
ZIAD EL-BABA ENGINEERING

674 GAUTHIER
TECUMSEH ONTARIO
N8N3P8 CANADA
CELL -313-938-8767
CELL -519-796-9882

FUNCTIONAL SERVICING REPORT

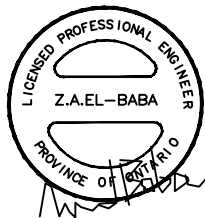
**1175 CABANA ROAD
WINDSOR ONTARIO**

DATE JULY 24 2024

DATE OCT 25 2024

DATE JULY.06.25

DATE DEC 20 2025



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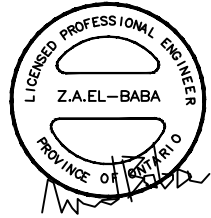
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1.1 PROJECT OVERVIEW

Two existing residences to be removed to make way for the new proposed development

A new three story residential building is proposed.

- first floor consists of 9 dwelling units . Five (5) one bedrooms and four (4) bachelors
- Second floor consists of 10 dwelling units . Six (6) one bedrooms and four (4) bachelors
- Third floor consists of 10 dwelling units . Six (6) one bedrooms and four (4) bachelors

the proposed building will be served with an elevator and two stair shafts, one each side
Along with activity room on the first (main) floor.

the new development with municipal services: sanitary sewers, storm sewers, water,
electricity and gas.

off street parking will be available for the proposed use.

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2.0 SANITARY SEWER

2.1 EXISTING CONDITIONS

The current use of the property consists of two separate residence. one is located at the south east corner of Cabana road West and Casgrain Dr with existing asphalt driveway of Casgrain Dr an serviced from and existing 250mm sanitary sewer. the other residence is fronting Cabana road with existing concrete driveway and serviced from an existing 250mm sanitary running east an west on Cabana road

2.2 CAPACITY OF EXISTING PUBLIC SANITARY SEWER

A new four story residential building is proposed.

- first floor consists of 9 dwelling units . Five (5) one bedrooms and four (4) bachelors
- Second floor consists of 10 dwelling units . six (6) one bedrooms and four (4) bachelors
- Third floor consists of 10 dwelling units . Six (6) one bedrooms and four (4) bachelors

RESIDENTIAL OCCUPANCIES

Based on min population OF 50 people per HECTARE
the existing 250 mm sanitary sewer serving the site runs from McGraw street east to

Longfellow street . down Casgrain Dr to Kennedy street.
the sanitary sewer service north and south bound of Cabana as well as both sides of Casgrain Dr, the area is estimated at 5. HEC(excluding the site) with a population of 50/HEC total estimated population is estimated at 265 people excluding the site proposal of four story residential building.

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CAPACITY OF EXISTING PUBLIC SANITARY SEWER - WINDSOR DEVELOPMENT MANUAL

City of Windsor
Development Manual

- d) The ultimate flow factor shall be taken from the following table:

Population	Ultimate Flow Factor
1,000	6.00
1,500	5.75
2,000	5.55
2,500	5.35
3,000	5.20
4,000	4.92
6,000	4.50
8,000	4.15
10,000	3.90
15,000	3.40
20,000	3.20

- e) Manning's Roughness Coefficient "n" factor (smooth walled sewer pipes only) shall be $n = 0.013$.

9.1.2 DESIGN CRITERIA

- a) The design criteria for sanitary sewers shall be as follows:
- Residential sewage flow 0.0042 Litre/second/capita
 - Infiltration 0.1560 Litre/second/hectare
 - Minimum velocity 0.75 metres per second
 - Maximum velocity 3.00 metres per second
- b) The ultimate flow shall be determined from the following formula:
- $$Q \text{ (Ultimate)} = \text{Residential Sewage Flow} \times \text{Ultimate Population Served} \times \text{Ultimate Flow Factor} + \text{Infiltration}$$

