovation to confirm the size and condition of the sewer. Should the size be too small or the condition of the pipe is poor, the lateral shall be replaced with a minimum 200mm diameter sanitary sewer @ 0.5%.

4. WATER DISTRIBUTION SYSTEM

Given the proposed Guido de Bres Christian High School development consists of the addition and interior renovation of the existing building, the intent of this analysis is to compare the pre- and post-development water demand rates to determine whether there will be an increase or a decrease in water demands to ensure the existing servicing would be sufficient to service the post-development building.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #3 are existing.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #4 are assumed and may not represent the final building plumbing design.
- The existing school is of non-combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.
- The proposed school will remain of non-combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.

The domestic water demand for the existing school is determined to be 584.4 L/min based on the fixtures and fixture units shown in Exhibit #3, attached. The domestic water demand for the proposed school is determined

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to be 497.1 L/min based on the fixtures and fixture units shown in Exhibit #4, attached. Table 7.4.10.5 in the Ontario Building Code is used to determine the water demands for the total fixture units.

The minimum water supply flow rate for fire protection of the existing school is determined to be 9,000 L/min (150L/sec) based on the above assumptions as shown in Exhibit #5, attached. The minimum water supply flow rate for fire protection of the existing school is determined to be 9,000 L/min (150L/sec) based on the above assumptions as shown in Exhibit #6, attached. The Office of the Fire Marshal Guideline - OFM-TG-03-1999 is used to determine the water supply flow rate for the fire protection of the building. Using the calculations provided in the City of Hamilton Adequate Water Services – Required Fire Flow and Available Fire Flow form the minimum water supply flow rate for fire protection is determined to be 150 L/s.

There are two existing fire hydrants located near the site. The first is located onsite which is north of the existing building. The second is located adjacent to the south property line on the south side of Albright Road. Additionally, there is maintenance hydrant located adjacent to the south property line at the end of the Albright Road cul-de-sac although this is not intended to provide fire flows for any of the of the existing buildings.

Hydrant pressure testing was performed by Troy Life and Safety for the existing hydrant located adjacent to the south property line on the south side of Albright Road and the results of the testing is as follows:

Hydrant ID	Address	Date of Hydrant Testing	Static Pressure (psi)	Residual Pressure (psi)	Test Flow (gpm)
N/A	350 Albright Road	14/04/2023	89	70	1,630

The hydrant provides a test flow of 1,630 gpm (6,170 L/min). Given the fire flow during the hydrant test is less than the required 9,000 L/min flow for the building, FAR20 calculations were performed to determine the flows from the hydrant at 20 psi residual pressure. This is calculated to be 3,270.7 gpm (12,381 L/min) as shown in Exhibit #5 & Exhibit #6, attached. Given the fire flow at 20 psi residual pressure within the watermain exceeds the required fire flows for the building, the existing municipal watermain can adequately service the site under fire flow conditions.

The post-development domestic water demand for the subject site will decrease by 87.3 L/min from the pre-development domestic water demand. Given this reduction in peak demand, the existing water service should be sufficiently sized for the development provided the domestic water service is a minimum 100mm diameter water service, the fire water service is a minimum 150mm diameter water service and both services are in good working condition. Should the sizes be too small or the condition of the pipe is poor, the lateral shall be replaced with a minimum 100mm diameter water service, the fire water service is a minimum 150mm diameter water service.

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5. CONCLUSION

The aforementioned calculations and recommendations for the sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

We trust this report meets your approval. Please contact the undersigned should you have any questions or comments.