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ESTIMATED SANITARY DISCHARGE FROM PUBLIC USE

Q ULTIMATE = RESIDENTIAL SEWAGE FLOW xULTIMATE POPULATION

SERVED (less than 1000) x ULTIMATE FLOW FACTOR + INFILTRATION

Q ULTIMATE = .0042 x265x6.0X.156(L/S/HEC)X5.3 HEC = 5.52 L/S (X.03531) = .20 cfs

DISCHARGE FROM SITE

Q ULTIMATE = .0042 x16 (1 PERSON)x6.0 X.156(L/S/HEC)x.375 HEC = .063 L/S

Q ULTIMATE = .0042 x17x(2 PEOPLE)x6.0 X.156(L/S/HEC)x.375 HEC = .133 L/S

TOTAL FLOW = 3.45 +.063+.133=3.65 L/S

CAPACITY OF EXISTING 250 SEWER

592.80 Upper invert at intersection of Cabana and Casgrain Dr

591.88 lower invert at intersection of Casgrain and Kennedy streets

120m (396 ft) pipe length of existing 250mm sanitary sewer

.232% slope of pipe

$$\frac{(250\text{mm})^{8/3} \times \sqrt{.23\%}}{(320836 \times 0.013)} = 28.52 \text{ L/s} > 3.65 \text{ L/s}$$

PROPOSED SANITARY SEWER



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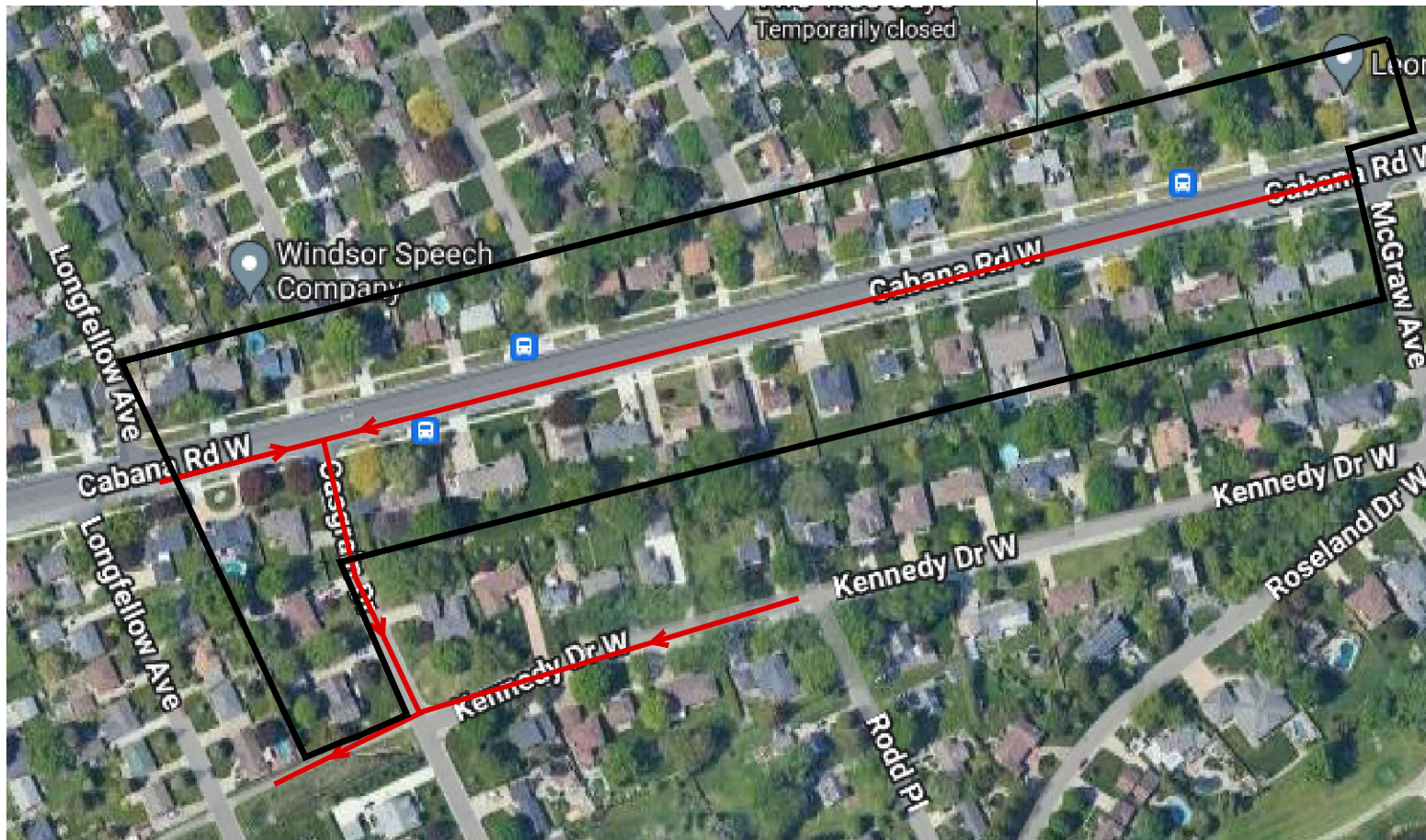
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AREA SERVICED BY
THE EXISTING 250mm (10")
PUBLIC SANITARY SEWER



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3.3 STORM WATER SUMMARY

- UNDER 5 YEAR DESIGN THE REQUIRED STORM WATER STORAGE IS 26.91 M³ (950 CU FT) WILL BE STORED IN THE NEW UNDERGROUND 1200mm DIA (48" DIA) PIPES
- THE DIFFERENCE FROM THE 100 YEAR AND THE 5 YEAR STORM EVENTS WILL BE STORED ON THE SURFACE FOR THE ADDITIONAL OF 39.30 M³ (1,388 CU FT)
- NEW 48" DIA OIL/WATER SEPARATOR WILL BE PROVIDED
- STORM WATER DESIGN IN REFERENCE WITH WINDSOR/ESSEX STORM MANAGEMENT STANDARDS MANUAL FOR DESIGN STANDARDS

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3.0 STORM WATER ANALYSIS

1.1 PRE AND POST DEVELOPMENT

STORM WATER CALCULATIONS: SITE AT BUILDING

TOTAL SITE FOR THE DESIGN : 40,252 SF = 3,739 M² = .374 HEC

PRE-DEVELOPMENT CONDITIONS

- 1) ASPHALT/CONC PAVING: 3,258 SF = 303 SQ. M. C=.95
- 2) GRASS AREA = 32,634 SF = 3,032 SQ. M C = .2
- 3) BUILDING = 4,360 SF = 405 SQ. M C = .90

$$C(EX)_{avg} = \frac{303 \times .95 + .20 \times 3032 + .90 \times 405}{3739} = .34$$

T=20 MIN EXISTING BASED ON STORAGE 5 YR STORM.

Q = 2.78 C I A = L/S (RATIONAL METHOD)

$$Q (PRE) = 2.78 \times .34 \times 75.4 \times .374 = 26.65 \text{ L/S} = .027 \text{ M}^3/\text{S}$$

POST DEVELOPMENT - CONDITIONS

- 1) ASPHALT/CONC PAVING: 13,572 SF = 1,261 SQ. M. C=.95
- 2) GRASS AREA = 16,680 SF = 1,540 SQ. M C =.20
- 3) BUILDING = 10,000 SF = 929 SQ M C = .90

$$C(N)_{avg} = \frac{1261 \times .95 + 1540 \times .20 + 929 \times .90}{3,739} = .63$$

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5 YEAR STORM – STORAGE VOLUME STORAGE

TOTAL SITE FOR THE DESIGN : 40,252 SF = 3,739 M² = .374 HEC $I = \frac{1259}{(T_c + 8.8)^{.838}} = \text{mm/HR}$

Q PRE RELEASE RATE : 26.65 L/S = .027 M³/S $V_p = \text{VOLUME RUN OFF}$
 $V_r = \text{VOLUME RELEASED}$

C RUNOFF COEFFICIENT = .63

TIME		$\frac{2.78(C I A)}{1000}$	V_p xTx60	V_r .027xTx60	$V_p - V_r$ M ³
MIN	INTENSITY	PEAK FLOW M ³ /S	RUN-OFF VOLUME	VOLUME RELEASED	STORAGE
5	139.5	.090	27.00	8.1	18.9
10	108.5	.070	42.45	16.2	26.25
15	88.4	.058	52.20	24.3	27.90
20	75.4	.049	59.30	32.4	26.91
25	65.9	.043	65.00	40.5	24.50
30	58.7	.039	69.78	48.6	21.18
35	53	.032		56.7	
40	48			64.8	
45	44.6			72.9	
50	41.4				
55	38.7				
60	36.30				

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100 YEAR STORM – STORAGE VOLUME STORAGE

$$\text{TOTAL SITE FOR THE DESIGN : } 40,252 \text{ SF} = 3,739 \text{ M}^2 = .374 \text{ HEC} \quad I = \frac{2375}{(T_c + 11)^{.861}}$$

$$Q \text{ PRE RELEASE RATE : } 26.65 \text{ L/S} = .027 \text{ M}^3/\text{S}$$

V_p = VOLUME RUN OFF
 V_r = VOLUME RELEASED

$$C \text{ RUNOFF COEFFICIENT} = .63$$

TIME		$\frac{2.78(C I A)}{1000}$	V_p $\times T \times 60$	V_r $.027 \times T \times 60$	$V_p - V_r$ M3
MIN	INTENSITY	PEAK FLOW L/S	RUN-OFF VOLUME	VOLUME RELEASED	STORAGE M3
5	218.3	.142	42.74	8.1	34.64
10	172.70	.112	67.45	16.2	51.26
15	143.90	.095	85.50	24.3	61.20
20	123.50	.081	97.11	32.4	64.72
25	108.60	.071	106.71	40.5	66.21
30	96.90	.063	113.40	48.6	64.80
35	87.96	.057	120.09	56.7	63.39
40	80.44	.0527	126.54	64.8	61.74
45	74.22				
50					
55					
60					