Yours truly,
HALLEX ENGINEERING LTD

Jim Halucha P.Eng
Civil/Structural Engineer

Jonathan Skinner, C.E.T., B.Tech
Civil Technologist

MAXIMUM PROBABLE DRAINAGE RATE

Fixture	# of Plumbing Fixtures	Fixture Units (Table 7.4.9.3.)	Total Sanitary Fixture Units
Basement Level			
Water closet w/ flush tank (public)	19 fixtures	4 FUs	76 FUs
Urinal (public, wall washout)	10 fixtures	1.5 FUs	15 FUs
Sink (domestic)	36 fixtures	1.5 FUs	54 FUs
Sink (washup)	5 fixtures	3 FUs	15 FUs
Shower drain (public, 1 head)	1 fixture	1.5 FUs	1.5 FUs
Sink (service or mop basin)	2 fixtures	3 FUs	6 FUs
Drinking fountain	4 fixtures	0.5 FUs	2 FUs
Main Floor Level			
Water closet w/ flush tank (public)	27 fixtures	4 FUs	108 FUs
Urinal (public, wall washout)	17 fixtures	1.5 FUs	25.5 FUs
Sink (domestic)	30 fixtures	1.5 FUs	45 FUs
Sink (washup)	6 fixtures	3 FUs	18 FUs
Shower drain (public, 1 head)	16 fixtures	1.5 FUs	24 FUs
Sink (service or mop basin)	4 fixtures	3 FUs	12 FUs
Drinking fountain	6 fixtures	0.5 FUs	3 FUs
Second Floor Level			
Water closet w/ flush tank (public)	2 fixtures	4 FUs	8 FUs
Sink (domestic)	5 fixtures	1.5 FUs	7.5 FUs
Sink (service or mop basin)	1 fixture	3 FUs	3 FUs
Drinking fountain	1 fixture	0.5 FUs	0.5 FUs
		Total =	424.0 FUs
		Total Flow =	478.3 L/min

Therefore the total calculated peak drainage rate is determined to be 478.3L/min.

MAXIMUM PROBABLE DRAINAGE RATE

Fixture	# of Plumbing Fixtures	Fixture Units (Table 7.4.9.3.)	Total Sanitary Fixture Units
Basement Level			
Water closet w/ flush tank (public)	12 fixtures	4 FUs	48 FUs
Urinal (public, wall washout)	10 fixtures	1.5 FUs	15 FUs
Sink (domestic)	29 fixtures	1.5 FUs	43.5 FUs
Sink (washup)	6 fixtures	3 FUs	18 FUs
Shower drain (public, 1 head)	1 fixture	1.5 FUs	1.5 FUs
Sink (service or mop basin)	2 fixtures	3 FUs	6 FUs
Drinking fountain	3 fixtures	0.5 FUs	1.5 FUs
Main Floor Level			
Water closet w/ flush tank (public)	23 fixtures	4 FUs	92 FUs
Urinal (public, wall washout)	9 fixtures	1.5 FUs	13.5 FUs
Sink (domestic)	26 fixtures	1.5 FUs	39 FUs
Sink (washup)	2 fixtures	3 FUs	6 FUs
Shower drain (public, 1 head)	8 fixtures	1.5 FUs	12 FUs
Sink (service or mop basin)	4 fixtures	3 FUs	12 FUs
Drinking fountain	3 fixtures	0.5 FUs	1.5 FUs
Second Floor Level			
Water closet w/ flush tank (public)	2 fixtures	4 FUs	8 FUs
Sink (domestic)	5 fixtures	1.5 FUs	7.5 FUs
Sink (service or mop basin)	1 fixture	3 FUs	3 FUs
Drinking fountain	1 fixture	0.5 FUs	0.5 FUs
		Total =	328.5 FUs
		Total Flow =	418.6 L/min

Therefore the total calculated peak drainage rate is determined to be 418.6L/min.
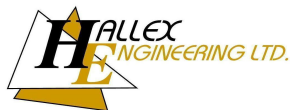
DOMESTIC WATER SUPPLY