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3.2 STORM WATER DETENTION

REQUIRED 5 YEAR STORAGE : 26.91 M3 950 FT3

REQUIRED 100 YEAR STORAGE : 66.21 M3 2,338 FT3

REQUIRED UNDERGROUND STORAGE = 26.91 M3 = 950 FT3, 5YR STORM

SURFACE STORAGE = 100 YEAR STORAGE LESS 5 YEAR STORAGE

SURFACE STORAGE = 66.21 - 26.91 = 39.30 M3 = 1,388 FT3 MAX

5 YEAR STORAGE PROVIDED

REQUIRED UNDERGROUND STORAGE = 26.91 M3 = 950 FT3, 5YR STORM

STORAGE PROVIDED

AREA OF 1200 mm PIPE (48") = .356 m²

VOLUME STORED IN 1200 mm PIPE (48") = $24.5\text{m}(80') \times 1.16 \text{ m}^2 = 28.42 \text{ m}^3 > 26.91 \text{ m}^3$

VOLUME STORED IN 900 mm PIPE (36") = $43.3\text{m}(142') \times .656 \text{ m}^2 = 28.40 \text{ m}^3 > 26.91 \text{ m}^3$

PROVIDE 25m (82 FT) OF 1200mm DIA PIPE(4'-0" DIA)

100 YEAR STORAGE PROVIDED

REQUIRED SURFACE STORAGE = 41.21 M3 = 1,455 FT3

STORAGE PROVIDED

SURFACE STORAGE PROVIDED

$V = \text{AREA} \times \text{DEPTH} / 3$ (CONICAL)

$V = 250 \text{ M}^2 (2700 \text{ SF}) \times .20 \text{ mm} (.67") / 3$ (3 AREAS) = 50 m³ > 41.21 M3

Q (PRE) = .0033 M3/S

AREA: ORIFICE= $\frac{Q_{\text{exe}}}{.62 \sqrt{2gh}}$

AREA: ORIFICE= $\frac{.027}{.62 \sqrt{2 \times 9.81 \times 1 + / -}} = .0091 \text{ M}^2$, A= 0.099 FT² D= 4.3 IN MIN

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4.0 WATERMAIN ANALYSIS

4.1 Existing Conditions

— the consists of separate parcels each has an existing residents. one at the corner of Casgrain Drive and Cabana Road W and is serviced by a 25mm water line. the second parcel facing Cabana and is serviced by 25mm waterline from the existing 200 mm watermain

4.2 Proposed development

— There will be a proposal for two separate water lines which will tie into the existing 200mm watermain on Casgrain Dr to provide 50mm domestic water line and a minimum of 100 mm fire water to the proposed four story residential building

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5.0 ADDITIONAL UTILITIES

5.1 Gas line

and existing gasmain is available in the east shoulder of Casgrain at the side of the property. and a 100mm gasmain of the south shoulder of Cabana Road at the northern property of the site in the right o way . the east parcel is serviced from the 100mm gasmain .

5.2 Cable

the site is serviced with overhead cable along the south property line from Casgrain Drive running east along the entire south property line.

5.3 Hydro (Enwin)

the site is serviced with overhead hydro along the south property line from Casgrain Drive running east along the entire south property line.

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5.0 ADDITIONAL UTILITIES

6.1 Existing conditions

Both properties facing Cabana Road W is already serviced with Windsor Bus System there is an existing bus stop at the center of the subject site the existing bus stop is serviced with a seating bench, garbage bin all over a large concrete pad

6.2 proposed conditions

The existing bus stop at the center of the site facing Cabana Road will remain a proposed pedestrian safety is proposed on the east of the proposed building to be connected to the existing public concrete sidewalk at the north property of the subject property in the right of way of Cabana road W

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PROPOSED
PEDESTRIAN
PATH
TO EXISTING PUBLIC
SIDEWALK ON
CABANA ROAD

SITE