Fixture	# of Plumbing Fixtures	Fixture Units (Table 7.6.3.2.A.)	Total Water Fixture Units
Basement Level			
Water closet w/ flush tank (public)	19 fixtures	5 FUs	95 FUs
Urinal (public, wall washout)	10 fixtures	4 FUs	40 FUs
Sink (domestic)	36 fixtures	2 FUs	72 FUs
Sink (washup)	5 fixtures	2 FUs	10 FUs
Shower drain (public, 1 head)	1 fixture	4 FUs	4 FUs
Sink (service or mop basin)	2 fixtures	3 FUs	6 FUs
Drinking fountain	4 fixtures	0.25 FUs	1 FUs
Main Floor Level			
Water closet w/ flush tank (public)	27 fixtures	5 FUs	135 FUs
Urinal (public, wall washout)	17 fixtures	4 FUs	68 FUs
Sink (domestic)	30 fixtures	2 FUs	60 FUs
Sink (washup)	6 fixtures	2 FUs	12 FUs
Shower drain (public, 1 head)	16 fixtures	4 FUs	64 FUs
Sink (service or mop basin)	4 fixtures	3 FUs	12 FUs
Drinking fountain	6 fixtures	0.25 FUs	1.5 FUs
Second Floor Level			
Water closet w/ flush tank (public)	2 fixtures	5 FUs	10 FUs
Sink (domestic)	5 fixtures	2 FUs	10 FUs
Sink (service or mop basin)	1 fixture	3 FUs	3 FUs
Drinking fountain	1 fixture	0.25 FUs	0.25 FUs
		Total =	603.8 FUs
		Total Flow =	584.4 L/min

Therefore the maximum domestic water demand is determined to be 584.4 L/min.

DOMESTIC WATER SUPPLY

Fixture	# of Plumbing Fixtures	Fixture Units (Table 7.6.3.2.A.)	Total Water Fixture Units
Basement Level			
Water closet w/ flush tank (public)	12 fixtures	5 FUs	60 FUs
Urinal (public, wall washout)	10 fixtures	4 FUs	40 FUs
Sink (domestic)	29 fixtures	2 FUs	58 FUs
Sink (washup)	6 fixtures	2 FUs	12 FUs
Shower drain (public, 1 head)	1 fixture	4 FUs	4 FUs
Sink (service or mop basin)	2 fixtures	3 FUs	6 FUs
Drinking fountain	3 fixtures	0.25 FUs	0.75 FUs
Main Floor Level			
Water closet w/ flush tank (public)	23 fixtures	5 FUs	115 FUs
Urinal (public, wall washout)	9 fixtures	4 FUs	36 FUs
Sink (domestic)	26 fixtures	2 FUs	52 FUs
Sink (washup)	2 fixtures	2 FUs	4 FUs
Shower drain (public, 1 head)	8 fixtures	4 FUs	32 FUs
Sink (service or mop basin)	4 fixtures	3 FUs	12 FUs
Drinking fountain	3 fixtures	0.25 FUs	0.75 FUs
Second Floor Level			
Water closet w/ flush tank (public)	2 fixtures	5 FUs	10 FUs
Sink (domestic)	5 fixtures	2 FUs	10 FUs
Sink (service or mop basin)	1 fixture	3 FUs	3 FUs
Drinking fountain	1 fixture	0.25 FUs	0.25 FUs
		Total =	455.8 FUs
		Total Flow =	497.1 L/min

Therefore the maximum domestic water demand is determined to be 497.1 L/min.

Required Minimum Water Supply Flow Rate for Fire Protection
(As required determined by the Office of the Fire Marshal Guideline - OFM-TG-03-1999)

Basement Area	2361.8 m²	1st Floor Area	5337.7 m²	2nd Floor Area	726.5 m²
Basement Height	4.9 m	1st Floor Height	4.9 m	2nd Floor Height	3.7 m
Basement Volume	11573 m³	1st Floor Volume	26155 m³	2nd Floor Volume	2688.1 m³

Total Building Volume   40416 m³

Water Supply Coefficient (K)   10 F3 Occupancy

Spatial Coefficient (S)   1

Total Minimum Water Supply 404156 L

The calculated Q is greater than 270,000 L therefore the required minimum water supply for fire protection is 9,000 L/min (as per Table 2 in the Office of the Fire Marshal Guideline).

FAR20 CALCULATIONS - $QR=QF*(HR^{0.54}/HF^{0.54})$

Static Pressure during Test=	89	psi
Residual Pressure during Test=	70	psi
Flow during Test QF=	1630	GPM
Pressure Drop to 20psi Residual Pressure HR=	69	psi
Pressure Drop Measured During Test HF=	19	psi
Calculated Flow at 20psi Residual Pressure QR=	3270.7	GPM
	206.3	L/sec

Required Minimum Water Supply Flow Rate for Fire Protection
(As required determined by the Office of the Fire Marshal Guideline - OFM-TG-03-1999)

Basement Area	2361.8 m^2	1st Floor Area	5265.9 m^2	2nd Floor Area	726.5 m^2
Basement Height	4.9 m	1st Floor Height	4.9 m	2nd Floor Height	3.7 m
Basement Volume	11573 m^3	Gym Area	1089.5	2nd Floor Volume	2688.1 m^3
		Gym Height	9.9		
		1st Floor Volume	36589 m^3		

Total Building Volume   50850 m^3

Water Supply Coefficient (K)   10 F3 Occupancy

Spatial Coefficient (S)   1

Total Minimum Water Supply 508498 L   The calculated Q is greater than 270,000 L therefore the required minimum water supply for fire protection is 9,000 L/min (as per Table 2 in the Office of the Fire Marshal Guideline).

FAR20 CALCULATIONS - QR=QF*(HR^0.54/HF^0.54)

Static Pressure during Test=	89	psi
Residual Pressure during Test=	70	psi
Flow during Test QF=	1630	GPM
Pressure Drop to 20psi Residual Pressure HR=	69	psi
Pressure Drop Measured During Test HF=	19	psi
Calculated Flow at 20psi Residual Pressure QR=	3270.7	GPM
	206.3	L/sec

Adequate Water Services - Required Fire Flow-RFF and Available Fire Flow-AFF – (PILOT VERSION-01)

Application Number :	SPA-23-019
Municipal Address :	350 Albright Road, Hamilton

Through staff report PW19096 - City of Hamilton Watermain Fire Flow Requirement Design Guidelines Policy on November 27th, 2019 Council adopted the new fire flow policy. This form is intended to guide applicants through the documentation requirements of this change. FUS calculations are no longer required for new submissions. This form is supplemental to related and supporting documentation/calculations.

1 - REQUIRED FIRE FLOW – RFF

1 a) Required Fire Flow-RFF a)

$Q = KVS_{Tot}$
Please provide required fire flow-RFF using the water supply flow rate method (OBC section A-3.2.5.7 ; OFM-TG-03-1999 FIRE PROTECTION WATER SUPPLY GUIDELINE FOR PART 3 IN THE ONTARIO BUILDING CODE - 6.3 Buildings Requiring On-Site Fire Protection Water Supply ; $Q = KVS_{Tot}$). This methodology shall be applied to all buildings falling under Part 3 and Part 9 of the Building Code (OBC sections 1.1.2.2 and 1.1.2.4). Detailed calculations shall be submitted as an appended memo.
Enter calculated value here (highest if multiple buildings) 150 _____ Litres / second
Comments :

1 b) Required Fire Flow-RFF b)

Target Table
Please select from **Table 1 : Target Available Fire Flow**

Table 1: Target Available Fire Flow

Land Use	Target AFF (L/s)
Commercial	150
Small ICI (<1,800 m^3)[1]	100
Industrial	250
Institutional	150
Residential Multi (greater than 3 units)	150
Residential Medium (3 or less units)	125
Residential Single	75
Residential Single (Dead End)	50

[1] 1800m^3 represents a maximum building volume that qualifies as "Small ICI"

Enter applicable value for Target Available Fire Flow (highest value if multiple Land Uses) here:

150 _____ Litres / second

Comments :

1 c) Required Fire Flow-RFF c)

Enter higher of a) or b) from above
Enter value here : 250 _____ Litres / second
Comments :

Application Number :	SPA-23-019
Municipal Address :	350 Albright Road, Hamilton

2 - AVAILABLE FIRE FLOW - AFF

2 a) Available Fire Flow-AFF a)

Field Hydrant Test calculated at 20 psi
Please provide available fire flow-AFF as determined through developer hydrant fire flow test or City Hydrant test database.
Enter value here :

<table>
<tr><td></td><td colspan="2">Enter value here :</td></tr>
<tr><td></td><td>206.3</td><td>Litres / second</td></tr>
<tr><td rowspan="2">Please check :</td><td>☑</td><td>Developer hydrant fire flow test, or <i>(as directed in FC or thereafter)</i></td></tr>
<tr><td>☐</td><td>City Hydrant test database</td></tr>
</table>

Comments :
Flow is based on FAR20 calculations shown in Exhibit #5

OR (as directed in FC or thereafter)

2 b) Available Fire Flow-AFF b)

Computer Modelling
Please provide available fire flow-AFF as determined through computer modelling.
☐ Modelling criteria and boundary conditions were approved by Hamilton Water

Enter value here :
_____ Litres / second

Comments :

DECLARATION OF ADEQUATE SERVICES

☐ RFF c) is less than or equal to AFF, or

☑ RFF c) is greater than AFF.

Prepared by : __J. Skinner_____

Date : ____April 14, 2023_____

FLOW TEST REPORT

Troy
Life & Fire Safety Ltd.

LOCATION: 350 ALBRIGHT ROAD, HAMILTON, ON

DATE OF FLOW TEST: APRIL 14th, 2023   TIME OF FLOW TEST: 9:00 AM

TEST BY: TROY LIFE & FIRE SAFETY   TEST CONDUCTED BY: DOUG ZIMMERMAN

WITNESSED BY: City Of HAMILTON

FLOW NOZZLE TYPE (IE HOSE MONSTER/PLAY PIPE):   HOSE MONSTER

WATER MAIN SIZE (IF AVAILABLE):

HYDRANT ELEVATION COMPARED TO BUILDING:

HYDRANT FLOW DATA:

STATIC PRESSURE: 89 PSI

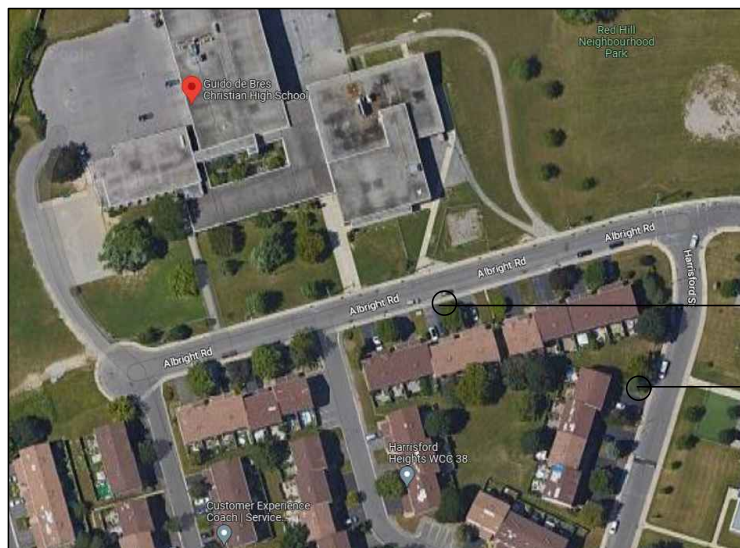|	1 x 1¾"	1 x 2½"	2 x 2½"
SIZE OF OPENING:	1 x 1¾"	1 x 2½"	2 x 2½"
DISCHARGE COEFFICIENT:	N/A	N/A	N/A
PITO READING:	70 PSI	40 PSI	27+20 PSI
FLOW USGPM:	745	1067	1630
RESIDUAL PRESSURE:	82 PSI	77 PSI	70 PSI

DRAWING OF SITE

FLOW HYD

STATIC/RES. HYD

WATER SUPPLY GRAPH

Data points on graph:
- 745 GPM @ 82 PSI
- 1067 GPM @ 77 PSI
- 1630 GPM @ 70 PSI

Y-axis: PRESSURE (PSI) — 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160

X-axis: FLOW (GPM)

											SCALE A
100	200	300	400	500	600	700	800	900	1000	1100	SCALE A
200	400	600	800	1000	1200	1400	1600	1800	2000	2200	SCALE B
400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	SCALE C